SMART GRID INTEROPERABILITY: THE GREAT ENABLER
CORRESPONDING PAIN POINT: HOW TO MAKE GRID TECHNOLOGY UPGRADES FUTURE-FRIENDLY

SIMPLIFY THE UTILITY JOURNEY
When the journey is long, the landscape tends to change in meaningful ways. Whether dealing with system upgrades or regulatory game changers, the utility journey has faced many twists and turns, with increasing urgency. So how do utilities move successfully into the next stage? The short answer is through system interoperability. Until now, the journey has been a true balancing act, especially considering weather-related system shocks, new sources of distributed energy that must be integrated, evolving regulations, and demands for enhanced security and reliability. But the next phase of the journey must be as future-friendly as possible, and the concept of system interoperability is integral to the future.

WHAT CAN INTEROPERABILITY DO FOR YOU?
Interoperability is the ability for grid components to speak the same language through common protocols and APIs. New systems must be interoperable with one another and must also communicate with the legacy systems that have served as the backbone of operations for decades. A survey of smart grid project managers by the Joint Research Centre Institute for Energy and Transport reveals that the lack of interoperability between grid components is the number one obstacle to smart grid projects—
even more so than the technical feasibility of projects. However, the stakes are high: according to the Electric Power Research Institute, the potential economic benefits of a fully deployed smart grid would be in the range of $1.3 to $2 trillion.

One major hurdle faced by utilities is that standards tend to change quickly. Also, the standards established by the National Institute of Standards and Technology are not always adopted by the Federal Energy Regulatory Commission, the primary energy regulatory body in the United States. Moreover, even if these standards are adopted, they’re not always enforceable.

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When standards are both uncertain and unenforceable, the entire ecosystem has less incentive to invest in grid changes and make costly capital expenditures. No wonder industry leaders at a recent Edison Foundation conference emphasized “regulation” of the future, even more than the concept of the “utility of the future/utility 2.0” – all the more reason to address interoperability with a flexible toolkit. The benefits of doing so include reducing stranded assets in the installed base and building a bridge between advanced metering infrastructure and outage management systems to more accurately delivery outage and restoration status. Even the most advanced distribution management system can't live up to its potential if it can't communicate with entrenched operational technology.

Grid interoperability can seem like a moving target but is a strong enabler for everything else. The pragmatic approach is for utilities to plan and assess for interoperability based on their current systems, to choose the most future-friendly platforms, and to build coalitions of vendors for future growth.

PLAN AND ASSESS

Jeff McCullough, VP of System Design and Development at Elster, describes the process of factoring interoperability into a company’s plans. “When looking at new system solutions to upgrade existing infrastructure, some of the primary attributes to assess are the network management capabilities, ability to transition, and support for existing and evolving technology,” says McCullough. “To enable this need, it will be imperative that the end devices -- both communications as well as device operating systems -- can be remotely upgraded securely over the air. This capability will not only help future proof your investment, but also reduce the OpEx.”

Lay a strong foundation for interoperability, and future changes can be addressed more easily. This also cuts down on the need to try to predict exactly which components and applications will be needed and when. Adds McCullough, “Nobody can predict what the future will require, but with remotely upgradeable and configurable devices, new applications can be created and downloaded to the device level of the solution to meet these needs. This enables utilities to continually leverage their investments to obtain the maximum return.”

In instances where a utility plans to take the implementation in phases, possibly to reduce CapEx, an interoperable solution is key. For example, a utility may initially implement a walk-by/drive-by smart meter solution, but with future plans to migrate to a fixed network offering. When the transition time comes, an interoperable offering will enable an easy switch from the mobile
system to a fixed network system, according to McCullough.

Planning and assessing means understanding that core systems should be upgraded in concert with one another. It also means that those systems (AMS, OMS, DMS, etc.) will need to be agile enough to smoothly provide future analytics and reporting data so utilities can quickly meet user needs and take corrective action when necessary.

CHOOSE A FLEXIBLE SOLUTION

The future tends to be friendlier when you keep the past close in mind. With the advent of more open protocols, legacy and core systems can easily be integrated into the big picture. Preeminent energy evangelist Daniel Yergin once said, “Combining three or four dozen different technologies for a smart grid system is far more difficult and time consuming than coming up with a new iPhone app.” But combining systems becomes more seamless when open protocols are involved.

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“With Elster’s Connexo platform, we have a single offering which is designed to provide integrated solutions for the smart grid,” says McCullough, referencing the company’s recently introduced interoperable smart grid software suite. “For large IOUs, the need is to provide the ability to integrate with enterprise systems. For smaller utilities that don’t have many of the enterprise systems an IOU may have, Connexo provides integrated options such as outage management, transformer monitoring, theft detection, and so on, meeting many of the small utilities’ operational needs.”

So much of what makes a smart grid software platform effective today is the use of standards-based application program interfaces (APIs). Standards-based APIs unite applications and components together more successfully than proprietary APIs. This applies both at the broader application and more specific device level.

“Standards-based APIs reduce costs,” says McCullough. “With proprietary interfaces, interoperability is greatly reduced without added expenses. The use of standards-based protocols enables the ability to support and manage the multitude of technology and devices required across the smart grid, providing increased interoperability and reduced operational cost.”

Flexible APIs take into account where a utility has been and where it’s going. IPv6 technology is very much an example of that. While the standard may not be used extensively yet, its importance is growing. According to McCullough, IPv6 is the type of future-proof communications that utilities will need. “The communication will change and morph over time, switching from existing mesh technology to standardization of IPv6 mesh technology. IPv6 has been requested in some markets, and its coming. Right now, the existing backhaul does not support IPv6. Given the limitations of existing public and private networks to support IPv6 over IPv4, the Elster solution utilizes standards based protocols to enable our solution to provide end-to-end IPv6 utilizing a standards-based IPv4 tunnel routing through backhauls. This is how the use of standards enables true system flexibility and interoperability.”

BUILD A COALITION:

Utilities can also build technology and regulatory coalitions with the very vendors that supply the grid. In contrast to state-mandated grid
modernization plans, these types of coalitions are highly flexible in their choice of the most relevant technology for interoperability. They also highlight the fact that regulators don’t always emphasize the same technology as utilities. In 2014, Massachusetts-based utilities argued against a state-mandated proposal for a ten-year grid modernization plan because they felt it reduced the overall flexibility of their technology upgrades.

The coalition approach, exemplified by Duke Energy’s “Coalition of the Willing,” focuses on true interoperability. With 25 coalition partners, focusing on all aspects from communication to grid control, the goal is to standardize the way grid technologies integrate. In the way that Android and iOS have opened up the world’s smartphones, Duke’s approach is to get participating vendors to open up their own systems. Other utilities can adopt this approach or at least benefit from participating in conversations around protocol standardization with their vendors. Elster is a participant in Duke’s coalition and believes that such standardization is important for justifying future utility investments.

“It’s about innovation. The collaboration with utilities not only helps to better understand what they are trying to achieve, but also enables discussion to generate new ideas to meet their business needs,” says McCullough. “One good example is applying the technology for distribution automation -- how to use communication management to monitor transformers and perform outage management, which spreads across residential and distribution, linking the two together to increase the intelligence obtained from the network. That’s what we like to talk to utilities, and Duke about.”

The more closely utilities work with their vendors the better the chances that interoperability can work as a cohesive strategy through the entire system.

CONCLUSION

Grid changes are coming, and a growing number of vendors will participate in the process and add further innovations. Interoperability will serve as the prime enabler of these changes. Utilities will be able to serve their constituents well only if they choose an upgrade path based on a common platform for change and find solutions that accommodate upgrades across the whole spectrum of the grid.