White Paper

Ensuring AMI Scalability:
5 dos and don'ts

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Is your utility ready for tomorrow's advanced smart grid applications?

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Ensuring AMI Scalability: 5 dos and don'ts

With the right advanced metering infrastructure (AMI), utilities can collect huge amounts of data from an array of devices — for example, 15-minute (or even 5-minute) interval data from over a million meters, 365 days a year. Yet, most utilities have just scratched the surface when it comes to leveraging the rich information available for collection from their meters and other sensing devices. These sensors can offer much more than billing data; power quality information, for instance, can be used to monitor grid health and improve energy delivery.

Utilities are well aware of this potential, even if they are years away from harnessing it. But few are factoring these long-term objectives into their current AMI decisions, resulting in far-reaching consequences.

Looking to the future

Advanced smart grid applications like distribution automation and demand response require significant scalability — in processing speed, network bandwidth, storage capacity and executable memory. Of particular importance is two-way throughput: The AMI system must be able to scale up to handle a high volume of simultaneous transactions without interfering with interval data transmission. But adding headroom after an AMI deployment is difficult; it must be built into the system from the start. Only then can utilities be confident of their ability to handle real-time event tracking and response, greater network traffic and complex data processing.

The key to ensuring scalability is careful planning and vetting of systems and vendors. Asking the right questions upfront will prevent complex challenges in the future.

5 Scalability Dos and Don'ts

Following are five dos and don'ts to consider when evaluating AMI systems and vendors if you want to ensure scalability well into the future.

1 DON'T THINK ABOUT SCALABILITY IN "PARTS AND PIECES"

Often, decision makers at utilities are swayed by vendors who tout the impressive capabilities of each separate component of their solution. In those cases, they fail to realize that the entire system must be able to perform at corresponding levels. Otherwise, the capabilities — speed, bandwidth, capacity — of each component will never be fully realized.

For true scalability to be achieved, component systems and devices must work in lockstep at all levels, including the sensor or device level, back-office platform, and application layer. An AMI system is only as scalable as its "weakest link," or the least scalable part of the system. If it is weak in one area, the whole system will be limited.

For optimum scalability at every level, it is important to shift thinking and consider the scalability of the AMI system as a whole. Think in terms of a total system requirement — not just a network or endpoints.

by Tim Weidenbach and Lisa Washburn

2 DON'T WEAR "DATA BINDERS"

Many utilities focus on "data at rest" — or data gathered at predetermined intervals and stored for later billing or analytics use. Often, this type of thinking is demonstrated in RFP questions that focus on the wrong metrics. For example, many utilities ask how many endpoints a vendor can communicate with per day. A more all-encompassing question would be: How quickly and accurately can your system deliver and process a certain volume of messages?

The latter question exposes the system's ability to handle "data in motion" — dynamic information that must move through the grid and be acted upon in real time. This becomes critical when managing daily service orders, as well as demand response and load control commands. To realize value from data in motion, utilities must be able to make real-time decisions on the grid as events occur. Without headroom in twoprocessing throughput, this level of smart grid management is impossible.

Even if you are not yet ready for advanced applications such as grid optimization, load management or demand response, thinking holistically about your data and throughput will lay the right foundation for the future.

3 DO CONSIDER FUTURE USE CASES

Too often, utilities do not look beyond immediate needs when choosing an AMI solution. As a result, the selected system does not provide appropriate levels of growth potential.

It's therefore important to create endto-end use cases. This allows you to demonstrate how the system would meet current needs, as well as future objectives. The key is to work it through the entire system, including enterprise integration and how data will be made accessible to all in a scalable fashion.

Only with an understanding of future demands can you develop a longer-term roadmap, align decision makers with that vision, and ensure that the AMI solution offers sufficient scalability.

Scalability Must-Haves

To be ready for advanced smart grid applications, AMI systems require:

- Sustainable capacity two-way processing throughput
- Extra margin in storage capacity
- Ability to support faster data speeds
- Headroom in executable memory
- More thoughtful overall architecture

4 DON'T UNDERESTIMATE SECURITY NEEDS

To properly implement comprehensive grid management solutions, regulatory bodies have prescribed prudent security measures to ensure the safe implementation of automation. When estimating their data requirements, utilities often neglect to consider whether the system will be able to maintain scalability when these additional security requirements are in place.

Utilities must factor in the system requirements needed to comply with security regulations. Encrypting data, for example, may put additional demands on the AMI network. Utilities must consider the effect that security requirements may have on system variables such as throughput and memory.

Sample Case Use

When evaluating a vendor's AMI solution, Landis+Gyr recommends approaching the appraisal from a use-case perspective. Following are some parameters and requirements included in a sample use case around demand response that Landis+Gyr met for a utility:

Parameters and requirements for a demand response event, include:

- Limited to no advance notice of a circumstance requiring a demand response action
- Event affecting up to 40% of the utility meter population
- Scalability up to 4 million endpoints in order to establish the upper limits of system requirements
- 15-minute rolling window, to ensure distribution system stabilization
- Execution over one hour (with 15-minute rolling sub-intervals)
- Execution at the device level within 5 minutes of request
- Delivery notification/acknowledgment provided within 10 minutes of request

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5 DO EVALUATE VENDOR EXPERIENCE

In vetting smart grid vendors, utilities rarely ask questions designed to determine the vendor's ability to support their future needs. At the same time, many vendors only speak theoretically about their solution's scalability. Why? Because they often have not undergone field testing or proven scalability of their solution on a sufficiently large scale.

Demanding answers and documentation from vendors standing behind the scalability of their solutions, including the request for reference accounts, will reduce risk.

One critical area to explore is system architecture. Ask potential vendors about the strategy they employed in designing their system. Find out what platform the core architecture is built on, and whether the vendor is leveraging everything the platform has to offer to make it scalable.

Gridstream® — Built-In Scalability

When evaluating AMI system solutions, utility executives must seek answers beyond whether a network platform is scalable. Challenging the vendor to demonstrate how scalability is built into their system architecture will provide the critical details necessary to maximize your investment and ensure future scalability.

Currently, Landis+Gyr offers the only platform in the smart grid marketplace with the scalability that today's utilities need to meet future needs. Only Gridstream enables enterprise-grade scalability, backed by the expertise of an industry leader.

Gridstream from Landis+Gyr delivers:

- *An architecture that is truly scalable — with a message queuing/message processing architecture that leverages parallel processing capabilities of Oracle® and Microsoft® SQL Server®*
- *The ability to leverage highly scalable and secure technologies such as Microsoft® Windows® Communication Foundation (WCF) Services, a framework for building service-oriented applications that enablesthe sending of asynchronous messages from one service endpoint to another*
- *Strict adherence to best practices for database architecture and management*
- *Proven solutions in simulated and real-world customer test environments*