Supplemental Project Notice

IDENTIFYING MODEL ERRORS THAT PREVENT SUCCESSFUL FLISR

Not all model errors have to be corrected for FLISR to be successful.

PROJECT HIGHLIGHTS

- Understanding the complete relationship between the distribution model and automatic FLISR.
- Determine how select the FLISR options within the DMS can optimize the success of FLISR
- Having a FLISR test system builds confidence in automatic FLISR.
- Large DA deployments, without automated FLISR, can stress Distribution System Operators and lead to human errors.

Background, Objectives, and New Learnings

Many utilities have smart grid programs aimed at deploying large numbers of controllable protective devices. In addition to the benefit from standard coordination of protective devices, if alternate sources are available, the same devices enable the remote execution of Fault Location, Isolation and Service Restoration (FLISR) to occur. FLISR can occur either under the direction of a Distribution System Operator (DSO) or under the direction of a computer system. Utilities that deploy large numbers of new devices under the control of the DSO may experience the unintended consequence of human performance errors associated with the natural desire to restore power quickly. To mitigate the errors associated with DSO executed FLISR, utilities have successfully deployed automated FLISR systems executed by a computer that performs the same function as the DSO but with greater speed and without errors.

Most Distribution Management Systems (DMS) have an automated FLISR module. The functionality with in the DMS based FLISR is user configurable. The DMS based FLISR can be configured to only utilize model connectivity and SCADA values to determine if FLISR should be executed. When configured in this manor, the DMS system is like rule based FLISR systems which have been very successful. The DMS systems also provides the utility with the option to perform a more in-depth analysis of the outage event based upon load flows and state estimation algorithms. In general, the additional analysis is intended to verify the location of the fault matches the location based upon impedance matching, identify any overloaded assets before the restoration action is taken and identify any voltage violations before the restoration action is taken.

As utilities decide which capabilities to enable, a keen understanding of the accuracy of their model and the model's impact on the success of automated FLISR should be understood.

New Learnings

The project aims to provide the following new learnings:

- Which functionalities should prevent automatic FLISR from occuring and which functionalities should alllow FLISR to be executed with alarms for the DSO to investigate.

Benefits

The primary benefit to the public is the utility's improved awareness and reaction to events involving complex SCADA devices. The more events that are executed by the DMS also lessens the events that are subject to human performance errors.

Project Approach and Summary

EPRI intends to work with the utility to replicate all the SCADA devices within area consisting of up to five interconnected feeders. The replication will match the DNP point mapping for the distribution automation devices in the area. The distribution simulation is intended to be installed on the EPRI servers at the Knoxville location.

EPRI intends to create two identical instances of the distribution simulation. Both simulations will have a remote login for manipulating the simulation and a distribution SCADA system (either production or development) connection to receive and transmit DNP messages from the simulated devices.

The two systems will enable the utility to associate one simulation instance with a distribution model that does not have errors. This system can be used for FLISR testing as well as FLISR training.

The second instance will be associated with an editable distribution model located at the utility. The utility will be able to manipulate their DMS model associated with the second instance to test and identify how the system will respond to various model errors.

Deliverables

- Two independent distribution simulations with remote connections.

The non-proprietary results of this work will be incorporated into EPRI's R&D Programs, and made available to the public, for purchase or otherwise.

Price of Project

The price to participate in the project is $.

The project qualifies for Self-Directed Funding (SDF). Project funding may be spread over two years of the project.

Utility commitment

The participating utility should provide the following.

- A schematic of a portion of their distribution system which will be replicated in the distribution simulator.
- The DNP point mapping for all the distribution automation devices
- DMS mapping of both distribution simulations within their DMS production or development system.
- Develop a method of manipulating the DMS model associated with one of the instances so that model errors can be tested and demonstrated.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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