White Paper

Smart Grid Network Platforms:
What Utilities Should Look for in Their Solution

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Is your platform robust enough to withstand the challenges of today and tomorrow?

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Smart Grid Network Platforms: What Utilities Should Look for in Their Solution

For utilities, evaluating smart grid solutions is a task that is almost always fraught with uncertainty. The sheer number of options available, as well as their cost and complexity, make it difficult to choose with confidence. Yet no decision likely looms larger in the minds of utility executives than selecting a smart grid network platform. The technology chosen will largely determine what the utility can do with its smart grid and how long it will deliver results. Add to this a price tag of hundreds of thousands of dollars, and it is clear — there is a lot on the line.

Only when utilities evaluate network platforms carefully do they minimize performance issues down the road. Should problems arise, the consequences can be significant:

- Additional systems may need to be purchased because the platform is not robust enough to deliver all the desired functionality
- Implementation problems and setbacks can prevent the utility from realizing the benefits of smart grid applications, while negatively impacting customer service
- New and emerging smart grid applications cannot be leveraged due to insufficient flexibility and scalability
- An entirely new platform may need to be purchased and installed because the originally selected system did not perform as desired

To prevent problems like these, utilities must vet network platforms meticulously and consider the use cases that must be addressed today — and those still on the horizon.

What to Look for in a Network Platform

Most utilities will derive the greatest value from a robust solution that addresses a wide variety of use cases, including everything from high data volume and message prioritization to command and control functionality.

Robust systems help to lower total cost of ownership by lasting longer and requiring fewer supplementary systems; by being able to grow and change with the needs of the utility; and by benefiting multiple disciplines and departments, which enables funding to be shared by a variety of budget owners. If implemented properly, robust network platforms can even replace redundant IT systems and eliminate duplication. To find a smart grid network platform that is suitably robust and right for the unique needs of the operation, utility executives should look for four key attributes.

High Degree of Scalability

Smart grids are, in essence, large sensor networks that generate massive amounts of data. Transmitting this data without overloading the system is one of the principal jobs of a network platform. For most utilities, much of this traffic is interval data produced by advanced metering infrastructure. However, as more and more operations look to implement distribution automation and demand response programs, they will need platforms with more headroom — in processing capacity, data speeds and executable memory.

Without this type of scalability, the platform will not be able to accommodate the additional network traffic volumes from command and control messages, load profile data, or some yet-to-be-developed smart grid application.

Of course, building true scalability into a network platform requires thoughtful architecture. There must be a balance between “push” and “pull” traffic based on need and priority. This can be achieved through a combination of factors, including: randomization of the data stream; an efficient routing algorithm; message prioritization to differentiate distribution grid automation and advanced metering traffic; and message consolidation, which can reduce the number of simultaneous messages during high-traffic periods, such as a mass outage.

Robust Network Platforms Cost Less to Own

- Last longer
- Require fewer supplementary systems
- Can grow and change over time
- Deliver benefits to and draw funding from multiple disciplines/departments

by Tim Weidenbach and Lizardo Hernandez

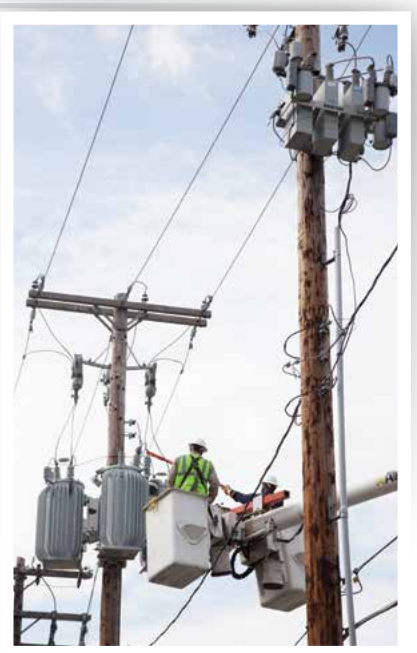
Another important factor is network design, or the physical layout of hardware and components. Network design that is done efficiently ensures that the quantity of network infrastructure meets a utility's performance requirements (often specified by service level agreements or SLAs) without cost overruns.

Ultimately, when evaluating solutions, utility executives must go beyond simply asking whether a network platform is scalable. Instead, they should challenge the solution provider to demonstrate how they have built scalability into their system's architecture.

Substantial Flexibility

When it comes to network platforms, few — if any — utilities have identical requirements. So, solution flexibility becomes incredibly important: It ensures that a chosen platform can be tailored to an individual utility's needs.

Flexible network platforms typically offer several options for communications media, such as RF mesh, cellular and power line carrier. This is particularly important for utilities that serve customers in a mix of urban, suburban and rural geographies. Because certain media are better suited to certain types of geographies, a platform that allows for a customized blend of communications options is the most desirable.



To ensure that a platform is "future proof", utilities should look for solutions that offer a clear migration path. This helps prevent stranded assets and gives utilities peace of mind — they know their next investment will enhance, not detract from, their solution's overall value.

Utilities whose use cases include distribution grid automation will also need a highly flexible platform structure. In this sense, flexibility is closely related to scalability. While scalability ensures the ability to handle vast quantities of data, flexibility allows the system to accommodate different types of data and network traffic. In the case of grid automation, that means a combination of low-latency (command and control) and relaxed-latency (interval read and non-critical control) data, as well as network traffic.

Today, many leading systems use a fixed-path network structure for all data, regardless of type. To prevent overload and ensure that low-latency messages receive priority, system traffic must be continuously monitored. Considering the labor and time involved, this is an expensive proposition. However, by using a combination of data stream randomization and peer-to-peer networks, greater balance and efficiency can be achieved. Introducing a certain amount of randomization lets the system use its own logic to relay relaxed-latency data, while ensuring that high-priority, low-latency data is able to take the fastest route.

Utilities that want a tailored solution, as well as the ability to accommodate low- and relaxed-latency data, should insist on flexibility.

Future-Proof Design

One of the biggest challenges for smart grid network platforms is the fluid nature of the electric distribution grid itself. Functionality is never implemented at a "moment in time"; rather, it is constantly evolving. Utilities that want to avoid obsolescence and be ready for emerging applications need network platforms that can evolve with them.

To ensure that a platform is "future proof," utilities should look for solutions that offer a clear migration path. Providers should be able to demonstrate that system components will work interchangeably — even across previous and future hardware and software releases. This helps prevent stranded assets and gives utilities the peace of mind of knowing their next investment will enhance, not detract from, their solution's overall value.

Another important consideration is interoperability. Utilities should look for platforms that are built to currently accepted and emerging global standards. Not only do standards represent an expert consensus on best practices within a particular industry, they are often designed to integrate with other industries' standards as well. So, by adhering to standards, network platform vendors ensure the longevity of their solutions, plus their compatibility with a host of complementary tools.

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In terms of current network platform technologies, utilities will want to verify compliance with the full Internet Protocol Version 6 (IPv6) standards and the IEEE (Institute of Electrical and Electronics Engineers) 802.15.4g radio standard for the communications layer.

While there is no single network platform that is completely future proof, choosing one with a clear migration path, based on accepted standards will ensure it remains relevant, longer.

Proven Provider Expertise

As anyone in the smart grid industry knows, there is an enormous difference between making promises and fulfilling them. So when utilities are evaluating network platforms, they must consider not only the solution, but the track record of the vendor behind it.

Providers with a history of success in complex, large-scale implementations are a definite plus. They have likely encountered the most common challenges already, and have fine-tuned their process accordingly. In addition, they are already accustomed to meeting deadlines and delivering on SLAs.

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Still, utility executives would do well to thoroughly investigate any provider on their short list — talking to current and previous customers about the efficiency of the deployment, the responsiveness of key team members, and whether the platform is performing to expectations. Due diligence in the consideration stage could prevent costly errors down the line.

Gridstream® — A Network Platform That Meets Any Need

Despite claims to the contrary, there is only one platform on the market today that is truly robust and comprehensive. While many offer interesting features, and some even excel in multiple categories, only Gridstream from Landis+Gyr delivers all the critical qualities — scalability, flexibility and future readiness, backed by the expertise of an industry leader.

With its latest platform release, Gridstream is able to unlock even greater value for utilities and their customers by:

- Supporting continuously increasing data traffic needs with some of the fastest transmission speeds available — up to 300 kbps
- Enabling efficient management of the standards stack while supporting simultaneous applications with a best-in-class ARM 9 processor
- Allowing ample room for managing firmware, application installations and upgrades with 16 MB of executable memory at the endpoint
- Eliminating stranded assets by ensuring compatibility with currently deployed Landis+Gyr hardware and software

Plus, Gridstream platforms enable ease of integration with other utility systems, as well as meter data management systems, home area networking, and more.

In addition, Gridstream solutions can be built to address an immediate need or use case, while supporting comprehensive smart grid functionality well into the future.

Success Depends on the Right Network Platform

Utility executives are best served by engaging in an intensive screening process in which prospective solutions are evaluated against four key criteria:

- Scalability – the ability of the network platform to efficiently handle vast quantities of data — the amount transmitted today, as well as what is on the horizon
- Flexibility – the ability of the solution to accommodate various types of data and communication media
- Future-Proof Design – the ability of the solution to not only evolve as new applications become available, but also to provide a clear migration path for the utility
- Provider Expertise – the record of the vendor offering the network platform — including proven success in deployment, performance and solution lifespan

Plus, Gridstream platforms enable ease By looking for these critical attributes, utilities will go a long way to ensuring that their chosen network platform delivers maximum value and optimal management for both their advanced metering and distribution grid management needs.

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