

# **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

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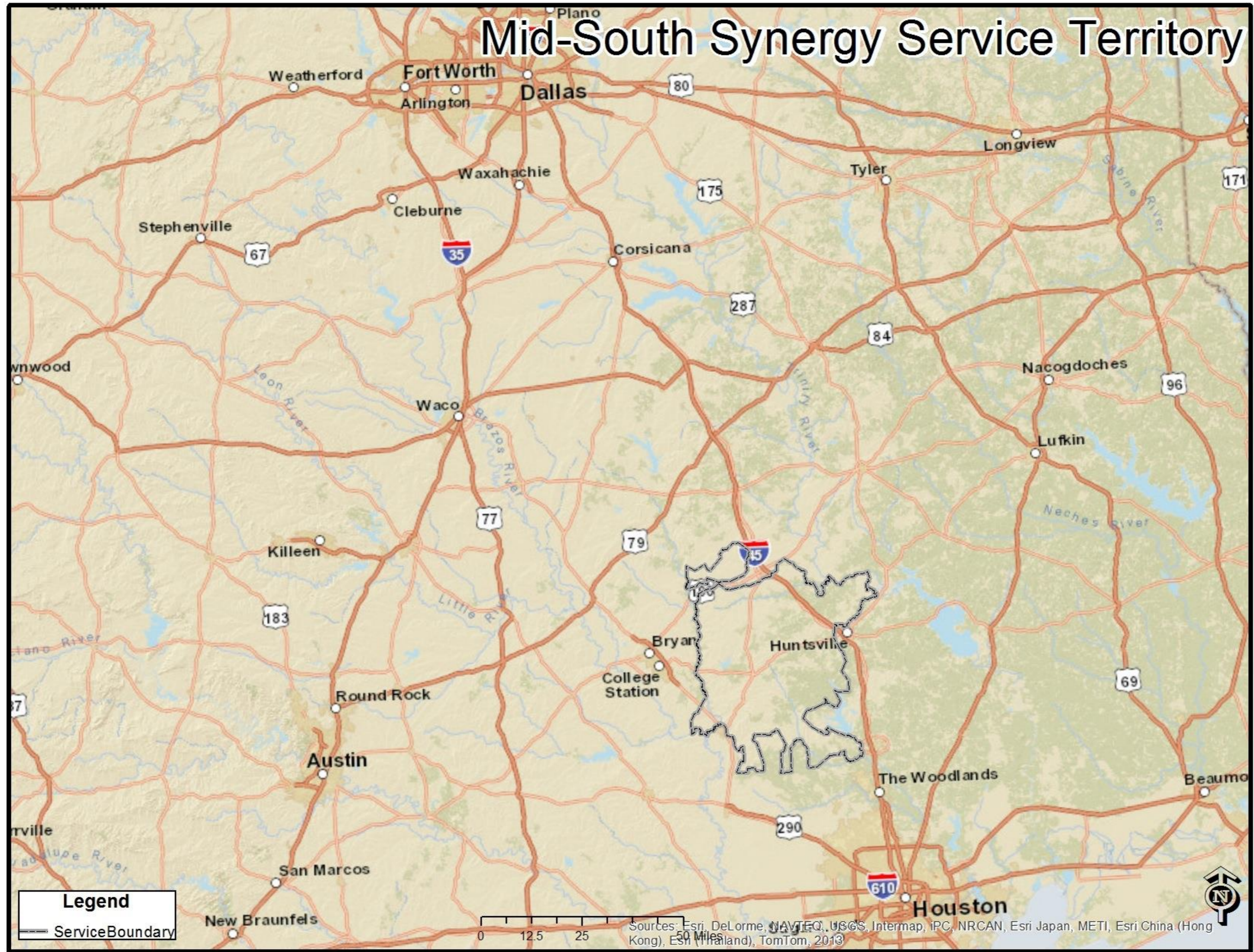
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# Mid-South Synergy Service Territory



**Legend**  
— Service Boundary

0 12.5 25 50 Miles

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Italy), TomTom, 2013

# Mid-South Synergy

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- ❑ **Six-County service territory (1,600 mi<sup>2</sup>)**
- ❑ **25 Electric Distribution Substations**
- ❑ **74 Electric Circuits**
- ❑ **3,000 Miles of Distribution Line**
- ❑ **30,000 meters**

# **‘Major’ Technology Ecosystem**

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

# **DFA At Mid-South Synergy**

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- ❑ 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

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- 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**

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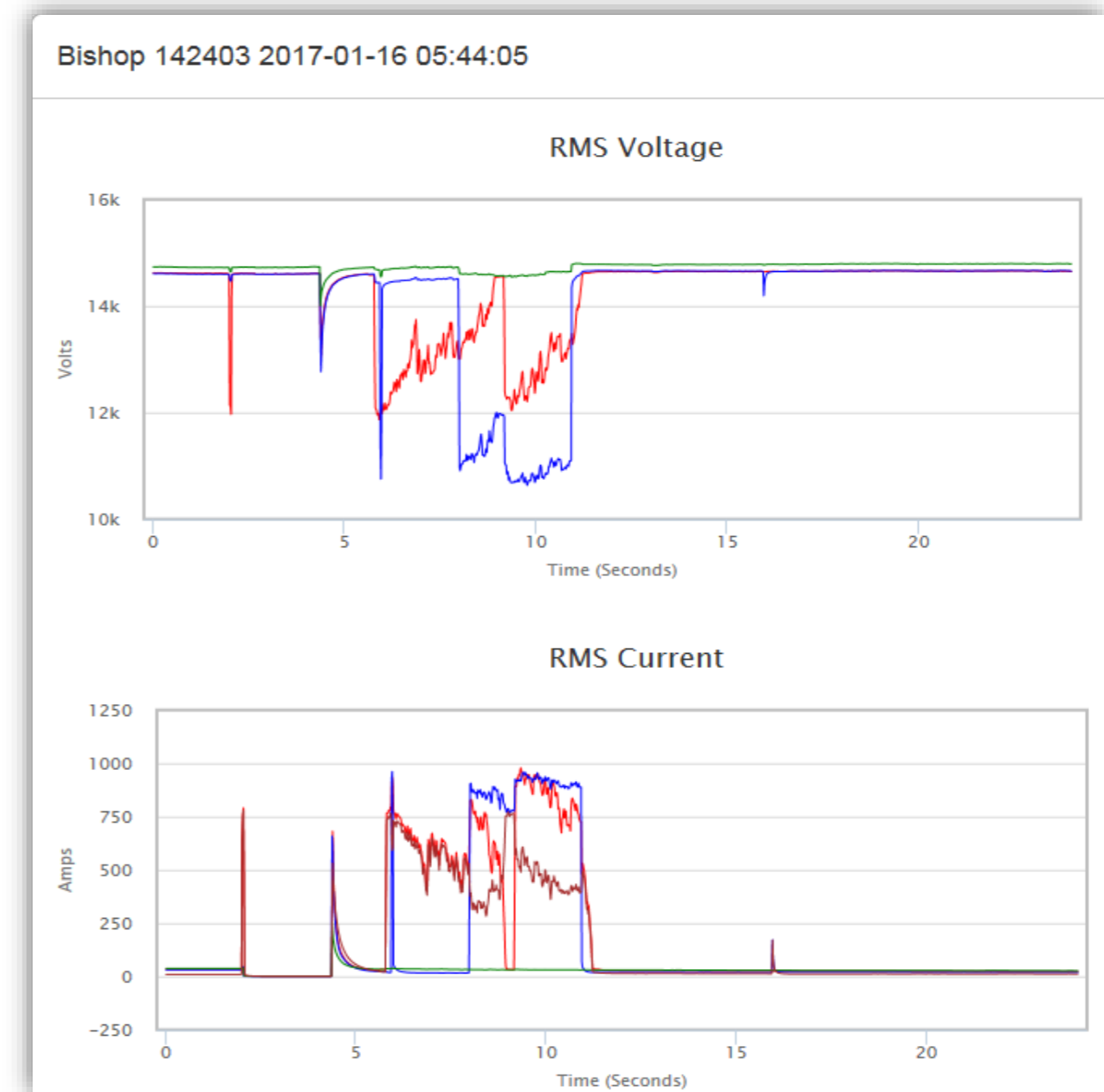
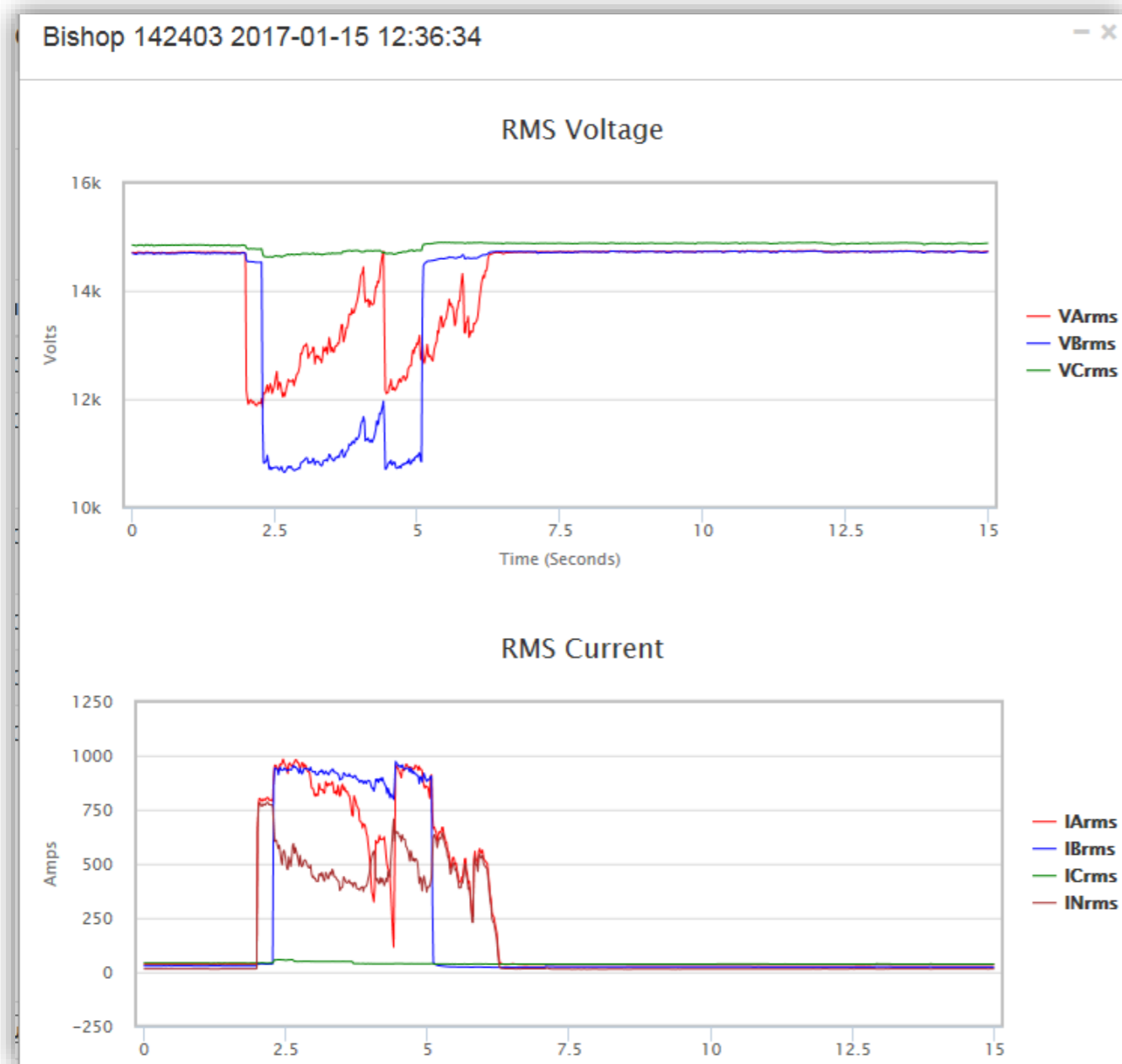
- ❑ Regular review of events via DFA website**
- ❑ Texas A&M provides email and phone consultation upon request**
- ❑ Mid-South uses DFA synergistically with an Engineering Analysis software (Milsoft)**

# Bishop Feeder 2403 Events

Expand	Substation	Circuit	Seen By	Event Type	Phases	Comments	Count	Last Occurred
	Bishop	142403	Bishop	Fault: Short lived	A	564 Amps (15 ms)	1	2017-01-23 13:23:02
	Bishop	142403	Bishop	Breaker reclose	AB	F-(3.0c,775A,AN)-T-2.3s-C-T(-,-,-)%-1.4s-F-(313.0c,955A,ABN)	2	2017-01-16 05:44:05
	Bishop	142403	Bishop	Multi-phase reclose	AB	F-(211.5c,966A,ABN)-T-(4,33,18)%-2.0s-C	1	2017-01-15 12:36:34



# Bishop Feeder 2403 Events

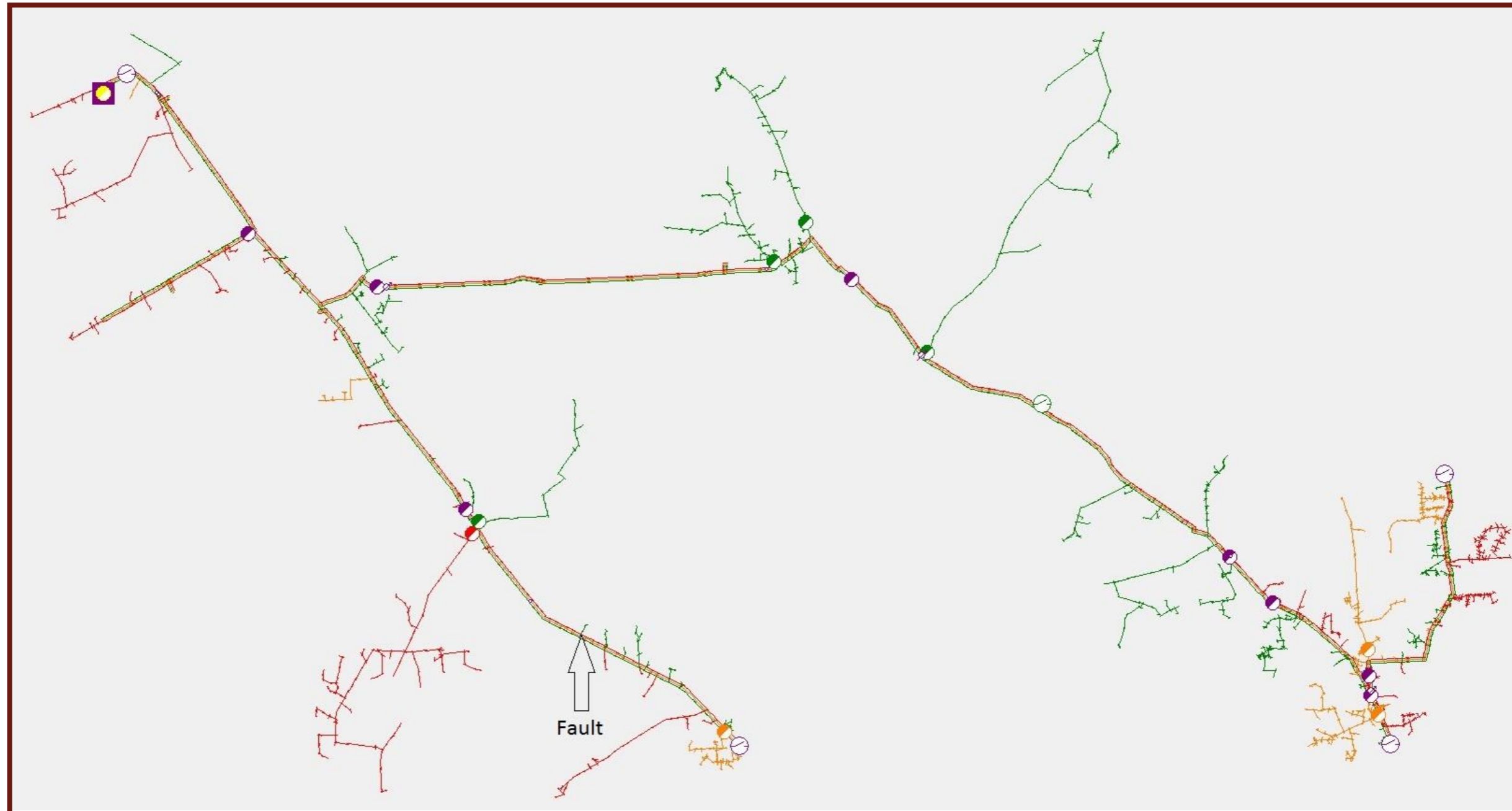


# Mid-South DFA Workflow

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- 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

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# Bishop Feeder 2403 site



# Consequence Avoided

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- 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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