



Grid West

Module 2 Discussion Transmission Rights

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DRAFT

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The Transmission Rights discussion will cover the following topics:

- Objectives
- Assumptions
- Challenges & Considerations
- Service Descriptions
- Process Overview
- Timeline
- Key Concepts
- Capability Design Summary
- Open Issues

The Transmission Rights Administration module has several objectives:

- Continue to honor all existing transmission rights and obligations
- Create a new medium-term market to allow participants to buy and/or sell transmission rights
- Release additional transmission capacity
- Create new commercial processes to obtain new or additional transmission service and/or rights
- Create a new transparent, centralized short-term redispatch market

The Beginning State Transmission Rights Administration discussion assumes the following:

- Capacity expansion will result in the creation of new Injection Withdrawal Rights (IWRs)
- Existing rights can be translated into IWRs
- Translated IWRs can be traded based on existing physical rights and available flowgate capacity
- New transmission rights will be in the form of firm physical rights (no counterflow allowed)
- The day-ahead redispatch market will be staged for implementation after the Reconfiguration and Real-Time Energy Markets are functioning
- There will be multiple reconfiguration markets - Annual, Monthly, and Intra-Monthly, and Daily
- Reconfiguration auctions will not be offered on a rolling basis, but by a series of interrelated forward auctions.

The Beginning State Transmission Rights Administration has the following challenges & considerations:

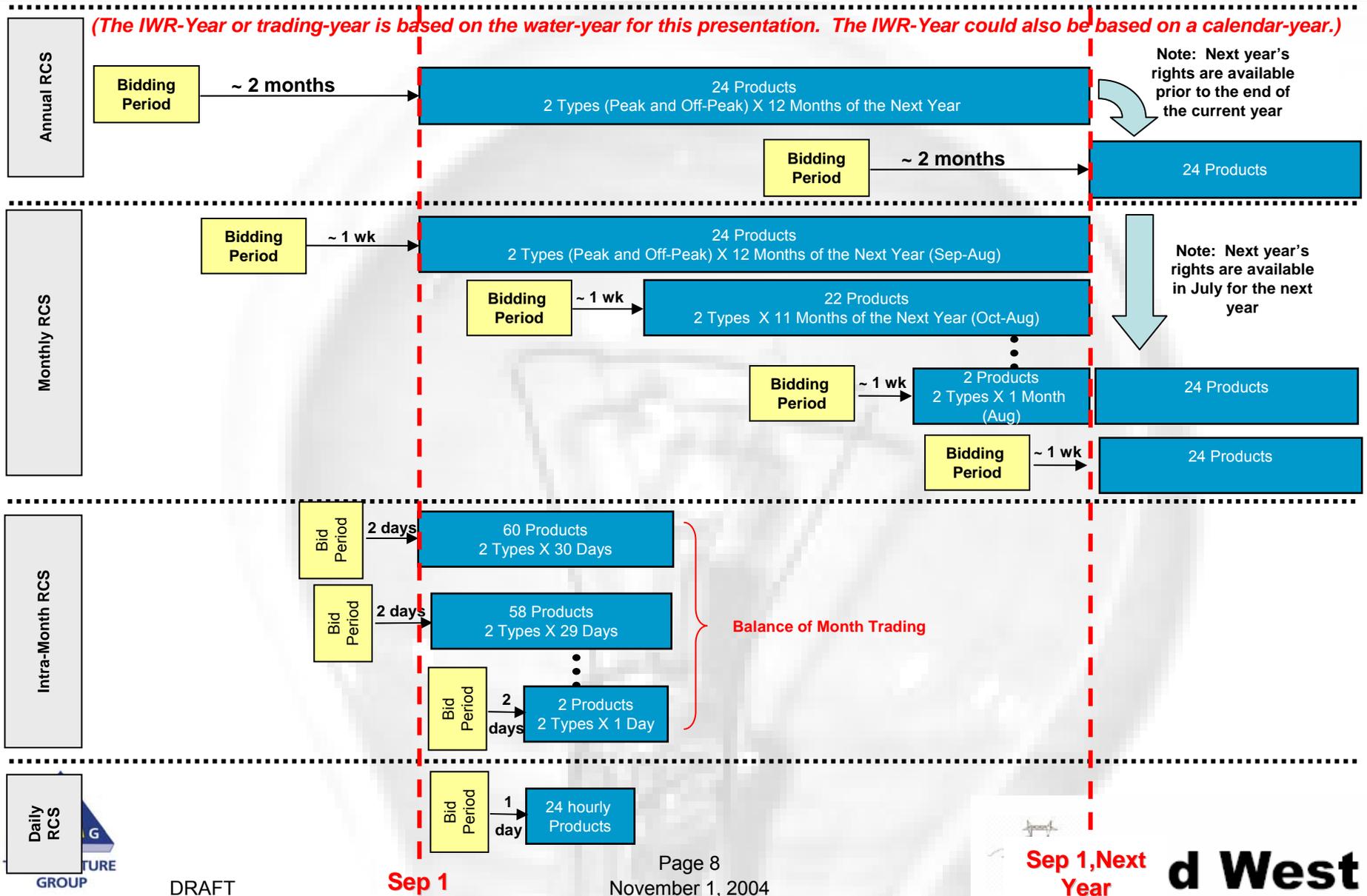
- Maintaining scheduling flexibility complicates the market design
 - Ensuring that participants who choose not to participate are held harmless results in a less optimal market design. This could lead to an infeasible solution.
 - Existing curtailment and checkout services need to fit within the market design or better alternatives must be developed
- Many of the services are interrelated and cannot be readily separated (e.g., Ancillary Services, Scheduling, and Reconfiguration)

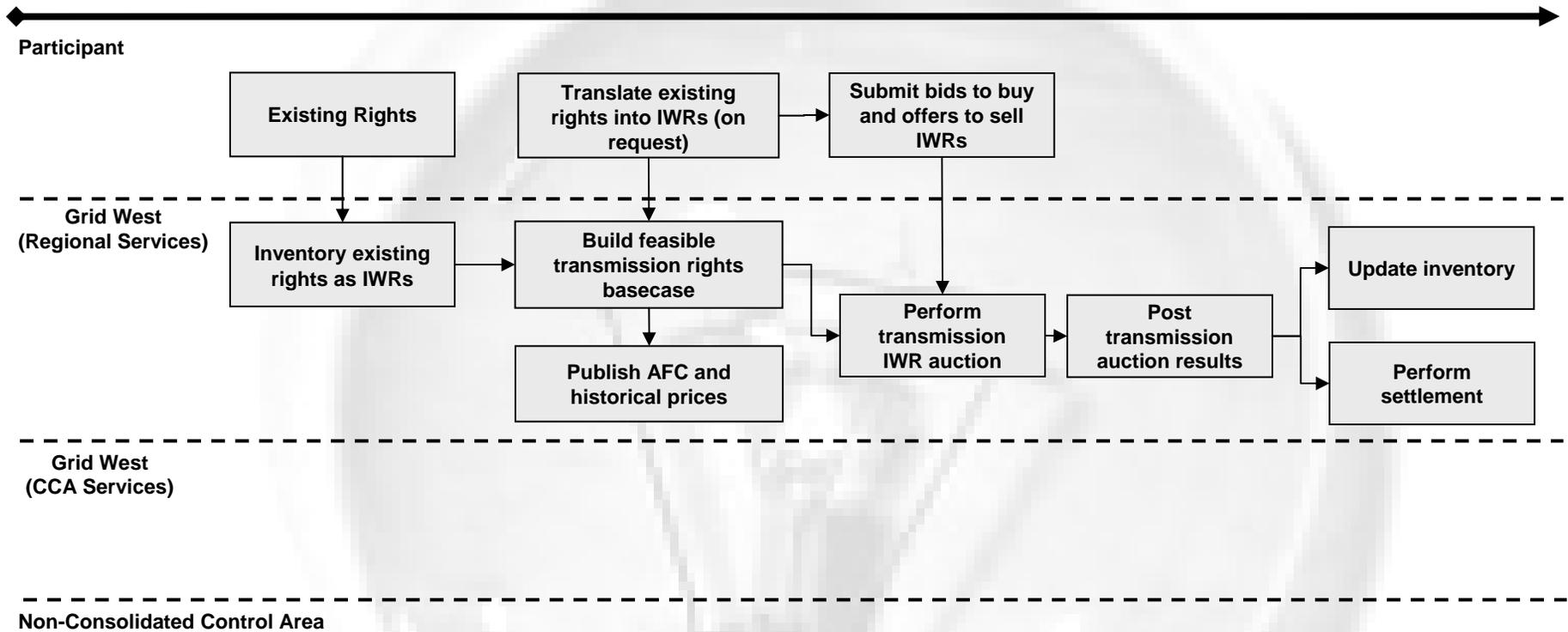
The Beginning State Transmission Rights Administration design has the following basic characteristics:

- Pre-existing rights are preserved
- New transmission rights are issued in the form of IWRs
- Opportunity for rights holders to sell transmission rights – A request for translation to IWRs to enable trade is not a sale, just certification of what will trade
- Offers made in Annual, Monthly, Intra-month and Daily Auctions
- IWRs awarded in response to bids to buy
- Value of rights awarded is maximized
- Sellers are paid for rights sold
- RCS does not need a one-to-one match to enable trades of IWRs to occur
- Rights can be created through Capacity Expansion Service

Grid West will provided the following Transmission Rights Services:

<p>Capacity Expansion Service</p>	<ul style="list-style-type: none"> • For multiple years in the future, addressing long-term service requests • New IWRs are granted for system expansion
<p>Annual Reconfiguration Service (A-RCS)</p>	<ul style="list-style-type: none"> • Starting prior to the beginning of each trading-year • Annual auction of twenty-four (24) monthly IWR products (peak/off-peak product for each calendar month of the year)
<p>Monthly Reconfiguration Service (M-RCS)</p>	<ul style="list-style-type: none"> • Starting prior to the beginning of each month • Monthly auction of monthly IWR products (peak/off-peak product conditions of the next calendar month)
<p>Intra-Monthly Reconfiguration Service (I-RCS)</p>	<ul style="list-style-type: none"> • Starting prior to the next monthly auction (“Balance of Month” trading) • Daily auction of balance of month IWRs (peak/off-peak products for each remaining day in the current month)
<p>Daily Reconfiguration Service (D-RCS)</p>	<ul style="list-style-type: none"> • Starting prior to the Day-Ahead Period • Daily auction of twenty-four (24) hourly IWR products





The following Transmission Rights Administration key concepts are explained in additional detail:

Long-Term Planning

Pre-Day Ahead

Day-Ahead

Transmission Rights Administration
Module 2

- Obtaining Rights
- Residual Rights Release
- Path Based Rights Translation
- Transmission Rights Basecase Feasibility
- Auction Methodology for RCS

A Grid West Participant has four (4) ways of obtaining IWRs:

- Initial IWR Translation Service
 - Performed by Grid West at the request of participants who wish to trade rights through Grid West

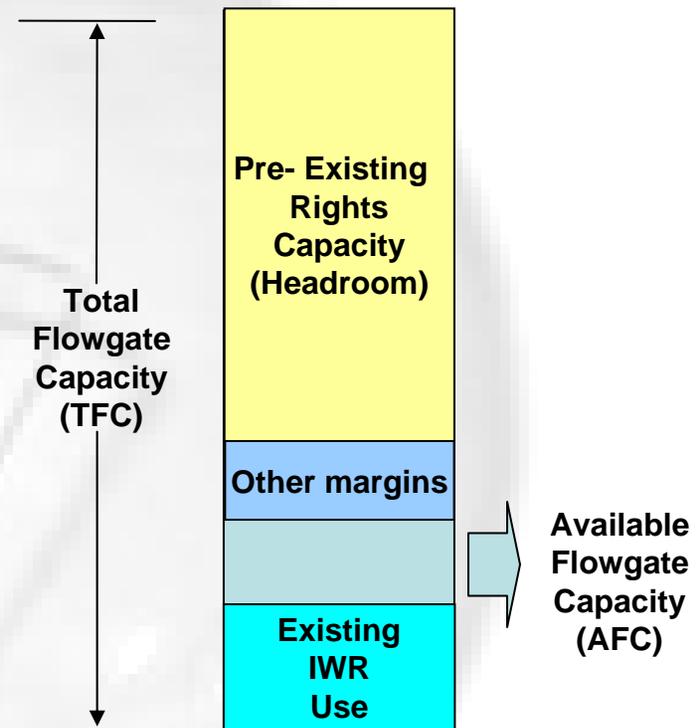
- Capacity Expansion Service
 - Parties propose and build transmission projects
 - Grid West studies the system and grants IWRs

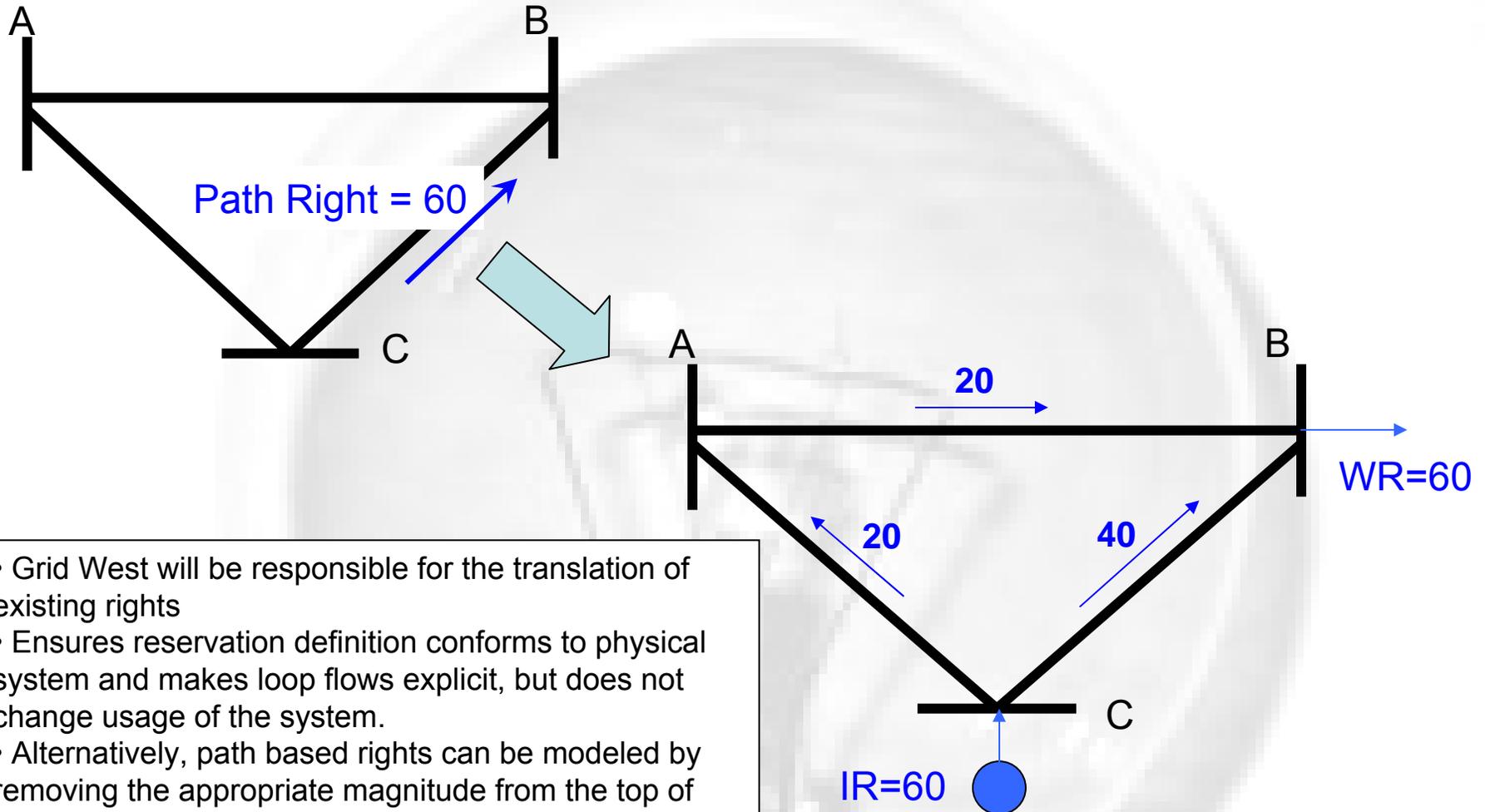
- Reconfiguration Services
 - Annual Reconfiguration Service
 - Monthly Reconfiguration Service
 - Intra-Month Reconfiguration Service
 - Daily Reconfiguration Service

- Bilateral Trading
 - Trading of IWRs directly by Grid West participants
 - Traded IWRs must be registered with Grid West (for scheduling purposes)

The Reconfiguration Service should result in the release of additional flowgate capacity:

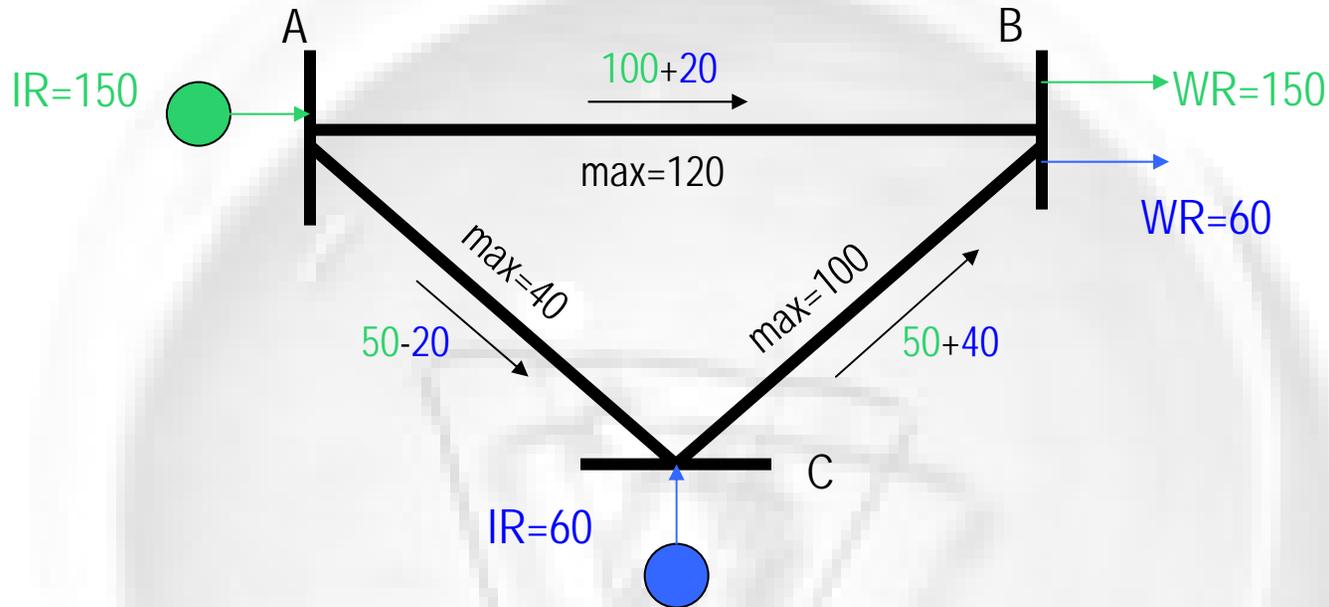
- Available Flowgate Capacity (AFC), along with offered IWRs, is made available to meet a request by IWRs buyers
- Grid West may have the discretion of the percentage of the residual capacity to be offered in auction markets
- The payments received for release of residual capacity (i.e., AFC) will be used to reduce R3A



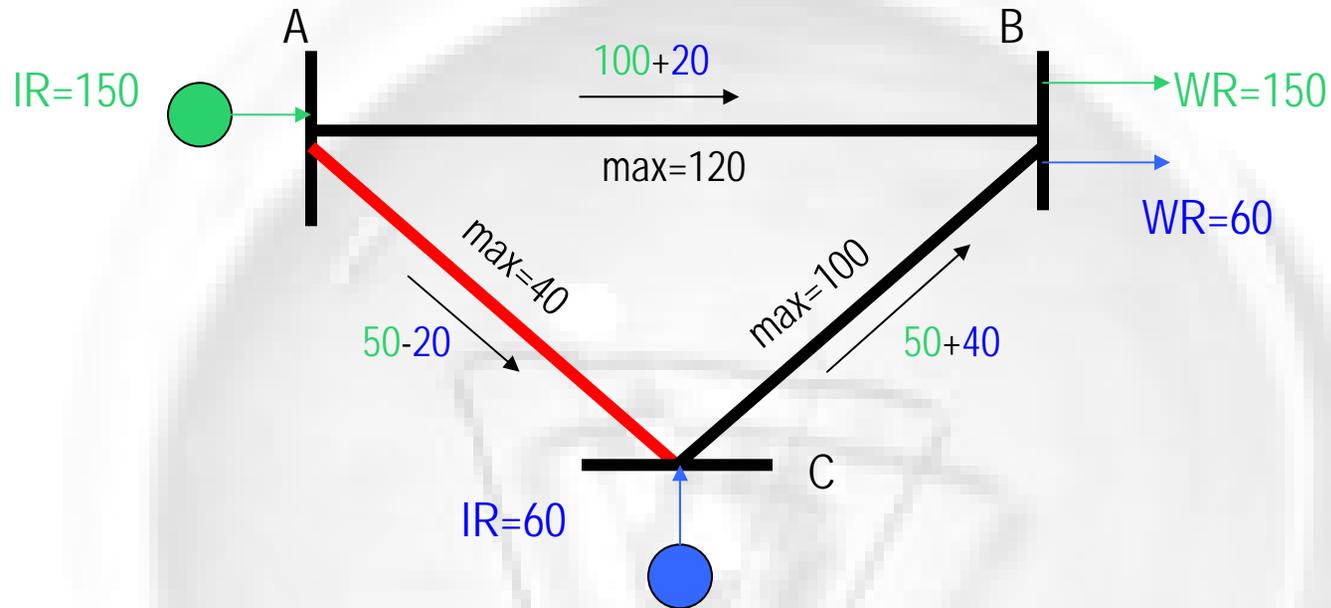


- Grid West will be responsible for the translation of existing rights
- Ensures reservation definition conforms to physical system and makes loop flows explicit, but does not change usage of the system.
- Alternatively, path based rights can be modeled by removing the appropriate magnitude from the top of path capacity.
- We do not recommend this option.

- Strict adherence to a physical rights model (with no flow netting) will likely lead to over-subscription of many transmission paths
- For most transmission paths; however, transmission rights may contribute to counterflow and netting
 - The rules for netting will have financial consequences
 - Such rules can be developed based on historical usage
 - These rules can be modified periodically
 - BPA's method of evaluating "Contract Accounting Flow" accounts for netting could be used as Grid West's starting point
- After initial netting, if some paths are still oversubscribed Grid West can:
 - Increase path rating to the "reserved amount" for auction purposes
 - Curtail existing rights
 - Implement more aggressive netting



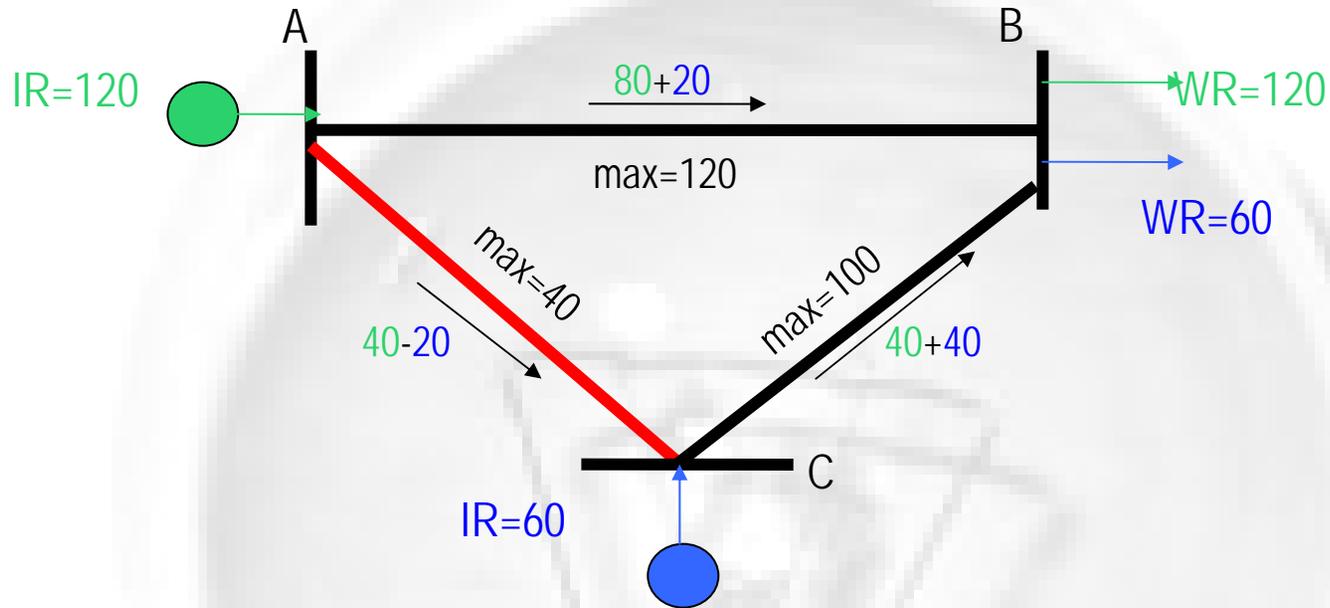
IWR_1 : 150 MW from Bus A to Bus B
 IWR_2 : 60 MW from Bus C to Bus B
 $TFC_{A-B} = 120$ MW
 $TFC_{C-B} = 100$ MW
 $TFC_{A-C} = 40$ MW



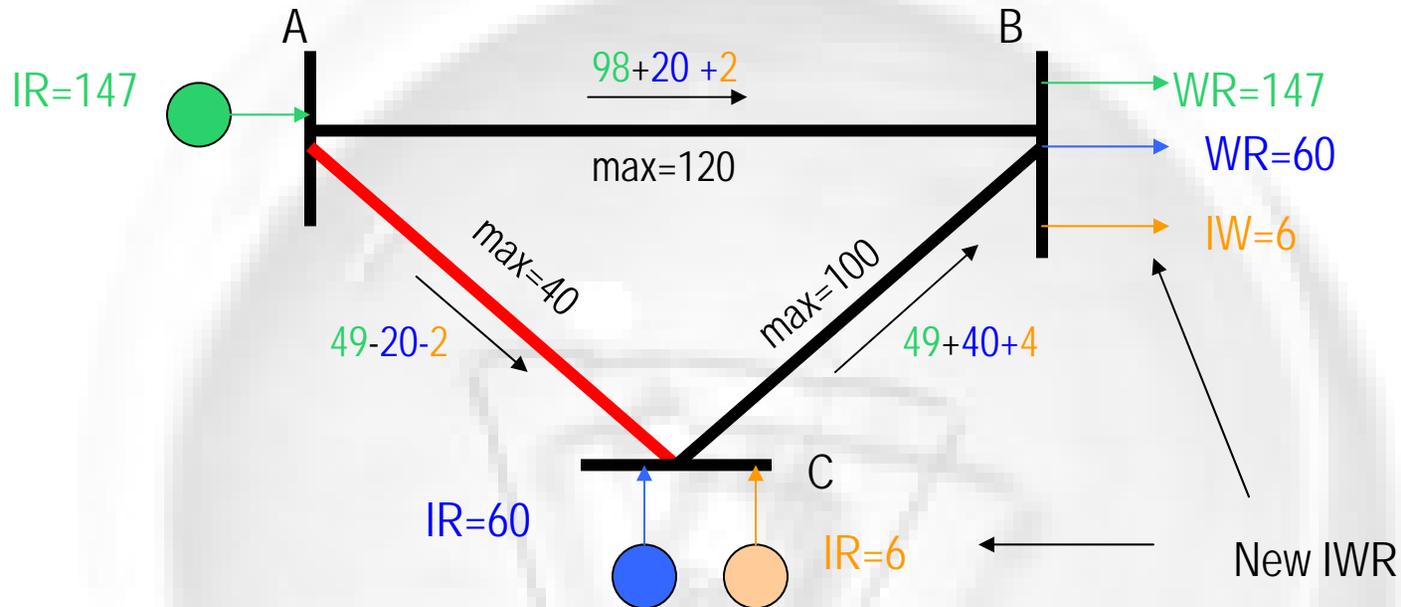
Based on the definition of physical rights this is an infeasible basecase since the flow for IWR_1 on path A-C is more than TFC on line A-C.

Option	Description	Example
A	“Firm Physical Rights Guaranteed.” Sum of the directional flow contribution due to each IWR < Limit.	<ul style="list-style-type: none"> Both F_{A-C} and F_{A-C} should be less than 40 IWR_1 must be curtailed
B	“Accept All Initial Counterflows” The new solution will be no worse-off in term of the potential violations	<ul style="list-style-type: none"> IWR_1 and IWR_2 are accepted No new rights are created from A-C
C	“Expand TFC” Change TFC_{A-C} to 50MW. Each IWR can be accommodated.	<ul style="list-style-type: none"> IWR_1 and IWR_2 are accepted No new rights are created A-C
D	“Transmission Margin” Accept limited counterflow based on a margin parameter	<ul style="list-style-type: none"> IWR_1 and IWR_2 are accepted New rights can be created from A-C if the margin allows

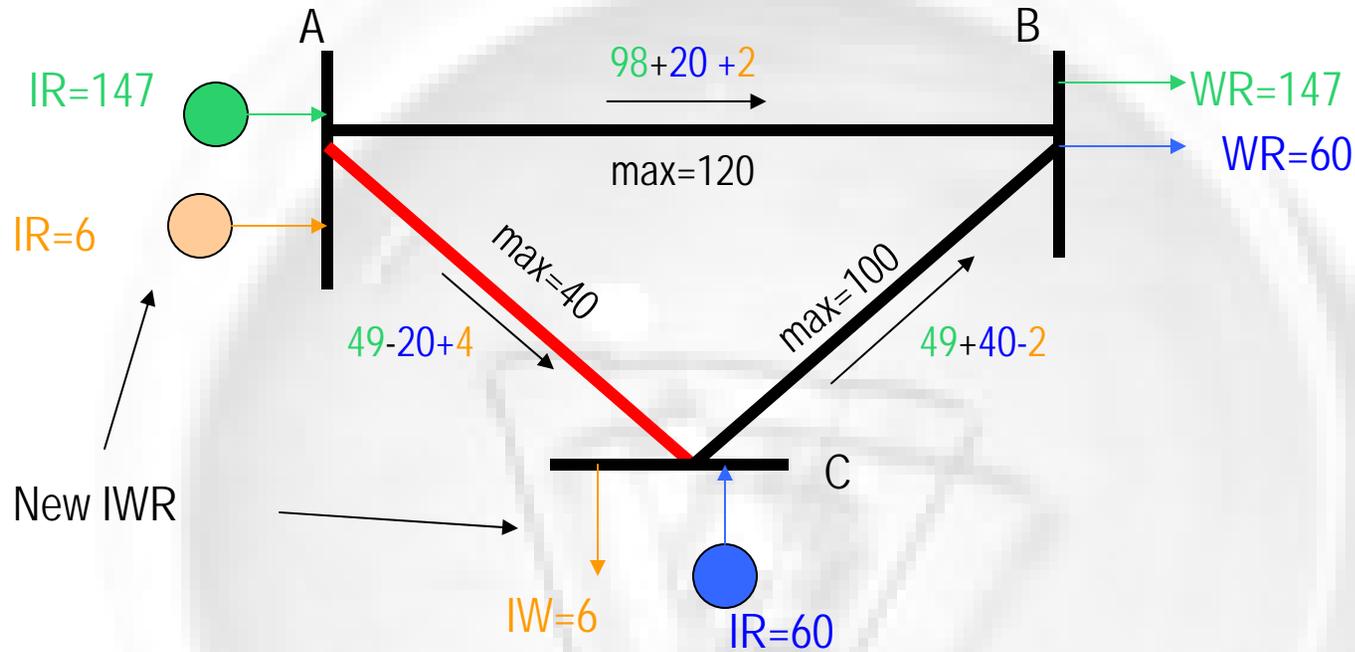
Ensuring Feasibility Option A: Firm Physical Rights Guarantee



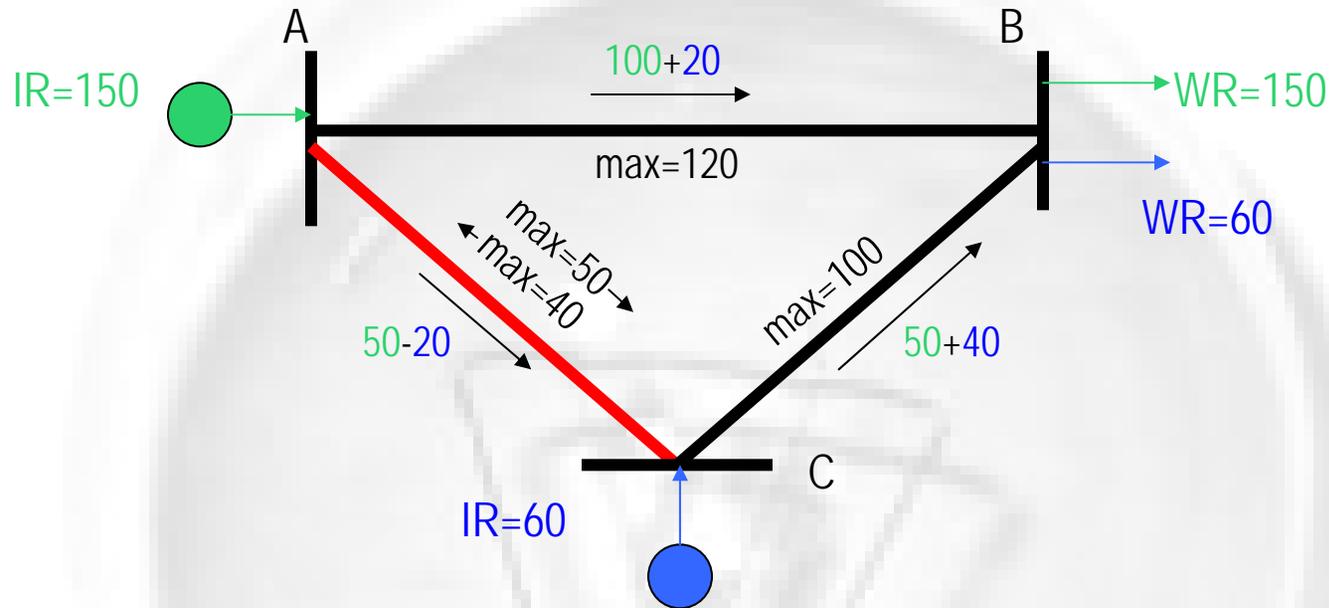
IWR₁ needs to be curtailed to 120 – we will not discuss curtailment as an option any more.



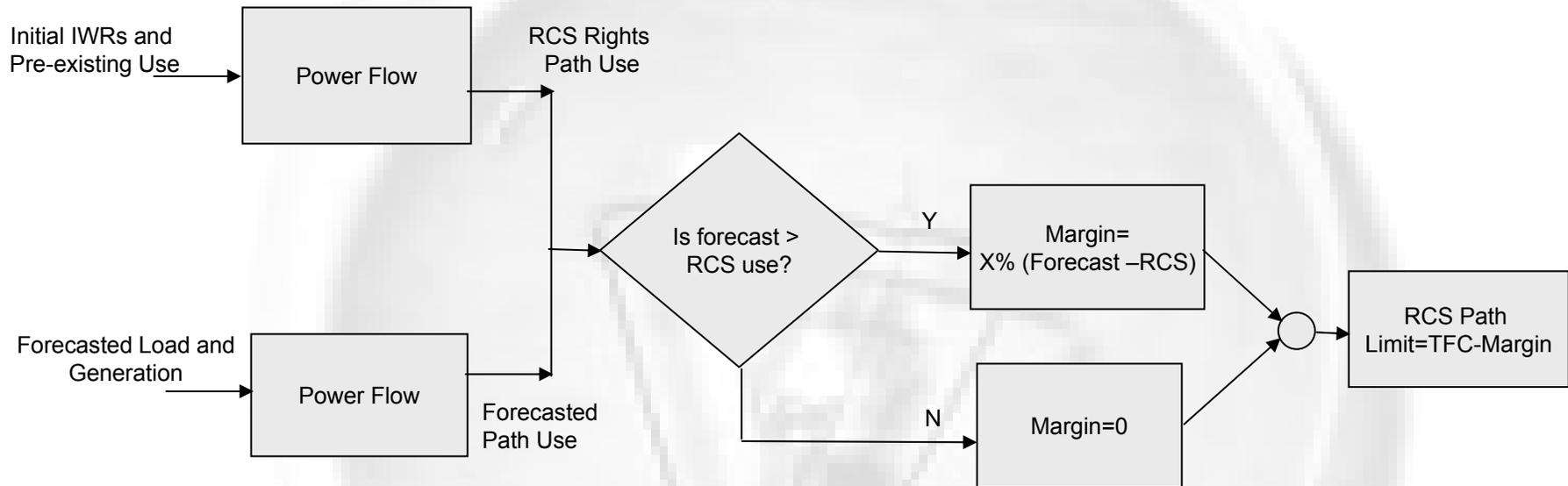
- For “oversubscribed paths,” do not allow flow limit to exceed initial value during the auction.
- If the Blue IWR is withdrawn, the flow from A-C is 47 and violation is 7 (The violation for blue IWR withdrawal in the base case is 10). This is an improvement. Accept.

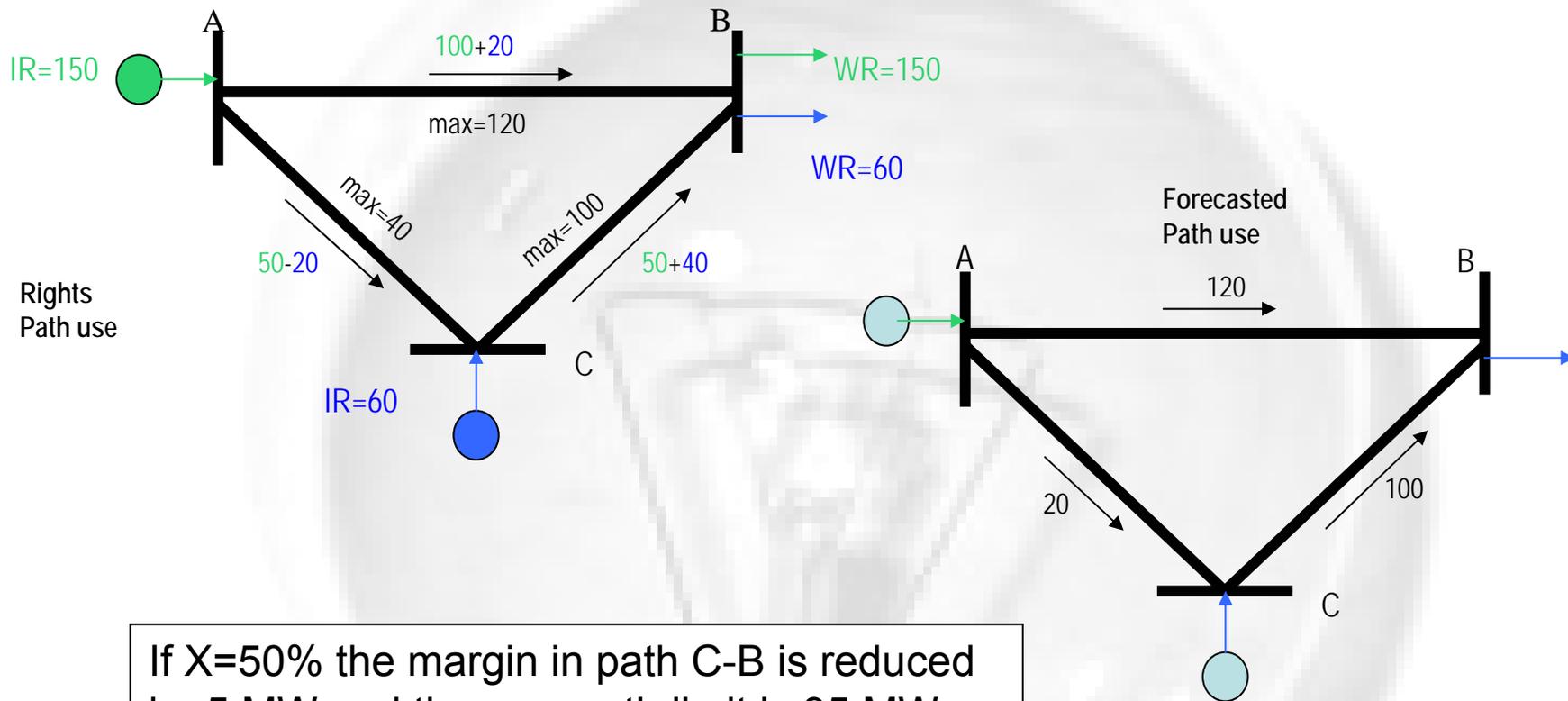


If blue IWR is withdrawn, the flow from A to C is 53 and violation is 13. This is worse-off. Reject.



- In this option, RCS enforces path limits based on directional use.
- In this example, the directional flow from A to C is 50, beyond the limit. We will expand the limit to be 50 to ensure that the starting point is feasible.
- New IWRs from C to A are permitted.





If X=50% the margin in path C-B is reduced by 5 MW and the new path limit is 95 MW.

- Study existing rights use pattern - allow limited netting
- Forecast the actual use of transmission system
- Adjust path limits to reflect the difference between forecasted (“actual”) transmission use and IWR use pattern

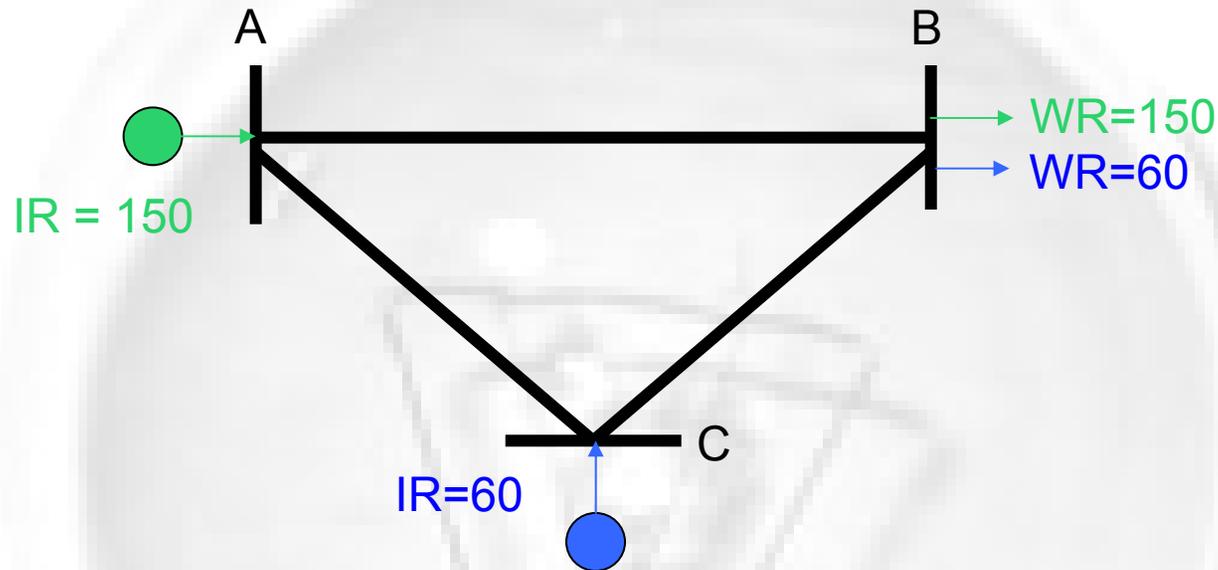
Note: Pre-existing rights will continue.

Recommended Option: Option D - Transmission Margin Approach

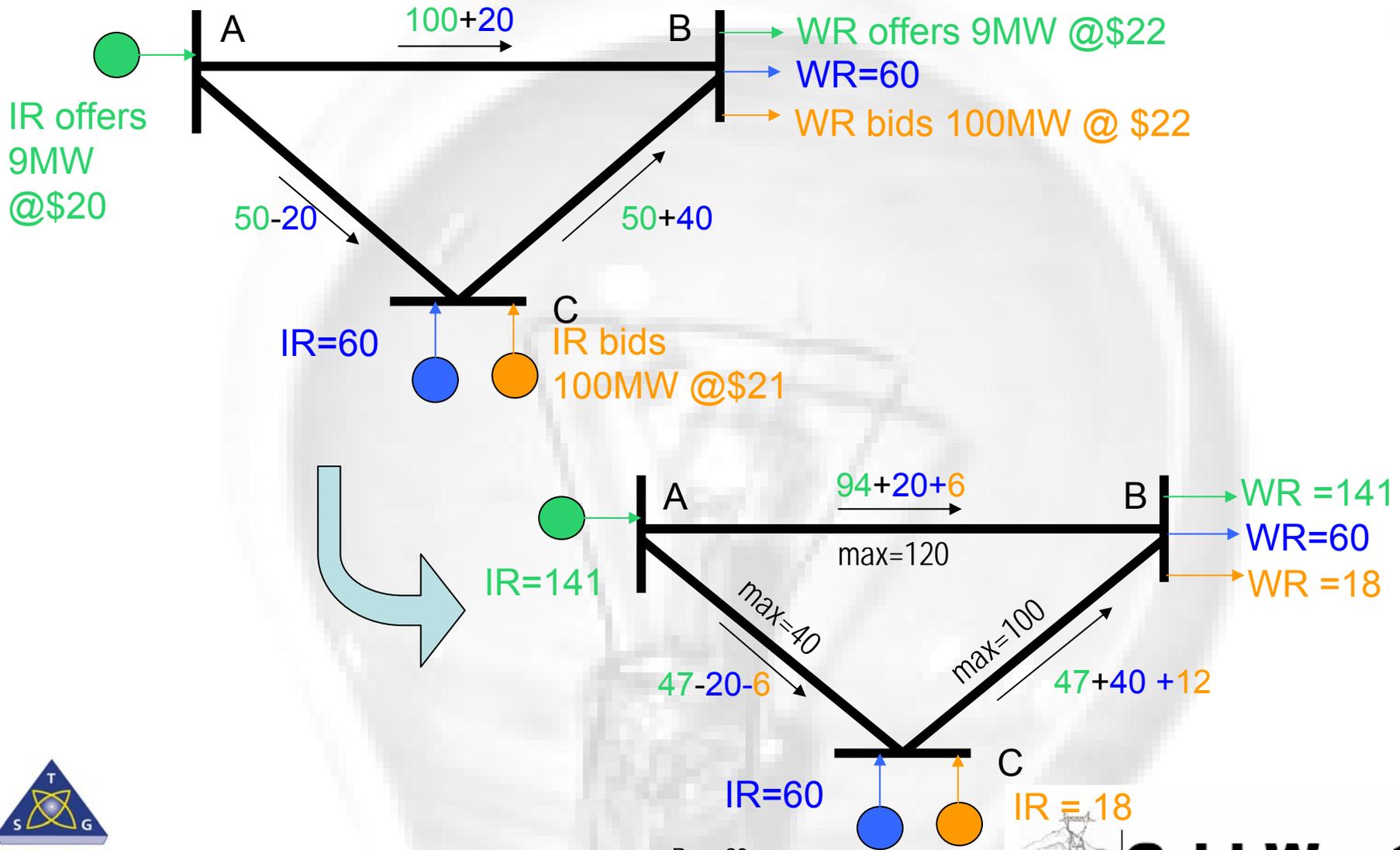
- Allows for better utilization of AFC
- Corresponds more closely with actual utilization of the system
- Provides the flexibility to adjust margins based on auction scenario
- Allows treatment of new IWRs as physical rights
- Even if new IWRs are “firm”, there is potential for overuse in real-time, as it exists today
- There are risks associated with the choice of “x-factor”

- Similar to Security Constrained Economic Dispatch (SCED)
- Maximizes value (“net value between buyers and sellers”)
- DC power flow model
- Market clearing prices for each IWR
- Losses are not included
- IWR modeling is performed by balancing Injection Rights and Withdrawal Rights
- Netting assumptions

The following is an example of RCS:

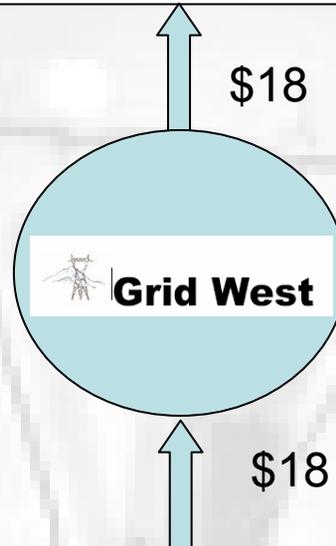


- The Green Participant offers to sell 9 MW of IWR @ \$2 from A-B
- The Orange Participant bids to buy 100 MW of IWR @ \$1 from C-B



Green settlement

$$\begin{aligned}\text{Net} &= \Delta IRa * Pa - \Delta WRb * Pb \\ &= -9 * 20 - (-9) * 22 = \$18\end{aligned}$$



Orange settlement

$$\begin{aligned}\text{Net} &= \Delta IRc * Pc - \Delta WRb * Pb \\ &= 18 * 21 - 18 * 22 = -\$18\end{aligned}$$

The next several slides summarize the proposed design. Each capability will be described by answering the following:

- Description of Function
- Timing & Frequency
- Grid West Responsibilities
- Transmission Owner Responsibilities
- Participant Responsibilities
- Methodology
- ISO / RTO Benchmarks

Capability Design Summary Regional Planning & Capacity Expansion

Capacity Expansion Service	
Description of Function	Long-term transmission planning for the Grid West footprint in cooperation with Grid West participants and neighboring transmission providers such as RTOs and utility companies and response to requests for long-term use of AFC.
Timing & Frequency	Two (2) or more years before the IWR-Year. Formal expansion studies are performed on an “as-needed” basis along with special troubleshooting or generation interconnection studies.
Grid West Responsibilities	<ul style="list-style-type: none"> • Perform long-term planning studies to identify reliability-based transmission expansion and administration of incentives (and rate recovery guarantees). Act as backstop or force building of reliability-based projects. • Perform long-term planning studies to identify economic-based transmission expansion and administer, when required, incentives for development of economic projects by GW Participants. • Review generation interconnection studies, when requested/required. • Define, assign, and administer IWRs as a part of capacity expansions.
Transmission Owner Responsibilities	<ul style="list-style-type: none"> • Provide Grid West with all required information and cooperate with planning studies. • Request specific IWRs for new capacity.
Participant Responsibilities	<ul style="list-style-type: none"> • Provide Grid West with all required information and cooperate with planning studies. • Request specific IWRs for new capacity.
Methodology	<ul style="list-style-type: none"> • Build an Expansion Transmission Rights Basecase based on the latest RCS Feasible Transmission Rights Basecase and the committed transmission expansion. • Use the Expansion Transmission Rights Basecase (ETRB) to study relevance and feasibility of requested rights.
ISO / RTO Benchmarks	All ISO/RTOs are working on similar capacity planning approaches. SeTrans had the most aggressive “participant funded expansion” proposal. No uniform solution exists today.

Existing Rights Translation	
Description of Function	Inventorying existing transmission rights and translating them into IWRs. The inventory is used by Grid West to determine AFC.
Timing & Frequency	Annually three (3) months before the beginning of the IWR-Year (September - August if a water-year basis is selected or January - December for a calendar-year basis).
Grid West Responsibilities	<ul style="list-style-type: none"> • Inventory existing transmission rights • Translate existing transmission rights into IWRs (on request) • Rights will be translated into peak/off-peak products.
Transmission Owner Responsibilities	<ul style="list-style-type: none"> • Provide a list of existing transmission rights to Grid West • Participate in the process and review rights translation
RCS Participant Responsibilities	<ul style="list-style-type: none"> • Review and verify existing transmission rights information provided by Transmission Owners • Participate in the process and review rights translation <p><i>Note: Pre-existing right holders choosing not to participate in the RCS are not considered participants.</i></p>
Process	<ul style="list-style-type: none"> • Define commercial scheduling points (buses, hubs, load zones) where power can be injected/withdrawn • Define auction products • Compile complete path data • Define IWR attributes based on: <ul style="list-style-type: none"> • I/W point(s) • Magnitude of power at each point • Applicable annual auction scenarios • Translate existing rights into IWRs using IWR attributes
ISO / RTO Benchmarks	All other ISOs and RTOs have permanent and/or forced rights conversion. In PJM existing rights are initially translated into ARR (Auction Revenue Rights) which will apply to the revenues from of FTR auction. In MISO existing rights are directly translated into FTRs.

Annual Reconfiguration Service	
Description of Function	Auction of the released IWRs on an annual basis. Award new IWRs, when possible, using available flowgate capacity.
Timing & Frequency	Annually, three (3) months before the beginning of the IWR-Year (September to August if a water-year basis is selected or January to December for a calendar-year basis).
Grid West Responsibilities	<ul style="list-style-type: none"> • Set up initial base case based on translated IWRs • Calculate and post TFCs based on IWRs • Calculate and post path utilization factors (PUFs) • Post price information from the past RCS processes whenever available • Accept, validate, and process IWR offers (sell) and IWR bids (buy) • Use a market clearing methodology to feasibly match IWR offers/bids and to award additional IWRs using available flowgate capacity for the 24 annual auction scenarios (peak and off-peak for every 12 months) • Determine clearing prices for all IWRs matched or awarded • Post public and private auction results accordingly
Transmission Owner Responsibilities	<ul style="list-style-type: none"> • Voluntarily submit IWR offers/bids to Grid West as desired • Verify existing IWRs before RCS
Participant Responsibilities	<ul style="list-style-type: none"> • Voluntarily submit IWR offers/bids to Grid West as desired
Methodology	<ul style="list-style-type: none"> • Establish the starting basecase by running SFT for all translated IWRs: Feasible Transmission Rights Basecase • Conduct IWR auction using bids and offers and available flowgate capacity, if any <ul style="list-style-type: none"> • All traded/awarded IWRs will be priced at the MCP of the I/W points • There will be a new class of “awarded rights holders”
ISO / RTO Benchmarks	All other operating RTOs and ISOs use a similar approach for rights auctions – however the rights auction is normally financial and include both options & obligations.

Capability Design Summary Monthly Reconfiguration Service

Monthly Reconfiguration Service	
Description of Function	Auction of the released IWRs on monthly basis for the remaining months of the year. Award new IWRs, when possible, using available flowgate capacity.
Timing & Frequency	The month before the month of dispatch. Performed monthly within the last fourteen (14) days of each month.
Grid West Responsibilities	<ul style="list-style-type: none"> • Set up initial base case based on translated/matched/awarded IWRs from all RCS processes • Calculate and post TFCs based on IWRs • Calculate and post path utilization factors (PUFs) • Post price information from the past RCS processes whenever available • Accept, validate, and process IWR offers (sell) and IWR bids (buy) • Use a market clearing methodology to feasibly match IWR offers/bids and to award additional IWRs using available flowgate capacity for the 2 monthly auction scenarios (peak and off-peak) for the remaining months of the year • Determine clearing prices for all IWRs matched or awarded • Post public and private trade results accordingly
Transmission Owner Responsibilities	<ul style="list-style-type: none"> • Voluntarily submit IWR offers/bids to Grid West as desired • Verify existing IWRs before RCS
Participant Responsibilities	<ul style="list-style-type: none"> • Voluntarily submit IWR offers/bids to Grid West as desired
Methodology	<ul style="list-style-type: none"> • Establish the starting basecase by running SFT for all translated/matched/awarded IWRs: Feasible Transmission Rights Basecase • Conduct IWR auction using bids and offers and available flowgate capacity, if any <ul style="list-style-type: none"> • All traded/awarded IWRs will be priced at the MCP of the I/W points
ISO / RTO Benchmarks	Most other operating RTOs and ISOs use similar approach <u>single</u> monthly rights auctions; however, the rights auctioned are normally financial and include both options & obligations.

Intra-Month Reconfiguration Service	
Description of Function	Auction of the released IWRs on daily basis for the “remaining” days of the month. Award new IWRs, when possible, using available flowgate capacity.
Timing & Frequency	Starting after M-RCS and ending two day before the IWR-Day. Performed once every Business Day– on Friday covers the upcoming Tuesday IWR-Days.
Grid West Responsibilities	<ul style="list-style-type: none"> • Set up initial base case based on translated IWRs as well as on new awards from all RCS processes. • Calculate and post TFCs based on IWRs • Calculate and post path utilization factors (PUFs) • Post price information from the past RCS processes whenever available • Accept, validate, and process IWR offers (sell) and IWR bids (buy) • Perform an IWR auction once on business days to match the residual and incoming IWR offer and bids for the “remaining days” of the month • Post public and private trade results accordingly
Transmission Owner Responsibilities	<ul style="list-style-type: none"> • Voluntarily submit IWR offers/bids to Grid West as desired. • Update residual IWR offers and bids as necessary.
Participant Responsibilities	<ul style="list-style-type: none"> • Voluntarily submit IWR offers/bids to Grid West as desired. • Update residual/standing IWR offers and bids as necessary.
Methodology	<ul style="list-style-type: none"> • Start with the most relevant Feasible Transmission Rights Basecase based on all IWRs already traded/awarded • Conduct IWR auctions using the same clearing algorithm as used in the annual auction: <ul style="list-style-type: none"> • All IWR trades can be priced at the MCP of the I/W points
ISO / RTO Benchmarks	No other RTO or ISO in North America provides a similar service for trading transmission rights.

Daily Reconfiguration Service	
Description of Function	Auction of the released IWRs on daily basis for the Dispatch day. Award new IWRs, when possible, using available flowgate capacity.
Timing & Frequency	The day before the IWR-Day (Day-Ahead). Performed once every Business Day – service on Friday covers the upcoming Saturday through Monday days of dispatch.
Grid West Responsibilities	<ul style="list-style-type: none"> • Set up initial base case based on translated/matched/awarded IWRs from all RCS processes • Calculate and post TFCs based on IWRs • Calculate and post path utilization factors • Post price information from the past RCS processes whenever available • Accept, validate and process 24 hourly IWR offers (sell) and IWR bids (buy) • Use a market clearing methodology to feasibly match IWR offers/bids and to award additional IWRs using available flowgate capacity for the 24 hourly auction scenarios • Determine clearing prices for all IWRs matched or awarded • Post public and private trade results accordingly
Transmission Owner Responsibilities	<ul style="list-style-type: none"> • Voluntarily submit IWR offers/bids to Grid West as desired • Verify existing IWRs before RCS
RSC Participant Responsibilities	<ul style="list-style-type: none"> • Voluntarily submit IWR offers/bids to Grid West as desired
Methodology	<ul style="list-style-type: none"> • Establish a basecase by running SFT for all translated/matched/awarded IWRs: Feasible Transmission Rights Basecase • Conduct IWR auction using bids and offers and available flowgate capacity, if any <ul style="list-style-type: none"> • All traded/awarded IWRs will be priced at the MCP of the I/W points
ISO / RTO Benchmarks	Most other operating RTOs and ISOs use similar approach for daily auctions; however, the rights are normally financial and include both options & obligations.

The following matrix summarizes the Beginning State design for Transmission Rights Administration:

Description	Current Practice	Proposed Change	Opportunities/ Value
Capacity Planning & Transmission Expansion	<ul style="list-style-type: none"> • Performed on a Control Area basis. • Limited Regional coordination. 	<ul style="list-style-type: none"> • Performed on a region-wide basis. 	<ul style="list-style-type: none"> • Regional coordination. • New IWRs based on capacity expansion providing region-wide benefits and incentives.
Existing Transmission Rights	<ul style="list-style-type: none"> • Rights provide scheduling priority. • Scheduling rules allow adjustment of some schedules up to 20 minutes prior to the Operating Hour without financial consequences. 	<ul style="list-style-type: none"> • No change required. 	<ul style="list-style-type: none"> • Maintenance of existing physical rights.
Reconfiguration Service	<ul style="list-style-type: none"> • Decentralized bilateral markets for existing transmission rights. 	<ul style="list-style-type: none"> • Multiple voluntary centralized reconfiguration auctions that allow rights to be acquired based on existing rights as well as available flowgate capacity • Bilateral market based on existing or awarded rights could readily co-exist 	<ul style="list-style-type: none"> • New market for participants to buy/sell existing transmission rights. • Release of additional flowgate capacity. • One-to-one trade is no longer required. • Additional revenue applied towards R3A and the reduction of existing rate bases.
Transition Plan	<ul style="list-style-type: none"> • Transmission Providers will confirm the existing rights contracts. • Lack of Independence. 	<ul style="list-style-type: none"> • Grid West will use an inventory to confirm rights and implement direct scheduling (within 2 years). 	<ul style="list-style-type: none"> • Transparency to all users.

The following issues have been identified during the initial round of design:

- **Offered Rights** - Once rights have been offered in RCS, should they be treated differently than the original rights that were either sold and scheduled or simply not used at all?
- **Feasibility Options** - Establishing a feasible transmission rights basecase (FTRB) is intended to avoid creating unassignable costs for Grid West during RCS processes. Several options may be used by Grid West to ensure feasibility in light of regional demand for physical transmission rights. Each will have their own issues, common among them will be some level of curtailment of rights close to actual dispatch – similar to existing practices.
- **Commercial Scheduling Points** - Definition of “commercial scheduling point” for I/W to correspond to anything but a bus will involve deviation from actual physical operation. Should I/Ws be limited to bus levels?
- **A/S Market Rules** - A/S market results can have direct impact on redispatch and operational services by Grid West and the control areas. A/S market needs to be carefully designed in order to ensure coordination with Control Areas

The following issues have been identified during the initial round of design:

- **Transmission Market Power** - Due to the unique nature of Grid West, the solutions proposed here for Grid West for administering transmission rights are somewhat unique in several of their characteristics. These characteristics should be verified against market power concerns as well as for ease of implementation and operation.
- **X Factor Issues** – If the x-factor is wrong, how are consequences addressed? Who bears risk? Is there curtailment? How would it work?

Today we covered the following topics:

- ✓ Objectives
- ✓ Assumptions
- ✓ Challenges & Considerations
- ✓ Service Descriptions
- ✓ Process Overview
- ✓ Timeline
- ✓ Key Concepts
- ✓ Capability Design Summary
- ✓ Open Issues