



California ISO

Congestion Revenue Rights (CRR) Upgrade Project Customer Partnership Group

Jan 25, 2023


10:00 a.m.–11:00 a.m. (Pacific Time)

| Web Conference Information | Conference Call Information |
|---|--|
| <p>Web Address: https://caiso.webex.com/caiso/j.php?MTID=m4c62047c8ca3c36c50e2d1182518f8f9</p> <p>Audio connection instructions will be available after connecting to the web conference. When prompted, select "Call me" and enter the phone number you will use during the call. You will be called by the conference shortly.</p> | <p>1-844-621-3956 United States Toll Free +1-650-479-3208 United States Toll</p> <p>Access code: 248 723 65119</p> |
| <p>Calls and webinars are recorded for stakeholder convenience, allowing those who are unable to attend to listen to the recordings after the meetings. The recordings will be publicly available on the ISO web page for a limited time following the meetings. The recordings, and any related transcriptions, should not be reprinted without the ISO's permission.</p> | |
| <p>https://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=54E8D66B-1CA6-4935-AD6E-C1C4D6CDD989</p> | |

Housekeeping

- Meetings will be on Thursdays not Wednesdays

Instructions for raising your hand to ask a question

- If you are connected to audio through your computer or used the “call me” option, select the raise hand icon located on the top right above the chat window. Note: #2 only works if you dialed into the meeting. 
- Please remember to state your name and affiliation before making your comment.
- You may also send your questions via chat to Brenda Corona or to all panelists.

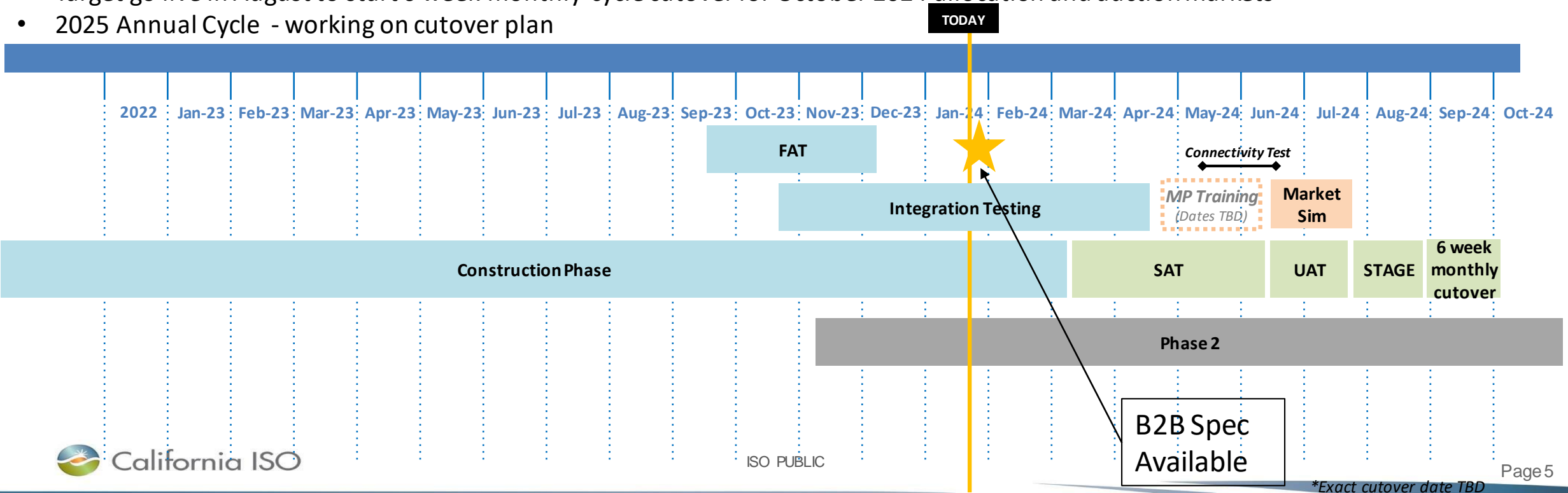
Agenda

| Time (PST) | Topic |
|---------------|--|
| 10:00 – 10:05 | Welcome |
| 10:05 – 10:15 | CRR Upgrade Project – Project updates <ul style="list-style-type: none">• Updated timeline |
| 10:15 – 10:25 | B2B Spec and Mock Services |
| 10:25 – 10:35 | Questions |
| 10:35 – 11:40 | Next Steps |

CRR System Replacement Update & Timeline

Updated January 2024

- Updated Business-to-Business (B2B) Specs available this month – Details will be discussed on TUG call on 1/30/24
 - Feedback from MPs on mock services provided last year
- Integration testing continues
- Functional testing (Site Acceptance Testing - SAT) starting in March.
- Connectivity Testing to start in May, in preparation for Market Sim in June
- Training will occur two weeks before Market Sim starts
- Target go live in August to start 6 week monthly-cycle cutover for October 2024 allocation and auction markets
- 2025 Annual Cycle - working on cutover plan



CAISO CRR Developer Forum

<https://developer.caiso.com/pages/application.aspx?app=CRR>

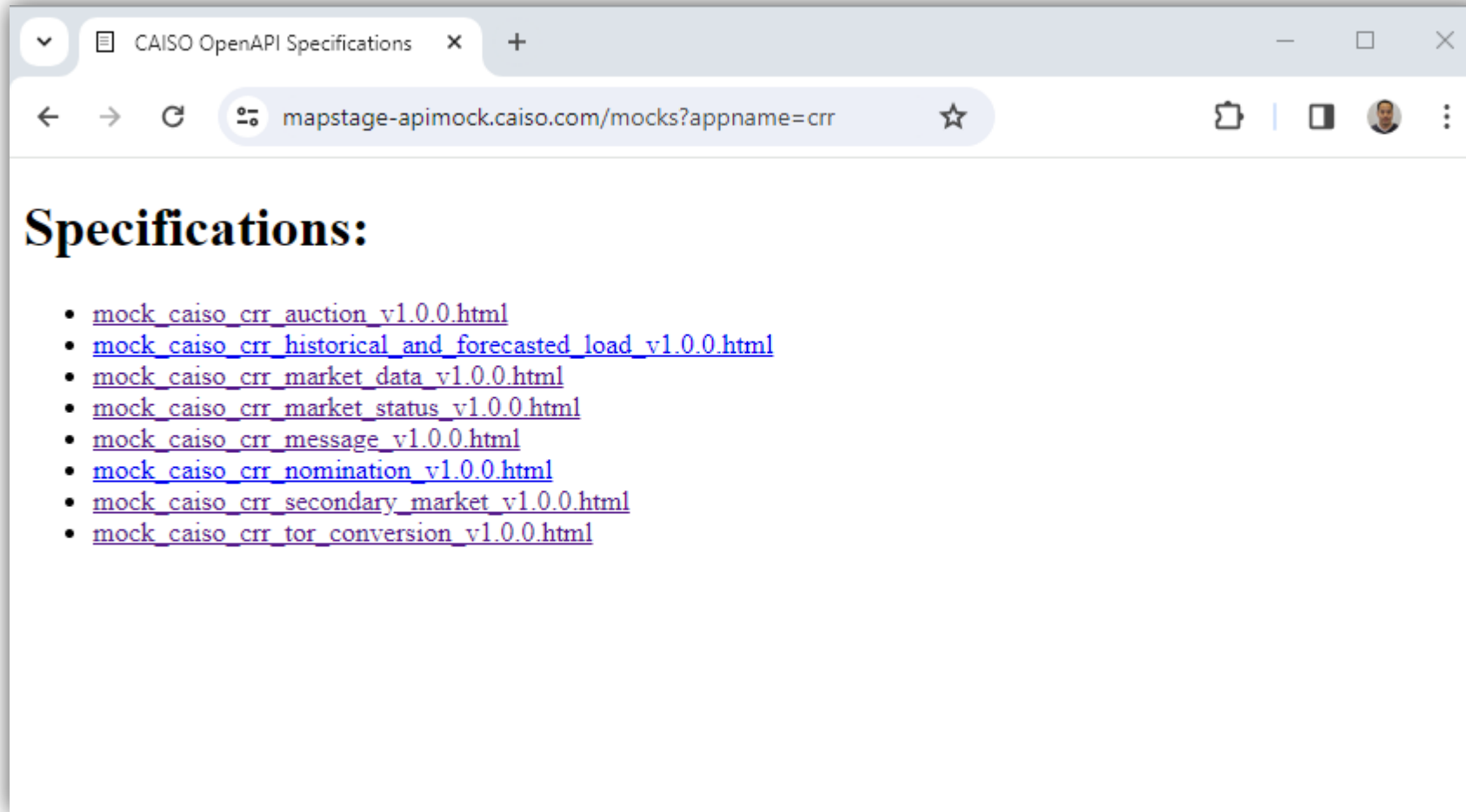
RESTful services About status

Search RESTful services Filter

| SERVICE | SPECIFICATION | DOCUMENTATION | STATUS | RELEASE | EFFECTIVE DATE |
|------------------------------------|---|---|---------------|-------------|----------------|
| CRR Auction | crr_auction_1.0.0.yaml | crr_auction_1.0.0.html | NA | NA | NA |
| CRR Historical and Forecasted Load | crr_historical_and_forecasted_load_1.0.0.yaml | crr_historical_and_forecasted_load_1.0.0.html | NA | NA | NA |
| CRR Market Data | crr_market_data_1.0.0.yaml | crr_market_data_1.0.0.html | NA | NA | NA |
| CRR Market Status | crr_market_status_v1.0.0.yaml | crr_market_status_v1.0.0.html | NA | NA | NA |
| CRR Message | crr_message_1.0.0.yaml | crr_message_1.0.0.html | NA | NA | NA |
| CRR Nomination | crr_nomination_1.0.0.yaml | crr_nomination_1.0.0.html | NA | NA | NA |
| CRR Secondary Market | crr_secondary_market_1.0.0.yaml | crr_secondary_market_1.0.0.html | ● PROD_LATEST | Spring 2020 | NA |
| | crr_secondary_market_0.0.0.yaml | crr_secondary_market_0.0.0.html | ● MAP_STAGE | DRAFT | NA |
| CRR Tor Conversion | crr_tor_conversion_1.0.0.yaml | crr_tor_conversion_1.0.0.html | NA | NA | NA |

CAISO CRR API Mock Services

<https://mapstage-apimock.caiso.com/mocks?appname=crr>



The screenshot shows a web browser window with the following details:

- Tab: CAISO OpenAPI Specifications
- Address Bar: mapstage-apimock.caiso.com/mocks?appname=crr
- Page Content:
 - Specifications:**
 - [mock_caiso_crr_auction_v1.0.0.html](#)
 - [mock_caiso_crr_historical_and_forecasted_load_v1.0.0.html](#)
 - [mock_caiso_crr_market_data_v1.0.0.html](#)
 - [mock_caiso_crr_market_status_v1.0.0.html](#)
 - [mock_caiso_crr_message_v1.0.0.html](#)
 - [mock_caiso_crr_nomination_v1.0.0.html](#)
 - [mock_caiso_crr_secondary_market_v1.0.0.html](#)
 - [mock_caiso_crr_tor_conversion_v1.0.0.html](#)

QUESTIONS?

Next Steps

- Next meeting is February 22, 2024
- Discuss following topics
- Visit CPG webpage for more information:
<http://www.caiso.com/informed/Pages/MeetingsEvents/CustomerPartnershipGroups/Default.aspx>

NEWS RELEASE: FERC accepts ISO tariff changes for a Western day-ahead electricity market

- New rules adopted for the Day-Ahead Market Enhancements (DAME) and the Extended Day-Ahead Market (EDAM).
- Stakeholders were deeply engaged in designing the market rules through a collaborative working group process, which included regional utilities, independent energy providers, state regulators, public interest organizations, and a variety of entities representing various interests and points of view throughout the Western Interconnection.
- Learn more about EDAM through this [link](#).
- Find out [What They're Saying](#), [News Release](#)



- *Energy Matters* blog provides timely insights into ISO grid and market operations as well as other industry-related news

<http://www.caiso.com/about/Pages/Blog/default.aspx>.



January 18, 2024
Inside the ISO, Leadership, Operations

The great transformation: Designing the grid of the future

By Mark Rothleder

California ISO executives and staff members are frequently asked to address energy conferences across the U.S. and abroad. The following is a keynote speech from Mark Rothleder, the ISO's Senior Vice President and Chief Operating Officer, delivered at "The Great Transformation: Designing the Grid of the Future" conference hosted Jan. 16 ...

[READ MORE](#)

- Subscribe to [Energy Matters blog monthly summary](#)

REFERENCE SLIDES

RECAP: CRR Upgrade Project - Overview

- The ISO has decided to upgrade the existing CRR system with a new system that adopts the latest technology stack aligned with the ISO's technology standards, consolidates all CRR related functions, minimizes human errors, reduces processing time, eliminates manual workarounds, and positions the system to accommodate policy changes down the road.
- This on-going Customer Partnership Group (CPG) will provide an overview of the schedule, review of external BRS and answer questions. Subsequent meetings will include detailed review and discussion of business process changes impacting market participants.
- http://www.caiso.com/Documents/BusinessRequirementsSpecification_Con gestionRightsRevenueUpgrade.pdf
- The goal of this CPG is to ensure customer readiness as this project deploys to Production in 2024.

RECAP: CRR Upgrade Project – Overview of changes

- **Load submission process**
 - At the time of load submission participant will be notified of any failed validation per sink location based on the exceedance load and allow to resubmit
- **OBAALSE process**
 - EQ load election will be submitted through the UI during the OBAALSE load submission
- **Consolidate data publishing in MUI and/or OASIS**
 - Calendar: change from webpost to OASIS
 - Model data: change from webpost to MUI, including both NDA and non NDAfiles
 - Market Result data: from webpost to MUI
- **Modeling data**
 - Powerflow case to be released in PSSE v30
 - ITC definition will be modeled as source and sink
- **Features added to enable user performing additional tasks**
 - MT_TOR: user to submit through UI, currently performed by CRR group
- **Changes to Load Migration and Source and Sink processes**
- **User access**
 - User will be provisioned to specific functions within the system, based on the application access request approval process
- **Webservices interface for interacting with MUI**

Market Sim - Overview

- Market participant training will complete prior to last week of connectivity, and one week before start of Market Sim
- 4 weeks connectivity
 - Week two CAISO will provide ability for allocation and auction API upload
 - No functionality will be available to test until the start of Market Sim
- 3 week structured scenario execution
- 2 week unstructured
- CAISO will request all interested CRR market participants sign up to participate in Market Sim
- All current user profiles will be migrated into Map-stage for Market Sim, new participants will need to request to be provisioned

Market Sim - Timeline

| Market Sim Month | | | | | | |
|------------------|--|---|---|---|--|--|
| | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY | |
| week 1 | | [Post all preloaded data] Open and close by 5pm - T1 mini Make available special processes that have changed | Post T1 mini results MP – review T1 results, need MEQ values and then build nominations when market is opens on Thursday Need Set aside post [time] | open and close at 5pm T2 mini | Post T2 mini results | |
| week 2 | CRR team setup for Monthly Mini Auction | [Send process ownership data] Market Sim call to discuss T1&T2 Monthly Mini Auction open Collateral verified | Market Sim Post Monthly Mini Auction Results (starts Settlements) Settlement T+3B | T1/PNP Annual Mini Annual data separate (2025 process, use 2024 annual data and mock it up) | T1/PNP Annual Mini Annual Post results | |
| week 3 | Market Sim / UAT – prep for mini Annual 2025 | Settlement results available UAT – Open Mini Annual Auction | UAT - Close Mini Annual Auction by 5pm | UAT – post all Reports | UAT – Post Mini Annual Auction Results | |
| week 4 | | unstructured | unstructured | unstructured | | |
| week 5 | | unstructured | unstructured | unstructured | | |

RECAP: CRR Upgrade Project– Overview of changes cont.

- **Source and Sink list release**
 - Remove the existing 30 days ahead of allocation version
 - Will be released in v0, v1 and other updates within the active market period
- **Retired resource mapping**
 - Re-map the retired PNode to the closest electrically connected PNode that is also a biddable location in the CRR processes and has the same source/sink designation as the retired location
 - Baseloading CRR will be mapped based on the model used in the active market period to capture the most accurate topology
 - Mapping will be released for the corresponding marketperiod
- **Source and Sink islanded by outage**
 - With baseloading CRR, sell offer allowed
 - No baseloading CRR, will not be biddable for the effective market

CAISO B2B Improvements – Goals & Current Status

- **Goals**

- Enhance the developer experience working with CAISO Web API's
- Provide API's in REST/JSON using OpenAPI 3.0 specification
- Provide examples, mock services and tooling to generate client/server stubs and SDK
- Provide tests for the API's using Postman collections
- Collaboration using Git and forums on developer.caiso.com
- Simplify authentication using mutual TLS and X.509 certificates

- **Update**

- POC updates and notes and recording from meetings are posted on developer forum at <https://developer.caiso.com/forum/topics.aspx?ForumID=4>.
- Documents uploaded to the Developer Forum:
<https://developer.caiso.com/forum/messages.aspx?TopicID=6119>
 - PowerPoint presentation and webinar recording
 - Draft version of CRR Auction Service OpenAPI Specifications
 - Draft version of CRR business validate message bundle

CAISO B2B Improvements – SOAP vs REST

SOAP

```
POST /GetStock HTTP/1.1
Host: www.example.org
Content-Type: application/soap+xml

<?xml version="1.0"?>
<soap:Envelope
xmlns:soap="http://www.w3.org/2001/12/soap-
envelope"
soap:encodingStyle="http://www.w3.org/
2001/12/soap-encoding">

<soap:Body xmlns:m="http://www.example.org/
stock">
  <m:GetStockPrice>
    <m:StockName>IBM</m:StockName>
  </m:GetStockPrice>
</soap:Body>
</soap:Envelope>
```

REST

```
GET http://example.org/stock/IBM
```

- SOAP (Simple Object Access Protocol) provides the following advantages when compared to REST:
 - Language, platform, and transport independent (REST requires use of HTTP)
 - Works well in distributed enterprise environments (REST assumes direct point-to-point communication)
 - Standardized
 - Provides significant pre-build extensibility in the form of the WS* standards
 - Built-in error handling
 - Automation when used with certain language products
- REST (Representational State Transfer) is easier to use for the most part and is more flexible. It has the following advantages when compared to SOAP:
 - Uses easy to understand standards like swagger and OpenAPI Specification 3.0
 - Smaller learning curve
 - Efficient (SOAP uses XML for all messages, REST mostly uses smaller message formats like JSON)
 - Fast (no extensive processing required)
 - Closer to other Web technologies in design philosophy
 - As one REST API tutorial put it: SOAP is like an envelope while REST is just a postcard

<https://www.soapui.org/learn/api/soap-vs-rest-api/>

CAISO B2B Improvements – CRR Developer Forum

<https://developer.caiso.com/pages/application.aspx?app=CRR>

RESTful services

[About status](#)

| Search RESTful services | | | | | | Filter |
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| CRR Message | crr_message_1.0.0.yaml | crr_message_1.0.0.html | NA | NA | NA | |
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| CRR Tor Conversion | crr_tor_conversion_1.0.0.yaml | crr_tor_conversion_1.0.0.html | NA | NA | NA | |

CAISO B2B Improvements – Example: CRR Auction API

```
1 openapi: 3.0.0
2 servers:
3   - url: https://virtserver.swaggerhub.com/RI-GM/caiso_crr_auction_v1.0.0_openapi/1.0.0
4
5 info:
6   description: This includes all openapi services for CRR bids and offers
7   version: "1.0.0"
8   title: CRR Auction API
9   contact:
10    email: ihedge-support@resource-innovations.com
11
12 tags:
13   - name: write
14     description: require read/write access
15   - name: read
16     description: requires read only
17
18 paths:
19   /auction/v1.0/portfolio:
20     get:
21       tags:
22         - read
23       summary: gets bids and offers for given market name
24       operationId: getPortfolio
25       description: |
26         By passing in the appropriate market name, portfolio name, and participant name, the
27         auction portfolio will be returned.
28       parameters:
29         - $ref: '#/components/parameters/MarketName'
30         - $ref: '#/components/parameters/PortfolioName'
31         - $ref: '#/components/parameters/ParticipantName'
32       responses:
33         '200':
34           description: search results matching criteria
35           content:
36             application/json:
37               schema:
38                 $ref: '#/components/schemas/Portfolio'
```

API SUMMARY

API METHODS - READ

- getPortfolio
- getPortfolioList
- getPortfolioRequiredCredit
- getPortfolioStatus

API METHODS - STATUS

- getStatus

API METHODS - WRITE

- deletePortfolio
- portfolioCreation
- portfolioSubmission
- postPortfolioRetraction

CRR Auction API

API and SDK Documentation

Version: 1.0.0

This includes all openapi services for CRR bids and offers

Read

getPortfolio

gets bids and offers for given market name, portfolio name, and logged-in user

By passing in the appropriate market name, portfolio name, and participant name, the auction portfolio will be returned.

GET

```
/auction/v1.0/portfolio
```

Usage and SDK Samples

Curl [Java](#) [Android](#) [Obj-C](#) [JavaScript](#) [C#](#) [PHP](#) [Perl](#) [Python](#)

```
curl -X GET \
-H "Accept: application/json" \
"https://virtserver.swaggerhub.com/RI-GM/caiso_crr_auction_v1.0.0_openapi/1.0.0/auction/v1.0/portfolio?marketName=&portfolioName=&participantName="
```

CAISO B2B Improvements – Free Swagger Editor Tool

<https://editor.swagger.io/>

The screenshot displays the Swagger Editor interface in a web browser. The left pane shows the OpenAPI specification in JSON format, and the right pane shows the rendered API documentation.

```
1 openapi: 3.0.0
2 servers:
3   - url: https://virtserver.swaggerhub.com/RI-GM/
      /caiso_crr_auction_v1.0.0_openapi/1.0.0
4
5 info:
6   description: This includes all openapi services for CRR bids and
      offers
7   version: "1.0.0"
8   title: CRR Auction API
9   contact:
10    email: ihedge-support@resource-innovations.com
11
12 tags:
13   - name: write
14     description: require read/write access
15   - name: read
16     description: requires read only
17
18 paths:
19   /auction/v1.0/portfolio:
20     get:
21       tags:
22         - read
23       summary: gets bids and offers for given market name, portfolio
24         name, and logged-in user
25       operationId: getPortfolio
26       description: |
27         By passing in the appropriate market name, portfolio name,
28         and participant name, the auction portfolio will be
29         returned.
30       parameters:
31         - $ref: '#/components/parameters/MarketName'
32         - $ref: '#/components/parameters/PortfolioName'
33         - $ref: '#/components/parameters/ParticipantName'
```

The rendered API documentation on the right shows the title "CRR Auction API" with version "1.0.0" and "OAS3" specification. It includes a description: "This includes all openapi services for CRR bids and offers" and a link to "Contact the developer". A "Servers" section shows the selected server URL: "https://virtserver.swaggerhub.com/RI-GM/caiso_crr_auction_v1.0.0_openapi/". Below, the "write" tag is expanded to show three POST operations:

- POST** /auction/v1.0 /portfolioCreation: creates a new auction portfolio
- POST** /auction/v1.0 /portfolioSubmission: submits portfolio to the specified auction
- POST** /auction/v1.0 /portfolioRetraction: retracts portfolio from being submitted to the specified auction

CAISO B2B Improvements – New Web Services for CRR

| Service | Operation |
|--|-----------|
| Allocation Nomination Portfolio | POST/GET |
| Auction Bid Portfolio | POST/GET |
| Historical and Forecasted Load | POST/GET |
| Existing CRRs (CRR Market Data) | GET |
| Market Data (CRR Market Data) | GET |
| Market Results (CRR Market Data) | GET |
| Private Allocation Results (CRR Market Data) | GET |
| Private Auction Results (CRR Market Data) | GET |
| Load Migration Data | POST/GET |
| Market Status (Market Info) | GET |
| CRR Messages | GET |
| Secondary Market | POST/GET |
| TOR Conversion | POST/GET |

CAISO B2B Improvements – File Naming Convention

A2A/B2B OpenAPI File Naming Conventions for versioning:

File name example: **caiso_crr_market_info_v1.0.0_openapi.yaml**

Version Numbering Format: **MAJOR.MINOR.MINI**

MAJOR version of the file name will be incremented if there are any new services added or any major version update to any of the existing services

MINOR version of the file name will be incremented if there any minor version update to any of the existing services

MINI version of the file name will be incremented if there are only documentation changes/corrections, with no service changes.

CAISO B2B Improvements

Each version update of the file name will reset the version numbers on the right

Version numbers will be tracked into the YAML file as part of the ReleaseNotes

Example:

- v1.0.0 File is published to marketparticipants
- v1.0.1 Edits were made to documentations, no functional changes
- v1.0.2 Edits were made to documentations, no functional changes
- v1.0.3 Edits were made to documentations, no functional changes
- v1.1.0 Added a Minor version for a service
- v1.1.1 Edits were made to documentations, no functional changes
- v1.2.0 Added a Minor version for a service
- v1.3.0 Added a Minor version for a service
- v2.0.0 Added a Major version for a service
- v2.0.1 Edits were made to documentations, no functional changes
- v3.0.0 Added a new service