

The Sensus FlexNet™ System Aids Alabama Power Company's Recovery Efforts from Historic Storm

Case Study

INTEGRATION OF OMS AND AMI SYSTEMS QUICKENS RESTORATION EFFORTS

Alabama Power Company had been preparing for severe weather to hit the state long before the morning of April 27, 2011. By daybreak, repair crews were already working to restore power to about 270,000 customers affected by storms that had passed through overnight. With predictions of a dangerous, tornado-laden storm on the way, bucket trucks and crews from utilities as far as Illinois headed to the Heart of Dixie in anticipation of more damage to come. Despite the helping hands, customers were advised to be prepared for more outages.

Parent Southern Company had been laying the groundwork for effective response management and system modernization well before the storm clouds formed when it embarked on an initiative to have its utility subsidiaries integrate the current outage management systems (OMS) with advanced meter infrastructure (AMI) systems.

By fall 2010, Alabama Power had successfully merged a proprietary OMS in service for years with FlexNet™, an open standards-based, multi-application, fixed-base, two-way wireless communications network from Sensus, to gain a number of key benefits, including real time situational analysis and grid stabilization.

Storm events are common for any utility and Alabama Power's recovery response protocol proved highly effective. The ability to collect data from smart meters and deliver it over the Sensus FlexNet system added a new dimension to utility operations because the information could be used to enhance the utility's outage estimation systems.

The April 27 storm that ripped through Tuscaloosa County and surrounding areas was anything but typical—before the skies cleared it would become the most

powerful, destructive event in recorded history, damaging or destroying many utility assets. The tower-based communication network, however, remained largely intact and provided valuable information that helped those responsible for the utility's restoration efforts.

THE CHALLENGE

Alabama Power Company built and maintained its OMS for many years. The OMS is a valuable tool that has performed well over the years, alerting technicians to the number of customers without power. But while an OMS can estimate where service is out, it can't necessarily reflect where service is back on, or more importantly, what locations could actually take power.

That, according to Derl Rhodes, Alabama Power Company's AMI Network Operations and Translation Team Leader, is critical in major outage events.

“Let's say there are 500 residences connected to one switch. We can know the switch is open either through the SCADA system indicating the switch is open or by pinging the affected meters. But if the switch is closed, the utility can't know the status of those 500 customers.”

A major outage would require utility personnel to perform site visits in order to understand its magnitude which could add significant delays to restoration.

THE SOLUTION

As part of a larger Southern Company initiative, the OMS system was integrated with the Sensus FlexNet system for greater situational awareness during outages.

Rhodes explained that the Sensus advanced meters send real-time alerts, the so-called “last gasp” to signal outages in

many cases, sooner than customers can call the utility to report the outage. With these messages, the OMS can specify critical loads, typically hospitals, fire stations or traffic signals for priority restoration. “The meter data carried by the FlexNet system is able to provide enough clues to give us the information about individual premises that the legacy OMS can’t.”

An important consideration in selecting the FlexNet system was that it required far less infrastructure, reducing exposure to damage. Thousands of miles of transmission and distribution lines and structures could be lost in a storm, leaving alternative communication systems vulnerable because downstream meters dependent on an alternative hopping scheme may not be able to communicate their status in an outage.

Alabama Power has a total of 150 antennae towers throughout its service territory, communicating point-to-multipoint with about 1.48 million electric meters. Each tower has battery backup; some also include an emergency generator. Battery backup of the tower collectors allow Alabama Power to know what happened in the immediate aftermath of an outage, including which towers didn’t have power. These were given priority for restoration.

THE CONCLUSION

Durability in a storm situation was a significant but not deciding factor in selecting an AMI technology several

years ago, but no one at Alabama Power could have anticipated the magnitude of destruction from the storm that hit the southeast that day in April.



The tornado’s path is easily seen in the graphic display of outages.

In all, Alabama Power had to restore power to more than 400,000 customers. The National Weather Service determined the path length of this violent tornado to be 80.3 miles with a maximum damage path width of 1.5 miles. Reports from Tuscaloosa indicated 43 people were killed, with over 1000 injured.

The Sensus FlexNet system remained largely intact after the storms blew through, save for one tower that had the top 40 feet bent down 180 degrees towards the ground. The antenna from the crippled tower, however, was still transmitting a signal.

Eight days after the storms, Alabama Power reported that most of the critical infrastructure had been repaired. In all, 412,000 customers were without power at the peak of the storms. More than 5,200 poles and more than 400 transmission system structures were damaged or destroyed. In addition, more than 300

substations lost power and six substations were either destroyed or suffered significant damage. At least 10,000 customers could not take power because of severe damage.

With the OMS and FlexNet combination, the utility could ensure power was on without having to dispatch personnel. This allowed restoration work to be prioritized for the most affected areas and slowly bring daily life back to normal.

When feeders were rebuilt and placed back in service, AMI feedback from individual accounts could relay the status of individual premises on the feeder to the OMS system so that a call or dispatch to the location weren’t necessary. Meter data could also be graphically displayed to understand the level of damage and help prioritize recovery operations. Additionally, it helped personnel estimate with some degree of accuracy the number of premises that were no longer able to take service because of storm damage. Alabama Power’s Rhodes reported that most service was restored two days faster than what had been experienced in the region’s worst storms up to this point, including Katrina.

“It’s tough to say outright what the FlexNet AMI system contributed to the speed of restoration,” said Rhodes, “but there’s no question that it was a contributing factor to effective response management by continually presenting up-to-the-minute data.”

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