Note to Readers: *This overview paper has been prepared by the Transmission Service Liaison Group (TSLG) to provide an overview of the conceptual framework for implementing Grid West's Basic Features, specifically Market and Operational Design features. The information provided in this draft is current as of the date shown below; however, since design work is on going, this paper will be updated and modified as TSLG completes additional work.*

The preparation of the white papers described in this overview paper is underway. As they are completed, the white papers will be released for review and comment. Each white paper focuses on individual elements of the overall design. This overview paper draft is being provided early to allow readers to understand how the individual white papers fit into the larger context of the Grid West Market and Operational Design.

1.0 Grid West Market & Operational Design

1.1 Contents of the Overview Paper

This overview paper has been prepared by the Transmission Service Liaison Group (TSLG) to help interested parties understand TSLG's proposal materials. It explains what the TSLG has set out to accomplish and provides background information about the transmission problems and opportunities the TSLG proposals seek to address. It explains the relationships among the various subject areas and introduces the white papers that are the focus of the TSLG's current activities.

Section 1 of this paper provides general background information. Section 2 explains how transmission providers currently manage contractual obligations and describes the operational challenges created by the present approach to transmission capacity management. Section 3 provides an overview of core elements of the TSLG's proposal for a new approach to providing transmission service. Section 4 briefly describes the TSLG's work on the concept of control area consolidation, which is an optional feature of the Regional Proposal (in the sense that transmission providers that join Grid West may opt to consolidate their control areas or not). Section 5 identifies additional elements of the TSLG's proposal that are not covered in earlier sections of this paper. Appendix A provides summaries of all white papers and reference papers produced by TSLG to document the conceptual framework for Grid West's market and operational design.

1.2 TSLG's Assignment

a. The TSLG's assignment is to develop a market and operational design framework for Grid West's Basic Features. The complete design work is divided into four layers, each with an increasing level of complexity.

b. The purpose of the first two layers is to develop a conceptual framework prior to Decision Point #2:

i. Layer 1 – Major functions were defined in 2004.

ii. Layer 2 – Methodology, responsibilities, and costs are to be identified in 2005.

- A series of white papers, that address major design features, describe the conceptual framework. Figure 1.1 shows the titles of the white papers, organized by the TSLG work modules with which they are associated. These white papers are introduced in Sections 3, 4 and 5 of this paper with summaries of the papers provided in those sections.
- The set of reference papers shown in Figure 1.1 cover general topics that are applicable to more than one of the white papers. The summaries of the reference papers are given in Section 5.
- A complete list of all the above papers with their summaries is also provided in Appendix A.
- A glossary of Grid West terms will also be provided.

c. Layers 3 and 4 will increase design detail to support Decision Points #3 and #4.

i. Layer 3 – Will develop protocols for market rules, business rules, transactions, etc.

ii. Layer 4 – Will prepare tariffs, functional specifications, interface designs, detailed technology requirements, etc.

1.3 Market Monitoring

a. The organizational form, authority and scope of activities for market monitoring are beyond the scope of TSLG's assignment.

b. However, in each of the white papers, potential market power issues are briefly discussed and prevalent mitigation strategies are identified.

c. The organization of formal markets for transmission rights, reserves and balancing energy will assist market monitoring activities.

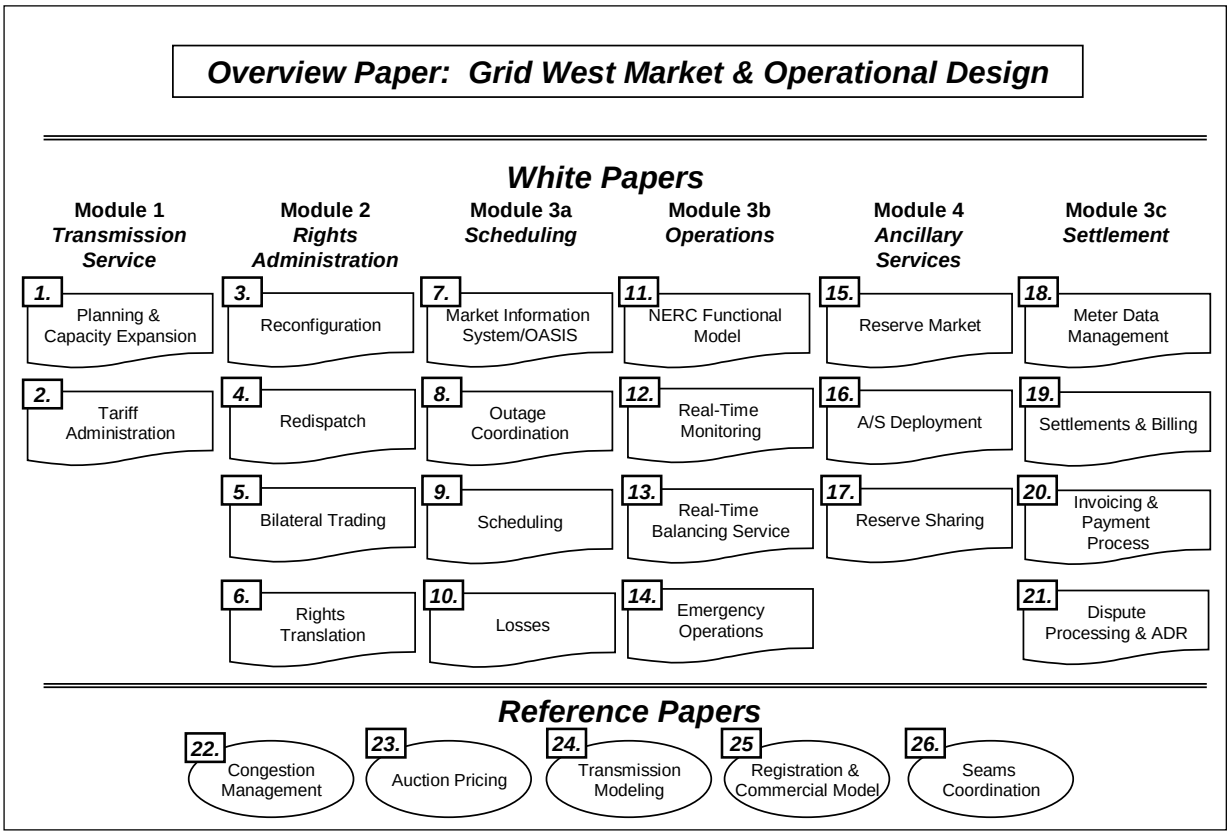

Figure 1.1. Chart of papers which cover the conceptual framework of market and operational design. Paper numbers are keyed to the list of paper summaries found in Appendix A.

2.0 A Commercial Usage Model to Match Physical Reality

2.1 Getting Started

a. The function of the transmission system is energy delivery from generation to load, including the ability to reliably serve load when contingencies occur either because of loss of generators or loss of lines within the transmission network.

i. Reliability aside, the value of the transmission system's delivery capacity is based on the value of the resources it can deliver. This is a reflected value rather than a direct value. Generation doesn't compete with transmission; rather, remote generation uses transmission to compete with local generation.

ii. The value of transmission in forward periods (i.e. from day-ahead to years ahead) is based on the market participants' individual perceptions of the value of energy at the time of delivery in the future.

b. The interconnection of utilities provides both reliability and economy.

i. Transmission systems began with simple arrangements – a line was built from a generator to a load. In the West much of that transmission initially was from remote hydro resources to either cities or mining centers.[1]

ii. There was an early recognition of opportunities for improvements in reliability and for obtaining economic savings if systems were interconnected.

iii. Whenever an interconnection of AC systems occurs, a new joint system is created. Such a multi-owner regional system is by nature a single system electrically.

- All the generators in an AC network are synchronized, i.e., they all operate at the same frequency, and because of governor action, they respond jointly to maintain standard frequency when there are changes in load or loss of generation or transmission.

[1] Thomas P. Hughes, Networks of Power, Electrification in Western Society, 1880-1930, Johns Hopkins University Press, Baltimore, MD 21218, 1983, pp. 282-283.

- Power flow distribution in the network is free-flowing and governed by system physics, i.e., the system topology, line impedances, and the location of generation and load.
- The ability to alter flows without changing the pattern of generation injections is very limited.

iv. A single system with multiple owners can create what has been called the "problem of the commons" – that is, the temptation for each user to maximize its own benefits from a shared resource without regard for the detrimental effects on other users.

- This problem of the commons is complicated by the fact that multiple owners have different levels of investments made at different points in time, which leads to different perceptions about each owner's appropriate usage share in the combined system.
- Over time, a set of usage rules developed to define each owner's share of the jointly created transmission capacity of the system. However in recent years there has been increasing concern that the current set of usage rules is inadequate.

2.2 Do We Need a New System Usage Model?

a. Today, transmission owners provide transmission services using an approach that is known as the "contract path" model. The base assumption of the contract path model is that separate owners can act independently. However, once interconnections began, this was never really true. As explained in more detail in Section 2.3, the contract path model was workable when it was first adopted because the transmission network was simpler (fewer interconnections) and there was sufficient "cushion" in the system to compensate for the mismatches between the way the contract path model assumed energy would flow (along the "contract path") and how energy actually moves across the system. These mismatches have come to be called "loop flow," which is explained in Section 2.4 below

b. The contract path approach is becoming less and less workable because the system has run out of "wiggle room." The methods used by transmission providers to manage the contract path model (described in Section 2.5 below) are not as effective as they need to be, because the contract path model does not account for actual power flow effects.

c. A new and practical commercial service model of system usage is needed that will align transmission right issuance and scheduling with the physical realities of power flow in the transmission system.

d. To meet this objective of the Regional Proposal, TSLG has developed a flow-based methodology (described in Section 3 of this paper) that recognizes that the actions of each transmission user affect all other transmission users to a greater or lesser degree based on system physics.

2.3 The Challenges of the Existing Contract Path Usage Model

a. During the summer of 2003, the Regional Representatives Group (RRG) developed a list of problems and opportunities[2].

i. The contract path model of system usage was identified as a significant factor in underutilization of transmission capacity.

ii. An opportunity exists to develop improved usage rules that allow existing capacity to be better utilized while still maintaining system reliability.

b. The contract path model is a simple "transportation" model.

i. For commercial purposes, transmission is assumed to be provided, and power is assumed to travel (or flow), on specific lines as if MWs were cars on a highway network.

ii. This simplifying approximation was acceptable when the pattern of interconnections was fairly simple and there was surplus capacity in the transmission system.

iii. However, this simple model has been retained past its useful life, as described in Section 2.4, because of its apparent simplicity and because of uncertainty about the outcome when converting existing obligations from one usage model to another.

c. The mismatch between the simple contract path and physical reality grew with the rapid growth of the system after World War II.

i. In the 30 years after World War II there was a burst of transmission construction.

- Canada and the Pacific Northwest were tied to California by the lines that make up the elements of the Pacific Interties.
- Transmission was strengthened within the greater northwest as interior hydro and coal-fired resources were developed.

[2] "Regional Representatives Group, Regional Transmission Problems and Opportunities List, Organized by General Categories - Update and Accompanying Notes," August 14, 2003, http://gridwest.org/Doc/RRGA_RefinedListClean_Aug142003.pdf.

- Ties were closed at Glen Canyon and in the Four Corners area that connected Arizona and New Mexico to Colorado and Utah (and from them to the greater Northwest).
- Transmission was built to import coal-fired resources into California from Arizona and New Mexico.

ii. Around 1970, the completion of the major interconnections described above "closed the loop" and gave the Western Interconnection its current system topology. Disputes quickly arose among the owners operating different portions of the transmission system because of inherent mismatch between actual system flows and the contract path model. This mismatch was dubbed *"loop flow."*

d. Loop flow is the reality that belies the fiction that each path owner can act independently of other operators. Years have been spent in a fruitless debate over who the loop flow culprits are, when the real culprit is a commercial use model that doesn't square with reality. The example described in Section 2.4 demonstrates this inherent flaw in the contract path model.

e. Current approaches to loop flow management force inefficiency into system operations. In order to protect an owner's independent use of its share of system capacity, limits are placed on other owners' use of their own facilities. These limitations endeavor to protect system reliability, however because they are made *a priori*, they lead to underutilization of transmission system capacity. The contract path model provides no reasonable economic means for transferring usage rights between owners as transmission user needs change.

f. An added problem with loop flow is that it cannot be predicted in advance under today's commercial arrangements. As a result, when loop flow problems occur in real-time, operators must use non-economic adjustment measures, i.e., the curtailment of schedules, to correct path overloads. This is not particularly effective, but it is the only tool available to operators today.

2.4 A Loop Flow Example

a. Under the contract path usage model, power is assumed to flow on an identified path as shown in Figure 2.1a. This example shows an injection made in system T with a withdrawal in system R. The transaction is scheduled through system S. The contract path is defined by the ownership of the contracting systems: R, S and T. Power is assumed to flow only on the facilities of these three owners.

b. The actual power flows on all the parallel paths based on system physics as shown in Figure 2.1b. The incremental effect of the injection in system T with a withdrawal in system R affects every line in the system. Lines with the lowest impedance see larger changes in flow (typically the higher voltage lines).[3] The difference between actual flow and scheduled flow (contract path flow) is deemed to be "loop flow."

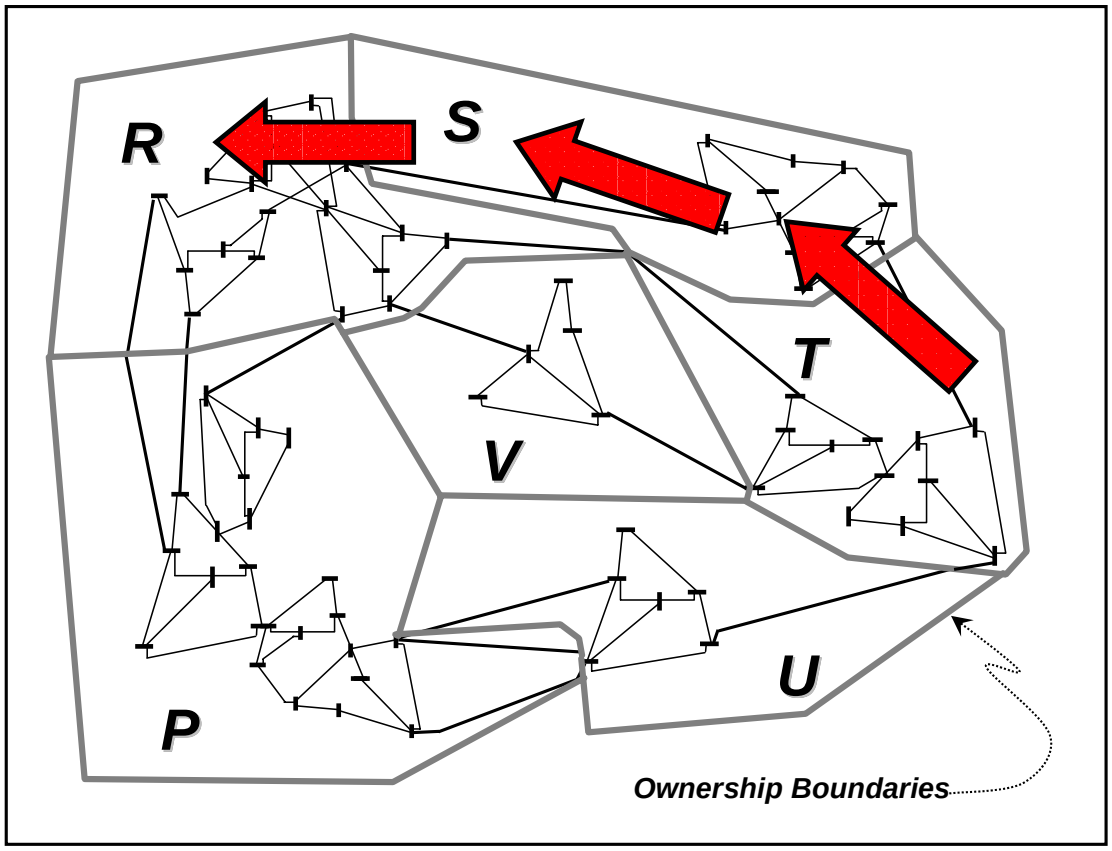

Figure 2.1a. An assumed contract path power flow over the facilities owned by systems R, S and T.

[3] Impedance is a measure of the opposition of an electrical element to a change in power flow in an AC network. It includes the effects of both the resistance and inductance of an electrical element (line, transformer, etc.), where inductance is a measure of the magnetic field effects created by current flowing in an electrical element.

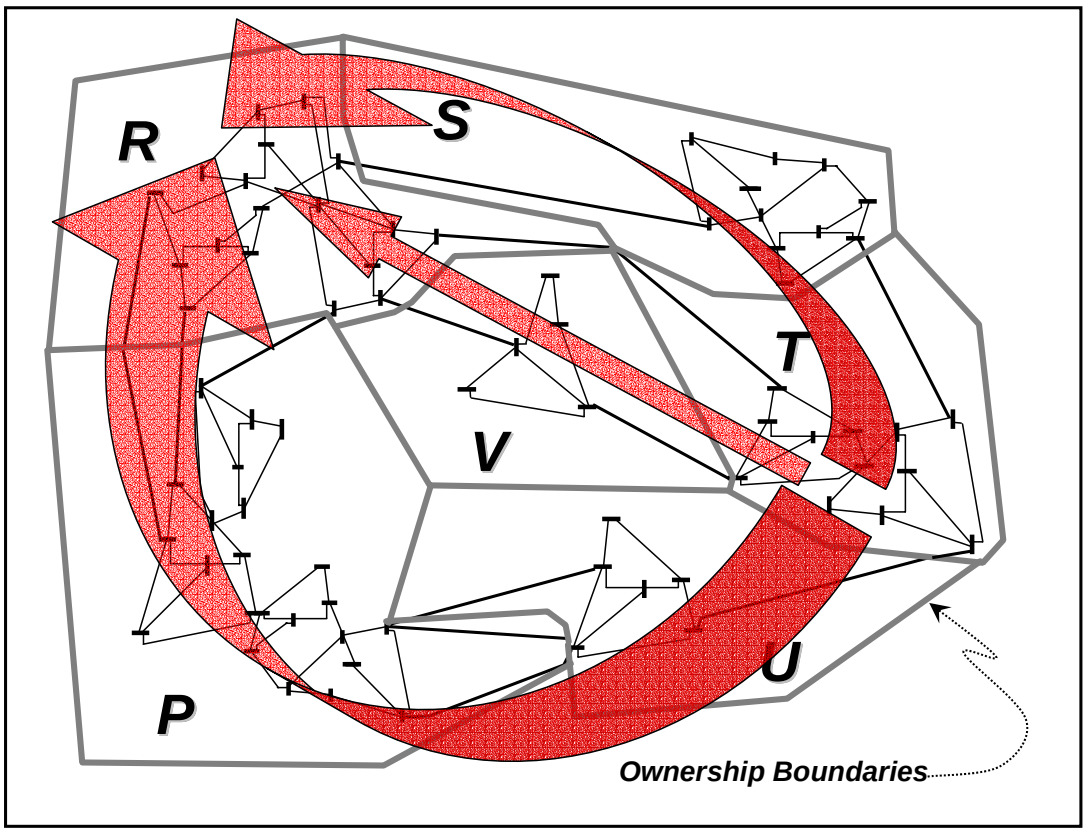

Figure 2.1b. A schematic representation of the actual power flows associated with the contract path flows shown in Figure 2.1a.

c. Loop flow is evaluated as the difference between the scheduled flow (i.e., the assumed contract path flow) and the actual flow. If the injection and withdrawal shown in Figure 2.1a is 100 MW, the contract flow through System S is 100 MW. If 60% of the injection in T moves through system S, then the actual flow through S is 60 MW. (The 60% ratio is called a Path Utilization Factor or PUF.) The loop flow in system S is then -40 MW, i.e., the actual flow of 60 MW minus the contract path flow of 100 MW. The 40 MW not flowing through system S, will be measured as actual flow moving through Systems P, V and U, although these latter three systems will have no matching schedule

for those flows, so the 40 MW will be identified as loop flow or unscheduled flow by P, V and U.[4]

2.5 Efforts to Mitigate the Problems of the Contract Path Model

a. Because simple contract path usage rules among owners impose unexpected costs,[5] adjustments to the contract path model have been made to mitigate the effects of loop flow.

b. When transmission systems were expanding rapidly prior to the 1980's, there was a tendency to build capacity ahead of need. Surplus capacity tends to mask the impact of actual flow to schedule flow mismatch, making it more tolerable.

i. Building ahead of need occurred in part because transmission line investments are "lumpy", i.e., you get the whole capacity of a transmission line when the line is energized, not some the capacity you need at the time.

ii. Because the system was growing quickly, the extra capacity from a project would be needed in one or two years to move additional generation, so the economic burden of extra capacity was small.

iii. These conditions no longer apply. System load is growing slowly. New generation tends to be gas fired, may well be owned by a non-utility entity, and located close to load and until recently. Little new transmission investment has been built in the past 15 years, and public resistance to transmission line siting is much more vigorous than it was 20-30 years ago.

c. Even with surplus brought into early system by the construction effects, there were still many hours when the presence of loop flow created operational problems; As a result there was clear appreciation of the need to recognize (at least in part) the effect of the actual flows on the major parallel paths in the Western Interconnection. That need led to simultaneous ratings of parallel paths.

i. Simultaneous path ratings provide an approximate, flow-based division of system capacity between parallel paths.

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[4] Loop flow or unscheduled flow is also called parallel flow within the industry. All three terms are equivalent.

[5] In spite of the difficulties of loop flow, no system has ever proposed cutting its interconnections to other systems in the West. This is unspoken testimony to the great value of interconnected transmission systems for both economic savings and system reliability.

ii. While the simultaneous ratings nomograms[6] provide bounds for operations, they do not provide a way of determining what operating point is "best."

iii. In order to protect independent use by each path owner, the scheduled use of a path must be limited to the path rating even if actual flow is below the rating. At the same time, actual flow also must be limited to the path rating, even if the schedule was below the path rating.

iv. The requirement to abide by this dual constraint causes capacity to go unused. The full system may be capable of moving more energy, but there is no way to enable heavier use on one owner's system if the owner of the parallel path is to be able to independently exercise its "share" of the simultaneous rating.

v. While the simultaneous rating process has reduced disputes among the owners, it has not resolved the underlying problem.

d. Another mitigation measure taken over the past 20 years is the installation and coordinated operation of phase shifting transformers[7] to partially regulate loop flow.

i. Because the range of such devices is limited, they can only reduce loop flow but not eliminate it.

ii. Their operation is not without cost; altering system flows by increasing phase angle also raises system losses.

iii. As with path rating, the consequences of the mismatch problem are mitigated but not resolved.

e. The difficulty of reconciling the contact path mismatch with the realities of system physics will continue to increase:

i. There has been limited transmission construction over the past decade, yet network usage continues to grow. The combined effect reduces the slack in the system that previously made tolerable the mismatch between scheduled and actual flows.

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[6] A nomogram is a graphic representation of the interdependence among transmission paths. These graphs show the tradeoff that must be made in reaching a simultaneous maximum flow. As flow is increased on one path it must be reduced on a parallel path.

[7] Also called phase shifters or phase angle regulators, these devices installed in one of two parallel systems, can alter the apparent phase angle between their terminals and force (or draw) flow onto (or from) the parallel facilities.

ii. New construction will only make network topology more complex and increase the number of places where the mismatch between actual flows and scheduled flows creates operational problems.

iii. Passage of the Energy Policy Act of 1992 opened wholesale market access to the transmission system and increased the number of transactions the network needs to accommodate.

iv. The addition of new generation has become difficult, especially for remote resources like wind generation.
- Available transmission capacity is in short supply when measured using the contract path usage model.
- However, studies of rated paths show that actual flows approach rated capacity in a relatively few number of hours of the year.

2.6 The Need for a Flow-based Usage Model

a. As the preceding sections demonstrate, the old contract path model is not an effective tool for making best use of the transmission system.

b. To address the problems inherent in the contract path model, a flow-based methodology is needed. This need is the major driver behind the development of the Grid West proposal described in Section 3 below.

c. The base assumption of the contract path model, that separate owners can act independently, is untenable.

i. The modifications of the contract path model described above trim owner independence to a degree, but they offer no systematic, simultaneous approach to deal with actual flow effects.

ii. The establishment of the Pacific Northwest Security Coordinator (PNSC) was a first step to looking at the combined real-time effects of system usage for the Northwest Power Pool control areas; however, the commercial model used for scheduling remains unchanged.

iii. A structural change is needed, namely adoption of a flow-based methodology, to reconcile the commercial model with system physics, thereby recognizing the effect that the actions of each transmission user has on all other transmission users.

3.0 The Flow-based Injection/Withdrawal Model

3.1 Why is the Proposed Flow-based Model Better?

a. A good commercial transmission model must align usage with physical realities, and it must be practical to implement.[8]

i. The Grid West proposal for an Injection-Withdrawal model meets these criteria.
- It is consistent with POD/POR designations in pre-existing transmission rights.
- It does not require the user to be a network expert.
- It is adaptable as the network changes.

ii. To implement a single system injection-withdrawal usage model, a single manager of transmission system capacity is needed – a single "gatekeeper" for use of system capacity.
- The capacity manager makes evaluations of existing commitments and future use based on a grid-wide, flow-based examination of the whole system as an integrated regional network.
- While the governance of the entity charged with the capacity management function must be responsive to regional needs, the capacity manager must at the same time be independent of the market participants and not have a stake in market outcomes.
- Grid West is designed to meet this need for a capacity manager for the region's transmission system capacity. Grid West's function is analogous to the function of an air traffic controller managing usage of shared air space.

[8] The region's first attempt at using flowgate rights in RTO West Phase 1 was too complex for practical implementation. The flowgate, physical rights model required each party to maintain a large, continually changing portfolio of rights on a set of critical flow gates. Limiting the number of critical flow gates to be considered was an approximation made to ease the user's burden. However by only considering a given set of identified constraints, adaptation was difficult as the system changed. If a new flowgate were deemed critical, each user's portfolios of rights would have to be restated each time a change occurred. However, the *coupe de grace* of this approach was the intractable problem of converting pre-existing rights to a distributed set of fractional rights. No unique set of such rights existed that would be agreeable to all parties.

3.2 Pre-conditions for Adoption a New Flow-based Model

a. New services should be made available to make better use of the system.

b. The pre-existing transmission rights are preserved and can be used as they were in the past.

c. The implementation of the new model should avoid known or foreseeable market power problems and not create gaming opportunities.

d. There needs to be a reasonable and reliable transition path from today's practice to putting the new model into operation that also does not preclude the ability to make adaptations as system needs change in the future.

3.3 Overall Features of the Grid West Flow-based Model

a. Pre-existing obligations and agreements are unchanged in order to preserve pre-existing transmission rights. Only voluntary choices made by the right holders will alter their current rights.[9]

b. A flow-based methodology with injection and withdrawal rights is adopted using a central administrator (Grid West) to manage the use of transmission capacity and to recognize the "one-system" (i.e. flow-based) reality of the regional system.

c. One-stop shopping for transmission services across the network is implemented through Grid West which will include transmission planning, capacity expansion and a single queue for long-term transmission service requests (one year or longer).

d. Transmission right reconfiguration services are implemented to enable better access to available capacity. These services combine release of capacity by transmission right holders with Available Flow Capacity (AFC)[10] to provide wider trade in transmission rights. This improves

[9] See Section 3.4a for more discussion on pre-existing transmission rights. Discussion of participation of pre-existing right holders in the Reconfiguration Services is provided in Section 3.5b and 3.5c.

[10] The term Available Transmission Capacity (ATC) has been used with the contract path model to designate an owner's uncommitted contract path capacity. In a flow-based method, the contract path no longer exists. Instead, service availability is determined according to the physical capacity of critical elements or flowgates. Flowgate may be a single line or transformer or a set of parallel facilities that can be treated as a single network constraint. The uncommitted physical capacity of a flowgate is called Available Flow Capacity (AFC). AFC is not based on ownership but on actual network effects of a

access to short-term services (from hourly service for the next operating day up to service for a full year).

e. Voluntary consolidation of control areas using a day-ahead reserve market and a real-time balancing market is enabled, consistent with the Regional Proposal.

f. A staged implementation will be used for building up Grid West's Basic Features. The implementation plan will allow functionality to be increased over time with a cycle of testing, user training and successful operation. The process will be repeated each time new features are added. This has proven to be a successful, cost-effective approach compared to a "big bang" start with all features at the outset.

3.4 Providing Transmission Service

a. A transmission service framework has been developed that will allow the implementation of the flow-based methodology while leaving in place the pre-existing obligations and agreements of the Transmission Owners.

i. This is not a wholesale change in the provision of transmission service, but rather an incremental change.
- Because the pre-existing rights remain in place the effect on the overall market will be quite modest.
- The change will better account for existing commitments as rights are issued and right trading is enabled.

ii. Transmission users with pre-existing rights may continue to use their rights as they have in the past.
- The contracts that establish such rights will continue to define the rights granted and the limitations imposed.
- The implementation of the Grid West flow-based model will not force any change in pre-existing agreements and obligations.
- The holders of pre-existing rights will have the option of using Grid West's broader transmission services or continuing to take transmission service as defined by their pre-existing contracts.[11]

transmission reservation. A given injection-withdrawal right will result in use of multiple flow gates, however, the Transmission Customer is not required to manage these details.

[11] See the Tariff Administration White paper for further discussion of pre-existing rights and obligations, rollover, load growth, etc.

iii. The proposed transmission service framework has two key aspects:
- The transmission service structure and
- The transmission tariff structure.

b. The Grid West transmission service structure.

i. Grid West will offer Regional Network Service (RNS), new suite of services that will allow users to obtain transmission rights to schedule energy across the Grid West network. This service suite includes:
- Reconfiguration Services.
- Capacity Expansion Service.
- Scheduling Services.

ii. To qualify for RNS a user must meet the System Access Requirement (SAR). The SAR verifies that a transmission customer is making a contribution to recovery of the system's fixed costs (i.e., the Transmission Owners' Revenue Requirements) that is appropriate for that transmission customer's situation.
- Load serving entities:
  - Where pre-existing rights cover an entity's full load, the SAR is met. This allows the entity to use RNS to release unused rights for sale or to obtain rights to reach new resources not covered by their pre-existing rights.
  - Load not covered by pre-existing agreements will pay a load based rate to cover such load, thus making RNS available to the entity.
- Generators:
  - The SAR is met by paying for interconnection with the system.
  - Those with pre-existing rights maintain those rights by continuing to pay the contract charges for the agreements that grant those pre-existing rights.
  - Additional transmission rights can be obtained using RNS.
- Marketers:
  - Marketers without generation or load must meet the technical and credit standards common to all users of RNS, but have no other intrinsic obligation.
  - If they have pre-existing rights, like generators, they maintain those rights by paying the contract charges for the pre-existing agreements.
  - Additional rights may be obtained using RNS.

- Exports:
  - An export from the Grid West system, whether made by a load-serving entity, a generator or a marketer, will be treated as a load at the point where the export occurs.
  - The exporter must either have pre-existing rights to cover that export "load" at the point of export or pay a Grid West load based rate to cover the export "load."

iii. Regional Revenue Requirement Adjustment (R3A)

- When Grid West commences operation, Transmission Owners will no longer issue transmission rights.
  - The revenues associated with pre-existing long-term transmission agreements will continue to be paid to the Transmission Owners according to the terms of those agreements.
  - Revenues for short-term firm and non-firm service currently received by Transmission Owners will no longer exist because Transmission Owners will not be offering new transmission service. Short-term and non-firm services will be replaced by IWRs purchased using the Reconfiguration Services.
  - Transmission Owners' loss of the short-term firm and non-firm revenues is, therefore, a cost associated with offering RNS.
- The R3A will be a charge made to all parties who choose to use RNS.[12]
  - Grid West's sales of AFC through the Reconfiguration Service will recover part (and perhaps most) of the revenue that was previously recovered by the Transmission Owners sale of non-firm and short-term firm transmission service.
  - The R3A will cover the net cost of offering AFC: any administrative costs associated uniquely with RNS markets and the residual lost revenue from short-term firm and non-firm sales not recovered by sales of AFC.
  - The R3A could also be zero if AFC sales fully offset the lost non-firm and short term revenues and RNS specific costs. Any surplus could be used to reduce other Grid West costs, to reduce the Company Rates of the Transmission Owners, etc.

[12] The rate design for collecting the R3A will be covered by the Pricing Work Group.

[Drafting note to readers: The following information on tariff structure is based on the Module 1 work done during 2004 Layer 1 design work. While it is the best information currently available, there will be changes in this section as Layer 2 work better defines the tariff structure and clarifies the relationships among the Transmission Owners, Transmission Customers, and Grid West.]

c. The transmission tariff structure.

i. The above transmission service structure will be implemented through the issuance of a set of tariffs.
- Pre-existing rights will continue be covered by the transmission tariffs and contracts under which they were established by the Transmission Owners.
- New services will be covered by a combination of a Grid West Tariff and Transmission Owner Tariffs.

ii. The Grid West Tariff[13] will cover:
- General provisions to cover requests for transmission service, planning and capacity expansion, scheduling, the recovery of Grid West's costs through a Grid Management Charge, etc.
- Transmission interconnections:
  - Interconnection requests will be covered in provisions in Transmission Owner Tariffs.
  - Grid West will provide coordination of interconnection requests and dispute resolution for transmission interconnections.
- RNS – rules for satisfying the SAR for load (including exports) not covered by pre-existing contracts, auction market rules, the R3A, etc.
- The Company Rates applicable to additional loads (i.e., load not under a pre-existing arrangement, including exports).
  - A Transmission Owner may choose to have its Company Rate included directly in the Grid West Tariff, or
  - A Transmission Owner may choose to have the Company rate included by reference with the Transmission Owner's Tariff separately filed and approved.

[13] The form of the Grid West Tariff and its relationship to Transmission Owner Tariffs has yet to be determined. Some propose that there be a standard set of new Transmission Owner Tariffs with Grid West acting as agent, while others propose a unified Grid West Tariff. At the completion of the Module 1 work, an owner option was suggested, but again the exact form of the tariff was not determined as of the date of this draft.

iii. Grid West will issue new transmission rights as Injection Withdrawal Rights (IWRs).
- Long term IWRs will be issued under the Capacity Expansion Service whether from existing AFC or based on new AFC created by system expansion.
- Reconfiguration service will issue IWRs for as long as one year and as short as one hour.
- Residual AFC will be made available from the end of the day-ahead process until the cutoff to real time on a first come-first served basis.

d. The white papers dealing with provision of transmission service are:

i. ***Regional Planning & Capacity Expansion White Paper*** – Describes the regional planning process to be facilitated by Grid West and the mechanisms for capacity expansion. Grid West will develop an open transmission planning process that examines expansion needs from a single system perspective, tests for transmission adequacy and considers non-transmission alternatives to meeting system needs. The capacity expansion service will deal with requests for long-term service requests (greater than one year). If capacity is not available to meet the request, the capacity expansion service enable market driven transmission projects to meet requests. It also provides for expansion backstops for maintaining existing transfer capability and meeting transmission adequacy standards.

ii. ***Tariff Administration White Paper*** – Describes the provision of transmission service through the Grid West Tariff and the related Transmission Owner Tariffs. It describes the roles of Grid West, the Transmission Owners and the transmission customers, and it provides discussion of issues related to pre-existing contracts, such as load growth, contract termination or roll-over, etc.

3.5 Trading Transmission Rights

a. The reconfiguration concept.

i. The challenge of an injection-withdrawal model is how to enable trade rights among transmission right holders.

ii. Trading rights bilaterally is limited to transactions in which the buyer desires the use of rights that are identical to those held by the seller.
- This means that independent trading requires a one-to-one match of injection and withdrawal points.

- Exact matches between buying and selling parties are unlikely, so such trade is limited.

iii. To overcome this limitation, the Grid West proposal includes a Reconfiguration Service that allows transmission right holders to sell rights between one set of points and buy rights between a different set of points at the same time. This ability to reconfigure rights is made possible by Grid West role as the single "gatekeeper" for issuance of all new transmission rights in the Grid West Managed Transmission System

iv. The Reconfiguration Service is based on a central auction of short-term transmission rights conducted by Grid West.
- IWRs released to the auction increase AFC on specific flowgates.
- Requests made can now be granted by using the combined AFC (both latent and released).
- Trade no longer requires a one-to-one match of injection points and withdrawal points.

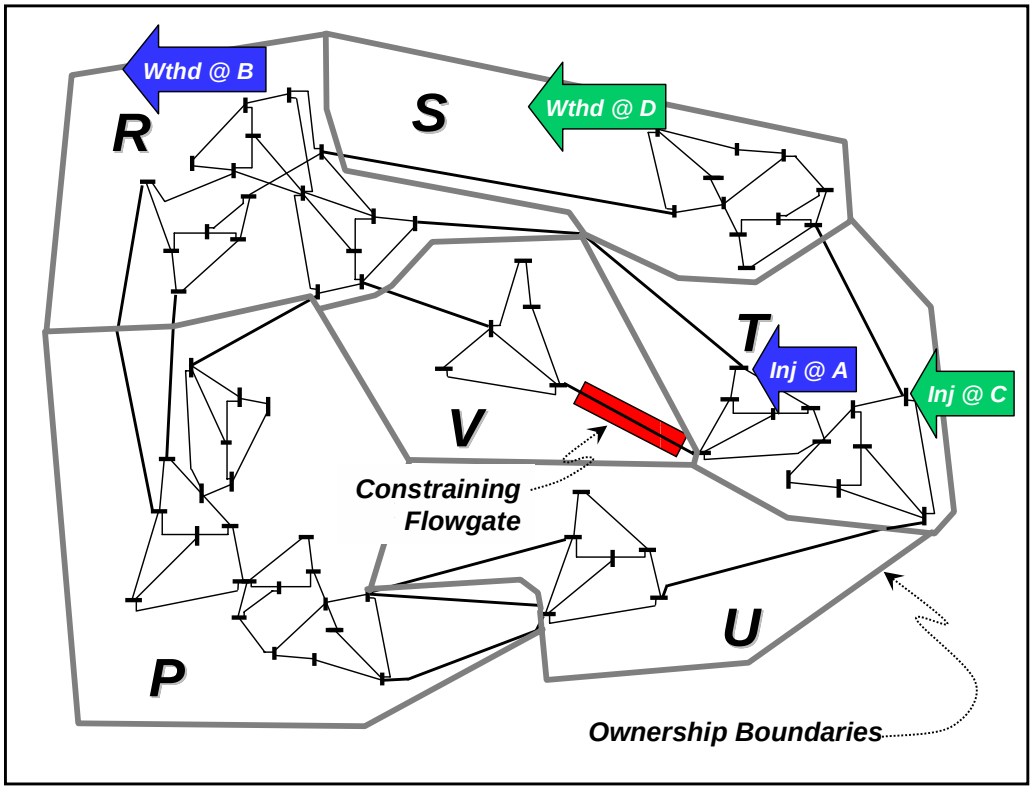

Figure 3.3. An example of IWR reconfiguration for an offer of A→B.

v. An example of IWR reconfiguration is shown in Figure 3.3.
   - *Situation:*
     - Party X holds an IWR from A to B of 100 MW that it will not be using next month.
     - Party Y wants to purchase an IWR from C to D for 200 MW that for next month.
   - *Without Reconfiguration Service:* Since the points of injection and withdrawal for the A→B right do not match, those of the C→B right requested, no direct trade of rights is possible.
     - Both have different effects upon the constraining flowgate that for this example is within the ownership boundaries of V.
     - The PUF for an A→B injection-withdrawal pair is 30%, that is, for a 100 MW schedule, there will be an incremental increase on flow of 30 MW on the constraining flowgate.
     - The PUF for C→D is 20%.
   - *With Reconfiguration Service*: Using the Reconfiguration Service a trade can be effected.
     - Party X offers its 100 MW A→B for release (sale), which makes the AFC on the constraining flowgate 30 MW (PUF_{A-B} x Offer).
     - Party Y bids to buy 200 MW C→D which would require 40 MW of AFC on the constraining flowgate.
     - Y's full request cannot be satisfied, but 30 MW is available, so a 150 MW C→D IWR can be issued. (AFC / PUF_{C-D})
     - Without the trade, the capacity held for X's use would have gone unused, yet there was no way for such a trade to have occurred on a bilateral basis.
     - Note that the MWs for the two IWR are different because of the impact of each IWR on the constraining flowgate, which shows another difficulty of the one-to-one trading restrictions that must be in place without a reconfiguration market.
   - In actual practice, many offers to release and bids to buy will happen simultaneously. The auction software that enables reconfiguration trading uses a power flow algorithm that can simultaneously award IWRs while keeping all subscriptions within AFC limits.
   - IWRs awarded in an auction are defined by the Grid West tariff. The nature of released (sold) rights of whatever vintage or source has no impact on the characteristics of an IWR.

b. Addressing Scheduling Flexibility.

i. A Day-Ahead Redispatch feature was included in the Regional Proposal[14] as a Basic Feature of Grid West.

ii. The purpose of the day-ahead redispatch was to enable greater use of the transmission system by getting advance scheduling commitments.

iii. Major difficulties were encountered in attempting to design such a day-ahead redispatch:
- Since participation would be voluntary, only some schedules would be constrained by the day-ahead redispatch, and schedule changes made after the redispatch pursuant to pre-existing contract provisions could undo any optimization achieved by the day-ahead redispatch.
- Measurement and settlement of committed schedules would be difficult because not all of them would be settled in the same balancing market, i.e., some within the CCA and some in non-CCA control areas.

iv. When Day-Ahead Redispatch was revisited after the reconfiguration service had taken shape, it became clear that the desired effect of allowing parties to release a portion of their scheduling flexibility (i.e. commit to all or a portion of a generation plan) could be accomplished through the Day-Ahead Reconfiguration Service (DA-RCS).
- If transmission right holders[15] give up their scheduling flexibility in the DA-RCS, there is a reduction in the "headspace"[16] that must be set aside to meet obligations for pre-existing rights.
- Reduced "headspace" becomes AFC that can be sold as IWRs.
- A voluntary day-ahead redispatch is a partial energy market that must be settled against a real-time energy market, but since not all parties participate, the optimization achieved can be undone by parties who retain their pre-existing scheduling flexibility. In

[14] "Narrative Description of RRG Platform Group Regional Proposal", December 24, 2003, pp. 7-8, http://gridwest.org/Doc/FinalNarrative_RegionalProposal_Dec242003.pdf. The Regional Proposal described an Independent Entity (IE) that has since been given the name Grid West.

[15] These flexible scheduling rights include those used for native load service by Transmission Owner and the largest potential source of releases of existing scheduling flexibility.

[16] Headspace is a term used to describe the capacity set aside prior to an RCS auction to preserve pre-existing rights, including the scheduling flexibility (or optionality) of transmission right holders to change their schedules after the close of the day-ahead scheduling process.

addition, without a real-time energy market applicable to all users, settlement of commitments was problematic. Finally, it appeared that there were potential gaming problems that would have to be addressed.

v. Enhancing the DA-RCS to handle releases of scheduling flexibility avoids the complications of the day-ahead redispatch service while achieving its objectives, namely making more capacity available through voluntary offers to restrict changes in generation patterns for the following day.

vi. With this modification, the typical day for pre-scheduling fits the general pattern in place today.
- Trades for the next day occur very early in the morning.
- Calls are made to find transmission from various transmission providers.
- Pre-schedules are submitted.

vii. The enhanced DA-RCS allows individual providers to find transmission through a central auction conducted by Grid West, where AFC is made available by releases of scheduling flexibility along with AFC and other transmission rights sale offers.

c. Rights Translation.

i. For many years, pre-existing transmission rights are expected to represent the majority capacity commitments of the Grid West Managed Transmission System. Therefore in order to have a successful Reconfiguration Service, pre-existing right holders must have a way to offer their rights for sale in the RCS auction. This is enabled through a rights translation process.

ii. If a right holder wishes to offer rights in the RCS, it will come to Grid West and request a translation of its rights into an equivalent set of IWRs. This translation may be partial, i.e., some IWRs and a residual retained right, with the combined set having no greater capacity commitments than were required for the original rights.

iii. Once a translation is “certified”, the right holder may (1) choose to do nothing and use its rights as before, or (2) release some or all of the identified IWRs into an RCS auction for a specific period (for instance, for all hours of the next day) and if sold, schedule its own use based on the residual retained right.

iv. A decision to offer rights in one auction does not bind the right holder to offer in any future auction. For instance, if a right holder offers IWRs for all hours of the next day in today’s DA-RCS, it could

subsequently choose not to release any IWRs in tomorrow's DA-RCS and schedule using its original transmission rights.

v. Scheduling flexibility for pre-existing rights can also be translated and released into the DA-RCS.

d. Treatment of Pre-Existing Firm Redirect Services.

i. Under today's open access transmission tariffs, transmission customers may request that their Points of Delivery (PODs) and Points of Receipt (PORs) be changed or redirected to other PODs and PORs on either a temporary or permanent basis. Redirects are granted only if transmission capacity is available to enable the request. In the case of a permanent redirect, the new points are firm. Most transmission providers offer temporary redirects on a non-firm basis only.

ii. When Grid West becomes the manager of available capacity for the Grid West Managed Transmission System, only Grid West will be able to make such availability determinations.

iii. After Grid West is operational, Transmission Owners who receive redirect requests under pre-existing contracts will only be able to grant requests after Grid West has confirmed availability.

e. The white papers dealing with transmission right trading are:

i. ***Reconfiguration White Paper*** – Describes the implementation of the reconfiguration service: mechanisms for determining pre-existing obligations, auction rules and pricing of IWRs sold and purchased.

- A series of auctions addresses different time periods:
  - Annual for monthly on-peak and off-peak IWRs.
  - Monthly for monthly on-peak and off-peak IWRs for the balance of the annual period of the auction cycles.
  - Intra-monthly for daily on-peak and off-peak IWRs for the balance of a month.
  - Day-Ahead for hourly IWRs for the next day.
- The Day-Ahead Reconfiguration Service (DA-RCS) will have an enhanced feature to enable trading of scheduling flexibility.

ii. ***Redispatch White Paper*** – Describes the day-ahead redispatch service envisioned in the original Regional Proposal and explains how the objectives of day-ahead redispatch will be met by enhancements to the Day-Ahead Reconfiguration Service without encountering the difficulties of reconciling day-ahead bids with real-time imbalances that were discovered during TSLG's Layer 1 work.

iii. ***Bilateral Trading White Paper*** – Evaluates the effects of Grid West proposed services and functions on current bilateral trading practices within the Grid West footprint.

iv. ***Rights Translation White Paper*** – Describes the processes and functions used by Grid West to manage transmission rights data. This includes methods for identifying the injection and withdrawal commitments associated with pre-existing agreements and obligations and for allow pre-existing right holders to translate their rights into IWRs, either in whole or in part, for release in reconfiguration auctions.

3.6 Scheduling Related Processes

a. Grid West will provide scheduling services for the use of the Grid West Managed Transmission System.

i. Initially the Transmission Owners will determine compliance with pre-existing contracts and adjust their own use to keep commitments within the limits of the owner's system.

ii. A transition of functions to Grid West will occur over a two year period.

b. The white papers on scheduling related processes are:

i. ***Market Information Services White Paper*** – Explains data and functional features of the OASIS used by Grid West for service requests, reconfiguration, scheduling and operational activities.

ii. ***Outage Coordination White Paper*** – Describes the proposed Grid West process for coordinating outages with regional scheduling and consolidated control area operations.

iii. ***Scheduling White Paper*** – Describes process and data needed by Grid West and its participants to schedule transactions including tagging requirements, timing requirements, etc. The paper describes the proposed process for adjusting schedules, after the completion of the day-ahead process but before the cut-off to real-time operations, acceptance or rejection of adjustments based on assuring reliable operation in real-time, and the checkout procedures required to ensure accurate interchange and Net Scheduled Interchange with neighboring interchange authorities.

iv. ***Losses White Paper*** – Describes the treatment of losses for pre-existing agreements and options for loss recovery/accounting methods that could be used for IWRs issued by Grid West.

3.7 Real-time Operation

a. At the close of the scheduling adjustment period and just prior to real-time operations, schedules will be handed-off to Control Areas for implementation.

b. The general white papers dealing with real-time operations are:

i. ***NERC Functional Model White Paper*** – Describes proposed roles and responsibilities for Grid West and participants to meet the requirements of the NERC functional model.

ii. ***Real-time Monitoring White Paper*** – Describes the proposed real-time monitoring process including the data needed to support both reliability and market functions.

4.0 Control Area Consolidation

4.1 Voluntary Control Area Consolidation

a. The Regional Proposal[17] noted that some of the Transmission Owners expected to be within the Grid West footprint were discussing the possibility of consolidating their individual control areas. Grid West would provide the services needed by the consolidating parties to operate the Consolidated Control Area (CCA). The motivations of those considering participating in the CCA include increased reliability and operational efficiencies.

i. *Reliability* – Consolidation of control areas, by those Grid West Transmission Owners expected to voluntarily participate, will put certain control functions for a substantial portion of the regional grid under a single operator who will have authority to take appropriate actions when needed. The need for wider visibility outside of individual control areas was identified as means of improving the capability of operators to make proactive adjustments to protect system reliability.[18] Consolidation of control areas with an associated investment in infrastructure will be necessary to obtain this benefit.

ii. *Operational Efficiencies* – Consolidation is expected to reduce the total requirement for regulating reserves and balancing, due to diversity among the loads and generation within the CCA. Furthermore, the establishment of a market for providing the Interconnected Operations Services (IOS)[19] necessary for operating the CCA is expected to reduce the cost of ancillary services.

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[17] "Narrative Description of RRG Platform Group Regional Proposal", December 24, 2003, pp. 11-12, http://gridwest.org/Doc/FinalNarrative_RegionalProposal_Dec242003.pdf.

[18] "A principal cause of the August 14 blackout was a lack of situational awareness, which was in turn the result of inadequate reliability tools and backup capabilities… Improved visibility of the status of the grid beyond an operator's own area of control would aid the operator in making adjustments in its operations to mitigate potential problems. The expanded view advocated above would also enable facilities to be more proactive in operations and contingency planning." Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations, U.S.-Canada Power System Outage Task Force, April 2004 pp. 159-160.

[19] IOS are generation services that, when combined with transmission services create ancillary services.

iii. *Transmission Utilization* – The CCA will be able to make full use of transmission capacity within its boundaries in real time to follow load, respond to contingencies, etc. without regard to facility ownership.

iv. *Voluntary Participation* – In keeping with the voluntary nature of control area consolidation, each existing control area operator will make its decision about whether or not to join the CCA based on it is own assessment of the benefits to be obtained.

4.2 Grid West as a Control Area Operator

a. Grid West will operate a Consolidated Control Area (CCA) for those who voluntarily choose to consolidate to obtain the benefits described in Section 4.1.

i. The IOS needed by Grid West for CCA operation are:
   - Capacity arranged day-ahead to obtain contingency reserve and regulating reserve needed for system operations.
   - Energy options (i.e., incremental and decremental offers) for balancing load, generation and interchange in real-time.

ii. Grid West will obtain IOS by operating markets since it is neither an owner of, nor in control of, any of the assets needed to provide these services. These markets will provide price transparency, which will benefit both buyers and sellers and assist in market monitoring efforts.
   - A Reserves Market will be used to obtain capacity related IOS.
   - A Balancing Service that will be a market using voluntarily offered real-time energy options for balancing system requirements.

iii. Grid West will encourage all market participants to make offers to provide these IOS to the CCA. Their participation will provide a wider range of options with lower costs and greater efficiency.

iv. Service costs for CCA operation will be separated from other Grid West activities that apply to the entire Grid West Managed Transmission System.

b. The white papers dealing with real-time operations within the CCA are:

i. ***Real-time Balancing Service White Paper*** – Describes the operation of the balancing service used to obtain balancing energy, while considering the nature and types of energy offers, selection of resources, the command and control process for dispatch of

resources selected to provide balancing, dispatch granularity, dispatch frequency, control signals process and routing, load following, AGC, etc.

ii. ***Emergency Operations White Paper*** – Describes the proposed emergency operations process covering topics that include contingency events, emergency levels, etc.

c. The white papers dealing with reserves are:

i. ***Reserve Market White Paper*** – Describes the proposed operation of the reserve auction, including reserve requirements, limited offer obligations of consolidating parties, inputs and outputs to reserve markets, locational nature of requirements and offers, etc.

ii. ***Deployment of Reserves White Paper*** – Describes the procedures to be used to deploy the reserves in real time that were obtained through the Reserve Market.

iii. ***Reserve Sharing White Paper*** – Describes the current Northwest Power Pool reserve sharing agreement and the role of Grid West as a control area operator in future reserve sharing.

5.0 The Rest of the Story

5.1 Administrative Functions

a. In order for Grid West to provide the services described above, a number of administrative functions must be put in place. While these functions may appear to be pedestrian in their nature, they are critical to the success of Grid West. Failure to manage credit, to render bills accurately, to collect fees expeditiously and to resolve disputes quickly can debilitate Grid West's ability to function.

b. The white papers dealing with administrative functions are:

i. ***Meter Data Management*** – Describes the proposed meter data management process, including SCADA vs. revenue quality metering, load accounting, calibration, etc.

ii. ***Settlement and Billing*** – Describes the proposed process for settlement and billing for Grid West services and markets, including settlements frequency, types of settlements, types of charges, roles and responsibilities for tariff billings, credit management, etc.

iii. ***Invoicing & Payment Processing*** – Describes the proposed process for invoicing and payments, including invoice frequency, late payments, counter-parties, short-pay scenarios, etc.

iv. ***Dispute Processing and Alternative Resolution*** – Describes the use of the Grid West ADR process for resolving settlement and billing disputes, including the resolution timelines, resettlement thresholds, etc.

5.2 Reference Papers

a. While developing the white papers described above, a number of general topics were covered by TSLG that apply to more than one of the white papers. The reference papers described below provide information which is supplemental to the white papers.

b. The reference papers are:

i. ***Transmission Modeling Reference Paper*** – Describes the methodologies to be used by Grid West for study and analysis of Grid West Managed Transmission System for regional planning, capacity expansion, reconfiguration service, scheduling, dispatch and real-time monitoring.

ii. ***Auction Pricing Reference Paper*** – Describes the pros and cons of two auction pricing methods – market clearing price and as-

offered-price – and the rationale for selection of the market clearing price for use in Grid West markets.

iii. ***Congestion Management Reference Paper*** – Describes the Grid West approach to congestion management, which differs from that used in other RTOs. By using a flow-based method for issuance of new physical transmission rights, Grid West addresses congestion before it occurs through planning, capacity expansion and reconfiguration. Other tools include scheduling, schedule adjustment and curtailments, and the operation of the reserves market, the real-time balancing services and real-time operations.

iv. ***Registration and Commercial Model Reference Paper*** – Describes the proposed process for registering and modeling the assets of market participants including defining locations, load accounting, scheduling coordinators (or agents) and describes the use of load zones and trading hubs in scheduling and in acquisition of IWRs.

v. ***Seams Coordination White Paper*** – Describes the seams issues that will impact Grid West operations, including timeline coordination, intertie scheduling curtailments, loop flow management, etc.

Appendix A
List of TSLG Papers for Layer 2 Design

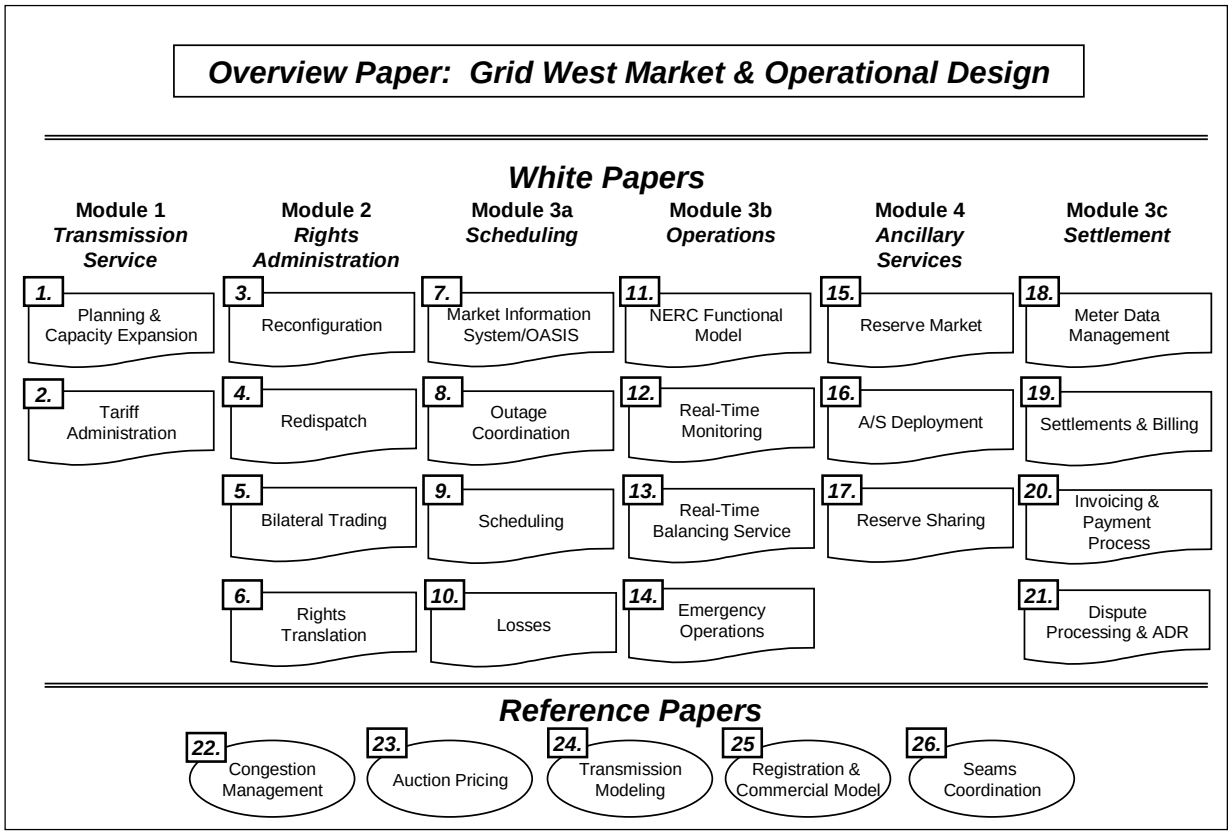

Figure A.
Chart of white papers and reference papers that describe the conceptual framework for market and operational design for Grid West Basic Features (paper numbers keyed to list below).

The White Papers:

1. ***Regional Planning & Capacity Expansion White Paper*** – Describes the regional planning process to be facilitated by Grid West and the mechanisms for capacity expansion. Grid West will develop an open transmission planning process that examines expansion needs from a single system perspective, tests for transmission adequacy and considers non-transmission alternatives to meeting system needs. The capacity expansion service will deal with requests for long-term service requests (greater than one year). If

capacity is not available to meet the request, the capacity expansion service enable market driven transmission projects to meet requests. It also provides for expansion backstops for maintaining existing transfer capability and meeting transmission adequacy standards.

2. ***Tariff Administration White Paper*** – Describes the provision of transmission service through the Grid West Tariff and the related Transmission Owner Tariffs. It describes the roles of Grid West, the Transmission Owners and the transmission customers, and it provides discussion of issues related to pre-existing contracts, such as load growth, contract termination or roll-over, etc.

3. ***Reconfiguration White Paper*** – Describes the implementation of the reconfiguration service: mechanisms for determining pre-existing obligations, auction rules and pricing of IWRs sold and purchased.

    a. A series of auctions addresses different time periods:
        - Annual for monthly on-peak and off-peak IWRs.
        - Monthly for monthly on-peak and off-peak IWRs for the balance of the annual period of the auction cycles.
        - Intra-monthly for daily on-peak and off-peak IWRs for the balance of a month.
        - Day-Ahead for hourly IWRs for the next day.

    b. The Day-Ahead Reconfiguration Service (DA-RCS) will have an enhanced feature to enable trading of scheduling flexibility.

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5. ***Bilateral Trading White Paper*** – Evaluates the effects of Grid West proposed services sand functions on current bilateral trading practices within the Grid West footprint.

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14. ***Emergency Operations White Paper*** – Describes the proposed emergency operations process covering topics that include contingency events, emergency levels, etc.

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