

RTS Scheduling

Preliminary – For Discussion Only

Market Structures Working Group

May 9, 2002

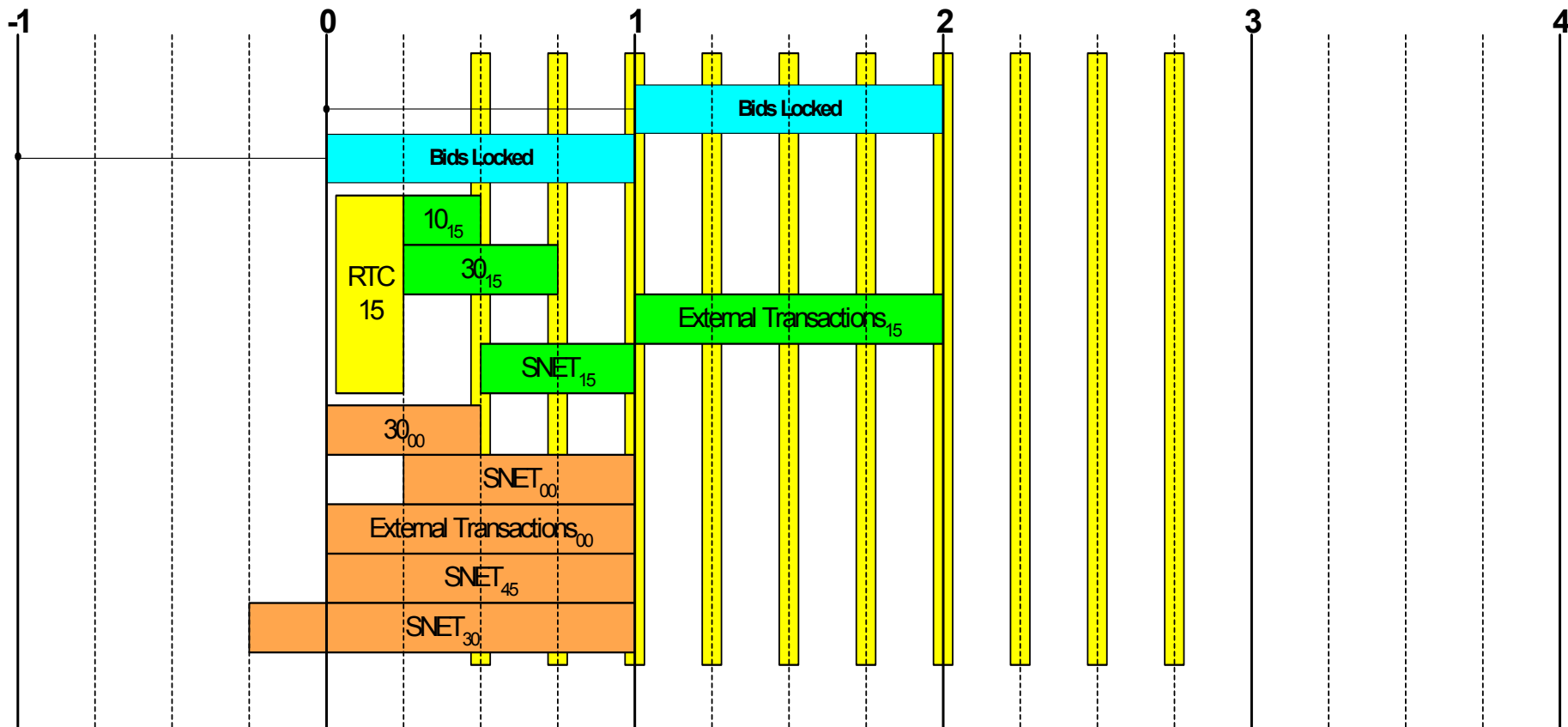
Topics

- **Real-Time Commitment (RTC)**
 - *10-minute generating units*
 - *30-minute generating units*
 - *External transactions*
- **Real-Time Dispatch (RTD)**
 - *Energy (base-points)*
 - *Ancillary Services*
- **Corrective Action (RTD-CAM)**

Real-Time Commitment (RTC)

- **Multi-period, security-constrained, unit commitment and dispatch**
- **Runs every 15 minutes**
- **Examines ten 15-minute periods**
- **RTC₁₅ posts at :15**
- **RTC₃₀ posts at :30**
- **RTC₄₅ posts at :45**
- **RTC₀₀ posts at :00(+1)**

RTC₁₅



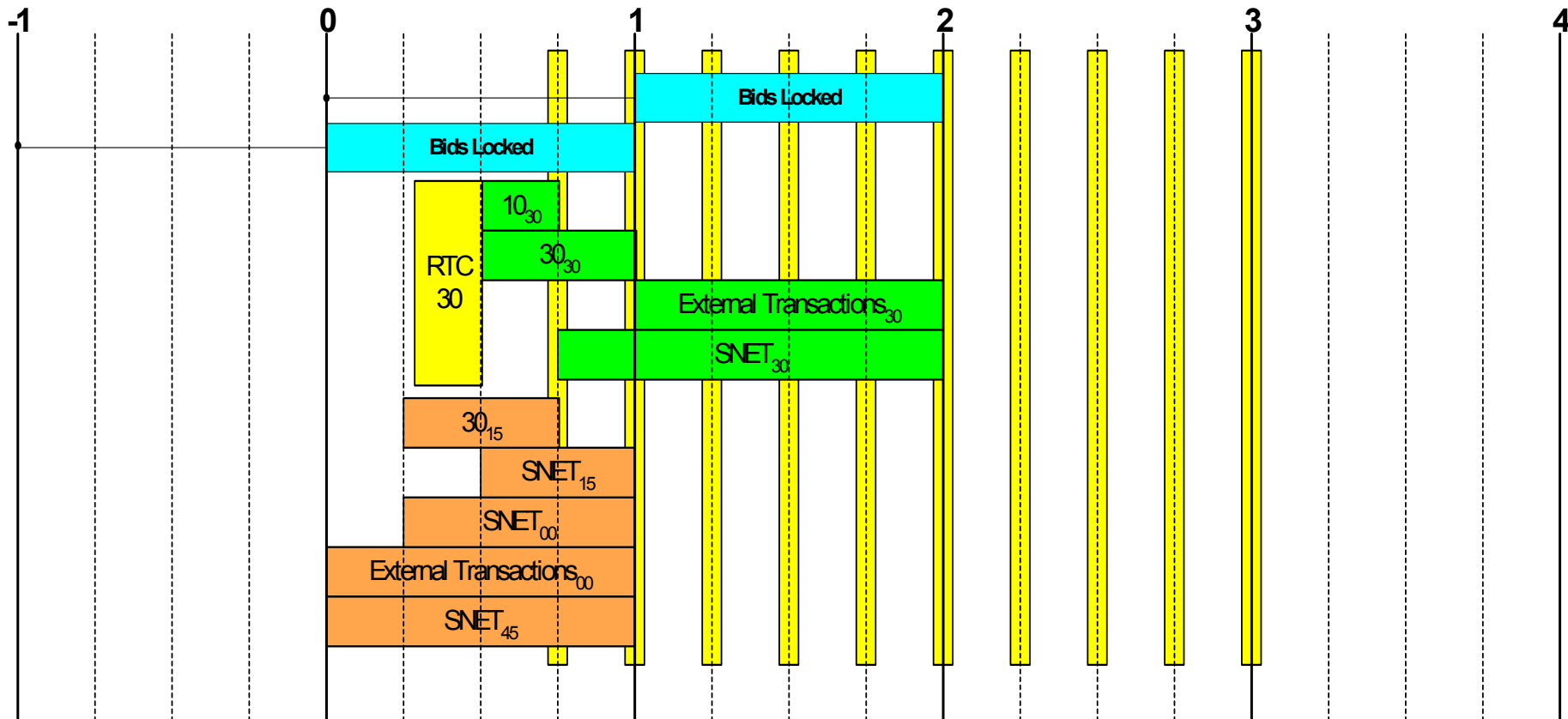
RTC₁₅

- **Runs during the interval :00 to :15**
- **Posts results by :15**
- **Evaluates times :30, :45, :00(+1), ..., :45(+2)**
- **Commits 10-minute units, running by :30**
Commits 30-minute units, running by :45
- **Decommits units, off by :30**

RTC₁₅

- **Schedules economically-bid external transactions for :00(+1) to :00(+2)**
- **Schedules PSTs for :00(+1) to :00(+2)**
- **Schedules SNETs for :30 to :00(+1)**
- **Reaffirms previous externals for :30 to :00(+1)**
- **Is aware of reserve requirements in making commitment decisions but does not schedule reserve**

RTC₃₀



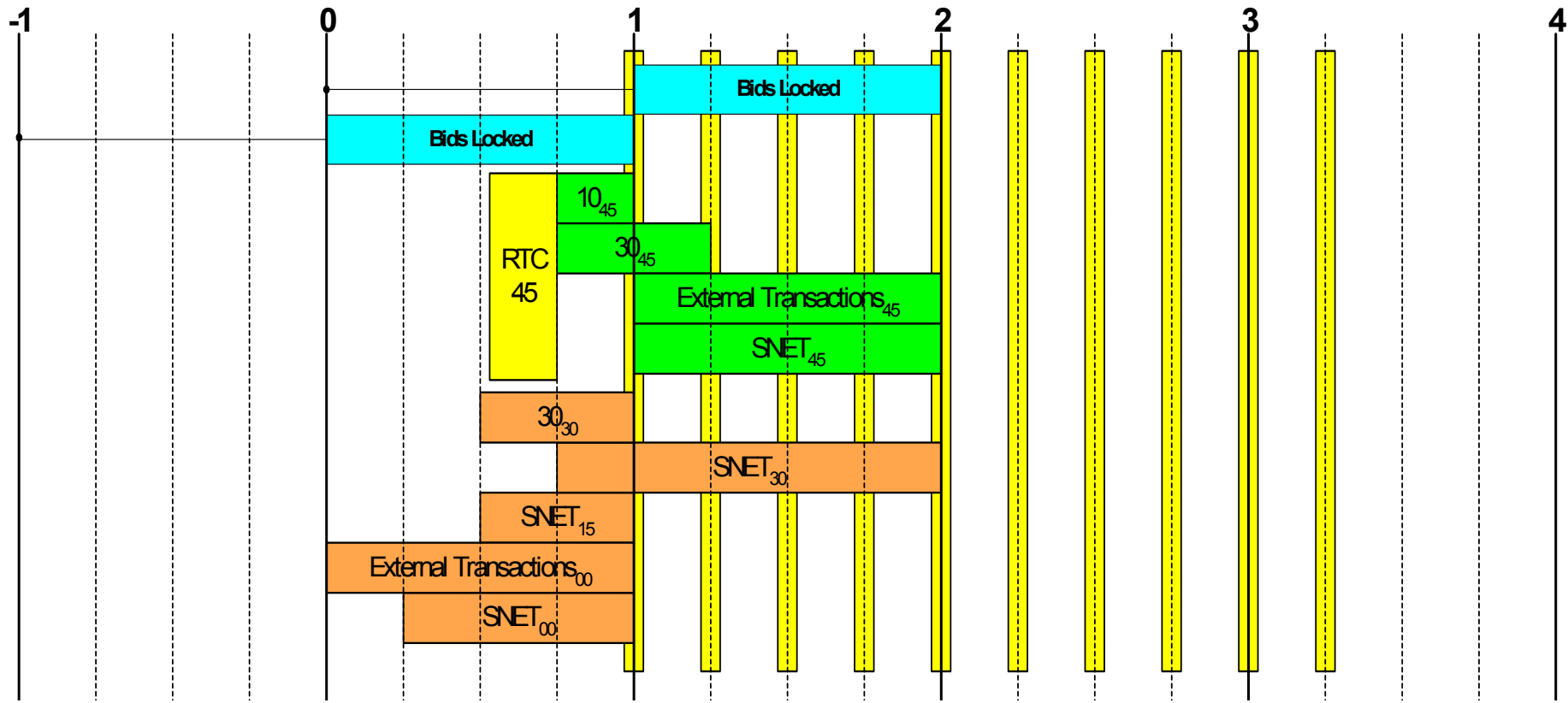
RTC₃₀

- **Runs during the interval :15 to :30**
- **Posts results by :30**
- **Evaluates times :45, :00(+1), :15(+1), ..., :00(+3)**
- **Commits 10-minute units, running by :45**
- **Commits 30-minute units, running by :00(+1)**
- **Decommits units, off by :45**

RTC₃₀

- **Reaffirms economically-bid external transactions for :00(+1) to :00(+2)**
- **Reaffirms PSTs for :00(+1) to :00(+2)**
- **Schedules SNETs for :45 to :00(+2)**
- **Reaffirms previous externals for :45 to :00(+1)**
- **Is aware of reserve requirements in making commitment decisions but does not schedule reserve**

RTC₄₅



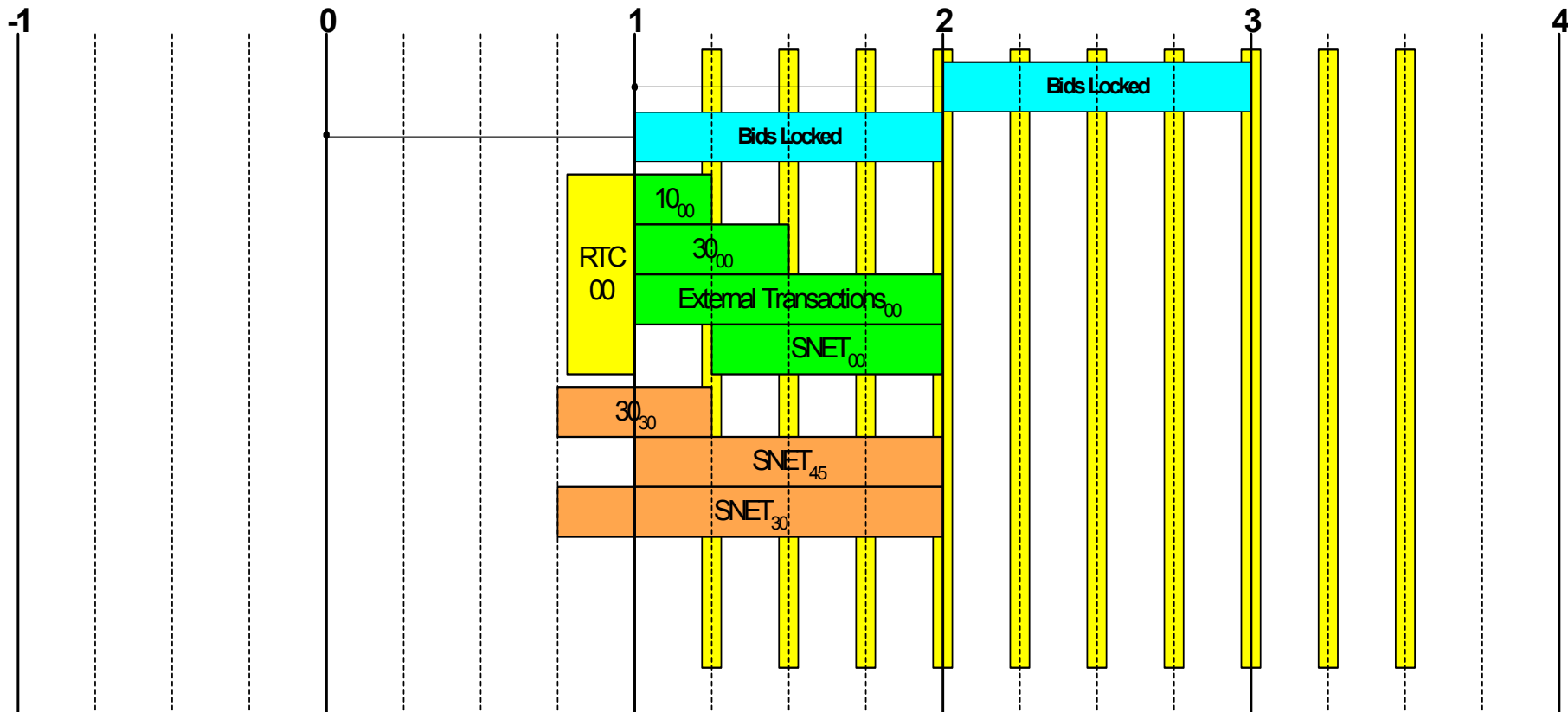
RTC₄₅

- **Runs during the interval :30 to :45**
- **Posts results by :45**
- **Evaluates times :00(+1), :15(+1), :30(+1), ..., :15(+3)**
- **Commits 10-minute units, running by :00(+1)**
- **Commits 30-minute units, running by :15(+1)**
- **Decommits units, off by :00(+1)**

RTC₄₅

- **Reaffirms economically-bid external transactions for :00(+1) to :00(+2)**
- **Reaffirms PSTs for :00(+1) to :00(+2)**
- **Schedules SNETs for :00(+1) to :00(+2)**
- **Reaffirms previous externals for :45 to :00(+2)**
- **Is aware of reserve requirements in making commitment decisions but does not schedule reserve**

RTC₀₀



RTC₀₀

- **Runs during the interval :45 to :00(+1)**
- **Posts results by :00(+1)**
- **Evaluates times :15(+1), :30(+1), :45(+1), ..., :30(+3)**
- **Commits 10-minute units, running by :15(+1)**
- **Commits 30-minute units, running by :30(+1)**
- **Decommits units, off by :15(+1)**

RTC₀₀

- **Reaffirms economically-bid external transactions for :15(+1) to :00(+2)**
- **Reaffirms PSTs for :15(+1) to :00(+2)**
- **Schedules SNETs for :15(+1) to :00(+2)**
- **Reaffirms previous externals for :15(+1) to :00(+2)**
- **Is aware of reserve requirements in making commitment decisions but does not schedule reserve**

Example 1. Hour-Ahead PST

100 MW Import (PJM to NY) 14:00 to 15:00

- **13:00: PST must be accepted by market close**
- **13:00 - 13:15: RTC_{13:15} schedules the PST for the time period 14:00 to 15:00**
- **13:15 – 14:00: Checkout with neighboring control area. With automation PST will have been checked out before market close.**
- **13:15 – 13:30: RTC_{13:30} reaffirms the PST schedule for 14:00 to 15:00**
- **13:30 – 13:45: RTC_{13:45} reaffirms the PST schedule for 14:00 to 15:00**

Example 1. Hour-Ahead PST

continued

- **13:45 – 14:00:** $RTC_{14:00}$ reaffirms the PST schedule for 14:15 to 15:00
- **14:00 – 14:15:** $RTC_{14:15}$ reaffirms the PST schedule for 14:30 to 15:00 and schedules other transactions from 15:00 to 16:00
- **14:15 – 14:30:** $RTC_{14:30}$ reaffirms the PST schedule for 14:45 to 15:00
- **14:30 – 14:45:** $RTC_{14:45}$ no longer sees the original hour-ahead PST

Example 2. Hour-Ahead Economically-Scheduled Transaction (EST) 100
MW Import (PJM to NY) 14:00 to 15:00

if the price is right

- **13:00: EST bid must be in place by market close**
- **13:00 - 13:15: RTC_{13:15} schedules the EST for the time period 14:00 to 15:00 *if the price is right***
- **13:15 – 14:00: Checkout with neighboring control area. Automation may facilitate checkout but the transaction cannot be checked-out before being scheduled by RTC_{13:15}**
- **13:15 – 13:30: RTC_{13:30} reaffirms the EST schedule for 14:00 to 15:00**
- **13:30 – 13:45: RTC_{13:45} reaffirms the EST schedule for 14:00 to 15:00**

Example 2. Hour-Ahead EST

continued

- **13:45 – 14:00: $RTC_{14:00}$ reaffirms the EST schedule for 14:15 to 15:00**
- **14:00 – 14:15: $RTC_{14:15}$ reaffirms the EST schedule for 14:30 to 15:00 and schedules other transactions from 15:00 to 16:00**
- **14:15 – 14:30: $RTC_{14:30}$ reaffirms the EST schedule for 14:45 to 15:00**
- **14:30 – 14:45: $RTC_{14:45}$ no longer sees the original hour-ahead EST**

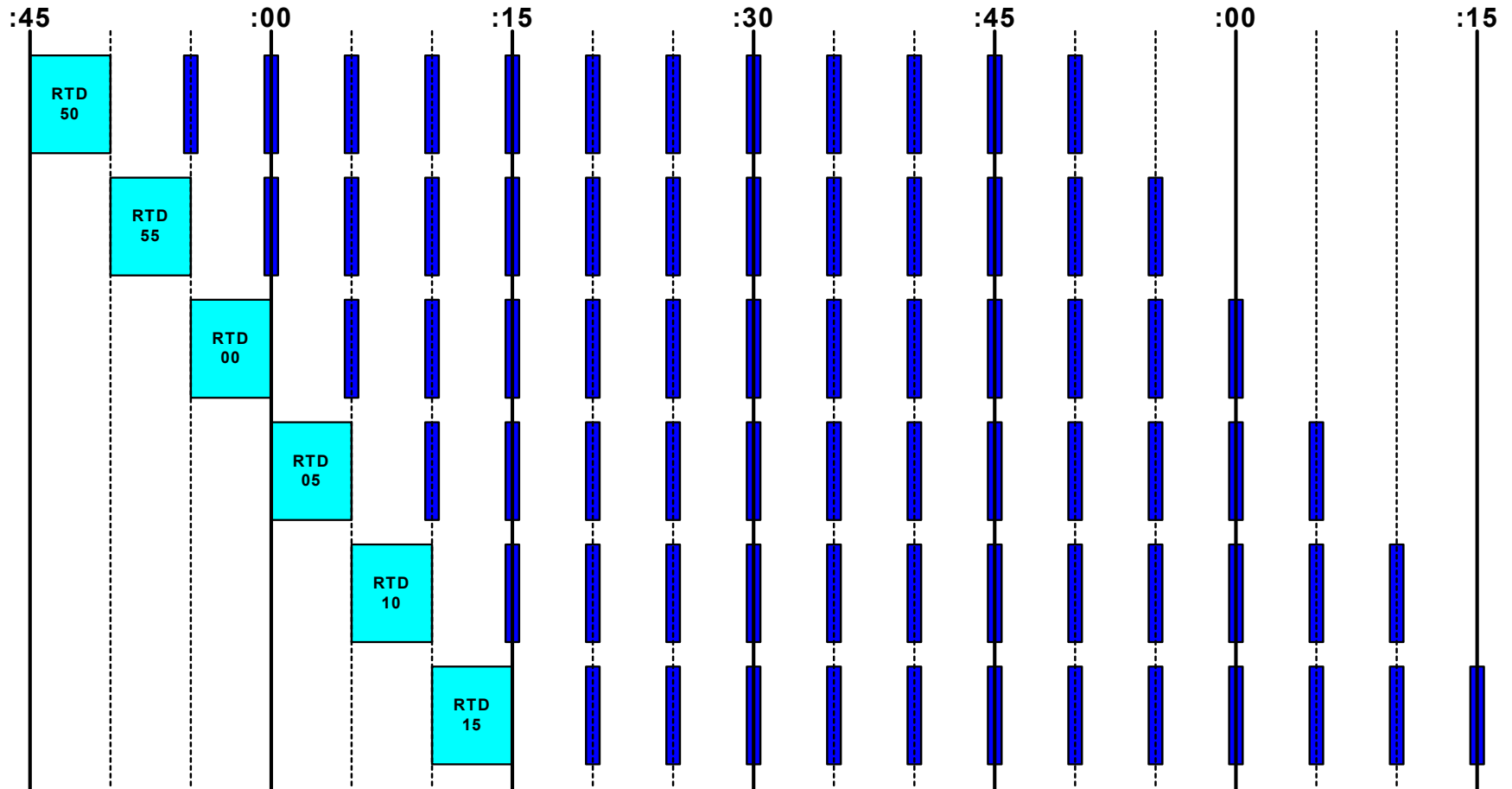
Real-Time Dispatch (RTD)

- **Multi-period, security-constrained, unit dispatch without commitment**
- **Runs every 5 minutes**
- **Examines twelve 5-minute periods**
- **RTD₅₀ posts at :50**
- **RTC₅₅ posts at :55**
- **RTC₀₀ posts at :00(+1)**
- **Etc.**

Real-Time Dispatch (RTD)

- **Generates a schedule (base-point) for on-dispatch units. The base-point indicates where the unit should be 5-minutes from the posting time**
- **Generates advisory base-points: 15-minute intervals on the quarter hour**
- **Adjusts reserve and regulation schedules**

RTD₅₀, RTD₅₅, ..., RTD₁₅



Corrective Action (RTD-CAM)

- **Adjust generation in response to an unexpected (or emergency) situation**
- **With or without commitment**
 - *Adjust units already on-line and consider starting additional units (with commitment) or*
 - *Adjust units already on-line (without commitment)*
- **Normal or emergency response**
 - *Move units at their emergency response rate, or*
 - *Move units at their normal response rate*

RTD-CAM

	<i>With Commitment (RTC)</i>	<i>Without Commitment (RTD)</i>
<i>Emergency Rate</i>	<i>Reserve Pickup</i>	<i>Max-Gen Pickup (locational)</i>
<i>Normal Rate</i>	<i>BASAP-CAN</i>	<i>Reserve Restoration BASAP-NC</i>