California Independent
System Operator Corporation

Suggested Change in Real-time LAP Pricing

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MRTU LAP Pricing and Settlement as Filed

- **RT LAP price components:**
  - LAP price:
    - Computed as weighted average of RT LMPs at LAP load nodes
    - LMP weights used = absolute value of nodal load deviation
  - LAP Price Adjustment:
    - (A) Compute RT LMP times LAP load nodal deviations and sum over all LAP load nodes
    - (B) Compute LAP price times SC LAP deviation and sum over all SCs
    - LAP Price adjustment = ((A)-(B))/(Sum of absolute values of SC LAP deviations over all SCs)
- **Settlement**
  - Price charged to SCs with positive LAP Load Deviation = (LAP Price + LAP Price Adjustment)
  - Price paid to SCs with negative LAP Load Deviation = (LAP Price - LAP Price Adjustment)

Statement of the Issue

- **Filed Methodology**
  - Advantages:
    - Achieves revenue neutrality through RT LAP rates
    - Avoids excessive prices that could result from using nodal deviations as LMP weights
  - Disadvantages:
    - Results in two real-time prices for over- and under- consumption (not compatible with the concept of Convergence Bidding)
    - Under some conditions may result in excessive or counter-intuitive rates
- **Proposed New Methodology**
  - Give up the idea of revenue neutrality in RT LAP rates in favor of a single RT LAP rate
  - Compute and allocate revenue neutrality uplift based on cost causation

Example 1

	LAP Load (MW)	LDF1	LDF2	Node 1 (MW)	Node 2 (MW)	LMP1	LMP2
IFM	20,000	50%	50%	10,000	10,000		
Real Time	20,005	51%	49%	10,202.55	9,802.45	$25	$10
Change	5			202.55	-197.55		

	SCA Load (MW)	SCB Load (MW)	Total (MW)
IFM	10,000	10,000	20,000
Real Time	10,100	9,905	20,005
Change	100	-95	5

Filed Methodology:

LAP Price = (202.55*$25 + 197.45*$10) / (202.55+197.45) = $17.59/MWh

LAP price Adj. = ((202.55*$25 - 197.45*$10) - $17.59 * (100 - 95)) / (100+95) = $15.39/MWh

	LAP MW Deviation	Real-time Settlement Amounts			Effective Rate ($/MWh)
		LAP price	LAP price Adjustment	Net	
SCA	100	$1,759	$1,539	$3,298	$32.98
SCB	-95	-$1,671	$1,461	-$210	$2.21
Total	5	$88	$3,000	$3,088	-

Example 2

	LAP Load (MW)	LDF1	LDF2	Node 1 (MW)	Node 2 (MW)	LMP1	LMP2
IFM	20,000	50%	50%	10,000	10,000		
Real Time	20,001	50.9975%	49.0025%	10,200	9,801	$25	$10
Change	1			200	-199		

	SCA Load (MW)	SCB Load (MW)	Total (MW)
IFM	10,000	10,000	20,000
Real Time	10,002	9,999	20,001
Change	2	-1	1

Filed Methodology:

LAP Price = (200*$25 + 199*$10) / (200+199) = $17.52/MWh

LAP price Adj. = ((200*$25 - 199*$10) - $17.52 * (2 - 1)) / (2+1) = $997.49/MWh

	LAP MW Deviation	Real-time Settlement Amounts			Effective Rate ($/MWh)
		LAP price	LAP price Adjustment	Net	
SCA	2	$35.04	$1,994.99	$2,303.03	$1,015.01
SCB	-1	-$17.52	$997.49	$979.97	-$979.97
Total	1	$17.52	$2,992.48	$3,010.00	-

Example 3

	LAP Load (MW)	LDF1	LDF2	Node 1 (MW)	Node 2 (MW)	LMP1	LMP2
IFM	20,000	50%	50%	10,000	10,000		
Real Time	20,001	50.9975%	49.0025%	10,200	9,801	$25	$10
Change	1			200	-199		

	SCA Load (MW)	SCB Load (MW)	Total (MW)
IFM	10,000	10,000	20,000
Real Time	10,001	10,000	20,001
Change	1	0	1

Filed Methodology:

LAP Price = (200*$25 + 199*$10) / (200+199) = $17.52/MWh

LAP price Adj. = ((200*$25 - 199*$10) - $17.52 * (1 - 0)) / (1+0) = $2,992.48/MWh

	LAP MW Deviation	Real-time Settlement Amounts			Effective Rate ($/MWh)
		LAP price	LAP price Adjustment	Net	
SCA	1	$17.52	$2,992.48	$3,010.00	$3,010.00
SCB	0	$0	$0	$0	-$2,974.96
Total	1	$17.52	$2,992.48	$3,010.00	-

Root of the Problem and Suggested Resolution

- **Nature of Cases Resulting in Excessive or Counter Intuitive Rates:**
  - Impact of LDF change from DA to RT dominates the impact of changes in LAP MW from DA to RT
- **Resolution:**
  - Separate the impact of LDF changes from LAP load changes
  - Establish a single rate for RT LAP Settlement for LAP load deviations (based on RT nodal LMPs and weights)
  - Allocate the impact of LDF changes as uplift to all RT LAP load (metered LAP load)

Example 1 (Repeated)

	LAP Load (MW)	LDF1	LDF2	Node 1 (MW)	Node 2 (MW)	LMP1	LMP2
IFM	20,000	50%	50%	10,000	10,000		
Real Time	20,005	51%	49%	10,202.55	9,802.45	$25	$10
Change	5			202.55	-197.55		

	SCA Load (MW)	SCB Load (MW)	Total (MW)
IFM	10,000	10,000	20,000
Real Time	10,100	9,905	20,005
Change	100	-95	5

New Methodology:

LAP Price = (1,0202.55*$25 + 9,802.45*$10) / (20,005) = $17.65/MWh

Impact of LDF Change with no LAP Load Deviation:

Node 1: 20,000 * (51% - 50%) = 200 MW

Node 2: 20,000 * (49% - 50%) = -200 MW

LDF Change Cost Impact (Neutrality) = $25*200 - $10*200 = $3,000

	LAP MW Deviation	Real-time Settlement Amounts		
		LAP price	Neutrality	Net
SCA	100	$1,765	$1,515	$3,280
SCB	-95	-$1,677	$1,485	-$192
Total	5	$88	$3,000	$3,088

Example 2 (Repeated)

	LAP Load (MW)	LDF1	LDF2	Node 1 (MW)	Node 2 (MW)	LMP1	LMP2
IFM	20,000	50%	50%	10,000	10,000		
Real Time	20,001	50.9975%	49.0025%	10,200	9,801	$25	$10
Change	1			200	-199		

	SCA Load (MW)	SCB Load (MW)	Total (MW)
IFM	10,000	10,000	20,000
Real Time	10,002	9,999	20,001
Change	2	-1	1

New Methodology:

LAP Price = (10,200*$25 + 9,801*$10) / 20,001 = $17.65/MWh

Impact of LDF Change with no LAP Load Deviation:

Node 1: 20,000 * (50.9975% - 50%) = 199.49 MW

Node 2: 20,000 * (49.0025% - 50%) = -199.49 MW

LDF Change Cost Impact (Neutrality) = $25*199.49 - $10*199.49 = $2,992.35

	LAP MW Deviation	Real-time Settlement Amounts		
		LAP price	Neutrality	Net
SCA	2	$35.30	$1,496.40	$1,531.70
SCB	-1	-$17.65	$1,495.95	$1,478.30
Total	1	$17.65	$2,992.35	$3,010.00

Example 3 (Repeated)

	LAP Load (MW)	LDF1	LDF2	Node 1 (MW)	Node 2 (MW)	LMP1	LMP2
IFM	20,000	50%	50%	10,000	10,000		
Real Time	20,001	50.9975%	49.0025%	10,200	9,801	$25	$10
Change	1			200	-199		

	SCA Load (MW)	SCB Load (MW)	Total (MW)
IFM	10,000	10,000	20,000
Real Time	10,001	10,000	20,001
Change	1	0	1

New Methodology:

LAP Price = (10,200*$25 + 9,801*$10) / 20,001 = $17.65/MWh

Impact of LDF Change with no LAP Load Deviation:

Node 1: 20,000 * (50.9975% - 50%) = 199.49 MW

Node 2: 20,000 * (49.0025% - 50%) = -199.49 MW

LDF Change Cost Impact (Neutrality) = $25*199.49 - $10*199.49 = $2,992.35

	LAP MW Deviation	Real-time Settlement Amounts		
		LAP price	Neutrality	Net
SCA	1	$17.65	$1,496.25	$1,531.90
SCB	0	$0	$1,496.10	$1,496.10
Total	1	$17.65	$2,992.35	$3,010.00

How Critical Is the Change?

- The filed method works well as long as the RT LAP deviation is more dominant than the impact of LDF variation from DA to RT (particularly when net RT nodal load deviations are positive)
- The new method is needed as day-ahead load underscheduling is reduced.

Example 4

	LAP Load (MW)	LDF1	LDF2	Node 1 (MW)	Node 2 (MW)	LMP1	LMP2
IFM	20,000	50%	50%	10,000	10,000		
Real Time	21,000	52.143%	47.857%	10,950	10,050	$25	$10
Change	1,000			950	50		

	SCA Load (MW)	SCB Load (MW)	Total (MW)
IFM	10,000	10,000	20,000
Real Time	11,200	9,800	21,001
Change	1,200	-200	1,000

Filed Methodology:

LAP Price = (950*$25 + 50*$10) / (950+50) = $24.25/MWh

LAP price Adj. = ((950*$25 + 50$10) - $24.25 * (1,200 - 200)) / (1,200+200) = $0/MWh

	LAP MW Deviation	Real-time Settlement Amounts			Effective Rate ($/MWh)
		LAP price	LAP price Adjustment	Net	
SCA	1,200	$29,100	$0	$29,100	$24.25
SCB	-200	-$4,850	$0	-$4,850	$24.25
Total	1,000	$24,250	$0	$24,250	$24.25

Example 4 (Repeated)

	LAP Load (MW)	LDF1	LDF2	Node 1 (MW)	Node 2 (MW)	LMP1	LMP2
IFM	20,000	50%	50%	10,000	10,000		
Real Time	21,000	52.143%	47.857%	10,950	10,050	$25	$10
Change	1,000			950	50		

	SCA Load (MW)	SCB Load (MW)	Total (MW)
IFM	10,000	10,000	20,000
Real Time	11,200	9,800	21,000
Change	1,200	-200	1,000

New Methodology:

LAP Price = (10,950*$25 + 10,050*$10) / 21,000 = $17.82/MWh

Impact of LDF Change with no LAP Load Deviation:

Node 1: 20,000 * (52.143% - 50%) = 429 MW

Node 2: 20,000 * (47.857% - 50%) = -429 MW

LDF Change Cost Impact (Neutrality) = $25*429 - $10*429 = $6,429

	LAP MW Deviation	Real-time Settlement Amounts		
		LAP price	Neutrality	Net
SCA	1,200	$21,386	$3,429	$24,815
SCB	-200	-$3,565	$3,000	-$565
Total	1,000	$17,821	$6,429	$24,250

Request for MSC Input

- **Comments on the proposed new method?**
- **Comments on the urgency to change the filed method?**
- **Other suggestions?**