

Agenda #4  
Business Issues Committee Meeting – June 26, 2002



## Real-Time Scheduling

*Business Issues Committee*

*06/26/02*

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Agenda #4



## Agenda

- **Background**
- **Architecture**
- **Functionality**
- **Process Benefits**
  - *Alternatives Evaluated*



## What is the Real-Time Scheduling (RTS) Project?

- **Project to design a new scheduling and dispatch methodology to replace both BME and SCD.**
  - *Eliminate known limitations*
  - *Support market enhancements*

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## What do we have today?

- **Security Constrained Dispatch (SCD)**
  - *In-house developed*
  - *Represented State of the Art Technology*
  - *Introduced security constrained operation to NY*
  - *Over 20 years old*
  - *Designed to dispatch energy.*
- **Balancing Market Evaluation (BME)**
  - *Reliability Process to support real-time operation*
  - *Exists as a result of NYISO market operation*
  - *Designed to simultaneously commit and dispatch energy and reserve.*

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## Current issues addressed by RTS Design

- **Inconsistency between scheduling and dispatch**
  - *Different models driving BME and SCD*
  - *Hourly peak scheduling solution vs. twelve 5 minute dispatch solutions*
  - *Three hour scheduling window vs. five minute dispatch window*
  - *Differences in reserve management between scheduling and dispatch*
- **Market enhancements limited by current applications and IT environment**
- **SEAMS issues related to real-time transaction management**

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## RTS Architecture

- **Real-Time Scheduling (RTS)**
  - *Real-Time Commitment (RTC)*
    - ▶ Real-Time Mitigation (RTC-AMP)
  - *Real-Time Dispatch (RTD)*
  - *Corrective Action Mode (RTD-CAM)*

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## RTS Architecture

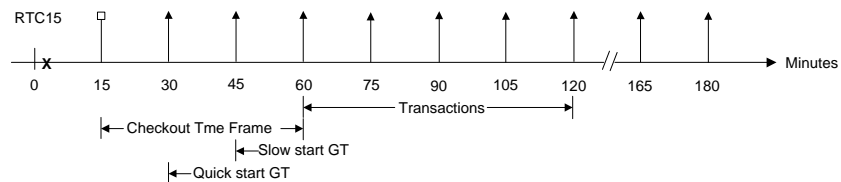
### ➤ Real-Time Commitment (RTC)

- *Executes every 15 minutes*
- *Schedules in 15 minute increments*
- *Sliding window from 1/2 hour to 3 hours out*
- *Schedules Transactions*
  - ▶ Initially hourly, supportive of 1/4 schedules
- *Commits all GTs*
  - ▶ Recognizes unit startup times and costs

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## RTC – Time Line Sequence



### ➤ First run of hour (RTC15)

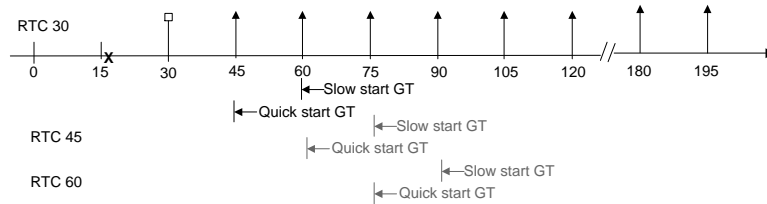
- *Posts results at T=15*
- *Determines upcoming hour transaction schedules*
- *Checkout occurs as soon as neighboring control areas are ready*
- *Sets self-schedule unit schedules for upcoming hour*
- *Binding commitment for slow start units for T=45*
- *Commits fast start units for T=30*

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## RTC – Time Line Sequence



➤ **Remaining runs of the hour(RTC30, RTC45, RTC60)**

- *Incorporate transaction schedules*
- *Incorporates previous RTC unit commitments and self-schedules*
- *Commits slow start units for T=60, 75, 90*
- *Commits fast start units for T=45, 60, 75*

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## RTS Architecture

➤ **Real-Time Dispatch (RTD)**

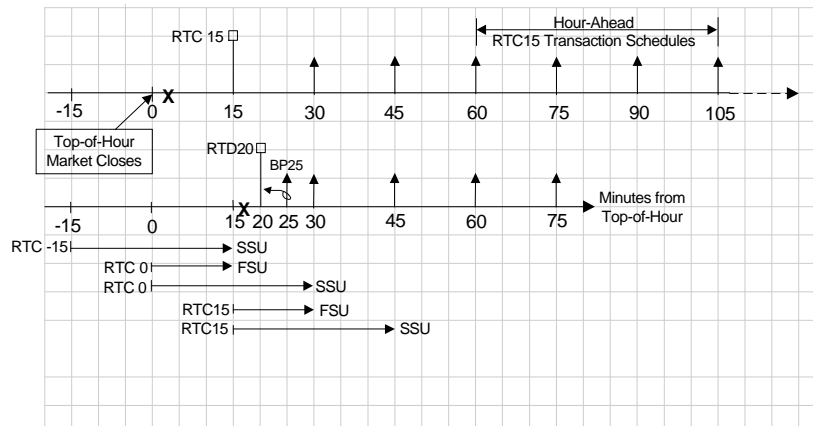
- *Executes every 5 minutes*
- *Sliding one hour look-ahead window*
- *Incorporate transaction schedules and self-schedules*
- *Dispatches generation*
- *Determines reserve and regulation schedules*

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## RTC and RTD Time Line Sequence



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## RTS Architecture

### ➤ RTD-CAM

- Respond to abnormal system conditions
- Short look-ahead
- Commit additional fast startup units
- Used for:
  - ▶ Reserve Pickup
  - ▶ Emergency dispatch
  - ▶ Fast basepoints

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## Generation Comparison

	BME/SCD	RTS
Slow start units	45 min notice 60 min schedules On-the-hour run time	30 min notice 60 min schedules ¼ hr starts
Quick start units	5 min notice 60 min schedules Immediate start	10-15 min notice 60 minute schedules ¼ hr starts (on-demand start)
Self-Scheduled (Fixed Output Unit)	45 min notice 1 hour blocks	45 min confirmation notice ¼ hr blocks
Dispatchable units	5 min notice 5 min schedules	5 min notice 60 min worth of forward advisory schedules
Regulating units	6 sec notice 6 sec schedule	6 sec notice 6 sec schedules

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## Committable Generation

- **Generator bids can be submitted up to 60 minutes prior to the hour**
- **Evaluations occur in all RTC evaluations based upon security and relative economics**
- **Units receive 15 or 30 minute startup notification based upon unit's bid**
- **Startup/Shutdown decisions passed to RTD for subsequent dispatches**

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## Self-Schedule/Self-Committed Generation

- **Generator bids can be submitted up to 60 minutes prior to the hour**
- **Bids given highest economic priority**
- **Schedules confirmed in RTC15 against network security**
- **Startup/Shutdown decisions passed to RTD for subsequent dispatches**

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## Transaction Comparison

	BME/SCD	RTS
Pre-Scheduled	Not currently available	At least 60 min notice ¼ hr schedules ¼ hr starts
Economically Scheduled	30 min notice 60 minute schedules	30 min notice 60 minute schedules

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## Pre-Scheduled Real-Time Transaction

- **Transaction request can be submitted prior to the market close time, with enough lead time to accommodate evaluation and checkout**
- **Evaluation based upon remaining ATC and ramp capacity**
- **Schedule coordinated with adjoining Control Areas**
- **Market participant receives schedule as soon as schedule is confirmed**
- **Schedule feasibility reaffirmed in RTC15**

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## Economically Evaluated Real-Time Transaction

- **Transaction request can be submitted up to 60 minutes prior to the hour in which it starts**
- **Evaluation occurs in RTC15 of prior hour based upon security and relative economics. Subsequent RTC and RTD executions incorporate schedule into solution**
- **Market participant receives advisory schedule at T-45**
- **After coordinating schedules with adjoining Control Areas, market participant received approved/rejected schedule**

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## Market Improvements

- **Two settlement system for Ancillary Services**
  - *Clearing price to incorporate marginal lost opportunity costs*
  - *Performance incentives embedded in settlement*
- **Reserve Demand Curve capability**
  - *Incorporate shortage cost into both the reserve and energy prices*
- **Real-Time Market Power Mitigation**
  - *Ex-ante AMP style conduct and impact testing*
- **Self-Commit/Self-Schedule functionality**

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## Market Improvements (cont)

- **Remove DAM 30 minute units must run obligation in RT**
- **Ex-Post (response adjusted) Pricing**
- **3-part bidding in real-time**
  - *Start-Up/Min Gen Cost/Incremental Cost*
- **Reduced Market Closing Time to 60 Minutes**

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## Operational Improvements

- **¼ hour Real-Time Pre-Scheduling of Transactions**
- **¼ hour scheduling of internal self-schedule supply and unit commitments**
- **Support for Demand Side Resources**
- **Forward looking advisory schedules and prices**
- **Units dispatched and responding consistent with pricing. Ability to chase price eliminated**
- **Schedules to load forecast at ¼ hour increments**
- **Enhanced reserve pickup logic**

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## Improved Price Convergence between Real-Time Scheduling and Dispatch

- **Consistent price setting rules**
- **Consistent reserve modeling**
- **Improved load forecast accuracy for Real-Time Scheduling**
  - *Four 15 minute intervals vs. single hourly peak*
  - *Improved short term load forecasting function*
  - *Load distribution based upon State Estimated values*
- **Forward looking algorithms**
- **Common platform / algorithm**

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## Alternatives reviewed in design process

- **Third settlement system covering RTC**
- **Physical scheduling systems for external transaction management**
- **Management of GT maximum stops per day**
- **Implementation of Short Notice External Transactions (SNETs)**
- **Controllable line scheduling**
- **Utilization of transmission margin for reserve**

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## Supporting Functionality

- **Northeast Energy Portal (aka OSS)**
  - *Pre-scheduling, improved coordination*
- **State Estimator**
  - *Security monitor, generator outputs, load profile*
- **Load Forecast**
  - *Short term regression and weather based forecast*
- **Simulator**
  - *Trials, Training, Testing*
- **SCADA/EMS Integration**
  - *Platform development to support robust system*
- **SCUC Performance Enhancements**

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