Supplemental Project Notice

TRANSMISSION PROTECTION ANALYSIS TOOLS USER GROUP

Tool and Forum for Advanced Protection Modeling and Studies

PROJECT HIGHLIGHTS

- Access to multiple tools for automating complex, time-consuming protection analysis across protection coordination studies, outage-scheduling and real-time operations, transient stabilty and EMT, and blackstart
- Tool integration with ASPEN OneLiner, Digsilent PowerFactory, and Siemens PSS-CAPE
- Support for protection relay and grid modeling in short circuit, transient stability, and EMT tools
- Conduct regular meetings and discussions with peer utilities
- Offer on-going tool support
- Provide source code for all the tools. Administration rights are not required for installation

Background, Objectives, and New Learnings

The optimal performance of protection systems is critical to the safe, reliable, and stable operation of modern power systems. Protection systems are designed to operate reliably both during normal system configurations and abnormal configurations. However, power grids are now being exposed to increasingly variable and extreme conditions. Unfortunately, protection relays have caused or exacerbated some past blackouts due to undesired tripping from misoperations, power swings, subsynchronous oscillations, and other dynamic events.

EPRI worked with electric company members of the Transmission Planning program to develop advanced tools for automating complex power system protection analysis. These tools enable power system engineers to identify potential misoperations, miscoordinations, and failures to trip using automated studies in the grid planning, grid operations, and traditional protection settings stages.

There are four primary tools which will be available to members of the User Group:

- Protection System Evaluation Tool (PSET) for automating wide-area protection coordination studies.
- Grid Consequences of Protection Status (GridCOPS) for automating protection coordination and security assessment in outage-scheduling and real-time operations.
- Protection in Planning Studies (PIPS) Tool for manually or automatically modeling, parameterizing, and storing settings for relays in transient stability and EMT simulation tools.
- Cranking Path Protection Analysis Tool (CrankProt) for blackstart studies focusing on protection coordination, sensitivity, and performance during system restoration.

The tools will be updated on a rapid development cycle where possible—small enhancements and bugfixes can be provided within days or a fortnight with more advanced features being integrated into the planned development cycle. The roadmap for each tool is compiled using input from all User Group members.

Benefits

The User Group provides the following key values:

- Significant reduction in engineering time and effort to perform protection study tasks, determine actionable outcomes, and document results for later audit.
- Enable automated modeling of protection relays in transient stability and EMT simulations which are otherwise impractical or extremely time-consuming.
- Gain support for relay modeling, relay model validation, and simulations in protection analysis tools.

Project Approach and Summary

User Group interaction will be facilitated through webcasts, face-to-face meetings, and training events. User Group interaction includes:

- Regular virtual meetings to enable members to share experience, discuss protection issues, identify major feature enhancements.
- Annual User Group meeting to provide updates on tool functionality, facilitate experience sharing, and solicit input for new functionality.
- Regular tool updates, guidance, support, bug-fixes, and training.
- Provide members with the latest versions and source code of the protection analysis tools.
- EPRI will run any of the four tools on participant's grid model and provide confidential summary report of the results and guidance on corrective actions.
- Optional scope: EPRI can also run any of the tools on a once-off or regular basis and provide detailed results and recommended mitigating measures for any identified issues.

Deliverables

- User Group members will gain access to the latest versions of EPRI's PSET, GridCOPS, PIPS, and CrankProt tools for ASPEN OneLiner, Digsilent PowerFactory, and Siemens PSS-CAPE
- 4 virtual and 1 in-person meeting per year
- Optional Scope: Confidential report

The non-proprietary and non-confidential results of this work will be incorporated into EPRI R&D Programs 40: Transmission Planning and 200: Distribution Planning and Operations.

Price of Project

The price to participate is $15,000 per year. A three-year commitment is required for a total of $45,000. There is no prorating for those who join late in the three-year User Group cycle. The software tools can only be licensed by joining the group. The project is eligible for Tailored Collaboration (TC) and Self-Directed Funds (SDF).

Optional scope: Contact EPRI for separate scope and pricing.

Project Status and Schedule

The User Group will run for three years from January 2024 to December 2026. At the end of 2026 EPRI will determine the need and support for continuing the group for another three-year cycle.

Who Should Join

Transmission utilities who wish to perform wide-area protection coordination studies; monitor protection coordination in the background and alert them to potential misoperation risks; consider protection performance in transient stability and EMT simulations; or otherwise use advanced tools to improve analysis of protection systems in their planning, operations, and protection teams.

Contact Information

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