Location of Document

Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Description</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/18/2017</td>
<td>1.0</td>
<td>Initial Version</td>
<td>CAISO</td>
</tr>
<tr>
<td>03/10/2016</td>
<td>1.1</td>
<td>Revised element specifications and added more comments and examples for clarification.</td>
<td>CAISO</td>
</tr>
<tr>
<td>03/28/2016</td>
<td>1.2</td>
<td>Re-ordered Sections 5 and 6. Changes to MeterData XSD incorporated</td>
<td>CAISO</td>
</tr>
<tr>
<td>04/06/2016</td>
<td>1.3</td>
<td>Refined SLA section and included AUP, Included Sample request with ALL keyword, and Included more error codes</td>
<td>CAISO</td>
</tr>
<tr>
<td>05/13/2016</td>
<td>1.4</td>
<td>Added AUP errors. Included CSV and MDEF file specification for UI submission</td>
<td>CAISO</td>
</tr>
<tr>
<td>06/24/2016</td>
<td>1.5</td>
<td>Clarified that RegisteredIntertie will not be used for data submission and provided description for flow gate. Removed sample submissions and retrieve for RegisteredIntertie. Additional error codes included</td>
<td>CAISO</td>
</tr>
<tr>
<td>07/20/2016</td>
<td>1.6</td>
<td>Provided Measurement type to resource type mapping Added Z for the intervalendtime that was missing in the samples</td>
<td>CAISO</td>
</tr>
<tr>
<td>08/16/2016</td>
<td>1.7</td>
<td>Modified the resource type to measurement type mapping Modified the sample submission in section 4.4.3.1.4 from a pump resource to any generator resource, including pumps</td>
<td>CAISO</td>
</tr>
<tr>
<td>11/1/2016</td>
<td>1.9</td>
<td>1. Changes to SLA and AUP sections and corresponding errors 2. Changes to RequestMeterData_v1.xsd to include SCID, TimeIntervalLength and updatedSinceDateTime</td>
<td>CAISO</td>
</tr>
<tr>
<td>Date</td>
<td>Version</td>
<td>Description</td>
<td>Author</td>
</tr>
<tr>
<td>------------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>11/9/2016</td>
<td>1.10</td>
<td>Added PMAX validation error message</td>
<td>CAISO</td>
</tr>
<tr>
<td>11/11/2016</td>
<td>1.11</td>
<td>Added error code 1029</td>
<td>CAISO</td>
</tr>
<tr>
<td>06/19/2017</td>
<td>1.12</td>
<td>Corrected sample XMLs for typos in time format. Added error code 1030 for negative meter data value validation intended to be included in a future release, 1.2.0. Revised the API performance specifications to align with the L &amp; P test results.</td>
<td>CAISO</td>
</tr>
</tbody>
</table>
| 10/18/2017 | 2.0     | 1. Cardinality change in MeterDataRequest class in RequestMeterData XSD to support better performance when multiple resource IDs are requested  
  2. Added a new measurement type of “MBMA” that will be active with ESDER 2 project activation for DRS replacement  
  3. Added error code 1031 | CAISO  |
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    10.3.2 **Start and Stop Meter Readings**
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1. Introduction

1.1 Purpose

This document describes the Market Participant interface to CAISO's MRI-Settlements (OMAR Replacement) web services. As part of the OMAR Replacement project, the current OMAR Online interface is being replaced with an enhancement to the existing MRI-Settlements interface. This will enable market participants to submit and download meter data from MRI-Settlements, which was previously used to only download Settlement files. It provides the WSDL, XSD, and XML information required by application programmers to create and send messages and to process response messages.

1.2 Contact Information

For any questions regarding this document or technical questions related to integrating applications with CAISO’s OMAR Replacement web services, please send email to ServiceDesk@caiso.com

1.3 Related Documents

CAISO’s ISO MARKET program has produced a set of documents describing its web services architecture and associated interfaces to the Bidding, Market Results, Trades, and Sandbox services. CAISO’s ISO MARKET Web Services Architecture & Integration Specification is the top-level document in this set; Market Participants and their application programmers should read this document to gain an overall understanding of CAISO’s web services architecture prior to reading any of the detailed documents shown below.

Figure 1 – ISO MARKET Web Services Interface Specification Document Set

Owner: Lam, Rick

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Doc ID: GNF0MEIUEBB-46-46
The ISO MARKET Web Services Interface Specification Document Set is available online at the locations indicated below.

<table>
<thead>
<tr>
<th>Doc. No.</th>
<th>Document Name</th>
<th>Location</th>
</tr>
</thead>
</table>

### 1.4 Release Notes

**Release Notes for ISO Interface Specification for OMAR Online Replacement Web Services Version 1**

This document release 1.0 will be the first release of the interface specification.

The services being created for OMAR Online Replacement effort are the following:
1. submitMeterData_v1 – submit a create or modify request for meter data
2. submitMeterData_v1_DocAttach – submit a create or modify request for meter data for .net clients
3. retrieveMeterData_v1 – retrieve request for meter data of a resource
4. retrieveMeterData_v1_DocAttach – retrieve request for meter data of a resource for .net clients
5. retrieveBatchValidationStatus_v1 – to request the status on a submission of a create or modify
6. retrieveBatchValidationStatus_v1_DocAttach – to request the status on a submission of a create or modify for .net clients

### 1.5 API Transition Support

Initial Implementation
2. Business Scenario

Market Participants can retrieve or submit the following data via the OMAR Replacement web services:

- Retrieve Meter data
- Submit request for Meter data
- Submit modification request for Meter data
- Retrieve status for the creation or modification requests
3. Service Level Agreement

The following service level agreement defines the business and technical requirements for service availability and performance.

<table>
<thead>
<tr>
<th>Service availability</th>
<th>Service Level goal is 99.9%.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected maximum size of payload</td>
<td>15 MB Uncompressed</td>
</tr>
<tr>
<td>Expected frequency (average and maximum)</td>
<td>5 Seconds</td>
</tr>
<tr>
<td>Longest time the service can be unavailable before business is impacted</td>
<td>4 hours</td>
</tr>
<tr>
<td>Business impact if is unavailable</td>
<td>Market Participants utilizing the service will not be able to submit or retrieve Meter Data, Baseline or Performance data</td>
</tr>
<tr>
<td>Expected response time for standard output for a submit</td>
<td>&lt;5 Seconds</td>
</tr>
<tr>
<td>Expected wait time for batch validation to be completed</td>
<td>5 Minutes</td>
</tr>
<tr>
<td>Expected time to retrieve meter data up to 100,000 records</td>
<td>&lt;120 Seconds on average</td>
</tr>
</tbody>
</table>

Acceptable Use Policy

For meter data submission, the maximum acceptable size of the attachment is 15 MB uncompressed. SCs can adjust either the trade date range or the number of resources being submitted to adhere to this requirement. Any submission with an attachment size greater than 15 MB will result in the following error being generated:

Use policy violated with an attachment of size XX* MB. Maximum allowed attachment size is 15 MB.

For meter data retrieve, we will use the number of database records in the resulting data set to control the volume and performance. We will do a count for the number of records requested and will limit this to 200,000. SCs can use the keyword ALL for the four distinct resource types and can also control the trade date interval being requested so that the resulting data set is within the limit of 200,000 records. Any retrieve request that results in more than 200,000 database records being retrieved will result in the following error being generated:
Use policy violated with YY** records retrieved. Maximum allowed is 200,000 records.

*actual payload size
**actual number of database records retrieved
4. SubmitMeterData

4.1 Use Model

The diagram below shows the sequence for submitMeterData.

---

Owner: Lam, Rick

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4.2 Operation Details

The service has `submitMeterData_v1` operation with three message types. All input and output messages are in XML format.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Message Types</th>
<th>Message</th>
<th>WSDL</th>
<th>XSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>submitMeterData_v1</td>
<td>Input</td>
<td>submitMeterDataRequest</td>
<td>submitMeterData_v1.wsdl</td>
<td>MeterData_v1.xsd</td>
</tr>
<tr>
<td></td>
<td>Output</td>
<td>submitMeterDataResponse</td>
<td>submitMeterData_v1_DocAttach.wsdl</td>
<td>StandardOutput_v1.xsd</td>
</tr>
<tr>
<td></td>
<td>Fault</td>
<td>faultReturn</td>
<td>faultReturn.xsd</td>
<td>StandardOutput_v1.xsd</td>
</tr>
</tbody>
</table>

4.3 WSDL (submitMeterData_v1.wsdl)

- `submitMeterData_v1.wsdl` – Used for normal SOAP messaging
- `submitMeterData_v1_DocAttach.wsdl` – Used when .NET is the source of processing

The WSDL can be found at the following location:

*Please refer to the latest version of the artifacts found under the technical specifications.*

4.4 Message Type: Submit Meter Data

SubmitMeterDataRequest

4.4.1 Element Table

<table>
<thead>
<tr>
<th>Element</th>
<th>Data Description</th>
<th>Type/Length</th>
<th>Req’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageHeader</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TimeDate</td>
<td>Application level relevant time and date for when this instance of the message was produced, in GMT Time format</td>
<td>datetime</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Element Data Description

<table>
<thead>
<tr>
<th>Element</th>
<th>Data Description</th>
<th>Type/Length</th>
<th>Req'd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Source system which provides data for this service</td>
<td>String</td>
<td>Yes</td>
</tr>
<tr>
<td>Version</td>
<td>Date reflecting the release this latest version update was related to. Valid value is: v20160301</td>
<td>String</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### MessagePayload (required)

### MessagePayload.MeterMeasurementData (one to many occurrences)

<table>
<thead>
<tr>
<th>measurementType</th>
<th>Type of the measurement.</th>
<th>String</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOAD or GEN or MBMA*</td>
<td><em>Meter Before Meter After (MBMA) can only be used upon ESDER 2 project activation for DRS Replacement.</em> Measurement types are the same as channel ID in current metering solution. LOAD is channel 1 and GEN is channel 4. The resource type and sub type to measurement type mapping is provided in the table below. The resource ID should always be entered in the XML element that matches the resource type classification in the MF. For example, when submitting data for an energy storage unit, the resource ID should always be included in the RegisteredGenerator element even though the measurement type can be either LOAD or GEN. Please see sample XML (4.4.3.1.4) for a Generator resource to submit data for the same resource for both measurement types.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Master File RES SUBTYPE

<table>
<thead>
<tr>
<th>Master File RES TYPE</th>
<th>Master File RES SUBTYPE</th>
<th>XML Element</th>
<th>Measurement Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEN</td>
<td>All Generators including Pumps, Storage etc.</td>
<td>RegisteredGenerator</td>
<td>GEN or LOAD</td>
</tr>
<tr>
<td>TG</td>
<td>RegisteredGenerator</td>
<td>GEN</td>
<td></td>
</tr>
<tr>
<td>LI</td>
<td>RegisteredGenerator</td>
<td>GEN or LOAD</td>
<td></td>
</tr>
<tr>
<td>LOAD</td>
<td>RegisteredLoad</td>
<td>LOAD</td>
<td></td>
</tr>
<tr>
<td>TIE</td>
<td>Flowgate</td>
<td>GEN or LOAD</td>
<td></td>
</tr>
<tr>
<td>Element</td>
<td>Data Description</td>
<td>Type/Length</td>
<td>Req’d</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-------------</td>
<td>-------</td>
</tr>
<tr>
<td>timeIntervalLength</td>
<td>Interval length of the trading time in minutes.</td>
<td>Integer</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>For submission, the valid values are: 5, 15 or 60</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>For retrieval, values that would be populated based on the interval length specified in the retrieve request are: 5, 10, 15 or 60</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The interval length should be the same for a trade date. For example, if the prior submission for the date happened in 5 minute intervals, all further revisions to the same date needs to be submitted with the same interval length.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>unitMultiplier</td>
<td>The unit multiplier of the measured quantity.</td>
<td>Enumeratiom</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Valid values are: M for Megawatt or k for kilowatt</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Values are case sensitive.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>unitSymbol</td>
<td>The unit of measure of the measured quantity.</td>
<td>Enumeratiom</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Valid value is: Wh</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Value is case sensitive.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MessagePayload.MeterMeasurementData.DemandResponseRegistration (optional, for demand response only)</td>
<td>This element will be populated when the DRS replacement project has been implemented in order to consolidate meter data exchange for DR and non-DR resources. For FALL 2016 implementation, this element should not be populated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mRID</td>
<td>Master resource identifier of the registration (Registration ID)</td>
<td>String</td>
<td>Yes</td>
</tr>
<tr>
<td>demandResponsePerfomanceMeasureme nt</td>
<td>Method used for the demand response performance measurement. Examples include Physical, Statistical etc.</td>
<td>String</td>
<td>No</td>
</tr>
<tr>
<td>MessagePayload.MeterMeasurementData.MeasurementValue (Required, one to many occurrences) – all activity records created for this asset</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>intervalEndTime</td>
<td>End Datetime in GMT of the interval for which the meter value is being submitted or retrieved. This is interval ending.</td>
<td>dateTime</td>
<td>Yes</td>
</tr>
<tr>
<td>meterValue</td>
<td>Meter value or Meter Quantity.</td>
<td>Decimal</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Decimal values should be (16, 8), meaning up to 8 digits before and after the decimal point. Example 1.12345678, 12022412.34 etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>timeStamp</td>
<td>Updated time stamp</td>
<td>dateTime</td>
<td>No</td>
</tr>
<tr>
<td>MessagePayload.MeterMeasurementData.MeasurementValue.VersionInfo (Required, one to many occurrences)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>measurementQuality</td>
<td>Quality of the measurement.</td>
<td>String</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Valid values are: ACTUAL or ESTIMATED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Element</td>
<td>Data Description</td>
<td>Type/Length</td>
<td>Req’d</td>
</tr>
<tr>
<td>---------</td>
<td>------------------</td>
<td>-------------</td>
<td>-------</td>
</tr>
<tr>
<td>versionTag</td>
<td>The version of the submission. Will be populated only in the retrieve response. Cannot be specified for submissions.</td>
<td>String</td>
<td>No</td>
</tr>
<tr>
<td>RetrieveMeterDataRequest</td>
<td>RetrievMeterDataResponse</td>
<td>CURRENT</td>
<td>CURRENT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PREVIOUS</td>
<td>PREVIOUS</td>
</tr>
<tr>
<td>HISTORY</td>
<td>CURRENT</td>
<td>PREVIOUS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T+3B</td>
<td>T+12B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T+55B</td>
<td>T+9M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T+18M</td>
<td>T+35M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T+36M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NULL</td>
<td>CURRENT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

HISTORY can be used to retrieve all versions. If no version is specified, then the default is CURRENT.

The application will maintain two versions for a given data set: CURRENT and PREVIOUS. **All prior versions will not be maintained.**

Request for a version of HISTORY will result in a response of meter data that was used in each of the various settlements runs, which are T+3B, T+12B, T+55B, T+9M, T+18M, T+35M, T+36M, in addition to the CURRENT and PREVIOUS.

**MessagePayload.MeterMeasurementData.RegisteredGenerator**

| mRID | Master resource identifier of the generator resources as specified by master file. | String | Yes* |

**MessagePayload.MeterMeasurementData.RegisteredInterTie**

| mRID | Master resource identifier of the intertie resource as provided in the master file. Note: This class will not be used in the current implementation and is included for potential future use. | String | Yes* |
**Element** | **Data Description** | **Type/Length** | **Req'd**
---|---|---|---
mRID | Master resource identifier of the load resource as provided in the master file | String | Yes*

*Only one of these four elements is required at a given time*

### 4.4.2 Schema (MeterData_v1.xsd)

The XSD can be found at the following location:

Please refer to the latest version of the artifacts found under the technical specifications.

### 4.4.3 Example XML File (SubmitMeterData_v1.xml)

**SubmitMeterData_v1.xml**

#### 4.4.3.1 Requests

**4.4.3.1.1 Sample request for a GEN meter data submission + Actual**

```xml
<?xml version="1.0" encoding="UTF-8"?>
    <MessageHeader>
        <TimeDate>2001-12-31T12:00:00</TimeDate>
        <Source>Source</Source>
        <Version>v20160301</Version>
    </MessageHeader>
    <MessagePayload>
        <MeterMeasurementData>

```
4.4.3.1.2 Sample request for a LOAD meter data submission + Estimated

```xml
<?xml version="1.0" encoding="UTF-8"?>
<MeterData xmlns="http://www.caiso.com/soa/MeterData_v1.xsd#"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.caiso.com/soa/MeterData_v1.xsd# MeterData_v1.xsd">
    <MessageHeader>
        <TimeDate>2001-12-31T12:00:00</TimeDate>
        <Source>Source</Source>
        <Version>v20160301</Version>
    </MessageHeader>
    <MessagePayload>
        <MeterMeasurementData>
            <measurementType>LOAD</measurementType>
            <timeIntervalLength>5</timeIntervalLength>
            <unitMultiplier>M</unitMultiplier>
            <unitSymbol>Wh</unitSymbol>
            <measurementValue>
                <intervalEndTime>2001-12-31T12:00:00Z</intervalEndTime>
                <meterValue>0.0</meterValue>
                <timeStamp>2001-12-31T12:00:00</timeStamp>
                <VersionInfo>
                    <measurementQuality>ESTIMATED</measurementQuality>
                </VersionInfo>
            </measurementValue>
        </MeterMeasurementData>
    </MessagePayload>
</MeterData>
```
4.4.3.1.3 Sample request for a Flow Gate meter data submission +Actual

```xml
<xml version="1.0" encoding="UTF-8">
    <MessageHeader>
      <TimeDate>2001-12-31T12:00:00</TimeDate>
      <Source>Source</Source>
      <Version>v20160301</Version>
    </MessageHeader>
    <MessagePayload>
      <MeterMeasurementData>
        <measurementType>GEN</measurementType>
        <timeIntervalLength>5</timeIntervalLength>
        <unitMultiplier>M</unitMultiplier>
        <unitSymbol>Wh</unitSymbol>
        <MeasurementValue>
          <intervalEndTime>2001-12-31T12:00:00Z</intervalEndTime>
          <meterValue>0.0</meterValue>
          <timeStamp>2001-12-31T12:00:00</timeStamp>
          <VersionInfo>
            <measurementQuality>ESTIMATED</measurementQuality>
          </VersionInfo>
        </MeasurementValue>
        <MeasurementValue>
          <intervalEndTime>2001-12-31T12:05:00Z</intervalEndTime>
          <meterValue>0.0</meterValue>
          <timeStamp>2001-12-31T12:00:00</timeStamp>
          <VersionInfo>
            <measurementQuality>ACTUAL</measurementQuality>
          </VersionInfo>
        </MeasurementValue>
      </MeterMeasurementData>
    </MessagePayload>
  </MeterData>
</xml>
```
<?xml version="1.0" encoding="UTF-8"?>
<MRI-Settlements ISO Interface Specification>

<VersionInfo>
  <measurementQuality>ACTUAL</measurementQuality>
</VersionInfo>

<Flowgate>
  <mRID>FG_001</mRID>
</Flowgate>

<MeterMeasurementData>
  <measurementType>LOAD</measurementType>
  <timeIntervalLength>5</timeIntervalLength>
  <unitMultiplier>M</unitMultiplier>
  <unitSymbol>Wh</unitSymbol>
  <MeasurementValue>
    <intervalEndTime>2001-12-31T12:00:00Z</intervalEndTime>
    <meterValue>0.0</meterValue>
    <timeStamp>2001-12-31T12:00:00</timeStamp>
  </MeasurementValue>
  <VersionInfo>
    <measurementQuality>ACTUAL</measurementQuality>
  </VersionInfo>
</MeterMeasurementData>

<MeterMeasurementData>
  <measurementType>LOAD</measurementType>
  <timeIntervalLength>5</timeIntervalLength>
  <unitMultiplier>M</unitMultiplier>
  <unitSymbol>Wh</unitSymbol>
  <MeasurementValue>
    <intervalEndTime>2001-12-31T12:05:00Z</intervalEndTime>
    <meterValue>0.0</meterValue>
    <timeStamp>2001-12-31T12:00:00</timeStamp>
  </MeasurementValue>
  <VersionInfo>
    <measurementQuality>ACTUAL</measurementQuality>
  </VersionInfo>
</MeterMeasurementData>

<MeterMeasurementData>
  <measurementType>GEN</measurementType>
  <timeIntervalLength>5</timeIntervalLength>
  <unitMultiplier>M</unitMultiplier>
  <unitSymbol>Wh</unitSymbol>
  <MeasurementValue>
    <intervalEndTime>2001-12-31T12:00:00Z</intervalEndTime>
    <meterValue>0.0</meterValue>
    <timeStamp>2001-12-31T12:00:00</timeStamp>
  </MeasurementValue>
  <VersionInfo>
    <measurementQuality>ACTUAL</measurementQuality>
  </VersionInfo>
</MeterMeasurementData>

<MeterMeasurementData>
  <measurementType>GEN</measurementType>
  <timeIntervalLength>5</timeIntervalLength>
  <unitMultiplier>M</unitMultiplier>
  <unitSymbol>Wh</unitSymbol>
  <MeasurementValue>
    <intervalEndTime>2001-12-31T12:05:00Z</intervalEndTime>
    <meterValue>0.0</meterValue>
    <timeStamp>2001-12-31T12:00:00</timeStamp>
  </MeasurementValue>
  <VersionInfo>
    <measurementQuality>ACTUAL</measurementQuality>
  </VersionInfo>
</MeterMeasurementData>

</MRI-Settlements ISO Interface Specification>
4.4.3.1.4 Sample request for a Generator Resource with both LOAD and GEN meter data submission + Actual

```xml
<?xml version="1.0" encoding="UTF-8"?>
<MeterData xmlns="http://www.caiso.com/soa/MeterData_v1.xsd#"
    xsi:schemaLocation="http://www.caiso.com/soa/MeterData_v1.xsd# MeterData_v1.xsd">
    <MessageHeader>
        <TimeDate>2001-12-31T12:00:00</TimeDate>
    </MessageHeader>
    <Flowgate>
        <mRID>FG_0012</mRID>
    </Flowgate>
</MeterData>
```

Owner: Lam, Rick

Copyright 2012 California ISO
<Source>Source</Source>
<Version>v20160301</Version>
</MessageHeader>
<MessagePayload>
<MeterMeasurementData>
<measurementType>GEN</measurementType>
<timeIntervalLength>5</timeIntervalLength>
<unitMultiplier>M</unitMultiplier>
<unitSymbol>Wh</unitSymbol>
<MeasurementValue>
<intervalEndTime>2001-12-31T12:00:00Z</intervalEndTime>
<meterValue>1.0</meterValue>
<timeStamp>2001-12-31T12:00:00</timeStamp>
<VersionInfo>
<measurementQuality>ACTUAL</measurementQuality>
</VersionInfo>
</MeasurementValue>
<MeasurementValue>
<intervalEndTime>2001-12-31T12:05:00Z</intervalEndTime>
<meterValue>1.1</meterValue>
<timeStamp>2001-12-31T12:00:00</timeStamp>
<VersionInfo>
<measurementQuality>ACTUAL</measurementQuality>
</VersionInfo>
</MeasurementValue>
<RegisteredGenerator>
<mRID>ABC_UNIT1</mRID>
</RegisteredGenerator>
</MeterMeasurementData>
<MeterMeasurementData>
<measurementType>LOAD</measurementType>
<timeIntervalLength>5</timeIntervalLength>
<unitMultiplier>M</unitMultiplier>
<unitSymbol>Wh</unitSymbol>
<MeasurementValue>
<intervalEndTime>2001-12-31T12:00:00Z</intervalEndTime>
<meterValue>0.8</meterValue>
<timeStamp>2001-12-31T12:00:00</timeStamp>
<VersionInfo>
<measurementQuality>ACTUAL</measurementQuality>
</VersionInfo>
</MeasurementValue>
<MeasurementValue>
<intervalEndTime>2001-12-31T12:05:00Z</intervalEndTime>
<meterValue>0.85</meterValue>
<timeStamp>2001-12-31T12:00:00</timeStamp>
<VersionInfo>
</MeasurementValue>
</MeterMeasurementData>
</MessagePayload>
4.5 Message Type : Standard Output

submitMeterDataResponse and faultReturnType both conform to the StandardOutput.xsd

4.5.1 Element Table

<table>
<thead>
<tr>
<th>Element</th>
<th>Data Description</th>
<th>Type / Length</th>
<th>Req’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>StandardOutput (required)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MessageHeader (optional)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TimeDate</td>
<td>Application level relevant time and date for when this instance of the message was produced, in GMT Time format</td>
<td>datetime</td>
<td>No</td>
</tr>
<tr>
<td>Source</td>
<td>Source system which provides data for this service</td>
<td>String</td>
<td>No</td>
</tr>
<tr>
<td>Version</td>
<td>Date reflecting the release this latest version update was related to.</td>
<td>String</td>
<td>No</td>
</tr>
<tr>
<td>MessagePayload (required)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EventLog.Service (required)</td>
<td>The service Id (created by the web service). This is an internal service id used for tracking the transaction and will be used for troubleshooting.</td>
<td>String</td>
<td>Yes</td>
</tr>
<tr>
<td>name</td>
<td>The name of the service as used by the Web Service. This is an internal service name used for tracking the transaction and will be used for troubleshooting.</td>
<td>String</td>
<td>Yes</td>
</tr>
</tbody>
</table>
4.5.2 Schema

StandardOutput_v1.xsd

The XSD can be found at the following location:

Please refer to the latest version of the artifacts found under the technical specifications.

4.5.3 Example XML File (StandardOutput.xml)

4.5.3.1 Response

4.5.3.1.1 Sample SUCCESS response for submitMeterData request

```xml
<?xml version="1.0" encoding="UTF-8"?>
  <MessageHeader>
    <TimeDate>2016-03-07T12:51:08.774+00:00</TimeDate>
    <Source>stlmt</Source>
    <Version>v20160301</Version>
  </MessageHeader>
  <MessagePayload>
    <EventLog>
      <mRID>
      </mRID>
    </EventLog>
  </MessagePayload>
</StandardOutput>
```
<Batch>
  <mRID>2805</mRID>
</Batch>

<Event>
  <creationDateTime>2016-04-07T22:47:55.754Z</creationDateTime>
  <description>Successfully received</description>
  <id>0198514e-6b53-41a1-9d6c-1ab09dc84926</id>
  <result>Success</result>
</Event>

<Service>
  <id>99ad2c93-2681-45b0-bf5e-4aba80326ff5</id>
  <name>submitMeterData_v1</name>
</Service>

</EventLog>
</MessagePayload>
</StandardOutput>

4.5.3.1.2 Sample ERROR response for submitMeterData request

```xml
<?xml version="1.0" encoding="UTF-8"?>
  <MessageHeader>
    <TimeDate>2016-03-07T12:51:08.774+00:00</TimeDate>
    <Source>stlmt</Source>
    <Version>v20160301</Version>
  </MessageHeader>
  <MessagePayload>
    <EventLog>
      <Event>
        <creationDateTime>2016-04-07T22:47:55.754Z</creationDateTime>
        <description>Invalid XML</description>
        <id>0198514e-6b53-41a1-9d6c-1ab09dc84926</id>
        <result>Error</result>
      </Event>
      <Service>
        <id>99ad2c93-2681-45b0-bf5e-4aba80326ff5</id>
        <name>submitMeterData_v1</name>
      </Service>
    </EventLog>
    </MessagePayload>
</StandardOutput>
```
5. RetrieveBatchValidationStatus

5.1 Use Model

The diagram below shows the sequence for retrieveBatchValidationStatus.

![Diagram of the sequence for retrieveBatchValidationStatus]

5.2 Operation Details

The service has retrieveBatchValidationStatus_v1 operation with three message types. All input and output messages are in XML format.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Message Types</th>
<th>Message</th>
<th>WSDL</th>
<th>XSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>retrieveBatchValidationStatus_v1</td>
<td>Input</td>
<td>retrieveBatchValidationStatusReq</td>
<td>retrieveBatchValidationStatus_v1.wsdl</td>
<td>BatchValidationStatus_v1.xsd</td>
</tr>
</tbody>
</table>
5.3 WSDL (retrieveBatchValidationStatus_v1.wsdl)

- retrieveBatchValidationStatus_v1.wsdl – Used for normal SOAP messaging
- retrieveBatchValidationStatus_v1_DocAttach.wsdl – Used when .NET is the source of processing

The WSDL can be found at the following location:
Please refer to the latest version of the artifacts found under the technical specifications.

5.4 Message Type
retrieveBatchValidationStatusRequest

5.4.1 Element Table

<table>
<thead>
<tr>
<th>Element</th>
<th>Data Description</th>
<th>Type/Length</th>
<th>Req’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageHeader</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TimeDate</td>
<td>Application level relevant time and date for when this instance of the message was produced, in GMT Time format</td>
<td>datetime</td>
<td>No</td>
</tr>
<tr>
<td>Source</td>
<td>Source system which provides data for this service</td>
<td>String</td>
<td>No</td>
</tr>
<tr>
<td>Version</td>
<td>Date reflecting the release this latest version update was related to. Valid value is: v20160301</td>
<td>String</td>
<td>Yes</td>
</tr>
<tr>
<td>MessagePayload (required)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mRID</td>
<td>This represents the batch ID of a request that was generated by the system and sent back to the user for submission of a request</td>
<td>String</td>
<td>Yes</td>
</tr>
<tr>
<td>creationTime</td>
<td>Date/time of status creation in GMT format</td>
<td>datetime</td>
<td>No</td>
</tr>
<tr>
<td>Element</td>
<td>Data Description</td>
<td>Type/Length</td>
<td>Req'd</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------</td>
<td>-------------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| description | Description of batch status  
There are 4 values for status: SUCCESS, ERROR, WARNING, IN_PROCESS, and PENDING.  
Once the batch is submitted, the status is set to "PENDING".  
If you query during the time the application is processing the batch, you will get "IN_PROCESS" status.  
Once the processing is complete, the status will change to "SUCCESS" or "ERROR" or "WARNING".  
If the status is SUCCESS, all data submitted in that batch has been accepted.  
If the status is ERROR, all data submitted in the batch has been rejected.  
If the status is WARNING, all data submitted in the batch has been accepted but there are meter values submitted that exceed the PMAX of a resource. This is generated as an alert. | String | No |

**MessagePayload.DistributedEnergyResourceContainer (optional) (0 to unbounded occurrences)**

This element will be populated when the DRS replacement project has been implemented in order to consolidate meter data exchange for DR and non-DR resources. **For FALL 2016 implementation, this element should not be populated.**

<table>
<thead>
<tr>
<th>Element</th>
<th>Data Description</th>
<th>Type/Length</th>
<th>Req'd</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRID</td>
<td>Master resource identifier of the distributed energy resource container (also referred to in the DRS system as the location) – not relevant to this specification, but used for submission of DR locations</td>
<td>String</td>
<td>No</td>
</tr>
<tr>
<td>name</td>
<td>Name of the location – not relevant to this specification</td>
<td>String</td>
<td>No</td>
</tr>
</tbody>
</table>

**MessagePayload.DistributedEnergyResourceContainer.ErrorLog (required) – reasons for error in locations**

This element will be populated when the DRS replacement project has been implemented in order to consolidate meter data exchange for DR and non-DR resources. **For FALL 2016 implementation, this element should not be populated.**

<table>
<thead>
<tr>
<th>Element</th>
<th>Data Description</th>
<th>Type/Length</th>
<th>Req'd</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRID</td>
<td>Master resource identifier of the error (Error Code)</td>
<td>String</td>
<td>No</td>
</tr>
<tr>
<td>startTime</td>
<td>Start time of the error in GMT</td>
<td>datetime</td>
<td>No</td>
</tr>
<tr>
<td>endTime</td>
<td>End time of the error in GMT</td>
<td>datetime</td>
<td>No</td>
</tr>
<tr>
<td>errMessage</td>
<td>error message</td>
<td>String</td>
<td>Yes</td>
</tr>
<tr>
<td>errPriority</td>
<td>Priority number for the error message, default is 0</td>
<td>integer</td>
<td>Yes</td>
</tr>
<tr>
<td>logTimeStamp</td>
<td>Date time when the error was created</td>
<td>datetime</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Element Data Description

| MessagePayload.DemandResponseRegistration (optional) (0 to unbounded occurrences) |
|---------------------------------|---------------------------------|
| **mRID** | Master resource identifier of the registration aka Registration ID | String | No |
| **name** | Name of the registration | String | No |

This element will be populated when the DRS replacement project has been implemented in order to consolidate meter data exchange for DR and non-DR resources. **For FALL 2016 implementation, this element should not be populated.**

| MessagePayload.DemandResponseRegistration.ErrorLog (required) – reasons for error in batch |
|---------------------------------|---------------------------------|
| **mRID** | Master resource identifier of the error (Error Code) | String | No |
| **startTime** | Start time of the error in GMT | datetime | No |
| **endTime** | End time of the error in GMT | datetime | No |
| **errMessage** | error message | String | Yes |
| **errPriority** | Priority number for the error message, default is 0 | integer | Yes |
| **logTimeStamp** | Date time when the error was created in GMT | datetime | Yes |

This element will be populated when the DRS replacement project has been implemented in order to consolidate meter data exchange for DR and non-DR resources. **For FALL 2016 implementation, this element should not be populated.**

| MessagePayload.ErrorLog (optional) – There can be some errors which are not associated with any resources in those situations this element will be used. For example, when batch payload fails xsd schema validations |
|---------------------------------|---------------------------------|
| **mRID** | Master resource identifier of the Error (Error Code) | String | No |
| **startTime** | Start time of the error in GMT | datetime | No |
| **endTime** | End time of the error in GMT | datetime | No |
| **errMessage** | error message | String | Yes |
| **errPriority** | Priority number for the error message, default is 0. | integer | Yes |
| **logTimeStamp** | Date time when the error was created in GMT | datetime | Yes |

| MessagePayload.RegisteredResource.RegisteredGenerator (Optional) |
|---------------------------------|---------------------------------|
| **mRID** | Master resource identifier of the registered generator resource as specified in masterfile | String | No |
| **name** | Name of the resource | String | No |

| MessagePayload.RegisteredResource.RegisteredInterTie (Optional) |
|---------------------------------|---------------------------------|
| **mRID** | Master resource identifier of the registered intertie resource as specified in Masterfile | String | No |

Note: This class will not be used in the current implementation and is included for potential future use.
<table>
<thead>
<tr>
<th>Element</th>
<th>Data Description</th>
<th>Type/Length</th>
<th>Req’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Name of the resource</td>
<td>String</td>
<td>No</td>
</tr>
</tbody>
</table>

**MessagePayload.RegisteredResource.RegisteredLoad (Optional)**

<table>
<thead>
<tr>
<th>mRID</th>
<th>Master resource identifier of the registered load resource as specified in masterfile</th>
<th>String</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Name of the resource</td>
<td>String</td>
<td>No</td>
</tr>
</tbody>
</table>

**MessagePayload.RegisteredResource.Flowgate (Optional)**

<table>
<thead>
<tr>
<th>mRID</th>
<th>Master resource identifier of the flowgate resource as provided in the master file. A flowgate is defined as any schedule flow between two substations. In the metering space, an intertie and/or citigate is referred to as a flowgate.</th>
<th>String</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Name of the resource</td>
<td>String</td>
<td>No</td>
</tr>
</tbody>
</table>

**MessagePayload.RegisteredResource.Measurements (Optional)**

<table>
<thead>
<tr>
<th>measurementType</th>
<th>Type of the measurement. Valid values are: LOAD or GEN or MBMA*</th>
<th>String</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>*Meter Before Meter After (MBMA) can only be used upon ESDER 2 project activation for DRS Replacement. Measurement types are the same as channel ID in current metering solution. LOAD is channel 1 and GEN is channel 4.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


| intervalEndTime | End Datetime in GMT of the interval for which the meter value is being submitted or retrieved. This is interval ending. | dateTime | Yes |

**MessagePayload.RegisteredResource.ErrorLog (one to many occurrences) – reasons for error in batch**

<table>
<thead>
<tr>
<th>mRID</th>
<th>Master resource identifier of the error (Error Code)</th>
<th>String</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>startTime</td>
<td>Start time of the error in GMT This element will not be populated</td>
<td>datetime</td>
<td>No</td>
</tr>
<tr>
<td>endTime</td>
<td>End time of the error in GMT This element will not be populated</td>
<td>datetime</td>
<td>No</td>
</tr>
<tr>
<td>errMessage</td>
<td>error message</td>
<td>String</td>
<td>Yes</td>
</tr>
<tr>
<td>errPriority</td>
<td>Priority number for the error message Default is 0.</td>
<td>integer</td>
<td>Yes</td>
</tr>
<tr>
<td>logTimeStamp</td>
<td>Date time when the error was created in GMT</td>
<td>datetime</td>
<td>Yes</td>
</tr>
</tbody>
</table>
5.4.2 Schema (BatchValidationStatus_v1.xsd)

The XSD can be found at the following location:
Please refer to the latest version of the artifacts found under the technical specifications.

5.4.3 Example XML File (BatchValidationStatus_v1.xml)

5.4.3.1 Requests

5.4.3.1.1 Sample for Request for Batch Validation Status for Batch Id

```xml
<?xml version="1.0" encoding="UTF-8"?>
<BatchValidationStatus
xmlns="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#
BatchValidationStatus_v1.xsd">
<MessageHeader>
<TimeDate>2001-12-31T12:00:00</TimeDate>
<Source>Source</Source>
<Version>v20160301</Version>
</MessageHeader>
<MessagePayload>
<BatchStatus>
<mRID>232434</mRID>
</BatchStatus>
</MessagePayload>
</BatchValidationStatus>
```

5.4.3.2 Responses

5.4.3.2.1 Sample for Response for Batch Validation Status for Batch Id: SUCCESS

```xml
<?xml version="1.0" encoding="UTF-8"?>
<BatchValidationStatus
xmlns="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#
BatchValidationStatus_v1.xsd">
<MessageHeader>
<TimeDate>2014-11-13T19:32:45.879+00:00</TimeDate>
<Source>String</Source>
<Version>v20160301</Version>
</MessageHeader>
<MessagePayload>
</MessagePayload>
```
5.4.3.2.2 Sample for Response for Batch Validation Status for Batch Id: IN_PROCESS

<? xml version="1.0" encoding="UTF-8"?>
<BatchValidationStatus
    xmlns:BatchValidationStatus_v1_xsd="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#
    BatchValidationStatus_v1.xsd">
    <MessageHeader>
        <TimeDate>2014-11-13T19:32:45.879+00:00</TimeDate>
        <Source>String</Source>
        <Version>v20160301</Version>
    </MessageHeader>
    <MessagePayload>
        <BatchStatus>
            <mRID>232434</mRID>
            <description>IN_PROCESS</description>
            <creationTime>2014-11-13T19:32:45.879+00:00</creationTime>
        </BatchStatus>
    </MessagePayload>
</BatchValidationStatus>

5.4.3.2.3 Sample for Response for Batch Validation Status for Batch Id: ERROR

This is the example for MessagePayload.ErrorLog object.

<? xml version="1.0" encoding="UTF-8"?>
<BatchValidationStatus
    xmlns:BatchValidationStatus_v1_xsd="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#
    BatchValidationStatus_v1.xsd">
    <MessageHeader>
        <TimeDate>2001-12-31T12:00:00</TimeDate>
        <Source>Source</Source>
        <Version>v20160301</Version>
    </MessageHeader>
    <MessagePayload>
        <BatchStatus>
            <mRID>232434</mRID>
            <description>ERROR</description>
            <creationTime>2001-12-31T12:00:00</creationTime>
        </BatchStatus>
    </MessagePayload>
</BatchValidationStatus>
5.4.3.2.4 Sample for Response for Batch Validation Status for Batch Id: ERROR + GEN

```xml
<?xml version="1.0" encoding="UTF-8"?>
<BatchValidationStatus
 xmlns="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#
 BatchValidationStatus_v1.xsd #">
 <MessageHeader>
   <TimeDate>2001-12-31T12:00:00</TimeDate>
   <Source>Source</Source>
   <Version>v20160301</Version>
 </MessageHeader>
 <MessagePayload>
   <BatchStatus>
     <mRID>232434</mRID>
     <description>ERROR</description>
     <creationTime>2001-12-31T12:00:00</creationTime>
   </BatchStatus>
   <RegisteredResource>
     <Measurements>
       <measurementType>GEN</measurementType>
       <MeasurementValue>
         <intervalEndTime>2001-12-31T12:00:00Z</intervalEndTime>
       </MeasurementValue>
     </Measurements>
     <RegisteredGenerator>
       <mRID>RES_001</mRID>
     </RegisteredGenerator>
   </RegisteredResource>
 </MessagePayload>
</BatchValidationStatus>
```
<name>RES_001</name>
</RegisteredGenerator>
</ErrorLog>
<ErrorLog>
<mRID>1006</mRID>
<endTime>2001-12-31T12:00:00</endTime>
<errMessage>Empty Measurement Quality </errMessage>
<errPriority>0</errPriority>
<logTimeStamp>2001-12-31T12:00:00</logTimeStamp>
<startTime>2001-12-31T12:00:00</startTime>
</ErrorLog>
</RegisteredResource>
<RegisteredResource>
<Measurements>
<measurementType>GEN</measurementType>
<MeasurementValue>
<intervalEndTime>2001-12-31T14:00:00Z</intervalEndTime>
</MeasurementValue>
</Measurements>
<RegisteredGenerator>
<mRID>RES_002</mRID>
<name>RES_002</name>
</RegisteredGenerator>
</ErrorLog>
<ErrorLog>
<mRID>1004</mRID>
<endTime>2001-12-31T12:00:00</endTime>
<errMessage>Invalid Resource</errMessage>
<errPriority>0</errPriority>
<logTimeStamp>2001-12-31T12:00:00</logTimeStamp>
<startTime>2001-12-31T12:00:00</startTime>
</ErrorLog>
</ErrorLog>
</RegisteredResource>
<RegisteredResource>
<Measurements>
<measurementType>GEN</measurementType>
<MeasurementValue>
<intervalEndTime>2001-12-31T14:00:00Z</intervalEndTime>
</MeasurementValue>
</Measurements>
<RegisteredGenerator>
<mRID>RES_002</mRID>
<name>RES_002</name>
</RegisteredGenerator>
</ErrorLog>
<ErrorLog>
<mRID>1005</mRID>
<endTime>2001-12-31T12:00:00</endTime>
<errMessage>versionTag should not be populated for submission</errMessage>
<errPriority>8</errPriority>
<logTimeStamp>2001-12-31T12:00:00</logTimeStamp>
<startTime>2001-12-31T12:00:00</startTime>
</ErrorLog>
</RegisteredResource>
<RegisteredResource>
<Measurements>
<measurementType>GEN</measurementType>
<MeasurementValue>
<intervalEndTime>2001-12-31T14:00:00Z</intervalEndTime>
</MeasurementValue>
</Measurements>
<RegisteredGenerator>
<mRID>RES_002</mRID>
<name>RES_002</name>
</RegisteredGenerator>
</ErrorLog>
<ErrorLog>
<mRID>1004</mRID>
<endTime>2001-12-31T12:00:00</endTime>
<errMessage>Invalid Resource</errMessage>
<errPriority>0</errPriority>
<logTimeStamp>2001-12-31T12:00:00</logTimeStamp>
<startTime>2001-12-31T12:00:00</startTime>
</ErrorLog>
</ErrorLog>
</RegisteredResource>
<RegisteredResource>
<Measurements>
<measurementType>GEN</measurementType>
<MeasurementValue>
<intervalEndTime>2001-12-31T14:00:00Z</intervalEndTime>
</MeasurementValue>
</Measurements>
<RegisteredGenerator>
<mRID>RES_002</mRID>
<name>RES_002</name>
</RegisteredGenerator>
</ErrorLog>
<ErrorLog>
<mRID>1005</mRID>
<endTime>2001-12-31T12:00:00</endTime>
<errMessage>versionTag should not be populated for submission</errMessage>
<errPriority>8</errPriority>
<logTimeStamp>2001-12-31T12:00:00</logTimeStamp>
<startTime>2001-12-31T12:00:00</startTime>
</ErrorLog>
</RegisteredResource>
<RegisteredResource>
<Measurements>
<measurementType>GEN</measurementType>
<MeasurementValue>
<intervalEndTime>2001-12-31T14:00:00Z</intervalEndTime>
</MeasurementValue>
</Measurements>
<RegisteredGenerator>
<mRID>RES_002</mRID>
<name>RES_002</name>
</RegisteredGenerator>
</ErrorLog>
5.4.3.2.5 Sample for Response for Batch Validation Status for Batch Id: ERROR + LOAD + GEN

<? xml version="1.0" encoding="UTF-8"?>
<BatchValidationStatus
 xmlns="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#
 BatchValidationStatus_v1.xsd ">
  <MessageHeader>
    <TimeDate>2001-12-31T12:00:00</TimeDate>
    <Source>Source</Source>
    <Version>v20160301</Version>
  </MessageHeader>
  <MessagePayload>
    <BatchStatus>
      <mRID>232434</mRID>
      <description>ERROR</description>
      <creationTime>2001-12-31T12:00:00</creationTime>
    </BatchStatus>
    <RegisteredResource>
      <Measurements>
        <measurementType>GEN</measurementType>
        <IntervalEndTime>2001-12-31T12:00:00Z</IntervalEndTime>
      </Measurements>
      <RegisteredGenerator>
        <mRID>RES_001</mRID>
        <name>RES_001</name>
      </RegisteredGenerator>
      <ErrorLog>
        <mRID>1004</mRID>
        <endTime>2001-12-31T12:00:00</endTime>
        <errMessage>Invalid Resource</errMessage>
        <errPriority>0</errPriority>
        <logTimeStamp>2001-12-31T12:00:00</logTimeStamp>
        <startTime>2001-12-31T12:00:00</startTime>
      </ErrorLog>
    </RegisteredResource>
    <ErrorLog>
      <mRID>1006</mRID>
      <endTime>2001-12-31T12:00:00</endTime>
      <errMessage>Empty Measurement Quality</errMessage>
    </ErrorLog>
  </MessagePayload>
</BatchValidationStatus>
<errPriority>0</errPriority>
<logTimeStamp>2001-12-31T12:00:00</logTimeStamp>
<startTime>2001-12-31T12:00:00</startTime>
</ErrorLog>
</RegisteredResource>
<Measurements>
  <measurementType>LOAD</measurementType>
  <MeasurementValue>
    <intervalEndTime>2001-12-31T14:00:00Z</intervalEndTime>
  </MeasurementValue>
</Measurements>
</RegisteredLoad>
<ErrorLog>
  <mRID>LDRES_004</mRID>
  <endTime>2001-12-31T12:00:00</endTime>
  <errMessage>Invalid Resource</errMessage>
  <errPriority>0</errPriority>
  <logTimeStamp>2001-12-31T12:00:00</logTimeStamp>
  <startTime>2001-12-31T12:00:00</startTime>
</ErrorLog>
</RegisteredResource>
</MessagePayload>
</BatchValidationStatus>

5.4.3.2.6 Sample for Response for Batch Validation Status for Batch Id: ERROR + FLOW GATE

<? xml version="1.0" encoding="UTF-8"?>
<BatchValidationStatus
  xmlns="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#" BatchValidationStatus_v1.xsd "">
  <MessageHeader>
    <TimeDate>2001-12-31T12:00:00</TimeDate>
    <Source>Source</Source>
  </MessageHeader>

  <mRID>1004</mRID>
  <endTime>2001-12-31T12:00:00</endTime>
  <errMessage>versionTag should not be populated for submission</errMessage>
  <errPriority>0</errPriority>
  <logTimeStamp>2001-12-31T12:00:00</logTimeStamp>
  <startTime>2001-12-31T12:00:00</startTime>
</ErrorLog>
</RegisteredResource>
</MessagePayload>
</BatchValidationStatus>
<Version>v20160301</Version>
</MessageHeader>
<MessagePayload>
<BatchStatus>
<mRID>232434</mRID>
<description>ERROR</description>
<creationTime>2001-12-31T12:00:00</creationTime>
</BatchStatus>
<RegisteredResource>
<Flowgate>
<mRID>FG_RES_001</mRID>
<name>FG_RES_001</name>
</Flowgate>
<Measurements>
<measurementType>GEN</measurementType>
<MeasurementValue>
<intervalEndTime>2001-12-31T12:00:00Z</intervalEndTime>
</MeasurementValue>
</Measurements>
</RegisteredResource>
<ErrorLog>
<mRID>1004</mRID>
<endTime>2001-12-31T12:00:00</endTime>
<errMessage>Invalid Resource</errMessage>
<errPriority>0</errPriority>
<logTimeStamp>2001-12-31T12:00:00</logTimeStamp>
<startTime>2001-12-31T12:00:00</startTime>
</ErrorLog>
<ErrorLog>
<mRID>1006</mRID>
<endTime>2001-12-31T12:00:00</endTime>
<errMessage>Empty Measurement Quality</errMessage>
<errPriority>0</errPriority>
<logTimeStamp>2001-12-31T12:00:00</logTimeStamp>
<startTime>2001-12-31T12:00:00</startTime>
</ErrorLog>
</RegisteredResource>
<RegisteredResource>
<Flowgate>
<mRID>FG_RES_002</mRID>
<name>FG_RES_002</name>
</Flowgate>
<Measurements>
<measurementType>LOAD</measurementType>
<MeasurementValue>
<intervalEndTime>2001-12-31T14:00:00Z</intervalEndTime>
</MeasurementValue>
</Measurements>
</RegisteredResource>
</ErrorLog>
5.4.3.2 Sample for Response for Batch Validation Status for Batch Id: WARNING + GEN

<? xml version="1.0" encoding="UTF-8"?>
<BatchValidationStatus
    xmlns="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.caiso.com/soa/BatchValidationStatus_v1.xsd#
    BatchValidationStatus_v1.xsd">
    <MessageHeader>
        <TimeDate>2001-12-31T12:00:00</TimeDate>
        <Source>Source</Source>
        <Version>v20160301</Version>
    </MessageHeader>
    <MessagePayload>
        <BatchStatus>
            <mRID>232434</mRID>
            <description>WARNING</description>
            <creationTime>2001-12-31T12:00:00</creationTime>
        </BatchStatus>
        <RegisteredResource>
            <Measurements>
                <measurementType>GEN</measurementType>
                <MeasurementValue>
                    <intervalEndTime>2001-12-31T12:00:00Z</intervalEndTime>
                </MeasurementValue>
            </Measurements>
        </RegisteredResource>
    </MessagePayload>
</BatchValidationStatus>
<RegisteredGenerator>
    <mRID>RES_001</mRID>
</RegisteredGenerator>

<ErrorLog>
    <mRID>1028</mRID>
    <endTime>2001-12-31T12:00:00</endTime>
    <errMessage>Meter value of 3 MWh exceeds the PMAX of 1 MWh</errMessage>
    <errPriority>0</errPriority>
    <logTimeStamp>2001-12-31T12:00:00</logTimeStamp>
    <startTime>2001-12-31T12:00:00</startTime>
</ErrorLog>

</RegisteredResource>
</MessagePayload>
</BatchValidationStatus>
6. RetrieveMeterData

6.1 Use Model

The diagram below shows the sequence for retrieveMeterData.
6.2 Operation Details

The service has `retrieveMeterData_v1` operation with three message types. All input and output messages are in XML format.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Message Types</th>
<th>Message</th>
<th>WSDL</th>
<th>XSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>retrieveMeterData_v1</td>
<td>Input</td>
<td>retrieveMeterDataRequest</td>
<td>retrieveMeterData_v1.wsdl</td>
<td>RequestMeterData_v1.xsd</td>
</tr>
<tr>
<td></td>
<td>Output</td>
<td>retrieveMeterDataResponse</td>
<td>retrieveMeterData_v1_DocAttach.wsdl</td>
<td>MeterData_v1.xsd</td>
</tr>
<tr>
<td></td>
<td>Fault</td>
<td>faultReturnType</td>
<td>StandardOutput_v1.xsd</td>
<td></td>
</tr>
</tbody>
</table>

The structure of the request for retrieving the meter data information is described below in 5.4. The response structure (MeterData_v1.xsd) and StandardOutput_v1.xsd have been described earlier in this document in sections 4.4 and 4.5.

6.3 WSDL (retrieveMeterData_v1.wsdl)

- `retrieveMeterData_v1.wsdl` – Used for normal SOAP messaging
- `retrieveMeterData_v1_DocAttach.wsdl` – Used when .NET is the source of processing

The WSDL can be found at the following location:

Please refer to the latest version of the artifacts found under the technical specifications.

6.4 Message Type

`retrieveMeterDataRequest`

6.4.1 Element Table

<table>
<thead>
<tr>
<th>Element</th>
<th>Data Description</th>
<th>Type/Length</th>
<th>Req’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>MessageHeader (Optional)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Element | Data Description | Type/Length | Req’d
--- | --- | --- | ---
TimeDate | Application level relevant time and date for when this instance of the message was produced, in Pacific Prevailing Time format | datetime | No
Source | Source system which provides data for this service | String | No
Version | Date reflecting the release this latest version update was related to. Valid value is: v20160301 | String | Yes

**MessagePayload (required)**

**MessagePayload.MeterDataRequest (one or more occurrences)**

**requestType** | Type of request. Valid values are: METER_DATA or DR_CALCULATED_DATA. The type ‘METER_DATA’ returns information related to the meter data. DR_CALCULATED_DATA relates information regarding the baseline and performance calculation and is not effective at this time. Any request with DR_CALCULATED_DATA will be rejected. | String | Yes

updateSinceDateTime | This field can be used to retrieve incremental changes by specifying the datetime since when the records were updated. | DateTime | No

**MessagePayload.MeterDataRequest.DemandResponseRegistration (optional, for demand response only)**

This element will be populated when the DRS replacement project has been implemented in order to consolidate meter data exchange for DR and non-DR resources. For FALL 2016 implementation, this element should not be populated.

**mRID** | Master resource identifier of the registration (Registration ID) | String | Yes

**MessagePayload.MeterDataRequest.Measurement (optional)**

measurementType | Type of the measurement. Valid values are: LOAD or GEN or MBMA*“Meter Befor Meter After (MBMA) can only be used upon ESDER 2 project activation for DRS Replacement.” Measurement types are the same as channel ID in current metering solution. LOAD is channel 1 and GEN is channel 4. | String | No
<table>
<thead>
<tr>
<th>Element</th>
<th>Data Description</th>
<th>Type/Length</th>
<th>Req’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>timeIntervalLength</td>
<td>Interval length of the trading time in minutes. Valid values are: 5, 10, 15 or 60</td>
<td>Integer</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Data submitted in any granularity will be saved in the database in 5 minute interval length. If a user specifies a value other than 5 in this field, the data will be aggregated to the requested granularity. If the user does not specify a value, the default is what is specified in the master file for that particular resource.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>unitMultiplier</td>
<td>The unit multiplier of the measured quantity. Valid values are: M for Megawatt or k for kilowatt Values are case sensitive.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>unitSymbol</td>
<td>The unit of measure of the measured quantity. Valid value is: Wh Value is case sensitive.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>versionTag</td>
<td>The version of the submission. Will be populated only in the retrieve response. Cannot be specified for submissions. Valid values are: CURRENT, PREVIOUS or HISTORY HISTORY can be used to retrieve all versions. If no version is specified, then the default is CURRENT. The application will maintain two versions for a given data set: CURRENT and PREVIOUS. All prior versions will not be maintained. Request for a version of HISTORY will result in a response of meter data that was used in each of the various settlements runs, which are T+3B, T+12B, T+55B, T+9M, T+18M, T+35M, T+36M, in addition to CURRENT and PREVIOUS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MessagePayload.MeterDataRequest.rangePeriod</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>end</td>
<td>End date and time of interval in GMT format for which data is requested. End limit of End Datetime in GMT of the interval for which the meter value is being retrieved. This is interval ending.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>start</td>
<td>Start date and time of interval in GMT format for which data is requested. Start limit of End Datetime in GMT of the interval for which the meter value is being retrieved. This is interval ending.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Element</th>
<th>Data Description</th>
<th>Type/Length</th>
<th>Req’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRID</td>
<td>Master resource identifier of the generator resources as specified by master file. Keyword ALL can be used to retrieve data for all generator resources. Request for “ALL” resources cannot be combined with individual resource IDs in the same MeterDataRequest class.</td>
<td>String</td>
<td>Yes*</td>
</tr>
</tbody>
</table>

**MessagePayload.MeterDataRequest.RegisteredInterTie *(one or more occurrences)*

| mRID   | Master resource identifier of the intertie resource as provided in the master file. Keyword ALL can be used to retrieve data for all intertie resources. Note: This class will not be used in the current implementation and is included for potential future use. | String | Yes* |

**MessagePayload.MeterDataRequest.RegisteredLoad *(one or more occurrences)*

| mRID   | Master resource identifier of the load resource as provided in the master file. Keyword ALL can be used to retrieve data for all load resources. Request for “ALL” resources cannot be combined with individual resource IDs in the same MeterDataRequest class. | String | Yes* |

**MessagePayload.MeterDataRequest.Flowgate *(one or more occurrences)*

| mRID   | Master resource identifier of the flowgate resource as provided in the master file. A flowgate is defined as any schedule flow between two substations. In the metering space, an intertie and/or citigate is referred to as a flowgate. Keyword ALL can be used to retrieve data for all flowgate resources. Request for “ALL” resources cannot be combined with individual resource IDs in the same MeterDataRequest class. | String | Yes* |

**MessagePayload.MeterDataRequest.SchedulingCoordinator**

| scid   | This field can be used for data retrieval for a specific SCID or ACL Group. | String | No |

*Only one of these four elements is required for a specific request*

### 6.4.2 Schema (RequestMeterData_v1.xsd)

The XSD can be found at the following location:

Please refer to the latest version of the artifacts found under the technical specifications.
6.4.3 Example XML File (RequestMeterData_v1.xml)

6.4.3.1 Requests

6.4.3.1.1 Sample request to retrieve meter data based on a Time Range and PREVIOUS + GEN

```xml
<?xml version="1.0" encoding="UTF-8"?>
  <MessageHeader>
    <TimeDate>2001-12-31T12:00:00</TimeDate>
    <Source>Source</Source>
    <Version>v20160301</Version>
  </MessageHeader>
  <MessagePayload>
    <MeterDataRequest>
      <requestType>METER_DATA</requestType>
      <Measurement>
        <measurementType>GEN</measurementType>
        <unitMultiplier>M</unitMultiplier>
        <unitSymbol>Wh</unitSymbol>
        <versionTag>PREVIOUS</versionTag>
      </Measurement>
      <RegisteredGenerator>
        <mRID>Gen_Res_001</mRID>
      </RegisteredGenerator>
      <rangePeriod>
        <end>2015-06-30T12:00:00Z</end>
        <start>2015-01-31T12:05:00Z</start>
      </rangePeriod>
    </MeterDataRequest>
  </MessagePayload>
</RequestMeterData>
```

6.4.3.1.2 Sample request to retrieve meter data based on a Time Range and CURRENT + LOAD

```xml
<?xml version="1.0" encoding="UTF-8"?>
  <MessageHeader>
    <TimeDate>2001-12-31T12:00:00</TimeDate>
    <Source>Source</Source>
    <Version>v20160301</Version>
  </MessageHeader>
  <MessagePayload>
    <MeterDataRequest>
      <requestType>METER_DATA</requestType>
      <Measurement>
        <measurementType>LOAD</measurementType>
        <unitMultiplier>kW</unitMultiplier>
        <unitSymbol>Wh</unitSymbol>
        <versionTag>CURRENT</versionTag>
      </Measurement>
      <RegisteredGenerator>
        <mRID>Gen_Res_001</mRID>
      </RegisteredGenerator>
      <rangePeriod>
        <end>2015-06-30T12:00:00Z</end>
        <start>2015-01-31T12:05:00Z</start>
      </rangePeriod>
    </MeterDataRequest>
  </MessagePayload>
</RequestMeterData>
```
6.4.3.1.3 Sample request to retrieve meter data based on a Time Range and CURRENT + FLOW GATE

```xml
<?xml version="1.0" encoding="UTF-8"?>
<RequestMeterData xmlns="http://www.caiso.com/soa/RequestMeterData_v1.xsd#
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.caiso.com/soa/RequestMeterData_v1.xsd#
RequestMeterData_v1.xsd #" >
<MessagePayload>
<MessageDataRequest>
<requestType>METER_DATA</requestType>
<Measurement>
<measurementType>LOAD</measurementType>
<unitMultiplier>M</unitMultiplier>
<unitSymbol>Wh</unitSymbol>
<versionTag>CURRENT</versionTag>
</Measurement>
<RegisteredLoad>
<mRID>ld_Res_001</mRID>
</RegisteredLoad>
<rangePeriod>
<start>2015-01-31T12:05:00Z</start>
<end>2015-06-30T12:00:00Z</end>
</rangePeriod>
</MessageDataRequest>
</MessagePayload>
</RequestMeterData>
```
6.4.3.1.4 Sample request to retrieve meter data based on a Time Range and HISTORY + GEN + Measurement Type GEN

```xml
<mRID>FG_Res_001</mRID>

<rangePeriod>
  <end>2015-06-30T12:00:00Z</end>
  <start>2015-01-31T12:00:00Z</start>
</rangePeriod>

</MeterDataRequest>
</MessagePayload>
</RequestMeterData>
```

6.4.3.1.5 Sample request to retrieve meter data based on a Time Range and HISTORY + LOAD + Measurement Type LOAD

```xml
<?xml version="1.0" encoding="UTF-8"?>

<!-- XML Content -->
```

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6.4.3.1.6 Sample request to retrieve meter data based on a Time Range + ALL Generators + SC ID

```xml
<xml version="1.0" encoding="UTF-8" xmlns="http://www.caiso.com/soa/RequestMeterData_v1.xsd#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.caiso.com/soa/RequestMeterData_v1.xsd#"
RequestMeterData_v1.xsd">
<MessageHeader>
  <TimeDate>2001-12-31T12:00:00</TimeDate>
  <Source>Source</Source>
  <Version>v20160301</Version>
</MessageHeader>
<MessagePayload>
  <MeterDataRequest>
    <requestType>METER_DATA</requestType>
    <Measurement>
      <measurementType>LOAD</measurementType>
      <unitMultiplier>M</unitMultiplier>
      <unitSymbol>Wh</unitSymbol>
      <versionTag>HISTORY</versionTag>
    </Measurement>
    <RegisteredLoad>
      <mRID>LD_Res_001</mRID>
    </RegisteredLoad>
    <rangePeriod>
      <end>2015-06-30T12:00:00Z</end>
      <start>2015-01-31T12:00:00Z</start>
    </rangePeriod>
  </MeterDataRequest>
</MessagePayload>
</xml>
```
6.4.3.1.7 Sample request to retrieve meter data based on a Time Range and HISTORY + GEN + Measurement Type GEN + timeIntervalLength

```xml
<xml version="1.0" encoding="UTF-8">
  <MessageHeader>
    <TimeDate>2001-12-31T12:00:00</TimeDate>
    <Source>Source</Source>
    <Version>v20160301</Version>
  </MessageHeader>
  <MessagePayload>
    <MeterDataRequest>
      <requestType>METER_DATA</requestType>
      <Measurement>
        <measurementType>GEN</measurementType>
        <timeIntervalLength>60</timeIntervalLength>
      </Measurement>
      <unitMultiplier>M</unitMultiplier>
      <unitSymbol>Wh</unitSymbol>
      <versionTag>HISTORY</versionTag>
      <RegisteredGenerator>
        <mRID>Gen_Res_001</mRID>
      </RegisteredGenerator>
      <rangePeriod>
        <end>2015-06-30T12:00:00Z</end>
        <start>2015-01-31T12:00:00Z</start>
      </rangePeriod>
    </MeterDataRequest>
  </MessagePayload>
</RequestMeterData>
```
6.4.3.1.8 Sample request to retrieve meter data based on a Time Range and HISTORY + GEN + Measurement Type GEN + timeIntervalLength + updateSinceDateTime

```xml
<?xml version="1.0" encoding="UTF-8"?>
<RequestMeterData xmlns="http://www.caiso.com/soa/RequestMeterData_v1.xsd#"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.caiso.com/soa/RequestMeterData_v1.xsd# RequestMeterData_v1.xsd ">
  <MessageHeader>
    <TimeDate>2001-12-31T12:00:00</TimeDate>
    <Source>Source</Source>
    <Version>v20160301</Version>
  </MessageHeader>
  <MessagePayload>
    <MeterDataRequest>
      <requestType>METER_DATA</requestType>
      <updateSinceDateTime>2016-10-30T12:00:00</updateSinceDateTime>
      <Measurement>
        <measurementType>GEN</measurementType>
        <timeIntervalLength>60</timeIntervalLength>
        <unitMultiplier>M</unitMultiplier>
        <unitSymbol>Wh</unitSymbol>
        <versionTag>HISTORY</versionTag>
      </Measurement>
      <RegisteredGenerator>
        <mRID>Gen_Res_001</mRID>
      </RegisteredGenerator>
      <rangePeriod>
        <end>2015-06-30T12:00:00Z</end>
        <start>2015-01-31T12:00:00Z</start>
      </rangePeriod>
    </MeterDataRequest>
  </MessagePayload>
</RequestMeterData>
```

6.4.3.1.9 Sample request to retrieve meter data based on a Time Range and multiple resource IDs + Measurement Type GEN + timeIntervalLength + updateSinceDateTime

```xml
<?xml version="1.0" encoding="UTF-8"?>
<RequestMeterData xmlns="http://www.caiso.com/soa/RequestMeterData_v1.xsd#"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.caiso.com/soa/RequestMeterData_v1.xsd# RequestMeterData_v1.xsd ">
  <MessageHeader>
    <TimeDate>2001-12-31T12:00:00</TimeDate>
    <Source>Source</Source>
    <Version>v20160301</Version>
  </MessageHeader>
  <MessagePayload>
    <MeterDataRequest>
      <requestType>METER_DATA</requestType>
      <updateSinceDateTime>2016-10-30T12:00:00</updateSinceDateTime>
      <Measurement>
        <measurementType>GEN</measurementType>
        <timeIntervalLength>60</timeIntervalLength>
        <unitMultiplier>M</unitMultiplier>
        <unitSymbol>Wh</unitSymbol>
        <versionTag>HISTORY</versionTag>
      </Measurement>
      <RegisteredGenerator>
        <mRID>Gen_Res_001</mRID>
      </RegisteredGenerator>
      <rangePeriod>
        <end>2015-06-30T12:00:00Z</end>
        <start>2015-01-31T12:00:00Z</start>
      </rangePeriod>
    </MeterDataRequest>
  </MessagePayload>
</RequestMeterData>
```
6.4.3.2 Responses

6.4.3.2.1 Sample response for GEN measurement type + CURRENT

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xmlVersion="1.0" encoding="UTF-8"/>
<Message>
  <MessageHeader>
    <TimeDate>2014-11-13T19:32:45.879+00:00</TimeDate>
    <Source>String</Source>
  </MessageHeader>
  <MessageType>
    <measurementType>GEN</measurementType>
    <timeIntervalLength>60</timeIntervalLength>
    <unitMultiplier>M</unitMultiplier>
    <unitSymbol>Wh</unitSymbol>
    <versionTag>HISTORY</versionTag>
  </MessageType>
  <Measurement>
    <mRID>Gen_Res_001</mRID>
  </Measurement>
  <Measurement>
    <mRID>Gen_Res_002</mRID>
  </Measurement>
  <Measurement>
    <mRID>Gen_Res_003</mRID>
  </Measurement>
  <Measurement>
    <mRID>Gen_Res_004</mRID>
  </Measurement>
  <rangePeriod>
    <start>2017-06-01T12:00:00Z</start>
    <end>2017-06-30T12:00:00Z</end>
  </rangePeriod>
</Message>
```
<Version>v20160301</Version>
<MessageHeader>
<MessagePayload>
<MeterMeasurementData>
  <measurementType>GEN</measurementType>
  <timeIntervalLength>5</timeIntervalLength>
  <unitMultiplier>M</unitMultiplier>
  <unitSymbol>Wh</unitSymbol>
  <MeasurementValue>
    <intervalEndTime>2014-11-13T19:35:00Z</intervalEndTime>
    <meterValue>2</meterValue>
    <timeStamp>2014-11-13T19:32:45.879+00:00</timeStamp>
    <VersionInfo>
      <measurementQuality>ACTUAL</measurementQuality>
      <versionTag>CURRENT</versionTag>
    </VersionInfo>
  </MeasurementValue>
  <MeasurementValue>
    <intervalEndTime>2014-11-13T19:40:00Z</intervalEndTime>
    <meterValue>22</meterValue>
    <timeStamp>2014-11-13T19:32:45.879+00:00</timeStamp>
    <VersionInfo>
      <measurementQuality>ACTUAL</measurementQuality>
      <versionTag>CURRENT</versionTag>
    </VersionInfo>
  </MeasurementValue>
  <MeasurementValue>
    <intervalEndTime>2014-11-13T19:45:00Z</intervalEndTime>
    <meterValue>22</meterValue>
    <timeStamp>2014-11-13T19:32:45.879+00:00</timeStamp>
    <VersionInfo>
      <measurementQuality>ACTUAL</measurementQuality>
      <versionTag>CURRENT</versionTag>
    </VersionInfo>
  </MeasurementValue>
  <MeasurementValue>
    <intervalEndTime>2014-09-13T19:50:00Z</intervalEndTime>
    <meterValue>23</meterValue>
    <timeStamp>2014-11-13T19:32:45.879+00:00</timeStamp>
    <VersionInfo>
      <measurementQuality>ACTUAL</measurementQuality>
      <versionTag>CURRENT</versionTag>
    </VersionInfo>
  </MeasurementValue>
  </MeterMeasurementData>
  <RegisteredGenerator>
    <mRID>GEN123</mRID>
  </RegisteredGenerator>
</MessagePayload>
6.4.3.2 Sample response for LOAD measurement type: +PREVIOUS

```xml
<?xml version="1.0" encoding="UTF-8"?>
<MeterData xmlns="http://www.caiso.com/soa/MeterData_v1.xsd#"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.caiso.com/soa/MeterData_v1.xsd# MeterData_v1.xsd">
  <MessageHeader>
    <TimeDate>2014-11-13T19:32:45.879+00:00</TimeDate>
    <Source>String</Source>
    <Version>v20160301</Version>
  </MessageHeader>
  <MessagePayload>
    <MeterMeasurementData>
      <measurementType>LOAD</measurementType>
      <timeIntervalLength>5</timeIntervalLength>
    </MeterMeasurementData>
    <MeasurementValue>
      <intervalEndTime>2014-11-13T19:35:00Z</intervalEndTime>
      <meterValue>5</meterValue>
      <timeStamp>2014-11-13T19:32:45.879+00:00</timeStamp>
      <VersionInfo>
        <measurementQuality>ACTUAL</measurementQuality>
        <versionTag>PREVIOUS</versionTag>
      </VersionInfo>
    </MeasurementValue>
    <MeasurementValue>
      <intervalEndTime>2014-11-13T19:35:00Z</intervalEndTime>
      <meterValue>2</meterValue>
      <timeStamp>2014-11-13T19:32:45.879+00:00</timeStamp>
      <VersionInfo>
        <measurementQuality>ACTUAL</measurementQuality>
        <versionTag>PREVIOUS</versionTag>
      </VersionInfo>
    </MeasurementValue>
    <MeasurementValue>
      <intervalEndTime>2014-11-13T19:35:00Z</intervalEndTime>
      <meterValue>4</meterValue>
      <timeStamp>2014-11-13T19:32:45.879+00:00</timeStamp>
      <VersionInfo>
        <measurementQuality>ACTUAL</measurementQuality>
        <versionTag>PREVIOUS</versionTag>
      </VersionInfo>
    </MeasurementValue>
  </MessagePayload>
</MeterData>
```
6.4.3.2.3 Sample response for Resource Type: Flow Gate + Measurement Type : Gen +Version: CURRENT

```xml
    <messageHeader>
        <timeDate>2014-11-13T19:32:45.879+00:00</timeDate>
        <source>String</source>
        <version>v20160301</version>
    </messageHeader>
    <messagePayload>
        <meterMeasurementData>
            <measurementType>GEN</measurementType>
            <timeIntervalLength>5</timeIntervalLength>
            <unitMultiplier>M</unitMultiplier>
            <unitSymbol>Wh</unitSymbol>
        </meterMeasurementData>
        <measurementValue>
            <intervalEndTime>2014-11-13T19:35:00Z</intervalEndTime>
            <meterValue>2</meterValue>
            <timeStamp>2014-11-13T19:32:45.879+00:00</timeStamp>
            <versionInfo>
                <measurementQuality>ACTUAL</measurementQuality>
                <versionTag>CURRENT</versionTag>
            </versionInfo>
        </measurementValue>
        <measurementValue>
            <intervalEndTime>2014-11-13T19:40:00Z</intervalEndTime>
            <meterValue>22</meterValue>
            <timeStamp>2014-11-13T19:32:45.879+00:00</timeStamp>
            <versionInfo>
                <measurementQuality>ACTUAL</measurementQuality>
                <versionTag>CURRENT</versionTag>
            </versionInfo>
        </measurementValue>
    </messagePayload>
</meterData>
```
6.4.3.2.4 Sample response for Resource Type: Generator + Measurement Type: Gen + Version: HISTORY

```xml
<xml version="1.0" encoding="UTF-8"/>
<MeterData xmlns="http://www.caiso.com/soa/MeterData_v1.xsd#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.caiso.com/soa/MeterData_v1.xsd# MeterData_v1.xsd">
<MessageHeader>
  <TimeDate>2014-11-13T19:32:45.879+00:00</TimeDate>
  <Source>String</Source>
  <Version>v20160301</Version>
</MessageHeader>
<MessagePayload>
  <MeterMeasurementData>
    <measurementType>GEN</measurementType>
    <timeIntervalLength>5s</timeIntervalLength>
    <unitMultiplier>M</unitMultiplier>
    <unitSymbol>Wh</unitSymbol>
    <MeasurementValue>
      <intervalEndTime>2014-11-13T19:35:00Z</intervalEndTime>
      <meterValue>2</meterValue>
      <timeStamp>2014-11-13T19:32:45.879+00:00</timeStamp>
    </MeasurementValue>
  </MeterMeasurementData>
</MessagePayload>
</MeterData>
```
7. Appendix – dateTime Data Type

The dateTime data type is used to specify a date and a time.

The dateTime is specified in the following form YYYY-MM-DDThh:mm:ss [(+|-) hh:mm:ss] where:

- **YYYY** indicates the year
- **MM** indicates the month
- **DD** indicates the day
- **T** indicates the start of the required time section
- **hh** indicates the hour
- **mm** indicates the minute
- **ss** indicates the second
- *(plus) or -(minus)* to specify an offset from the UTC time

Sample dateTime format variations supported by OMAR Replacement API:

- 2016-01-26T07:00:00.000-00:00
- 2016-01-26T07:00:00Z

Note that this version does not support more than 3 decimal places for milliseconds

<table>
<thead>
<tr>
<th>Daily -0000 offset</th>
<th>start</th>
<th>end</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daylight-Savings Time</td>
<td>2014-10-15T07:00:00:00</td>
<td>2014-10-16T07:00:00:00</td>
</tr>
<tr>
<td>Non Daylight-Savings Time</td>
<td>2014-11-15T08:00:00:00</td>
<td>2014-11-16T08:00:00:00</td>
</tr>
<tr>
<td>Short Day</td>
<td>2014-03-09T08:00:00:00</td>
<td>2014-03-10T07:00:00:00</td>
</tr>
<tr>
<td>Long Day</td>
<td>2014-11-02T07:00:00:00</td>
<td>2014-11-03T08:00:00:00</td>
</tr>
</tbody>
</table>
## 8. Appendix – Validation Errors

<table>
<thead>
<tr>
<th>ERROR CODE</th>
<th>ERROR MESSAGE</th>
<th>ERROR DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>Unexpected Error</td>
<td>Unhandled Exception</td>
</tr>
<tr>
<td>1002</td>
<td>Invalid XML</td>
<td>XSD validation errors</td>
</tr>
<tr>
<td>1003</td>
<td>Invalid File</td>
<td>One or many of the mandatory fields are missing in the attachment</td>
</tr>
<tr>
<td>1004</td>
<td>Invalid Resource</td>
<td>The resource ID being specified is not provisioned to the user for the given trade date</td>
</tr>
<tr>
<td>1005</td>
<td>SC submission of data for this resource is not allowed</td>
<td>The resource ID being submitted is not provisioned for SC submission</td>
</tr>
<tr>
<td>1006</td>
<td>Late Meter Data</td>
<td>Trade date submitted is beyond the later meter cutoff date</td>
</tr>
<tr>
<td>1007</td>
<td>Invalid Measurement Type</td>
<td>Valid values are LOAD or GEN</td>
</tr>
<tr>
<td>1008</td>
<td>Invalid Time Interval Length</td>
<td>Valid values are 5, 15 or 60 for submission and 5, 10, 15 or 60 for retrieve request</td>
</tr>
<tr>
<td>1009</td>
<td>Invalid time format</td>
<td>Interval End Time should be in GMT</td>
</tr>
<tr>
<td>1010</td>
<td>Interval End Time does not match with Time Interval Length</td>
<td>The granularity specified in the Interval Time Length field should match the granularity of the interval end time</td>
</tr>
<tr>
<td>1011</td>
<td>Invalid meter value precision</td>
<td>Valid precision for meter value is (16,8), i.e. 8 digits before and after the decimal point</td>
</tr>
<tr>
<td>1012</td>
<td>Invalid measurement quality</td>
<td>Valid values are ACTUAL or ESTIMATED</td>
</tr>
<tr>
<td>1013</td>
<td>Version cannot be specified for meter data submission</td>
<td>Version field will only be populated for data retrieve request and response, but cannot be specified in the submission</td>
</tr>
<tr>
<td>1014</td>
<td>Invalid version requested</td>
<td>Valid values for retrieve request are CURRENT, PREVIOUS or HISTORY</td>
</tr>
<tr>
<td>1015</td>
<td>Invalid Resource type</td>
<td>The resource id is associated to a wrong XML element for resource type</td>
</tr>
<tr>
<td>1016</td>
<td>Duplicate data found</td>
<td>For a given resource id, and measurement quality, more than one value found for a given interval end time</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Message</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>1017</td>
<td>Estimated data cannot be provided for this trade date</td>
<td>Estimated data can only be submitted for the recalculation statements until T+48B Midnight for a trade date.</td>
</tr>
<tr>
<td>1018</td>
<td>DemandResponseRegistration should not be provided</td>
<td>Meter data for DR Resources are not allowed at this time.</td>
</tr>
<tr>
<td>1019</td>
<td>Unexpected Security Error</td>
<td>Unhandled exception specific to auth service.</td>
</tr>
<tr>
<td>1020</td>
<td>No Access to resources for batch</td>
<td>No Read Access allowed for the resources under this batch id.</td>
</tr>
<tr>
<td>1021</td>
<td>Invalid Trade Date</td>
<td>Meter data can only be submitted for up to 7 days in the future.</td>
</tr>
<tr>
<td>1022</td>
<td>Invalid Unit of Measurement</td>
<td>Unit of Measurement is not in values [k,M].</td>
</tr>
<tr>
<td>1024</td>
<td>Actual data cannot be provided for this trade date</td>
<td>Actual data can only be submitted once the trade date has occurred.</td>
</tr>
<tr>
<td>1026</td>
<td>Time interval length does not match meter data interval specified for this resource</td>
<td>Meter data interval as specified per resource in the master file does not match the time interval length being submitted.</td>
</tr>
<tr>
<td>1027</td>
<td>Invalid measurement type for resource ID</td>
<td>The measurement type specified for the resource ID is not valid.</td>
</tr>
<tr>
<td>1028</td>
<td>Meter value of X* MWh exceeds the PMAX of Y* MWh</td>
<td>Meter value submitted for a resource is more than the registered PMAX in the master file. Note: This is a warning, and data will still be accepted.</td>
</tr>
<tr>
<td>1029</td>
<td>Invalid SC ID or ACL Group</td>
<td>The SC ID or ACL Group being specified is not provisioned to the user.</td>
</tr>
<tr>
<td>1030</td>
<td>Invalid meter value</td>
<td>Meter value cannot be negative.</td>
</tr>
<tr>
<td>1031</td>
<td>Invalid Request</td>
<td>Request for &quot;ALL&quot; resources cannot be combined with individual resources in the same MeterDataRequest class.</td>
</tr>
</tbody>
</table>
*actual values,
9. UI – CSV File Specification

9.1 File Content Rules

1. The required header record will consist of all the Field names identified in Field Specifications.
2. The field names are not case sensitive.
3. The file will not use text qualifiers such as single quote or double quote characters.
4. The file will use ANSI characters with CRLF to separate records.
5. Submit all inbound files in GMT format.
6. All file records will be consistent with respect to a single time format.

9.2 File Name

1. Inbound file extension must be “.CSV”.
2. Filename length must not exceed 255 characters, including the extension.
3. Filename is case insensitive.

9.3 Field Specification

All fields shown below are REQUIRED

<table>
<thead>
<tr>
<th>ORDER</th>
<th>FIELD</th>
<th>TYPE (Max Length)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RES_ID</td>
<td>Text (32)</td>
<td>Resource ID as defined in the Master File. Example: ABC1_UNIT 1.</td>
</tr>
<tr>
<td>2</td>
<td>MSMT_TYPE</td>
<td>Text (4)</td>
<td>Type of Measurement. Valid values are LOAD or GEN. Measurement type is the same as Channel ID in current metering solution. LOAD is channel 1 and GEN is channel 4.</td>
</tr>
<tr>
<td>3</td>
<td>INTERVAL_END_TIME</td>
<td>Date Time (29)</td>
<td>End Datetime in GMT of the interval for which the meter value is being submitted. This is interval ending. Example: 2016-06-04T07:15:00.000+00:00</td>
</tr>
<tr>
<td>4</td>
<td>VALUE</td>
<td>Decimal (16,8)</td>
<td>Meter Value.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td><strong>Document Version</strong></td>
<td><strong>Date Created</strong></td>
<td></td>
</tr>
<tr>
<td>MRI-Settlements ISO Interface Specification</td>
<td>2.0</td>
<td>10/18/2017</td>
<td></td>
</tr>
</tbody>
</table>

Decimal values should be (14,7), meaning up to 7 digits before and after the decimal point.

Example: 1.1234567

<table>
<thead>
<tr>
<th>5</th>
<th>UOM</th>
<th>Text (1)</th>
<th>Unit of Measure.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Valid values are k (for kWh) or M (for MWh)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6</th>
<th>INTERVAL_LENGTH</th>
<th>Integer (2)</th>
<th>Interval length in minutes.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Valid values are 5, 15 or 60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7</th>
<th>MSMT_QUALITY</th>
<th>Text (1)</th>
<th>Measurement Quality.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Valid values are A or E.</td>
</tr>
</tbody>
</table>
10. UI – MDEF File Specification

10.1 File Structure

Each record of the file has the following basic layout:

<table>
<thead>
<tr>
<th>BYTES</th>
<th>FIELD</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>RLEN</td>
<td>Record Length</td>
</tr>
<tr>
<td>3-4</td>
<td>RCODE</td>
<td>Record Code</td>
</tr>
<tr>
<td>5-216</td>
<td>Data</td>
<td>(format based on RCODE)</td>
</tr>
</tbody>
</table>

The record code (RCODE) is used to define several different types of records. The types of records and data to be included are:

<table>
<thead>
<tr>
<th>RCODE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Meter (Recorder/Site) Record (ID, Start/Stop Times, etc.)</td>
</tr>
<tr>
<td>10</td>
<td>Channel Header Records (Recorder ID, Meter Readings, Physical Channel Number, etc.)</td>
</tr>
<tr>
<td>1001-9998</td>
<td>Interval Data Records</td>
</tr>
<tr>
<td>9999</td>
<td>Trailer Record (One record per file)</td>
</tr>
</tbody>
</table>

10.2 Meter (Recorder / Site) Header Record Layout

There will be one meter (recorder / site) header record written for each set of data. The Record Length (RLEN) and Record Code (RCODE) will be binary fields stored in Least Significant Byte (LSB) first. All other fields in the record will be character fields written in ASCII.

<table>
<thead>
<tr>
<th>FIELD</th>
<th>BYTES</th>
<th>TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLEN</td>
<td>01-02</td>
<td>Int</td>
<td>Record Length</td>
</tr>
<tr>
<td>RCODE</td>
<td>03-04</td>
<td>Int</td>
<td>Record Code (Value = 1)</td>
</tr>
<tr>
<td>CM_CUSTID</td>
<td>05-24</td>
<td>A/N</td>
<td>Customer ID (Optional)</td>
</tr>
<tr>
<td>CM_NAME</td>
<td>25-44</td>
<td>A/N</td>
<td>Customer Name (Optional)</td>
</tr>
<tr>
<td>CM_ADDR1</td>
<td>45-64</td>
<td>A/N</td>
<td>Customer Address Line 1 (Optional)</td>
</tr>
<tr>
<td>CM_ADDR2</td>
<td>65-84</td>
<td>A/N</td>
<td>Customer Address Line 2 (Optional)</td>
</tr>
<tr>
<td>CM_ACCOUNT</td>
<td>85-104</td>
<td>A/N</td>
<td>Customer Account Number (Optional)</td>
</tr>
<tr>
<td>105-111</td>
<td>A/N</td>
<td></td>
<td>Reserved</td>
</tr>
<tr>
<td>CM_LOGCHAN</td>
<td>112-115</td>
<td>A/N</td>
<td>Total Channels for Customer (Optional)</td>
</tr>
<tr>
<td>116-119</td>
<td>A</td>
<td></td>
<td>Reserved</td>
</tr>
<tr>
<td>TA_START</td>
<td>120-131</td>
<td>N</td>
<td>Start Time of data (yyyymmddhmmm) (see Notes below)</td>
</tr>
</tbody>
</table>
10.2.1 Start and Stop Times

These times represent the start and stop times for an individual meter’s channel data stored after the Meter (Recorder / Site) Header. The interval data for each channel in the file up to the next Meter (Recorder / Site) Header must cover this time period exactly. The last hour of the day is defined as “2400”.

In the case of a Fall DST change, TA_STOP time cannot fall on the 01:00, 02:00, or any interval between 01:00 or 02:00.

10.2.2 DST Flag

The DSTFLAG should always be N since the data needs to be submitted in GMT.

10.3 Channel Header Record Layout

There will be one channel header record written for each channel of data to be sent to the mainframe. The Record Length (RLEN), Record Code (RCODE), Logical Channel Number (DC_LOGCHAN), and the KW/KVAR/KVA Set Number (DC_KVASET) will be binary fields stored in Lease Significant Byte (LSB) first. All other fields in the record will be character fields written in ASCII.

<table>
<thead>
<tr>
<th>FIELD</th>
<th>BYTES</th>
<th>TYPES</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLEN</td>
<td>01-02</td>
<td>Int</td>
<td>Record Length</td>
</tr>
<tr>
<td>RCODE</td>
<td>03-04</td>
<td>Int</td>
<td>Record Code (Value = 10)</td>
</tr>
<tr>
<td>DC_CUSTID</td>
<td>05-24</td>
<td>A/N</td>
<td>Customer ID (Optional)</td>
</tr>
<tr>
<td>DC_RECID</td>
<td>25-38</td>
<td>A/N</td>
<td>Resource ID (Site ID)</td>
</tr>
<tr>
<td>DC_METERID</td>
<td>39-44</td>
<td>A/N</td>
<td>Reserved for Resource ID</td>
</tr>
<tr>
<td>TA_START</td>
<td>57-68</td>
<td>N</td>
<td>Start Time (YYYYMMDDHHMM) (See Notes below)</td>
</tr>
<tr>
<td>TA_STOP</td>
<td>69-80</td>
<td>N</td>
<td>Stop Time (YYYYMMDDHHMM) (See Notes below)</td>
</tr>
<tr>
<td>DC_PYSCHAN</td>
<td>81-92</td>
<td>A/N</td>
<td>Reserved</td>
</tr>
<tr>
<td></td>
<td>93</td>
<td>A/N</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

Owner: Lam, Rick

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<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC_LOGCHA N</td>
<td>Int</td>
<td>Customer Channel Number (Optional)</td>
</tr>
<tr>
<td>DC_UOMCODE</td>
<td>N</td>
<td>Unit Of Measure Code (see Table below for definitions)</td>
</tr>
<tr>
<td>CHANSTAT</td>
<td>A</td>
<td>Channel Status Present (Y/N)</td>
</tr>
<tr>
<td>INTSTAT</td>
<td>A</td>
<td>Interval Status Present (Y/N)</td>
</tr>
<tr>
<td>STRTMTR (Optional)</td>
<td>N</td>
<td>Start Meter Reading     (See Notes below)</td>
</tr>
<tr>
<td>STOPMTR (Optional)</td>
<td>N</td>
<td>Stop Meter Reading    (See Notes below)</td>
</tr>
<tr>
<td>DC_MMULT</td>
<td>N</td>
<td>Meter Dial Multiplier (3 dec)</td>
</tr>
<tr>
<td>DC_SERVTYP</td>
<td>A</td>
<td>'W'=WYE, 'D'=Delta '+'=Leading P.F., '-'=Leading P.F. (Optional)</td>
</tr>
<tr>
<td>DR_INPHR</td>
<td>N</td>
<td>Intervals Per Hour</td>
</tr>
<tr>
<td>TD_STATUS</td>
<td>A</td>
<td>Validation Results (Future)</td>
</tr>
<tr>
<td>DC_FLOW</td>
<td>A</td>
<td>Power Flow Direction (Optional) 'D'=Delivered, 'R'=Received</td>
</tr>
<tr>
<td>DC_KVASET</td>
<td>Int</td>
<td>KW/KVAR/KVA Set Number (Optional)</td>
</tr>
<tr>
<td>TD_ORIGIN</td>
<td>A</td>
<td>Origin of Data (Optional) 'T'=Translated, 'R'=Remote, 'I'=Imported, 'P'=Portable, 'S'=Summary File</td>
</tr>
</tbody>
</table>

**Deleted:** 1.12
**Deleted:** Post-Market Consol - OMAR Replacement
**Deleted:** 12/8/2015
10.3.1 Start and Stop Times

Start and Stop times in the Channel Headers should match the Start and Stop times in the Meter (Recorder / Site) Header unless the channel data is being split due to an interval size or Unit of Measure (UOM) change. In that case, the Start time in the Channel Header of the first split and the Stop time in the Channel Header of the last split should match the times in the Meter (Recorder / Site) Header. The Start and Stop times in the Channel Headers should always represent the time span of the Interval Data Records immediately following the header. The last hour of the day is defined as “2400”.

In the case of a Fall DST change, TA_STOP time cannot fall on the 01:00, 02:00, or any interval between 01:00 or 02:00.

10.3.2 Start and Stop Meter Readings

These meter readings will be calculated for the start and stop times based upon actual meter readings retrieved during previous meter interrogations. The Unit of Measure (UOM) values are: 01 for KWH or 41 for MWH.

10.4 Interval Data Record(s) Layout

Interval data records will consist of engineering units data and associated interval and channel status codes.

a. Each interval data record will contain up to 48 elements (intervals) of data in the four byte IEEE floating point format. The actual number of intervals per data record will depend on the presence of channel and/or interval status data. The status data will be output as two byte unsigned integers for both the channel and interval status.

b. If the last data record for each channel is not completely filled with data, it will be padded to the end of the record with a binary integer value of 32767 for each two bytes of the four byte interval value and in each two bytes of the status codes (if status codes are present).

c. Any gaps in data will be resolved by padding the time period of the gap with zero data and setting the interval status to missing data. All channel data records will have data (or values identified as missing) for the time period shown in the Channel Header record.

d. If there are changes in interval length or Unit of Measure (UOM) codes for a channel, the data will be split with a channel header record preceding each part of the channel data. When a channel is split, then all channels for the device should be split at the same interval.

e. All binary data including the two byte record length, two byte record code, two byte customer channel number, four byte IEEE floating point interval values, the two byte interval and channel status data, and the two byte 32767 end of record padding values are all stored with the Least Significant Byte (LSB) first.
This table defines the interval data record layout.

<table>
<thead>
<tr>
<th>FIELD</th>
<th>BYTES</th>
<th>TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLEN</td>
<td>01-02</td>
<td>Int</td>
<td>Record Length</td>
</tr>
<tr>
<td>RCODE</td>
<td>03-04</td>
<td>Int</td>
<td>Record Code (Value=100 1-9999)</td>
</tr>
<tr>
<td>CM_CUSTID</td>
<td>05-24</td>
<td>A/N</td>
<td>Customer ID (Optional)</td>
</tr>
<tr>
<td>INTERVAL</td>
<td>25-26</td>
<td>Float</td>
<td>Interval Data in Engineering Units (192 bytes)</td>
</tr>
</tbody>
</table>

10.5 Trailer Record Layout

The trailer record will be the last record written in a data set and will contain the total number of customers in the file as well as the total records written to the file.

<table>
<thead>
<tr>
<th>FIELD</th>
<th>BYTES</th>
<th>TYPES</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLEN</td>
<td>01-02</td>
<td>Int</td>
<td>Record Length</td>
</tr>
<tr>
<td>RCODE</td>
<td>03-04</td>
<td>Int</td>
<td>Record Code (Value=9999)</td>
</tr>
<tr>
<td>TOTREC</td>
<td>35-44</td>
<td>N</td>
<td>Total Record Count (includes Trailer)</td>
</tr>
<tr>
<td>XF_TSTAMP</td>
<td>205-216</td>
<td>N</td>
<td>Time Stamp (yyymmddhhss) (Optional) (see Notes below)</td>
</tr>
</tbody>
</table>