

Agenda ACE Diversity Interchange Task Force

June 14, 2010 | 8:00 a.m.–5:00 p.m., PDT
British Columbia Transmission Company (BCTC)
Charles Room – 11th Floor
1055 Dunsmuir
Vancouver, British Columbia V7X 1V5

Ready Talk Remote Participation:

Audio Conference: 866-740-1260
Access Code: 5247033 #

Web Conference: <http://www.readytalk.com>
Access Code: 5247033

Purpose: The ACE Diversity Interchange Task Force (ADITF) will write, review, and edit the ACE Diversity Interchange white paper.

Agenda:

1. **Administrative — Don Badley**
 - a. Introductions of Membership and Guests
 - b. Arrangements
 - c. NERC Antitrust Compliance Guidelines
 - d. Approval of April, 2010 ADITF Meeting Minutes
Attachment — April 29, 2010 Meeting Minutes
 - e. Approval of Meeting Agenda
 - f. **Attachment** — ADITF Scope
 - g. **Attachment** — Duke Energy Letter to NERC OC Chair Regarding the Implementation Requirements for ADI, March 12, 2009
 - h. **Attachment** — Doug Hils ADITF e-mail dated October 8, 2009
 - i. **Attachment** — Doug Hils ADITF e-mail dated December 3, 2009
 - j. **Attachment** — ADITF Roster

2. **Write and Review ADI White Paper – Don Badley**
 - a. **Attachment** — White Paper Draft Outline (from the St. Louis ADITF Meeting)

- b. **Attachment** — White Paper Draft Outline and Written Sections — To be Sent Under Separate Cover
 - c. **Attachment** — ADI White Paper Review Material
 - d. **Attachment** — ADI Examples
- 3. Review and Address ADI Interchange Aspects — Don Badley**
Including Dynamic Transfer Discussions (Dynamic Schedule, Pseudo-Ties)
- 4. Presentations /Discussion/Proposals**
- a. **Attachment** — Reliability Concerns Related to Supplemental Regulation
 - b. **Attachments** — Additional Presentations May be Sent Under Separate Cover
- 5. Dates and Locations of Future Meetings**
- Future ADITF meetings will be hosted at ADITF member, Region, utility, or volunteer facilities.

Antitrust Compliance Guidelines

I. General

It is NERC's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. This policy requires the avoidance of any conduct that violates, or that might appear to violate, the antitrust laws. Among other things, the antitrust laws forbid any agreement between or among competitors regarding prices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that unreasonably restrains competition.

It is the responsibility of every NERC participant and employee who may in any way affect NERC's compliance with the antitrust laws to carry out this commitment.

Antitrust laws are complex and subject to court interpretation that can vary over time and from one court to another. The purpose of these guidelines is to alert NERC participants and employees to potential antitrust problems and to set forth policies to be followed with respect to activities that may involve antitrust considerations. In some instances, the NERC policy contained in these guidelines is stricter than the applicable antitrust laws. Any NERC participant or employee who is uncertain about the legal ramifications of a particular course of conduct or who has doubts or concerns about whether NERC's antitrust compliance policy is implicated in any situation should consult NERC's General Counsel immediately.

II. Prohibited Activities

Participants in NERC activities (including those of its committees and subgroups) should refrain from the following when acting in their capacity as participants in NERC activities (e.g., at NERC meetings, conference calls and in informal discussions):

- Discussions involving pricing information, especially margin (profit) and internal cost information and participants' expectations as to their future prices or internal costs.
- Discussions of a participant's marketing strategies.
- Discussions regarding how customers and geographical areas are to be divided among competitors.

- Discussions concerning the exclusion of competitors from markets.
- Discussions concerning boycotting or group refusals to deal with competitors, vendors or suppliers.
- Any other matters that do not clearly fall within these guidelines should be reviewed with NERC's General Counsel before being discussed.

III. Activities That Are Permitted

From time to time decisions or actions of NERC (including those of its committees and subgroups) may have a negative impact on particular entities and thus in that sense adversely impact competition. Decisions and actions by NERC (including its committees and subgroups) should only be undertaken for the purpose of promoting and maintaining the reliability and adequacy of the bulk power system. If you do not have a legitimate purpose consistent with this objective for discussing a matter, please refrain from discussing the matter during NERC meetings and in other NERC-related communications.

You should also ensure that NERC procedures, including those set forth in NERC's Certificate of Incorporation, Bylaws, and Rules of Procedure are followed in conducting NERC business.

In addition, all discussions in NERC meetings and other NERC-related communications should be within the scope of the mandate for or assignment to the particular NERC committee or subgroup, as well as within the scope of the published agenda for the meeting.

No decisions should be made nor any actions taken in NERC activities for the purpose of giving an industry participant or group of participants a competitive advantage over other participants. In particular, decisions with respect to setting, revising, or assessing compliance with NERC reliability standards should not be influenced by anti-competitive motivations.

Subject to the foregoing restrictions, participants in NERC activities may discuss:

- Reliability matters relating to the bulk power system, including operation and planning matters such as establishing or revising reliability standards, special operating procedures, operating transfer capabilities, and plans for new facilities.
- Matters relating to the impact of reliability standards for the bulk power system on electricity markets, and the impact of electricity market operations on the reliability of the bulk power system.
- Proposed filings or other communications with state or federal regulatory authorities or other governmental entities.
- Matters relating to the internal governance, management and operation of NERC, such as nominations for vacant committee positions, budgeting and assessments, and employment matters; and procedural matters such as planning and scheduling meetings.

Meeting Minutes ACE Diversity Interchange Task Force

April 29, 2010
Tucson Electric Co. Office
Tucson, Arizona

A meeting of the Resources Subcommittee, ACE Diversity Interchange Task Force (ADITF) was held on April 29, 2010 at the Ameren Corporation Office in St. Louis, Missouri. The agenda, and attendance list are attached as **Exhibits A** and **B**, respectively. There are no individual statements or minority opinions.

ACE Diversity Interchange Task Force Chair Don Badley presided and a quorum was present.

ACE Diversity Interchange Task Force Appreciation for Meeting Host Ameren Corporation

The ACE Diversity Interchange Task Force acknowledges and appreciates the hospitality that the Ameren Corporation and specifically Gerry Beckerle and Crystal Ward provided to the subcommittee as it hosted the ADITF meeting at their facility.

Antitrust Compliance Guidelines

Secretary Vandervort acknowledged the NERC Antitrust Compliance Guidelines.

ADITF Welcomes New Members

The ADITF Chair Don Badley added Carol Opatrny and Tony Nguyen to the task force. The ADITF welcomes Carol and Tony to the task force.

January 29–30, 2010 ADITF Meeting Summary

The ADITF approved the January 27–28, 2010 ADITF meeting summary.

ACE Diversity Interchange Definition

The ADITF reviewed the “ACE Diversity Interchange” definition that the task force defined during the January, 2010 meeting. The task force did not change or revise the definition, which is as follows:

ACE Diversity Interchange (ADI) is a form of supplemental regulation that uses real-time, sub-minute adjustments to the initial ACE values of participating Balancing Authorities that always net to zero and become non-zero individually when at least one participating

Balancing Authority's initial ACE value differs in algebraic sign from at least one other participating Balancing Authority's ACE. Participating Balancing Authorities achieve reductions in their control and reporting ACE values via dynamic transfers of the ACE corrections computed by ACE Diversity Interchange algorithm.

Examples of ADI

Doug Hils made a presentation on examples of ADI. See **Exhibit D**.

Reliability Issues Related to Supplemental Regulation

Mike Potishnak made a presentation on the Reliability Issues Related to Supplemental Regulation. Due to the sensitive nature of the data, the presentation will not be included in the meeting minutes.

ACE Diversity Interchange Discussion

The ADITF had a discussion on the many perceived advantages and disadvantages of ADI. The composition of the ADITF has a very diverse stance of the functional aspects of ADI. As the white paper is written, the various issues and concerns will be discussed, vetted, and enhanced by first the ADITF, then by the RS, ORS, and the IS, then finally by the NERC Operating Committee.

There are ADITF members that suggest that an entity (e.g., ACE Sharing Group or a similar name) that addresses ADI should be formed to address implementation, accounting, summarizing, and reporting. This sharing group would be similar to reserve sharing groups for disturbances.

There are ADITF members that suggest that a SAR will be necessary to incorporate ADI into the NERC reliability standards to establish performance control requirements.

ACE Diversity Interchange White Paper Outline

Chair Badley led the ADITF through the white paper outline. ADITF members volunteered to write various sections of the white paper, see **Exhibit C**.

Mr. Badley requested the ADITF write and return their outline assignments to him as soon as possible, but no later than by June 7, 2010.

Dates and Locations of Future Meetings

Additional meetings or conference calls may be scheduled as necessary for ADITF business-related purposes.

Monday, June 14, 2010 (note the NERC OC meets on June 15-16, 2010)	8 a.m. – 5 p.m.	Vancouver, BC, Canada Host: British Columbia Transmission Company * Coordinator: Tony Nguyen (note the NERC OC meets on June 15–16, 2010 in Vancouver, BC)
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* Future ADITF meetings will be hosted at ADITF member, Region, utility, or volunteer facilities.

Respectfully submitted,

Tom Vandervort

Thomas J. Vandervort
Resources Subcommittee Secretary

RS ACE Diversity Interchange Review Group (ADITF) Scope

Charter

NERC Resources Subcommittee Review of ACE Diversity Interchange (ADI) Review Group

Establishment and Authority

NERC Resources Subcommittee has established an ACE Diversity Interchange (ADI) Review Group to respond to the Duke Energy March 12, 2009 letter to the NERC Operating Committee Chair regarding the Implementation Requirements for ACE Diversity Interchange.

Purpose/Responsibilities

The purpose of the ADI review group is to evaluate and respond to the questions and issues raised within the Duke Energy March 12, 2009 letter (attached hereto). The evaluation and responses shall include, but not be limited to:

- A review of ADI implementation impacts to:
 - BAL-001-0.1a
 - BAL-002-0 R1.1
 - BAL-005-0b R6
 - BAL-005-0b R9
 - BAL-005-0b R10
 - BAL-006 R4.3
 - MOD Standards in General
 - Basis for CPS2 L₁₀ limits
 - Other

The objectives and requirements ADI review group shall include, but not be limited to:

1. Clear responses to Duke Energy's concerns
2. Proposed recommendations to the NERC OC Chair with respect to actions necessary by the OC including but not limited to recommendation of areas necessary for SAR actions.
3. Proposed process for addressing proposals such as ADI on a forward-looking basis.

Work Group Composition and Governance

ADI review group shall be composed of technical representatives from the NERC Resources Subcommittee. The group will coordinate with the ORS and IS.

Project Lead: NERC Resources Subcommittee Vice Chair

Time-Line

The ADI review group shall deliver its findings and report for consideration the NERC Resources Subcommittee and further by the NERC OC by March 2010.

To: Gayle Mayo, NERC Operating Committee Chair

Subject: Implementation Requirements for ACE Diversity Interchange

Date: March 12, 2009



Dear Gayle,

The NERC Resources Subcommittee was approached last year to discuss a process for sharing ACE sometimes referred to as ACE Diversity Interchange or "ADI". The Resources Subcommittee at that time declined to offer its opinion of whether the use of ADI is permitted under the current reliability standards; however, our company believes that the use of ADI needs further investigation due to the potential reliability impact the implementation may have on the operation of the Bulk Electric System. Attachment A presents our concerns and questions regarding ADI implementation.

Parties implementing ADI recognize that the CPS2 L10 bounds at times are more restrictive than necessary for reliable operation, however we are not assured that implementation will have appropriate and adequate reliability/transmission oversight or that the operation will not adversely impact the Interconnection frequency. It is possible that if the current Standards do not prevent two Balancing Authorities from swapping MWs for a minute or two, or more often, that other standards requiring ACE recovery within a defined time, such as DCS under BAL-002 or the draft Balancing Authority ACE Limit under Project 2007-18, could be circumvented without appropriate provisions to address such transfers.

Notwithstanding our concern that ADI may be circumventing the basis for the non-linear allocation of the CPS2 L10 limits, we believe that ADI can be implemented reliably and within the scope of the standards given certain provisions being met; however, we also believe that ADI under other circumstances can be implemented in a manner detrimental to reliable operation of the system. Compliance, integration of renewable resources, and management of operating costs have all pushed the expansion of the use of ADI to where we believe the implementation and use needs to be addressed.

We respectfully request that the NERC Operating Committee discuss this topic and consider directing the Resources Subcommittee to address this subject more fully with the Operating Reliability Subcommittee and Interchange Subcommittee as needed to address the concerns and questions noted. The work may result in the identification of areas necessary for a SAR if not addressed adequately under the current standards. Please let me know if you have any questions or comments on our request.

Sincerely,

Doug Hills

Director, Midwest Control Area Operation

cc: J. Holeman
L. Kezele
G. Adamski
T. Bilke
T. Vandervort

ATTACHMENT A

STANDARD PROVISIONS CITED:

BAL-005-0b R6. The Balancing Authority's AGC shall compare total Net Actual Interchange to total Net Scheduled Interchange plus Frequency Bias obligation to determine the Balancing Authority's ACE.

BAL-005-0b R9. The Balancing Authority shall include all Interchange Schedules with Adjacent Balancing Authorities in the calculation of Net Scheduled Interchange for the ACE equation.

BAL-005-0b R10. The Balancing Authority shall include all Dynamic Schedules in the calculation of Net Scheduled Interchange for the ACE equation.

BAL-006 R4.3. A Balancing Authority shall make after-the-fact corrections to the agreed-to daily and monthly accounting data only as needed to reflect actual operating conditions (e.g. a meter being used for control was sending bad data). Changes or corrections based on non-reliability considerations shall not be reflected in the Balancing Authority's Inadvertent Interchange. After-the-fact corrections to scheduled or actual values will not be accepted without agreement of the Adjacent Balancing Authority(ies).

MOD Standards in general.

INT Standards related to dynamic transfers.

CONCERNS AND QUESTIONS

A process sometimes referred to as "ACE Diversity Interchange", or "ADI", has been used between two or more Balancing Authorities to "share" ACE for control performance compliance reporting under BAL-001. There are multiple forms of this approach in place, however it is not clear that the current NERC Standards allow for the use of ADI, or that the practice of allowing BAs to add CPS2 L10 limits is not circumventing the basis for the non-linear allocation of the limits.

An example of ADI would be where two Balancing Authorities develop a process where the ACE for each BA is monitored in real-time, and the BAs are provided information supporting that the ACE of one BA could be, or is being, used to offset what would otherwise be a CPS2 exceedance for the other BA or both BAs. For example, two BAs with a bias each of -27 MW/0.1Hz and CPS2 L10 of 40 MW, could operate in a manner where one BA could be pushing 60 MW and the other pushing 10 MW, and ACE would be "swapped" in a manner so that both BAs are kept within their CPS2 bounds - essentially giving the two BAs a combined CPS2 L10 target of 80 MW.

Another scenario could be where a computer combines the information for both BAs and provides a dynamic value between them to balance the two within the combined target of 80 MW for 90% of the ten-minute periods each month under CPS2. An extreme example under either implementation would be where BA1 could be pushing 500 MW and BA2 could be dragging 579 MW, and the ACE shared for compliance could be any variation of allocation attempting to keep both BA's within their CPS2 L10 limit (BA1 with minus 39 MW and BA2 with minus 40 MW reported ACE for example, reflecting a 539 MW dynamic transfer from BA1 to BA2 under ADI).

For the implementation, a variable to reflect the ACE swapped could go into the ACE equation as either scheduled or actual interchange, however that is where our questions begin:

If the interchange reflected in the ACE equation is considered Actual Interchange,

- a) Is the interchange considered a pseudo-tie that has to be modeled to capture the potential transmission impact of the dynamic transfer?
- b) Can the value operated to be removed from Actual Interchange accounting after-the-fact where the transfers then become part of Inadvertent Interchange?
- c) Do the BAs have to be Adjacent BAs for the pseudo-tie implementation? If not, what are the requirements that must be met?
- d) Do the BAs have to ensure that anticipated transfers are accounted for in ATC/AFC and other transmission capability determinations under the MOD Standards?
- e) Do the BAs have to procure transmission service?
- f) Can the dynamic transfer be implemented between two Balancing Authorities without the knowledge of the applicable Transmission Operators or Transmission Service Providers?

If the interchange reflected in the ACE equation is considered Scheduled Interchange:

- a) Does the anticipated flow need to be tagged and updated as a Dynamic Schedule?
- b) Can any value besides the tagged Net Interchange Schedules with Adjacent Balancing Authorities be included the Scheduled Interchange component of the ACE equation? If so, what criteria applies to capturing such transfers in transmission modeling?
- c) Does transmission service have to be procured?
- d) Can the values operated to be removed from Scheduled Interchange accounting after-the-fact where the transfers then become part of Inadvertent Interchange?
- e) Can scheduled interchange between two BAs be implemented without the knowledge of the applicable Transmission Operators or Transmission Service Providers?

Under either type of dynamic transfer, is it possible under the existing standards for two BAs to swap a few MWs, or a few hundred MWs, for only a minute or so? If so, what provisions need to be met in order for such an implementation and what information must be kept to make auditors aware of the implementation?

The non-linear aspect of the CPS2 L10 allocation to all BAs based upon their bias provides the opportunity under ADI for multiple BAs to operate in a manner no different than that of single BA, but have a combined CPS2 L10 much greater than what a single BA of equivalent size is afforded. For example, ten 100 MW BAs (1000 MW total) could operate under ADI with a combined CPS2 L10 of 77.4 MW, a value greater than what would have been

allocated to a 9500 MW BA in 2008. The justification and intent of the CPS2 L10 non-linear allocation appears to be violated by ADI.

If the net result of a group of BAs sharing ACE is no different than operation of a single BA, should the combined size of the ADI group be used as the basis for the CPS2 L10 allocation? Provision of Supplemental Regulation Service by definition is one BA supplementing another BA's regulation; when the provision moves to bidirectional sharing of regulation (or multi-party sharing of regulation for three or more parties under ADI), it appears that the basis for the non-linear allocation of the CPS2 L10 limits is not consistent with the intended application.

Arguments in support of the CPS2 requirement have indicated that the L10 limits are needed to limit the impact of imbalanced operation on the transmission system. If such arguments are supported, what requirements must be met to mitigate unscheduled flows or monitor transmission loading resulting from sustained operation outside the L10 bound by use of interchange perhaps not tagged or considered in transmission service? Can BAs implement ADI without the knowledge of appropriate Transmission Operators and Transmission Service Providers? Can Transmission Service Providers allow BAs to implement ADI without transmission service while not providing comparable service to other entities?

If ambiguity exists on the treatment of Interchange under ADI (scheduled or actual), then it isn't clear how such Interchange is captured appropriately by the parties responsible for compliance to the MOD Standards for development of ATC/AFC calculations.

Can a Balancing Authority have an arrangement with multiple BAs across the country to exchange ACE for CPS1 and CPS2 compliance? There isn't a clear line on where simple provision of Supplemental Regulation Service moves to operation in a manner similar to a single BA where the basis for the compliance measures remains consistent with the intended application.

MATERIAL IMPACT OF THE IMPLEMENTATION:

The material impact would be to those affected by adverse conditions on the Interconnection including: a) Actual Frequency impact of Balancing Authorities operating under BAL-001 without proper calculation of variables used for performance monitoring and compliance; b) transmission impacts of unscheduled interchange not being subject to transmission loading relief procedures; c) transmission impacts of Transmission Operators and Transmission Service Providers not having all information available for development of correct ATC/AFC calculations and other requirements under the MOD Standards.

RELATED DEFINITIONS:

Dynamic Interchange Schedule or Dynamic Schedule: A telemetered reading or value that is updated in real time and used as a schedule in the AGC/ACE equation and the integrated value of which is treated as a schedule for interchange accounting purposes. Commonly used for scheduling jointly owned generation to or from another Balancing Authority Area.

Dynamic Transfer: The provision of the real-time monitoring, telemetering, computer software, hardware, communications, engineering, energy accounting (including inadvertent interchange), and administration required to electronically move all or a portion of the real energy services associated with a generator or load out of one Balancing Authority Area into another.

Interchange: Energy transfers that cross Balancing Authority boundaries.

Interchange Authority: The responsible entity that authorizes implementation of valid and balanced Interchange Schedules between Balancing Authority Areas, and ensures communication of Interchange information for reliability assessment purposes.

Interchange Schedule: An agreed-upon Interchange Transaction size (megawatts), start and end time, beginning and ending ramp times and rate, and type required for delivery and receipt of power and energy between the Source and Sink Balancing Authorities involved in the transaction.

Interchange Transaction: An agreement to transfer energy from a seller to a buyer that crosses one or more Balancing Authority Area boundaries.

Interchange Transaction Tag or Tag: The details of an Interchange Transaction required for its physical implementation.

Net Actual Interchange: The algebraic sum of all metered interchange over all interconnections between two physically Adjacent Balancing Authority Areas.

Net Interchange Schedule: The algebraic sum of all Interchange Schedules with each Adjacent Balancing Authority.

Net Scheduled Interchange: The algebraic sum of all Interchange Schedules across a given path or between Balancing Authorities for a given period or instant in time.

Overlap Regulation Service: A method of providing regulation service in which the Balancing Authority providing the regulation service incorporates another Balancing Authority's actual interchange, frequency response, and schedules into providing Balancing Authority's AGC/ACE equation.

Pseudo-Tie: A telemetered reading or value that is updated in real time and used as a "virtual" tie line flow in the AGC/ACE equation but for which no physical tie or energy metering actually exists. The integrated value is used as a metered MWh value for interchange accounting purposes.

Supplemental Regulation Service: A method of providing regulation service in which the Balancing Authority providing the regulation service receives a signal representing all or a portion of the other Balancing Authority's ACE.

From: Hils, Doug
Sent: Thursday, October 08, 2009 5:03 PM
To: Don Badley; Jim Castle
Subject: [ADI] ADI Review Group - Information for our discussions

Dear Don and Jim,

I appreciate each of you volunteering to lead the discussions for the RS and ORS around the subject of ACE Diversity Interchange (ADI). As the discussions will overlap quite a bit across both groups, I would ask that you consider combining the effort into one set of discussions addressing ADI from both a frequency and transmission perspective and allowing the RS and ORS to jointly report back to the NERC OC on the item.

Attached is the response from the RS to my original list of concerns sent to the NERC OC. After reviewing ADI further, I noted a few other concerns and questions in an email to the ORS and RS on August 20, 2009 (at the bottom of this email). For our discussions, I've attached a PDF of the Dynamic Transfer and Interchange Reference Documents from the last NERC OC agenda.

Thanks,
Doug

-----Original Message-----

From: Hils, Doug
Sent: Thursday, August 20, 2009 2:34 PM
Subject: [RBC] ADI and Pseudo-ties

Hi everyone,

Attached are the questions that I included in my original letter to the NERC Operating Committee regarding the implementation of ACE Diversity Interchange along with comments from the first Resources Subcommittee discussion. Below are more items for the ACE Diversity Interchange discussion:

When questioned as to whether dynamic transfers under ADI are part of Scheduled or Actual Interchange, the typical answer is that ADI is implemented in Actual Interchange as a Pseudo-tie (otherwise the transfer would have to be tagged as a Dynamic Schedule). In addition to my opinion that Pseudo-ties must be modeled and have firm transmission to capture the impact of the anticipated dynamic transfers, I have also questioned the practice of zeroing out the Pseudo-tie transfers after-the-fact given that it creates Inadvertent Interchange for all ADI participants (I don't care if it nets to zero).

The NERC and NAESB definitions of "Pseudo-tie" state that the integrated value (of the real-time telemetered reading or value) is used as the metered MWh value for interchange accounting purposes, not zero:

NERC Definition of Pseudo-Tie: A telemetered reading or value that is updated in real time and used as a "virtual" tie line flow in the AGC/ACE equation but for which no physical tie or energy metering actually exists. The integrated value is used as a metered MWh value for interchange accounting purposes.

We need to ensure that variables used in the ACE equation are recorded and properly accounted for so that the primary components of ACE can be

reconstructed. We may need to go further for dynamically calculated values as we focus further on measures looking at real-time ACE performance.

Interchange accounting requires that all Scheduled and Actual Interchange be tied-out with the Adjacent BAs. If BAs are operating to Interchange values that cannot be coordinated in real-time and tied out with adjacent systems, then we're moving away from the guiding principles of interconnected operation...but what's meant by "adjacent"?

The definition of "Adjacent Balancing Authority" states it's a "Balancing Authority Area that is interconnected <with> another Balancing Authority Area either directly or via a multi-party agreement or transmission tariff." Can three generation-only Balancing Authorities, one in Florida, one in South Dakota, and one in Louisiana, sign a multi-party agreement and implement Pseudo-Ties to operate under ADI? What we've heard so far: ADI transfers are not modeled, they're not tagged, no transmission service is procured, values are zeroed after-the-fact - so what is preventing the three-BA ADI scenario? Is interaction with the Transmission Operators and Transmission Service Providers even needed for the Pseudo-tie implementations?

The Resources Subcommittee is putting together a task group to look at the ADI issues further - perhaps it should be a joint group with the Operating Reliability Subcommittee given the overlap of issues and transmission loading implications. Once we point at what has to be in place for the three-BA ADI scenario, we can then look at the Standards to determine which ones support our arguments; where the Standards fall short we can determine what requirements need to be tightened, clarified, or added, to address ADI or any other implementation of Pseudo-Ties in the future.

Thanks,
Doug

Doug Hills
Duke Energy
Midwest Control Area Operation

From: Hils, Doug [mailto:Doug.Hils@duke-energy.com]

Sent: Thursday, December 03, 2009 11:40 AM

To: Tom Vandervort; don.badley@nwpp.org; jcastle@nyiso.com; herbslhw@pjm.com; jpmurphy@bpa.gov; jtolo@tep.com; mpotishnak@iso-ne.com; robert.staton@xcelenergy.com; sbrown@spp.org

Subject: RE: Documents for Friday, Dec 4 ADITF Conf Call

Hi everyone,

Attached are a few items to add to Tom's email:

- My comments inserted into the document "ADI Comments by the Resources Subcommittee".
- A starting document for the ADI Review Work Group that includes relevant NERC definitions and a list of issues for the group's editing.
- A presentation of "ADI examples" to help illustrate some of the issues noted.

I think there are at least three areas of focus:

- 1) Proper implementation and accounting of Pseudo-ties including:
 - a) Required interactions with reliability entities and appropriate modeling of load/gen transfers,
 - b) Treatment of associated transfers under transmission loading relief procedures when firm transmission service is not in place,
 - c) MW accounting of the transfers (should not end up as inadvertent interchange), and
 - d) Mitigation of ability for BAs to implement a brief MW transfer (calling it a "pseudo-tie") that could be used to reset a compliance time limit (implications to DCS and BAAL).
- 2) Complexity of capturing the net transmission impact of ADI transfers (illustrated in presentation).
- 3) Circumvention of the intent of the non-linear allocation of the CPS2 limits (example given at end of presentation)

We've heard quite a bit about how current implementations have addressed reliability – that should not be the subject of our discussion. I feel we need to focus on what standards fail to meet their mark, where the loopholes are, and whatever else is needed to mitigate the potential abuse of the use of Pseudo-ties under ADI or any other implementation that could impact reliable operation.

Thanks,

Doug

From: Tom Vandervort [mailto:Tom.Vandervort@nerc.net]

Sent: Thursday, December 03, 2009 11:05 AM

To: don.badley@nwpp.org; jcastle@nyiso.com; herbslhw@pjm.com; Hils, Doug;
jpmurphy@bpa.gov; jtolo@tep.com; mpotishnak@iso-ne.com; robert.staton@xcelenergy.com;
sbrown@spp.org; Tom Vandervort

Subject: Documents for Friday, Dec 4 ADITF Conf Call

ADI Task Force

Attached are background documents for the ADI Task Force conference call tomorrow. The call details and call-in information were sent to you this past Monday.

Please check the ADITF Roster contact information for accuracy.

The 1 hour conference call will basically be an introduction call with Don giving an overview of the mission and goal for the task force.

On behalf of ADITF Chair Don Badley, I thank you for your participation in this effort,

Tom

ACE Diversity Interchange (ADI) Task Force Roster

Name	Contact Information
Don Badley, ADITF Chair	Tel: 503.445.1076 don.badley@nwpp.org
Jim Castle	Tel: 518.356.6244 jcastle@nyiso.com
Joe Gardner	Tel: 317.249.5446 jgardner@midwestiso.org
Bill Herbsleb	Tel: 610.666.8874 herbslhw@pjm.com
Doug Hils	Tel: 513.287.2149 doug.hils@duke-energy.com
Don Lacen	Tel: 505.241.2032 don.lacen@pnm.com
Jamie Murphy	Tel: 360.418.2413 jpmurphy@bpa.gov
John Tolo	Tel: 520.745.7106 jtolo@tep.com
Mike Potishnak	Tel: 413.535.4308 mpotishnak@iso-ne.com
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Tony Nguyen	Tel: 604.455.1780 Tony.nguyen@bctc.com
Carol Opatrny	Tel: 360.666.8510 ccopat@e-z.net
Tom Vandervort	Tel: 609.524.7033 tom.vandervort@nerc.net

Revised: April 29, 2010

ADI White Paper Outline

BACKGROUND

Purpose of White Paper	John Tolo
Definitions (from NERC Glossary of Terms, ADI definition, etc)	John Tolo
Area Control Error	
ACE Inadvertent	
Inadvertent Interchange	
Primary Inadvertent Interchange	
Secondary Inadvertent Interchange	
Dynamic Transfer	
Dynamic Schedule	
Pseudo-Tie	
ACE Diversity Interchange (ADI)	
Regulating Reserve	
 Starting Point	
End Point	

ADI PRACTICE AND ATTRIBUTES

PROS/CONS

Pros	<i>? – Volunteer to write</i>
<ul style="list-style-type: none"> • Performance (improvements) - CPS1, CPS2: • Unit Movement (Reduction) higher Efficiencies 	
Cons	Doug Hills

OTHER ISSUES

Tariff Issues/Legal Issues:	Doug Hills
Equipment/Infrastructure Requirements	Carol Opatrny, Tony Nguyen
Impact Input/Export Capacity (Is ADI going to affect transmission?)	Mike Potishnak
Equity Issues	<i>? – Volunteer to write</i>
Tracking	Mike Potishnak, Jim Castle, Carol Opatrny
Monitoring	Mike Potishnak, Jim Castle, Carol Opatrny
Interactions with market	Bob Staton, Steve Bruening, David Lemmons
Complexity of issues	Carol Opatrny

Transmission Reservation vs. No Transmission Reservation	Shari Brown
FERC view	? – <i>Volunteer to write</i>
Merchant Issues	Bob Staton
Transmission	Doug Hils
Tagging (should ADI be tagged as Pseudo-Tie or Dynamic Schedule)	Doug Hils
Existing Markets (conflicts or restrictions)	? – <i>Volunteer to write</i>
Settlement	? – <i>Volunteer to write</i>
• Pros:	? – <i>Volunteer to write</i>
• Cons:	? – <i>Volunteer to write</i>

ANALYSES

Technical Discussion	? – <i>Volunteer to write</i>
Necessary Attributes	? – <i>Volunteer to write</i>
Constrained Paths	Carol Opatrny
Equal Benefits	? – <i>Volunteer to write</i>
Implementation	? – <i>Volunteer to write</i>
Additional Consideration	? – <i>Volunteer to write</i>
Affects of ADI on Reliability	? – <i>Volunteer to write</i>

CONCLUSION

SUMMARY

PARKING LOT ISSUES:

- How does ADI affect frequency response
- Compare the White Paper to Doug's Duke Energy ADI Concerns Letter

ADI Review Work Group

Relevant NERC Definitions:

Adjacent Balancing Authority: “A Balancing Authority Area that is interconnected *<with>* another Balancing Authority Area either directly or via a multi-party agreement or transmission tariff.”

Area Control Error: “The instantaneous difference between a Balancing Authority’s net actual and scheduled interchange, taking into account the effects of Frequency Bias and correction for meter error.”

Dynamic Schedule or Dynamic Interchange Schedule: “A telemetered reading or value that is updated in real time and used as a schedule in the AGC/ACE equation and the integrated value of which is treated as a schedule for interchange accounting purposes. Commonly used for scheduling jointly owned generation to or from another Balancing Authority Area.”

Dynamic Transfer: “The provision of the real-time monitoring, telemetering, computer software, hardware, communications, engineering, energy accounting (including inadvertent interchange), and administration required to electronically move all or a portion of the real energy services associated with a generator or load out of one Balancing Authority Area into another.

Inadvertent Interchange: The difference between the Balancing Authority’s Net Actual Interchange and Net Scheduled Interchange. (IA – IS)

Interchange: Energy transfers that cross Balancing Authority boundaries.

Interchange Schedule: An agreed-upon Interchange Transaction size (megawatts), start and end time, beginning and ending ramp times and rate, and type required for delivery and receipt of power and energy between the Source and Sink Balancing Authorities involved in the transaction.

Interchange Transaction: An agreement to transfer energy from a seller to a buyer that crosses one or more Balancing Authority Area boundaries.

Net Actual Interchange: The algebraic sum of all metered interchange over all interconnections between two physically Adjacent Balancing Authority Areas.

Net Interchange Schedule: The algebraic sum of all Interchange Schedules with each Adjacent Balancing Authority.

Net Scheduled Interchange: The algebraic sum of all Interchange Schedules across a given path or between Balancing Authorities for a given period or instant in time.

Overlap Regulation Service: A method of providing regulation service in which the Balancing Authority providing the regulation service incorporates another Balancing Authority’s actual interchange, frequency response, and schedules into providing Balancing Authority’s AGC/ACE equation.

Pseudo-Tie: A telemetered reading or value that is updated in real time and used as a “virtual” tie line flow in the AGC/ACE equation but for which no physical tie or energy metering actually exists. The integrated value is used as a metered MWh value for interchange accounting purposes.

Regulation Service: The process whereby one Balancing Authority contracts to provide corrective response to all or a portion of the ACE of another Balancing Authority. The Balancing Authority providing the response assumes the obligation of meeting all applicable control criteria as specified by NERC for itself and the Balancing Authority for which it is providing the Regulation Service.

Supplemental Regulation Service: A method of providing regulation service in which the Balancing Authority providing the regulation service receives a signal representing all or a portion of the other Balancing Authority's ACE.

ACE Diversity Interchange Issues and Proposed Next Steps:

- a) ADI algorithms we've reviewed voluntarily go to zero when all pre-ADI ACEs are in the same direction - there are no rules that state that it must be done that way. Even with that rule, other voluntary rules are needed to limit the MW amount of the ADI transfer so that ADI ACEs can't be zero for two BAs having a pre-ADI ACEs of -300 MW and +300 MW respectively. In addition, negative pre-ADI ACEs could be summed and then spread back out to BAs keeping all within their CPS2 L10 limit as long as the sum of the negative ACEs was less than the sum of the CPS2 L10s.

Next Steps:

- b) ADI circumvents CPS2 and the non-linear allocation of the limits; multiple BAs can join together and have a combined CPS L10 quite a bit larger than a similarly-sized BA as indicated above. The result can impact both frequency and transmission loading. As it's possible to set up multiple dynamic transfers to achieve the same effect as ADI (but modeled appropriately?), this is a problem with the CPS2 standard and not a standard violation.

Next Steps:

- c) More structure is needed around the rules for interchange and what is or isn't allowed to modify ACE in real-time. We can't have loopholes that can allow BAs to "reset" a 15 or 30-minute counter for compliance by implementing a one-minute dynamic transfer.

Next Steps:

- d) ADI implementations don't properly account for the Dynamic Transfers – everything is zeroed out and becomes part of the BA's Inadvertent Interchange to be paid back at a later time – the argument is that the net inadvertent is zero in real-time; however, the after-the-fact payback is random by all participants: ADI purposely creates errors that are passed on to the Interconnection during payback. The definition of Pseudo-tie includes how it should be accounted for: integrated over the hour.

Next Steps:

- e) ADI concepts don't follow the primary rules of interchange for managing congestion – actual interchange including Pseudo-ties should be captured in modeling and scheduled interchange should be captured in tagging (with the exception perhaps emergency energy under reserve sharing for a short time) to ensure transmission loading relief procedures are being implemented based upon accurate information to achieve the desired congestion relief.

Next Steps:

- f) Adding to the above, Pseudo-ties must be modeled and to the extent such transfers cannot be captured in modeling, Dynamic Schedules should be used (Dynamic Transfer Reference Document). Similar to physical ties for actual interchange, Pseudo-ties are typically implemented between adjacent systems: as the “Native” and “Attaining” BAs and associated the transfers move beyond physically adjacent systems, the impact of the transfers may be such that they need to be implemented as Dynamic Schedules so that the impact of the transfers on other systems can be assessed in real-time and be subject to transmission loading relief procedures (I’ll note that without transmission service the Dynamic Transfers don’t even have non-firm transmission rights for the interchange).

Next Steps:

- g) ACE can only be modified by the frequency bias component, meter error adjustment, or scheduled/actual interchange coordinated between adjacent BAs. The definition of “Adjacent Balancing Authority” is problematic in not defining transmission and other requirements to be met in order for two BAs to operate as if “adjacent” if not directly interconnected. ADI implementations are allowing a variable to be placed into the ACE that doesn’t follow the rules of either a Pseudo-tie or Dynamic Schedule as interchange.

Next Steps:

- h) Is there a transaction that can take place that modifies ACE, for which arguments can be made that neither transmission service nor other interchange-type requirements are needed, and who would need to approve such implementations? I can see where commercial provision of primary/secondary frequency response might drive such discussions, however ADI is not that, and in fact it might be reducing the secondary response to frequency deviations we see today by the loss in diversity. I could argue that third party provision of primary/secondary frequency response could be considered as a new form of Regulation Service if limited to the real-time bias obligation taken on by another BA – it would require transmission consideration, but wouldn’t constitute a “source-to-sink” dynamic transfer as the provision would be to the Interconnection at all times. Among other considerations, providing the service under those conditions would require a change to the existing standard regarding the treatment of Frequency Bias. Rules are needed.

Next Steps:

- i) We have no idea if there are ADI implementations out there between BAs with no transmission or reliability oversight; we only know about the ADI implementations that have been discussed publicly where Reliability Coordinators and Transmission Operators have been involved. None of the ADI implementations that I’m aware of cause me concern from a real-time reliability perspective, as they’ve been developed with oversight from the Transmission Operators and Reliability Coordinators and don’t allow substantial amounts of unscheduled flows on the system, however the expectations of the reliability/commercial rules around interchange must also be met.

Next Steps:

- j) Some would argue that ADI is no different than Supplemental Regulation Service; however Supplemental Regulation Service is intended to be through a bilateral agreement between merchants (FERC filed?) and implemented/settled as interchange with associated transmission service - the NERC rules only cover how the Balancing Authorities treat such transfers in the bias calculations. Supplemental Regulation Service was never intended to be an untracked, un-modeled transfer without transmission service or other recognition of the transfers, potentially impacting the Interconnection both in real-time, and at later times as the Inadvertent Interchange is paid back. ADI

implementation however has set a serious precedent that's detrimental to the rules around interchange without clear indication around who must approve the implementation.

We need to ensure that variables used in the ACE equation are recorded and properly accounted for so that the primary components of ACE can be reconstructed. We may need to go further for dynamically calculated values as we focus further on measures looking at real-time ACE performance.

How are ADI transfers captured in meeting Mod-001-1 R1.2?

“Mod-001-1 R1.2 An accounting for how the reservations and schedules for firm (non-recallable) and non-firm (recallable) transfers, both within and outside the Transmission Service Provider's system, are included.”

The rules for Dynamic Schedules allow for schedule deviations of a certain magnitude:

INT-004-2 R2. The Purchasing-Selling Entity responsible for tagging a Dynamic Interchange Schedule shall ensure the tag is updated for the next available scheduling hour and future hours when any one of the following occurs:

R2.1. The average energy profile in an hour is greater than 250 MW and in that hour the actual hourly integrated energy deviates from the hourly average energy profile indicated on the tag by more than 10%.

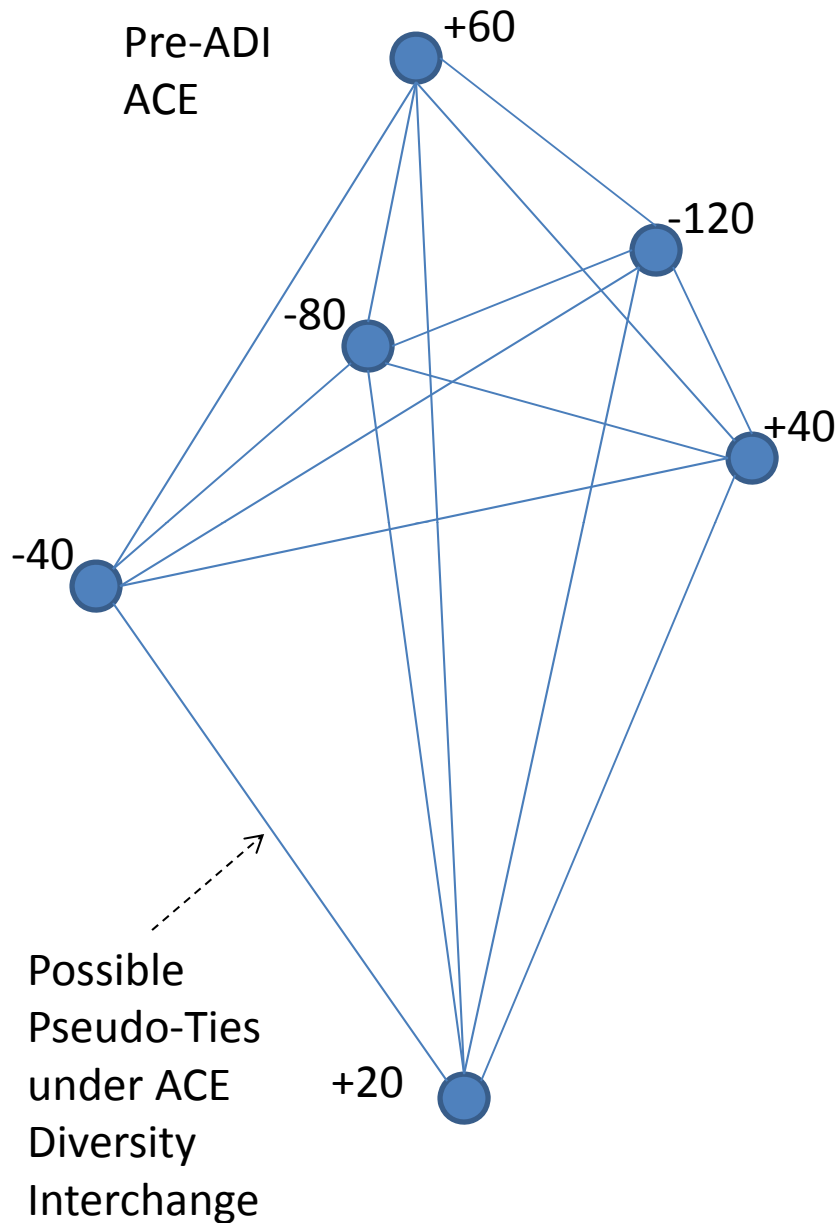
R2.2. The average energy profile in an hour is less than or equal to 250 MW and in that hour the actual hourly integrated energy deviates from the hourly average energy profile indicated on the tag by more than +25 megawatt-hours.

R2.3. A Reliability Coordinator or Transmission Operator determines the deviation, regardless of magnitude, to be a reliability concern and notifies the Purchasing-Selling Entity of that determination and the reasons.

Should a similar requirement be considered for the maximum magnitude of a Pseudo-tie allowed without modeling? Would the magnitude be the net of Pseudo-ties in one direction as the intent of INT-004-2 could be circumvented by implementing many small Dynamic Schedules?

ACE Diversity Interchange (ADI) Examples for Discussion Purposes Only

ACE Diversity Interchange (ADI) Examples for Discussion Purposes Only



In this set of examples, we have a simple ADI scenario of six BAs with the following Pre-ADI ACE, Frequency Bias and CPS2 L_{10} :

BA 1:	+60 ,	-37.9 MW/0.1Hz,	46.72 MW
BA 2:	-80 ,	-113 MW/0.1Hz,	80.66 MW
BA 3:	-120 ,	-44.9 MW/0.1Hz,	50.85 MW
BA 4:	-40 ,	-11 MW/0.1Hz,	25.17 MW
BA 5:	+40 ,	-11 MW/0.1Hz,	25.17 MW
BA 6:	+20 ,	-1 MW/0.1Hz,	7.59 MW

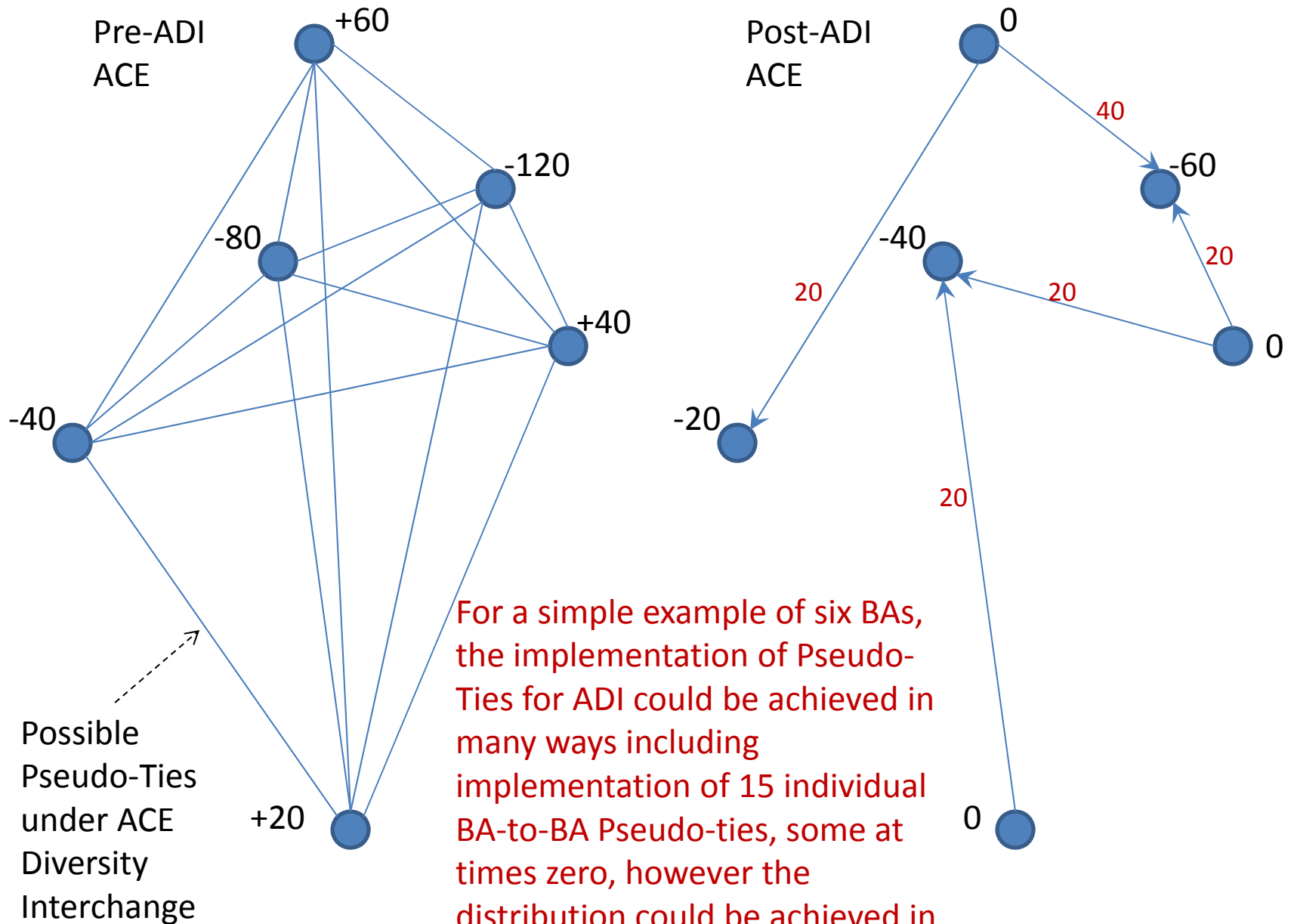
5 out of 6 BAs beyond their CPS2 L_{10}

Sum of Frequency Bias: -218.8 MW/0.1 Hz
(slightly less than a 22,000 MW BA)

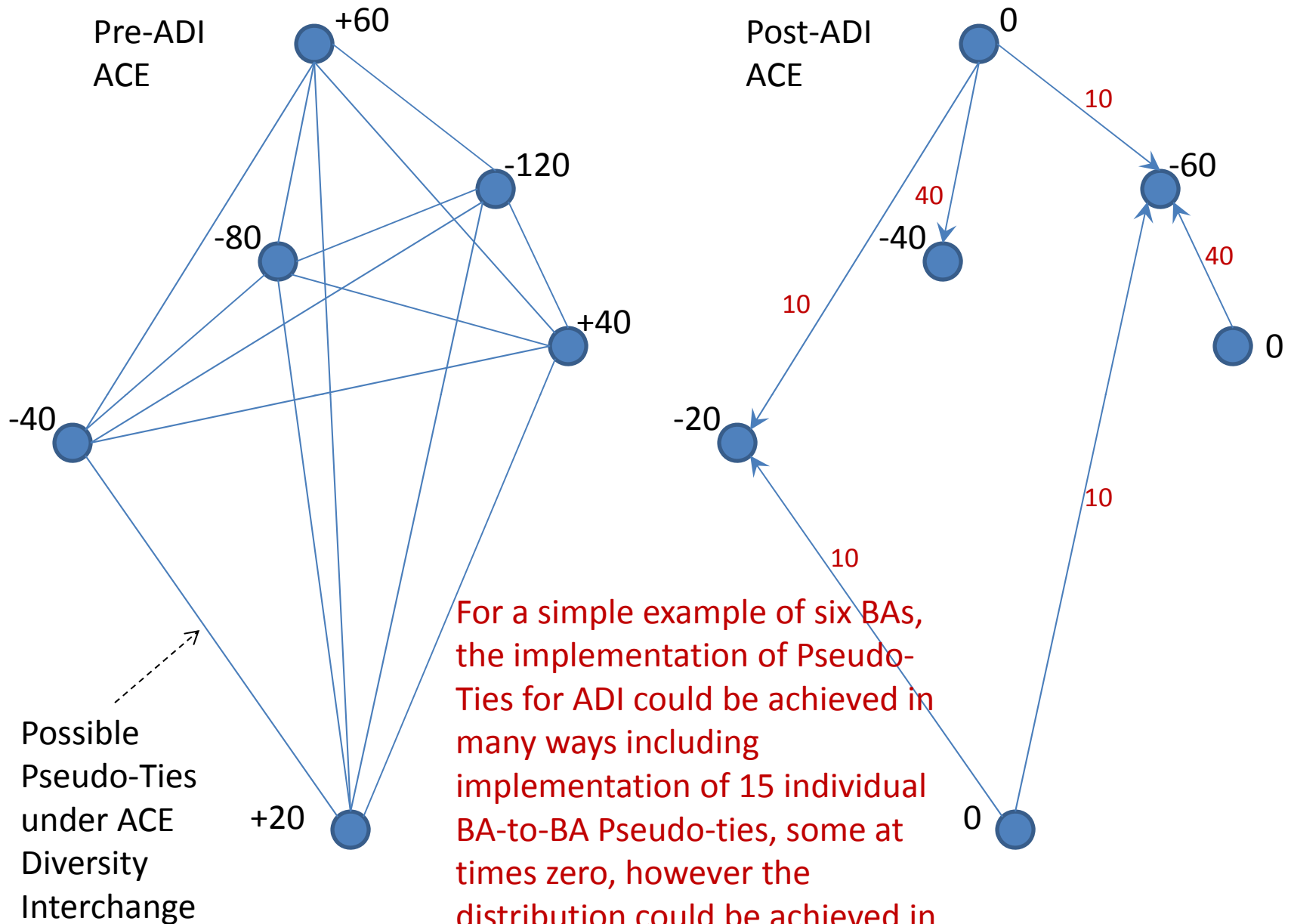
Sum of CPS L_{10} : 156.16 MW
(about the same as a 42,000 MW BA)

CPS L_{10} for a 22,000 MW BA: 112.3 MW

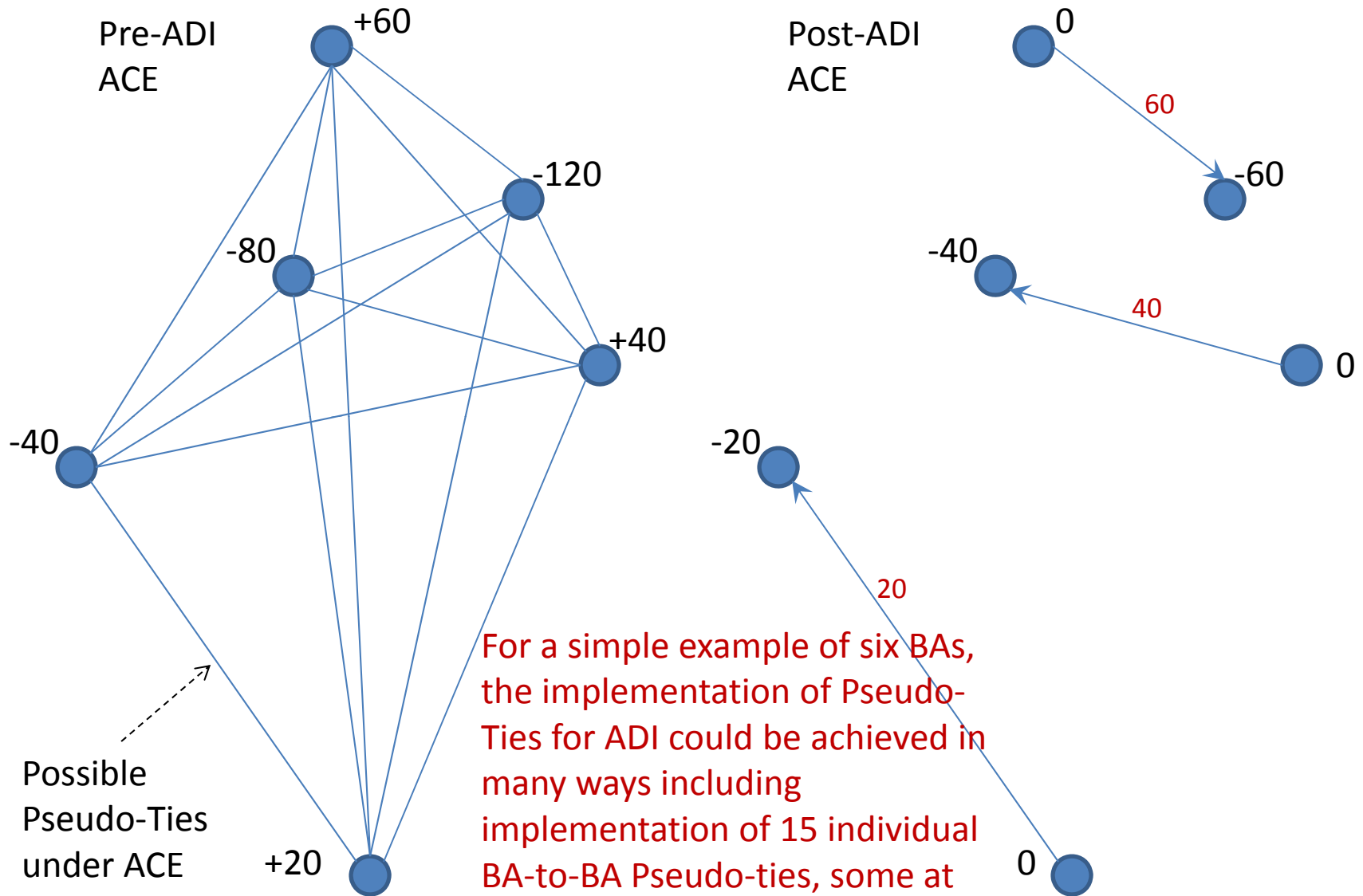
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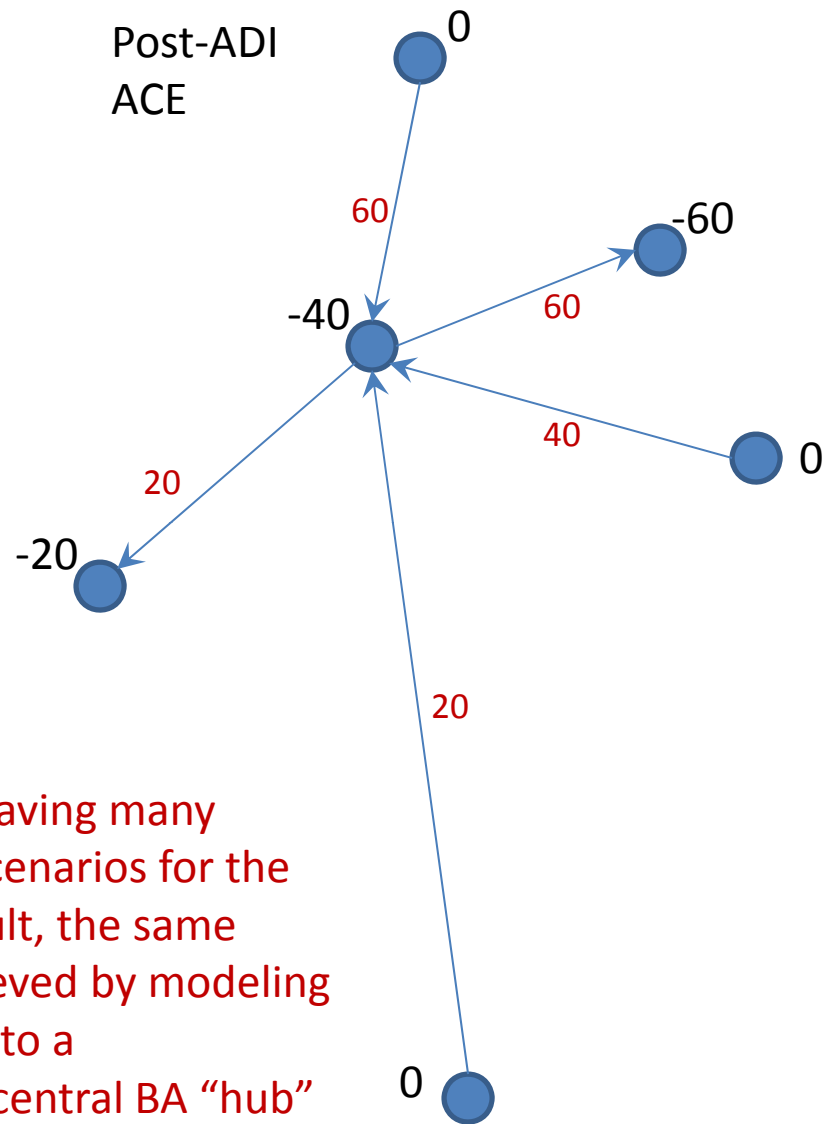
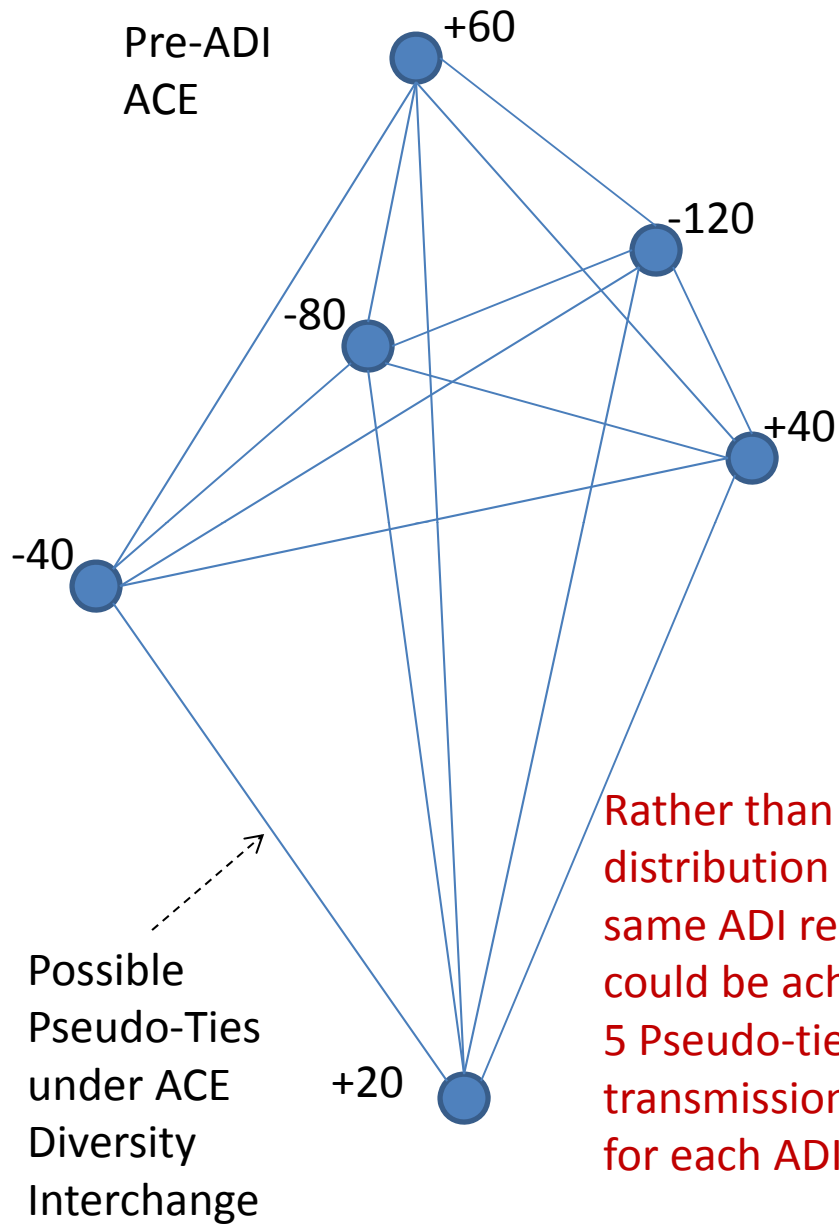
ACE Diversity Interchange (ADI) Examples for Discussion Purposes Only



Possible Pseudo-Ties under ACE Diversity Interchange

For a simple example of six BAs, the implementation of Pseudo-Ties for ADI could be achieved in many ways including implementation of 15 individual BA-to-BA Pseudo-ties, some at times zero, however the distribution could be achieved in many different ways.

ACE Diversity Interchange (ADI) Examples for Discussion Purposes Only

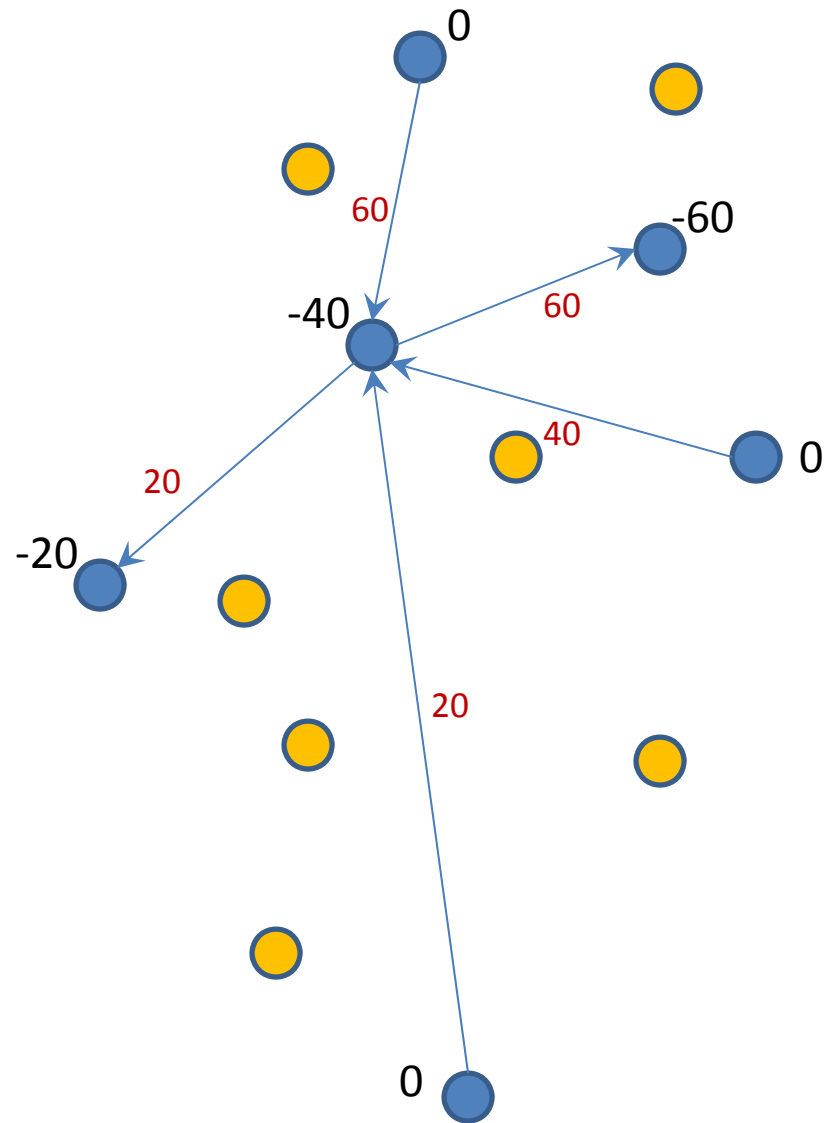


Rather than having many distribution scenarios for the same ADI result, the same could be achieved by modeling 5 Pseudo-ties to a transmission-central BA "hub" for each ADI solution.

ACE Diversity Interchange (ADI) Examples for Discussion Purposes Only

The problem enters in when neighboring systems may also be impacted by the resulting ADI transfers for which they may have no knowledge of the real-time transfers, no RC modeling capturing such transfers, and no capability to curtail such transfers under transmission loading relief procedures before firm and non-firm transactions are curtailed.

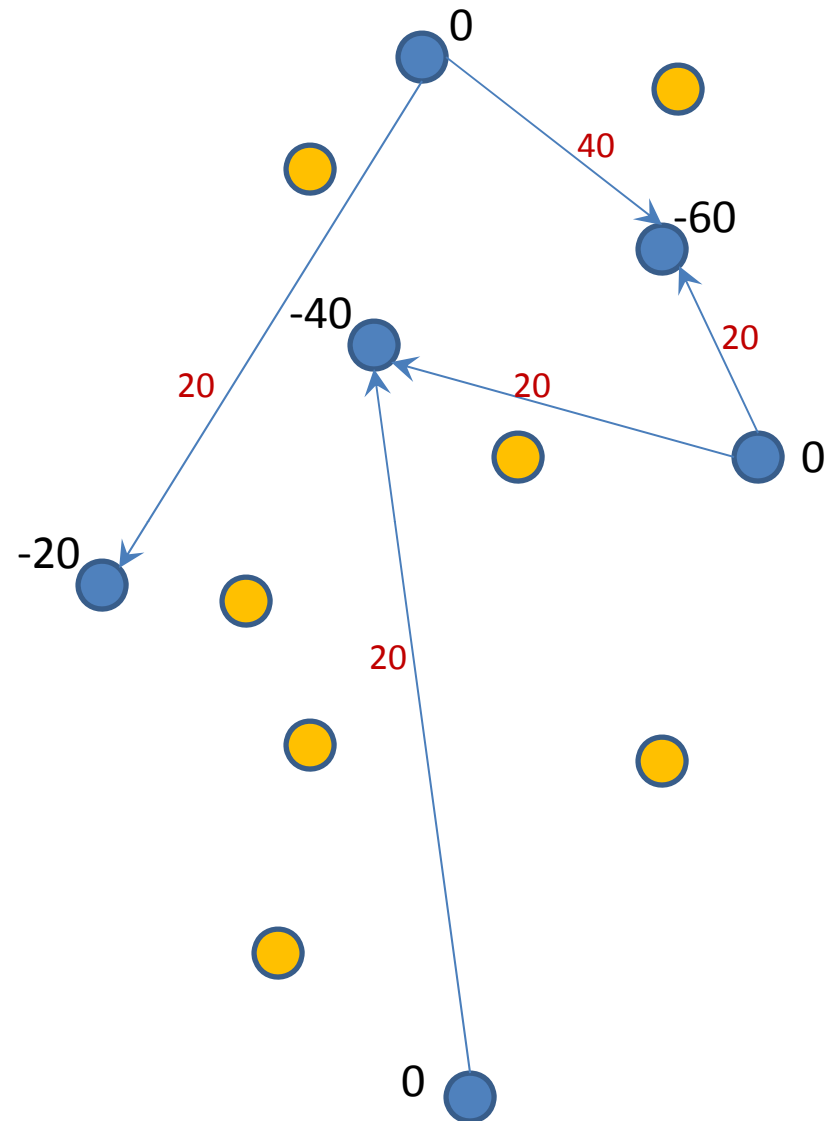
It's possible that the BAs may not be directly interconnected as the requirements around Pseudo-ties are primarily addressed in NERC reference documents and not the Standards.



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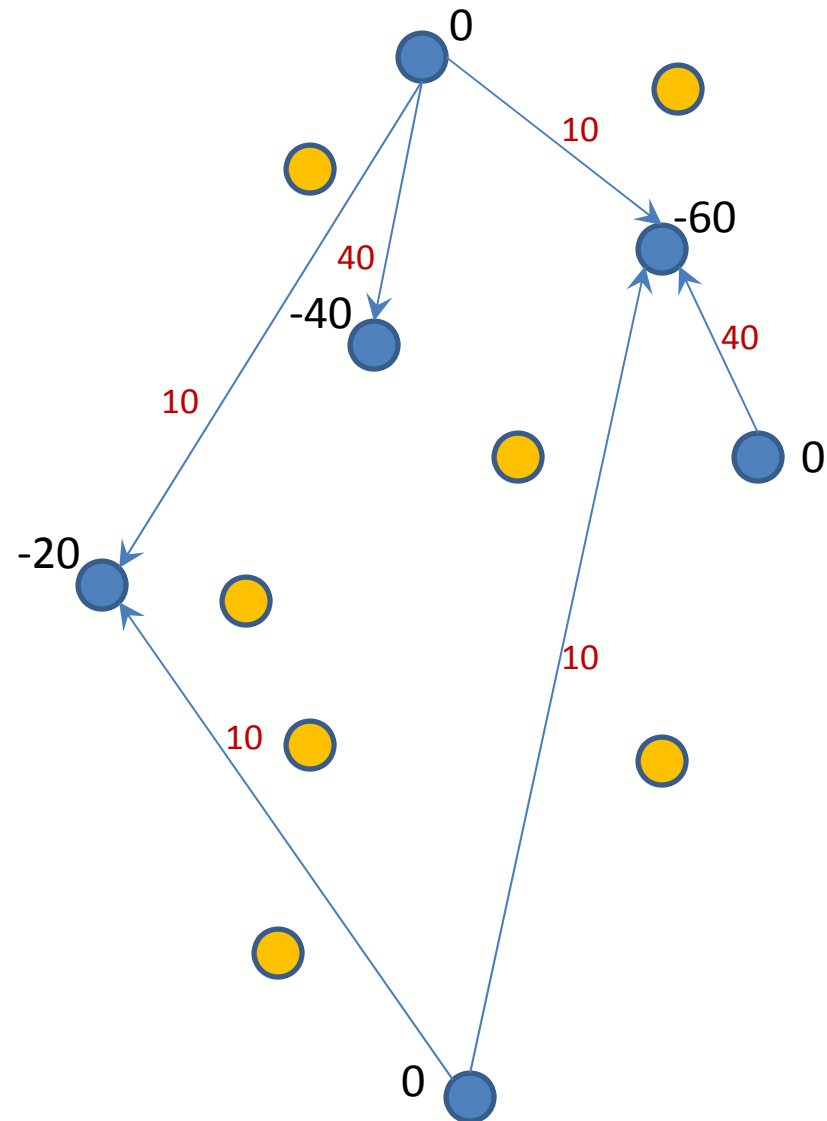
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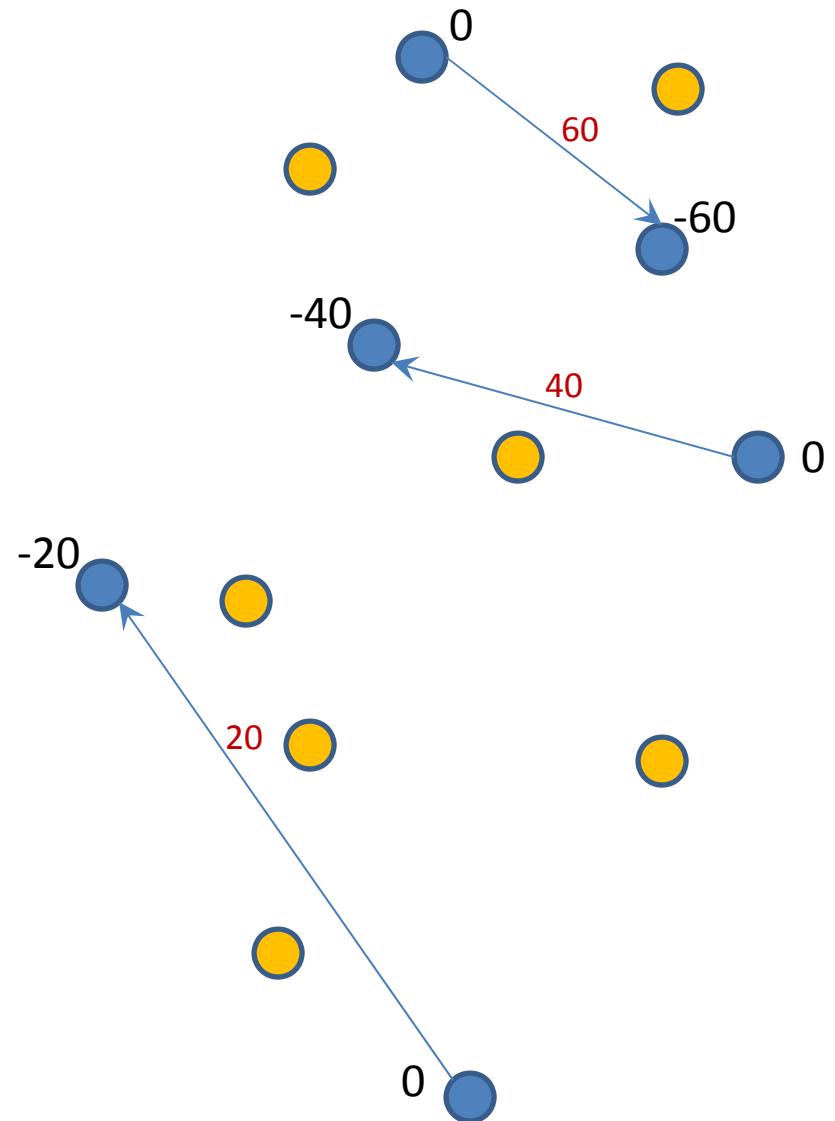
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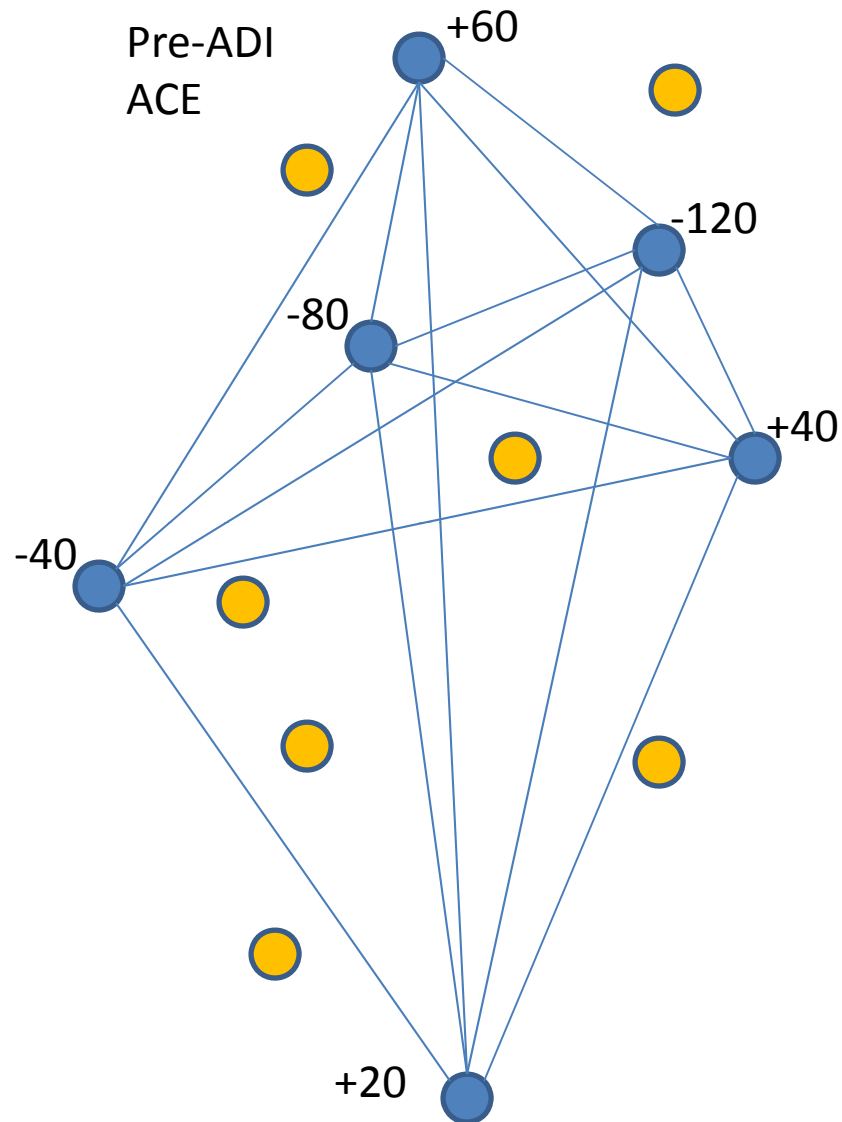
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It's possible that the BAs may not be directly interconnected as the requirements around Pseudo-ties are primarily addressed in NERC reference documents and not the Standards.

As the ADI solutions may be ever-changing, modeling the transmission impact of operation appears complex – perhaps more complex than capturing the transmission impact of varying dispatch across a large Balancing Authority where the incremental and decremental aspect of operation is known.

As the ADI solutions may be ever-changing, the transmission-related issues around operation appear to be more difficult to address than the frequency related issues. Placing the ADI group under rules no more, and no less, restrictive than those placed on a similar-sized Balancing Authority would address the net impact of its operation on frequency. A group ACE is easy to calculate.

ACE Diversity Interchange (ADI) Examples for Discussion Purposes Only

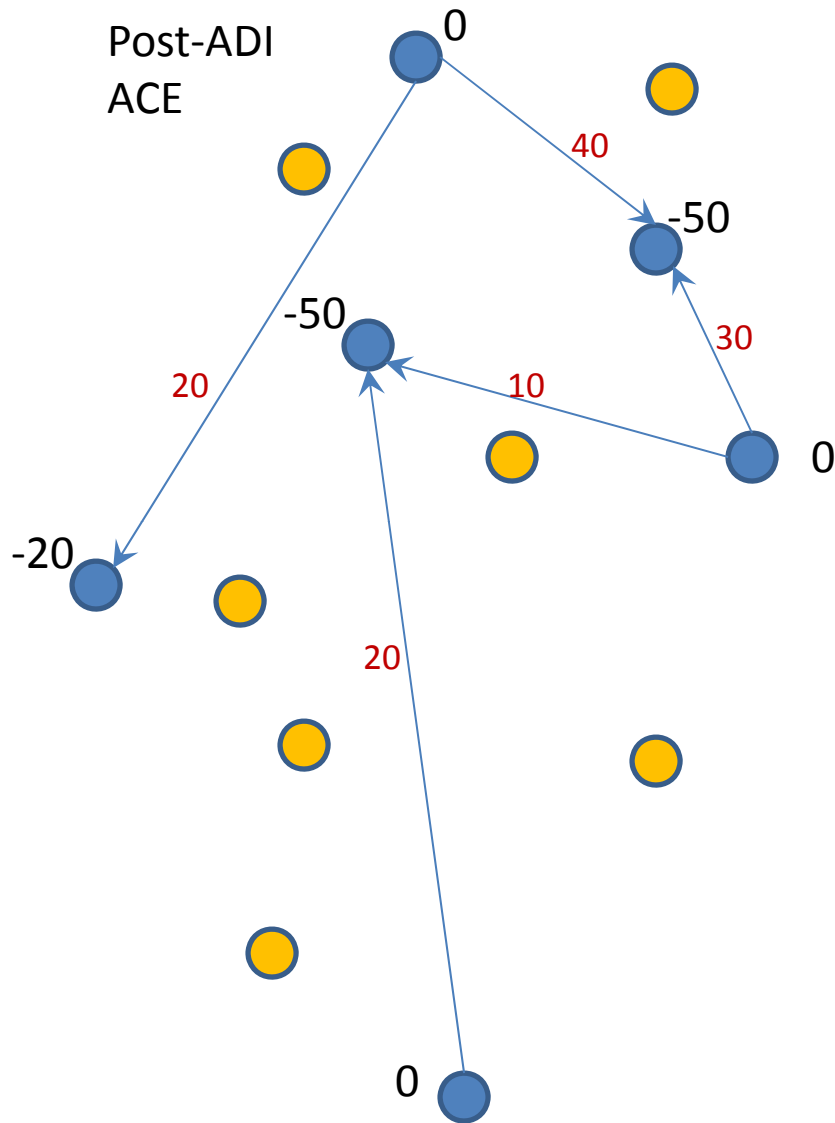


Same Pre-ADI as last set of examples, however in this case, ADI is optimized to place all BAs within their CPS2 L10 when possible.

Pre-ADI ACE and CPS2 L₁₀:

BA 1:	+60	46.72 MW
BA 2:	-80	80.66 MW
BA 3:	-120	50.85 MW
BA 4:	-40	25.17 MW
BA 5:	+40	25.17 MW
BA 6:	+20	7.59 MW

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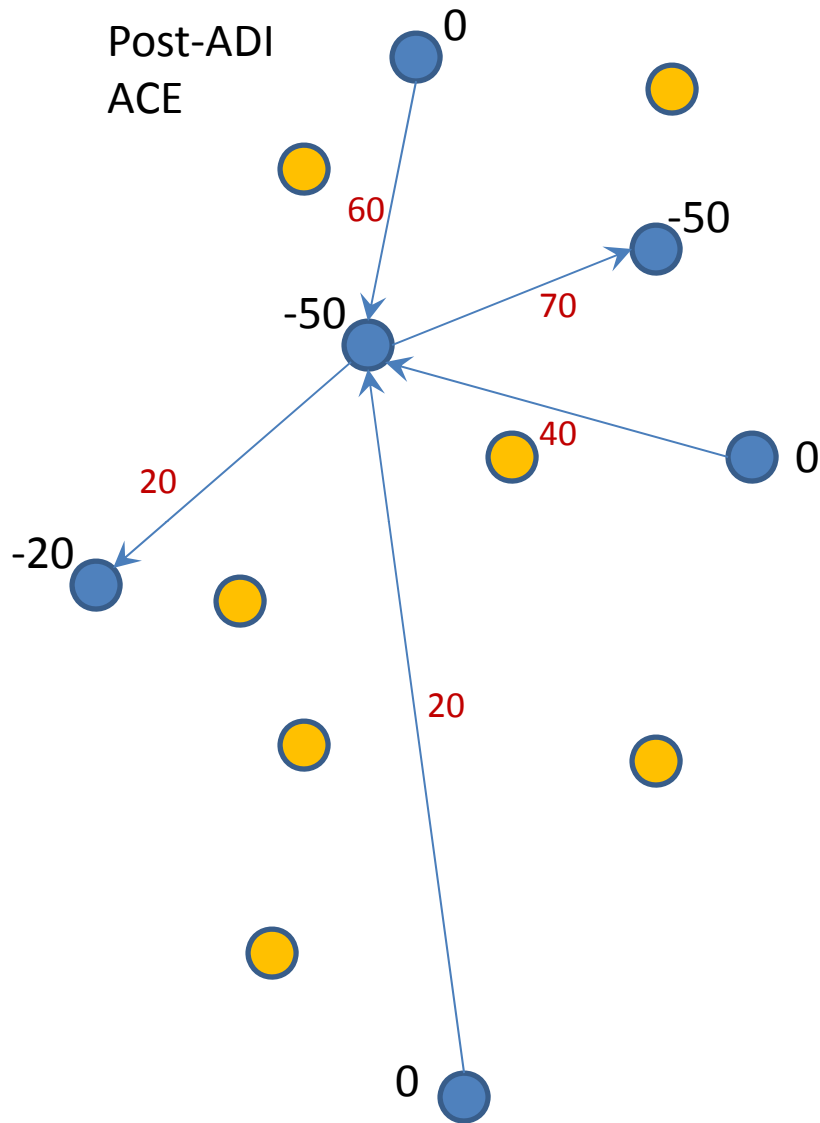
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- BA 5 : +40 , 25.17 MW
- BA 6 : +20 , 7.59 MW

Post-ADI ACE and CPS2 L₁₀ :

- BA 1 : 0 , 46.72 MW
- BA 2 : -50 , 80.66 MW
- BA 3 : -50 , 50.85 MW (now within limits)
- BA 4 : -20 , 25.17 MW
- BA 5 : 0 , 25.17 MW
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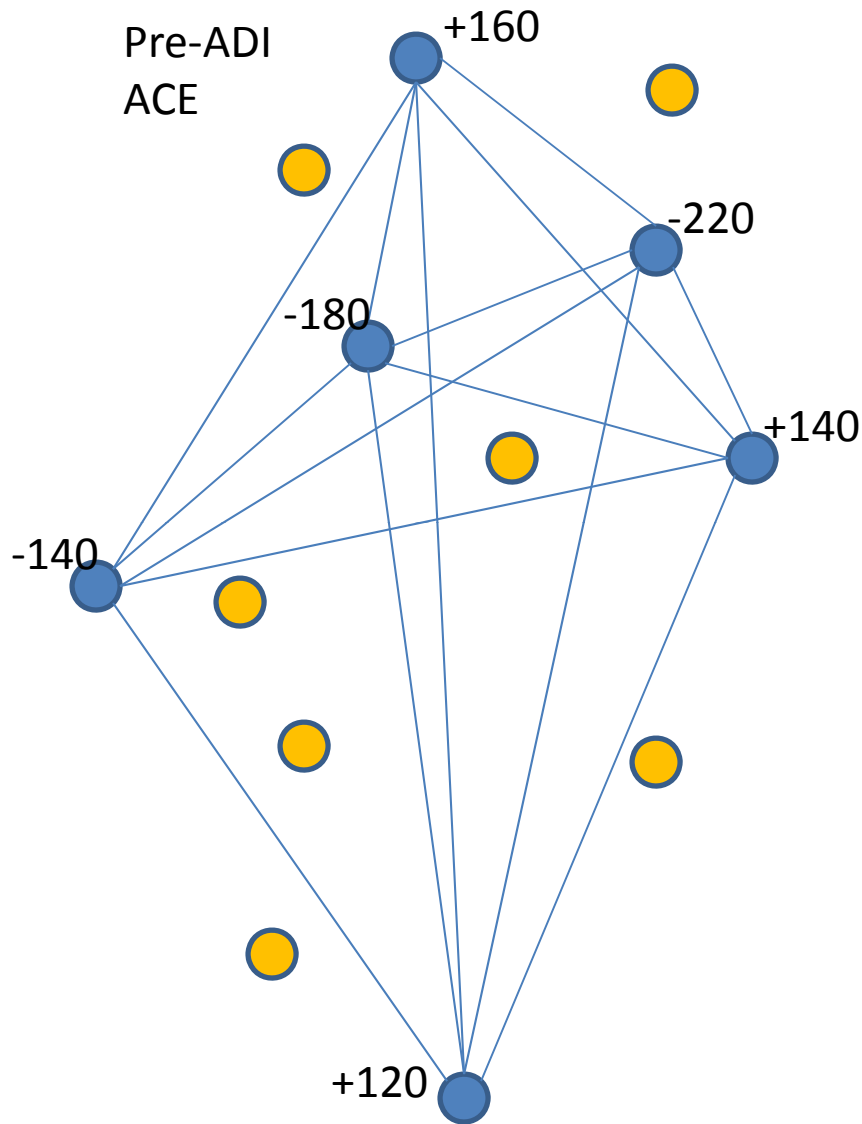
Pre-ADI ACE and CPS2 L_{10} :

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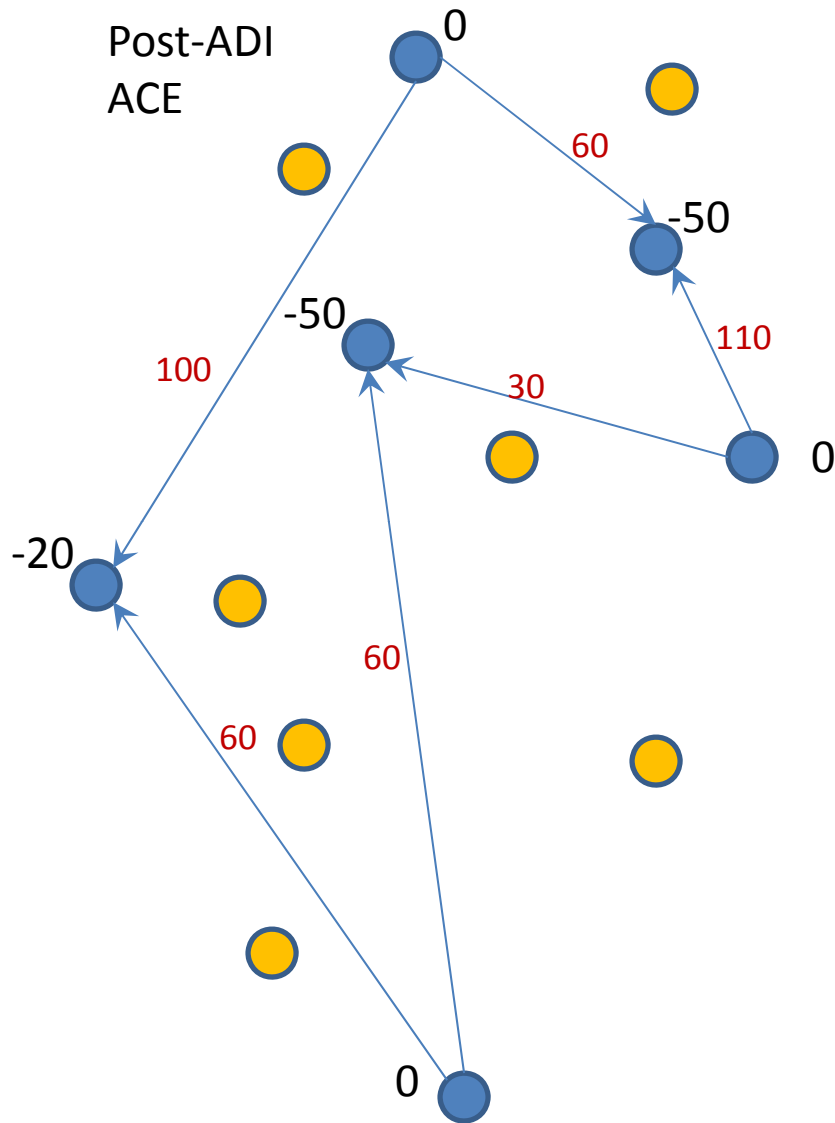


More extreme Pre-ADI example with design set to keep all BAs within their CPS2 L10 when possible.

Pre-ADI ACE and CPS2 L_{10} :

BA 1:	+160 ,	46.72	MW	Added +100 MW to each positive BA and -100 MW to each negative BA.
BA 2:	-180 ,	80.66	MW	
BA 3:	-220 ,	50.85	MW	
BA 4:	-140 ,	25.17	MW	
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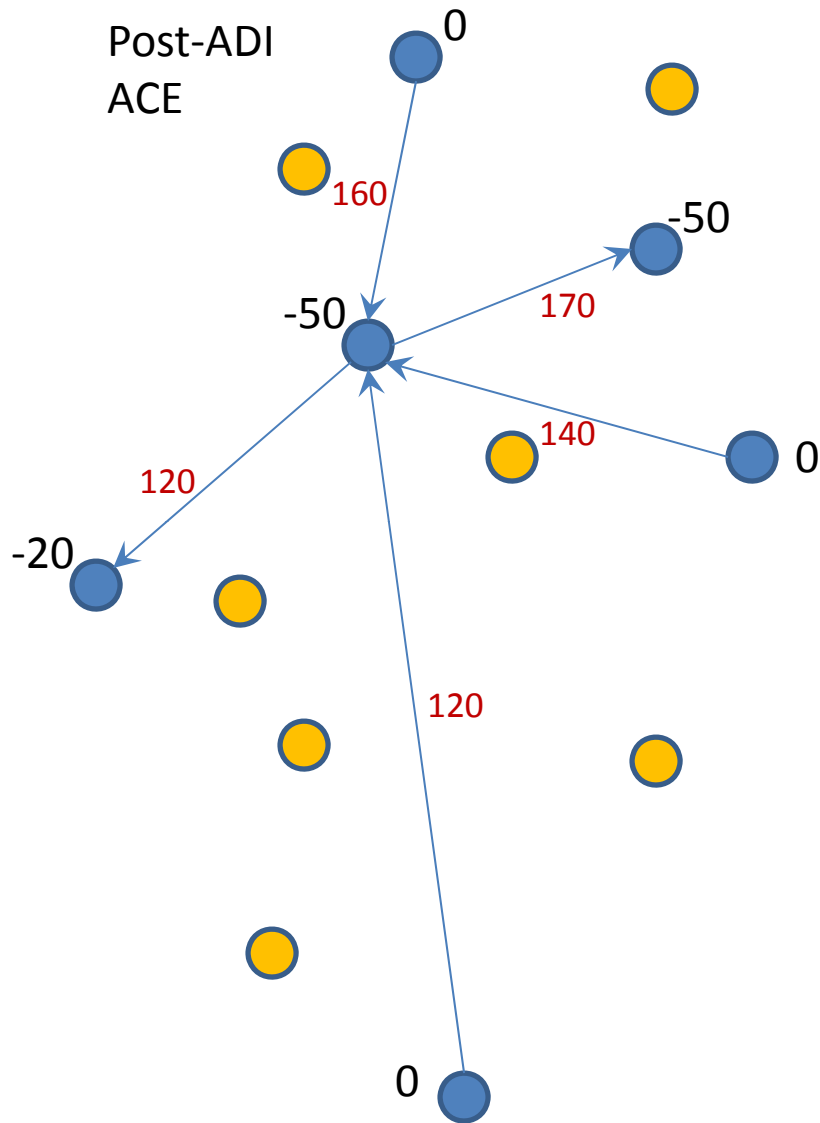
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Post-ADI ACE and CPS2 L_{10} :

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Under ADI, large positive and negative pre-ADI ACEs can offset each other, however the transmission impact of the unscheduled flows could be significant.

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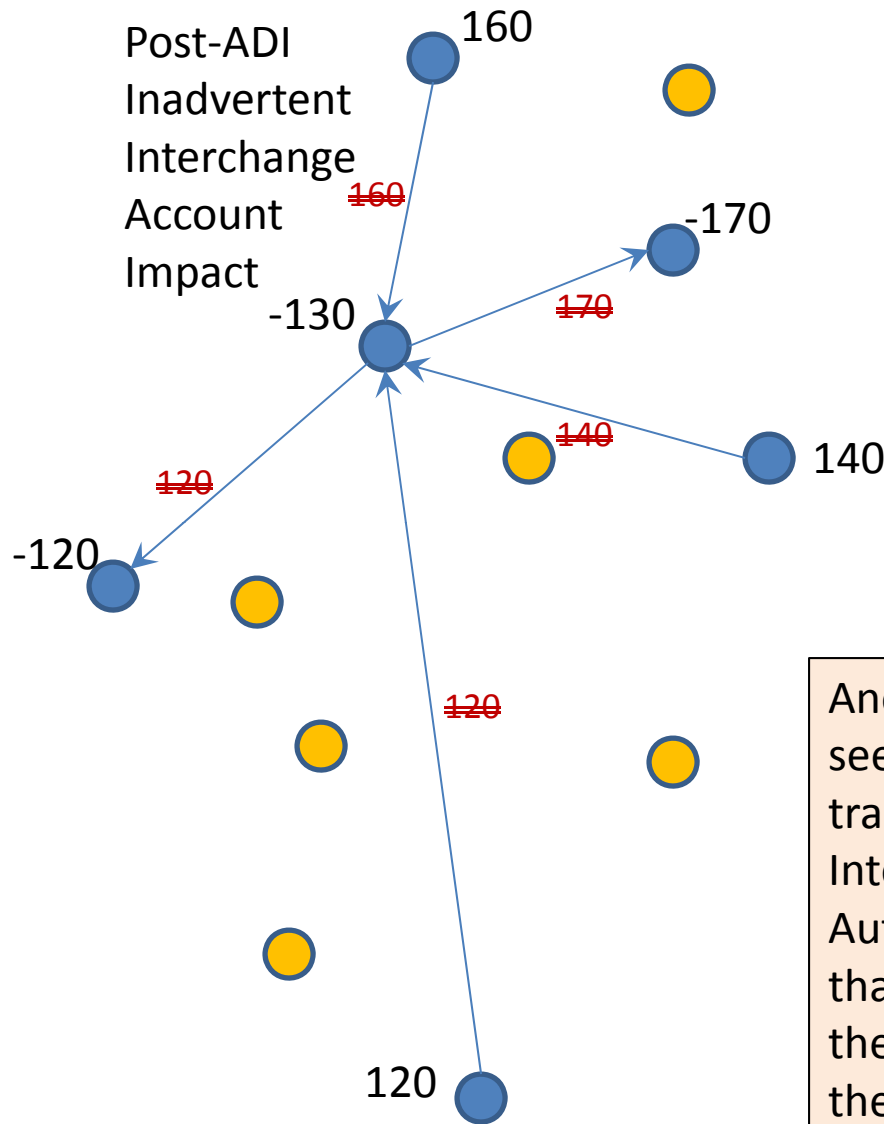
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Another aspect of ADI implementations we've seen is the practice of zeroing out the ADI transfers after-the-fact, causing Inadvertent Interchange for each participating Balancing Authority as illustrated for this example. Note that the real-time net might be zero, however the process introduces errors passed on to the Interconnection at different times during individual Inadvertent Interchange payback.

Under ADI, large positive and negative pre-ADI ACEs can offset each other, however the transmission impact of the unscheduled flows could be significant.

ACE Diversity Interchange (ADI) Examples for Discussion Purposes Only

An ACE Diversity Interchange scenario not implemented:

The Balancing Authorities to the right could “swap ACE” under ADI and have a combined CPS2 L₁₀ of 1485 MW for which they could operate outside that limit for up to 10% of the ten-minute periods in the month.

Starting with a blank sheet of paper, what is the list of issues and items that would have to be addressed to reliably implement ADI for this scenario? *The resulting list should be applicable to all ADI implementations.*

While under the Field Trial of BAL-007, the participating Balancing Authorities are not held to a CPS2 limit, but operate to a Balancing Authority ACE Limit (“BAAL”) that becomes increasingly more restrictive than the CPS2 L₁₀ as frequency deviates further from 60 Hz.

Balancing Authority Participants	2009 Freq Bias	CPS2 L ₁₀
American Electric Power (CSW)	-102.3	76.8
Duke Energy Carolinas (DUK)	-201	107.6
East Kentucky Power Cooperative (EKPC)	-37.9	46.7
Entergy (EES)	-223.3	113.4
EON-US (LGEE)	-72	64.4
Independent Electricity System Operator (IESO)	-285	128.1
Manitoba Hydro (MHEB)	-44.9	50.8
Midwest Independent Transmission System Operator (MISO)	-1106	252.4
PJM Interconnection (PJM)	-1344	278.2
Santee Cooper (SC)	-79.6	67.7
Southern Company (SOCO)	-465	163.6
Tennessee Valley Authority (TVA)	-319.2	135.6
TOTAL	-4,280	1485.3

ACE Diversity Interchange (ADI) Examples for Discussion Purposes Only

An ACE Diversity Interchange scenario not implemented:

Quite a few smaller BAs could group together to “swap ACE” under ADI to have a combined CPS2 L₁₀ of 498 MW (compared to 105 MW for similar-size 19,000 MW BA).

Compare the two scenarios: an ADI group representing 428,000 MW on the Eastern Interconnection would have a limit of 1485 MW, while an ADI group representing only 19,000 MW would have a limit of 498 MW. The non-linear allocation of CPS2 limits allows that disparity.

Some believe that ADI circumvents the intent of the BA limits set under CPS2 and can have a detrimental impact on transmission and Interconnection frequency unless Interchange is properly modeled and appropriate rules for balancing are in place. *It is suggested that BAs under ADI should be required to assess the net impact of their operation no differently than a similar-size BA, as the group’s operation could mimic that of a larger BA but with much larger bounds to operate absent such a requirement.*

BA	Frequency Bias	CPS2 L ₁₀
HST	-1	7.6
TAL	-9	22.8
GVL	-6	18.6
RC	-2	10.7
NSB	-1	7.6
DPC	-9.2	23.0
LES	-7.7	21.1
YAD	-2	10.7
BBA	-5.7	18.1
BREC	-17	31.3
BUBA	-1	7.6
CNWY	-2.1	11.0
DENL	-2.7	12.5
DERS	-1	7.6
WMUC	-1	7.6
EEL	-10	24.0
CPLW	-11	25.2
SEPA	-15	29.4
PUPP	-19.9	33.9
KACY	-7	20.1
INDN	-3.3	13.8
LAFA	-5	17.0
EDE	-11.8	26.1
GRDA	-10	24.0
LEPA	-3	13.1
SECI	-11	25.2
WFEC	-14.6	29.0
	-190	498.3

Reliability Concerns Related To Supplementary Regulation

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Example for this presentation

- BA #1 is regulation “poor”, BA #2 is “rich”
- BA#1 agrees to receive up to 20 MW of BA#2’s ACE when BA#2’s ACE magnitude > 50 MW
- 3 modes of supplementary regulation
- Mode A – assistance for dragging only
- Mode B – bidirectional assistance
- Mode C – bidirectional, but only if BA#1’s ACE gets pushed closer to 0

Frequency Neutrality

- To the extent practical, assignments must be a zero sum game throughout the process
- Bad algorithm
- Bad business process
- Bad communications
- When a BA chooses to opt out for a period, the algorithm must react accordingly ASAP

Frequency Neutrality (cont.)

- To protect against communications failures from violating frequency neutrality, the algorithm and participants must check to see if a timestamp is changing, and disable if it is not ASAP
- Failure to address algorithm, business process, or communications problems will violate frequency neutrality in all 3 operating modes

“To The Extent Practical”

- Algorithm must always be a zero sum game
- Communications latency time and differing scan rates in the very short term may not always honor the zero sum game, but on an hourly basis, the net MWH of supplemental regulation must be very very close to zero
- Communications failures should result in a graceful exit < 1 minute

Affecting Transmission Adversely

- Participants must continuously assure that the supplemental regulation is not affecting transmission of any member of its interconnection adversely
- The IDC is **not** the tool to do this
- Supplemental regulation values are transient with a probable value of zero and TLR curtailment does not apply

IDC Issues

- IDC is used by an RC to achieve relief on a constrained interface
- The goal is to adjust schedules so that, hopefully, actual flows will be reduced on the constrained interface
- If there were multiple players in a supplementary regulation program, one might think that tags could be created for all extrema possibilities

IDC Issues (cont.)

- Tagging the extrema could be counterproductive if the IDC calls for curtailment based on an extrema that does not presently exist
- The curtailment process might curtail other real schedules/actuals less than needed in a mistaken hope that the curtailment of the tagged supplemental regulation may help
- Mode A, dragging, may be an exception

Equity Issues

- Supplemental regulation per BAL-00x does not require any L10 adjustments
- Inadvertent created by supplemental regulation should not be treated any differently than inadvertent created by operations without supplemental regulation, whether it comes as a result of controlling to CPS 1 and/or CPS 2 or BAAL limits or prospective RBC limits