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Real-time Tools Guideline

Revised: June 19, 2014

Purpose

This document provides a guideline for best practices related to real-time tools available for the monitoring and control of the Bulk Electric System (BES). The document was created under the guidance of the Western Electricity Coordinating Council (WECC) Energy Management Systems Work Group (EMSWG), which is a group of Energy Management Systems (EMS) staff within the WECC Reliability Coordinator's (RC) operating area. This document will continue to evolve as new tools and practices are discovered. This document shall be maintained by the WECC EMSWG for those updates/changes. This guideline provides best practices for running real-time tools in the EMS. The real-time tools do not necessarily need to be run as part of the EMS so long as they are able to provide the same situational awareness functionality.

Real-time tools can further be broken down to the following categories:

- Advanced applications
  - Network model
  - State estimator
  - Contingency/Security Analysis
  - Real-time study environment
- Alarming/Alerting
- Health and support of advanced applications

Applicability

This document can be used as a benchmark for determining appropriate settings and capabilities of EMS used by entities registered as TOPs or for use by any entity that wishes to use real-time tools.

Roles and Responsibilities

- The RC should perform the following as it relates to Real-Time tools.

- Overall responsibility for monitoring of the underlying TOPs with the use of advanced applications
- Notify TOPs of potential SOL exceedances due to credible contingencies, as seen by the RC's advanced applications

- TOPs should perform the following as it relates to Real-Time tools
  - Notify the RC of potential SOL exceedances due to credible contingencies, as seen by the TOP's advanced applications
  - Contact entities with model changes based on model changes posted to peakrc.org

Key Issues

The creation of these guidelines was coordinated with the FERC/NERC report *Arizona-Southern California Outages on Sept 8, 2011: Causes and Recommendations*, recommendation #12, which states:

> *TOPs should take measures to ensure that their real-time tools are adequate, operational, and run frequently enough to provide their operators the situational awareness necessary to identify and plan for contingencies and reliably operate their systems.*

Based on this recommendation the following provides some best practices for the operation, monitoring, and use of real-time tools and advanced applications.

Detailed Guidelines

The following sections provide more granular detail of the guidelines for critical portions of the real-time tools identified above.

I. **Network Model** – The network model is the base for all other advanced applications within the EMS and provides necessary data that feeds the other advanced applications.
   a. Entity network models should be of sufficient scope to identify contingencies:
      i. Within their boundaries affecting their system
      ii. Within their boundaries affecting neighboring system(s)
      iii. Outside of their boundaries affecting their system
   b. Topology data clearing house
      i. Changes that affect the overall functionality of advanced applications should be shared with the RC and neighboring entities in a centralized location.

ii. Model changes are posted on peakrc.org, information contained has highlights that will provide entities with notification of changes in neighboring areas.

c. Modeling practices should include a process by which changes are captured and the model is updated at some frequency determined by the entity.
   i. Changes should fall under the entities change control process as to limit the possibility of errors in the model.

II. Real Time Data Exchange – Real time tools are dependent on real time data. While real time data is exchanged between entities in many way (such as phone call, email, common RTU, ICCP, EIDE, others…), real time data exchange for the data needed by real-time tools should be done by ICCP.

a. Real time data should include sufficient MW, MVAR, KV, TAP, and STTS information for neighboring entities to support state estimation.
   i. It is the responsibility of the requesting entity to determine what real time data is needed, and to work with the owning entity to find a mutually acceptable way to exchange the data.

b. For switch status information that is not normally generated by a meter (pseudo status information), it is preferred for this data to be manually maintained by the organization closest to the source of the information and distributed via ICCP to necessary entities. Pseudo status information should be indicated as such either or both in the ICCP data exchange and the model topology information exchange.

III. State Estimator – The state estimator is the tool that processes the EMS data collection with the network model to create a best guess of the current state of the transmission system. The state estimator is constrained by metering, physical capabilities modeled, and error processing.

a. An available state estimator should include the following:
   Sufficient accuracy to correctly identify potential contingencies when studied;
   i. Within the boundaries affecting their system
   ii. Within the boundaries affecting neighboring system(s)
   iii. Outside of the boundaries affecting their system

b. Availability rate for the state estimator should be tracked and stored for historical purposes.

c. The entity should have the state estimator available at critical times such as peak loads or during events when elements are coming in or going out of service.

d. The state estimator should be periodically updated. The time period for periodic updates and availability should be at least once every 10 minutes.

i. Unavailability of the state estimator should be alarmed, at most, 30 minutes after the application becomes unavailable
ii. If the unavailability persists longer than 60 minutes, notification to the RC and neighboring entities should be sent

e. Snap shots of system conditions available for use in a study environment should be made at least once a day and stored for at least seven days.
f. Specific individual cases should be stored based on the capture certain BES conditions such as:
   i. Peak Load within the Balancing Authority (BA)/TOP
   ii. Peak Generation output within the BA
   iii. Significant system conditions – as determined by the entity

IV. Study Environment – Study environment covers the work area that allows additional system analysis that is not automatically evaluated by the periodic contingency analysis. This can be one of the following:

a. Separate offline system (quality assurance or development) available to EMS staff and operating engineers.
b. Separate area on the production EMS that does not impact the running production environment.
c. Case storage work areas for operating engineers and operators to perform next-day and pre-switching/real-time studies.

V. Contingency Analysis – Contingency analysis provides important situational awareness as it pertains to the Bulk Electric System and future contingencies as well as real-time analysis. Active use of contingency analysis should be a daily occurrence or as often as needed to obtain appropriate situational awareness of the BES changes.

a. Contingency analysis should produce results at least once in a 15-minute period.
b. The entity should have contingency analysis available at critical times such as peak loads, or during events when elements are coming in or going out of service. Alerting of new contingency system operating limits violations and unsolved convergence should be available to the real-time operators

VI. Alarming/Alerting – Alarming provides critical notifications to operations staff and is required for appropriate situational awareness to the current conditions of the Bulk Electric System or critical components of the EMS.

a. Critical alarms, as determined by the entity, should have both an audible and visual queue for the dispatcher.

i. Alarm priorities should be developed to appropriately show the criticality of the alarm.

b. Alerting should be categorized to make the notifications available to the relevant dispatch desk.

c. Alarm watchdog process should be running to validate that the alarm process is working correctly.

VII. Health and support of the advanced applications

a. Support should be available 24/7 to operations for issues with the advanced applications, in the form of one of the following:
   i. Operating/Planning Engineers
   ii. EMS support
   iii. Technical support in the form of processes and procedures used to resolve common issues

b. Monitoring the health of the advanced application should be in line with its operation or the overall EMS health.

c. Changes that affect the overall functionality of advanced applications should be shared with the RC and neighboring entities in a centralized location.

Approved By:

Approving Committee, Entity or Person	Date
Operating Committee	March 25, 2015
Critical Infrastructure and Information Management Subcommittee	February 19, 2015
Energy Management Work Group	June 19, 2014