

Congestion Revenue Rights (CRR) Upgrade Project Customer Partnership Group

Mar 20, 2025

This Meeting only 3:00 p.m. –4:00 p.m. (Pacific Time)

Web Conference and New Meeting Information

Starting February 2025 and moving forward - WebEx details for each meeting can be found at the notice or <u>ISO calendar</u>. Participating in the monthly CRR Customer Partnership Group (CPG) forum. All calls are scheduled through the end of the year and a notice will provide the latest call-in details for each meeting.

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.

To review previous materials, please click link below:

https://www.caiso.com/meetings-events/topics/congestion-revenue-rights-crr-settlement-upgrade-project-customer-partnership-group

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Meeting reminders

- This call is being recorded for informational and convenience purposes only. Any related transcriptions should not be reprinted without ISO's permission.
- The meeting is structured to stimulate dialogue and engage different perspectives.
- Please keep comments professional and respectful.
- Please try and be brief and refrain from repeating what has already been said so that we can manage the time efficiently.



Instructions for raising your hand to ask a question

- Open the Participant and Chat panels from the bottom right corner of your screen.
- If you are connected to audio through your computer or used the "call me" option, select the raise hand icon blocated at the bottom of the participant panel.
 -Note: press *3 to get into the question queue if you dialed into the meeting.
- Please remember to state your name and affiliation before making your comment.
- If you need technical assistance during the meeting, please send a chat to the event producer.
- You may also send your question via chat to either Yelena Kopylov-Alford or to all panelists.



Agenda

| Time (PST) | Topic | | | | |
|-------------|-------------------------------------|--|--|--|--|
| 9:00 – 9:05 | Welcome | | | | |
| 9:05 – 9:10 | CRR Upgrade Project timeline Update | | | | |
| 9:10 – 9:30 | Market Sim and Cutover plans | | | | |
| 9:30 – 9:40 | Questions and Next steps | | | | |



CRR System Upgrade – Project Update & Timeline

Last Updated March 2025

- No changes to schedule from last month.
- Fixed known issue to correct time zone to be GMT for all public/private JSON download date/times and loaded to Mapstage on 3/17
- Started week 4 for 1st week of unstructured market sim
- May apply another patch for other issues on 3/24 before week 5 resumes (3/25/25)
- Schedule:

| | | | | | F | | | | | | |
|----|--|------------|------|-------------|-------------|----------|---|--------------|----------------------------|---------------------------------------|--|
| | Task Name | ▼ Duration | on 🔻 | Start - | Finish | T | l | January 2025 | January 2025 February 2025 | January 2025 February 2025 March 2025 | January 2025 February 2025 March 2025 April 2025 |
| 1 | CRR Market Sim through Phase 1 Production | 66 day | S | Tue 1/28/25 | Wed 4/30/25 | | | | | | |
| 2 | Connectivity Testing - MUI + 1 or more API | 8 days | | Tue 1/28/25 | Thu 2/6/25 | | | | | | |
| 3 | Connectivity Testing - MUI + all API | 6 days | | Fri 2/7/25 | Fri 2/14/25 | | | | <u> </u> | | |
| 4 | ■ Original Market SIM plan | 28 day | s | Tue 2/18/25 | Thu 3/27/25 | | | | ├ | | |
| 5 | week 1 - structured | 3 days | | Tue 2/18/25 | Thu 2/20/25 | | | | * | — | — |
| 6 | week 2 - structured | 3 days | | Wed 2/26/25 | Fri 2/28/25 | | | | 1 | * | * |
| 7 | week 3 - structured | 3 days | | Tue 3/4/25 | Thu 3/6/25 | | | | | ™ ¬ | * |
| 8 | Break Week | 5 days | | Mon 3/10/25 | Fri 3/14/25 | | | | | | |
| 9 | week 4 - unstructured | 3 days | | Tue 3/18/25 | Thu 3/20/25 | | | | | <u> </u> | • • • • • • • • • • • • • • • • • • • |
| 10 | week 5 - unstructured | 3 days | | Tue 3/25/25 | Thu 3/27/25 | | | | | ` | <u> </u> |
| 11 | Refresher training | 1 day | | Wed 4/23/25 | Wed 4/23/25 | | | | | | l l |
| 12 | Production cutover to new CRR application | 3 days | | Mon 4/28/25 | Wed 4/30/25 | | | | | | |

- June is first month with processes fully on the new system
 - June FNM posting will post 1 week later



CRR System Upgrade – Market Simulation Timeline

Connectivity Testing:

CRR Market Interface UI (MUI): 02/03/24 – 02/14/25

• B2B API (First): 02/03/25 - 02/14/25

B2B API (Second): 02/07/25 – 02/14/25

Structured Market Simulation:

Week 1: 02/18/25 - 02/20/25

Week 2: 02/25/25 - 02/27/25

Week 3: 03/04/25 – 03/06/25

Unstructured Market Simulation:

Week 4: 03/18/25 – 03/20/25

Week 5: 03/25/25 – 03/27/25

Activation & New Application Cutover: 04/30/25

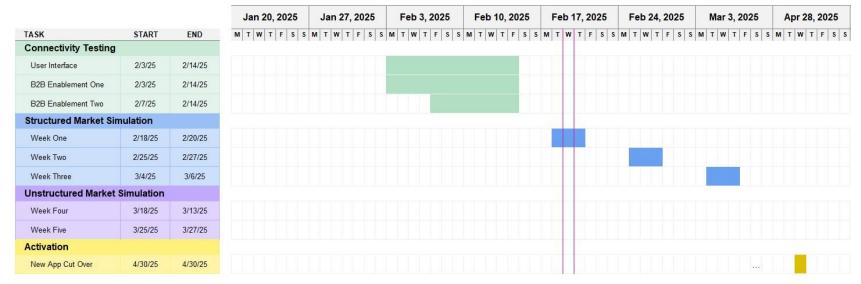
UI reporting issues:

- 1. Cert Name
- 2. Time period
- 3. Screenshots

B2B reporting issues:

- 1. Cert Name
- 2. Time period
- Request Header UUID (for restAPIs only)
- 4. Endpoint used
- Request submitted to CRR app (SCID/entityID used)
- 6. Response from CRR app
- 7. Screenshots

Note: Refer to CRR Market Simulation Plan for Market Simulation Scenarios and detailed Market Simulation Calendar. Market Participant Portal URL for CRR UI (https://mapstage-crrmui.caiso.com/) updated for Connectivity Testing. See Mock APIs (https://developer.caiso.com/Pages/application.aspx?app=CRR) and request Parameters and responses.





Market Sim plan – other links

Published on https://www.caiso.com/informed/Pages/ReleasePlanning/Default.aspx:

2025 releases

Independent 2025

Congestion revenue rights system upgrade

- Market Simulation Plan v1.9 Congestion Revenue Rights System Upgrade ₱₱ 03/04/2025, 12:13 PM
- Presentation Market Simulation Forum Dec 19, 2024 PDF 12/20/2024, 10:21 AM
- Business Requirements Specifications v 1.7 Congestion Revenue Rights System Upgrade ™ 02/24/2025, 2:08 PM

Business Requirements Specifications v1.7 - Congestion Revenue Rights System Upgrade

Cutover Plan: https://www.caiso.com/documents/2025-monthly-and-2026-annual-allocation-and-auction-calendar.pdf



OPEN DISCUSSION AND QUESTIONS



Next Steps

- Next meeting is tentatively scheduled for Thursday April 17, 2025 @10:00am, will be confirmed via notice.
- Please contact Yelena Kopylov-Alford at <u>ykopylovalford@caiso.com</u> or <u>ISOStakeholdersaffairs@caiso.com</u> with any questions.
- General questions regarding market simulation, contact <u>marketsim@caiso.com</u>. For training questions, contact <u>CustomerReadiness@caiso.com</u>.
- Specific issues or questions regarding the CRR System Upgrade project, please submit a CIDI ticket with the subject "<Project Name>: <System Name> <Issue Title>" with the functional environment associated.
- Visit CPG webpage for more information: https://www.caiso.com/meetings-events/topics/congestion-revenue-rights-crr-settlement-upgrade-project-customer-partnership-group
- Starting February 2025 and moving forward WebEx details for each meeting can be found at the notice or <u>ISO calendar</u>.
- Participating in the monthly CRR Customer Partnership Group (CPG) forum. All calls are scheduled through
 the end of the year and a notice will provide the latest call-in details for each meeting.





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

https://www.caiso.com/about/news/energy-matters-blog



Story | Operations

A small distributed energy resources project that could have a big impact

By ISO Staff

03/10/2025



Story | Transmission

Spring is the season of managing planned maintenance for RC West

By Raja Thappetaobula

03/05/2025



Story | Leadership

Another year of new challenges and opportunities at CAISO

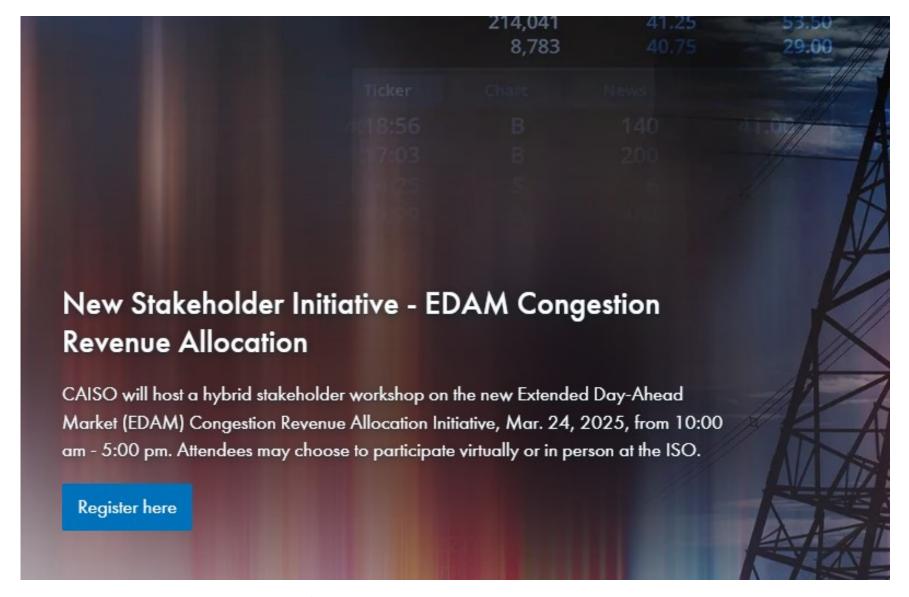
By Severin Borenstein

02/27/2025

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REFERENCE SLIDES



MapStage AIM Provisioning

- For CRR Holders and Load-Serving Entities that are currently provisioned in AlM as:
 - EXTERNAL MUI USER WITH NDA or
 - EXTERNAL MUI RESTRICTED WITHOUT NDA
- The ISO will provision/migrate access to:
 - EXTERNAL CRR HOLDER READ/WRITE ACCESS
- For CRR NDA Users that are currently provisioned as:
 - CRRFNM EXTERNAL READ-ONLY or
 - EXTERNAL MUI USER WITH NDA
- The ISO will provision/migrate their access to:
 - EXTERNAL CRR NDA REPORTS READ-ACCESS



MapStage AIM Provisioning

- If you have new users that need to be provisioned for testing, please make sure you provision them to any of these new roles:
 - EXTERNAL CRR HOLDER READ/WRITE ACCESS or
 EXTERNAL CRR HOLDER READ ACCESS
 (both above follows the existing CRR Holder participant registration process)
 - EXTERNAL CRR NDA REPORTS READ-ACCESS
 (follows the existing CRR ISO Non-Disclosure Agreement process)



CRR – B2B Spec Updates

| Spec File | Changes |
|---|---|
| caiso_crr_historical_forecasted_load_v1.1. 1.yaml | - Added error code SEC0002 for invalid participant name |
| caiso_crr_load_migration_v1.3.1.yaml | Added error code SEC0002 for invalid participant name Added error code LMV1003 for the specified load migration market name does not exist in the system |
| caiso_crr_secondary_market_v1.2.1.yaml | - Added error code SEC0002 for invalid participant name - Added error code SMT0016 for nonexistence of request ID in the system - Added error code SMT0063 for mismatched asset owner of specified request and participant name - Added error code SMT0145 when price in the response does not match price in the corresponding offer - Correct description of error code SMT0082 to "Unable to retrieve a secondary market record by the given request ID and participant name." |
| caiso_crr_tor_conversion_v1.2.1.yaml | Remove Start Date and End Date from ConversionApprovalRecord to be consistent with MUI TOR Conversion Approval Editor Added error code SEC0002 for invalid participant name Modified description of error code TOR0016 for nonexistence of TOR conversion window name in the system |
| caiso_crr_messages_v1.2.1.yaml | - Added error code SEC0002 for invalid participant name |



CRR – JSON Schema Update

| Schema Name | Changes |
|--|---|
| CRRHistoricalForecastLoad_v1.0.2.draft- 07.schema | - Corrected time in date example to '2025-07-01T 07 :00:00Z' |



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CRR MUI CSV Templates, API Connectivity Guidance

Developer Site https://developer.caiso.com

Apps > CRR > Release Notes

(1) CRR v4.x.x MUI Upload CSV Template for MP DRAFT.zip CSV Template for MP draft

| CRRH Only | CLSE/CRRH | CUDC | TOR | CEC |
|---|--|--|---------------------------|--------------------------|
| CRR bids/Offers Secondary market | CRR nominations CRR bids/Offers Historical and forecasted load Secondary market LT Nomination Election MT_TOR CRR Approvals | Customer rate (once a year) Customer number DASR | TOR Conversion Request | Load data - no change |

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CRR MUI CSV Templates, API Connectivity Guidance

Developer Site https://developer.caiso.com

Apps > CRR > Release Notes

(2) CRR v4.x.x API Connectivity.zip

CRR_APIConnectivitySoapUI_v1.0.xml: SoapUI project

CRRv4.x.x.APIConnectivity.pdf: Contains information about the API testing tool (SoapUI) request and responses for CRR B2B API connectivity testing purposes

Purpose

This document is an accompaniment to the CRR v4.x.x. Application Programming Interface (API) connectivity/sample SoapUI project <CRR_APIConnectivitySoapUI_v1.0.xml>; which is comprised of a subset of CRR endpoints' screenshots, illustrating its respective request and response.

Market participants may utilize the provided SoapUI project to confirm initial integration with the CRR application via APIs manually, such that: API submissions can successfully connect to CRR endpoints and servers, with a valid return response code Verifying that the API authenticates and authorizes user to access the CRR application

Pre-requisites/Dependencies

Market participants who would utilize the SoapUI project would need:

SoapUI 5.7.2, to import the project

Valid ISO certificate and correct user access role provisioned

To execute the API requests within the same network as where your system API calls would be coming from

API Connectivity Checklist

The provided SoapUI project contains one POST and/or GET method sample for each of the ten (10) RESTful CRR v4.x.x services available. Please refer to the ISO Developer Portal CRR application page for the comprehensive/complete endpoint service definitions per API.

CRR Service Endpoint Details

| # | Service | GET | POST | Likelihood that file submission may be greater than > 1 MB filesize | |
|---|-------------------------------------|-----|------|--|--|
| 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 | х | Х | Yes | Maximum 500 recs for any file submission to the system 20 bid segments per bid (business rule) |
| 3 | CRR Load Migration | х | х | No | - |
| 4 | CRR Nomination | Х | Х | Yes | Maximum 500 recs for any file submission to the system |
| 5 | CRR Secondary Market | х | 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 | х | | | |
| 2 | CRR Market Data | x | n /o | | |
| 3 | CRR Market Status | x | n/a | n/a | Only retrieve data, no submission |
| 4 | CRR Messages | Х | | | |



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_CongestionRightsRevenueUpgrade.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



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 offerallowed
- 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

REST

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

2001/12/soap-encoding">

</soap:Envelope>

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

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

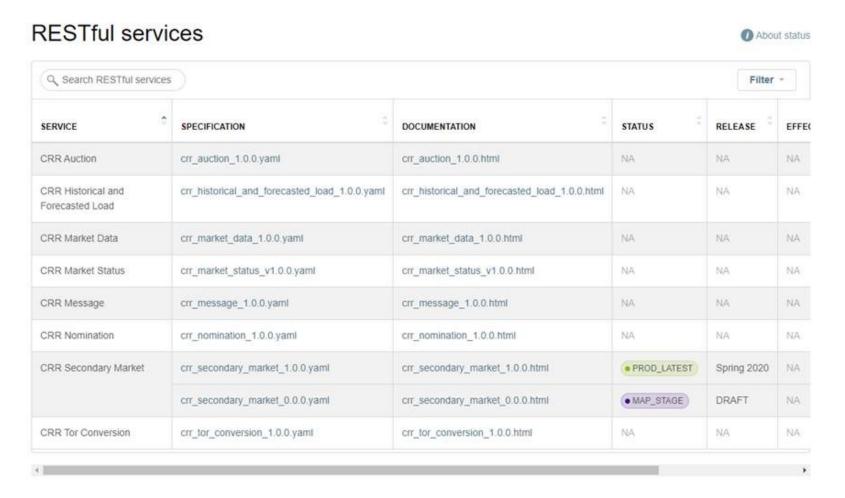
https://www.soapui.org/learn/api/soap-vs-rest-api/



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CAISO B2B Improvements – CRR Developer Forum

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





CAISO CRR API Mock Services

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

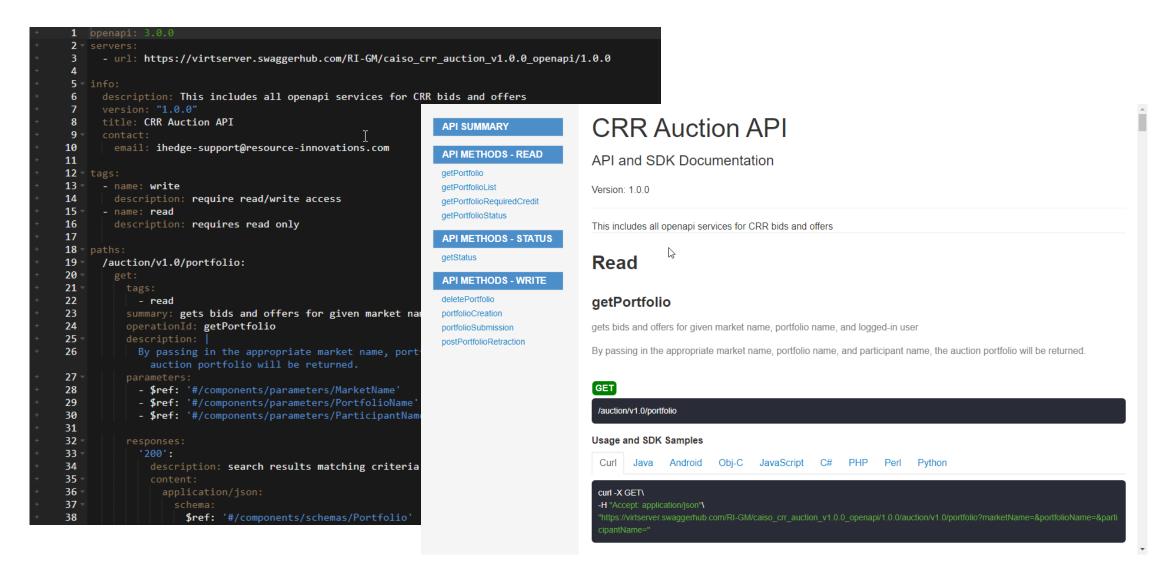


Specifications:

- · 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



CAISO B2B Improvements – Example: CRR Auction API

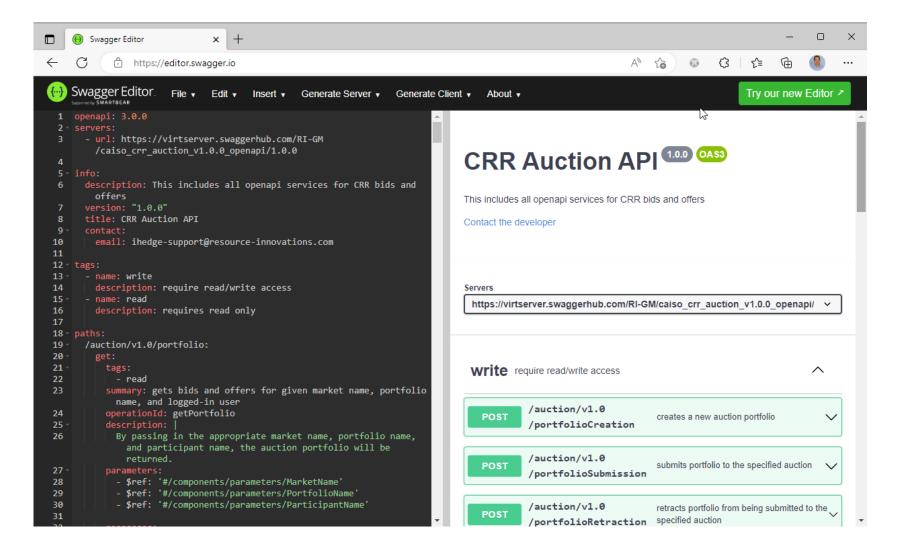




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CAISO B2B Improvements – Free Swagger Editor Tool

https://editor.swagger.io/





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 newservices 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

