A536: Real-Time Scheduling Market Information Posting

CONCEPT OF OPERATION (COO)

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06/07/02	Advisory RTC ex-ante prices added as suggested by Market Structures WG
05/23/03	Changes to reflect current RTC/RTD design

DRAFT – For Discussion Purposes Only

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List of Exhibits:

1   INTRODUCTION

This COO identifies the Information Posting changes that need to be made in support of the new Real-Time Scheduling (RTS) System, which will replace the existing BME and SCD programs.

2   DISCUSSION

Changes reflect inputs from the Market Structures Working Group and the NYISO team.

Note 1: Zonal prices as described in this COO are the prices to be paid by the loads. These prices will be calculated according to the prevailing settlement definitions.

Posted LBMPs will have three components (same as now): Energy, Losses, and Congestion.

Table 2-1: Definitions, Acronyms, and Abbreviations

Term	Description
AAS$	Advisory Ancillary Services prices (from RTC and RTD 15-minute increments)
AGC	Automatic Generation Control
ATC	Available Transfer Capability (from RTC15)
AZGP$	Advisory zonal and generator LBMP (from RTC and RTD 15-minute increments)
BME	Balancing Market Evaluation
C$	Limiting Constraints and shadow pricing information (from RTD 5-minute look-ahead and corresponding to the Proxy Prices for RTC15)
EET	Economically Evaluated External transaction (from RTC15 for the binding hour)
HAM	Hour Ahead Market
LBMP	Locational Based Marginal Price
MIS	Market Information System
MP	Market Participant
PAR	Phase Angle Regulator
PXP$	The average of the four 15 minute External bus Proxy prices (from RTC15 for the binding hour)
RTC	Real-Time Commitment
RTCxx	Real-Time Commitment that posts at xx minutes after top-of-hour
RTD	Real-Time Dispatch
RTDxx	Real-Time Dispatch that posts at xx minutes after top-of-hour
RTM	Real-Time Market
RTS	Real-Time Scheduling
SCD	Security Constrained Dispatch
TTC	Total Transfer Capability
5ZGP$	Zonal and generator LBMP (from RTD 5-minute look-ahead)
5AS$	5-minute look-ahead Ancillary Services prices from RTD
5MBP	5-minute look-ahead basepoint (for AGC) from RTD
15MBP	15-minute increment basepoint from RTD
15MCS	15-minute increment commitment schedule from RTC (advisory information)

3   DESCRIPTION

3.1   Present Market Information Posting

Some of the information that is currently being posted will continue to be posted in its present format. The indicated posting changes relate primarily to the replacement of the existing BME and SCD programs by the new Real-Time Commitment (RTC) and Real-Time Dispatch (RTD) programs respectively.

3.1.1   Public Information

The following is a subset of in-day information (related to BME/SCD) that is currently available on the NYISO website. A detailed description is presented in the NYISO Market Participant User's Guide:

1) Real-Time Market LBMP

     a) Zonal Real-Time prices from the MIS

     b) Generator Real-Time prices from the MIS

2) Hour-Ahead Market Ancillary Services Prices (to be replaced by 15- minute advisory pricing (AAS$) from RTC and RTD)

                                                                              Deleted: 5-minute (5AS$) and

3) NYISO Reference Bus LBMP as required for the LBMPs being posted

4) Real-Time LBMP prices on e-Data Services

5) Hour-Ahead Market LBMP

     a) Zonal (to be replaced by 15-minute advisory prices from RTC and RTD)

     b) Proxy bus (to be replaced by 15-minute advisory external bus proxy prices for the binding hour from RTC15)

     c) Generator (to be replaced by 15-minute advisory from RTC and RTD)

6) Time Weighted/Integrated Real-Time LBMP (to be calculated by the MIS on an hourly basis and posted hourly)

     a) Zonal

     b) Generator

7) LBMP Zone Maps

     a) Hour-Ahead Market Data (to be replaced by 15-minute advisory prices from RTC and RTD)

     b) Real-Time Market Data calculated by the MIS

8) Limiting Constraints (to be produced by RTD and RTC15 for the Proxy Prices)

9) PAR Schedules (to be produced by RTD)

10) ATC/TTC (to be produced by RTC15)

11) Zonal Actual Load.

3.1.2   Private Information

The following is a subset of in-day information that is currently available to authorized Market Participants on a confidential basis:

1) Accepted and rejected bids

2) Generation schedules (to be produced by RTC and RTD)

3) Price Responsive Load schedules (to be produced by RTC and RTD)

4) Economically Evaluated Transaction schedules (to be produced by RTC15 for the binding hour).

3.1.3   Data Dictionary (Version 16.0)

The existing data dictionary will also need to be updated to reflect the implementation of RTC and RTD and the related posting of information.

3.2   New Market Information Posting

The new Real-Time Scheduling (RTS) process will produce new market information that needs to be posted. This market information consists of:

1) Information that is available to the Public

2) Information that is available to individual Market Participants on a private and authorized basis.

The format and style of the information to be posted is not described in this COO, but will be defined during the design phase of the RTS project. The goal will be to post information for timely and convenient access and viewing.

3.2.1   Real-Time Commitment (RTC) Information

The public and private information to be posted from the execution of RTC as described in this subsection is different than the information presently being posted for the Hour -Ahead Market (HAM). An RTC information table is presented to show the data to be posted.

Public: The following information will be produced by RTC and will need to be posted:

1) External bus Proxy Prices for the binding hour, when constrained. Refer to the RTC15 entries (PXP$) in Table 3-1. Other prices will be produced by RTD.

2) Updated ATCs for each RTC15 interval. Refer to the Table 3-1 entries (ATC).

3) Advisory prices for Zones and Generators, indicated by "AZGP$" in Table 3-1. These prices will be posted together with advisory RTD prices as shown by Table 3-3.

4) Limiting constraints and shadow prices (C$) for RTC15 for each 15-minute increment that corresponds to the Proxy Prices (PXP$).

5) Advisory Ancillary Services prices as shown by (AAS$) in Table 3-1. Other prices will be produced by RTD. The following incremental prices are posted:

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   a)   10-min Spinning Reserve (West and East)

   b)   10-min Non-Spinning Reserve (West and East)

   c)   30-min Spin/Non-Spin Reserve (West and East)

   d)   NYISO Regulation.

Private: The following information will be produced by RTC and will need to be made available to authorized MPs:

1) Economically Evaluated External Transaction (EET) MW schedules for the binding hour. Refer to the RTC15 table entries (EET) in Table 3-1.

2) Advisory MW commitment schedules (15MCS) for generators for each RTC 15-minute increment beyond the time frame covered by RTD (see Table 3-1).

The following table shows the information to be posted by RTC. The column headings RTC15, RTC30, RTC45, and RTC60 represent the four executions of RTC that occur each hour. For example, RTC15 starts shortly after the top-of-hour and has its results available at 15 minutes after top-of-hour. RTC15 calculates commitments and schedules for 10 look-ahead times, which are labeled as @30 to @165 in minutes from the top-of-hour in which RTC15 executes. The asterisks in the table indicate that results are calculated by RTC, but are not posted.

Table 3-1: Information to be Posted by RTC

RTC>	Information to be Posted by RTCxx (times are from top-of-hour)			
	15	30	45	60
@ 30	ATC			
@ 45	ATC	*		
@ 60	ATC, C$ PXP$, EET	*	*	
@ 75	ATC, C$ PXP$, EET	*	*	*
@ 90	ATC, C$, 15MCS PXP$, EET, AZGP$ AAS$	*	*	*
@ 105	ATC, C$, 15MCS PXP$, EET, AZGP$ AAS$	AZGP$, 15MCS, AAS$	*	*
@ 120	ATC, AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$	*
@ 135	ATC, AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$

	Information to be Posted by RTCxx (times are from top-of-hour)			
RTC>	15	30	45	60
@ 150	ATC, AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$
@ 165	ATC, AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$
@ 180		AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$
@ 195			AZGP$, 15MCS, AAS$	AZGP$, 15MCS, AAS$
@ 210				AZGP$, 15MCS, AAS$

Note 2: (*) means that no Postings by RTC30, RTC45, and RTC60 are currently anticipated for the time intervals shown.

3.2.2 Real-Time Dispatch (RTD) Information

The public and private information to be posted from the execution of RTD as described in this subsection is different than the information presently being posted for the Real-Time Market (RTM). An RTD information table is presented to show the data to be posted.

Public: The following information will be produced by RTD and will need to be posted:

1) 5-minute look ahead zonal and generator prices (5ZGP$) from the first increment of RTD as shown in Table 3-2.

2) Advisory zonal and generator LBMPs for each 15-min look-ahead interval of RTD. The prices are to be updated as shown by (AZGP$) in Table 3-2.

3) Ancillary Services prices for the 5-min look-ahead interval of RTD as shown by (5AS$) in Table 3-2. The following incremental prices are posted:

   a) 10-min Spinning Reserve (West and East)

   b) 10-min Non-Spinning Reserve (West and East)

   c) 30-min Spin/Non-Spin Reserve (West and East)

   d) NYISO Regulation.

4) Advisory Ancillary Services prices for each 15-min look-ahead interval of RTD as shown by (AAS$) in Table 3-2. The following incremental prices are posted:

   a) 10-min Spinning Reserve (West and East)

   b) 10-min Non-Spinning Reserve (West and East)

   c) 30-min Spin/Non-Spin Reserve (West and East)

   d) NYISO Regulation.

Public: The following additional information will be posted as required:

1) Phase Angle Regulator (PAR) schedules for internal NYISO PARs (These will either be based upon pre-determined schedules or as determined by RTS, depending on agreed-upon RTC/RTD program options).

2) Limiting Constraints on transmission network MW flows (Constraint Type [Base/Contingency] and Shadow Price). These are shown as (C$) in Table 3-2.

Public: A set of real-time prices produced by the MIS will also be posted periodically at a NYISO specified time. These prices may be corrected and reposted as required.

Public: The following Time Weighted/Integrated LBMP information will be produced by the MIS, using the 5-minute real-time prices, also from the MIS. The time weighted/integrated LBMPs will be posted on an hourly basis within 10-minutes after top-of-hour:

1) Zonal

2) Generator

Private: The following information will be produced by RTD and will need to be made available to authorized MPs:

1) MW base points for each look-ahead interval of RTD. The first base point from RTD is a 5-minute look-ahead and is immediately passed on to the Automatic Generation Control (AGC) program. Refer to (5MBP) in Table 3-2. The remaining base points are considered to be advisory and are given at 15-minute intervals as shown by (15MBP) in Table 3-2.

Note 3: Market Participants must examine the RTD 15-minute advisory base points in order to get advance notice of upcoming Unit Startups and Shut Downs. The beginning and end of a Startup period or Shutdown period always occurs at the 15-minute clock times as established by RTC.

Table 3-2 shows the information to be posted by RTD. The column headings RTD00 to RTD55 represent the 12 executions of RTD that occur each hour. For example, RTD05 starts shortly after the top-of-hour and has its results available at 5 minutes after the top-of-hour. RTD05 calculates schedules for five look-ahead times, which are labeled as @10, @15, @30, @45, and @60 in minutes from the top-of-hour in which RTD05 executes.

Table 3-2: Information to be Posted by RTD

RTD>	Information to be Posted by RTDxx (times are from top-of-hour)											
	00	05	10	15	20	25	30	35	40	45	50	55
@ 05	5MBP 5AS$ C$, 5ZGP$											
@ 10		5MBP 5AS$ C$, 5ZGP$										
@ 15	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	5MBP 5AS$ C$, 5ZGP$									
@ 20				5MBP 5AS$ C$, 5ZGP$								
@ 25					5MBP 5AS$ C$, 5ZGP$							
@ 30	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	5MBP 5AS$ C$, 5ZGP$						
@ 35							5MBP 5AS$ C$, 5ZGP$					
@ 40								5MBP 5AS$ C$, 5ZGP$				
@ 45	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	5MBP 5AS$ C$, 5ZGP$			
@ 50										5MBP 5AS$ C$, 5ZGP$		
@ 55											5MBP 5AS$ C$, 5ZGP$	
@ 60	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	5MBP 5AS$ C$, 5ZGP$
@ 75			15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$
@ 90						15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$
@ 105								15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$	15MBP AAS$ AZGP$
@ 120												15MBP AAS$ AZGP$

Note 4: The Energy prices (5ZGP$) for generators and zones will be used by the MIS to determine the real-time prices based on market rules.

Advisory Price Posting

Advisory prices for zones and generators will be available for posting as illustrated by Table 3-3.

Each column in Table 3-3 lists the most recent advisory price information that is to be posted. These public prices are given in 15-minute increments out to the horizon of RTC. Only one column of information will be posted and updated every execution of RTC and RTD and will be available for viewing and down loading by the Market Participants.

The source of the prices, either RTD (shaded) or RTC is also indicated. The prices from RTD will be updated every five minutes and the prices from RTC will be updated every 15 minutes.

Table 3-3: Advisory Prices to be Posted for Zones and Generators

	Prices to be Posted by RTC & RTD at the times from top-of-hour											
TIME>	00	05	10	15	20	25	30	35	40	45	50	55
@ 15	RTD 00 AZGP$	RTD 05 AZGP$	RTD10 5ZGP$									
@ 30	RTD 00 AZGP$	RTD 05 AZGP$	RTD 10 AZGP$	RTD 15 AZGP$	RTD 20 AZGP$	RTD25 5ZGP$						
@ 45	RTD 00 AZGP$	RTD 05 AZGP$	RTD 10 AZGP$	RTD 15 AZGP$	RTD 20 AZGP$	RTD 25 AZGP$	RTD 30 AZGP$	RTD 35 AZGP$	RTD40 5ZGP$			
@ 60	RTD 00 AZGP$	RTD 05 AZGP$	RTD 10 AZGP$	RTD 15 AZGP$	RTD 20 AZGP$	RTD 25 AZGP$	RTD 30 AZGP$	RTD 35 AZGP$	RTD 40 AZGP$	RTD 45 AZGP$	RTD 50 AZGP$	RTD55 5ZGP$
@ 75	RTC 00 AZGP$	RTC 00 AZGP$	RTD 10 AZGP$	RTD 15 AZGP$	RTD 20 AZGP$	RTD 25 AZGP$	RTD 30 AZGP$	RTD 35 AZGP$	RTD 40 AZGP$	RTD 45 AZGP$	RTD 50 AZGP$	RTD 55 AZGP$
@ 90	RTC 00 AZGP$	RTC 00 AZGP$	RTC 00 AZGP$	RTC 15 AZGP$	RTC 15 AZGP$	RTD 25 AZGP$	RTD 30 AZGP$	RTD 35 AZGP$	RTD 40 AZGP$	RTD 45 AZGP$	RTD 50 AZGP$	RTD 55 AZGP$
@ 105	RTC 00 AZGP$	RTC 00 AZGP$	RTC 00 AZGP$	RTC 15 AZGP$	RTC 15 AZGP$	RTC 15 AZGP$	RTC 30 AZGP$	RTC 30 AZGP$	RTD 40 AZGP$	RTD 45 AZGP$	RTD 50 AZGP$	RTD 55 AZGP$
@ 120	RTC 00 AZGP$	RTC 00 AZGP$	RTC 00 AZGP$	RTC 15 AZGP$	RTC 15 AZGP$	RTC 15 AZGP$	RTC 30 AZGP$	RTC 30 AZGP$	RTC 30 AZGP$	RTC 45 AZGP$	RTC 45 AZGP$	RTD 55 AZGP$
@135	RTC 00 AZGP$	RTC 00 AZGP$	RTC 00 AZGP$	RTC 15 AZGP$	RTC 15 AZGP$	RTC 15 AZGP$	RTC 30 AZGP$	RTC 30 AZGP$	RTC 30 AZGP$	RTC 45 AZGP$	RTC 45 AZGP$	RTC 45 AZGP$
@150	RTC 00 AZGP$	RTC 00 AZGP$	RTC 00 AZGP$	RTC 15 AZGP$	RTC 15 AZGP$	RTC 15 AZGP$	RTC 30 AZGP$	RTC 30 AZGP$	RTC 30 AZGP$	RTC 45 AZGP$	RTC 45 AZGP$	RTC 45 AZGP$
@165				RTC15 AZGP$	RTC 15 AZGP$	RTC 15 AZGP$	RTC 30 AZGP$	RTC 30 AZGP$	RTC 30 AZGP$	RTC 45 AZGP$	RTC 45 AZGP$	RTC 45 AZGP$
@180							RTC30 AZGP$	RTC 30 AZGP$	RTC 30 AZGP$	RTC 45 AZGP$	RTC 45 AZGP$	RTC 45 AZGP$
@195										RTC45 AZGP$	RTC 45 AZGP$	RTC 45 AZGP$

Note5: Only a single column of prices will be posted and updated every five minutes. RTD xx and RTC yy indicate the sources of these prices.

3.3 Generator Schedule Posting

Generator MW schedules will be available for posting on a private basis as illustrated by Table 3-4.

Each column in the table lists the most recent generator schedule information that is to be posted. These private schedules are produced by RTC and RTD. Only one column of information will be posted and updated every execution of RTC and RTD and will be available for viewing and downloading by the Market Participants.

The source of the schedules, either RTD (shaded) or RTC is also indicated. The schedules from RTD will be updated every five minutes and the schedules from RTC will be updated every 15 minutes.

Table 3-4: MW Schedules to be Posted for Generators

TIME>	Generator MW Schedules to be Posted by RTC & RTD at the times from top-of-hour											
	00	05	10	15	20	25	30	35	40	45	50	55
@ 00												
@ 05	5MBP RTD00											
@ 10		5MBP RTD05										
@ 15	15MBP RTD00	15MBP RTD05	5MBP RTD10									
@ 20				5MBP RTD15								
@ 25					5MBP RTD20							
@ 30	15MBP RTD00	15MBP RTD05	15MBP RTD10	15MBP RTD15	15MBP RTD20	5MBP RTD25						
@ 35							5MBP RTD30					
@ 40								5MBP RTD35				
@ 45	15MBP RTD00	15MBP RTD05	15MBP RTD10	15MBP RTD15	15MBP RTD20	15MBP RTD25	15MBP RTD30	15MBP RTD35	5MBP RTD40			
@ 50										5MBP RTD45		
@ 55											5MBP RTD50	
@ 60	15MBP RTD00	15MBP RTD05	15MBP RTD10	15MBP RTD15	15MBP RTD20	15MBP RTD25	15MBP RTD30	15MBP RTD35	15MBP RTD40	15MBP RTD45	15MBP RTD50	5MBP RTD55
@ 75	15MCS RTC00	15MCS RTC00	15MBP RTD10	15MBP RTD15	15MBP RTD20	15MBP RTD25	15MBP RTD30	15MBP RTD35	15MBP RTD40	15MBP RTD45	15MBP RTD50	15MBP RTD55
@ 90	15MCS RTC00	15MCS RTC00	15MCS RTC00	15MCS RTC15	15MCS RTC15	15MBP RTD25	15MBP RTD30	15MBP RTD35	15MBP RTD40	15MBP R TD45	15MBP RTD50	15MBP RTD55
@ 105	15MCS RTC00	15MCS RTC00	15MCS RTC00	15MCS RTC15	15MCS RTC15	15MCS RTC15	15MCS RTC30	15MCS RTC30	15MBP RTD40	15MBP RTD45	15MBP RTD50	15MBP RTD55
@ 120	15MCS RTC00	15MCS RTC00	15MCS RTC00	15MCS RTC15	15MCS RTC15	15MCS RTC 15	15MCS RTC30	15MCS RTC30	15MCS RTC30	15MCS RTC45	15MCS RTC45	15MBP RTD55
@135	15MCS RTC00	15MCS RTC00	15MCS RTC00	15MCS RTC15	15MCS RTC15	15MCS RTC15	15MCS RTC30	15MCS RTC30	15MCS RTC30	15MCS RTC45	15MCS RTC45	15MCS RTC45
@150	15MCS RTC00	15MCS RTC00	15MCS RTC00	15MCS RTC15	15MCS RTC15	15MCS RTC15	15MCS RTC30	15MCS RTC30	15MCS RTC30	15MCS RTC45	15MCS RTC45	15MCS RTC45
@165				15MCS RTC15	15MCS RTC15	15MCS RTC15	15MCS RTC30	15MCS RTC30	15MCS RTC30	15MCS RTC45	15MCS RTC45	15MCS RTC45
@180							15MCS RTC30	15MCS RTC30	15MCS RTC30	15MCS RTC45	15MCS RTC45	15MCS RTC45
@195										15MCS RTC45	15MCS RTC45	15MCS RTC45

Note6: Only a single column of schedules will be posted, updated every five minutes. RTDxx and RTCyy indicate the sources of these schedules.