

## Lesson Learned

### Importance of State Estimator Save Cases and Troubleshooting Guide

#### Primary Interest Groups

Reliability Coordinators (RCs)  
Transmission Operators (TOPs)  
Transmission Owners (TOs)

#### Problem Statement

A state estimator failed to solve for 37 minutes, resulting in real-time contingency analysis also being unavailable.

#### Details

During this event, operators had system visibility via supervisory control and data acquisition (SCADA) and could still take control actions, including the ability to shed load.

The Inter-Control Center Communications Protocol (ICCP) continued to function, providing real-time data to the RC and the other local entities in the RC's footprint. The entity confirmed with its RC that the RC's state estimator continued to solve and provide real-time contingency analysis.

The root cause was never specifically determined. At the time of the event, the state estimator was not archiving save cases on a periodic basis. Because there was no saved data to review, support staff were unable to perform a detailed post-event analysis.

#### Corrective Actions

- The entity developed a method to automatically archive state estimator save cases more frequently to assist in post-event reviews.
- The entity developed a state estimator troubleshooting guide for system operators to ensure a consistent approach and performed refresher training for them.
- The entity worked with its RC and other local entities to review solution parameters that could contribute to unsolved state estimator solutions.

#### Lessons Learned

- A state estimator should be able to automatically and frequently save cases to assist in post-event analysis. It should also automatically save non convergent cases.
- Operators and support staff should have clear guidance and training on troubleshooting state estimator failures. An online state estimator guide for systems operators should be available to

ensure consistent troubleshooting. Periodic refresher training should also be employed, including reviews of recent aborted cases.

- A joint review of state estimator issues with other entities should be periodically conducted to ensure applicable common solutions are implemented.

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