

Full Network Model: Scheduling and Pricing

Scott Harvey

Member: California Market Surveillance Committee

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Critical thinking at the critical time™

INTERCHANGE PRICES

In LMP markets, interchange prices differ across transactions for two reasons:

- Differences due to binding path limits on the transaction contract path;
- Differences in the impact of the transactions on binding physical transmission constraints on the ISO transmission system of the ISO scheduling the transaction.

INTERCHANGE PRICING

The impact of interchange transactions on path limits is straightforward to account for because interchange transactions are scheduled on a contract path.

- The impact of interchange transactions on physical constraints is not straightforward to account for because it depends on the location at which physical generation will be incremented or decremented at a location outside the ISO.
- The California ISO proposes to use North and South scheduling hubs to calculate the congestion impact of interchange transactions in order to better reflect the location at which generation will be incremented or decremented and hence more closely align interchange prices with their value.

PRICING INTERCHANGE

A tag source does not necessarily reflect location of incremental generation to support interchange. PJM's experience shows the futility of using tags to determine generation sources.

- Following the integration of APS into PJM on April 1, 2002, PJM had separate proxy buses for AEP and VACAR.
- PJM quickly found that interchange transactions scheduled from the higher priced VACAR proxy bus were actually sourced in AEP. On July 19, 2002 PJM shifted to pricing based on the tag source.
- PJM found that the tag was ineffective in identifying the true source of power and consolidated the AEP and VACAR proxy buses for pricing purposes on March 1, 2003.

PRICING INTERCHANGE

Following the integration of AEP and Dayton into PJM, PJM had separate Southeast and Southwest proxy buses.

- PJM again found that transactions nominally sourced from the southeast proxy buses had flow impacts indicating a source in the southwest.
- Effective October 1, 2006 PJM combined the southeast and southwest proxy buses so there was only a single proxy bus on the south side of PJM.

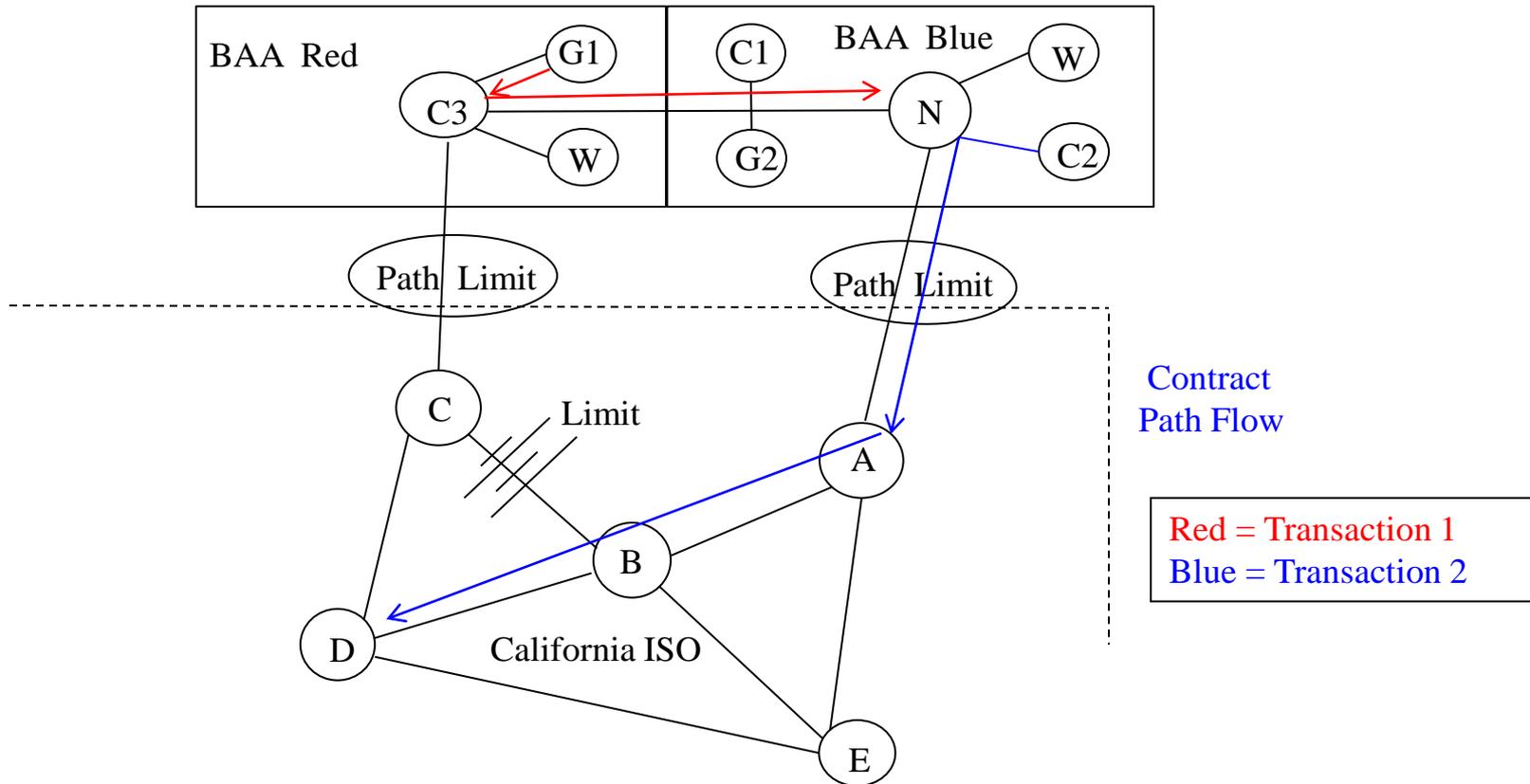
See Stan Williams, "Uncompensated Parallel Flow (Loop Flow) Update, August 8, 2006 and PJM, "Southeast and Southwest Interface Pricing Point Consolidation Approach," August 31, 2006, PJM Market Monitoring Unit, "2006 State of the Market Report," pp. 169, 177-178, 195-199.

PRICING INTERCHANGE

Eastern ISO's do not rely on tags to identify the source of interchange transactions for modeling and pricing their congestion impacts.

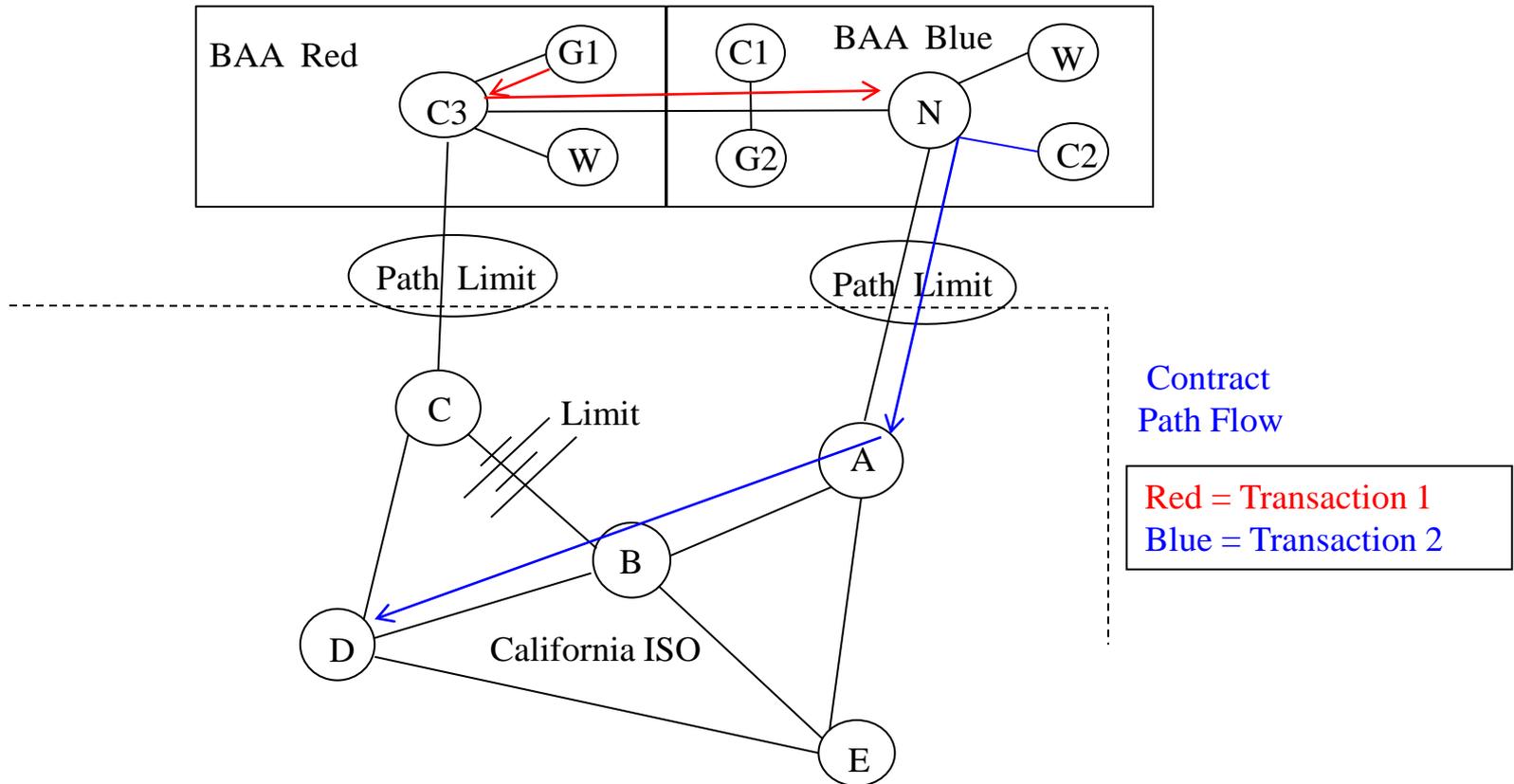
- PJM's pricing system for interchange with non-ISO balancing authority areas to its south is exactly what the California ISO proposes and has been for roughly 7 years.
- All interchange with Duke, TVA, Southern, SPP and other systems is settled using the same price, regardless of the nominal source on the tag.

Tags and Contract Paths



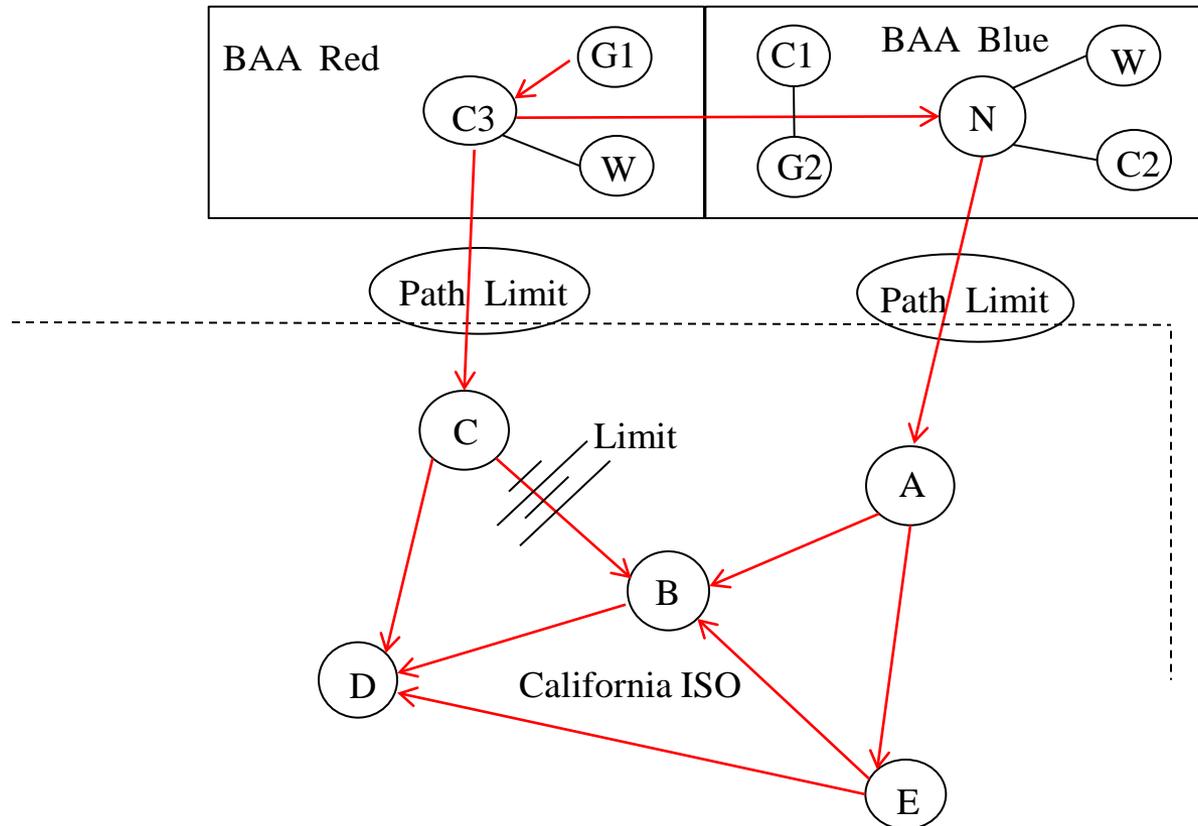
The tagged source for the transaction sinking in the California ISO, transaction 2, is C2.

Tags and Contract Paths



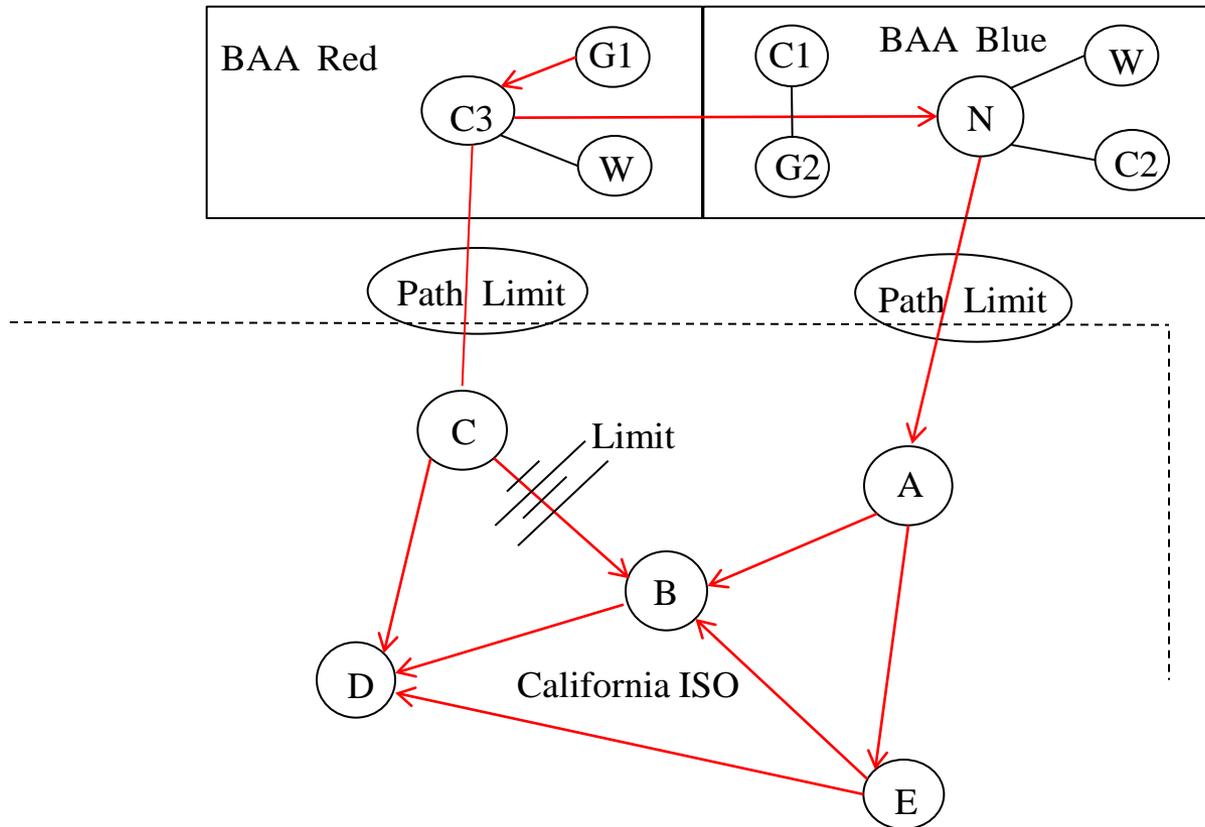
C2 is a baseload coal unit, however, whose output does not change. The power sold into the California ISO with a tag sourced at C2 is replaced with power from G1 in BAA red.

Tags and Contract Path



The actual impact of scheduling transaction 2 on California ISO transmission constraints will be determined by the location at which generation is incremented (G1), not the tag source (C2).

Tags and Contract Paths



This outcome is not speculative. This is exactly what happened to PJM on a large scale with the AEP and VACAR hubs.

PJM AND PROGRESS

PJM prices interchange with Progress (now part of Duke) based on the terms of the agreement Progress entered into with PJM.

- The Progress PJM agreement is analogous to a MEEA in the California ISO design.
- In fact, the MEEA concept is derived from the PJM Progress precedent.

PJM AND RTOS

PJM's interchange pricing with MISO reflects the PJM- MISO market to market congestion management design, so is fundamentally different from interchange pricing with balancing authority areas not entering into such a relationship.

Interchange pricing between Ontario, New York and PJM can vary based on the contract path because of contractual agreements for adjustments to PAR schedules based on contract path schedules.

NYISO TAGGING AND CHECKOUT TIMELINES

Day-Ahead market

“An E-tag is not required prior to submitting a DAM transaction or the posting of Day Ahead results at 11A.M. Since a transaction request in the MIS indicates the maximum energy profile that may be accepted, it may be premature for the PSE to submit the associated E-tag before the DAM results are posted if the maximum is not scheduled.”

See New York ISO, “Market Participants User’s Guide,” June 2012 pp. 7-54- 7-55.

NYISO TAGGING AND CHECKOUT TIMELINES

“All new HAM transaction requests will require a NERC tag identifier to be provided in the MIS at the time of transaction request submission. For the HAM, this time requirement is no later than seventy-five minutes prior to the hour the schedule is to become active.”

See New York ISO, “Market Participants User’s Guide,” June 2012 p. 7-55.

NYISO TAGGING AND CHECKOUT TIMELINES

“The associated E-Tag for a Real-Time external transaction must be submitted no later than seventy-five minutes prior to the scheduling hour in order to be evaluated for that scheduling hour in the Real-Time Market. Each time an external transaction bid/offer is submitted or updated in the MIS, it will be checked for a valid corresponding E-Tag.”

NYISO TAGGING AND CHECKOUT TIMELINES

“The NYISO uses a two-step process, evaluation and checkout, to schedule external transactions. The evaluation step, performed during the Real Time Commitment (RTC) process, determines whether a proposed transaction meets economic criteria established by the Market Participant and honors all relevant capacity and ramp limitations...

During the checkout step, which follows the evaluation step, the NYISO verifies that the transaction is acceptable to all relevant Balancing Authorities, and that the information in the transaction’s E-tag is consistent with the results of the evaluation step.”

NYISO TAGGING AND CHECKOUT TIMELINES

“A Market Participant that fails to get a matching E-Tag implemented at least 20 minutes prior to flow will be subject to Financial Impact Charges for transactions that do not flow.”

New York ISO Technical Bulletin 27 “NERC Electronic Tagging Under NYISO Operation,” p. 5.

NYISO TAGGING AND CHECKOUT TIMELINES

“If an energy injection scheduled by RTC at a Proxy Generator Bus fails in the ISO’s checkout process, the Supplier or Transmission Customer that was scheduled to make the injection will pay the Energy imbalance charge described above in Section 4.5.3.1.”

The Energy imbalance charge is the real-time price times the difference between the day-ahead and real-time schedule.

NYISO TAGGING AND CHECKOUT TIMELINES

“In addition, if the checkout failure occurred for reasons within the Supplier’s or Transmission Customer’s control it will be required to pay the ‘Financial Impact Charge’ described below. The ISO’s Market Mitigation and Analysis Department will determine whether the Transaction associated with an injection failed for reasons within a Supplier’s or Transmission Customer’s control.”

The financial impact charge is the larger of the RTD price minus the RTC price or zero.

INTERCHANGE PRICING OPTIONS

The California ISO design will provide multiple levels of accuracy in interchange pricing.

- Join the California ISO, be paid the resource specific LMP;
- Join the EIM, be paid the resource specific LMP;
- Sign a MEEA, be paid a BAA specific LMP;
- If you don't know where the power is coming from or going to, pay or be paid the generic proxy bus LMP.

EXTENT OF NETWORK MODEL

Eastern ISO network models extend considerably outside their own balancing authority area.

- Even in 1999 the New York Power Pool real-time network model extended far outside the New York transmission system.
- The swing bus was actually located at Brown's Ferry, Tennessee
- The New York ISO's current network model includes parts of MISO, as well as PJM, Ontario and ISO New England.