



Transient Security Assessment (TSA)

Update on the Real-Time Transient Tool

for PJM Operations

1. Current Status of TSA Project

- Committee Status Reports & Trainings
- Overview of TSA
- Inputs to TSA
- Process for Ensuring TSA Accuracy
- Highlights of TSA Operations Memo

2. Validations & Lessons Learned

3. Plans & Next Steps

Committee Status Reports & Trainings

- Presented TSA to the Committees
 - April 2008 (SOS, OC)
 - September 2009 (SOS, OC, PC)

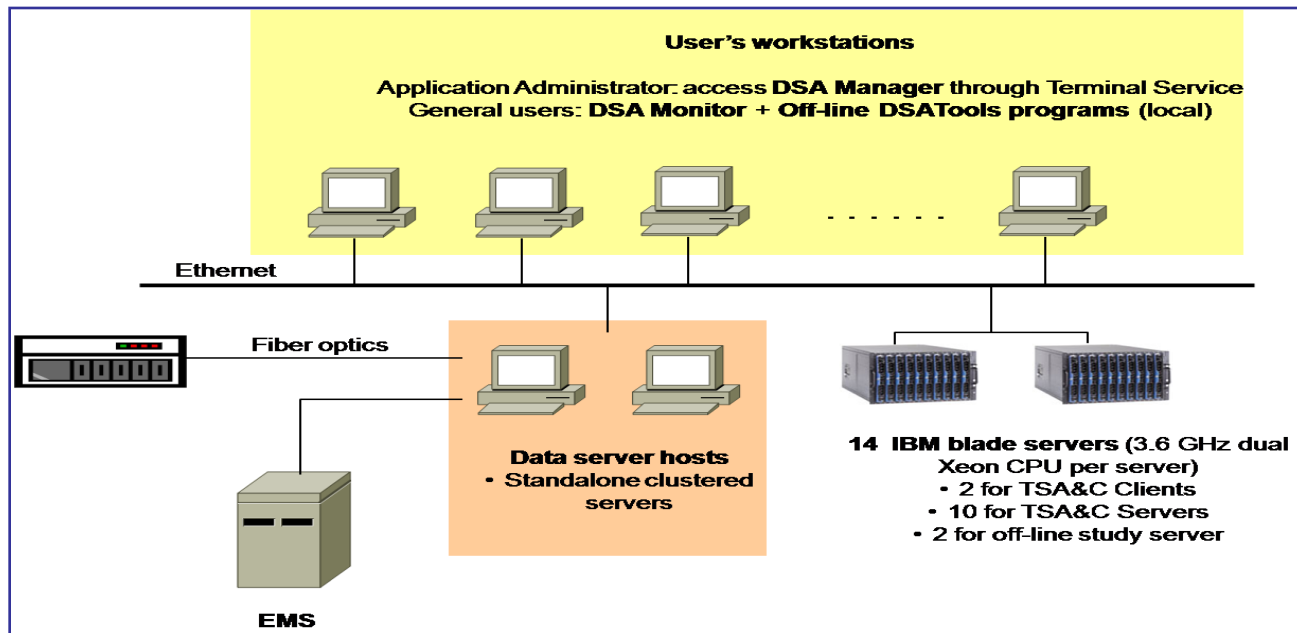
- Provided Trainings for PJM Users
 - Dispatchers
 - Reliability Engineers
 - Operations Planning Engineers

Overview of TSA

- Monitor and determine **transient stability** of the PJM system subject to 3000 pre-defined contingencies.
- Compute **stability limits** by using real time data input and real time network models.
- Provide recommend **transient stability control measures** required to prevent the system from losing transient stability for potentially unstable system condition and/or contingencies.
- Replace the current process which uses the tables generated by off-line planning studies incorporated in Manual 3 Section 5.

Overview of TSA

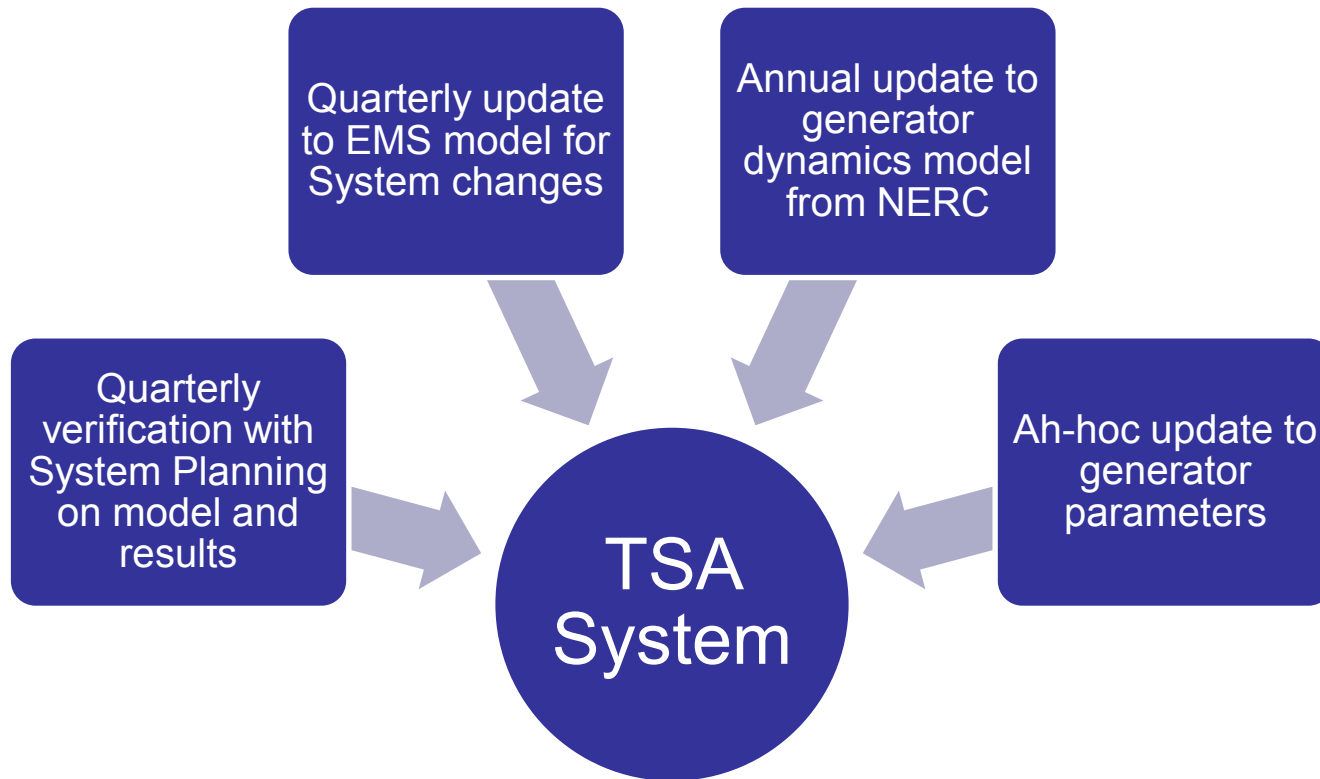
- Advanced non-linear system technology
- Parallel computation
- Assessment cycle: every 15 - 20 minutes



Inputs to TSA

- Real time network model and State Estimation solution
 - Interfaces with PJM EMS
 - Sequence Network model
- Dynamic model for each generator (over 3000 units)
- EMS contingency definitions
 - Incorporate T.O or Planning fault clearing times
 - Balanced and Unbalanced faults

Process for Ensuring TSA Accuracy



Highlights of TSA Operations Memo

- Day Ahead study for certain Planned outages
 - Conservative study for pre-positioning of generators.
 - Communicate study results to impacted Transmission and Generation Owners.
 - Differentiate between flexible vs inflexible generator for control.
- Real-Time
 - Monitor the TSA tool in real-time Operations to ensure system stability.
 - Take corrective actions to maintain stability.

1. Current Status of TSA Project

2. Validations & Lessons Learned

- Validation of TSA Software
- Validation of TSA Models
- Found Model Inaccuracies
- Validations Performed

3. Plans & Next Steps

- **Validation of TSA Software**
 - Compared with the PSSE transient program by using same cases.
 - The simulation results of TSA and PSSE were the same.

- **Validation of TSA Models (Real time network model, Dynamic generator models and contingency models)**
 - TSA results were consistent with Planning Studies
 - Impact of Using PJM EMS or MMWG Internal Model is negligible
 - Impact of Using PJM EMS or MMWG External Model is negligible

- **Found Model Inaccuracies**
 - GSUs & Tap settings
 - Line impedances

- **Validations Performed With**
 - **PSEG:** Artificial Island Stability Benchmarking
 - Internal and External Model Impact
 - **DOM:** Dom's Stability Areas Study
 - **PPL:** Initial NEPA Interface Study
 - **COMED:** Reviewing Currently
 - **AEP:** In progress

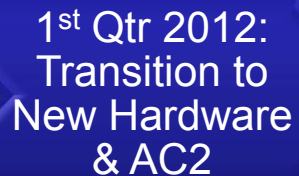
1. Current Status of TSA Project

2. Validations & Lessons Learned

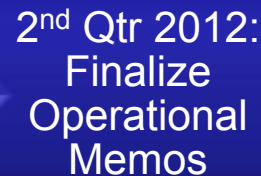
3. Plans & Next Steps

Plans & Next Steps

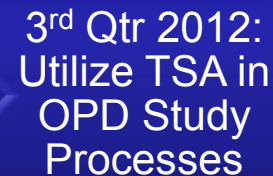
- Implementation Plan for 2012

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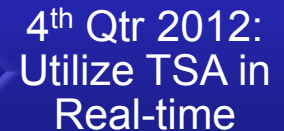
1st Qtr 2012:
Transition to
New Hardware
& AC2

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2nd Qtr 2012:
Finalize
Operational
Memos

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3rd Qtr 2012:
Utilize TSA in
OPD Study
Processes

A blue chevron-shaped arrow pointing right, containing the text "4th Qtr 2012: Utilize TSA in Real-time".

4th Qtr 2012:
Utilize TSA in
Real-time

- Complete Benchmarking for remaining stability areas with Transmission Owners by 3rd Qtr 2012



Questions?