Inadvertent Interchange

Technical Issues

1. Caused by Control Area imbalance between its resources and demand, and is inevitable because generation control is not perfect.

    a. Inadvertent it calculated by subtracting the scheduled interchange from the actual interchange.

    b. The Control Area is always "chasing" the demand (actually chasing its Area Control Error to maintain compliance with NERC control performance standards).

    c. Inadvertent interchange is between the Control Area and its Interconnection – not between Control Areas.

2. The net effect of all Control Areas' imbalances results in a frequency error in the Interconnection, to which other Control Areas respond through their frequency response (governor response + load response).

    a. Frequency error is the difference between actual and scheduled Interconnection frequency. Scheduled frequency is usually 60 Hz unless there is a time correction, which requires a 0.02 Hz offset.

3. A Control Area can account for inadvertent caused by its control error ("bad" inadvertent) versus inadvertent caused by its response to frequency error ("good" inadvertent). NERC does not keep track of these different balances, but some Control Areas do.

4. Control Areas must check out their actual and schedule interchange each day with their adjacent Control Area(s). They must agree on these numbers. NERC's Appendix 1F, "Inadvertent Interchange Dispute Resolution Process and Error Adjustment Procedures" explains how to report inadvertent interchange and resolve disputes.

    a. Control areas report their inadvertent balances to their Regional Councils, who report the Regional totals to NERC. NERC resolves inadvertent disagreements between the Regions. By definition, each Interconnection's inadvertent total must equal zero.

5. Some Control Areas are only generators without load. They operate to an interchange schedule.

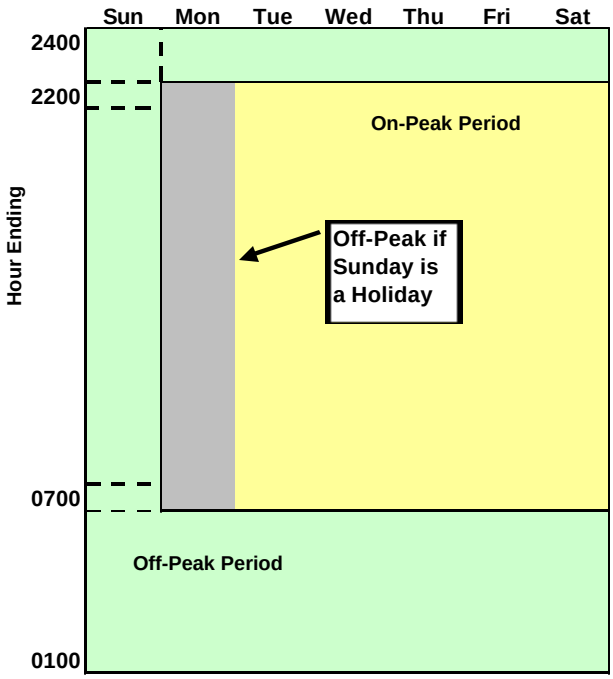
Vertically Integrated Control Area

1. Assumption: Generation is owned and operated by the Control Area.

2. Control Area repays inadvertent interchange with "in kind" energy. On-peak and off-peak. On-peak is hour ending 0700 through hour ending 2200, CST, Monday through Sunday. (see diagram at right).

    a. Six U.S. holidays are off-peak

    b. As are Mondays that follow these holidays.



3. Inadvertent repayment can be either unilateral to the Interconnection, or bilateral with a Control Area with an inadvertent balance in the "opposite" direction.

4. Unilateral payback tends to correct time error because it causes the Interconnection frequency to change. But time correction is not perfect because the frequency response will probably be different. Bilateral inadvertent is physically identical to any interchange schedule and does not affect Interconnection frequency.

5. Some CAs in MISO and SPP are using financial payback among the RTO members, but the net inadvertent to the Interconnection doesn't change and is repaid with "in-kind" energy.

Possible Business Practice Issues

1. Definition of on- and off-peak periods.

2. Financial payback? (not sure)

Functional Model under a Market Operator with Balancing Authorities

1. Assumption: Balancing Authority will not necessarily own or operate generators

2. The Market Operator operates an energy imbalance market, which is a way to settle after-the-fact imbalances.

3. Imbalance market takes care of financial compensation for under- or over-generation. But the imbalance market is not compensation for inadvertent interchange.

4. Balancing Authority will deploy the Interconnected Operations Services that are arranged by the transmission customer for regulation.

    a. Balancing Authority does not take title to the IOServices.

5. Balancing Authority failure to balance, for whatever reason, causes an inadvertent interchange between the BA and the Interconnection.

Possible Business Practice Issues

1. Failure for Balancing Authority to balance causes other generators to generate more or less than their contracted amount due to governor action in response to Interconnection frequency error.

2. How are generators compensated for contributing their frequency response within Balancing Authorities providing "good" inadvertent?

    a. If there was a frequency response Ancillary Service, then they would be paid for this response. Governor action will cause generators to produce more than their schedules when frequency error is negative, and less when frequency error is positive.

    b. From NERC's response to the FERC SMD NOPR: "NERC recommends that Primary Frequency Response be considered as either a required ancillary service in the SMD framework or a requirement of interconnecting and operating a generator."

3. There is also the issue of time correction, which means purposely operating the Interconnection above or below 60 Hz to correct clock time. This also trues up the Interconnection's energy balance. All generators must contribute to time error corrections.

    a. As in 2a above, generating at a higher frequency to correct slow time means producing more energy. Conversely for fast time correction.

4. The BA isn't a market participant — provides an operating service.