

Bluebonnet Electric Uses DFA Technology to Detect Arrester Failure and Accelerate Response

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Bluebonnet Electric Cooperative (BEC) recently used Distribution Fault Anticipation (DFA) technology to detect and locate a failed lightning arrester and initiate response by a line crew before receiving conventional notification of the failure. DFA enabled BEC to respond to this event sooner and with better diagnostic information.

BEC is one of six utility companies participating in the Texas Power Line-Caused Wildfire Mitigation project, a field demonstration effort supported by the Texas legislature. As part of that effort, BEC has instrumented fourteen distribution circuits with DFA technology. Instrumenting a circuit with DFA technology consists of installing a substation-based DFA device, which detects and warns of faults, failures, and other events along the length of the circuit.

During fair weather on the afternoon of 4 July 2016, a DFA-instrumented circuit experienced a short-circuit fault. BEC's conventional circuit protection properly detected and isolated the fault, blowing a fuse and interrupting service to a single member. Relying solely on conventional systems, BEC would have been unaware of this issue until a member reported an outage, which in this case did not happen for a full hour. As an aside, this was the only outage on this circuit for this entire day.

Electrical recordings by the substation-based DFA detected the fault and enabled determination that the likely cause was failure of a lightning arrester. BEC was otherwise unaware of the fault. The circuit in question is a long, rural circuit with more than 160 miles of total overhead line. The BEC control center used circuit model software to estimate the likely location of the fault and dispatch a line crew, informing the crew that the most likely cause was a failed arrester. The crew was en route when the dispatch control center received a "lights out" call from the affected member. Upon arrival on the scene, BEC's crew confirmed a blown fuse and failed arrester and effected appropriate repairs.

BEC's proactive use of information from the DFA system enabled faster response and a shorter outage. In addition to the early notification, it generally is beneficial to know the likely cause of an outage, because identification of the cause of an outage sometimes can be quite challenging and time-consuming for the responding crew.

Beyond improving reliability, earlier awareness of failures and better diagnostic information about them can, in some cases, help mitigate fire hazards. The failure of a lightning arrester, for example, often draws an electrical arc in the air and expels superheated fragments that fall to the ground. Conventional technologies may not enable utility companies to detect failures and outages in a timely way, much less know details about their underlying causes. Although no technology will ever prevent all failures and risks, DFA technology appears to be able to provide quicker notification and better information, enabling an improved response.



DFA technology enabled detection and identification of a failed arrester, thereby improving response.

DFA technology enables a utility to manage its power distribution system better, by providing awareness of line conditions and events not detected by conventional technologies. Each substation-installed DFA device monitors circuit currents and voltages continuously, via conventional CTs and PTs. DFA devices use embedded pattern-matching software to characterize and report electrical events, including events not detected by conventional means. DFA devices report line events to a master station server, which provides access to reports from the systemwide fleet of DFA devices. DFA reports conventional faults and also events that have not yet caused faults or affected customers. Awareness of adverse events and conditions enables preemptive action, directed repairs, and condition-based maintenance. No technology can eliminate all failures, but DFA provides a step forward in detecting and diagnosing many failures.

DFA technology was developed by Texas A&M Engineering, in collaboration with the Electric Power Research Institute, Inc. and is offered commercially by Power Solutions, Inc.



Headquartered in Bastrop, Texas, Bluebonnet Electric Cooperative serves more than 85,000 consumers in central Texas. Bluebonnet has instrumented fourteen distribution lines with DFA technology, in conjunction with the Texas Power Line-Caused Wildfire Mitigation project.