7

Applications an AMI Solution Should Support

Silver Spring®
NETWORKS

An advanced metering infrastructure (AMI) is the foundation of any smart grid deployment and represents a significant investment. Utilities can make the most of that investment by selecting an AMI solution that supports multiple applications beyond electricity metering, such as gas and water metering, service restoration, and theft detection.

Here are seven additional applications that utilities can implement if they have the right AMI solution –and what to look for when investigating AMI offerings.

Gas Metering

Business Drivers

Meter reading expenses, safety
Utilities often have a separate infrastructure for electricity and gas metering, which drives up costs, especially operational costs associated with meter reading. In addition, over-capacity events present a serious safety risk, so utilities need a way to rapidly identify leaks as well as significant increase in customer usage patterns that may indicate service at that location is undersized.

AMI Requirements

To address operational overhead, an AMI system must eliminate duplication by providing a single network capable of reading all types of meters along with one head-end system whose software supports multiple smart grid applications. For safety, an AMI system supporting gas metering must have the ability to detect over-capacity events and issue timely alerts. In addition to reducing infrastructure overhead, minimizing field reads, and boosting safety, the AMI system must be designed with security features to ensure privacy of customer information.

Silver Spring Networks Solution

Silver Spring's AMI network and head-end software support Silver Spring and partner interface management units for gas meters. Utilities benefit from lower opex by eliminating the need for manual meter reading as well as the need for any other overlay network solutions. Silver Spring's AMI platform has robust, built-in security that encrypts data end-to-end to protect customer privacy and prevents spoofing and other attacks.

In addition, Silver Spring's back-end software, in conjunction with the endpoint hardware and network infrastructure, can deliver real-time alerts for over capacity events. This industry-leading feature enables utilities to rapidly indentify—and respond—to such events.

Business drivers

Meter reading expenses, safety, cash flow

As with gas metering, utilities often have a separate infrastructure for water metering, which drives up operational overhead. In addition, having crews manually read water meters is costly and poses challenges that impact worker safety and utility cash flow. Crews face repetitive stress injuries, animal encounters, and other hazards when reading outdoor meters, and must rely on homeowners for access to indoor meters, which results in long billing cycles and high numbers of estimated bills. Leaks and theft also drive up costs.

AMI Requirements

An AMI system must eliminate infrastructure duplication by providing a single network capable of reading all types of meters, including water meters. An AMI-based water solution must support remote, automated meter reading on a customizable schedule, and enable the utility to modify its billing cycle for more frequent billing (for example, monthly vs. quarterly) and payment collections.

To support leak and theft detection, an AMI system must be able to detect meter tampering, zero usage on previously active service lines, and other anomalous activity and send an alert. The AMI system should also enable the utility to measure water leaks, as well as present water customers with the information they need to determine whether or not to fix the leak.

Silver Spring Networks Solution

Silver Spring's AMI network supports water meters for automated meter reading, enabling utilities to eliminate the expense and safety risks of manual reading. In addition, utilities get timely, accurate usage data, which eliminates estimated bills and allows utilities to accelerate their billing and collections cycle and reduce the working capital needed to maintain service.

Silver Spring's AMI system tracks events, or alerts, providing utilities—and their customers—with information about opportunities for conservation by reducing leakage. Depending on how a water utility has metered its distribution system, the Silver Spring AMI platform can determine whether a leak is upstream or downstream of a customer's meter. The Silver Spring system can also detect if a meter has been removed or its direction reversed, indicators of possible theft. As a result, water utilities can protect revenue.

Service Restoration

Business Drivers

Customer satisfaction, operational efficiency, penalty avoidance
Nobody likes when their electricity goes out, and customers are particularly unhappy when their service provider can't say whether it will take 40 minutes or 40 hours for power to be restored. Consequently, utilities try to pinpoint where an outage has occurred and resolve it as quickly as possible to ensure customer satisfaction and to avoid penalties associated with unreliable service delivery.

However, utilities lack reliable and timely outage reporting, typically relying on customer calls. This lack of insight can lead to delays and inaccuracies in detecting and scoping outages, especially nested outages and single-customer outages. It can also lead to dispatching crews to the wrong area or recalling them before all outages in a locale are resolved, which is highly inefficient. Poor visibility into outages also makes it difficult to accurately predict restoration times.

AMI requirements

To aid utilities with outage detection and restoration, an AMI system must provide: proactive notification of outages (ideally before a single customer calls); detailed information on the location and extent of an outage so crews can be dispatched appropriately and unnecessary truck rolls avoided; and fast, reliable restoration information so crews don't leave an area before all problems, such as nested outages, are resolved.

Smart meters send a "last gasp" notification when they lose power and transmit restoration messages when power is back on. An AMI system must tie into a utility's existing Outage Management System (OMS) and deliver a sufficient number and distribution of last gasps to enable the OMS to predict any outage accurately. The AMI system must also allow the OMS to directly request information, such as the restoration status of a set of meters, which is critical to identifying a nested outage.

In addition, an AMI system should support two-way communications with distribution automation (DA) devices, such as reclosers, feeder switches, and capacitor bank controllers. With this capability, utility staff can locate trouble spots on the network and reroute power around them, automatically restoring service to segments of the network not affected by the fault or avoiding an outage completely.

Silver Spring Networks Solution

Silver Spring's service restoration solution begins with its Communications Modules, which reside in smart meters and provide proactive notification of an outage and power restoration through last gasp and restoration messages. Silver Spring's AMI network also gives utilities the ability to "ping" meters in real time, which makes it possible to verify power status remotely.

Silver Spring's UtilityIQ Advanced Metering Manager (AMM) and UtilityIQ Outage and Restoration Detector (ORD) applications work together to collect and process outage and restoration notifications from the AMI network and to ensure the utility's OMS receives only verified outage data. UtilityIQ ORD also correlates last gasp messages and transformer-level outages, enabling staff to quickly pinpoint the source of a problem and immediately dispatch field personnel to resolve it, cutting outage times and boosting customer satisfaction. Likewise, Silver Spring pairs outage and restoration data so utility staff can identify nested outages easily.

Through its Bridge family of devices, Silver Spring extends two-way communications to existing grid devices, such as feeder switches, transformers, reclosers and other grid devices, giving utilities visibility and control into devices downstream of the substation and further improving their ability to quickly pinpoint outages. Silver Spring Bridges coupled with fault circuit indicators (FCIs), for example, provide near-real-time information about power flowing in distribution lines, so utilities get advance notification of potential problems or circuit faults and can take appropriate action to limit—or avoid—an outage.

 SSN -enabled distribution automation (DA) can also redistribute power around faults, ensuring that customers in nearby areas don't lose power. Silver Spring's AMI solution, coupled with IntelliTeam– automated switches, for example can detect a fault and automatically reconfigure the distribution system, quickly restoring service to unaffected segments of the feeder line.

GridScape, which manages the Silver Spring Bridge family as well as the network infrastructure supporting the Bridges, is another key piece of Silver Spring's service restoration solution. GridScape conveys the broader context of the DA network by depicting the RTUs connected to the network, the traffic flow going over it, and the physical location of the assets. With GridScape, operators can proactively monitor transformers and other devices and address problems before they escalate, reducing outages.

In addition to enabling utilities to quickly identify and scope outages, avoid unnecessary truck rolls, and restore service in a timely manner, Silver Spring's AMI solution helps boost customer satisfaction. Silver Spring provides integration with a utility's Customer Information System (CIS), giving call center staff real-time information and tools to assist customers who call to report an outage or request restoration time--improving customer service.

Temperature Detection
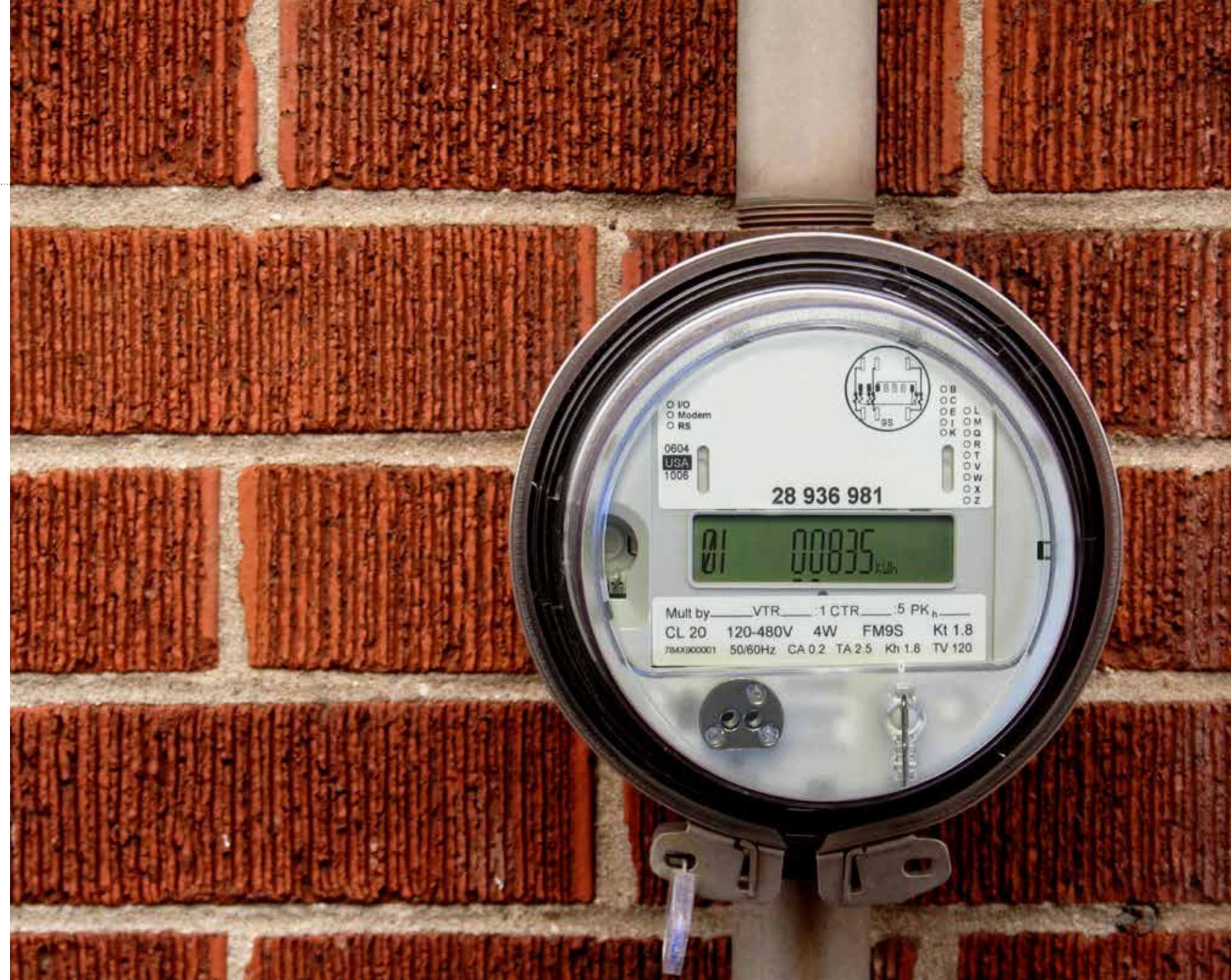
Business Drivers

Safety

Many new meters are made with plastics rather than metal, and when plugged into older sockets are , in some cases, subject to overheating, even electricity arcing, which can cause a fire. Several such fires have been documented.

AMI Requirements

To ensure safety, utilities need meters that can track their temperature and send an alert when it is out-of-bounds (too high or too low), as well as an AMI network that immediately routes those alerts to the back office for appropriate action. For example, the alert data can be fed automatically into a work order management system and a crew dispatched to the at-risk site.

Silver Spring Networks Solution

Silver Spring's AMI system allows a utility to quickly find out about temperature irregularities and limit operational risks. All Silver Spring-supported meters report temperature data, which is made available to utility back-office systems over the Silver Spring AMI network. Silver Spring also offers SilverLink, a subscription-based cloud service that is fully integrated with the Silver Spring AMI platform. SilverLink functionality includes the Link Meter Center, which delivers daily endpoint insights such as remote meter temperatures and Google Earth files that display service territory meter maps with device status.

Business drivers

Lower provisioned energy transmission for greater efficiency and capital and operational savings
Low voltage can occur at any point on the distribution circuit, change throughout the day, and be affected by season, weather events, new loads and physical changes in the distribution network itself, such as relocation of a transformer. Without insight into actual voltage levels at customer locations, utilities often boost voltage levels leaving the substation to ensure they're in compliance with mandated levels. However, this approach results in wasted energy.

AMI Requirements

An AMI-based conservation voltage reduction (CVR) and Volt/VAR Optimization (VVO) solution can help utilities optimize both energy savings and compliance, lowering both capex and opex. Such a solution must be able to assess, monitor, and control voltage levels. Specifically, an AMI-based CVR/VVO solution must: support meters that provide voltage-related data; have head-end software that monitors and analyzes both exception-based and polled voltage data, allowing utilities to perform local polling to get the full scope of premise-level voltage detail; integrate with VVO software to adjust SCADA devices and provide granular control of voltage levels of grid devices such as load tap changers; and include tools for measuring and validating voltage reduction to document savings in support of rate cases and to demonstrate compliance with energy efficiency, carbon reduction or other mandates.

Silver Spring Networks Solution

Silver Spring's CVR/VVO solution lets utilities "right-size" voltage provisioning, reducing overall system load and cutting energy waste as much as 4 percent. A turn-key CVR solution, Silver Spring's UtilityIQ Voltage Optimizer takes full advantage of a Silver Spring AMI network and automatically polls meters for voltage data, reports exception-based data for analysis, and feeds data to SCADA/DMS for voltage control.

Silver Spring's CVR/VVO solution uses industry-leading algorithms to analyze the voltage data from meters and substations and automatically adjusts voltage settings on grid devices throughout the distribution network to maximize energy savings. Voltage Optimizer can pinpoint locations with out-of-compliance voltage readings or voltages that are near the threshold, identifying sags and swells in less than a minute. Utilities benefit from the ability to constrain voltage levels to a narrow band without compromising compliance, achieving energy efficiency gains while improving customer satisfaction.

Electricity Theft Detection

Business Drivers

Revenue assurance, safety

Electricity theft is more common than many utilities realize, resulting in lost revenue and presenting a risk of electrocution to individuals who tap a power line to avoid service metering, replace a meter with copper wire, or tamper with the meter itself.

AMI Requirements

To detect electricity theft, utilities need an AMI network that uses detection algorithms to detect theft upstream of meters, as well as provides meters that can report a variety of data, including tamper alerts.

Silver Spring Networks Solution

Silver Spring uses a variety of methods to detect theft, including tamper alerts from meters, pattern recognition, event correlation, and measurement analysis, that help utilities determine if theft is occurring anywhere in their deployment. Through use of sophisticated algorithms, the Silver Spring AMI system filters out false positives and presents utilities with actionable information that ensures both safety and revenue collection.
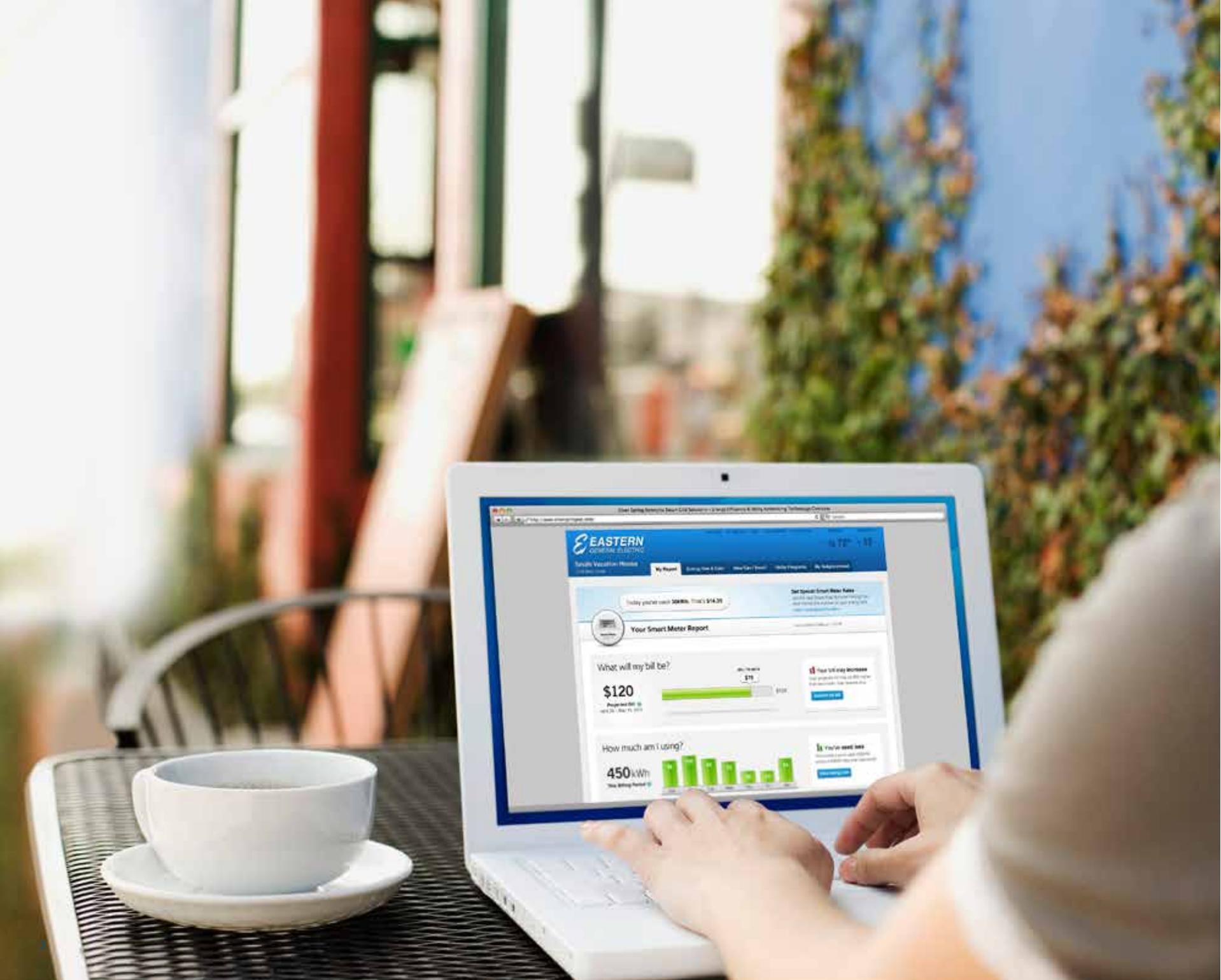
Service Prepayment

Business Drivers

Revenue assurance, customer convenience and satisfaction
Prepayment is a good option for utilities that want to ensure payment from customers who have no credit history or a record of non-payment. Prepayment is easy and convenient for customers and provides revenue assurance while reducing a utility's bad debt.

AMI Requirements

To support prepayment, an AMI network must give utilities the ability to connect and disconnect meters remotely. In addition, the AMI head-end software must support open standards to facilitate ease of integration with prepayment system and the utility's CIS. Such integration is necessary for proper usage tracking, accurate payment history and outstanding balance, customer status (whether billed regularly or prepay), and other information utilities need for proper billing and collections. An AMI-based prepayment solution must also provide delinquent customers with notification of disconnection, be able to disconnect service if payment is not received, and restore service in a timely manner once the prepay account is replenished..

Silver Spring Networks Solution

Silver Spring partners with a number of prepayment system providers to deliver an integrated solution that is convenient for customers and ensures revenue for utilities. Leveraging data from Silver Spring's AMI network, the prepayment solution connects to a utility's CIS and other back-end systems, provides the latest account balances, counts down the account balance based on usage data, notifies non-paying customers of impending service disconnection, and issues connects or disconnects over the AMI network, as needed.

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