Smart Energy Alliance

From Roadmap to Reality

Solutions Brief
Utilities

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A Powerful Example of a *Smart Energy Alliance*™ Solution

What Happens When A Car Hits A Pole in a Service Area with Smart Energy Alliance Capabilities?

The Smart Energy Alliance — a collaboration of Capgemini, Cisco, GE Energy, HP, Intel and Oracle — is deploying utility solutions that improve the integration of key emerging utility technologies by using an architecture roadmap focused on modularity and flexibility.

The combined expertise of the Smart Energy Alliance makes comprehensive solutions cost-effective and deployable — solutions incorporating tools such as distribution SCADA, smart transformers, worker mobility, substation automation, smart metering, GPS and Geographic Information Systems (GIS), and real-time pricing.

The interactive demo described below debuted at DistribuTECH 2006 to illustrate the positive impacts that such a comprehensive Smart Energy Alliance solution can have. In this case, the solution integrates multiple operations and business applications into a Distribution Monitoring and Control System™ (DMCS™).

The Situation: A Car Hits a Pole

The premise of the demo is a common occurrence: a car hits a utility pole and knocks it over. In the United States, there are 100,000 such incidents each year, 30% of which result in a power outage. In our example, the damage causes a power outage affecting a large rural VA hospital.

Immediate Knowledge

Normally, it could take 30 minutes for the utility to become aware of the outage, as various effected customers call in. In our case, the hospital has a single feed from the grid and a backup generator managed by the utility. The generator starts automatically, which triggers an immediate notification through the monitoring software in the utility's Operations Department; Operations is the first to know. Time elapsed: 20 seconds.

Initial Response

The notification from the generator, like all actions in this demo, is automatically logged, making compliance with regulations faster and more accurate than normally experienced with paper-based workflows.

An e-mail is automatically sent to responsible parties within the utility notifying them of the problem at the hospital. Where appropriate, this e-mail message arrives as a web page, SMS or a voice message. Immediately after the generator notification is received, the metering system senses a non-responsive meter in the area, triggering a six-pass test to check meter integrity. Although the exact location of the outage is not yet known, the GIS-enabled Outage Management System (OMS) locates the incident with enough accuracy to dispatch the first truck. The Work Management System (WMS) advises the best truck to send based on equipment, crew and the current status of the project the crew is currently working on. The dispatch is made wirelessly by the Mobile Dispatch System (MDS) to the appropriate device, which may be an in-truck mobile computer, a crew member's PDA, or a voice radio call backed by a wireless data message — depending on which is the safest and most effective way to notify the crew. As the truck begins moving, its location change is reflected on the GIS map in Operations. Time elapsed: 3 minutes.

Identifying the Problem Location

The DMCS takes advantage of Automatic Meter Reading (AMR) to track meter usage via regular reads. The six-pass test for meter responsiveness provided a unique set of meters that were not responding, thus giving a very close approximation of the outage area. This more-detailed location information is sent wirelessly as an update to the crew which is already heading to the general area. Time elapsed: 5 minutes.

Truck Crew Arrives

The truck crew acknowledges the updated location and is shown a detailed street map as well as a picture of the pole. Seeing that the pole is down, the crew opens a work order requesting that emergency services (911) be called, power be shut down and replacement equipment (a pole, etc.) be sent.

Operations receives this update, notifies 911 and remotely shuts down power at the protective device closest to the site. Customers affected by the power shutdown are notified automatically by an outbound voice messaging system. Permission to replace the pole as well as a schematic of the pole and power off notification are returned to the crew.

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The crew scans the pole using an RFID scanner and determines that there is a mismatch between the expected pole and the actual pole. This scan automatically updates the work order and passes the information on to the logistics team at the warehouse and to the pole yard, insuring that the right equipment arrives at the job site. This occurs fast enough to prevent the transport of the wrong pole and cuts total transit time for the pole in half. (7% of materials sent to emergency job sites are in error and require re-shipment.) Time elapsed: 15 minutes.

Low Fuel at the Hospital Generator

Operations receives an automated warning about the decreasing fuel level in the hospital generator. Using the appropriate materials management system, Operations determines that delivery through normal channels will take too long. Therefore, Operations initiates an online reverse auction for the fuel. A variety of the utility's suppliers respond, several of which can meet the time requirements, and Operations instantly places an emergency order into the supplier's purchasing system. The location of the truck carrying the replacement pole is being tracked on the GIS map. Time elapsed: 30 minutes.

Pole Arrives and Work Begins

As soon as the pole arrives the truck crew advises Operations, which immediately authorize the replacement — all reflected in a series of work order screens in the truck and in Operations. The truck crew completes the pole replacement and updates the work order to notify Operations and to advise re-energizing. Operations energizes the circuit and the truck crew acknowledges that power has been restored. However, Operations receives an automated alert that there was a problem with the startup. Time elapsed: 2 hours.

Startup Failure and Demand Response

Operations notifies the truck crew to stay in the area because of the startup problem. The Event Management System isolates the startup problem to a capacitor bank near the site of the replaced pole. A new work request is sent wirelessly to the truck crew.

At the same time, Operations recognizes that reactive power is out of limit and a correction must be made. Fortunately, the utility has agreements with several commercial customers that, based on their pricing, gives the utility the ability to take protective action by taking equipment out of service at three customer locations. (Note that proper warning systems and delay times are built into the system, so that no safety issues are created at the commercial customer sites).

Operations then uses the inventory management system to determine that the capacitor bank is in stock and dispatch it to the site. This results in a second crew truck — this time from a subcontractor— being dispatched. Because the subcontractor has been fully integrated into the utility's solution, communications with this truck is similar to communications with the first truck. Time elapsed: 2 hours, 5 minutes.

Capacitor Bank Repair

The GIS map soon shows the arrival of the second truck and the work order is updated with the ETA of the capacitor bank. Operations then dispatches a crane to the location to assist with the repair. In the mean time, the fuel truck has arrived at the hospital and refueling has started, as reflected on the fuel gauge display in Operations and in the clearing of the fuel alert in the Event Management System.

The capacitor bank arrives along with the crane, and there are currently four trucks at the location — two crew trucks, a crane and a logistics truck — all coordinated and tracked by GIS. Permission to begin work is requested and granted via the crew superintendent's PDA.

Unfortunately the replacement capacitor bank does not fit and a modification is necessary. This change is approved and the logistics truck departs. To enable the modification, Operations provides a wiring diagram via wireless communication to the appropriate device at the repair site. With this information it is possible to make the modifications and complete the repair. The Event Management System detects that before the capacitor bank can be energized it is necessary to deploy new software to it. After successfully deploying the software, Operations activates the capacitor bank and runs the meter tests which indicate complete success on all passes. The grid is back to normal operation. Time elapsed: 2 hours, 35 minutes.

All Systems Normal

With everything operating normally it is safe to resume operation of the customer equipment which was turned off for reactive power management. This is done in a series of steps in Operations. The Event Management System shows the hospital generator still active and this can now be taken off line. When this is done, everything is back to normal, and appropriate notifications are made to management and customer service. Total time elapsed for the repair: 2 hours, 45 minutes.

Cleanup and Compliance

The event manager initiates the application that closes out the paperwork with a high level of automation, routing all required documents to the Legal, Customer Relations, Dispatch and Maintenance Departments. When it is determined that one of the trucks has not completed the required paperwork, an automated message notifies the truck operator to complete the process and walks him through the required steps.

Technology Solutions That Deliver Transforming Value

This demo illustrates how solutions from the Smart Energy Alliance can transform your power distribution business. By focusing on solutions that are modular, flexible and comprehensive, the companies of the Smart Energy Alliance can help you meet your challenges with unmatched levels of functionality, performance, interoperability and ease-of-deployment. Talk to us today about your strategy and challenges.

For more information please visit us online
http://www.smart-energy-alliance.com.

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