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Real-time Assessments

FERC and ERO Enterprise Joint Report

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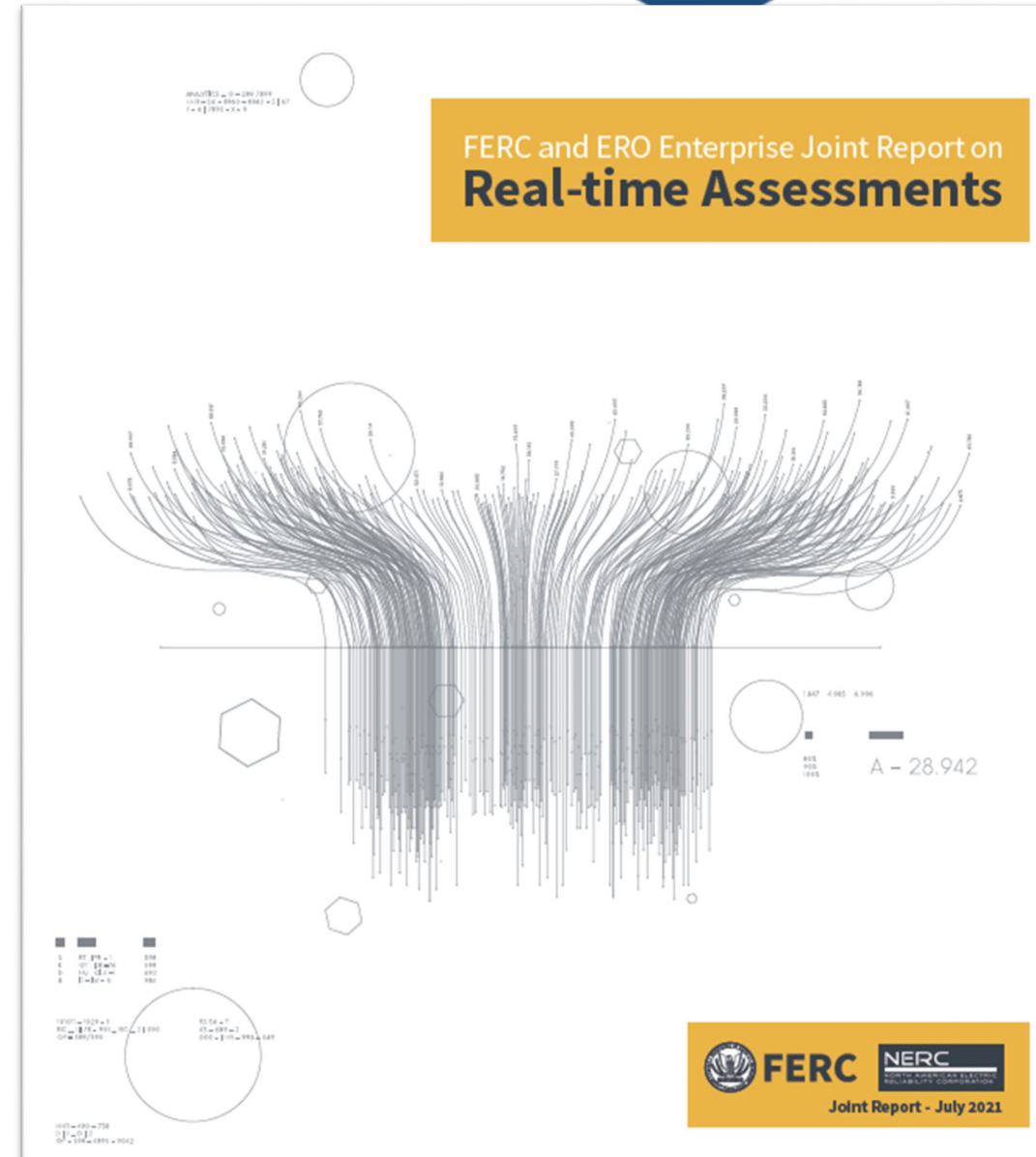
September 16, 2021 9:00 – 10:00 am Central Time

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Agenda -

- Background and summary of report
- We'll focus in on two key components in particular:
 - *Data Quality for EMS and SCADA*
 - *Alternate Real-time Assessments*
- Conclusions/Q&A



- FERC, NERC, and the regions visited nine Reliability Coordinator/Transmission Operator Control Centers (pre-Covid)
 - The nine participants received a set of scoping statements and questions prior to an on-site visit by the team. This allowed the participants to prepare for the on-site discussion.
 - Upon completion of the site visits and teleconferences with participants, the joint review team compiled its findings and recommendations and observed beneficial practices to share with industry.
 - The team observed numerous best practices employed by participants that go beyond the recommendations and may go beyond the scope of smaller entities.

- **Seven Technical Areas Were Examined:**
 - Real-time Assessment tools under normal operating conditions
 - ***Real-time data and data quality***
 - Managing the loss of Real-time data
 - ***Alternative Real-time Assessment and study tools***
 - Model Management
 - Control Center hardware configuration
 - Major system upgrades/vendor changes
- **The Team's recommendations focus on the following issues and objectives:**
 - Maintaining situational awareness when tools are impacted
 - Ensuring actions are known and consistent in timing and scope
 - Having feasible, accurate backup plans with related training programs
 - Establishing verification procedures to ensure that models are accurate and consistent
 - Maintaining awareness of changes/upgrades to the EMS

- What is a Real-time Assessment?
 - *An evaluation of system conditions using Real-time data to assess existing (pre-Contingency) and potential (post-Contingency) operating conditions. The assessment shall reflect applicable inputs including, but not limited to: load levels; generation output levels; known Protection System and Remedial Action Scheme status or degradation; transmission and generator outages; Interchange; Facility Ratings; and potential phase angle and stability limitations, if any. Real-time Assessments may be provided through internal systems or through third-party services.*

[NERC Compliance Implementation Guidance](#)

Data Quality



- Most participants stated that their systems and their neighbors' systems provided redundant data through overlap between RTUs and ICCP data links.
- Often the duplicate values were presented on displays side-by-side
 - Color coding to highlight the magnitude of differences
 - Allows entities to compare values and select best value when the sources diverged
- Some entities were able to switch between redundant data sources on a point-by-point basis.
- Section III-B in the report has detailed information on *Data Quality Measures and Thresholds*.

- Some participants were measuring convergence rates and could anticipate an SE failure if they saw it was taking longer to solve.
- Some entities were performing stress tests on backup systems
 - They removed a large piece of data
 - Assess how the system responds
 - Helps identify if redundancy is sufficient or not
- At what point is stale data causing unacceptable results? At what point is a State Estimator solution no longer providing results within an acceptable threshold? These are the key issues that each control center needs to determine for their particular system.

- The Reliability Standards do not provide exceptions to the 30-minute requirement to complete a Real-time Assessment.
 - Reliability Coordinators and Transmission Operators are required to perform a quality Real-time Assessment even during the partial or complete loss of primary tools or Real-time data.
 - This includes Real-time Contingency Analysis (RTCA)
- So let's focus on the Alternate RTCA practices that the members shared with the team.
 - 6 of the 9 participants indicated that they can perform RTCA with off-line tools, such as powerflow programs.
 - If a planning model is used instead of a EMS model snapshot, that planning model needs to be maintained daily to reflect current system conditions.

- Alternate RTCA practices (cont'd):
 - Two of the Transmission Operator participants did not use offline tools and instead relied on their RC's RTCA results to meet their RTCA portion of their Real-time Assessment. Typically, the RC already is using the full contingency set from the TOP.
 - One RC participant obtained the RTCA results from its Transmission Operators when its own RTCA is not available.
 - One RC, in addition to its offline tool capability, developed its own separate contingency analysis tool that it uses when its primary RTCA application is not available.

- Now let's look at a few examples of **when** entities initiate the use of offline RTCA tools:
 - One TOP would rely on their RC's RTCA if their State Estimator failed three consecutive times (15 mins).
 - One RC, upon a failed SE solution for 10 mins, would download the last successful SE model and perform RTCA offline with a redundant copy of their primary RTCA program. This RC could also load the last SE model into an offline powerflow program, if necessary.

So you can see the difference between TOPs and RCs backup RTCA plans that we talked about earlier- often times it's based on their size and impact to the Bulk Power System.

Conclusion



- For additional information on Situational Awareness topics, register to attend the [*NERC Monitoring and Situational Awareness Conference*](#)
 - **Session 1 | September 23, 2021**
Overview of the bulk power system
 - **Session 2 | October 7, 2021**
Distributed Energy Resources
 - **Session 3 | October 28, 2021**
Technique and Workforce Challenges



Questions and Answers