CALIFORNIA ISO

MARKET PARTICIPATING LOAD TECHNICAL STANDARD FOR SUMMER 2000

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APPENDIX 1 - ISO SECURITY POLICY

1. Introduction

1.1 Background & Introduction

This document provides the standards required for Loads to participate in the ISO Non-Spinning Reserve and Replacement Reserve Ancillary Services (A/S) markets, and the Supplemental Energy (SE) market for the trial period of June 15, 2000 through October 15, 2000, all pursuant to the market notice inviting requests to participate in the ISO's "Summer 2000 Market Participating Load Trial Program" (Request for Participation) issued in conjunction herewith.

Load responsiveness can play a critical role in the California ISO real-time Imbalance Energy and Ancillary Services markets. This role was acknowledged by the ISO Governing Board resolution on price caps adopted in August 1999, which conditioned the level of price caps in summer 2000 on the availability of practicable Demand side options. It is important to emphasize, however, that Load responsiveness can play several different roles in the electricity markets.

Participation by Loads in ISO markets was recognized and approved by the ISO Governing Board as one ingredient of the A/S Market Redesign, which included the Participating Load Agreement (PLA) filed as part of ISO Tariff Amendment No. 17 and subsequently accepted by the Federal Energy Regulatory Commission (FERC). The objective of the Participating Load Agreement is to bind Loads participating in the ISO's SE and A/S markets to the ISO Tariff as the Participating Generator Agreement binds Generators.

The ISO also filed tariff changes with the FERC in Amendment No. 17 to specify the conditions under which Loads subject to existing retail interruptible service arrangements may participate in the ISO's SE and A/S markets. Those conditions include: 1) authorization by the California Public Utilities Commission (CPUC) or other Local Regulatory Authority, and 2) mitigation of any incentives under the retail tariff to be unavailable or incapable when the ISO is relying on the capacity.

A variety of requirements apply to Loads that participate in the ISO's markets, including requirements related to metering, scheduling, dispatching, and ISO EMS Telemetry, as well as contractual, certification and testing requirements. Several Loads (primarily large pumps) meet all current ISO requirements today and are already participating in the ISO's markets.

Further expansion of Load participation in the A/S markets depends on the ability of Loads to aggregate and still meet ISO requirements. For

Aggregated Loads, particular issues arise with regard to communication requirements supporting ISO EMS Telemetry. The ISO EMS must obtain near real-time values, for Participating Loads providing A/S, in order for the ISO to continuously monitor the status, location and amount of reserves available to meet reliability criteria set by the Western Systems Coordinating Council (WSCC) and the North American Electric Reliability Council (NERC). To address visibility and other issues related to Load participation in the ISO's markets, a Participating Load Working Group (PLWG) was established at the ISO. This document sets forth the approach and minimum requirements for Load participation for the Summer 2000 Market Participating Load Trial Program and is the product of the PLWG, the draft Participating Load Principles released by the ISO on December 3, 1999, and stakeholder comments to those draft principles.

Due to the nature of the requirements for Regulation and Spinning Reserve, Load participation is presently limited to the ISO's markets for Supplemental Energy, Non-Spinning Reserve and Replacement Reserve.

1.2 Definitions

Unless the context otherwise indicates, any word or expression defined in the Master Definitions Supplement, Appendix A to the ISO Tariff, and capitalized herein has the same meaning where used in these principles. In addition, the following words and expressions used in these principles with initial capitalization have the meanings set forth below:

1. Aggreged Loads: Multiple Loads represented as a Participating Load that meet ISO standards specified in this technical document, and that are approved by the ISO to schedule and bid Supplemental Energy and Ancillary Services as a single resource using some combination of individual Loads.

2. Aggregating Load Meter Data Server (ALMDS): a Meter Data acquisition and processing system which is capable of passing Operational Data to the ISO SCADA IOC for means of telemetry for one or more Aggregated Loads, within the parameters set forth in the ISO's standards for Participating Loads.

3. Compatible Meter Data Server (CMDS): a Meter Data acquisition system which is capable of passing Operational Data to either the ISO SCADA IOC or the ALMDS, within the parameters set forth in the ISO's standards for Participating Loads. The term compatible meter data server (CMDS) is generic for a device or specific functionality of a revenue meter that establishes an interface between a revenue meter and a communications media. Fundamental to the functionality of the CMDS is that it must reliably present accurate measurement data to the host with which it communicates.

4. DNP 3.0: Distributed Network Protocol, Version 3.0, a data processing application that runs on master and remote devices and is used for data exchange. (see www.dnp.org for more information on this protocol)

5. EMS Telemetry: A process for measuring a quantity (amps, volts, MW, etc.) and transmitting the result via a communication system (radio, microwave, etc.) to a remote location for indication or recording.

6. Energy Communications Network (ECN): The overall ISO digital network architecture comprised of multiple subnet, wide area, and local network segments.

7. ISO Supervisory Control and Data Acquisition Intelligent Open Controller (SCADA IOC): An Internet or ECN enabled host that will receive Operational Data from the various Load data reporting devices. The ISO SCADA IOC will be capable of retrieving Operational Data in various SCADA protocols and will be secured using X.509v3 Digital Certificates and Secure Socket Layer (SSL) for authentication and encryption.

8. KYZ output: A three-wire pulse output from a metering device to drive external control or recording equipment. Each pulse or transition represents a predetermined increment of power or other quantity.

9. "Load Only" ISO Certified Meter: One of a class of revenue metering devices intended for use on Loads that is capable of providing an interface for Operational Data.

10. ModBus: A data processing application that runs on master and remote devices and is used for data exchange. Modicon ModBus Protocol was developed originally for use with Modicon Programmable Logic Controllers.

11. Operational Data: Data (such as, but not limited to kV, MW, MVAr, MWh, MVArh, status) collected at defined periods by ISO EMS Telemetry that is immediately available for ISO system operator's use in determining system conditions.

12. Ramp Rate: The measured rate, expressed in MW per minute, of a resource's ability to adjust its output or consumption.

13. Report by Exception: A data collection method that involves only retrieving data that has changed by predetermined parameters since the last scan period when the data was actually retrieved and is used to reduce the amount of data that must be retrieved during each scan.

14. Scan Rate: Predefined rate for receiving or sending data.

15. Secure Socket Layer (SSL): A security protocol that uses symmetrical and public key cryptography to secure communication over the Internet.

16. Transmission Control Protocol / Internet Protocol (TCP / IP): IP is used at the network layer of the Objective Systems Integrators (OSI) stack for routing packets. TCP is used at the transport layer of the OSI stack and works with IP for packet routing.

17. X.509v3: Digital certificate public key format defined by the International Telecommunications Unit (ITU) X.509 Standard.

1.3 References

ISO Tariff
ISO Participating Load Agreement
ISO Dispatch Protocol
ISO Metering Protocol
ISO Metering Specification
ISO Scheduling Protocol
ISO Scheduling and Bids Protocol
ISO Settlements and Billing Protocol

2. Operational Requirements

2.1 General Requirements

- Participating Loads must comply with all applicable requirements in the ISO Tariff. Participating Loads that provide Non-Spinning Reserve, Replacement Reserve, and Supplemental Energy must provide ISO EMS Telemetry.

2.2 Scan Rates

Non-Spinning Reserve

- ISO EMS Telemetry for Non-Spinning Reserve must be available on a four-second Scan Rate from the ALMDS to the ISO EMS. Each meter behind the ALMDS must be polled no less frequently than once per minute. The aggregated Demand shall be updated after each individual meter is polled. The four-second ISO SCADA IOC scans will be performed because the aggregated value will be changing as each meter is read. This four-second timeframe is necessary to ensure Operating Reserve is managed in real time and to accommodate numerous operator decisions which sometimes take place within the span of seconds/minutes.

- An effective way to meet such requirement is by having a revenue meter capable of providing Operational Data in four-second intervals. The ISO EMS Telemetry requirement can also be met using a device other than the revenue meter, in which case the revenue meter would not have to be capable of providing four-second interval data. All Load resources must have the capability to provide required data simultaneously to Folsom and Alhambra.

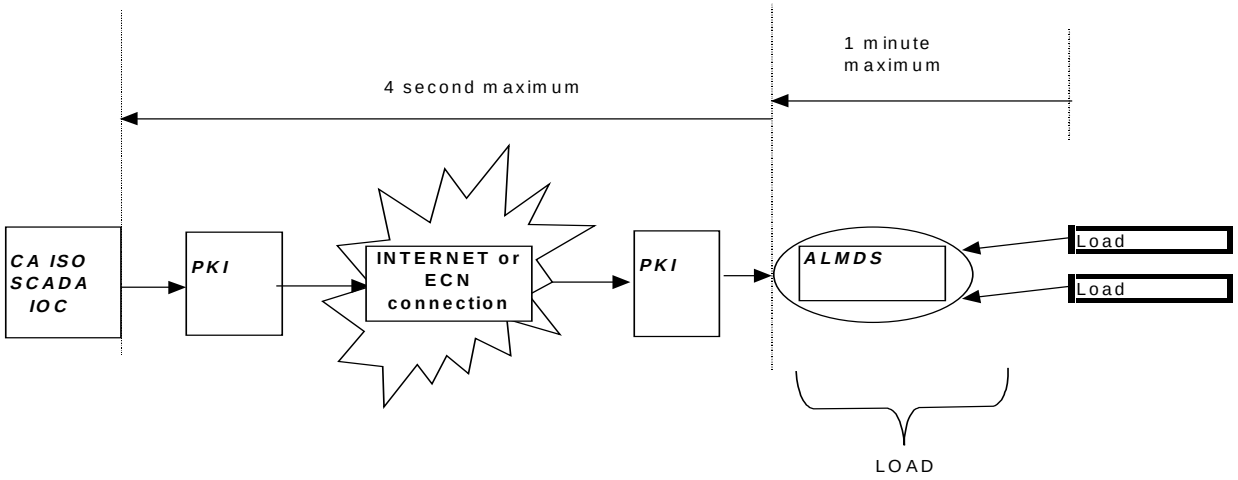
Replacement Reserve and Supplemental Energy

- ISO EMS Telemetry for Replacement Reserve and Supplemental Energy must be available on a Scan Rate no less frequent than one minute from the ALMDS to the ISO EMS. For Aggregated Loads, underlying Meter Data should be submitted to the ALMDS within 5 minutes. Each meter behind the ALMDS must be read no less frequently than once per five-minute interval and the aggregated Demand shall be updated after each individual meter scan. The ALMDS shall provide the aggregated Demand value to the ISO EMS at no greater than one minute.

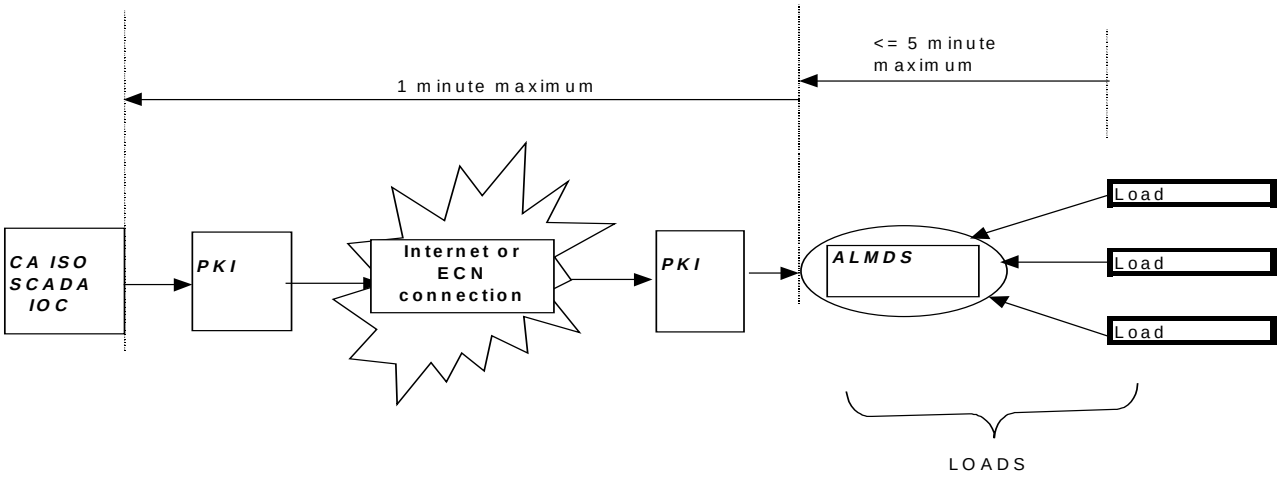
- An effective way to meet such ISO EMS Telemetry requirement is by having a revenue meter capable of providing KYZ output. The

telemetry requirement can also be met using a device other than the revenue meter, in which case the revenue meter would not have to be capable of providing KYZ output. All Load resources must have the capability to provide required data simultaneously to Folsom and Alhambra.

Timing for Loads supplying Non-Spinning Reserve



Replacement Reserves and Supplemental Energy Timing



2.3 Visibility

- At a minimum, Participating Loads scheduling Non-Spinning Reserve, Replacement Reserve, and Supplemental Energy must provide active ISO EMS Telemetry on a continuous basis during the trial period.

- Bids would be deemed invalid should loss of telemetry occur during the time a Load is called upon to participate in the Market.

- Loss of telemetry for Participating Loads not bid in the Markets must be restored to visibility as soon as possible, however, in the event telemetry is not restored within two (2) business days, the ISO may exercise its reasonable discretion with regard to whether such Participating Load will be permitted to continue to bid into any of the ISO's markets for the remainder of the trial period. The Loads would not be allowed to bid into the Market during the time the telemetry is out of service.

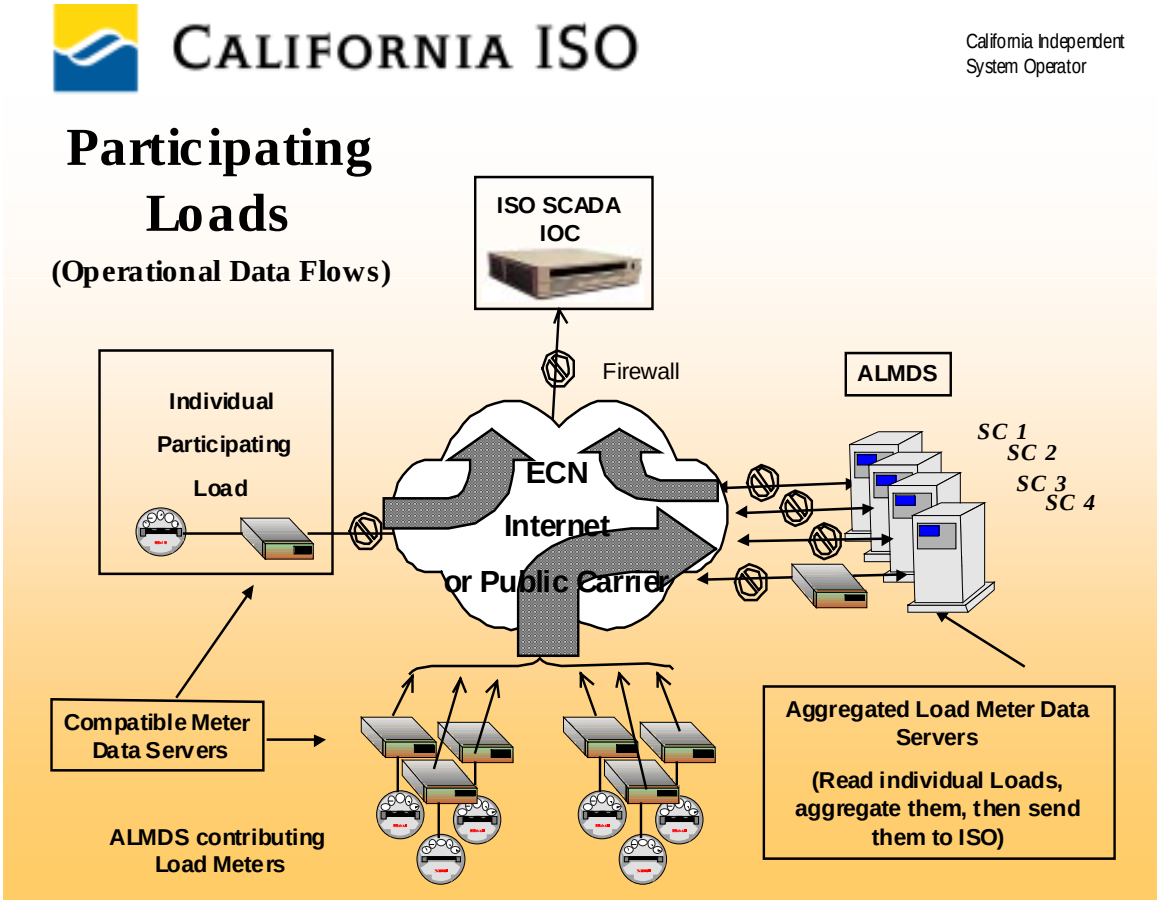
- Participating Load Operational Data will be directly communicated to the ISO SCADA IOC via the public Internet or the ISO Energy Communications Network (ECN) connection.

- The ISO will provide the necessary number of ISO SCADA IOCs to serve as portals to receive Operational Data over the Internet or the ISO ECN from individual Participating Loads and from ALMDS.

2.4 Operating Characteristics to Provide A/S

- For Non-Spinning Reserve, Replacement Reserve, and Supplemental Energy, Participating Loads are required to provide MW.
- It is recommended that Participating Loads provide MVAR, kV (individual Loads only) and status/connectivity if they are available.

FIGURE 1.



3. ISO EMS Telemetry Requirements

3.1 Overview

- Figure 1 provides a high level overview of the Operational Data flows related to Participating Loads, either from an individual Load or from an Aggregated Load and an ALMDS.

- As illustrated on the left-hand side of Figure 1, the individual Load meter is interfaced to a Compatible Meter Data Server (CMDS) that is extracting Operational Data and presenting it directly to the ISO SCADA IOC.

- For Aggregated Loads, the data can be presented from the Load to the ALMDS through any direct (i.e., not dial-up) communication path available to the Load aggregator. After the data from each of the contributing Loads is presented to the ALMDS, the data is aggregated, stored and transmitted to the ISO SCADA IOC. CMDS may be used for the ALMDS interface to the ISO SCADA IOC, if the ALMDS does not feature the required application support. The ISO EMS Telemetry requirements for the Aggregated Load must be met, in the same manner as for individual Loads, through the entire data transfer process, from the Load to the ALMDS to the ISO SCADA IOC.

- There are a variety of components of the telemetry system, including the CMDS, the ALMDS, the Internet or the ISO ECN, and the ISO SCADA IOC. While the ISO will provide and maintain the ISO SCADA IOC, the Participating Loads and/or their SCs will be fully responsible for all other telemetering equipment, communications circuits, systems, and hardware required to provide Operational Data to the ISO SCADA IOC.

- In terms of performance, a SC will be responsible for assuring 1) the functionality of its entire telemetering system and 2) the integrity and accuracy of data telemetered to the ISO. To enforce this requirement, SCs must comply with ISO auditing requirements, and the ISO will have auditing rights similar to those applicable to SC metering systems.

3.2 Communication

- The ISO will provide the ISO SCADA IOCs as the portals for providing Operational Data from Participating Loads to the ISO EMS. Telemetered data will be presented to the ISO SCADA IOC through the Internet or the ISO ECN from either individual Loads using a CMDS or Aggregated Loads using an ALMDS. The data from either of these sources should appear identical to the ISO. To permit flexibility for the Market Participants, the ISO SCADA IOC will be able to accept two different SCADA protocols, DNP 3.0 and ModBus.

- The system will make use of public communication infrastructures such as the Internet.

- The ISO ECN will be made available to support Market Participant's systems.

- Market Participants' systems must comply with ISO Security Standards attached as Appendix 1 and set forth on the ISO Home Page at www.caiso.com.

- Market Participants' are responsible for remote site connectivity to the Internet via their ISP using T-1, 56k BRI, ISDN, Modem, HDSL, DSL, ADSL, Frame Relay (DSU/CSU) or other standard connections provided by Internet Service Providers.

- Multiple serial interfaces via RS232C for DNP 3.0 and/or ModBus connections to servers and/or standalone devices such as individual meters are supported both at remote locations and at the ISO Control Centers. Interfaces provide for connection of combinations of devices, such as an RTU on one port, a server on another port, and individual meters or Programmable Logic Controllers. Each port can be a different supported protocol.

4. Metering Infrastructure

4.1 Overview

- Participating Loads must ensure that Meter Data is made available to the ISO revenue Meter Data Acquisition System (MDAS) in accordance with the ISO Tariff and the ISO Metering Protocol. The specific requirements for ISO Metered Entities and details regarding the "Load Only" ISO Certified Meter can be found in the ISO Metering section on the ISO Home Page at www.caiso.com.

- For all Participating Loads, Meter Data must be recorded and submitted at 5-minute intervals for purposes of financial settlements. All Loads participating in ISO markets, including A/S and SE markets must have revenue quality metering equipment that records data at intervals no longer than five-minutes. Settlement for A/S and SE provided by Participating Loads will be based on SQMD prepared by the ISO in the case of ISO Metered Entities and by the SC in the case of SC Metered Entities. Operational Data obtained through ISO EMS Telemetry will be used to validate SQMD, but will not be used for financial settlement purposes.

- ISO Metered Participating Loads - All individual Participating Loads are ISO Metered Entities and therefore are required to obtain, install and have inspected ISO certified metering as outlined in the ISO Metering Protocol. Additionally, the ISO has issued a "Load Only" meter specification to the market to allow for the possibility of a lower cost meter that is capable of being ISO Certified. "Load Only" ISO Certified Meters are listed on the ISO Home Page. Revenue Meter Data will be recorded at 5-minute intervals. The ISO may allow a temporary exemption for existing, revenue quality interval meters (error less than 0.3%) that can generate all required Operational Data.

- Aggregated Participating Loads - Each individual contributing Load must have a certified interval meter based on the relevant Local Regulatory Authority requirements. The revenue Meter Data must be provided to the ISO as SQMD at 5-minute intervals. If the ALMDS is polling interval values to be used for contributing to aggregated ISO EMS Telemetry values, the meter must be programmed to record intervals no greater than 1 minute.

4.2 Metering Communication

- Individual Participating Loads - ISO Metered Entities will, in accordance with the ISO Tariff and ISO Metering Protocol, use the ECN to interface directly with ISO MDAS. Meter Data will be collected regularly by ISO MDAS as well as to collect Meter Data on demand.

- Aggregated Participating Loads - For Settlement Quality Meter Data the SC must submit the aggregated values to MDAS when required by the ISO Payment Calendar (presently T+45 calendar days). The SC shall interface the Aggregated Loads (ALMDS) with the ISO MDAS via the ECN.

4.3 Access to Meter Data - Individual Participating Loads

- The ISO, in accordance with the ISO Tariff and ISO Metering Protocol, will have complete access to the Meter Data of ISO Metered Entities recorded by the ISO certified meter.

- Individual Participating Loads must comply with the security requirements as presented in ISO Metering Protocol Section 9.

- The ISO is responsible for performing the validation, editing, and estimation on the raw meter data acquired directly by the ISO from the ISO certified meter. The ISO will follow the requirement set forth in Section 10 of the ISO Metering Protocol.

4.4 Access to Meter Data - Aggregated Participating Loads

- The SC is responsible for submitting SQMD for the Aggregated Loads. The SC shall provide, in the format prescribed by Schedule 1 of the PLA, the required information with respect to the meters for all SC Metered Entities it represents in the aggregated ALMDS.

- The SC, upon request, must provide the ISO with the meter reads for the individual SC Metered Entities represented and any substitution routines used in the aggregated Meter Data produced by the ALMDS.

- The SC shall ensure that the ISO will have access to the entire metering facilities of the individual SC Metered Entity as well as

the ALMDS facilities that it represents in order to inspect, test, or otherwise audit those metering facilities.

- The SC shall apply the security and validation procedures prescribed by the California Public Utilities Commission (CPUC) or relevant Local Regulatory Authority to the meter data of the SC Metered Entities that it represents. If the relevant Local Regulatory Authority has not prescribed any such procedures, the SC shall apply the procedures set forth in the ISO Metering Protocol.

4.4.1 SC Metered Entity

SC Metered Entities participating as Aggregated Loads may use any revenue quality interval meter that meets the standards of and is approved by the CPUC or a Local Regulatory Authority for direct access use, and that meets all other applicable ISO requirements:

- Meters must provide Settlement Quality Meter Data (SQMD) on a 5-minute interval basis.
- SCs will be responsible for providing the ISO with SQMD for all Loads that they represent at the same granularity as scheduled.
- Individual contributor Load data that comprises aggregated SQMD must be readily available to the ISO for audit and review.
- Aggregated Loads will be treated like any other SC Metered Entity for purposes of financial settlements.
- SCs must ensure that validation, editing, and estimation are completed, and SQMD is provided to the ISO within the required schedule. SC's must also use the established mechanisms for data exchange, and must comply with all other applicable requirements in the ISO Tariff and ISO Metering Protocol.

4.5 Compatible Meter Data Server (CMDS)

A Participating Load may use a CMDS to either communicate Operational Data from an individual Load to the ISO SCADA IOC or from an Aggregated Load to the ALMDS for aggregation with other Participating Loads. The ALMDS may be used to communicate the Operational Data to the ISO SCADA IOC.

4.5.1 CMDS Requirements

- Auditable procedures must be in place and periodically tested to assure the proper functioning of the CMDS. The integrity of the Operational Data needs to be maintained from the meter until it is processed and sent by the CMDS.

- The CMDS must provide raw, unedited Operational Data to either the ISO SCADA IOC or the ALMDS. No Validation, Editing and Estimation (VEE) may occur in the CMDS, except that with Aggregated Loads substitution may occur, in accordance with substitution standards specified by the ISO and posted on the ISO Home Page.

- The CMDS must have access control measures in place. Access controls on the server should be implemented to prevent unauthorized or inadvertent access to the CMDS. A record will be available that documents who has access to the CMDS and who can authorize access.

- If the CMDS becomes unavailable, the responsible SC must be notified immediately and take the appropriate action.

- The CMDS must be available for audit by the ISO

- Configuration control must be maintained for the CMDS. The ISO requires documentation including, but is not limited to, the following: equipment manufacturer, model, and other vendor information, system software manuals, firmware or software version, revisions and system design documents and design changes and modifications.

4.6 Aggregated Load Meter Data Server (ALMDS)

- An ALMDS will collect and combine Operational Data for Aggregated Loads or individual Loads. Aggregated data will be transmitted to the ISO SCADA IOC via the Internet or ECN.

4.6.1 ALMDS Requirements

- The ALMDS must provide raw, unedited Operational Data to the ISO SCADA IOC. No validation, editing and estimation (VEE) may occur in the ALMDS. Load data can be substituted in accordance with the ISO substitution standards.

- The ALMDS must have access control measures in place. Access controls on the server should be implemented to prevent unauthorized or inadvertent access to the ALMDS. A record should be available to document who has access to the ALMDS and who can authorize access

- If the ALMDS becomes unavailable, the responsible SC must be automatically provided the status of communications and data quality failures. The ISO must be automatically provided status of communications and data quality failures by telemetry.

- There must be a documented control process for acquiring the Operational Data from the CMDS. Audible procedures must be in place and periodically tested to assure the proper functioning of the controls. The integrity of the Operational Data needs to be maintained from the CMDS until it is processed and sent by the ALMDS

- The ALMDS must provide to the ISO SCADA IOC aggregated Operational Data for Participating Loads. This data must be available continuously to the ISO EMS for the calendar day in which they submitted a bid in the market, whether accepted or not.

- The ALMDS must record all error events associated with data acquisition and aggregation and make those records available to ISO for review. The format of the log should be provided in the implementation.

- The ALMDS shall retain all individual contributor data that contributes to the aggregated values for a period of no less than 45 days and that information must be available to be provided to ISO on demand.

- The ALMDS must be available for audit by the ISO.

5. Security and Meter Data Validation

5.1 Overview

Security requirements will apply to the transfer of data from an ALMDS to the ISO SCADA IOC, or in the case of individual Loads, to the transfer of data from a CMDS to the ISO SCADA IOC. Security requires support for X.509v3 Digital Certificates and SSL for authentication and encryption between the ISO SCADA IOC and the CMDS or ALMDS. The ISO maintains its own certificate authority and will provide digital certificates. The ISO recommends that Participating Loads provide firewalls between their web providers and application servers. See Security Protocol attached as Appendix 1.

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6. Services and Scheduling

6.1 Services

Load Resources (certified by the ISO) can bid the following services:

- Non-Spinning Reserve
- Replacement Reserves
- Supplemental Energy

6.1.1 Non-Spinning Reserve

All Non-Spinning Reserve bids submitted to the ISO must contain the following information for each Load resource:

- Scheduling Coordinator name/identification code;
- Load resource identification (name and location);
- Dates for which bids apply;
- Time it takes to interrupt Load following the ISO's notification (min);
- Maximum allowable curtailment duration (hr);
- The Demand available for interruption within 10 minutes;
- Bid price

- The Load resource must be able to reduce Demand as quickly as possible to its bid value (MW) reaching the indicated value in ten (10) minutes or less after issuance of the instruction.

- The Load resource must be ***capable*** of remaining off-line for at least 2 hours.

- The Load resource must indicate the maximum amount of time (minutes) between notification by the ISO and full amount of Load reduction bid into the market.

- The Load resource must indicate if the Load reduction would be done as a fixed amount or if the committed Load would be reduced incrementally. Load Resources that are reduced incrementally must also be able to fully curtail or drop within ten minutes.

- The Load resource participating in Non-Spinning Reserve must also indicate how the Load reduction will be accomplished (i.e. manually, automatically via RAS, hybrid schemes etc.).

Resources proposing to automatically curtail or drop Load must have an adequate back-up plan to curtail or drop Load in the event the automatic scheme is out of service. A description of the process involved in restoring all dropped Load must also be discussed.

6.1.2 Replacement Reserves

All Replacement Reserve bids submitted to the ISO must contain the following information for each Load resource:

- Scheduling Coordinator name/identification code;
- Load resource identification (name and location);
- Dates for which bids apply;
- Time it takes to interrupt Load following ISO's notification (min);
- Maximum allowable curtailment duration (hr);
- The Demand available for interruption within 60 minutes;
- Bid price

- The Load resource must be able to reduce Demand as quickly as possible to its bid value (MW) reaching the indicated value in 60 (sixty) minutes or less after issuance of the instruction.

- The Load resource must be ***capable*** of remaining off-line for at least 2 hours.

- The Load resource participating in Replacement Reserve must also indicate how the Load reduction will be accomplished (i.e. manually, automatically via RAS, Hybrid schemes etc.).

- Load resources proposing to automatically curtail or drop Load must have an adequate back-up plan to curtail or drop Load in the event the automatic scheme is out of service. A description of the process involved in restoring all dropped Load must also be discussed.

6.1.3 Supplemental Energy

All Supplemental Energy bids submitted to the ISO must contain the following information for each Load resource:

- Scheduling Coordinator name/identification code;
- Load resource identification (name and location);
- Dates for which bids apply;
- Time it takes to interrupt Load following ISO's notification (min);
- Maximum allowable curtailment duration (hr);
- The Demand available for interruption within 60 minutes;
- Bid price

- The Load resource must be able to reduce Demand as quickly as possible to its bid value (MW) reaching the indicated value in 60 (sixty) minutes or less after issuance of the instruction.

- The Load resource participating in the Supplemental Energy market must also indicate how the Load reduction will be accomplished (i.e. manually, automatically via RAS, hybrid schemes etc.).

- Resources proposing to automatically curtail or drop Load must have an adequate back-up plan to curtail or drop Load in the event the automatic scheme is out of service. A description of the process involved in restoring all dropped Load must also be discussed.

6.2 Scheduling & Bidding Requirements

- A Participating Load must be at least 1 MW to participate in ISO markets. Smaller Loads may be aggregated together to achieve the 1 MW threshold. A Participating Load must be treated as a single resource for purposes of certification, scheduling, bidding, metering, and Settlement. Loads may be added to or removed from a single resource to maintain it's ISO rated capacity. Additions and removals must be submitted to the ISO within 5 business days, for final approval of modifications and confirmation of the Load's ISO rated capacity. Changes (increases or decreases) in capacity for a single resource that will extend for more than 10 business days must be submitted to the ISO for prior approval when the change is greater than 10% of the single resource rated capacity or greater than 1 MW, whichever is less. All modifications, to a resource, must be documented and submitted to the ISO.

- The maximum amount of interruptible capacity allowed to be represented by an ALMDS is 100 MW.

- Either the Load must be a certified Scheduling Coordinator or must make arrangements with an existing Scheduling Coordinator in order to participate in ISO markets. The Scheduling Coordinator provides the various interfaces between the Load and the ISO bidding and Settlement systems.

- Loads served under existing or future interruptible retail service arrangements are eligible to participate if both the following conditions are met:

  (1) Bidding in the ISO's A/S and SE markets is allowed under the retail service arrangement.

  (2) To assure that the Load is available for curtailment and not curtailed prior to the ISO's dispatch notice, the PLA under which such Load is represented must provide penalties that offset any incentives for prior curtailment that exist under the retail service arrangement.

- The ISO may adjust the A/S and SE requirements temporarily to take into account, among other things, variation in conditions, real time dispatch constraints, contingencies, and voltage and dynamic stability assessments.

- Participating Loads providing A/S or SE must be scheduled separately from other Loads scheduled by a Scheduling Coordinator, and SQMD must be provided at the same granularity. (e.g., if a Scheduling Coordinator represents 500 meters, and 10 of those meters are Participating Loads aggregated through an ALMDS, the SC will schedule the 10 Participating Loads separately from the other 490 Loads. The SC will submit aggregated SQMD for the 10 Participating Load meters separate from the SQMD for the other 490 meters, but at the same granularity as scheduled.)

- The location of the Load must be included in the bids submitted to the ISO. Loads posing potential intra-zonal congestion problems will be identified and will not be allowed to participate. Preference would be given to loads within areas where potential congestion problems could be mitigated by load reduction or areas where post contingency operating voltages are expected to drop to unacceptable levels following outage conditions.

- Aggregation may be allowed on a Load Take-Out Point, Load group, or Demand zone basis, subject to the ISO's approval of the implementation plan, which will provide for safe and reliable operation and will ensure that no unreasonable limits are imposed on the ISO's dispatch of the associated A/S. However, a SC may not submit two Load schedules for the same Take-Out Point, Load group, or Demand zone. (For example, if a SC is allowed to aggregate Participating Loads by Load group, it will have to submit its schedule for the remainder of its Loads by Take-Out Point or Demand zone.)

- The ISO reserves the right to determine whether a group of Loads behind an ALMDS spans or interferes with an intra-zonal path. All meters that are behind an ALMDS must have the location verified and accepted by the ISO.

- The communication requirements and other rules for scheduling and dispatching of Participating Loads are no different from those applicable to other resources providing Non-Spinning Reserves, Replacement Reserves and Supplemental Energy. SCs scheduling or bidding Participating Loads to sell A/S or SE, or to self provide A/S, must comply with all applicable requirements for scheduling set forth in the ISO Tariff and applicable ISO Protocols.

- The ISO will not dictate the mechanism by which a SC communicates instructions to its Participating Loads. Participating Loads that fail to comply with ISO Dispatch instructions will be subject to the same financial consequences that apply in the case of any other resource providing A/S or SE that fails to comply with an ISO Dispatch instruction; except only that Participating Loads that have responded to the Dispatch instruction will be exempt from the requirements of ISO Tariff section 2.5.26.2.3 in the hour of the Dispatch instruction and for the following two (2) hours for the trial period.

- Any combination of Loads within a Participating Load may be curtailed to meet the ISO Dispatch instruction.

- Where the metering to a Load or facility is configured such that the single end-use may be served through multiple meters, all the individual meters must be aggregated in the same Participating Load. This requirement is necessary so that a Load that is curtailed does not substitute that service through another meter not included in the same Participating Load.

7. Implementation

7.1 Overview

- Responses to the Request for Participation referenced in Section 1.1 received from resources wishing to participate in the ISO Ancillary Services market will be evaluated in a timely manner. All responses to the Request for Participation will be stamped with the date and time they are received by the ISO and will be evaluated within 5 working days after receipt.

- To participate in the ISO's markets, including the SE and A/S markets, each Participating Load must be represented in a PLA. In addition, each Participating Load must be represented in the applicable Meter Service Agreement.

- As part of its response to the Request for Participation, a Participating Load and/or a SC will be required to submit to the ISO its implementation plan for complying with the applicable requirements for Participating Loads. Once the ISO has accepted the Request for Participation and approved the implementation plan, a Participating Load and/or a SC can proceed with implementation of necessary systems. In addition, before A/S can be provided, the Participating Load and/or SC will have to successfully complete A/S testing and certification.

7.2 Contractual Requirements – PLA

- All Loads for which A/S bids, self-provision schedules, or SE bids are submitted to the ISO must be bound to the ISO Tariff by the PLA between the Participating Load and the ISO. Several Loads may be represented in a single Participating Load Agreement, with each individual Load (or each contributing Aggregated Load component) listed in Schedule 1 of the PLA.

- The terms of the PLA will be the same for all types of Loads.

7.3 Contractual Requirements - Metering Agreements

- An individual Load must be represented in Schedule 1 of a Meter Service Agreement for ISO Metered Entities (MSA ISOME).
- Individual contributing Loads may not be added to or removed from an ALMDS without prior consent of the ISO. If Loads are added to or removed from an ALMDS, re-certification may be required by the ISO.
- The contributing Loads comprising an Aggregated Load must be listed in Schedule 1 of a Meter Service Agreement for Scheduling Coordinators (MSA SC).
- An Aggregating Load Meter Data Server (ALMDS) must be represented in a MSA ISOME.

7.4 Certification of Services

Any resource wishing to participate in the ISO Ancillary Services markets must be certified for the services that it intends to provide. Load resources, which are properly certified, may participate in either the Non-Spinning Reserve or Replacement Reserve markets. There is no Ancillary Services certification requirement for participation in the Supplemental Energy market. All Loads wishing to participate in ISO markets must submit a plan for how they intend to comply with ISO Dispatch instructions.

7.4.1 Non-Spinning Reserve Requirements

- Declaration of Certified Demand – The Load must declare the Demand that it intends to certify as available for Non-Spinning Reserve. This Demand is the amount of Load that can be interrupted within ten (10) minutes of when the ISO issues a Dispatch instruction. This Demand is the maximum quantity that may be bid as Non-Spinning Reserve. It is acceptable to bid a quantity less than that which is certified. Any Demand that is interrupted more than ten (10) minutes after the ISO issues a Dispatch instruction may not be included in the Non-Spinning Reserve certified Demand.
- Load Participation Implementation Plan - An implementation plan indicating the operator actions required to interrupt the

Load must be submitted to the ISO. The ISO reserves the right to perform an on-site inspection of the Load in order to verify that the implementation plan is feasible and that the operating personnel are capable of carrying out the plan within ten (10) minutes of the ISO Dispatch instruction.

- Successful Completion of Certification Test – Prior to receiving its Ancillary Service certification, the Load must schedule to perform a certification test. Such test shall include, but not be limited to, the following:
    - Confirmation of telemetry – The ISO will observe that the Load telemetry is in place and operational and providing required data points;
    - Confirmation of the Load telemetry meets Scan Rates and processing cycle requirements;
    - Confirmation of voice communication – The ISO, the SC and the Load Control Center will test communications on primary and secondary voice communication circuits;
      and
    - Confirmation of Load control performance – The Load will demonstrate its ability to adjust its Demand by a quantity mutually agreeable by the ISO, Load, and SC.

7.4.2 Replacement Reserve Requirements

- Declaration of Certified Demand – The Load must declare the Demand that it intends to certify as available for Replacement Reserve. This Demand is the amount of Load that can be interrupted within 60 (sixty) minutes of when the ISO issues a Dispatch instruction. This Demand is the maximum quantity that may be bid as Replacement Reserve. It is acceptable to bid a quantity less than that which is certified. Any Demand that is interrupted more than 60 (sixty) minutes after the ISO issues a Dispatch instruction may not be included in the Replacement Reserve certified Demand.

- Load Participation Implementation Plan – An implementation plan indicating the operator actions required to interrupt the Load must be submitted to the ISO. The ISO reserves the right to perform an on-site inspection of the Load in order to verify that the implementation plan is feasible and that the operating personnel are capable of carrying out the plan within 60 (sixty) minutes of the ISO Dispatch instruction.

- Successful Completion of Certification Test – Prior to receiving its Ancillary Service certification, the Load must schedule to perform a certification test. Such test shall include, but not be limited to, the following:
  - Confirmation of telemetry – The ISO will observe that the Load telemetry is in place and operational and providing required data points;
  - Confirmation of the Load telemetry meets Scan Rates and processing cycle requirements;
  - Confirmation of voice communication – The ISO, the SC and the Load will test communications on primary and secondary voice communication circuits; and
  - Confirmation of Load control performance – The Load will demonstrate its ability to adjust its Demand by a quantity mutually agreeable to the ISO, Load and SC.

7.4.3 Supplemental Energy Requirements

- The resource must state its maximum Curtailable Demand. This Curtailable Demand is the maximum amount of Demand that the Load expects to curtail within 60 (sixty) minutes of receiving a Dispatch instruction for Supplemental Energy. The Load may bid any quantity of Demand up to and including this maximum value into the Supplemental Energy market.

- The resource intending to provide Supplemental Energy to the ISO must submit a Load participation implementation plan that

is acceptable to the ISO.

- Although there is no certification test for Supplemental Energy, prior to participating in the Supplemental Energy market, the Load must demonstrate the following:
  - Confirmation of telemetry - The ISO will observe that the Load telemetry is in place, operational and providing the required data points;
  - Confirmation that the Load telemetry meets Scan Rates and processing cycle requirements; and
  - Confirmation of voice communication - the ISO, the SC and the Load will test communication on primary and secondary voice communications circuits.

7.5 Implementation Plan

The implementation plan describes in detail the steps, switching actions and/or operating activities that must be accomplished to curtail the Demand in the time required for the service being delivered. The following principles should be followed in developing the implementation plan:

- The plan should indicate how the curtailable Demand would be monitored in real-time to enable queries about the quantity of curtailable Demand available at any given time.
- The plan should indicate the availability of operating personnel to perform the curtailment should it be requested.
- The plan should indicate the operator steps and switching actions required to curtail the Load. Each step or action should be accompanied by a best estimate of the time required to perform the operation as well as a best estimate of any expected delays between operations.
- The plan should indicate a timeline for curtailing the Demand that indicates the total reduction in Demand at over the period of the service requested.
- The plan should allow for a reasonable communication delay from ISO to Scheduling Coordinator to Load of no less than one minute. The ten (10) minute clock for Non-Spinning Reserve and the sixty (60) minute clock for Replacement Reserve and Supplemental Energy begin when the ISO issues a Dispatch instruction.

The ISO reserves the right to perform an on-site inspection of the Load facility including a dry run (no actual switching of Load will occur) of the operator actions required to curtail the Demand.

APPENDIX 1 - ISO SECURITY POLICY

1.1 Cryptographic Security

Technology Risk Management (TRM) has established an enterprise-wide information security architecture based on a Public Key Infrastructure (PKI). The CAL ISO PKI provides digital certificates to every user and application. The information security policy for all existing and future CAL ISO applications is to fully leverage the CAL ISO Public Key Infrastructure in order provide the highest possible level of information security.

Recognizing that it may be impractical to modify existing applications, CAL ISO envisions multiple application configurations as described later in this section under the heading Application Configuration.

1.2 Application Security Function

Every application must provide the following security functions:

1. Mutually identify and authenticate the communicating parties based on their digital certificates. Applications must interface with the CAL ISO PKI to check the validity of all certificates.
2. Protect, through strong encryption, the confidentiality and integrity of all data that flows between the communicating parties.
3. Control access to resources based on the authenticated identity of the communicating party. That is, the name of a party, as embedded in its digital certificate must be used as one of the keys that determine access rights.
4. Record an audit trail of all security sensitive events. Audit records must be available to authorized viewers. Each audit record should minimally contain the name of the communicating party, as embedded in the party's digital certificate, an accurate time-stamp, and whether the attempt was successful or not. When appropriate, additional information such as the network address of the party should also be included. The events that must be recorded for an audit trail include, but are not limited to:
    - Attempts to establish a session.
    - Attempts to login via an attached console.
    - Attempts to transfer data to or from the system.
    - Attempts to query or change an operating parameter of the application software or the underlying hardware.
    - All sent or received messages that bear a digital signature.
5. Interface with a tamper evident cryptographic module that stores the systems secret key and is capable of performing cryptographic functions. The module must minimally conform to FIPS 140-1 level 1standard.
6. Demonstrate its capabilities to implement non-repudiation based on the digital certificates of the transacting parties.
7. Use accepted information security industry standard-protocols (e.g., SSL, SOCKS, and IPSEC) for establishing secure sessions.

1.3 Control Functions

Every application and its underlying hardware system must adhere to the following control functions:

1. The system must not provide any direct dial-in capabilities. All dial-in access must be provided through officially approved ISO dial-in servers. Such an access is no different from any access to the application; all security functions described under Cryptographic Security above apply to all access paths.
2. Systems that allow access via an attached console must do so based on a user ID and password. All login attempts must be audited. Additionally, the system must always *boot-up* to a mode that requires a user ID and a password for console access. That is, it should not be possible to turn off the system, turn it back on again, and gain access to the system without a correct user ID and password. The console password must be different than the factory installed password and must adhere to the procedures described in CAL ISO Supporting Security Standards and Guidelines.
3. Systems must disable all internet application services (e.g., telnet, ftp, etc.) that are not explicitly required. All internet application services that are required must provide the security functions described under Cryptographic Security above.

1.4 Application Configuration

Existing Applications Communicating Via Standard Internet Application Protocols
All applications that communicate via standard Internet application protocols (e.g., http, ftp, telnet, etc.) must be configured to provide end-to-end security. This is irrespective of whether the communicating parties are in the same subnet or not.

Existing Applications Communicating Via Proprietary Application Protocols
Applications that use either proprietary application protocols or utilities industry specific application protocols must be minimally configured to provide site-to-site security.

New Applications
All new applications communicating with other new applications must be configured to provide end-to-end security. This is regardless of the application protocol and irrespective of whether the communicating parties are in the same subnet or not. New applications must demonstrate their ability to migrate to an integrated solution that fully uses the CAL ISO PKI. When a new application communicates with an existing application, it must be configured to match the security functionality of the existing application.

External Entities Interfacing with CAL ISO Applications
It is the sole responsibility of the companies interfacing with CAL ISO to ensure that their applications can communicate with CAL ISO's application in a secure manner.

2 STANDARDS

2.1 Crypto Standards

- All digital certificates will conform to the ITU Recommendation X.509 Version 3.
- Certificate Revocation Lists will conform to X.509 V2.
- Cryptographic Hardware Modules must conform to FIPS 140-1 Level 1 or higher.
- Accepted information security industry standards for establishing a secure session include, but are not limited to:
    - The Secure Socket Layer (SSL) Version 3.
    - Internet Engineering Task Force Standards on IP Security (IPSEC)
    - Internet Engineering Task Force Standards on the SOCKS protocol Version 5.
- Adhere to all applicable CA ISO Supporting Security Standards and Guidelines.

3 COMPLIANCE TEST CRITERIA

3.1 Minimum Tests

Compliance with the CAL ISO Application Security Policy requires that at a minimum the following tests be satisfied.

1. Test that an expired certificate is not honored.
2. Test that a revoked certificate is not honored.
3. Test that all access paths to the application require mutual authentication based on a digital certificate.
4. Test that the communicating parties are using accepted information security industry standard protocols.
5. Test that the communication is strongly encrypted with accepted information security industry standard algorithms.
6. Test that session keys are renewed at pre-determined intervals, as specified in the application configuration file.
7. Test that a session does not last beyond the validity period of a party's certificate.
8. Test that a session is dismantled if a party's certificate is revoked.
9. Test that an authentic principal cannot access an application resource for which it is not authorized.
10. Test that security sensitive events are logged and can be retrieved.
11. Test that all messages that bear a digital signature are recorded and can be retrieved.
12. Test that Internet services that are not required for the operation of the system are turned off.

4 COMPLIANCE

4.1 On-Going Process

Several methods will serve as the mechanism for ensuring on-going Application Security Policy Compliance for existing and new applications. These mechanisms include:

- The ISO Change Management Process.
- The ISO Project Charter Process.
- Executive Sponsorship Process.
- On going audits and reviews.

The requester of any new application system will be responsible for obtaining and validating the existing certificates for all CAs (i.e., the root CA and the organizational CAs).

The requester of any new application system will be responsible for generating keys and obtaining digital certificates for all components of the system. The requester is also responsible for identifying authorized users (both human users and application users) to the CAL ISO TRM to make certain that these users already possess a valid digital certificate.

On-going operation and maintenance of the application must include provisions for renewing certificates when the certificate nears its expiration date.

On-going operation and maintenance of the application must include provisions for notification to the Certification Authority or its Certificate Revocation List Agent in case of a compromised key. The terms and conditions of such notification are defined in the pertinent CAL ISO Certification Practice Statements (CPS) which are available on ISO's web site.