Power On
Outage Detection Takes a Leap Forward with the Active Grid

Power outages in the U.S. are occurring more frequently, they’re lasting longer and costing more than just a decade or two ago. These trends are validated by statistics from government, industry and third-party sources.

In 2008, according to the Eaton Blackout Tracker, there were a total of 2,169 power outages (of all sizes and scopes) in the U.S. affecting a total of 25 million people. In 2011, there were more than 3,071 outages affecting 41.8 million people. In 2016, the number of outages increased significantly again to 3,879 outages, an increase of nearly 9 percent over 2015, affecting 18 million people according to the Eaton tracker. Estimates put the economic cost of these outages at anywhere from $85 to $150 billion annually.

This steady increase in outages is due to the combination of underinvestment in modernizing the grid over the past quarter century, increasing peak demand for electricity, and more severe storms and weather. And this comes at a time when consumer expectations for reliability of service run higher than ever.

In addition to greater investment to harden the grid, smart meters, with their ability to send a signal to the utility when they lose power, have been deployed widely as a tool to help utilities detect and restore outages more quickly. Yet, while current-generation smart metering technology has added a valuable data stream to the outage management equation, there’s still considerable room for improvement in translating those capabilities into reliable and actionable data for grid operators.

**This Can Be Better**

The current state of outage detection and analysis via the smart metering network is that it’s still an inferential exercise based on how many affected meters can successfully transmit “last gasp” outage messages over the network, how many of those messages successfully reach the utility over a network that may be losing power, and the filtering and analysis by grid operators continues from there.

While different vendors make varying claims about how many outage notification messages will successfully reach the system head end during an outage, they all still rely on the same basic approach to outage detection. The meters transmit a tsunami of outage notification data over the network. Grid operators use that data, along with SCADA data and customer phone calls, to understand the location and extent of the outage, and infer possible causes.

It’s better than before the utility had smart meters but it’s still not as good as it can or should be. This outage analysis process is also hampered by lack of an accurate and continually updated connectivity model that associates meters and distribution system assets.

**The Value of Active Grid Outage Detection**

- Eliminates need to manage “tsunami” of smart meter outage notifications to understand outage conditions
- Location awareness and peer-to-peer communications yield much more timely and accurate detection
- Peer-to-peer communications enables massive parallel communications and processing efficiencies not possible on point-to-point or traditional mesh network
- Accelerates outage detection and analysis by 2X or more
- Provides continual verification of outage and restoration state
- Adds more than $3 million in annual business case value compared to current AMI systems for a utility with 1 million customers as well as improved customer satisfaction
Using Distributed Intelligence
The Active Grid and OpenWay® Riva technology deliver a fundamentally different and better approach to accelerate outage detection and analysis. By combining location awareness on the grid with peer-to-peer communications at the edge of the network, the OpenWay Riva solution systematically and continuously evaluates the status of all meters on the network to quickly model and localize outage events and report summary information back to the utility in near real time.

By initially analyzing the bulk of the data at the edge of the network, many of the difficulties and deficiencies current smart metering networks encounter in outage detection – including large-scale volumes of unfiltered outage data congesting the network – are eliminated.

When an outage event does take place, regardless of the scale or location, the OpenWay Riva solution automatically initiates an analysis mode among meters and devices on the network to examine outage data and conditions at the edge. The meters that still have power quickly go into a progressive outage analysis mode, and via peer-to-peer communications with other meters, they ask their assigned “buddy” meters, “do you have power?” No other system available combines distributed intelligence and peer-to-peer communications to process and analyze data this way during an outage.

This distributed approach to outage analysis is effective for both large-scale and small-scale outages, including “nested” and individual outages. This represents a dramatic improvement in outage detection and analysis through a combination of intelligence in the endpoint and network to ensure that outage detection data from smart meters adds business value, not just more data to sift through.

Transforming the effectiveness of the outage detection process is another example of how the Active Grid, through OpenWay Riva, is redefining what’s possible in grid operations while also making current work processes more efficient and effective.

Actionable Analysis
So, instead of a tsunami of unfiltered and unanalyzed data, the utility receives summarized, accurate and actionable information on outage conditions, including scale and location of the outage, affected meters, affected transformers, etc. – all in a compressed timeframe.

The outage is detected (usually before the first customer calls), modeled so that the extent and probable cause of the outage is rapidly understood and the appropriate resources can be dispatched efficiently to exactly where they are needed to begin restoration efforts.

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