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1.2 Generation Management System (GMS)

The GMS provides generation control functions for generators in the PJM Western Region. PJM Members in the Western Region supply telemeter data to the GMS and may receive data and control signals from the GMS. Western Region Members also supply transmission system data to the PJM EMS in the Eastern Region office to support the state estimator and security analysis functions.

1.3 SCADA-Supervisory Control and Data Acquisition

The PJM SCADA system allows PJM to communicate directly with individual generators or smaller Control Centers. The system uses computer, database and digital communications technology to implement the use of common standards in an open environment, independent of any particular vendor or proprietary protocols system.

The PJM SCADA system is designed to allow transfer of both generation and revenue data via one system. A data concentrator (e.g. Remote Terminal Unit, Generator Control System, etc.) is located at the Member's site, and, after collecting data from the industrial metering H T X L S P H Q W F R P P X Q L F D W H V Z L W K 3 - 0 ¶ V 6 & $ ' $ V \ V W H P X V L Q J (Distributed Network Protocol) or ICCP (Inter-Control Center Protocol).

The system allows real-time bi-directional transfer of analog and digital data into the system database for storage and real-time transfer to the EMS system.

Information can also be sent from the EMS system through the SCADA system via ICCP and/or DNP 3.0 to the customer, allowing for Automatic Generation Control (AGC), set point, device control, and other functions.

> NOTE: Although DNP 3.0, Level 2 is a minimum functional requirement, the additional installation of object 23.5 is strongly recommended for all users. Without this object installed, collection of revenue data becomes difficult.

1.4 Data Historian System

The Data Historian System serves as a data archive for operational data in near-real-time. It provides visualization tools for presenting data to operators and provides a permanent archive of data for post-event study and analysis. Telemeter data is archived from EMS and other operational data is imported from other sources, including Market Systems

1.5 Enhanced Energy Schedu ler (EES)

The Enhanced Energy Scheduler (EES) records customer requests for interchange transactions, the bulk power scheduled between PJM and neighboring regions. PJM personnel use EES to process and schedule these transactions. The EES validates PJM ramp, use of transmission reservation rights, and other PJM scheduling business rules as described in the PJM Manual for Scheduling Operations.

1.6 Two Settlement System (eMKT)

The Two-Settlement system consists of two markets, a day-ahead market and a real-time balancing market. The Day-ahead Market is a forward market in which hourly clearing prices are calculated for each hour of the next operating day based on generation offers, demand bids Increment offers, Decrement bids and bilateral transaction schedules submitted into the

Day-ahead Market. The balancing market is the real-time energy market in which the clearing prices are calculated every five minutes based on the actual system operations security-constrained economic dispatch. Separate accounting settlements are performed for each market, the day-ahead market settlement is based on scheduled hourly quantities and on day-ahead hourly prices, the balancing settlement is based on actual hourly (integrated) quantity deviations from day-ahead scheduled quantities and on real-time prices integrated over the hour. The day-ahead price calculations and the balancing (real-time) price calculations are based on the concept of Locational Marginal Pricing.

The Day-ahead Market enables participants to purchase and sell energy at binding day-ahead prices. It also allows transmission customers to schedule bilateral transactions at binding day-ahead congestion charges based on the differences in LMPs between the transaction source and sink. Load Serving Entities (LSEs) may submit hourly demand schedules, including any price sensitive demand, for the amount of demand that they wish to lock-in at day-ahead prices. Any generator that is a PJM designated capacity resource must submit a bid schedule into the day-ahead market even if it is self-scheduled or unavailable due to outage. Other generators have the option to bid into the day-ahead market. Transmission customers may submit fixed, dispatchable or 'up to' congestion bid bilateral transaction schedules into the day-ahead market and may specify whether they are willing to pay congestion charges or wish to be curtailed if congestion occurs in the Real-time Market. All spot purchases and sales in the day-ahead market are settled at the day-ahead prices. After the daily quote period closes, PJM will calculate the day-ahead schedule based on the bids, offers and schedules submitted, using the scheduling programs described in section 2 of this manual, based on least-cost, security constrained unit commitment and dispatch for each hour of the next operating day. The day-ahead scheduling process will incorporate PJM reliability requirements and reserve obligations into the analysis. The resulting Day-ahead hourly schedules and Day-ahead LMPs represent binding financial commitments to the Market Participants. Financial Transmission Rights (FTRs) are accounted for at the Day-ahead LMP values (see the PJM Manual for Financial Transmission Rights (M -06)).

The Real-time Energy Market is based on actual real-time operations. Generators that are designated PJM capacity resources that are available but not selected in the day-ahead scheduling may alter their bids for use in the Real-time Energy Market during the Generation Rebidding Period from 4:00 PM to 6:00 PM (otherwise the original bids remain in effect for the balancing market). Real-time LMPs are calculated based on actual system operating conditions as described by the PJM state estimator. LSEs will pay Real-time LMPs for any demand that exceeds their day-ahead scheduled quantities (and will receive revenue for demand deviations below their scheduled quantities). Generators are paid Real-time LMPs for any generation that exceeds their day-ahead scheduled quantities (and will pay for generation deviations below their scheduled quantities). Transmission customers pay congestion charges based on Real-time LMPs for bilateral transaction quantity deviations from day-ahead schedules. All spot purchases and sales in the balancing market are settled at the Real-time LMPs.

1.7 Dispatch Management Tool (DMT)

The Dispatch Management Tool (DMT) is a software tool that is designed to enable the PJM dispatchers to manage generating unit and transmission constraint information and administer the Real-Time Regulation Market. Since many of the current dispatcher logging activities is position independent, the DMT allows each dispatcher position to view the same

generation and transmission constraint information simultaneously. This real-time sharing of logging information provides the PJM dispatchers with an efficient communication vehicle to help them perform their job functions more effectively.

The DMT is used by the PJM dispatchers to:

- View and record real-time unit generation information
- View and record unit generation scheduling information
- Review the chronological log of generation events
- Analyze system resources
- Record and calculate regulation assignment information
- Record and calculate Synchronized Reserve assignment information
- View and record real-time transmission constraint information

1.8 Open Access Same -time Information System (OASIS)

The PJM OASIS system maintains transmission and ancillary services information for PJM Members. OASIS operates on a collection of PJM and PJM Member computers linked by private and public networks. For additional information, see the PJM Manual for PJM OASIS Operation (M -04).

1.9 Other eSuite Tools (eMTR, eSchedules, eLRS, eFTR)

The other eSuite tools are all Web-based tools that PJM members use to facilitate the exchange of information with PJM and support various PJM market activities.

a. eLRS application will be used to allow Curtailment Service Provides to retrieve emergency event specific information for their registered demand resources.

1.10 Planning Systems

PJM operates several planning systems which are used to run studies for reliability and capacity planning and for transmission planning. Reliability and capacity planning includes the Generating Availability Data System (GADS) database and eRPM are computer programs and databases used for entering, storing, and reporting generating unit data concerning outages, unit performance, and fuel performance. In addition, PJM Members provide information to the PJM Central Planning Database, a database containing planning information relating to generation production costs, load flow analyses, short circuit and system dynamics studies, and LSE load data. Additional details about these planning functions may be found in the PJM Manual for Load Forecasting and Analysis (M -19), and the PJM Manual for PJM Resource Adequacy Analysis(M -20).

PJM also performs transmission planning studies. For example, PJM Members staffs provide transmission planning capacity and load data to the PJM Transmission Planning Tool which generates performance adequacy and reliability assessments (see the PJM Manual for T ransmission Service Request (M -02)).