

## THE POWER OF RELIABILITY: OUTAGEADVISOR FAULT DETECTION AND LOCATION SOLUTION

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### The Problem

For the past three decades, electric utilities have relied primarily on faulted circuit indicators to detect and locate faulted sections of their distribution system. Although fault indicator technology has provided a reliable means to locate permanent faults, the utility worker still has to physically patrol and inspect the devices. Additionally, many have expressed a desire for the device to differentiate between permanent faults and momentary faults—providing them with valuable information regarding recloser maintenance and vegetation management, their largest operation and maintenance cost. In order to reduce the duration of outages and minimize response time, utilities today are looking for a low-cost communicating device that will relay fault information back to the control center.

Due to regulatory pressure, as well as public relations concerns, improved reliability has become

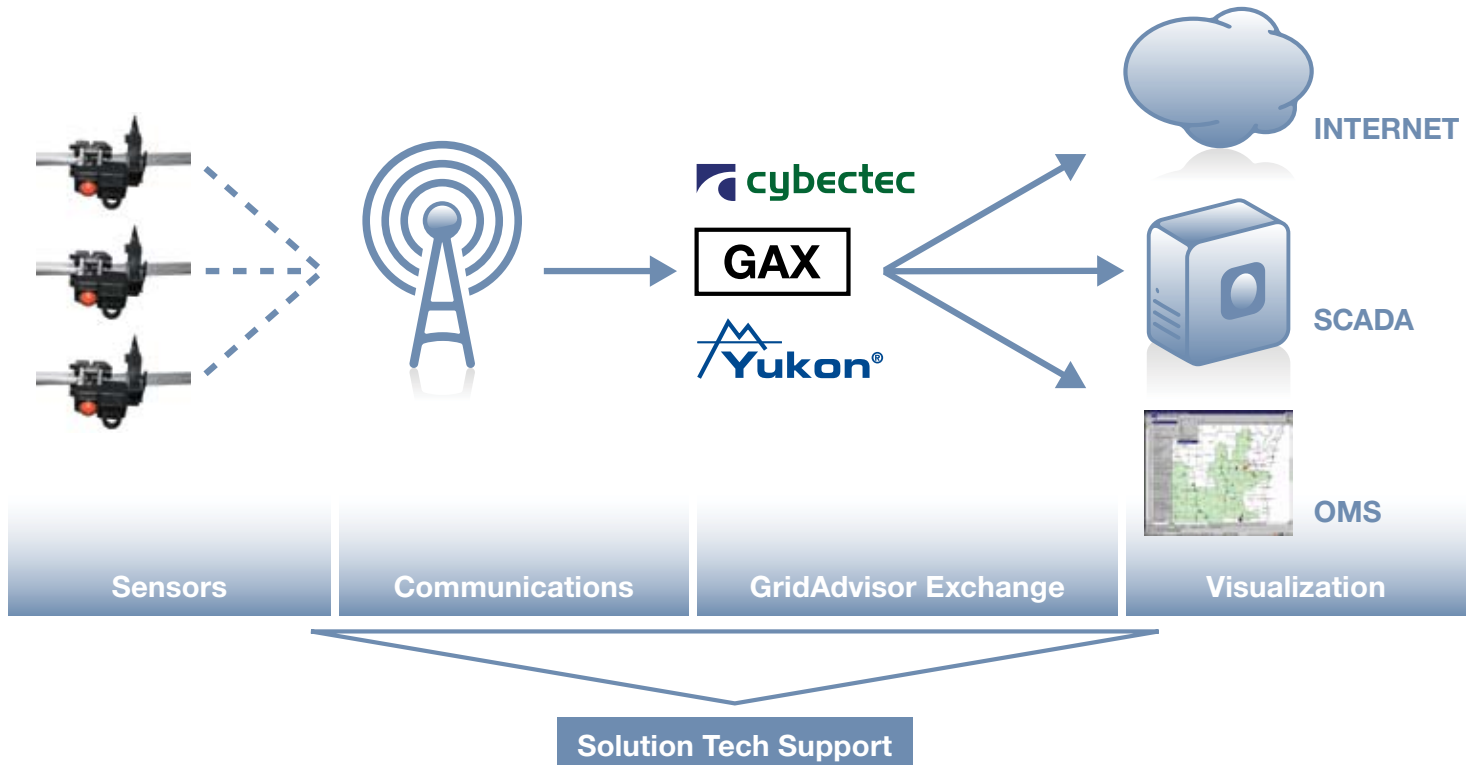
a primary goal for all electric utilities. Utility companies with less-than-desirable reliability rates could be issued penalties such as yearly fines, declines in rate increase requests, or issues with capital planning and funding. This is in addition to how they may be perceived by the surrounding community. Most companies rely on reliability indices such as System Average Interruption Frequency Index (SAIFI) or System Average Interruption Duration Index (SAIDI) to help them determine what circuits or feeders are in need of attention. Customer complaint reports and regulatory commission complaints are two other tools that can be used; however, those are worst-case situations utility companies attempt to avoid. Ideally, reliability indices are tracked by the utilities that remain proactive when it comes to operation and maintenance of their system and therefore reliability.

While performance indices generally do not track momentary outages specifically, most utility customers will not distinguish between long or short outages. In fact, many utilities report that their customers tend to file more complaints regarding frequent, short-duration power outages than they do longer-term, storm-related outages. Momentary outages that happen repeatedly in a day are even more likely to draw undesirable customer attention due in part to the inconvenience of re-booting computer systems and resetting digital clocks. An inexpensive apparatus that can be deployed to help isolate the cause and timing of momentary faults is invaluable in maintaining customer satisfaction.

In order to manage and improve system performance, utilities use a variety of tools. Some will initiate specific projects intended to improve reliability on their

# OutageAdvisor

Fault Detection and Location Solution



The OutageAdvisor system provides visual alerts about real-time grid conditions.

poorest-performing circuits. These reliability projects can include, but are not limited to, tree trimming, tap-fuse installation, fault-indicator installation, coordination studies, circuit tie lines, replacement of bare conductor with insulated cable, relays, substation monitoring equipment, or installation of additional switchgear and controls. These options range in cost from the less-expensive devices such as additional cutouts, tap fuses and faulted circuit indicators to the more expensive insulated cable and switchgear installation.

Taking this a step further, some utilities are extending the capabilities of their existing Advanced Metering Infrastructure (AMI) to help them identify and locate outages on their system. This technology provides system operators with the ability to actively poll meters at specific locations as opposed to contacting customers by phone and asking them if they have service or not.

Using this technology can be valuable, but at the same time, it does present some limitations. If a large area is affected by an outage, none of the metering will report back. The data is too generalized to be of value, and inner-outages can be missed. The time taken to perform the polling is also a significant disadvantage. Following each restoration effort, the metering devices must again be polled to verify that the outage is fully restored. As a result, utilities have expressed a need for a device that will monitor the system, detect fault events, and report a fault or an outage as well as execute power restoration in real time.

## The Solution

The OutageAdvisor Fault Detection and Location Solution is designed to utilize both existing fault indicator technology and commercially proven communication technology

to quickly and accurately locate faulted sections of a utility's distribution system. The OutageAdvisor Solution provides utilities with the ability to achieve greater reliability and reduce O&M expense. This simple, yet sophisticated, solution is designed to quickly and accurately indicate both permanent and momentary faults and find their location as well as shorten response time and improve reliability indices. The benefits of this device include detection and location of permanent faults, recloser monitoring, and vegetation management assistance.

## Apparatus Sensors

The OutageAdvisor sensor is based on Cooper Power Systems Pathfinder Current-Resetting Faulted Circuit Indicator (SCVT). This easily installed device contains field-proven technology with high reliability. In addition to the functionality of the SCVT, this

device will differentiate between momentary and permanent faults and indicate restoration of system power. It will also provide data, including battery status, system power status, average load current, and the location of the device, through an existing wireless communication network. Periodic health transmissions are also sent to provide updated information and indication of consistent communications. These features are in addition to the ease of application and installation utilities have come to trust with the Cooper Power Systems line of S.T.A.R. Faulted Circuit Indicators.

### Communication Integration

This solution is designed to be available with minimal investment in a communication network. The OutageAdvisor Fault Detection and Location Solution supports wireless technologies using either a national cellular network or RF radio technologies (licensed and unlicensed bandwidth options). This allows for a more flexible solution that requires minimal infrastructure investment. Cooper Power Systems will work with the utility to determine their communication capabilities and requirements. Services can include communication survey, drive-test propagation study, installation and deployment support, post-sale technical support, and optimization.

### Enterprise Software Integration

As part of the overall GridAdvisor Solution, Cooper Power Systems will offer a software package called the GridAdvisor Exchange (GAX). This software will fully integrate the smart sensor data into an existing outage management system (OMS) using common communication protocols such as DNP 3.0, ICCP (Inter-Control Center Communications Protocol) or MultiSpeak® software specification. By residing on the utility-owned server, the exchange resides behind the existing secure firewall managed by the internal IT group. This will minimize administrative setup. The

solution is also designed to run seamlessly with other utility control center applications. The GridAdvisor Exchange is engineered to integrate and transfer OutageAdvisor sensor information with existing systems. This minimizes the operator learning curve, allowing users to continue to work with a system they've come to know and trust. This system simply adds more data and functionality. Other features include the ability for the data to be scanned by a utility's Supervisory Control and Data Acquisition (SCADA) system and a Human-Machine Interface (HMI) where an operator can view and manipulate administrative data.

Also available is a web-hosted solution that operates on the Cannon Yukon software platform from Cooper Power Systems. The advantage of this option is that the Yukon platform already has some of the functionality of an outage management system—if the utility is not currently running one—and the system is hosted by Cooper Power Systems. This provides an opportunity to pilot the OutageAdvisor solution before a full deployment takes place.

### Distribution Automation: The Future of the Smart Sensor

By deploying the OutageAdvisor Fault Detection and Location Solution, a utility takes an initial step towards an automated distribution system. This low-cost, high-value proposition can lead a utility to a more automated and reliable electric system.

Cooper Power Systems is actively working towards being the manufacturer of choice for utilities heading towards a fully automated distribution system. Look forward to more devices from the GridAdvisor Solution suite of products—including a capacitor bank fuse-open detector, switch position indicator, and power theft monitor device, which will be available in the very near future. ■

## OUTAGEADVISOR BENEFITS OVERVIEW

The OutageAdvisor solution provides a full range of benefits including improved reliability, vegetation management, and recloser maintenance.

### Improved Reliability

The OutageAdvisor solution provides timely, accurate, and reliable data on the location of a fault. This information can reduce patrol time and, in turn, improve reliability indices.

### Vegetation Management

The OutageAdvisor solution allows utilities to quickly and accurately detect the locations of momentary faults. This information provides valuable feedback as to areas where vegetation management should occur.

### Recloser Maintenance

Customers have identified the need to track the number of operations of their hydraulic reclosers. This data is valuable in deciding how Operation and Maintenance dollars will be spent. By tracking the number of momentary outages using the OutageAdvisor solution, customers can plan and prioritize maintenance on their recloser equipment.

The OutageAdvisor Fault Detection and Location solution allows you to quickly locate outages, shorten your response time, and increase reliability. As a sole solution provider, Cooper Powers Systems will provide total solution implementation including a communications study and on-going support. Contact Cooper Power Systems today to find out how our OutageAdvisor solution can work for you.