CONGESTION REVENUE RIGHT ALLOCATION AND AUCTION

1.   INTRODUCTION

The purpose of this document is to describe the methodology and procedural steps for Congestion Revenue Right (CRR) Allocation and Auction, consistent with the Market Design 2002 (MD02). The following principles govern the CRR Allocation and Auction:

- Transmission capacity is awarded, allocated, and auctioned in the following priority sequence:

    1) non-converted Existing Transmission Contracts (ETCs);

    2) converted ETCs;

    3) ETCs under conversion;

    4) LSE nominations; and

    5) CRR bids.

- CRR Allocation and Auction takes place at three overlapping time periods:

    i)   every three years, yielding long-term (3-yr) CRRs;

    ii) every year, yielding mid-term (1-yr) CRRs; and

    iii) every month, yielding short-term (1-mo) CRRs.

    Longer-term CRRs have priority in transmission capacity allocation over shorter-term CRRs.

- Transmission capacity is reserved before any CRR Allocation and Auction to honor ETCs, which are modeled as Point-To-Point (PTP) Options. ETCs are subject to a Simultaneous Feasibility Test (SFT) based on their respective priorities.

- Available Transmission Capacity (ATC) after subtracting ETC reservations is released for CRR Allocation and Auction as follows:

    i)   30% of ATC for long-term CRRs;

    ii) 75% of ATC for long-term and mid-term CRRs; and

    iii) 100% of ATC for long-term, mid-term, and short-term CRRs.

- ETC holders have the option to permanently convert their rights to long-term, mid-term, and short-term PTP CRR Options or Obligations for the remaining term of their ETCs. At conversion time, CRRs are awarded subject to a SFT based on the respective ETC priorities. After conversion, the awarded CRRs are subject to a pro rata SFT during the CRR Allocation and Auction process before new ETC conversions.

- PTP and Network Service Right (NSR) Obligations are allocated to LSEs subject to a SFT based on standardized priorities before the CRR Auction. Existing CRR allocations to LSEs are included as constant power transfers in the SFT.

- PTP and NSR Obligations are awarded through a CRR Auction based on submitted bids. The CRR Auction maximizes auction revenue subject to a SFT. Existing CRRs are included as constant power transfers in the CRR Auction.

Note: In the short-term and mid-term CRR Allocation and Auction process, longer-term CRRs are not subjected to a SFT, but are considered fixed. Because the ATC in these processes is significantly larger than the one used in the longer-term processes (100% versus 75%, and 75% versus 30%), it is likely that longer-term CRRs are feasible, although not guaranteed. In the unlikely case where longer-term CRRs are infeasible, network constraint violations may persist through the CRR allocation to LSEs and through the CRR Auction. Therefore, network constraints should be modeled as "soft constraints" in the SFT and the CRR Auction to permit violations if they cannot be removed. Any remaining network constraint violations after the short-term CRR Auction may contribute to revenue neutrality loss, however, this unlikely event should be of no concern since it will be washed away into the CRR Balancing Account.

The following sections describe in detail the CRR Allocation and Auction process for each CRR term.
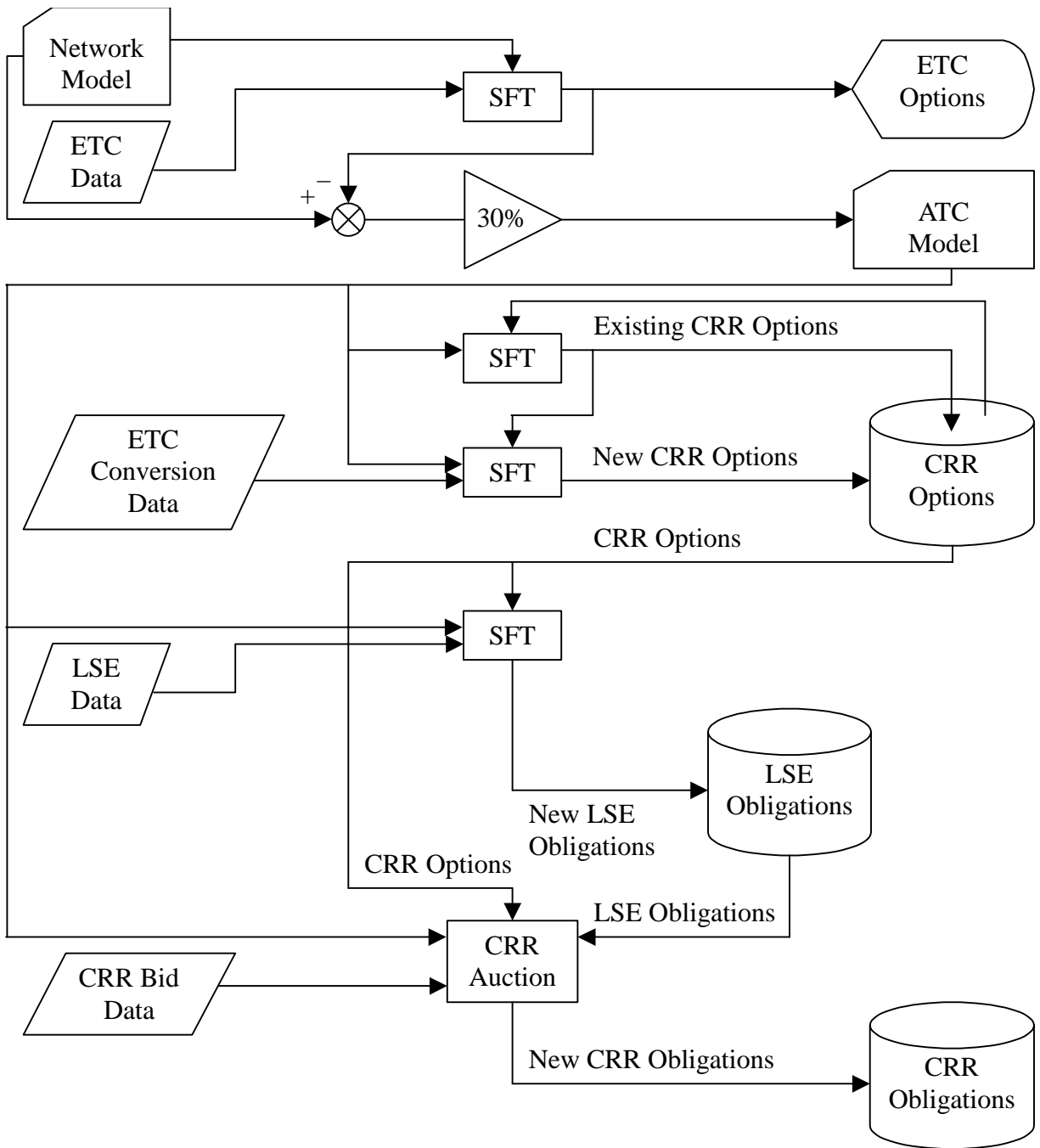

2.   LONG-TERM CRR ALLOCATION AND AUCTION

Figure 1 shows the flowchart for the long-term CRR Allocation and Auction. The procedural steps are as follows:

1) Use a full DC network model for the CAISO Controlled Grid with an external equivalent where some important transmission facilities are preserved for Contingency Analysis that is included in the SFT. All existing transmission facilities are in service.

2) Compile ETC data consisting of PTP power transfers equal to their *maximum coincident historical transmission capacity reservation on their respective contract path over the most recent 12-month period*, at specified global priority levels. Exclude data for ETCs that are converted this year.

3) Perform a SFT of all ETC PTP power transfers based on their priorities, i.e., accommodate ETCs with higher priority before ETCs with lower priorities, and reduce ETCs with Power Transfer Distribution Factors (PTDFs) exceeding 3% pro rata within each priority level if necessary. Treat all ETC PTP power transfers as options (power transfer options do not provide counterflow transmission capacity).[1] The result is the set of *feasible ETC PTP power transfer options* used solely to calculate the ATC for the long-term CRR Allocation and Auction.

4) Subtract the *feasible ETC PTP power transfer options* from the network capacity by reducing the power flow limit on each network branch and direction by the gross power flow contribution on that branch and direction.

5) Reduce the remaining network capacity (ATC) to *30%* to derive the *ATC network model* for the long-term CRR Allocation and Auction.

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[1] The SFT software should use the Power Transfer Distribution Factors and allocate transmission capacity among positive only power flow contributions in each network branch and direction.

Figure 1. Long-Term CRR Allocation and Auction

6) Perform a SFT of the *existing long-term CRR Options and Obligations* awarded to ETC holders that have converted their rights in prior years. Reduce CRR Options and Obligations with PTDFs exceeding 3% pro rata if necessary. This step may be necessary because the network model at this time may be different from the ones used when the relevant ETCs were converted. The result is the set of *feasible existing long-term CRR Options and Obligations*.

7) Fix the injections and ejections of the *feasible existing long-term CRR Options and Obligations* (only CRR Options are shown in Figure 1).

8) Compile ETC conversion data for ETCs that are converted this year consisting of PTP power transfers equal to *30% of their minimum historical transmission capacity use on their respective contract path over the most recent 12-month period*, at specified global priority levels, and a selection to be converted to CRR Options or Obligations.

9) Perform a SFT of all PTP power transfers of ETCs under conversion based on their priorities, i.e., accommodate ETCs with higher priority before ETCs with lower priorities, and reduce ETCs with PTDFs exceeding 3% pro rata within each priority level if necessary. Treat the PTP power transfers of ETCs under conversion as options or obligations according to their respective selection. The result is the set of *feasible new long-term CRR Options and Obligations* awarded to ETC holders that convert their rights this year. These long-term CRR quantities are locked in for the remaining term of the relevant ETC, but are subject to a SFT every 3 years during Step (6) of the long-term CRR Allocation and Auction process.

10) Fix the injections and ejections of the *feasible new long-term CRR Options and Obligations* (only CRR Options are shown in Figure 1).

11) Compile LSE CRR nomination data consisting of PTP and/or NSR power transfers with a total sink not exceeding *30% of the minimum of the 99.5% levels of their monthly historical net load duration curves over the most recent 12-month period*. The total sink should be divided in aggregate into four quarters at priorities 1, 2, 3, and 4, respectively. The sources should also indicate priority segments at any priority from 1 through 4.

12) Perform a SFT of all PTP and NSR nominations, sequentially on sink priorities, i.e., allocate CRRs with higher sink priority before CRRs with lower sink priorities, and use the source priorities within each sink priority level to prioritize among the sources.[2] Treat the PTP and NSR nominations as power transfer obligations. The result is the set of *long-term CRR Obligations allocated to LSEs*.

13) Fix the injections and ejections of the *long-term CRR Obligations allocated to LSEs*.

14) Compile CRR bid data consisting of PTP and/or NSR Obligation bids.

15) Conduct the long-term CRR Auction to award *long-term CRR Obligations*.

Figure 2 illustrates graphically the partition of network capacity after the long-term CRR Allocation and Auction process.

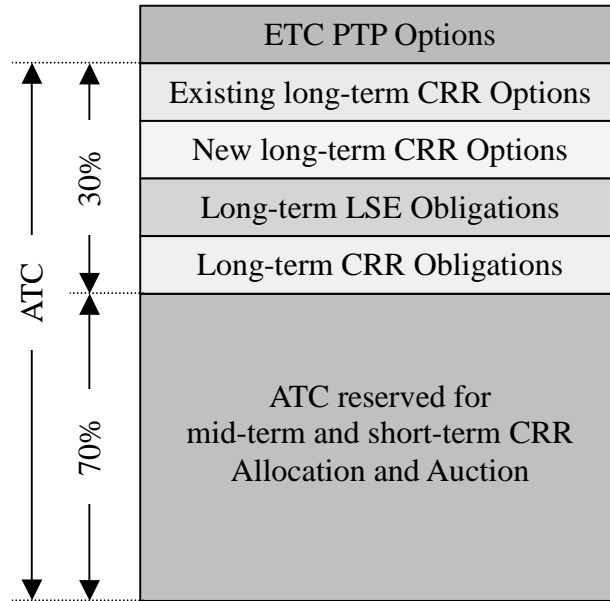[2] This process may require up to 16 pro rata allocations.

	ETC PTP Options
30%	Existing long-term CRR Options
	New long-term CRR Options
	Long-term LSE Obligations
	Long-term CRR Obligations
70%	ATC reserved for mid-term and short-term CRR Allocation and Auction

(Figure labeled ATC on the left spanning both 30% and 70% sections)

Figure 2. *Long-Term Network Capacity Partition*

3.   MID-TERM CRR ALLOCATION AND AUCTION

Figure 3 shows the flowchart for the mid-term CRR Allocation and Auction. The procedural steps are as follows:

1) Use a full DC network model for the CAISO Controlled Grid with an external equivalent where some important transmission facilities are preserved for Contingency Analysis that is included in the SFT. All existing transmission facilities are in service.

2) Compile ETC data consisting of PTP power transfers equal to their *maximum coincident historical transmission capacity reservation on their respective contract path over the most recent 12-month period*, at specified global priority levels. Exclude data for ETCs that are converted this year. For the first year of a long-term CRR term, this step is the same as Step (2) of the long-term CRR Allocation and Auction process.

3) Perform a SFT of all ETC PTP power transfers based on their priorities, i.e., accommodate ETCs with higher priority before ETCs with lower priorities, and reduce ETCs with PTDFs exceeding 3% pro rata within each priority level if necessary. Treat all ETC PTP power transfers as options. The result is the set of *feasible ETC PTP power transfer options* used solely to calculate the ATC for the mid-term CRR Allocation and Auction.
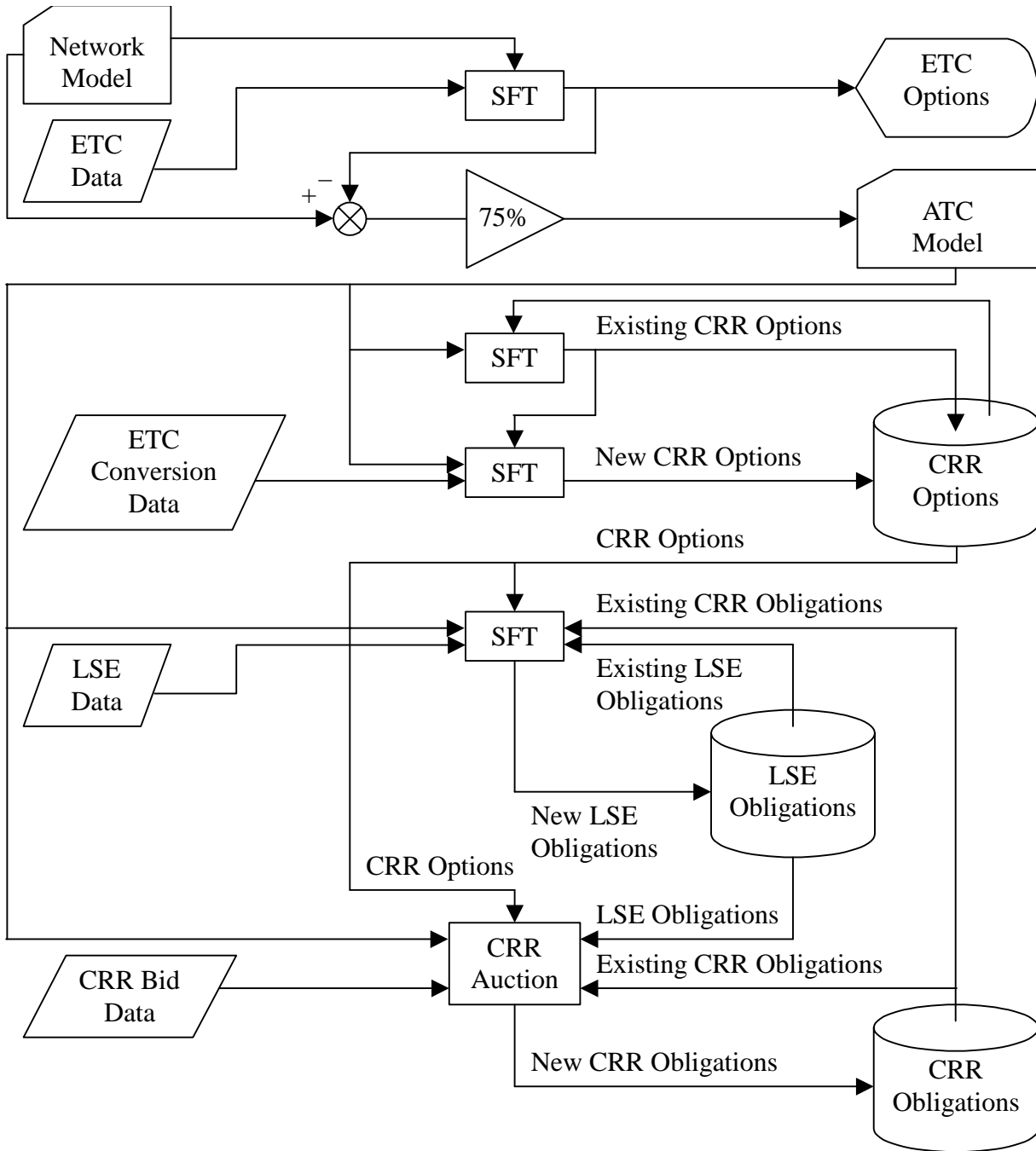
Figure 3. Mid-Term CRR Allocation and Auction

4) Subtract the *feasible ETC PTP power transfer options* from the network capacity by reducing the power flow limit on each network branch and direction by the gross power flow contribution on that branch and direction.

5) Reduce the remaining network capacity (ATC) to *75%* to derive the *ATC network model* for the mid-term CRR Allocation and Auction.

6) Fix the injections and ejections of the *existing long-term CRR Options and Obligations* awarded to ETC holders that have converted their rights in prior years. Perform a SFT of

the *existing mid-term CRR Options and Obligations* awarded to ETC holders that have converted their rights in prior years. Reduce CRR Options and Obligations with PTDFs exceeding 3% pro rata if necessary. This step may be necessary because the network model at this time may be different from the ones used when the relevant ETCs were converted. The result is the set of *feasible existing mid-term CRR Options and Obligations*.

7) Fix the injections and ejections of the *feasible existing mid-term CRR Options and Obligations* (only CRR Options are shown in Figure 3).

8) Compile ETC conversion data for ETCs that are converted this year consisting of PTP power transfers equal to *75% of their minimum historical transmission capacity use on their respective contract path over the most recent 12-month period, reduced by their long-term CRR awards*, at specified global priority levels, and a selection to be converted to CRR Options or Obligations.

9) Perform a SFT of all PTP power transfers of ETCs under conversion based on their priorities, i.e., accommodate ETCs with higher priority before ETCs with lower priorities, and reduce ETCs with PTDFs exceeding 3% pro rata within each priority level if necessary. Treat the PTP power transfers of ETCs under conversion as options or obligations according to their respective selection. The result is the set of *feasible new mid-term CRR Options and Obligations* awarded to ETC holders that convert their rights this year. These mid-term CRR quantities are locked in for the remaining term of the relevant ETC, but are subject to a SFT every year during Step (6) of the mid-term CRR Allocation and Auction process.

10) Fix the injections and ejections of the *feasible new mid-term CRR Options and Obligations* (only CRR Options are shown in Figure 3). Fix the injections and ejections of the *long-term CRR Obligations allocated to LSEs*.

11) Compile LSE CRR nomination data consisting of PTP and/or NSR power transfers with a total sink not exceeding *75% of the minimum of the 99.5% levels of their monthly historical net load duration curves over the most recent 12-month period, reduced by their long-term CRR allocations*. The total sink should be divided in aggregate into four quarters at priorities 1, 2, 3, and 4, respectively. The sources should also indicate priority segments at any priority from 1 through 4.

12) Perform a SFT of all PTP and NSR nominations, sequentially on sink priorities, i.e., allocate CRRs with higher sink priority before CRRs with lower sink priorities, and use the source priorities within each sink priority level to prioritize among the sources. Treat the PTP and NSR nominations as power transfer obligations. The result is the set of *mid-term CRR Obligations allocated to LSEs*.

13) Fix the injections and ejections of the *mid-term CRR Obligations allocated to LSEs*. Fix the injections and ejections of the *long-term CRR Obligations*.

14) Compile CRR bid data consisting of PTP and/or NSR Obligation bids.

15) Conduct the mid-term CRR Auction to award *mid-term CRR Obligations*.

Figure 4 illustrates graphically the partition of network capacity after the mid-term CRR Allocation and Auction process.
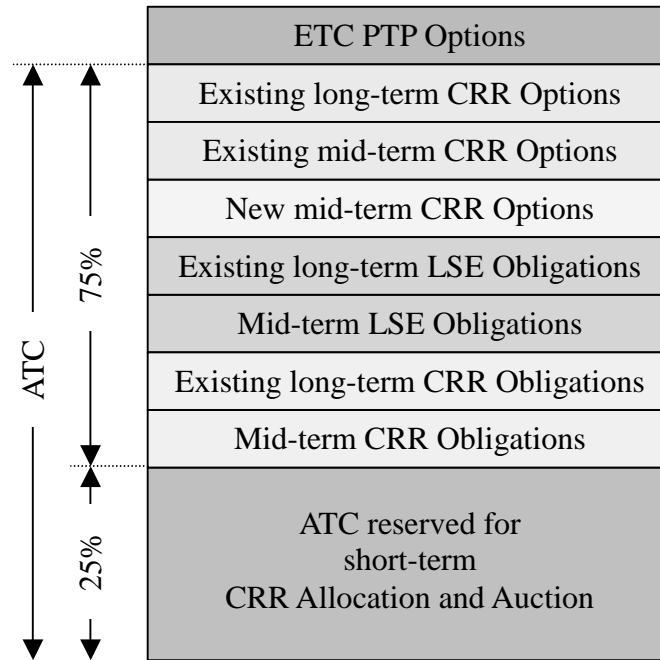
ETC PTP Options
Existing long-term CRR Options
Existing mid-term CRR Options
New mid-term CRR Options
Existing long-term LSE Obligations
Mid-term LSE Obligations
Existing long-term CRR Obligations
Mid-term CRR Obligations
ATC reserved for short-term CRR Allocation and Auction

(Left-hand bracket labeled "ATC" spanning the full height; "75%" spans the upper eight rows, "25%" spans the bottom "ATC reserved for short-term CRR Allocation and Auction" block.)

Figure 4. *Mid-Term Network Capacity Partition*

4.   SHORT-TERM CRR ALLOCATION AND AUCTION

Figure 5 shows the flowchart for the short-term CRR Allocation and Auction. The procedural steps are as follows:

1) Use a full DC network model for the CAISO Controlled Grid with an external equivalent where some important transmission facilities are preserved for Contingency Analysis that is included in the SFT. All existing transmission facilities are in service. Transmission facilities with planned outages exceeding half an hour at a time will be included to a set of *coincident hourly contingencies* for Contingency Analysis under normal power flow limits.[3]

2) Compile ETC data consisting of PTP power transfers equal to their *maximum coincident historical transmission capacity reservation on their respective contract path over the most recent same month*, at specified global priority levels. Exclude data for ETCs that are converted this year.

3) Perform a SFT of all ETC PTP power transfers based on their priorities, i.e., accommodate ETCs with higher priority before ETCs with lower priorities, and reduce ETCs with PTDFs exceeding 3% pro rata within each priority level if necessary. Treat all ETC PTP power transfers as options. The result is the set of *feasible ETC PTP power transfer options* used to calculate the ATC for the short-term CRR Allocation and Auction. The *feasible ETC PTP power transfer options* can also be used as a benchmark for the actual ETC uses during the month providing guidance for future ETC transmission capacity reservations.

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[3] This may result to a theoretical maximum of 744 unique contingencies, although the actual number will likely be much smaller.
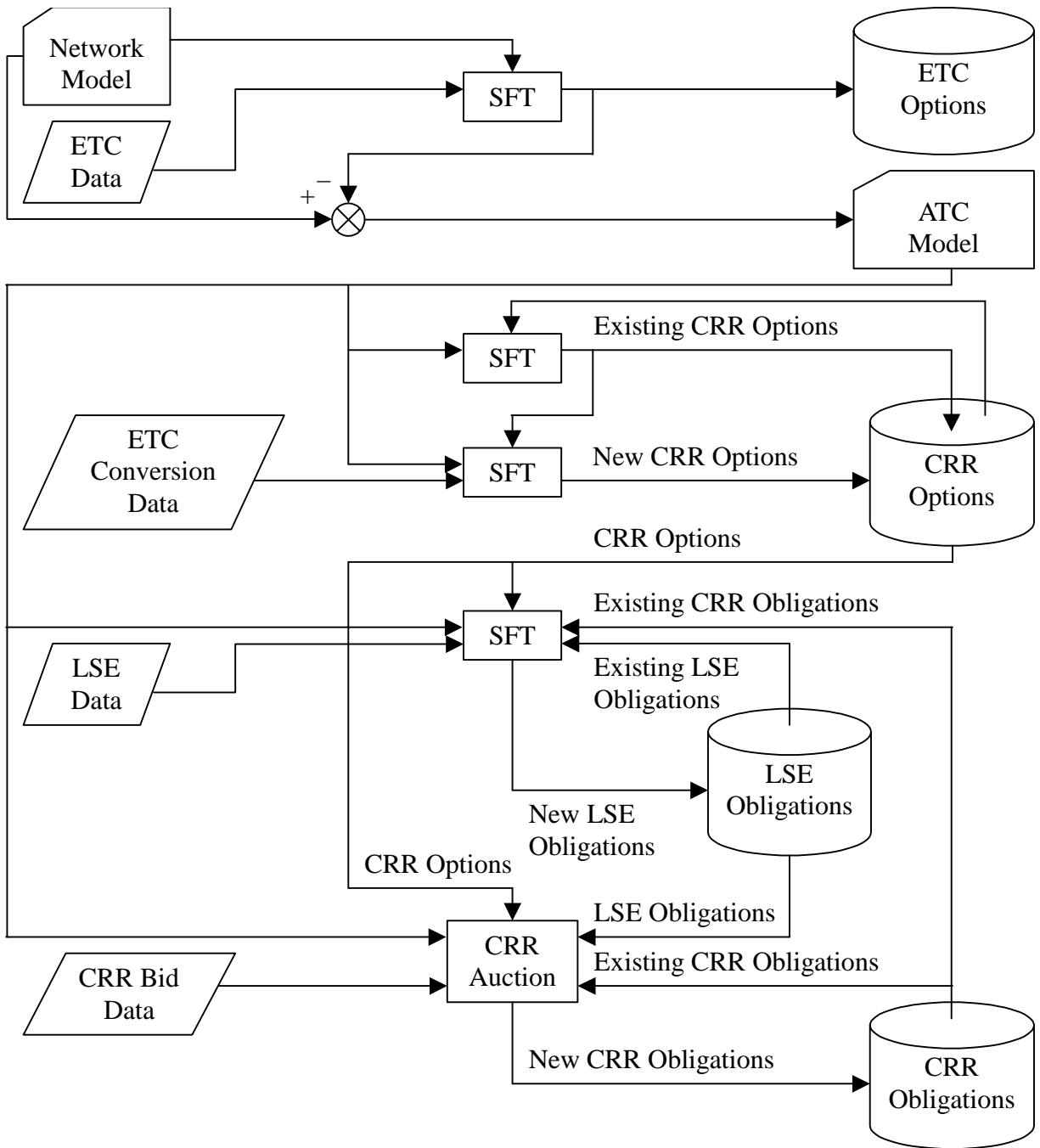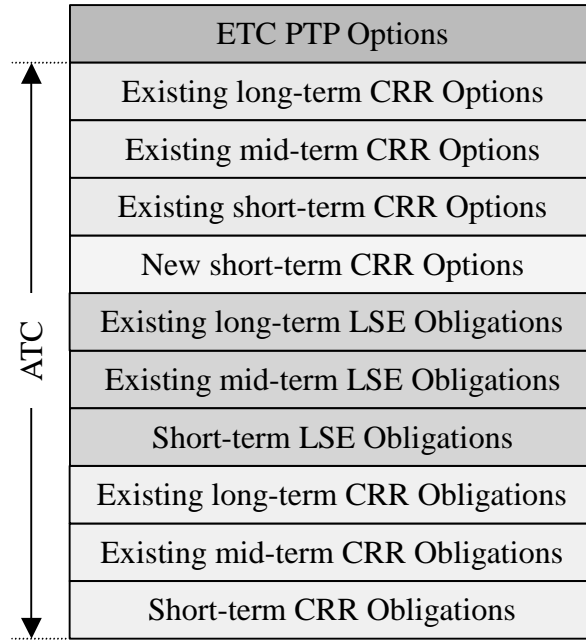
Figure 5. Short-Term CRR Allocation and Auction

4) Subtract the *feasible ETC PTP power transfer options* from the network capacity by reducing the power flow limit on each network branch and direction by the gross power flow contribution on that branch and direction.

5) The remaining network capacity (ATC) constitutes the *ATC network model* for the short-term CRR Allocation and Auction.

6) Fix the injections and ejections of the *existing long-term and mid-term CRR Options and Obligations* awarded to ETC holders that have converted their rights in prior years.

Perform a SFT of the *existing short-term CRR Options and Obligations* awarded to ETC holders that have converted their rights in prior years. Reduce CRR Options and Obligations with PTDFs exceeding 3% pro rata if necessary. This step may be necessary because the network model at this time may be different from the ones used when the relevant ETCs were converted. The result is the set of *feasible existing short-term CRR Options and Obligations*.

7) Fix the injections and ejections of the *feasible existing short-term CRR Options and Obligations* (only CRR Options are shown in Figure 5).

8) Compile ETC conversion data for ETCs that are converted this year consisting of PTP power transfers equal to *their minimum historical transmission capacity use on their respective contract path over the most recent same month, reduced by their long-term and mid-term CRR awards*, at specified global priority levels, and a selection to be converted to CRR Options or Obligations.

9) Perform a SFT of all PTP power transfers of ETCs under conversion based on their priorities, i.e., accommodate ETCs with higher priority before ETCs with lower priorities, and reduce ETCs with PTDFs exceeding 3% pro rata within each priority level if necessary. Treat the PTP power transfers of ETCs under conversion as options or obligations according to their respective selection. The result is the set of *feasible new short-term CRR Options and Obligations* awarded to ETC holders that convert their rights this year. These short-term CRR quantities are locked in for the remaining term of the relevant ETC, but are subject to a SFT every year during Step (6) of the short-term CRR Allocation and Auction process.

10) Fix the injections and ejections of the *feasible new short-term CRR Options and Obligations* (only CRR Options are shown in Figure 5). Fix the injections and ejections of the *long-term and mid-term CRR Obligations allocated to LSEs*.

11) Compile LSE CRR nomination data consisting of PTP and/or NSR power transfers with a total sink not exceeding *the minimum of the 99.5% level of their forecasted net load duration curve for the relevant month, reduced by their long-term and mid-term CRR allocations*. The total sink should be divided in aggregate into four quarters at priorities 1, 2, 3, and 4, respectively. The sources should also indicate priority segments at any priority from 1 through 4.

12) Perform a SFT of all PTP and NSR nominations, sequentially on sink priorities, i.e., allocate CRRs with higher sink priority before CRRs with lower sink priorities, and use the source priorities within each sink priority level to prioritize among the sources. Treat the PTP and NSR nominations as power transfer obligations. The result is the set of *short-term CRR Obligations allocated to LSEs*.

13) Fix the injections and ejections of the *short-term CRR Obligations allocated to LSEs*. Fix the injections and ejections of the *long-term and mid-term CRR Obligations*.

14) Compile CRR bid data consisting of PTP and/or NSR Obligation bids.

15) Conduct the short-term CRR Auction to award *short-term CRR Obligations*.

Figure 6 illustrates graphically the partition of network capacity after the short-term CRR Allocation and Auction process.

ETC PTP Options
Existing long-term CRR Options
Existing mid-term CRR Options
Existing short-term CRR Options
New short-term CRR Options
Existing long-term LSE Obligations
Existing mid-term LSE Obligations
Short-term LSE Obligations
Existing long-term CRR Obligations
Existing mid-term CRR Obligations
Short-term CRR Obligations

Figure 6. Short-Term Network Capacity Partition