EMS – RTSCED Dispatch Data Flow

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January 17, 2024

Overview

- Purpose
  - Provide a high-level understanding of the generation data flow between Energy Management System (EMS) and Real-Time Security Constrained Economic Dispatch (RT SCED).
- Key Takeaways
  - RTSCED Overview
  - AGC Overview
  - EMS-RTSCED data flow

RT SCED

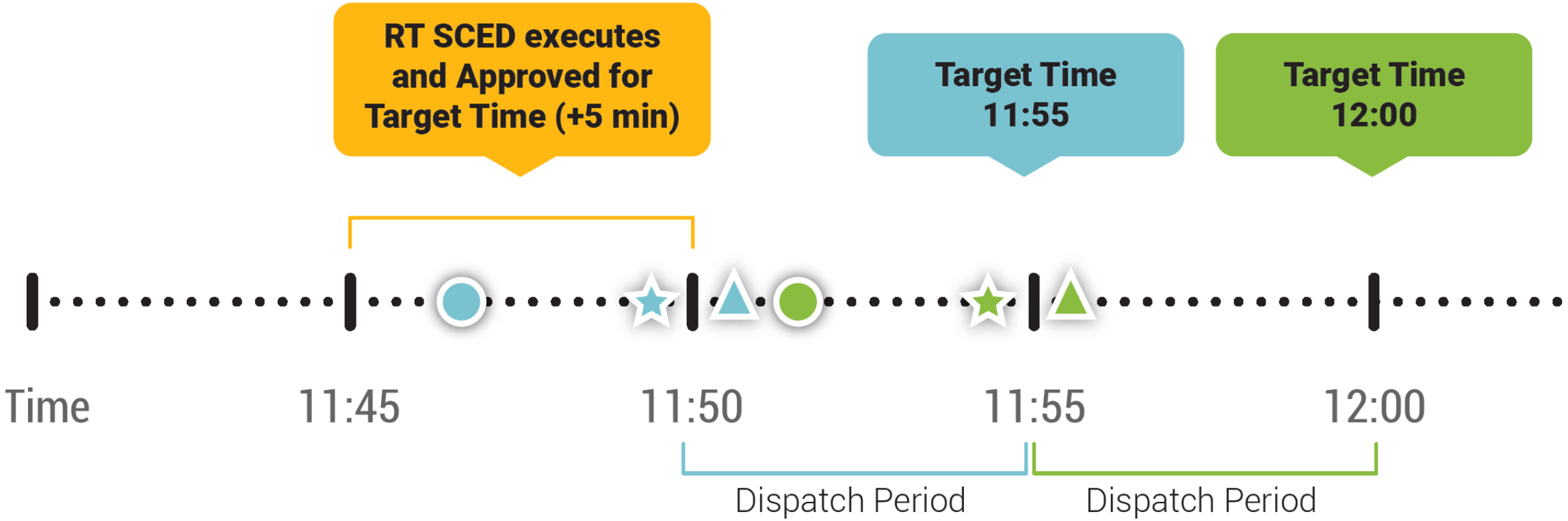
- RT SCED cases are auto executed every 5 minutes or upon demand
- ~1.5 minutes to solve each RTSCED case
- ~20-30 seconds to render on the UEV display
- ~2-2.5 minutes to review case
- ~3 seconds to approve RTSCED case

- Dispatches online resources (generation and Demand Resource) for Energy and Regulation
- Procure flexible reserve MW to meet SR, PR, and 30-Min Reserve requirement
- Resource economic basepoint from approved cases is passed to PJM AGC
- Resource AS assignments from approved cases is passed to PJM AGC

Inputs into RTSCED Engine and Frequency

Inputs Used	Description	Frequency
Resource Bid Data	Latest Participant Resource Bid data (Offers MW, Offers Price, Parameters and MW limits)	1 Minute
EMS Data	Latest State Estimator run, Constraint specific Distribution Factors and Loss Penalty Factor	~1 to 2 Minutes
Load Forecast	RT SCED uses Neural Net Load Forecast (VSTLF). It is a rolling 6 hours into the future and is updated every 5 minutes	5 Minutes
Regulation	Current Regulation Resources and assignment data	Available Each case execution
Interchange	Energy Schedules	5 Minutes
Load Bias	Bias utilization is based on actual load, actual interchange, and the actual performance/availability of generation resources	Ad hoc
Operator specific Inputs	Hydro Schedules, Constraint Control %, Marginal Value Limit Overrides	Ad hoc

RTSCED Case Sequence

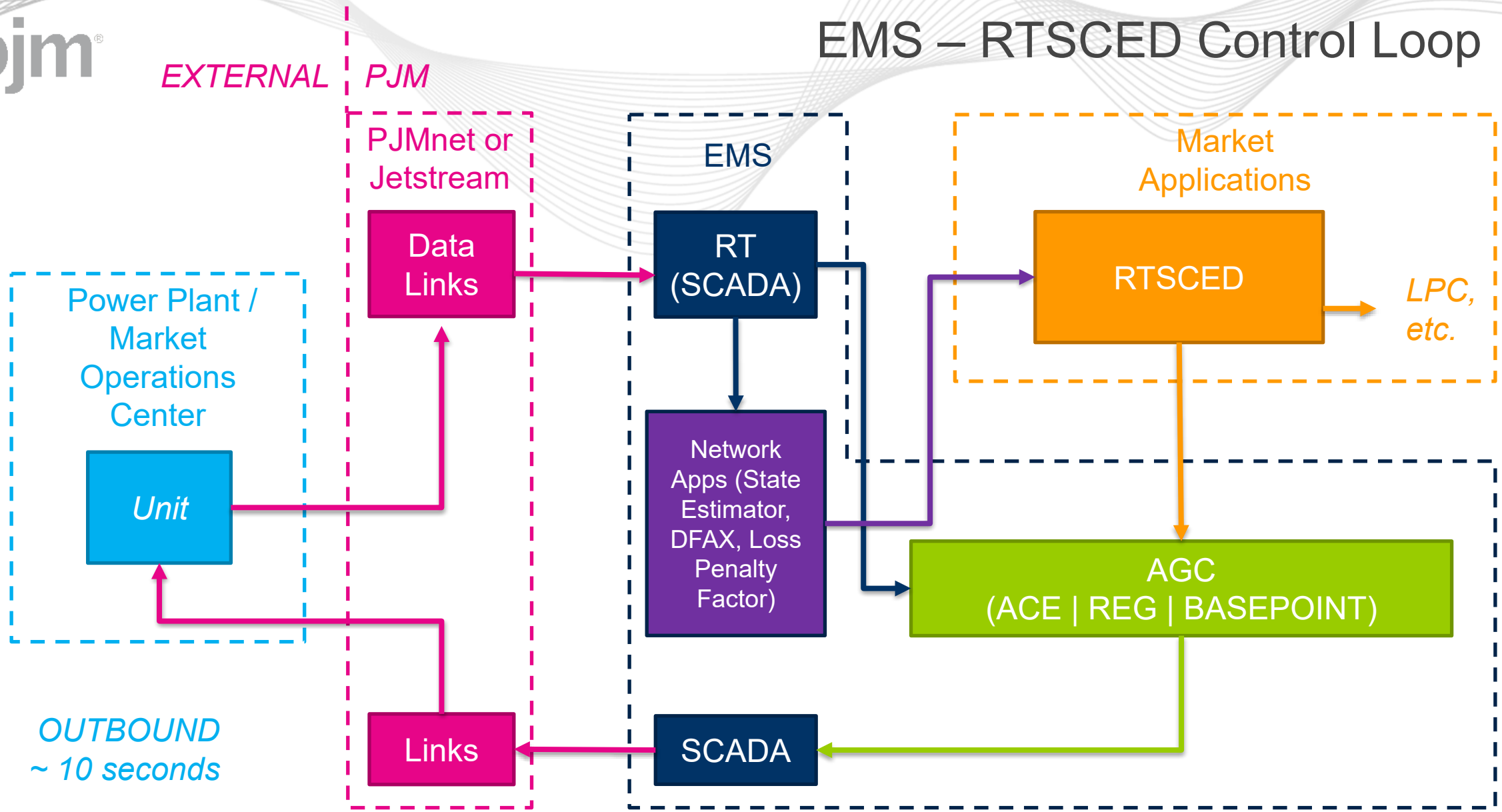


AGC

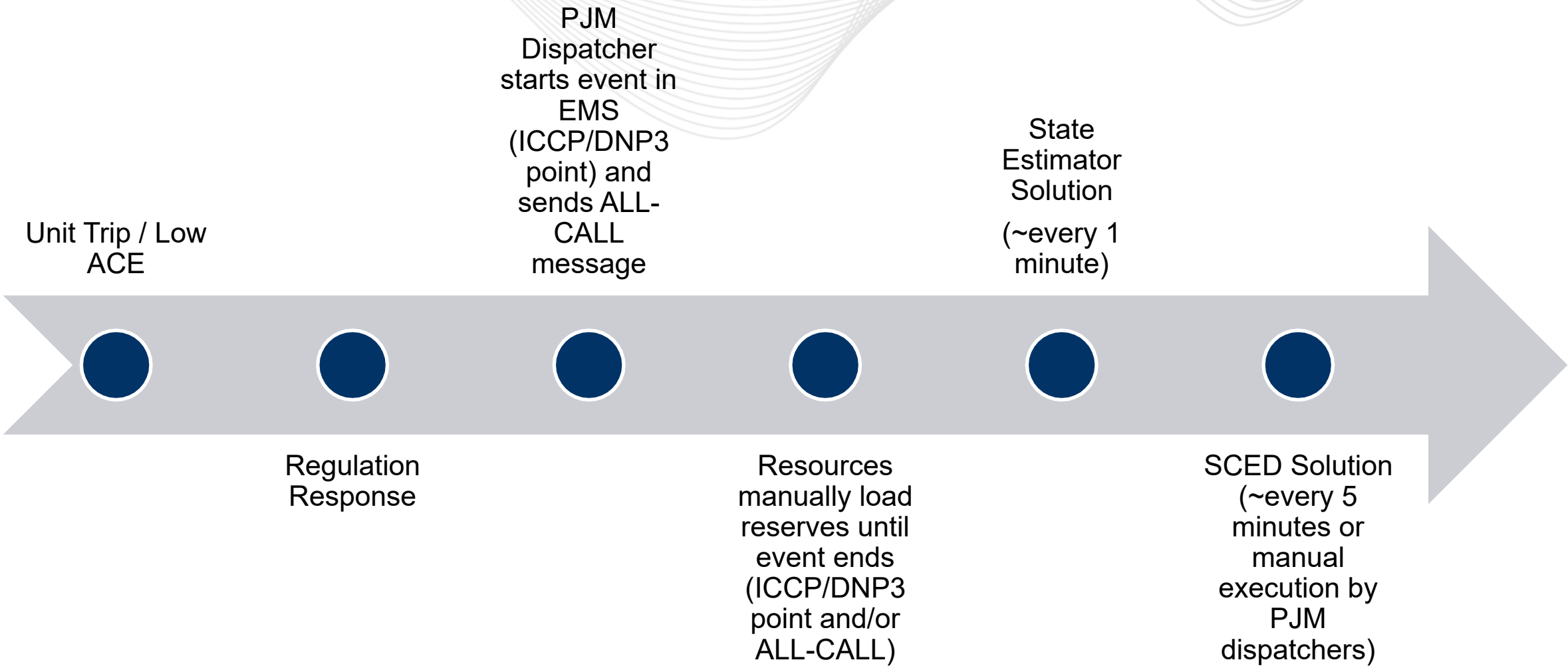
- AGC executed every 2 seconds
- Calculates Area Control Error (ACE)
- Calculates Area Regulation Signal (AR)
- Calculates Manual Economic Dispatch for “OFF SCED” Period (when necessary)
- ~10 seconds to telemeter RTSCED values out
  - ~2 seconds for Reg
  - ~2-10 seconds for basepoint

- AGC processes basepoint information and passes information to external resources
- AGC validates basepoints against the resource economic limits
- AGC maintains unit dispatchable status
- Spin Flag communicated when dispatcher initiate a spin event
- Unit Deviation (Gen-SCED)

EMS – RTSCED Control Loop



Spin Event Timeline



Key Data Transfers and Frequency Summary

- Telemetry into EMS (~3 seconds)
- State Estimator Solution (1 minute)
- Distribution Factors (2 minutes)
- Loss Penalty Factors (1 minute)
- SCED Solution (~5 minutes)
- AGC Basepoint to Resource (~10 Seconds)

- Spin event notification (~3 seconds)
  - AGC flag

Summary

- On average, it takes ~5 minutes from State Estimator solution to RTSCED case approval.
- Minimal lag, ~10 seconds, between approved RTSCED case and AGC telemetering the dispatch basepoint out.
- Depending on when a unit loss occurs, it could take ~10-15 minutes for RTSCED reflect system conditions.

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EMS-RTSCED Dispatch Data Flow

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Appendix

Reference Presentations

- Regulation Control – Presentation provide overview on how Regulation is control via AGC and key definitions
- Reserve Event Performance Measurement & Penalty Rules – Presentation provides overview of how spin response is measured and penalty structure
- Synchronized Reserve Deployment – Presentation details synchronized reserves event deployment, PJM Dispatcher actions and NERC Standards

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