HOW DISTRIBUTED INTELLIGENCE DEMONSTRATES VALUE

▷ **COUNTRY: USA**

▷ **AREA: FLORIDA**

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More than ever, operating a modern grid with increasing penetration of variable decentralised generation and complex power flows requires visibility from the edge up to the control room. As the number of connected devices increases, from smart appliances and distributed generation in the home to sensors and gateways in substations and the network, distributed intelligence opens the way for more rapid awareness and insights by moving processes away from the central control room to distributing them across the grid.

When central Florida utility Tampa Electric Company embarked on the upgrade of its 810 000 meters with smart meters, the opportunity presented itself to investigate the potential for distributed intelligence (DI) in the meters to provide customer and grid operation benefits.

To explore this innovation and validate the decision to implement distributed intelligence applications, Tampa Electric, in partnership with Itron, opted for a leading analytics company to test the performance against back-office cloud analytics to determine which option would deliver the maximum value in terms of detecting conditions more effectively.

Tampa Electric expected that moving the analytics to the meter with access to one-second data and peer-to-peer communications would deliver greater accuracy in finding conditions and result in a higher yield and fewer inference and wasted resources.

With faster decision-making based on more valuable information –

assuming the value of data degrades with latency – a significant drop in the total cost of ownership could result through less data backhaul, storage and analysis in the back-office.

Tampa Electric selected three applications (apps) for testing in the lab over one month: meter bypass theft detection; residential neutral fault detection; and high impedance detection.

Among the results, the meter bypass theft detection DI app identified all ten use cases; how whereas, while the back-

office analytics identified all the use cases as well, it also produced seven false positives.

The residential neutral fault detection DI app identified six use cases, but the back-office analytics identified zero use cases as the attributes required to identify broken neutrals are not present in the data available in the back-office.

Similarly, the high impedance detection DI app also identified all the five use cases, but again the back-office analytics identified zero use cases as the attributes required to identify broken neutrals are not present in the back-office data.

"These results demonstrated that Tampa Electric's predictions were correct in that the access of distributed intelligence to real-time data provided actionable information and the ability to tackle problems from

an entirely different perspective," says David Lukcic, Director of AMI Strategic Solutions at Tampa Electric.

"In addition, distributed intelligence has enabled the discovery of events with safety and customer impact issues that are otherwise undetectable by back-office analytics, and highlighted the potential money savings in investigating false positives."

NEXT STEPS

With Tampa Electric's smart meter rollout now largely complete, some features have become effective immediately. Among these are the more convenient starting and stopping of electricity services, increased privacy with secure meter read data transmission and minimisation of estimated bills.

Further benefits that are being planned include the provision of alerts and other information for consumers to control their electricity use and potentially more payment options.

Tampa Electric is also in the process of deploying the distributed intelligence apps in the field, and these can be uploaded to the smart meters in the same way as apps are to smartphones.

Tampa Electric and Itron have jointly conducted the first real-world, large scale pilot project to demonstrate that Itron's Distributed Intelligence (DI) applications can be deployed at scale and deliver their intended outcomes in a real-world, production environment.

Tampa Electric was aiming for full-scale deployment of the three distributed intelligence apps by the end of 2021. In 2022, the company plans to work toward a second bundle of apps to include location awareness, electric vehicle and photovoltaic (PV) detection.

Lukcic explains that Tampa Electric's interest in distributed intelligence emerged as part of its broader digital transformation around the automation of data and services. The company is well on its way to maximising the benefits of earlier AMI investments and was looking for ways to further improve service delivery and to provide additional revenue opportunities in a decentralising system.

"We're one of the first utilities in the country that's teaming up with technology companies to test and develop apps that can help detect failing equipment before an outage occurs, detect tampering with meters and more," comments Lukcic.

In a survey with Zpryme, almost three-quarters of respondents reported that grid edge technology is critical to their utility's future. Outage identification and management, a key use case outcome of distributed intelligence, was identified as the number one plan for managing and creating customer value in the grid. ∎

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