Tuning of Optimization Solver Configurations for SCED under RTC+B

RTCBTF

January 20, 2026

Optimization problem in RTC SCED and its Solver

- The RTC+B implementation adds more control variables and constraints to MMS SCED optimization, including binary or integer variables.
- Therefore, the new RTC SCED is modeled as a Mixed-Integer Quadratic Programming (MIQP) problem and solved using IBM CPLEX, a high-performance optimization solver widely used in the power industry, as well as in other industries.

Observation of Non-Optimal SCED Solution

After RTC go-live, it has been observed that, for certain SCED intervals , MMS SCED didn’t achieve the optimal solution. The issues reported include:

- At a Resource level, some Resources weren't dispatched or awarded to their maximum economic benefit, despite there being no Resource-specific constraints violated.
- At the system level, there were minor differences between Ancillary Service award shortages and its corresponding price on the Ancillary Service Demand Curve (ASDC). For the observed cases, it was typically limited to a few MWs for Non-Spin reserves.
- In a few rare cases, it was also observed that certain transmission constraints were shown as binding with non-zero shadow prices, even though the dispatched flow was below the constraint limit.

Investigation and Testing

- After identifying these outcomes, ERCOT collaborated with the software vendor to investigate specific SCED instances. After reviewing the results and ruling out any software errors, it was determined that the results were due to parameter settings within the optimization solver, and possible deficiencies of the selected solver algorithm.

- In collaboration with the vendor, ERCOT has worked to tune and test the optimization solver by changing the identified solver parameters and testing different solver algorithms.

Changes to the Optimization Solver

After confirming the changes would not negatively impact SCED performance, on January 8, 2026, ERCOT implemented the following changes in MMS SCED to improve the solver accuracy and stability:

- The setting for Relative MIP Gap Tolerance was adjusted from “1e-4” to “1e-7”. This parameter is used by the optimization solver to determine when it has reached a satisfactorily optimal solution and can stop searching for a “better” solution. Lowering this value requires that the solver find a solution closer to the true optimal solution.
- The CPLEX solver algorithm was switched from "Barrier (Interior Point Method)" to "Primal Simplex". As the root cause of the concern with the "Barrier" algorithm is still being investigated, the "Primal Simplex" algorithm was recommended as a more stable alternative and showed significant improvement on the testing cases.
- Pre-deployment testing showed the none of the identified issues that resulted from the previous parameter settings were present once those parameters were modified.