

# *The Service Upgrade*

*By Ron Wallace*

## Asset Management and the Smart Grid

TODAY'S UTILITY COMPANIES ARE BEING DRIVEN TO UPGRADE their aging transmission and distribution networks in the face of escalating energy generation costs, serious environmental challenges, and rising demand for cleaner distributed generation from both developing and digital economies worldwide.

The current environment requires utilities to drive down costs while increasing the ability to monitor and control utility assets. Yet due to aging infrastructure, many utilities operate without the benefit of real-time usage and distribution load information—while also contending with limited resources for repair and improvement. Even consumers, with climate change on their minds, are demanding that utilities find more innovative ways to help them reduce energy consumption and costs.

One of the key challenges facing the industry is how to take advantage of new technologies to better manage the delivery of service to customers today and into the future. While introducing this new technology, utilities must keep data and networks secure to be in compliance with critical infrastructure protection regulations. The concept of “service management” for the smart grid provides an approach for getting started.

### A Smart Grid

A smart grid is created with new solutions that enable new business models. It brings together processes, technology, and business partners to empower utilities with an IP-enabled, continuously sensing network that overlays and connects together a utility's equipment, devices, systems, customers, partners, and employees. A smart grid enables on-demand access to data and information that is used to better manage, automate, and optimize operations and processes throughout the utility.

A utility relies on numerous systems that reside both within and outside its physical boundaries. Common internal systems include:

- ✓ energy trading systems (ETs)
- ✓ customer information systems (CISs)
- ✓ supervisory control and data acquisition (SCADA) systems
- ✓ outage management systems (OMSs)
- ✓ enterprise asset management (EAM)
- ✓ mobile workforce management (MWFM) systems
- ✓ geospatial information systems (GISs)
- ✓ enterprise resource planning (ERP) systems.

These systems are purchased from multiple vendors and often use a variety of protocols to communicate. In addition, utilities must also interface with external systems and often integrate all of these systems using a point-to-point integration model to establish connectivity between systems on an as-needed basis. The point-to-point approach can result in numerous complex connections that need to be maintained.

### Service Management for a Smart Grid

The key concept behind service management is the idea of managing assets, networks, and systems to provide a service, as opposed to simply operating the assets. For example, Rolls-Royce Civil Aerospace uses this concept to sell “pounds of thrust” as a service. Critical to utility operation is the ability to manage all facets of the services being delivered. And critical to the operation of the smart grid are new solutions in the areas of advanced meter management (AMM), network automation and analytics, and EAM, including meter asset management.

## Utilities are facing many challenges today and taking advantage of new technologies that will help better manage the delivery of service to customers tomorrow.

A service management platform provides a way for utility companies to manage the services they deliver with their enterprise and IT assets. It provides a foundation for managing the assets, their configuration, and the interrelationships that are key to delivering services. It also provides a means of defining work flow for the instantiation and management of the services being delivered. Underlying this platform is a range of tools that can assist in the management of the services.

Gathering and analyzing data from advanced meters, network components, distribution devices, and legacy SCADA systems provide a solid foundation for automating service management. When combined with the information available in asset management systems, utility companies can streamline their operations and make more efficient use of valuable resources.

### **AMM**

AMM centers on a more global view of the informational infrastructure, examining how automatic meter reading (AMR) and advanced metering infrastructure (AMI) integrate with other information systems to provide value-added benefits. It is important to note that for many utilities AMM is considered to be a “green” initiative since it has the ability to influence customer usage patterns and, therefore, to lower peak demand.

It is through AMM that the potential for true business transformation exists, and adopting AMM is the first stage in a utility’s transformation to a more information-powered business model. New “smart meters” are network-addressable and, along with AMM, are core components of the smart grid. Smart meters and AMM provide the capability to automatically collect near-real-time usage data and transport meter reads at regular intervals or on demand.

AMR and AMI systems that aggregate their data in collection servers or concentrators and expose the data through an interface can be augmented with event management products to monitor the health and operational status of the meter. Many organizations already deploy these solutions for event management within network operations center environments and for consolidated operations management as a top-level “manager of managers.”

A smart grid includes many devices other than meters, so event management can also be used to monitor the health of the rest of the network and IT equipment in the utility infrastructure. Integrating meter data with operations events gives network operations center operators a much broader view of a utility’s distribution system.

These solutions can enable an end-to-end integration of data, from the meter collection server in a substation to the

back-end help desk and billing applications. This approach can enable improved speed and accuracy of data while leveraging existing equipment and applications.

### **Network Automation and Analytics**

Most utilities use SCADA systems to collect data from sensors on the energy grid and send events to applications with SCADA interfaces. These systems collect data from substations, power plants, and other control centers. They then process the data and allow for control actions to be sent back out. Energy management and distribution management systems typically provide additional features on top of SCADA, targeting either the transmission or distribution grid.

SCADA systems are often distributed on several servers (anywhere from two to 100) connected via a redundant local area network. The SCADA system in turn communicates with remote terminal units (RTUs), other devices, or other computer networks. RTUs reside in a substation or power plant and are hard-wired to other devices to bring back meaningful information about current megawatts, amperes, and voltages; pressures; open and closed switches; tripped breakers; and other conditions. Distribution business units within a utility company also utilize SCADA systems to track low-voltage applications, such as meters and pole drops, while the transmission business unit uses the system on larger assets, which include towers, circuits, and switchgear.

To facilitate network automation, IT solutions can help utilities monitor and analyze data from SCADA systems in real time, monitor the computer network systems used to deploy SCADA systems, and better secure the SCADA network and applications using authentication software. An important element of service management is the use of automation to perform a wide range of actions and automate manual tasks for improved work-flow efficiency. Another key ingredient is the use of service level agreements (SLAs) to give a business context for IT, enabling greater accountability to business user needs and improving a utility’s ability to prioritize and optimize.

A smart grid includes a large number of devices and meters—millions in a large utility—and these are critical to a utility’s operations. A combination of IT solutions can be deployed to manage events from SCADA devices as well as the IT equipment they rely on.

### **EAM for Utilities**

Historically, many utility companies have managed their assets in silos. The emergence of the smart grid and smart

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meters combined with the existing challenges of an aging workforce, a demanding regulatory environment, and the availability of common IT architecture standards mean it is critical for utilities to standardize on one asset management platform as new requirements to integrate physical and IT assets arise. Figure 1 shows the variety of assets found in a typical utility network infrastructure.

Today, utility companies are using EAM to manage work in gas and electric distribution operations, including construction, inspections, leak management, vehicles, and facilities. In the transmission and substation area, EAM software is used for preventative and corrective maintenance and inspections.

EAM also helps track asset financials such as purchasing, depreciation, asset valuation, and asset replacement costs. EAM helps integrate this data with ERP systems and stores the history of asset testing and maintenance management. It integrates with GIS or other mapping tools to create geographic and spatial views of all distribution and smart grid assets.

Meter asset management is another area of increasing interest, as meters have an asset life cycle similar to most other assets in a utility. Meter asset management is simply the managing of the meter as an asset—tracking the meter from receipt to storeroom to truck to final location—as distinct from managing the data the meter produces.

Now there are IT asset management solutions with the ability to manage meters as part of the IT network. These solutions can be used to provision the meter, track configurations, and provide service desk functionality. IT asset management solutions can also update meter firmware and easily move and track the location and status of these assets over time in conjunction with a configuration database.

Reducing the number of truck rolls is another key focus area for utility companies. Using a combination of solutions, companies can:

- ✓ better manage the life cycles of physical assets such as meters, meter cell relays, and broadband-over-power-line (BPL) devices to improve preventive maintenance
- ✓ reconcile deployed asset information with information collected by meter data management systems
- ✓ correlate the knowledge of physical assets with problems experienced with the IT infrastructure to better analyze a problem for root cause
- ✓ establish more efficient business process work flows and strengthen governance across a company.

Utilities are facing many challenges today and taking advantage of new technologies that will help better manage the delivery of service to customers tomorrow. The deployment of the smart grid and related solutions is a significant

initiative that will be driving utilities for the next ten years or more. The concept of “service management” for the smart grid provides an approach for getting started. But these goals do not need to be tackled all at once. Utilities should develop a road map for the smart grid; each company’s road map will depend on its specific priorities. Utilities do not have to go it alone, however. Carnegie Mellon University’s Smart Grid Maturity Model can help a utility develop a road map of activities, investments, and best practices to ensure success and progress in line with available resources.

### Biography

Ron Wallace is with IBM Software.

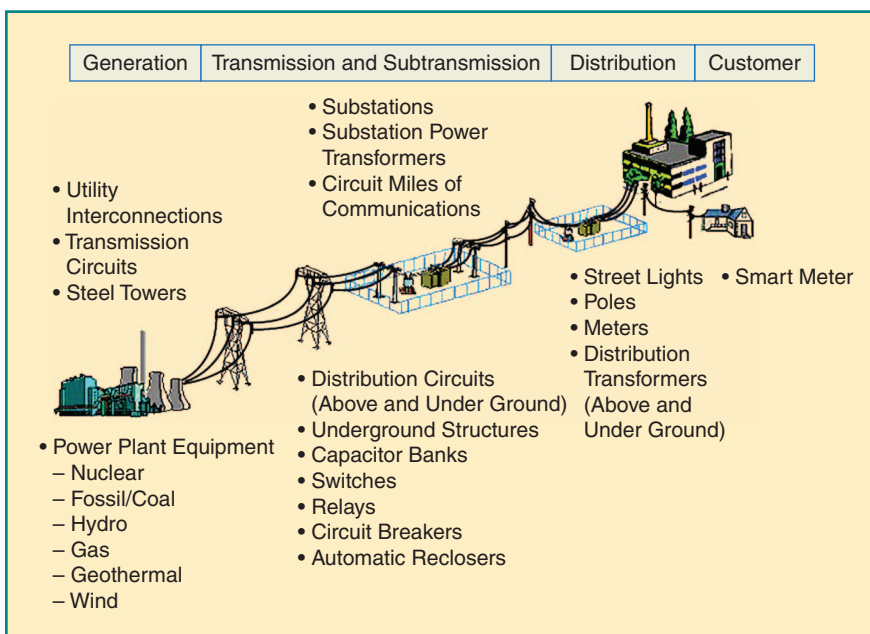


figure 1. Assets in a utility network infrastructure.