Faults And Outage Avoided Through Proactive Detection Of Distribution Conductor On Wooden Crossarm, Using DFA Technology

Presented to the 70th Annual Conference for Protective Relay Engineers
Texas A&M University, College Station, Texas
Wednesday, 05 April 2017
Mid-South Synergy

- Six-County service territory (1,600 mi\(^2\))
- 25 Electric Distribution Substations
- 74 Electric Circuits
- 3,000 Miles of Distribution Line
- 30,000 meters
‘Major’ Technology Ecosystem

- GIS, FIELD INSPECTIONS, DIGITAL LINE DESIGN
- CIS, WORK MANAGEMENT SYSTEM
- SCADA, OMS
- AMI, MDMS
- AVL
- Distribution Fault Anticipation (DFA)
DFA At Mid-South Synergy

- One of eight utilities participating in the Texas Power Line Caused Wildfire Mitigation Project
- DFA devices installed on 10 worst performing Feeders
- Installation completed in March 2016
DFA Detecting The Problem

- DFA device reports fault and protection operations, including those of unmonitored reclosers along the length of feeder
- Use of automatic waveform classification engine to provide a summary of each event
- Current and voltage waveforms are available
DFA At Mid-South Synergy

- Regular review of events via DFA website
- Texas A&M provides email and phone consultation upon request
- Mid-South uses DFA synergistically with an Engineering Analysis software (Milsoft)
### Bishop Feeder 2403 Events

<table>
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<tr>
<th>Expand</th>
<th>Substation</th>
<th>Circuit</th>
<th>Seen By</th>
<th>Event Type</th>
<th>Phases</th>
<th>Comments</th>
<th>Count</th>
<th>Last Occurred</th>
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<tr>
<td></td>
<td>Bishop</td>
<td>142403</td>
<td>Bishop</td>
<td>Fault: Short lived</td>
<td>A</td>
<td>564 Amps (15 ms)</td>
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<td>142403</td>
<td>Bishop</td>
<td>Breaker reclose</td>
<td>AB</td>
<td>F-(3.0c, 775A, AN)-T-2.3s-C-T-(-,-,-)%-1.4s- F-(313.0c, 955A, ABN)</td>
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<td>142403</td>
<td>Bishop</td>
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</table>
Bishop Feeder 2403 Events
Mid-South DFA Workflow

- DFA detected two ‘similar’ events on same feeder
- Fault Locating Software used to estimate location
- One of two possible Reclosers had logged events that matched DFA
- Crews were dispatched and they identified the problem a few spans from model’s prediction
Network modelling in Milsoft
Bishop Feeder 2403 Events
Consequence Avoided

- Outage prevented, 140 customers
- Possible broken conductor
- Possible Pole Fire
- Possible ignition of leaf litter and other dry material near base of pole
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