



California ISO

Congestion Revenue Rights (CRR) Upgrade Project Customer Partnership Group

May 30, 2024


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

- Next meeting is tentative until notice, will start at 9am due to Market Performance and Planning Forum.

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.
- 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.

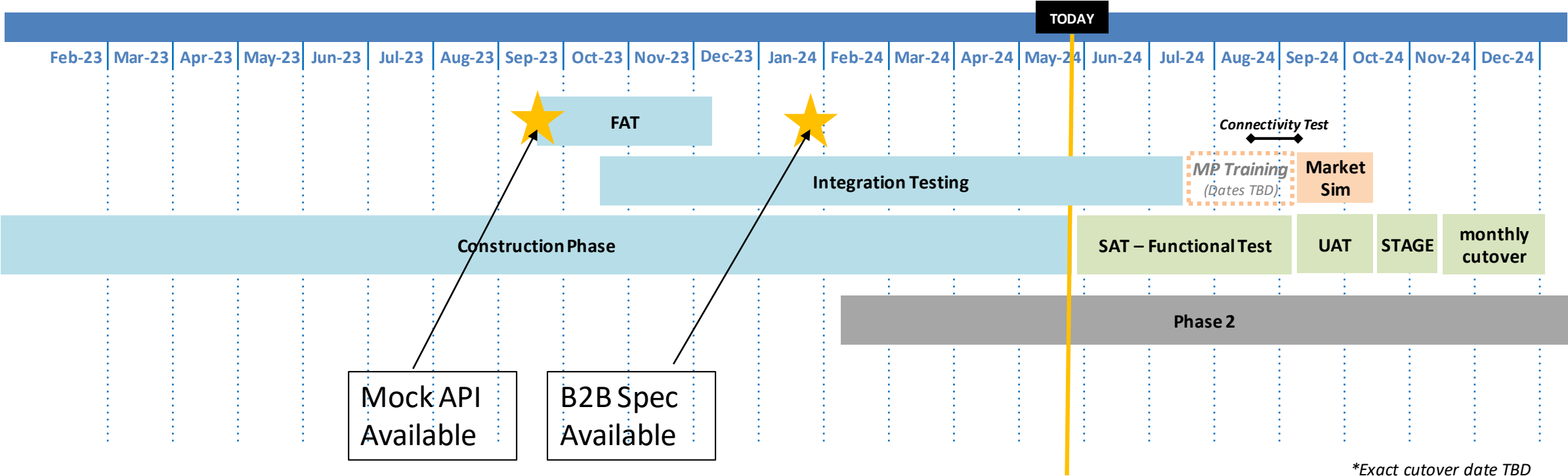
Agenda

Time (PST)	Topic
10:00 – 10:05	Welcome
10:05 – 10:10	CRR Upgrade Project timeline Update
10:10 – 10:25	Questions
10:25 – 11:30	Next Steps

CRR System Upgrade – Project Update & Timeline

Updated May 2024

- Construction Phase is complete and Functional System Acceptance Testing (SAT) starts this week
- Connectivity Testing starts in August
- Market Sim starts in September
- Annual Cycle Cutoff will be on current CRR System
- Monthly Cycle Cutoff will still be for Jan 1st 2025 on new CRR System



*Exact cutover date TBD

QUESTIONS?

Next Steps

- Next meeting is Thursday June 27, 2024 at **9am**
- Discuss following topics
- Visit CPG webpage for more information:
<http://www.caiso.com/informed/Pages/MeetingsEvents/CustomPartnershipGroups/Default.aspx>

REFERENCE SLIDES

CRR Service Endpoint Details

#	Service	GET	POST	Likelihood that file submission may be greater than > 1 MB filesize	CRR System (UI / API)
1	CRR Historical & Forecasted Load	x	x	Yes	Phase 1: Use UI for submission for now, no API available Phase 2: API submission pattern - TBD
2	CRR Auction	x	x	Yes	Maximum 500 recs for any file submission to the system 20 bid segments per bid (business rule)
3	CRR Load Migration	x	x	No	-
4	CRR Nomination	x	x	Yes	Maximum 500 recs for any file submission to the system
5	CRR Secondary Market	x	x	No	Maximum 500 recs for any file submission to the system

CRR Service Endpoint Details

#	Service	GET	POST	Potential submission for >1mb filesize	Comments
1	CRR App Status	x	n/a	n/a	Only retrieve data, no submission
2	CRR Market Data	x			
3	CRR Market Status	x			
4	CRR Messages	x			

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>

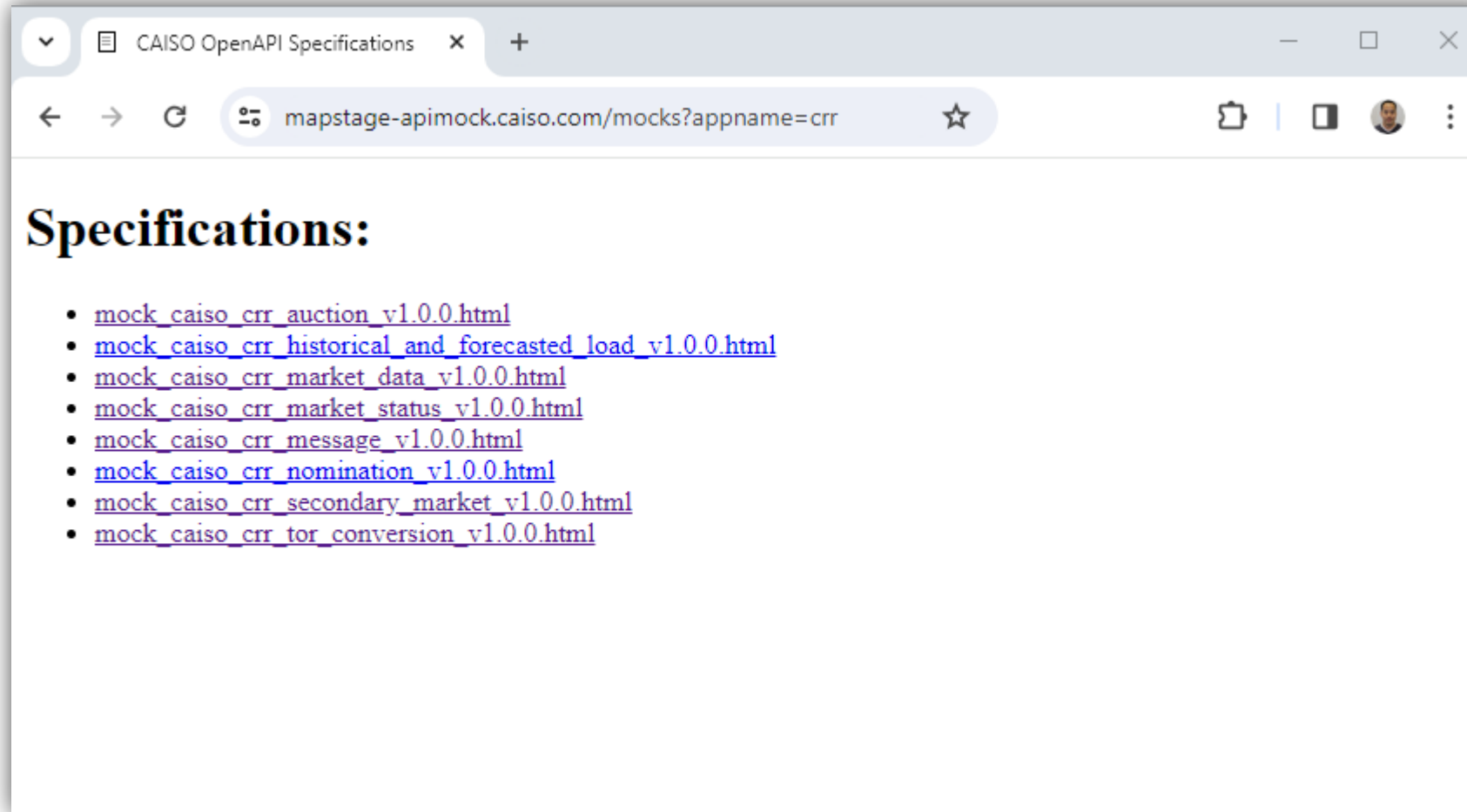
RESTful services

 About status

<div>Search RESTful services</div> <div>Filter</div>					
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>



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 auction portfolio will be returned.
+ 27       parameters:
+ 28         - $ref: '#/components/parameters/MarketName'
+ 29         - $ref: '#/components/parameters/PortfolioName'
+ 30         - $ref: '#/components/parameters/ParticipantName'
+ 31
+ 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 web application. The left pane shows the OpenAPI definition in YAML format, and the right pane shows the corresponding visual API documentation.

Swagger Editor Interface:

- Left Pane (YAML Definition):**

```
1 openapi: 3.0.0
2 servers:
3   - url: https://virtserver.swaggerhub.com/RI-GM/
4     /caiso_crr_auction_v1.0.0_openapi/1.0.0
5 info:
6   description: This includes all openapi services for CRR bids and
7     offers
8   version: "1.0.0"
9   title: CRR Auction API
10  contact:
11    email: ihedge-support@resource-innovations.com
12 tags:
13   - name: write
14     description: require read/write access
15   - name: read
16     description: requires read only
17 paths:
18   /auction/v1.0/portfolio:
19     get:
20       tags:
21         - read
22       summary: gets bids and offers for given market name, portfolio
23         name, and logged-in user
24       operationId: getPortfolio
25       description: |
26         By passing in the appropriate market name, portfolio name,
27         and participant name, the auction portfolio will be
28         returned.
29       parameters:
30         - $ref: '#/components/parameters/MarketName'
31         - $ref: '#/components/parameters/PortfolioName'
32         - $ref: '#/components/parameters/ParticipantName'
```
- Right Pane (Visual API):**
 - Header:** CRR Auction API 1.0.0 OAS3
 - Description:** This includes all openapi services for CRR bids and offers. [Contact the developer](#)
 - Servers:** https://virtserver.swaggerhub.com/RI-GM/caiso_crr_auction_v1.0.0_openapi/
 - Operations:**
 - write** (require read/write access)
 - 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