### "The Virtues of Virtual RTOs"

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What are the interregional coordination problems?

- Loopflow impacts
- Interchange scheduling
  - Congestion impacts
  - Optimizing flow levels
- Reliability surprises







Loopflows can have adverse impacts on adjacent control areas.

- In the Eastern Inter-Connection, the congestion impact of inter-control area transactions is accounted for in the IDC and generally addressed through TLRs.
  - TLRs are at best an inefficient solution.
  - TLRs provide a slow solution.
  - TLRs provide an uncertain solution.
  - Continued reliance on TLRs raises costs, compromises reliability and contributes to problematic cost shifts.
- There is currently no mechanism to account for the congestion impact on adjacent control areas of intra-control area transactions or dispatch.
- As control areas expand, the external effects of intra-control area dispatch may be greatly magnified.







Improved regional coordination can reduce congestion management costs arising from loop flows in three ways:

- Coordination can ensure that an adjacent control area's internal dispatch does not aggravate congestion.
- Coordination can allow an adjacent control area's internal redispatch to be used to manage congestion.
- The improved ability to control line flows through regional coordination can enable operation to higher rating limits.



No Interchange

**37.5 MW Net Interchange** 



#### **37.5 MW Net Interchange**





A second coordination problem is accounting for the congestion impacts of interchange schedules:

- In evaluating and pricing the congestion impact of interchange schedules, each control area must make an assumption about the location of the generation that will move with a change in interchange schedules.
- Without information regarding supply offers and transmission constraints in the other control area, these assumptions cannot be accurate.

Improved interregional coordination of congestion management would reduce the cost of meeting load by eliminating pricing inefficiencies that can result in inefficiently high or low interchange schedules.



A third interregional coordination problem is the process for optimizing interchange between dispatch regions. This optimization is constrained by:

- Export charges.
- Reaction time/limited information.
- Coordination-related transmission limits on interchange.
- Other reliability constraints (ICAP recall).

Different levels and kinds of coordination are required to address these limits to optimizing interchange and reduce the cost of meeting load.



## VIRTUAL RTOs

Cost

While all of these interregional coordination problems could be realized through formation of a single regional RTO, there are costs to that approach.

- 1. Implementation costs, software, hardware, training
- 2. Implementation risk
- 3. Coordination limits
  - Software/hardware
  - Humans
- 4. Cost shifts
- 5. Reliability shifts
- 6. Market design complexity







#### VIRTUAL RTOS

An alternative approach is to attempt to improve interregional coordination and realize some of the benefits of a combined RTO through formation of a virtual RTO.

- The crux of a virtual RTO is that information is exchanged between RTOs to allow coordination of some activities between RTOs in the same manner that they are coordinated within an RTO.
- This may also entail some coordination functions otherwise handled by market participants being coordinated directly between the affected RTOs.
- This could entail direct RTO determination of interchange, inter-RTO coordination of congestion management, or both.



One step toward a virtual RTO that NYISO and ISO-New England are evaluating with their market participants is that RTOs could optimize interchange by periodically adjusting the level of real-time interchange to keep proxy bus prices in equilibrium.

- RTO determination of interchange would address reaction time issues by streamlining the bid evaluation, security analysis, and check out process by making market participant inter-RTO transactions financial.
- RTO determination of interchange would address the limited information issue by exchanging supply curve information.



#### VIRTUAL RTOS

What

Successful implementation of this limited step toward a combined dispatch requires several developments in RTO processes.

- Consistent forward-looking interchange evaluations.
- Process for joint determination of real-time interchange.
  - Security analysis.
  - Supply curves.
- Settlements process for physical interchange and financial transactions.

This step, however, does not directly address the inefficiencies in interchange schedules arising from incorrect assumptions about marginal generation sources in adjacent control areas.



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