Technology Innovation Project

Closing Project Brief

TIP 356: Improving Tools for Real Time study Engineers using Node-Breaker Models

Context

Transmission strategic initiatives and industry groups such as the Western Electricity Coordinating Council (WECC) Path Operator Task Force are moving transmission operations away from planned, nomogram driven system operating limits (SOLs) to "SOLs on Demand". Transmission limits calculated close to real time are more accurate and specific to actual operating conditions. Fewer assumptions in the calculation of SOLs can reduce the need for over conservative margins which allow for unknown conditions. Less conservative transmission limits, especially when calculated out into the next few hours, should increase non-firm sales and revenues.

There is a need to provide a view of reliability constraints, violations, and system operating limits that encompasses the next few hours, so that System Operators have the necessary awareness of upcoming conditions to prevent problems without the need to resort to curtailments or re-dispatch in real time. Real time strategies that are coordinated and based on current system conditions, reduce the risk of canceling planned maintenance and in turn result in a more reliable and efficient use of the transmission system.

Description

Real time study engineers need more real-time and near-term (+1 through 24 hours) analysis tools to provide a basis for proactive system operation.

This project developed analytical tools that will address the flexibility of the transmission system by building flexible study tools for real time. Rather than a single study per day, these tools build a suite of studies to assess changing conditions and also look ahead as the forecasts of wind, generation and load change.

BPA purchased the Maxisys Case Builder tool in April 2017 and began testing functionality of the tool since installation approval in July of 2017. During testing, data was manually uploaded into the tool for proof of concept and compatibility.

The project was conducted in two phases:

Phase 1 (2016-18) acquired software that allows real time engineers to predict probable regions of operation, identify critical conditions within those regions and extensively test the conditions against reliable criteria. It then provides the results of all these studies in a manner that allows a real-time operations engineer to easily monitor the state of the contingency analysis, identify results which need further analysis, and preform that analysis within real-time timelines. Various software packages were tested and adopted for use in this phase.

Phase 2 (2018-19) automated data compilation and uploading to allow for contingency analysis. Further customization of the Maxisys Case Builder software was preformed to allow the automated uploading of more precise model and system information.

Benefits

Transmission limits calculated close to real time are more accurate and specific to actual operating conditions. Fewer assumptions in the calculation of SOLs results reduces the need for over-conservative margins which allow for unknown conditions. Less conservative transmission limits, especially when calculated out into the next few hours, should increase non-firm sales and revenues.

The tools developed in this project may avoid unnecessary redispatch of federal hydro projects (e.g. during fish spill, BiOp issues) due to over-conservative SOLs or unexpected transmission conditions.

Better forward looking real time tools give dispatch time to adjust the system before problems occur leading to fewer compliance violations.

Accomplishments

This project developed analytical real-time tools that can predict probable regions of operation, identify critical conditions within those regions, and extensively test the conditions against reliability criteria.

The tools provide the results of all of these studies in a manner which allows a real-time operations engineer to easily monitor the state of contingency analysis, identify results which need further analysis, and perform that analysis within the real-time timelines.

Deliverables

1. Software acquisition and implementation in (State Estimator and Case Builder) in phase1 (2016-17).

2. Software modifications to Casebuilder and Scheduler software to enable automated date loading, run scheduling, and validation in phase 2 (2018-19).

3. Peer reviewed publication (on phase 1 of the project).

4. Software training / documentation (on phase 2 of the project).

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Project Start Date: October 1, 2015

Project End Date: September 30, 2018

For More Information Contact:

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Reports , References, Links

Participating Organizations

Maxisys, Inc.

Conclusions

This project achieved its objective to produce a process that yields hour-ahead cases that can be used for near-term system analysis. However, further development and testing is needed before the software can be used in every day production.

The project has been moved to the IT Alternative Solutions Assessment process to determine if it is the best available solution to the problem statement.