



Municipal Utility's Grid Improves by 50% With Self-Healing Technology

S&C Featured Solution: Distribution automation

Location: Chattanooga, Tennessee

Customer Challenge

EPB of Chattanooga, Tennessee, wanted to improve electrical service reliability across its service area, but it also wanted to improve quality of life for the community to attract new employers and residents. That meant ensuring power stayed on in all weather conditions. Chattanooga knew the way to accomplish these goals was to become a Smart City, so it invested in a fiber-optic network and a self-healing smart grid in hopes to improve power reliability by 40 percent.

Key Facts

- 42% SAIDI and 51% SAIFI improvement
- July 2012 storm: 42,000 outages avoided
- 150 customers per segment
- \$35 million in projected annual customer cost savings

As part of the city's effort to achieve greater societal benefits by modernizing its infrastructure, EPB recognized that, in a truly smart city, an electric grid would boast less downtime for businesses and consumers. Further, the reduced duration of power outages would translate into financial savings for local businesses and greater economic competitiveness. EPB set out to install distribution automation across its 600-square-mile service area with matched funds from U.S. Department of Energy (DOE) stimulus monies, which would accelerate deployment.

After an extensive evaluation process of the industry's leading smart grid innovators, EPB chose to partner with S&C and use its IntelliRupter® PulseCloser® Fault Interrupter and IntelliTeam® SG Automation Restoration System software to improve the reliability across its broad service area.

S&C Solution

Estimates based on industry studies indicate that, prior to the automatic restoration system's implementation, Chattanooga's economy was losing \$100 million each year due to power outages. EPB knew that a restoration system such as S&C's IntelliTeam SG software system, which automatically reconfigures the distribution system after a fault to quickly restore service to unaffected feeder segments, would be able to eliminate 40 percent of the interruption minutes. When outages could not be automatically restored for customers in the damaged section, the system would enable crews to go right to the affected area and fix problem segments faster.

EPB's planning strategy for this deployment involved evaluating the number of customers per segment, load per segment, and the amount of overhead-line exposure per segment. That process resulted in EPB deploying more than 1,100 IntelliRupter Fault Interrupters, which equates to one unit for every 0.6 circuit miles, or one device for every 150 customers.



Installation of an IntelliRupter Fault Interrupter.

Wanting to build an intelligent and self-healing grid, EPB was impressed by S&C's IntelliRupter® PulseCloser® Fault interrupter and IntelliTeam® SG Automatic Restoration System.



"We're frequently in excess of 60 to 65 percent improvement in every metric that exists. Even if a person's outage cannot be automatically restored because they are in the damaged section, automating the system improves reliability for everyone because it allows our crews to go right to the problem and get to work sooner."

—Dave Wade, Executive Vice President and Chief Operating Officer, EPB

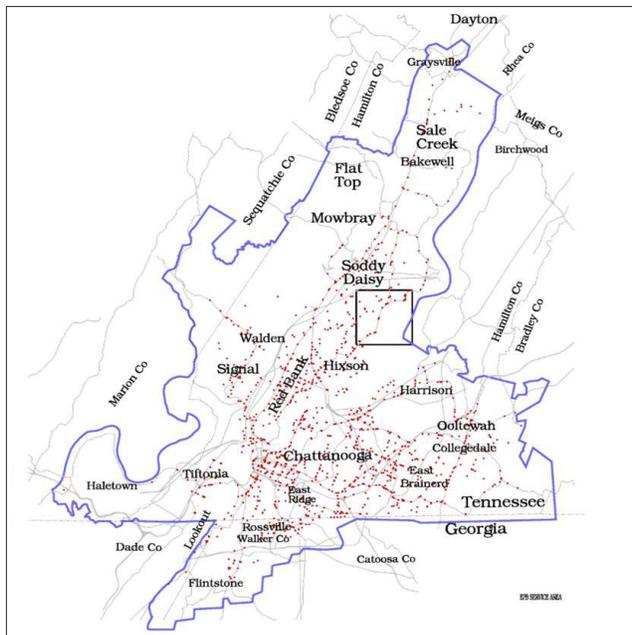
IntelliRupter Fault Interrupters detect faults on the system and use PulseClosing® Technology to test and determine whether the fault is temporary or permanent. If temporary, the devices restore power in seconds without damaging equipment with fault currents. If the fault is permanent, the devices use the intelligence in the IntelliTeam SG software to isolate the faulted segment and reroute power from other available sources in a matter of seconds.

Results

With S&C's field-proven self-healing solutions in place, Chattanooga now experiences dramatic decreases in the duration of power outages. EPB has exceeded its projected 40 percent improvement in reliability, with 42 percent and 51 percent respective improvement in the duration (SAIDI) and frequency (SAIFI) of power outages.

The project helped Chattanooga earn national media attention and the nickname "Gig City," a moniker also aided by the city's investment in a fiber-optic network that guaranteed Internet access up to one gigabit per second to everyone in the area. The benefits of this smart city were further realized in July 2012, when the city was hit by an unusually strong storm that

caused power outages in about 80,000 homes and businesses. In terms of severity, it was one of the top five storms in the city's history. However, the adoption of a self-healing grid limited the outage impact to a ranking that wasn't anywhere close to the city's top five.



Some 1,100 IntelliRupter Fault Interrupters have been placed within EPB's 600-square-mile service region.

Using the IntelliRupter PulseCloser Fault Interrupters and the S&C IntelliTeam SG Automatic Restoration System, EPB was able to prevent an interruption or automatically restore power to 53 percent of customers, or 42,000 homes, during the storm. This improvement reduced the total restoration time for the event by nearly 17 hours. EPB projects using this system will save customers some \$40 million or more per year in power-outage costs.