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IOU / POU / CCA

Concept Design Document for CEC LMS Single Statewide Tool

Program	**CEC Load Management Standard Single Statewide Tool**
Project	**Concept Design for RIN, Rate Comparison and Rate Change Statewide Tool**

Prepared by	John Lin

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Document Change History

Author/Contributor	Version	Date	Description of Changes
John Lin	0.1	5/30/2024	Initial Draft
John Lin	0.2	6/10/2024	Second Draft
John Lin	0.3	6/17/2024	Risk mitigation and project development paths
John Lin	0.4	6/18/2024	Cybersecurity posture description, Plug Fest recommendation inclusion
John Lin	0.5	6/24/2024	Request-Response transaction formats, strength, and weakness description of design choices
John Lin	0.55	6/25/2024	Improved design choice figure
John Lin	0.6	7/1/2024	Addition of Executive Summary section
John Lin	0.61	7/12/2024	Edits and revisions from SCE & SDG&E
John Lin	0.62	7/30/2024	Edits and revisions from IOU / POU / CCA Workshop I, II
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John Lin	0.71	9/1/2024	Minor fix + clean-up of MSWord file release
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John Lin	0.85	9/16/2024	Addition of Joint IOU statement Section 2.9
John Lin	0.9	9/26/2024	CalCCA and LADWP revisions
John Lin	1.0	10/1/2024	Updated CCA list

Project Reference

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PM Name	John Lin

Document Ownership and Responsibility

- *Please refer to John Lin at PG&E for more information.*

Table of Contents

1.0 Purpose of this Document

This document is the Concept Design for the high-level design specifications and requirements, along with accompanying information on the proposed implementation architecture, for the California Energy Commission (CEC) Load Management Standard (LMS) Single Statewide Tool (SST). It is prepared for stakeholders to partly satisfy the obligations under Title 20 California Code of Regulations (CCR) 1623(c), for large IOUs, large POUs, and large CCAs[1] (as large IOUs, large POUs, and large CCAs are defined in section 1621(c)) to submit the terms and conditions and design for a "single statewide tool" to the CEC for approval on October 1, 2024. It is the intent that, upon approval of this document by the CEC, this plan forms the input to the build and implementation phase of the CEC LMS SST.

The Concept Design is meant to be jointly submitted by stakeholders of the planned implementers (large IOUs, large POUs, and large CCAs) of the CEC LMS Statewide Tool to the CEC (October 1, 2024), and the proposed implementation architecture and associated design elements are meant to guide subject matter experts on eventual build and implementation planning of the consensus Concept Design. The large IOUs, large POUs, and large CCAs have not reached consensus on all aspects of the Concept Design, as noted throughout this document. Still to be resolved are critical details regarding the structure for third-party access to rate components required by the SST from the large IOUs and large CCAs for unbundled customers. In addition, final agreement on all aspects of the Concept Design is conditioned on identification and clarity regarding funding sources, cost, and cost allocation for the SST.

[1] All references to CCAs throughout this Concept Document are to the "Large CCAs" as defined in the LMS Regulations, § 1621(c)(10).

1.1 Concept Design Document Project Timeline

The following timeline is the plan for the submittal of this Concept Design document to the CEC.

Project Element	Start	End
Hold Joint IOU weekly working sessions to align on scope and design	5/6/24	6/30/24
1st Draft of Word document of Joint IOU Single Statewide Tool Concept Design document shared with Joint IOUs	5/21/24	5/30/24
Align with other IOUs on and finalize Joint IOU Single Statewide Tool Concept Design document	6/3/24	6/30/24
Outreach and circulation of working results between stakeholders	6/3/24	6/30/24
Obtain leadership approval of Joint IOU Single Statewide Tool Concept Design document	7/1/24	7/16/24
Schedule working sessions with Large POUs, CCAs, and CEC staff on recommended scope and design	7/8/24	8/31/24
Circulate "Recommendations" document to Large POUs, CCAs, and CEC staff	7/15/24	7/15/24
Obtain feedback from Large POUs, CCAs, and CEC staff - SCE SharePoint for stakeholders to comment	7/15/24	8/31/24
Hold working sessions with Large POUs, CCAs, and CEC staff to share on recommended scope and design	7/30/24	8/31/24
Finalize Concept Design recommendations considering feedback from Large POUs, CCAs, and CEC staff	9/3/24	9/13/24
Obtain respective leadership approval on Concept Design recommendations	9/14/24	9/24/24
File Final Concept Design to CEC as IOU/POU/CCA proposal	9/25/24	10/1/24

Table 1: Timeline to submittal of Concept Design

2.0 Executive Summary

The detailed explanation of the CEC LMS SST design described in this Concept Design document follows in subsequent sections. Here in Section 2.0, we present the conclusions, the specific choices and recommendations made based on the details available in this document and discussed by the stakeholders. For the specifics on individual feature design, please refer to the subsequent sections and descriptions. For purposes of this Concept Design document, “customer” refers to IOU/POU/CCA retail customers and excludes wholesale customers.

2.1 CEC LMS Single Statewide Tool Canonical Description

The CEC LMS SST is introduced in California Code of Regulations, CCR 1623(c). CEC staff and Commissioner have described perspectives on the SST through meetings and conversations. This document presents stakeholder perspectives on the SST through collective interpretation of the requirements in CCR 1623(c).

In general, a canonical description of SST for the purposes of this document can be understood as an IT infrastructure coupled loosely to the CEC’s Market Informed Demand Automation Server

(MIDAS)[2], such that the SST is positioned to fulfill its intended purpose of facilitating automated demand flexibility based on real-time price and Green House Gas (GHG) emission signals to third parties, including Automation Service Providers (ASP). The context schematic maps the key elements and information flows for SST, MIDAS, and third parties along with IOU/POU/CCAs functional support. Central to this description of SST is the fulfilment of CCR 1623(c) required features, listed in Section 4.1. While the diagram below indicates that CCAs will independently interact with third parties and ASPs through the SST, it should be noted that, consistent with other operational practices, the IOUs may perform certain SST functions on behalf of CCAs as set forth in Section 2.8 herein.

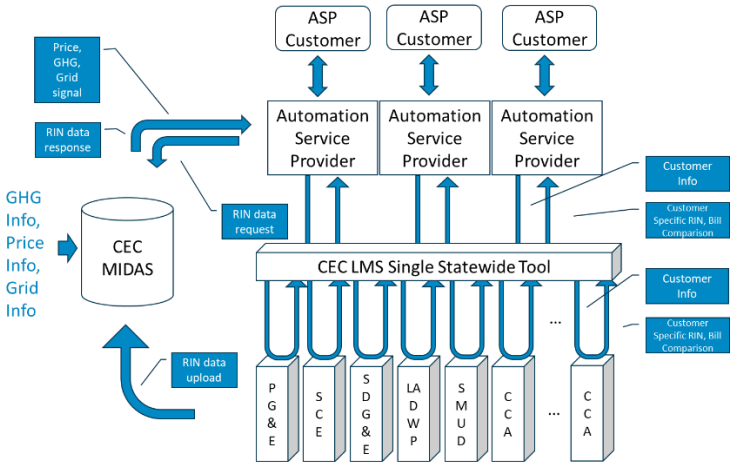

Figure 1: Canonical Context Mapping of SST, AST, LSE/UDC (for unbundled customers, the IOU is the UDC), and MIDAS

2.2 Single Statewide Tool Design Planning Process

The canonical description of Figure **1** served as the starting point of the Joint IOU working group of PG&E, SCE, and SDG&E, and then subsequently the model discussion was opened to the larger Joint LSE working group of POUs and CCAs to work together in concert towards a single concept design through workshops and feedback sessions over a two month period starting from July 17, 2024.

2.2.1 Design and Planning Considerations

The canonical description of the SST in Figure **1** can translate to any number of design possibilities for the SST. However, CA CCR 1623(c) (1) (A) – (G), and all the practical considerations to solve the entire domain of the problem as laid out in Section 4.0, coupled with the large California IOUs by default being important stakeholders to realize the SST, actually define the specification requirements of SST. Therefore, those applicable scope of requirements are specified in Section 5.0.

Also of note is that while several architectural options were explored early in the design process, per Section 5.0, a relatively "thin" common SST layer was deemed best fit to the defined scope of requirements. Thus, the joint IOUs submitted a draft Concept Design document that has remained neutral for all feedback from larger IOU/POU/CCAs in the workshop and feedback process. What is presented in this document is the best-fit "draft Concept Design" based on a "thin" common layer SST described in this document.

[2] Market Informed Demand Automation Server (MIDAS) (ca.gov) and Title 20 CCR 1623(b).

2.2.2 Introducing the Concept Design Proposal for SST

The Concept Design discussed between the joint IOU/POU/CCA includes all the implicit optionality surrounding the explicitly mandated core features of the SST, Section 4.1, in the form of a solution framework diagram, Figure **2**.

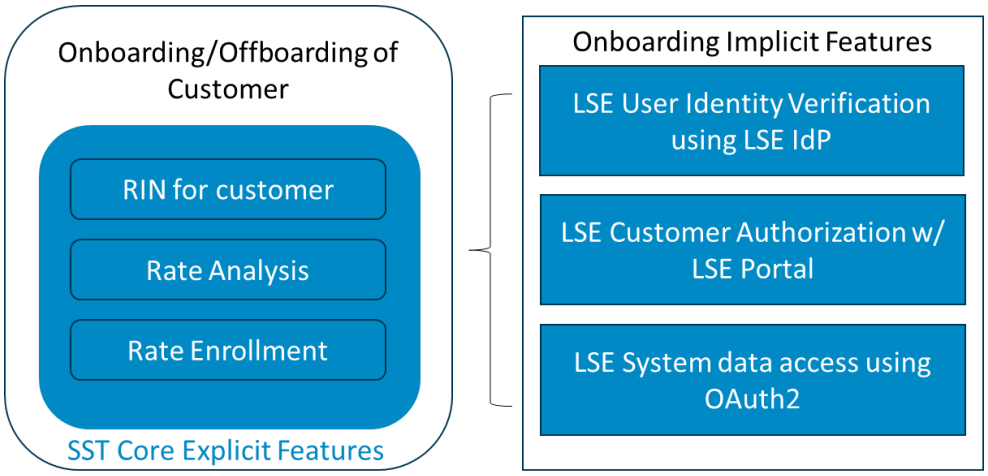

Figure 2: Solution Framework for SST to be implemented at supporting IOU/POU/CCA

A *Single* Statewide Tool can be achieved by constructing an API Proxy Gateway as the outward representation of the SST, a common layer, to all ASPs.

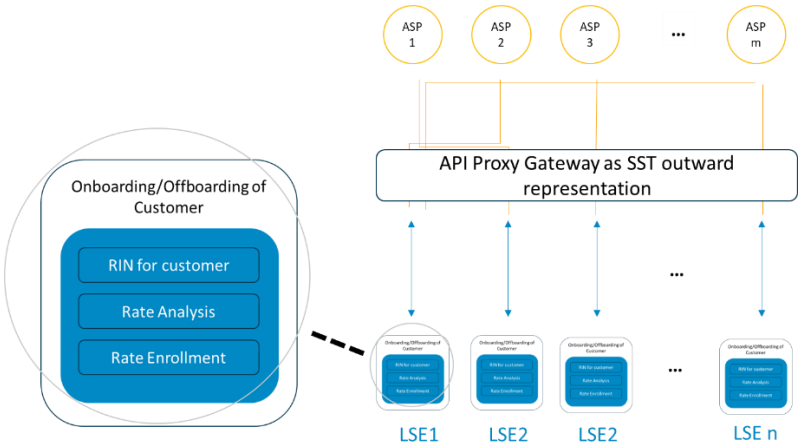

Figure 3: SST common layer is hosted independent of
LSE systems but routes requests and responses to LSE/UDCs as an API Proxy Gateway

Therefore, the cooperating IOU/POU/CCAs herein propose an SST API Proxy Gateway common layer that operates as an independent firewall and gateway that redirects online API requests and responses to ASP IT systems. The individual IOU/POU/CCAs (LSEs) implement backend systems in support of this API Proxy Gateway, as is relevant and appropriate for their level of participation to fulfill the CEC LMS SST mandate. The proposal is for each of the supporting IOU/POU/CCA to implement the backend system in the form of the Application Framework illustrated in Figure 2, except to the extent the IOUs perform the functionalities of such backend system on behalf of the CCAs as set forth in Section 2.8.

The total set of the API Proxy Gateway and supporting IOU/POU/CCA Application Framework as in Figure 3 functionally form the Single Statewide Tool in this Concept Design proposal.

The implementation of the entire set of SST explicit core features and the onboarding implicit features requires that the various design details in this Concept Design document be agreed to in a stakeholder wide consensus process. Starting with base proposal of a "thin" SST common layer and Application Framework for implicit features, where stakeholders were not possible to coalesce to specific design for SST aspects, the dependencies, open issues, gaps, and reasons are described in full in this document.

2.3 Concept Design Feature Summary

This Concept Design models the SST as a combination of the API proxy gateway and LSE/UDC individual IT implementations, subject to the CCA recommendations set forth in Section 2.8. There is no single SST implementation that stands independent and complete. An ASP accessing the API proxy gateway "sees" the gateway as SST, but in fact the services that respond to ASP requests are backed up by LSE/UDC application framework's feature implementations. As such, all RIN value delivery, bill comparison for all available RIN tariff rates, and rate change happen at the individual relevant IOU/POU/CCA, except to the extent IOUs perform functions on behalf of CCAs as set forth in Section 2.8. The API interaction is expected to be asynchronous in general.

The defining characteristic of this proposal is that features necessary to fulfill the requirements of CCR 1623(c) are implemented at individual participating LSE/UDCs in their respective enterprise IT systems to the extent the stakeholders are responsible, except to the extent IOUs perform functions on behalf of CCAs as set forth in Section 2.8. No service for data nor accounts are maintained by any independent SST implementation but relies completely on supporting LSE/UDC systems. No user interface is planned for ASPs nor customers on the API proxy gateway layer, and all user interactions are served by the relevant IOU/POU/CCA system. If no existing bill comparison function is available at a specific IOU/POU/CCA, the Concept Design does not require implementing the function specifically for the SST.

Table 2 below summarizes the IOU/POU/CCA features decisions and positions to realize the SST through the Concept Design. The features are listed according to the use cases considered from Section 5.1. Details of the consideration given for design choices are available in Section 6.5. Section 2.8 provides the large CCAs' recommendations on all use cases set forth in Table 2.

	Bundled Customer	Unbundled Customer
UC1.1	IOUs can verify customer	IOUs can verify CCA customers
UC1.2	IOUs can manage access	IOUs can manage access
UC1.3	IOUs can authorize function	IOUs can provide authorization function for UDC RIN, Bill Comparison to mirrored tariff rates, rate change
UC1.4	IOUs can process issues	IOUs can process issues for UDC tariff rates, UDC rate changes
UC2.1	IOUs provide bill comparison	IOUs provide UDC bill comparison and IOU mirrored tariff rates of CCA rates for bill comparison; no direct CCA rate/product bill comparison
UC2.2	IOU IT system provides cybersecurity	IOU IT system provides cybersecurity
UC2.3	IOU system processes change and issues notification	IOU system processes change and issues notification
UC3.1	IOU provides RIN of time-dependent tariff rates	N/A
UC3.2	N/A	IOU provides RIN of time-dependent tariff rates for distribution rates and IOU mirrored rates of CCA rates
UC3.3	IOU provides eligible tariff rates including time-dependent tariff rates and RIN	N/A
UC3.4	IOU provides bill comparison of eligible tariff rates	N/A
UC3.5	N/A	IOU provides eligible tariff rates for distribution rates including time-dependent tariff rates and RIN and IOU mirrored rates of CCA rates
UC3.6	N/A	IOU provides bill comparison of eligible tariff rates for distribution portion and IOU mirrored rates of CCA rates
UC3.7	IOU process change of rates	N/A
UC3.8	N/A	IOU processes change of UDC rate and requests processing for CCA rates
UC3.9	Onboarding and IOU processing Mode 1 and Mode 2	Onboarding and IOU processing Mode 1 and Mode 2

Table 2: List of features for Concept Design of SST, per the Use Cases from Section 5.1

2.4 SST User Experience

The Concept Design based on the features of Table 2 will define a particular type of user experience by the customer and by the ASP. Below are some expectations of the user experience.

2.4.1 SST Customer Experience

The Concept Design details the onboarding functionality of the SST. For bundled and unbundled customers, the onboarding should be effectively identical, and utilize online accounts already available to the customer when engaging their IOU (on behalf of itself or itself and the CCA)/POU. Existing online credentials are used.

ASPs will generally engage the customer through various user experience tools such as webpages, and that session will be redirected to IOU/POU sign-in page, followed by authorizations for Class 1 data delivery, and return to the ASP to continue the ASP-Customer interaction. This interaction establishes the ability of ASP to obtain data and start the interaction for Class 2 authorized activities, namely rate change.

Especially for rate changes, ASPs are responsible for their representations and relationship with their customers. Rate change processes at IOU/POU/CCAs will evaluate eligibility upon request and respond with acceptance or rejection based on established rules and procedures. Any customer experience issues arising from rate change response upon ASP request is solely the responsibility of ASPs and its inherent obligation to communicate implications of rate change request functionality on SST.

2.4.2 SST ASP Experience

The Concept Design calls for the use of token-based access control for authorized customer data and activities. Therefore, the ASP will need to establish an API-based server infrastructure to interact with the SST. Due to the intricate token related management and potential handling of sensitive customer data, the Concept Design calls for all third parties and their personnel wanting to interact with the SST to become "qualified". Upon qualification by a central authority, as discussed further in Section 6.4, all third parties will need to register at individual IOU/POU/CCA (usually through the IOU as generally described in Section 2.8) with which they wish to interact for their customers. Upon registration, the ASP may interact with the customers of the IOU/POU/CCA (usually through the IOU as generally described in Section 2.8) to offer them RIN, Bill Comparison, and Rate Change services, as applicable.

It is important to note that Bill Comparison of SST does not and cannot present any analysis beyond what information, data, and capability the existing rate comparison tools possess. Therefore, it is completely up to the ASP to consume the information upon authorization to then process in their own information and data about interventions they envision for their automated technology and present the information to the customer. The IOU/POU/CCAs take no part in any ASP aspects nor interactions involving the customer.

2.5 Single Statewide Tool Implementation Timeline

IOU/POU/CCAs agree on the need for phased implementation of SST in four phases: Phase 0 for planning, Phase 1 for customer specific RIN delivery, Phase 2 for Bill Comparison, and Phase 3 for Rate Change.

2.6 Single Statewide Tool Cost Estimation

The IOU/POU/CCA agree that cost estimation and clarity on avenue for its funding for each phase is crucial for the individual IOU/POU/CCA stakeholders to fully adopt and endorse this Concept Design proposal in its entirety as a robust and enduring plan to implement upon approval by the CEC.

When at submittal time October 1, 2024, if cost estimations and avenues of funding are not settled to a threshold level for individual IOU/POU/CCA to endorse this Concept Design fully, this proposal still forms the contingent submittal by adopting IOU/POU/CCAs with associated caveats on feasibility in effect due to cost and funding uncertainties. The IOU/POU/CCA reserve the right to modify the present Concept Design to fit realities of cost and funding when those issues become apparent over time.

2.6.1 Unbundled Customer Cost Recovery

It is important to ensure efficient and equitable use of funding which utilizes existing systems and limits duplication of efforts, reducing overall costs. Rate based cost-recovery is ideally achieved through distribution rates or Public Purpose Programs funding, which are paid by both bundled and unbundled customers. Therefore, this Concept Design generally reflects framework where IOUs/CCAs maintain current Billing Service Obligations (located in Rule 23 for PG&E and SCE Tariffs and Rule 27 for SDG&E Tariff) as the basis of any feature work related to SST, and that no additional scope to Billing Service Obligations be introduced as part of creating the SST.[3] The specifics of cost recovery

[3] Please refer to cost recovery in Pleading document *"INITIAL PROPOSED FRAMEWORK FOR SINGLE STATEWIDE STANDARD TOOL REQUIRED BY California Code of Regulations, Title 20, Section 1623(c)* " Section V.B.2 for more specific explanation.

will ultimately depend on the final design of SST as approved by the CEC, including the regulating bodies' approval of cost recovery mechanics for each LSE subject to the regulation.

2.6.2 Alternate Cost Recovery

The IOU/POU/CCAs are all very concerned about affordability of utility bills for California rate payers. The group has formed a strong consensus about cost impacts of SST development on customer bills and encourage the CEC to explore charging ASPs/third parties for SST features and function to help defray the cost onto California rate payers of implementing CEC's SST per LMS Section 1623(c).

Alternate design options could be considered for SST so that ASPs/third parties can be directly charged for use of SST as basis of the architecture and implementation. This allows for LSE customers to not be charged for ASP access to SST, but only for the initial set-up and operations and maintenance of the system by IOU/POU/CCAs.

2.7 IOU/POU/CCA Joint Recommendations

The IOU/POU/CCAs collectively stress the importance of clear funding source and approvals before Phase 0 can move forward upon approval of the Concept Design document. The current document also has open discussion items from Section 6.5 that require closure. Therefore, the IOU/POU/CCAs recommend that the CEC helps facilitate resolution of the open issues upon and after submittal of this document on October 1, 2024, to the CEC.

Additionally, the IOUs/POUs/CCAs collectively are concerned about costs associated with the implementation of the SST, and how those costs may be assessed onto California rate payers as part of the funding mechanism. As ratepayers across the state face affordability challenges, the CEC must ensure that LSEs are not being forced to build systems and tools that are not cost effective or affordable. In particular, the LSEs are concerned that requiring ratepayers to fully fund the SST is improperly asking ratepayers to subsidize the interests of ASPs/third parties who stand to benefit from the implementation of the SST. The LSEs also note that, at this stage, it is not clear what level of utilization the SST will have. Without any sense of ASP utilization levels, the cost effectiveness of any such tool cannot currently be determined. Therefore, the IOU/POU/CCA strongly recommend the CEC pursue sources of non-ratepayer funds to support the SST, and further recommend that any ratepayer funded SST include mechanism(s) that require ASPs/third parties that will be the prime beneficiaries of such a tool (via their business and customer relationships) to share in the costs of accessing and/or developing the tool. For example, costs to access could be incorporated, which could be used to offset the cost to ratepayers for development and maintenance. Such cost charging mechanisms should be explored by the CEC to help alleviate the high cost of energy services to Californians.

2.8 CCA Overall Recommendations; SST Interface, Cost Recovery Issues, Reservation of Rights

CCA "unbundled" customer rates are comprised of both CCA generation components and IOU transmission and distribution components, creating complexity for CCA participation in the SST. IOU and POU rates "bundle" the generation, transmission, and distribution components, which allow for IOU and POU functions in the canonical description of the SST set forth in Section 2.1 to be relatively straightforward. As noted throughout this document, during SST development discussions, the IOUs and CCAs identified and attempted to reconcile the complexities of providing the combined CCA/IOU RINS, rate comparisons, and bill comparisons required by LMS section 1623(c) for unbundled customers. When a third party/ASP engages with the SST on behalf of an unbundled customer, in many instances the first "stop" will be the IOU, which can interact (i.e., provide the requested

information for the both the CCA generation component, and IOU transmission and distribution component) with the SST on behalf of the IOU and CCA for that unbundled customer. Therefore, overall and to ensure cost effectiveness and ratepayer affordability, CCAs recommend the existing "business rules" and billing services agreements between the IOUs and CCAs govern the provision of services by the IOUs to the CCAs for the SST, resulting in the IOUs being the entity generally directly interfacing with the SST on behalf of CCAs, with cooperation from the CCAs. This direct interface of the IOU on behalf of the CCA will result in CCAs generally not interfacing with the SST, as set forth in Figure **1**, unless an individual CCA chooses such direct contact with the SST.

Certain details of the functionalities between the IOUs and CCAs for the SST remain unresolved, such as whether SCE and SDG&E will build systems to cache the RINs already provided by CCAs for customer bills. If SCE and SDG&E do not cache the RINs, the CCAs will not be able to provide the RINs and rate, and bill comparisons required by LMS.

In addition, costs, funding sources and cost allocation for the functionalities of the SST, including the IOU/CCA functionalities, remain uncertain and must be resolved prior to final adoption of the SST as proposed herein. Finally, the CCAs reserve all rights to seek approval for revisions to the SST, including CCA functionalities thereunder.

This Section 2.8 is the position and recommendation of the CCAs for the SST, notwithstanding any other diagram or statement in this Concept Design.

2.9 Joint IOU Statement on unresolved issues

In response to the statement of the CCAs in Section 2.8, the Large IOUs wish to make clear that they do not agree that the IOUs should take on any of the CCAs' responsibilities in relation to making CCA customer generation RINs available on the SST. Specifically, the IOUs disagree that they should be tasked with delivering the generation RINs available to CCA customers to the SST, acting as a conduit between the SST and CCAs, facilitating any bill comparison functions using the CCAs' own rates, or performing any other function that should be performed by the CCAs. Although there may be aspects of the SST that IOUs can support on behalf of CCA customers, such as identification of a CCA customer and provision of a proxy bill comparison for residential customers, there are other aspects of SST requirements that are not enabled by IOUs for CCA customers today. Depending on the solution crafted, making the IOUs responsible for these items, including RINs, may lead to inefficiencies, such as creating a new data feed to request and then retrieve certain data from a multitude of different CCAs, or may lead to inaccuracies, such as provision of information that is outdated.

3.0 Context for the Single Statewide Tool

3.1 Background

In 1974, the Legislature passed the Warren-Alquist Act in response to the energy crisis of the early 1970s and the state's growing demand for energy resources. The Warren-Alquist Act established the California Energy Commission (CEC) and, among other directives, gives the CEC authority to review and site power plants, establish efficiency standards for buildings and appliances, and establish load management standards (LMS). The CEC adopted regulations for load management under statutes soon after it was created.

Recently on April 1, 2023, the state adopted amendments to LMS that intended to increase statewide demand flexibility by requiring the largest utilities and community choice aggregators to give all customers access to rates and/or programs that provide the information needed to optimize

their energy use. By taking advantage of the technological enhancements across all sectors, the updated standards will help form the foundation for a statewide system that sends time- and location-based automation signals that devices use to provide real-time load flexibility. The amendments state that California's largest energy utilities and community choice aggregators must, barring certain exceptions: a) develop and offer to customers at least one marginal cost-based rate that changes at least hourly, or for POUs and CCAs, a cost-effective load flexibility program b) provide and update hourly and time-varying rates in the CEC's statewide Market Informed Demand Automation Server (MIDAS) database, c) develop a standard tool to support third-party services' access to rate information for its customers, and d) integrate information about time-dependent rates and automation technologies into existing customer education and outreach programs.[4] As noted above, POUs and CCAs have the flexibility to meet the LMS by offering demand flexibility programs that allow customers to respond to marginal prices price signals or other CEC approved signals, among other options available to CCAs and POUs.

Based on the recent revision to the CEC LMS, the large IOUs, large POUs, and large CCAs are working toward arriving at a consensus single design for rate access and rate change system, the SST, and will submit it to the CEC by October 1, 2024. The implementation build of the SST will be subject to an approved source of funding by the appropriate authorities.

3.2 Business Drivers

This Concept Design intakes the CEC's assertion as is: "By taking advantage of the technological enhancements across all sectors, the updated standards will help form the foundation for a statewide system that sends time- and location-based automation signals that devices use to provide real-time load flexibility".[5]

The CEC LMS in CCR 1623(c) specifies rate identification numbers (RINs), rate access, and rate change as the primary functions of a Statewide Tool, and therefore this Concept Design document focuses on design elements thereof as the "mandated explicit core features". This Concept Design document describes important feature aspects that relate to realizing delivery of rate comparison files and rate change functions for stakeholders.

The Concept Design document considers some of the funding assumptions and realities of build, operation, and maintenance of the Single Statewide Tool and lays out the design choices and elements. Important requirements are itemized in Section 4: Scope for clarity and consensus purposes.

3.3 External Stakeholders

CCR 1623(c) states that "Large IOUs, Large POUs and Large CCAs" must develop a "single statewide tool" for "authorized rate data access by third parties". [6] The IOUs, POUs, and CCAs are working together to develop this SST for third parties and customers. Additionally, the California Energy Commission (CEC) as regulating entity and its staff have vested interest to approve the design of the SST and successfully launch it as an effective tool for California consumers to enhance ability to "Link Devices to Electricity Rates".[7] The following is the specific list of stakeholders subject to the LMS and working to develop the SST:

[4] https://www.energy.ca.gov/sites/default/files/2022-10/Load_Management_Fact_Sheet_ADA.pdf
[5] Ibid
[6] CCR 1623(c)(1)
[7] CCR 1623(c)

1	IOU	SDG&E
2	IOU	SCE
3	IOU	PG&E
4	POU	LADWP
5	POU	SMUD
6	CCA	Clean Power Alliance
7	CCA	Ava Community Energy (formerly East Bay Community Energy)
8	CCA	MCE
9	CCA	Central Coast Community Energy
10	CCA	Silicon Valley Clean Energy
11	CCA	San José Clean Energy
12	CCA	Peninsula Clean Energy
13	CCA	CleanPowerSF
14	CCA	Sonoma Clean Power
15	CCA	San Diego Community Power
16	CCA	Clean Energy Alliance
17	CCA	Pioneer Community Energy
18	CCA	Orange County Power Authority
19	CCA	Valley Clean Energy

Table 3: List of stakeholders IOU/POU/CCA

3.4 Internal Stakeholders

The Concept Design and the implementation architecture information is intended to be approved by the stakeholder community. As such, each stakeholder organization is requested to review and evaluate this Concept Design document within the prescribed timelines.

It is the responsibility of each stakeholder organization to concretely and without ambiguity, and with full responsibility, evaluate the Concept Design and associated information with their internal stakeholders along the project timeline of Table 1.

3.5 Consensus of Stakeholders

The Concept Design document was subject to consensus and thus approval by individual stakeholder organizations as listed in Table 3 to the extent they were able. The following are the individual review tasks expected of the stakeholder organization:

a) Language of Sections 2.0 and 3.0 of this Document.
b) Each line item of Sections 4.2 and 4.3 that describes the Problem Statement.
c) Each table and item in Section 5.0 for Scope.
d) Each design element description in Section 6.0.
e) Approve a selection of features from Section 9.0.

Each participating stakeholder organization was requested to:

i) Participate in consensus building workshops and review, edit sessions within allocated and agreed timeframes

ii) Disposition its agreement or disagreement from the above list.
iii) If disagree, state precisely the context and details where possible.
iv) If conditionally agree, state precisely the context and details where possible.
v) If available in time for the October 1, 2024, submission to the CEC, provide a high-level estimate of required resource, cost, timeline, and conditions to realize their responsibility of the Statewide Tool per the Document.
vi) Submit their input to be part of the Document per agreed timeframes.
vii) Conclude on the processes above so that the compiled final Document can be distributed for final sign-off per agreed timeframe.
viii) Once the Concept Design Document is submitted by October 1, 2024, and if approved by the CEC, progress in good faith effort to fulfill its obligation pertaining to this Document.

4.0 Problem Statement

4.1 Specification excerpt from CCR Title 20 Section 1623(c)

The specific requirements from CCR Title 20 Section 1623(c) are described in the excerpt text below:

(c) Support Customer Ability to Link Devices to Electricity Rates.

(1) Third-party Access. The Large IOUs, Large POUs and Large CCAs shall develop a single statewide standard tool for authorized rate data access by third parties that is compatible with each of those entities' systems. The tool shall:

(A) Provide the RIN(s) applicable to the customer's premise(s) to third parties authorized and selected by the customer.

(B) Provide any RINs, to which the customer is eligible to be switched, to third parties authorized and selected by the customer.

(C) Provide estimated average or annual bill amount(s) based on the customer's current rate and any other eligible rate(s) if the Large IOU, Large POU or Large CCA has an existing rate calculation tool, and the customer is eligible for multiple rates.

(D) Enable the authorized third party to, upon the direction and consent of the customer, modify the customer's applicable rate to be reflected in the next billing cycle according to the Large IOU's, Large POU's or Large CCA's standard procedures.

(E) Incorporate reasonable and applicable cybersecurity measures.

(F) Minimize enrollment barriers; and

(G) Be accessible in a digital, machine-readable format according to best practices and standards.

(2) Pursuant to Section 1623(c)(1), the Large IOUs, Large POUs and Large CCAs will submit the single statewide standard tool developed to the Commission for approval at a Business Meeting.

(A) The tool must be submitted within eighteen (18) months of April 1, 2023.

(B) The Executive Director may extend this deadline upon a showing of good cause.

(C) The Large IOUs, Large POUs and Large CCAs will describe a single set of terms and conditions they intend to require of third parties using the single statewide standard tool.

(3) Upon Commission approval the Large IOUs, Large POUs and Large CCAs will implement and maintain the tool developed in Section 1623(c)(1), subject to future developments that result in future maintenance by an independent third-party entity.

4.2 Requirement Summary

The April 1, 2023, approval and update to the California Energy Commission (CEC) Load Management Standard (LMS) sections 1623(b) and 1623(c) described the following four elements:

1. The California Energy Commission (CEC), large utilities and Large community choice aggregators maintain the accuracy of existing and future time-varying rates in the publicly available and machine-readable Market Informed Demand Automation Server (MIDAS) rate database.
2. Large utilities and Large CCAs develop a standard rate information access tool to support third-party services.

3. Large utilities and Large CCAs develop and submit, if applicable, locational rates that change at least hourly to reflect marginal wholesale costs, or for POUs and CCAs, a cost-effective load flexibility program.

4. Large utilities and Large CCAs integrate information about new time-varying rates and automation technologies into existing customer education and outreach programs.

This Concept Design document addresses element 2 above, and the documented design elements are intended to guide the development of a Statewide Tool solution that enables automation technology to utilize information made available from implementation of element 1, as described in Figure **1**. The Concept Design assumes that the resulting SST implementation project will be planned as a multi-year (2025-2027+) phased solution building project, where the large IOUs, large POUs and large CCAs submit this Concept Design document and any associated additional resource material on October 1, 2024, for approval by the CEC Commissioners. Upon approval of this Concept Design, the solution building project shall be sourced for solution building by relevant parties in phases when funding mechanisms are identified and approved.

4.3 Interpretation and Assumptions from the CEC Load Management Standard

The main premise implied by CCR Section 1623(c) (1) is:

1. Customer's ability to access their rate information is intended to be via the CEC's MIDAS.
2. The customer's ability to link their Devices to MIDAS is intended to be through the SST.
3. The SST is viable by continued operational input from the stakeholder LSE/UDCs.
4. The SST is available only to authorized third parties, including automation services providers (ASPs).
5. The SST enables correlation of Customer's current rate and available future rate options with RINs from MIDAS, if applicable.
6. The SST enables rate comparison of individual customer utility service agreements.
7. The SST enables rate changes of individual customer utility service agreements by third parties if authorized, and if such rate change capability is available prior to SST.
8. The "Single" Statewide Tool can mean identical implementations accessible individually at each obligated stakeholder or can be a unitary implementation supported by each obligated stakeholder.
9. The deliverable to the CEC Executive Director is this Concept Design document.

The additional implicit assumptions generally are:

A. The business requirements and constraints exist to realize the SST.
B. The relevant privacy and liability constraints exist and are imposed by legal obligations
C. The relevant tariffs and regulations that impose additional constraints exist on the SST.
D. Constraints exist from market and industry technology at large.
E. Resource constraints exist at the implementing stakeholders internally due to their technical infrastructure and operations.
F. Complexities exist for SST functionalities to be provided to CCA customers, as noted in Section 2.8 herein.

5.0 Scope of Requirements

5.1 Use Cases of SST

The use cases considered within the requirements are summarized below:

UC1	LSE/UDC
UC1.1	Make sure that system is working with the right customer records
UC1.2	Be able to reject unreasonable or conflicting actions from ASP
UC1.3	Enable Opt-in and Opt-out for the customer
UC1.4	The Customer to be able to communicate and raise issues about ASPs
UC2	Customer
UC2.1	See Bill Comparison and it should be same as what I see on my utility online system
UC2.2	Make sure that ASP is trustworthy and protects my PII
UC2.3	Change my rates and get confirmation from my utility
UC3	Third Party ASP
UC3.1	Obtain RIN associated with bundled customer
UC3.2	Obtain RIN associated with unbundled customer
UC3.3	Presents eligible rates & RIN from bundled customers
UC3.4	Obtain Bill Comparison between eligible rates for bundled customers
UC3.5	Presents eligible rates & RIN from unbundled customers
UC3.6	Obtain Bill Comparison between eligible rates for unbundled customers
UC3.7	Change rates for my bundled customers
UC3.8	Change rates for my unbundled customers
UC3.9	Keep Customer interaction mainly within ASP system

Table 4 Use Cases for Single Statewide Tool

5.2 Itemization of Regulatory Requirements

In itemized form the following are the stated requirements for the CEC LMS Statewide Tool:

Identifier	Requirement
CEC1	Provide the RIN(s) applicable to the customer's premise(s) to third parties authorized and selected by the customer
CEC2	Provide any RINs, to which the customer is eligible to be switched, to third parties authorized and selected by the customer
CEC3	Provide estimated average or annual bill amount(s) based on the customer's current rate and any other eligible rate(s) if the Large IOU, Large POU or Large CCA has an existing rate calculation tool, and the customer is eligible for multiple rates
CEC4	Enable the authorized third party to, upon the direction and consent of the customer, modify the customer's applicable rate to be reflected in the next billing cycle according to the Large IOU's, Large POU's or Large CCA's standard procedures.
CEC5	Incorporate reasonable and applicable cybersecurity measures
CEC6	Minimize enrollment barriers
CEC7	Be accessible in a digital, machine-readable format according to best practices and standards

Table 5 CEC mandate under Load Management Standard CCR 1623(c)

5.3 Itemization of Regulatory Commitments

CCA Enablement

CCA1	When the CEC LMS single statewide tool is ready, CCA enablement by IOU shall not change the scope of existing billing service responsibilities

Table 6: Commitments through Implementation Plans

5.4 Itemization of Business Requirements

Derived, Business and Implicit Non-Functional Requirements (NFR)

NFR1:	Rate Comparison via ASP shall be an Opt-In capability
NFR2:	Rate Change via ASP shall be Opt-In
NFR3:	The Statewide Tool shall at least include Rate information for Customer Classes that have RIN; it does not prevent LSE/UDCs from providing additional rate information in the SST
NFR4:	Customer rate comparison includes direct customer-Utility interactions as default method
NFR5:	Customer rate change for delivery service shall be made by UDC and rate changes for generation service shall be made by each LSE/UDC
NFR6:	Customer experience for rate comparison is through ASP, i.e. ASP serves as customer proxy and concierge
NFR7:	Customer experience of rate change can be through ASP
NFR8:	Rate comparison information on ASP and Utility shall be based on single source of truth and be consistent across organizations[8] but may not be available if account is less than 12 months old
NFR9:	Rate change information on ASP and Utility, along with rate enrollment/unenrollment information, shall be based on single source of truth, consistent across organizations, and not through a new process
NFR10:	RIN information provided for Rate Comparison
NFR11:	RIN information provided for Rate Change
NFR12:	Statewide tool and MIDAS are independent and decoupled except for RIN
NFR13:	Utility identifies users presented by ASP using onboarding APIs
NFR14:	ASPs satisfy minimum requirements per section 6.4
NFR15:	ASPs are registered with the CPUC and/or CEC
NFR16:	Customers receive confirmation from LSE/UDCs upon rate change
NFR17:	LSE/UDC can reject conflicting or non-conforming requests from ASP
NFR18:	LSE/UDC may have option to block ASPs not on central authority list per own requirements
NFR19:	Statewide Tool may implement functional availability in phases for customer classes
NFR20:	LSE/UDC verify the customer for Statewide Tool transaction on rate comparison and rate change
NFR21:	Require ASP to present customer and LSE/UDC verify and confirm
NFR22:	Minimization of potential liabilities on data release and other customer account changes
NFR23:	Mitigation of Risks of PII data leakage and cybersecurity attacks

[8] Idempotency: Understanding Idempotency in APIs: A Comprehensive Guide | by Rakesh Kumar | Nerd For Tech | Medium

NFR24:	Proof of Customer Authorized Action per 7.2 Class 2 description, and IOU/POU shall record authorizations; customer shall explicitly authorize rate changes
NFR25:	ASP access within authorized limits
NFR26:	SST shall not store any data
NFR27:	ASP shall not change rates; ASP shall request change of rates, but LSE/UDC shall be responsible for actual change
NFR28:	ASP shall provide to customers proper education on rates and full understanding of impacts to customers they represent

Table 7: Business process considerations

5.5 Organizational Constraints and Requirements

IT Internal Infrastructure Requirements

LSE1	Reuse of existing infrastructure
LSE1.1	Pull RIN from internal data source per utility service agreement
LSE1.2	Reuse Online Enrollment API
LSE1.3	Reuse existing rate analysis API
LSE1.4	Expand any existing API gateway and application to include rate analysis/rate change
LSE1.5	LSE/UDC systems shall not directly interact with ASP systems
LSE1.6	Clear onboarding onto Statewide Tool required and shall match onboarding onto LSE/UDC services for data and feature access
LSE1.7	Lifecycle manage onboarded customers from Statewide tool through to LSE/UDC systems
LSE1.8	Clear offboarding from Statewide Tool and matching offboarding from LSE /UDC services from data and features

Table 8: Infrastructure requirements

6.0 The Concept Design

The Single Statewide Tool (SST) is CEC's concept intended to help solve some of California's energy problems by price aware automation device technologies. The SST requires coordination and cooperation between multiple business delivery systems, i.e. IT infrastructure of a heterogeneous group of IOU/POU/CCA stakeholders together with MIDAS and ASP IT systems. The alignment of individual stakeholders around one single concept design for SST is a challenge that requires focused leadership of the CEC.

In general, there are and have been many learnings about interoperability of information technology systems from pilots and industry services, and well-established concepts exist to facilitate exchange of information and services between disparate IT systems of stakeholders. The SST is no different in that respect, and owing to the complexity of the issues involved, the SST should not try to reconsider methods established from best-in-class solution models wherever possible.

The following are recognized as major design elements for systems that have features common to SST purposes:

Implicit Feature	Onboarding of ASP for SST
Implicit Feature	Offboarding of ASP for SST
Implicit Feature	Onboarding of IOU/POU/CCA Customer onto SST IOU/POU/CCA Customer Identification IOU/POU/CCA Customer Authorization of ASP IOU/POU/CCA Customer control of Access by ASP
Implicit Feature	Offboarding of IOU/POU/CCA Customer
Implicit Feature	IOU/POU/CCA Customer Data Access by ASP
Explicit Feature	RIN data to ASP from IOU/POU/CCA for Customer
Explicit Feature	Rate Analysis service by ASP for IOU/POU/CCA Customer
Explicit Feature	Rate Enrollment service by ASP for IOU/POU/CCA Customer

Table 9: List of Features

The approach taken and descriptions arrived in this document for a practical SST is based on an ad hoc consensus process the IOU/POU/CCA have undertaken prior to submittal of the Concept Design document on October 1, 2024. The consensus focuses on limiting total cost of product and ownership while reducing risk of functional failures, cybersecurity threats, and ASP adoption.

6.1 Roadmap & Release Planning

The SST is a new software service and with all new services and technologies, experiential evidence serves to inform how California should go about realizing this service. History has shown that reducing functional and adoption risks at release is proportional to the amount of preventive engineering design, time and resources that have been expended leading up to the release.

Upon approval of the proposed Concept Design on or after October 1, 2024, each large IOU/POU/CCA will need to obtain funding to implement its respective responsibilities of the SST. The IOU/POU/CCA agrees that to enable delivery of SST services as efficiently as possible, the consensus position is to release SST features in phases according to individual stakeholder plans and capabilities.

A well-defined plan for release of milestone and deployment needs to be considered separate and distinct from the design aspects of the SST. Risk management, effectiveness control, and quality assurance are important factors in deployment and milestone planning. The following figure illustrates the phased approach envisioned for the SST. Upon approval from CEC, IOU/POU/CCAs will secure funding, jointly plan, and issue relevant RFPs from IOU/POU/CCA for Phase 0, including the common RFP for API Proxy Gateway. POUs would need to include such funding need in future rate cases and/or budgets subject to approval by their local Boards. Costs, funding sources and cost allocation for the functionalities of the SST, including the IOU/CCA functionalities, remain uncertain and must be resolved prior to final adoption of the SST as proposed herein. Here, the assumption is that SST supporting IOU/POU/CCA individually build functions of SST according to their own manageable timelines, and subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. The three phases follow Phase 0 of securing funds, planning and RFP process. Phases 1/2/3 map to three core features of SST per CEC 1+2, CEC 3, CEC 4 from Table 5.

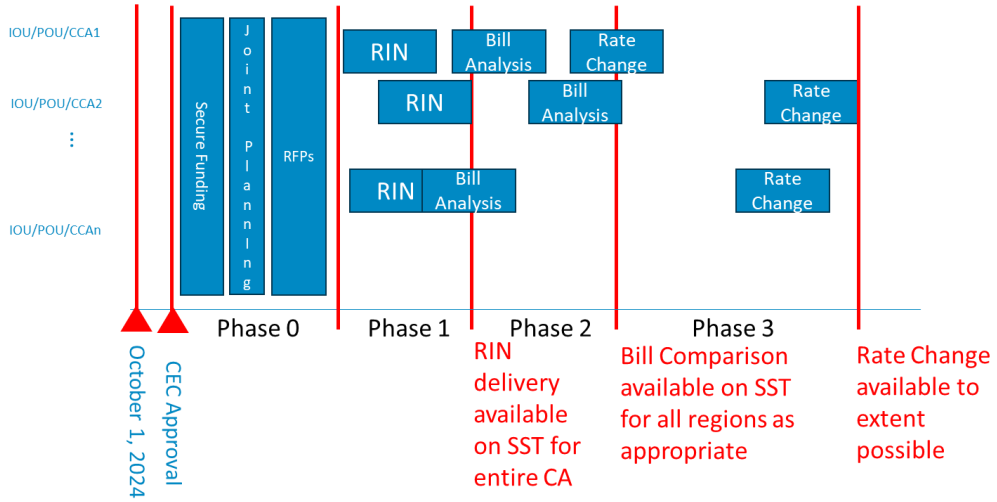

Figure 4: Phased deployment of SST features

6.1.1 Timeline of Phases

The proposed release plan calls for Phases along the timeline of releases. While it is not clear when Phase 0 ends due to many regulatory approval dependencies, namely clarity on funding, ample time should be allocated for each Phase to ensure ordered release and deliveries of capability.

In general, Phase 1 may take 12 months, and similarly for Phase 2. Phase 3 has heavy dependency on modifications to LSE Billing Systems, a business-critical IT infrastructure. Therefore Phase 3 itself should be considered a 12-to-24 months project.

For example, if Phase 0 ends in Q2 2025, Phase 1 may take up to Q2 2026. It is also possible that since Phase 3 involves modifications to business-critical enterprise Billing Systems, there may be a hiatus between the end of Phase 2 and the start of Phase 3.

Note that end of Phase 1 implies all IOU/POU/CCA of concern providing the RIN delivery (subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs), but individual LSE/UDCs may provide services earlier.

6.1.2 Coordination of Release Timelines

Given the risks and potential mitigation strategies, the following are strongly recommended to make SST available at the earliest possible opportunity to the greatest extent possible at any time. For effective SST release:

a) Upon approval of the Concept Design and funding approvals, allow each IOU/POU/CCA to propose their own implementation design, development, and deployment schedule.
b) Upon approval of the Concept Design and funding approvals, allow each IOU/POU/CCA to prioritize the deployment of specific features and functions as appropriate and efficient to individual SST infrastructure design, development, and deployment project scales and complexities.
c) Release SST features in coordination with release of same features by other stakeholders. A phased release is recommended.
d) RFP in Phase 0 should be issued by individual LSE/UDCs (IOU/POU/CCAs), subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs, to coordinate on Phases of the release timeline
e) RFP in Phase 0 should be issued for common gateway layer after sufficient discussion between the IOU/POU/CCAs, as shown below in Figure **5**.

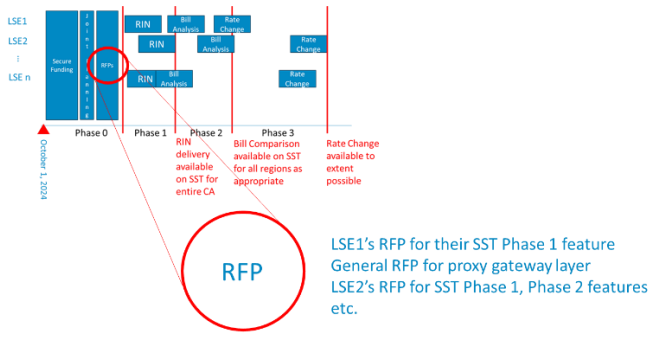

Figure 5: RFP on following Phases of the release timeline

6.1.3 Risk Mitigation

The release of SST requires several practical considerations. These are listed below:

a) Ability of each of IOU/POU/CCA to secure enough funding for SST to function.
b) Ability of each of IOU/POU/CCA to design, develop, and release the required infrastructure per Concept Design for each Phase of the Phased deployment timeline of Figure 4, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

There are several risks associated with the above two points. These are listed below along with proposed resolutions.

6.1.3.1 Stakeholder Capability Risk

The aim for the SST is for third party automation services provider(s) to associate their customers and devices to the relevant RIN values, rates, and obtain price signals from MIDAS, and that the SST be able to do so across California. CCR 1623(c) creates an obligation to SST that no one member of

the stakeholders can be responsible for another(i.e., one party cannot manage or force any of the other parties to fund or finish their infrastructure). There is significant risk that the result will be an incomplete SST that may not be fully functional for CEC's intended purpose.

The IOU/POU/CCAs all have different technology infrastructures. In this heterogenous environment, the features of the SST are to be overlayed for implementation.

Each IOU/POU/CCA should be able to elect to reduce implementation risk by opting to build new or on top of existing infrastructure. The result may be that each IOU/POU/CCA implementation of SST supporting functions run on disparate infrastructure, but implementation timetables and costs may be more manageable than having to build nearly identical infrastructures across IOU/POU/CCA.

For SST implementation design and development, decoupling the implementation timelines will mitigate overall SST realization risks. It is therefore recommended that individual IOU/POU/CCA become relatively free to implement the Concept Design based on individual infrastructure realities and project plans, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs, and the entire SST be deployed in phases per 6.1.

6.1.3.2 Prioritization and Risk

CCR 1623(c) does not specify any prioritization on the individual features and functions. However, requiring all features of SST upon release creates undue risks. For any service based on technology, building capabilities and features on existing infrastructure is different from creating new infrastructure to realize new capabilities. In some situations, building features on top of existing infrastructure, if one were available, can simplify implementation and quicken timelines. A prerequisite for this approach is to prioritize features of SST, such that each IOU/POU/CCA can freely plan specific feature implementation at different timelines, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. In this way SST features become available sooner rather than later, for parts or whole of California. Without prioritization, SST service can only be offered once all parties are complete with their implementations.

As a practical point, SST's individual features should be prioritized for implementation by each stakeholder as appropriate to the type of infrastructure it may operate. This requires a specific allowance and recognition by all stakeholders that implementation design and development may run independent of each stakeholder, and that certain features may be released earlier rather than later. Thus, a phased deployment approach for SST is recommended.

6.1.3.3 Customer Experience Risk

While CCR 1623(c) requires the operation of SST from IOU/POU/CCAs, the LSE organizations must also uphold customer satisfaction thresholds for SST on par with other established services the LSE provides. If any given implementation at a LSE is found to be problematic for its own services of SST or impacts the image of the SST in general, appropriate remediation measures should be taken individually and as needed collectively to ensure protection of LSE image, as well as upholding customer confidence in SST services. As such, phased release timelines may be impacted due to unforeseen risks to customer experience, and such occurrences could introduce plan changes and delays in overall timeline for SST phase releases until problems can be addressed and resolved.

6.1.4 Plug Fest Interoperability Assurance of SST

The SST is a service requiring coordination and connection with multiple stakeholders' technology infrastructures. To successfully launch such a service, planned milestones should include interoperability testing sessions with multiple parties including ASPs; later implementation of SST functionality or compatible client services can use the testing sessions as way to align to earlier implementations, thus assuring that common practices and implicit design features are disseminated across all stakeholders at any time along a protracted deployment phase. This process allows for realistic management of alignment from multilateral implementations on both server and client sides of SST.

"Plug Fests", as multiple party testing sessions are called in the industry, provide such a technical working session and forum to inform, test, align all stakeholders around standard implementations and bring interoperability across the stakeholder landscape. SST is necessarily a networked application and interoperability testing sessions in the form of Plug Fests can increase the likelihood impactful and successful roll out of SST features. The industry is strongly encouraged to plan in Plug Fests along phased release timelines during implementation design and development phase as industry best practice. Plug Fests should have interoperability test scenarios defined prior to session so that IOU/POU/CCA and ASP technical teams may prepare their implementations accordingly. A PlugFest should be arranged prior to completion of Phases 1, 2, and 3.

6.2 High Level Architecture & Design Principles

The SST shall consist of a single online resource for ASPs to interact with California load serving entities (LSE/UDC), i.e. the large IOU, large POU, and large CCA.

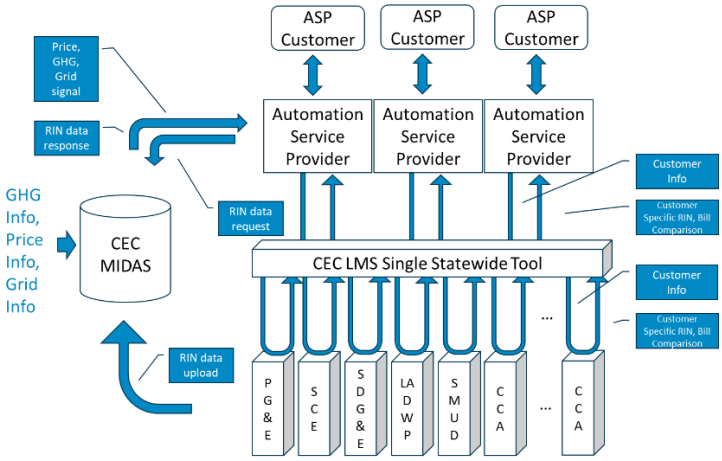

Figure 1 Single Statewide Tool (SST)

Per Figure 1 , Automation Service Provider (ASP) submits Customer Information to SST; SST uses the submitted Customer Information and gets the associated RIN from IOU/POU/CCA, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. The ASP then can reference MIDAS to determine the rate details of the customer and set automation devices accordingly to business specific purposes.

The SST is assumed to fulfill the following characteristics for its overall architecture:

CEC7-SST is hosted on an environment that is accessible from the Internet using APIs
SST is an online service, and its root level domain name is representative of the SST, such as www.*someNameToBeDeterminedForSingleStatewideTool*.com

CEC5-ASPs interact with SST; LSE/UDC interact with SST, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

The following summary description provides an overview of the SST, and subsequent sections describe the individual concept design elements in more depth. The Concept Design recommendation is to have the APIs facing ASP be realized by Proxy API gateway, supported by IOU/POU/CCA, and collectively be the SST. **Thus, it is the proposal of this Concept Design that the SST is not a single entity, but a thin layer of SST gateway backed up by individual IOU/POU/CCA SST service, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.**

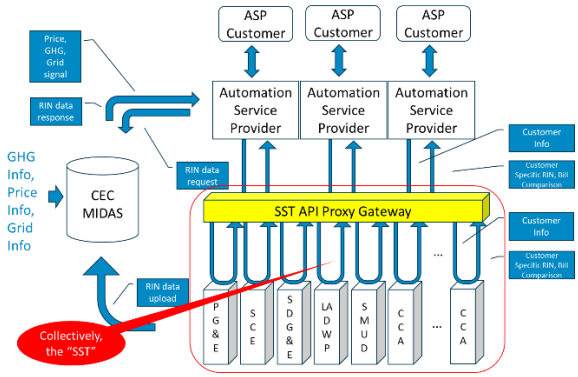

Figure 6: SST as collective of API Proxy Gateway supported by individual IOU/POU/CCA systems, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs

6.2.1 Application Framework for SST Solutioning

The SST implies a set of requirements for implementation by IOU/POU/CCA, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. In terms of solutioning, the SST translates to creating a software application, and specifically one that realizes the core features in the mandate: 1) RIN presentation, 2) bill/rate analysis, and 3) rate change. These are specific application-level functionalities accessible on the SST once an ASP is authorized and able to request those core feature services on behalf of the IOU/POU/CCA customer.

For the consensus design choice, the following Application Framework is proposed below for the SST as a solution to implement at IOU/POU/CCA.

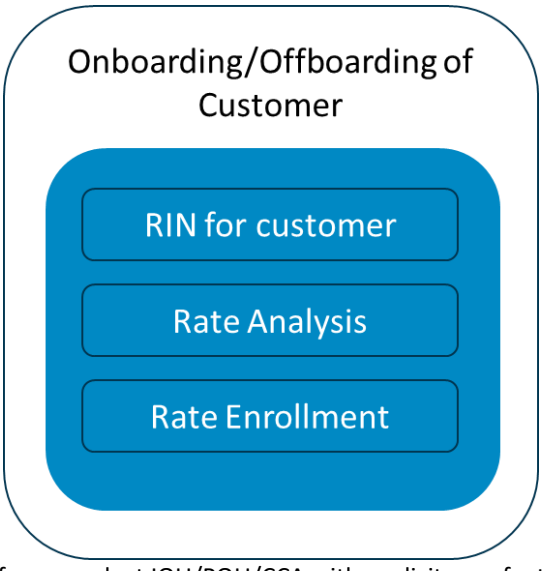

Figure 7: SST application framework at IOU/POU/CCA with explicit core features and implicit Onboarding/Offboarding customer features

Within the Framework, the explicitly mandated features form the three core features of the SST and are access controlled by the implicit feature of onboarding. **This explicit feature set is required to be implemented at each IOU/POU/CCA as relevant, as basis of this Concept Design, subject to the**

specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

To emphasize, in Figure 7 of the application framework, the IOU/POU/CCA Customer Onboarding/Offboarding functionalities are implicitly required in the SST by CCR 1623(c). From experience at IOU/POU/CCAs, these implicit features typically form a large and critical piece of realizing a practical and functional IT software solution, and therefore this Concept Design document provides due weight to extensively cover the characteristics of the implicit feature set and options to be implemented at the IOU/POU/CCA, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

6.2.2 Performance aspects of SST Solution

The Concept Design seeks to balance stakeholder requirements with feature and function delivery. In this context, it is natural for anyone to seek understanding of how the SST based on this Concept Design will perform.

While true performance characteristics of such a complex system as the SST can only be understood by measuring an actual system when it is built, some aspects may be discussed to help with expectations of how the SST will perform.

SST system performance may be defined by many aspects, but generally one can state system performance such as response time, availability, capacity/throughput/scalability, general latency as typical aspects to consider and seek understanding for.

6.2.2.1 Roundtrip Response Time

All API based roundtrip response times are defined by either the synchronous API request/response time or the initial response of an asynchronous request/response and its promised return push response after the asynchronous process completion.

The SST will most likely have its response times constrained by the individual layers that constitute a Concept Design implementation, and by the individual Application Framework that supports the SST but at individual IOU/POU/CCA per transaction, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. In general, the API Proxy Gateway layer is envisioned not to contribute too much roundtrip response time as it is essentially a pass-through mechanism. The constraint on the response time is likely to come from query response time of specific RIN or Bill Comparison request upon the IOU/POU/CCA data source, along with competing processes that also load the data source at each local implementation, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

As an important point to emphasize, fundamental response time performance work is generally considered outside the scope of SST related IT build. This is because databases and access thereof are basic IT infrastructure issues and SST only leverages such existing infrastructure; costly improvements, revisions and refactoring of entire data infrastructures at IOU/POU/CCAs for the purpose of the SST is explicitly considered out-of-scope of Concept Design (ref: Table 8).

6.2.2.2 Availability

The SST application framework calls for support infrastructure at each relevant IOU/POU/CCA, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of

the SST on behalf of the CCAs. Such infrastructure supports the API Proxy Gateway; the availability of the IT infrastructure at the IOU/POU/CCA is generally governed by shared resource operations and maintenance policies of that organizations' IT infrastructure policy. Hence the SST of this Concept Design, while the API Proxy Gateway may be available at some certain percentage value, may still have varied server availability depending on the incoming transaction and the state of the supporting IOU/POU/CCA infrastructure.

As an important point to emphasize, system availability is generally considered outside the scope of SST related IT build. This is so because the corresponding IOU/POU/CCA basic IT infrastructure is governed by existing system operations regimen; costly improvements, revisions and refactoring of entire infrastructures at IOU/POU/CCAs for the purpose of the SST is explicitly considered out-of-scope of Concept Design (ref: Table 8).

6.2.2.3 Capacity/Throughput/Scalability

The API Proxy Gateway layer handles incoming requests and routes it to corresponding supporting IOU/POU/CCA, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. Transactional traffic management occurs at this layer, ahead of the individual IOU/POU/CCA supporting layers. The API Proxy Gateway will need to be configured and sized to a specific traffic capacity/throughput. Changes to scale may be readily addressed and made, but not without material impact to cost of operation of the system. Therefore, the SST is expected to be sized once, and remain static in terms of capacity/throughput to an assumed scale, and while able to change, cannot be changed unless associated cost issues can also be addressed and solved.

6.2.2.4 General Latency

The individual IOU/POU/CCA systems form the foundation of SST; as such, the responses of ASP data requests is dependent on the data fulfillment characteristics of individual IOU/POU/CCA data source characteristics and individual data collection mechanisms, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. The SST Concept Design does not address and expressly excludes as out-of-scope any improvements, revisions, and refactoring of existing meter data management systems, customer retail database processing, verification, estimation, and editing of data. The SST Concept Design assumes leveraging of existing database capabilities at IOU/POU/CCA (ref: Table 8).

6.3 Feature Operation vs. Feature Ownership for Bundled and Unbundled Customers

The IOUs and CCAs operate customer energy services; for "unbundled customers", the IOUs are the utility distribution company (UDC) transmitting and distributing energy to customers, and the CCAs are the LSEs sourcing the energy generation for those custpmers. In the "bundled customer" case, the IOUs operate as both the UDC and LSE, where the IOU sources the energy generation and transmits and distributes it to customers.

The customer is to be served by SST for both explicit and implicit features to be described further below. Due to the coupling of feature related processes between IOUs and CCAs for unbundled customers, it is important to detail the feature and process operation versus ownership. The CEC LMS requirements 1623(c) mandate IOU/POU/CCA for the creation, operation, and maintenance of the SST. Hence each of the IOU/POU/CCA shall be responsible owners of their customer service to

the extent that they are responsible to deliver energy as a UDC or LSE. Table 10 below lists the respective ownership vs. operational responsibilities for the SST explicit and implicit feature sets.

Note that for "IOU Proxy" (or "mirror"), it refers to cases where relevant, the IOU provides operational service to CCAs as set forth in Section 2.8. This is not the case for all IOUs; however, issues regarding the IOU services to be provided to CCAs for the SST remain to be resolved as set forth in Section 2.8.

	Customer Type	SST Feature Operation	SST Feature Ownership
explicit	**Customer Type**	**RIN Operation**	**RIN Ownership**
	Bundled Customer	IOU/POU	IOU/POU
	Unbundled Customer	UDC: IOU LSE: IOU proxy or CCA	UDC: IOU LSE: CCA
explicit	**Customer Type**	**Bill Analysis Operation**	**Bill Analysis Ownership**
	Bundled Customer	IOU/POU	IOU/POU
	Unbundled Customer	UDC: IOU LSE: IOU proxy or CCA	UDC: IOU LSE: CCA
explicit	**Customer Type**	**Rate Change Operation**	**Rate Change Ownership**
	Bundled Customer	IOU/POU	IOU/POU
	Unbundled Customer	UDC: IOU LSE: CCA	UDC: IOU LSE: CCA
implicit	**Customer Type**	**Customer Identification Operation**	**Customer Identification Ownership**
	Bundled Customer	IOU/POU	IOU/POU
	Unbundled Customer	UDC: IOU LSE: IOU proxy or CCA	UDC: IOU LSE: CCA
implicit	**Customer Type**	**Authorization Operation**	**Authorization Ownership**
	Bundled Customer	IOU/POU	IOU/POU
	Unbundled Customer	UDC: IOU LSE: IOU proxy or CCA	UDC: IOU LSE: CCA
implicit	**Customer Type**	**Data Access Operation**	**Data Access Ownership**
	Bundled Customer	IOU/POU	IOU/POU
	Unbundled Customer	UDC: IOU LSE: IOU proxy or CCA	UDC: IOU LSE: CCA

Table 10: Feature Ownership vs. Operation for Unbundled Customers

6.3.1 IOU Billing Service Obligation and Relationship to Feature Operation and Ownership

The IOUs and CCAs agree that the CEC LMS for SST does not modify nor expand the existing IOU-CCA relationship with respect to established rules and precedence of IOU's billing service obligations onto IOUs and CCAs, nor should the CEC LMS modify the existing expense recovery mechanism relationship set forth in the IOU tariffs and rules regarding CCAs. The specifics of billing service obligations will ultimately depend on the final design of SST as approved by the CEC, including the regulating bodies' approval of terms of service for each LSE subject to the regulation.

The extent of IOU Proxy operation of CCA related RIN delivery, Bill Comparison and Rate Change shall first and foremost be based on existing Bill Service Obligation systems and functions and be based on SST IOU and CCA relationship described in Section 2.8 herein.

6.4 ASP Qualification

For the purposes of the SST, any third party (3P) wishing to access SST functionality shall be required to qualify as an Automation Services Provider (ASP). Therefore, any and all third parties are ASPs as far as the SST is concerned. This Concept Design assumes that the ASPs be required to qualify once for the SST and that this qualification be accepted and applied across the State of California. Thus, the scope, jurisdiction, and authority to grant such qualified status is beyond scope of any single IOU/POU/CCA business. It is also important to note that for various risk and liability issues that any particular IOU/POU/CCA may face, these organizations reserve the right to reject specific qualified ASPs even though such an ASP may have gone through a statewide vetting process.

6.4.1 Jurisdiction and Regulatory Oversight of ASPs

The manner of qualifying an ASP depends on the default oversight requirements of ASP candidates, i.e. third parties. If ASPs are subject to clear regulatory oversight under LMS, an authority with legal jurisdiction is an appropriate central authority to exercise such responsibilities. If ASPs are not subject to specific regulatory oversight in the context of the LMS, the central authority qualifying third parties to become ASPs can be an organization sanctioned by the industry, i.e. the IOU/POU/CCAs as part of a presumed RFP process in Phase 0 of the SST phased implementation roadmap of 6.1.

6.4.2 Types of ASPs

The third parties (3Ps) that eventually become ASPs will probably vary in their scope of service to customers. In reference to the core features of SST, any ASP may service all (RIN, Bill Comparison, Rate Change) or some of the features for their customers after weighing business value and risks. Therefore, this Concept Design does not assume that all ASPs implement, nor desire to implement all services available at the SST.

6.4.2.1 Data only ASPs

3Ps interested in RINs for the customer and a bill comparison are for all intents and purposes, data extraction only ASPs from an SST perspective. From customer point of view, identifying the data released is the key information for authorization. These ASPs may get permission from customers based on simple but clear terms and conditions for specific data releases. Upon receipt of the data, ASPs shall maintain proper custody and so the requirements onto ASPs are clear and therefore such ASPs can be grouped into a “data only” ASP category, with corresponding authorization class for qualification to become SST ASPs.

6.4.2.2 Rate Change ASPs

IOU/POU/CCAs agree that 3Ps interested in Rate change must obtain customer authorization specific to that action because of the grave implications and impact of rate change requests on customer bills. A rate change will cause billed amount changes that are forecast using the bill comparison data, but no real assurance can be made about actual billed amount. Furthermore, rate changes involve eligibility evaluations that limit the number of rate changes customers can enact in each time frame,[9] amongst other conditions, such as attestations of owning certain equipment. Unlike a simple data release, rate change carries multiple, varied, and other effects unbeknownst to and not

[9] CPUC Electric Tariff Rule 12: ELEC_RULES_12.pdf (pge.com)

completely describable by bill comparison alone. Thus, it is important that both the customer and 3P must accept the full implications of a rate change. As a result, IOU/POU/CCAs deem the authorization to require higher order constraints, and accordingly additional conditions should apply to 3Ps to be qualified to be ASPs who request rate changes in accordance with their corresponding authorization level.

6.4.3 ASP Onboarding

This Concept Design requires that a Central Authority qualify 3P as eligible to become ASP for SST services. That Central Authority shall be assigned the task of maintaining a list of qualified ASPs. The following should be the minimum qualification requirements of ASPs:

1. An ASP shall be in good standing that is legally registered as a legal entity in one of fifty states of the United States of America.
2. An ASP shall operate and store data only in continental USA.
3. An ASP shall apply to qualify and be approved on the SST-eligible registry of:

   Central Authority

4. An ASP shall be compliant and maintain compliance with CCPA and CPRA.[10]
5. An ASP shall be a "covered entity" serving either a primary purpose or secondary purpose under Electric Tariff Rule 27 (PG&E)/Rule 25 (SCE) & Rule 33 (SDG&E) for the IOUs.
6. An ASP shall be required to accept the SST Terms & Conditions document.

An ASP is solely responsible of its own ASP-customer relationship. For ASP to interact with the SST, the ASP is required to onboard their ASP customer onto the SST by having the SST verify that user as the relevant and appropriate IOU/POU/CCA customer. Onboarding enables the ASP to interact with the IOU/POU/CCA, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs, supporting the services of the SST. ASPs are responsible for proving relevant information to the prospect customers in multiple languages, as with utilities and CCAs, so customers can clearly understand the implication of the rate changes they authorize ASPs to make on their behalf.

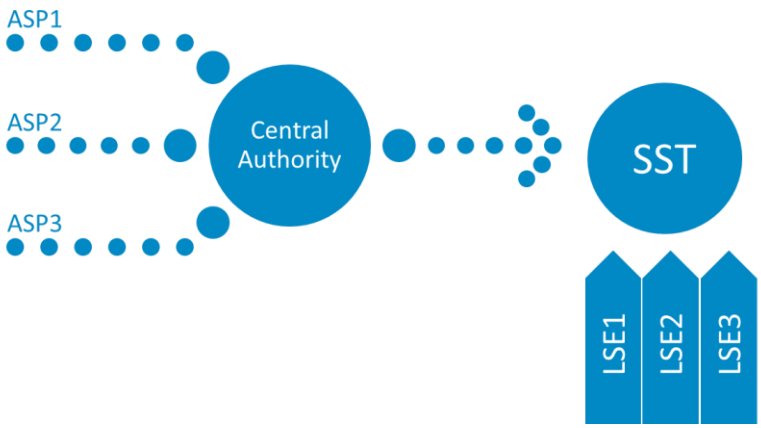

Figure 8 Upon qualification with central authority,
ASP can register at the SST and corresponding LSE/UDC services

[10] California Consumer Privacy Act (CCPA) | State of California - Department of Justice - Office of the Attorney General, California Privacy Rights Act, 2020 (CPRA) - Consumer Privacy Act

6.4.4 Registration of Qualified ASP

Given that an ASP attains a status of good standing from the central authority, the SST and its participating IOU/POU/CCA needs to take the list of ASPs of good standing, i.e. the qualified ASPs and enable them to be participating on their IOU/POU/CCA systems that support the SST, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. The mechanism of "registering" these ASPs at the IOU/POU/CCA IT system may vary and is treated separately from ASP and IOU/POU/CCA customer interactions on SST services.

6.4.5 ASP Offboarding

The central authority may de-qualify ASPs at any time due to violation or forfeiting of its obligations under the requirements of ASP onto SST. Upon de-qualification, the IOU/POU/CCA supporting the SST functionality for that ASP shall end all access to all IOU/POU/CCA customers of the ASP on SST functions and features. Notification shall go to IOU/POU/CCA customers from SST that the ASP access to SST has been canceled to that associated customer.

If central authority were to re-qualify the ASP onto the qualification list, all customer onboarding will need to be re-done with SST. SST maintains no data and records of ASP and related customer interactions once ASP de-qualification occurs, and the IOU/POU/CCAs are not obligated to maintain any records of the de-qualified ASP and its actions.

An ASP shall be required to inform the central authority when it chooses to stop offering its customers services related to the SST. An ASP may also cease operation, and if so, shall be required to inform the central authority. If an ASP ceases operation without informing the central authority or IOU/POU/CCA., upon discovering that an ASP have exited or ceased operation, IOU/POU/CCA shall be able to end all access to SST services for that ASP.

6.4.6 ASP Rejection by IOU/POU/CCA

The individual IOU/POU/CCA may have business and other reasons to individually reject interacting with a specific ASP. Therefore IOU/POU/CCA reserve the right and authority to reject qualified ASPs by Central Authority. Such rejection may be incidental, temporary, or permanent and may begin and end at judgement of individual IOU/POU/CCA. The rejection may be immediate upon judgement by the individual IOU/POU/CCA and shall be in effect by denial of access to SST features of IOU/POU/CCA for that specific ASP. The IOU/POU/CCA may elect to further take steps to petition the Central Authority to Offboard an ASP in general from the SST.

Customer complaints about specific ASPs may be directed at the Central Authority or individual IOU/POU/CCAs.

6.5 Catalogue of Feature-based Concept Design Positions and Open Issues

The stakeholders shown in Section 3.3 have gathered in weekly workshops from July 17, 2024, through September 18, 2024, to discuss SST features and options, and those are described in detail in the following Section 7.0. The workshop process involved surfacing agreed features, disagreements on features due to critical dependencies, and unresolved features. Each subsection below lists the agreements, open, and unresolved gaps along with critical dependencies that prevent agreement or resolution. The consensus on the "single" design is the sum of all agreed, open, unresolved features along with their dependencies. The open and unresolved elements are left for resolution beyond October 1, 2024, submittal and approval by CEC.

6.5.1 IOU/POU/CCA Positions on Customer Verification

Customer Verification is an implicit feature of this Concept Design that enables the SST to correlate a particular customer to explicit set of data such as providing RIN, Rate and Bill Comparison, and enacting on Rate Change for specific accounts.

6.5.1.1 Feature

For bundled customers of IOU/POU, the existing online customer credentials can be leveraged to verify customer identity for SST.

For unbundled customers of IOU/POU (and subject to the reservation of CCA rights to seek approval for changes to the SST set forth in Section 2.8):

PG&E can identify unbundled customers of LSE (CCA) upon PGE.COM credential presentation at sign-in on PG&E servers and upon query of customer characteristic value in its backend system.

SCE can identify unbundled customers of LSE (CCA) upon SCE.COM credential presentation at sign-in on SCE servers and upon query of customer characteristic value in its backend system.

SDG&E can identify unbundled customers of LSE (CCA) upon SDGE.COM credential presentation at sign-in on SDGE servers and upon query of customer characteristic value in its backend system.

6.5.1.2 Feature Dependency

Customer verification requires an online customer account IT infrastructure, but for unbundled customers, CCAs generally lack the capability due to reliance on existing billing services of IOUs, Therefore, CCAs may rely on IOUs to perform the customer verifications, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

Both IOUs and CCAs take the position of not altering the existing IOU billing service relationship and scope, and the CCAs generally advocate utilizing existing IOU services provided to CCA to enable SST, as set forth in Section 2.8. Therefore, CCAs may not operate independent of IOUs on SST, as described in Section 2.8. IOUs also agree on the CCA position as well. Enabling CCA customer verification directly involves creation of customer accounts at the CCA and is beyond the scope of the existing current CCA system. CCAs reserve their rights to request approval for changes to the SST in the future if their systems change, as set forth in Section 2.8.

6.5.1.3 Feature Option

One option proposed by the CCAs is for IOUs to make a downstream call to CCA APIs, whereupon CCAs respond to the IOU with requisite customer data. However, this functionality may not exist today, and “cost estimation and avenue for funding for each stage and each party is crucial prior to stakeholder sign-on.” It “must be ensured unbundled customers are not double-charged for SST functionality – if IOUs recover their costs through distribution rates, and CCAs recover their costs through generation rates, unbundled customers will pay for the SST twice. Utilizing existing systems and limiting duplication of efforts will minimize overall costs and streamline cost recovery as bulk of

costs (for bundled/unbundled customers can be recovered through IOU rates, distribution, or PPP)."[11].

IOUs generally concur with the CCAs and discourage expanding customer verification functionality for unbundled customers to be coupled with a CCA system via a CCA API for the same reasons cited by CCAs above, and as set forth in Section 2.8.

6.5.2 IOU/POU/CCA Positions on Customer Authorization

Customer Authorization is an implicit feature of this Concept Design to enable the SST customers to specifically authorize ASPs for the explicit features to receive RINs, a Bill Comparison, or request a Rate Change on behalf of the customer.

6.5.2.1 Feature

For bundled customers of IOU/POU, the customer authorization feature shall enable a clear authorization record of each customer.

For unbundled customers of IOU/POU (and subject to the reservations of CCA rights to seek approval for changes to the SST set forth in Section 2.8):

PG&E offers the identical mechanism for authorization for unbundled customers with scope of authorization limited to data delivery of IOU UDC RIN values, IOU mirrored tariff rate RIN of CCA rates and products, and IOU mirrored tariff rates of CCA rates and products for Bill Comparison and eligible rates. Furthermore, the rate change scope is limited to existing billing service agent obligations between PG&E and CCAs.

SCE offers the identical mechanism for authorization for unbundled customers with the scope of authorization limited to data delivery of IOU UDC RIN values, IOU proxy generation rates and UDC rates for Bill Comparisons for Residential customers, and UDC rates for Non-Residential customers. Furthermore, the rate change scope is limited to existing UDC billing service agent obligations between SCE and CCAs.

SDG&E offers the identical mechanism for authorization for unbundled customers with scope of authorization limited to data delivery of IOU UDC RIN values, IOU proxy generation rates and UDC rates for Bill Comparison. Furthermore, the rate change scope is limited to existing billing service agent obligations between SDG&E and CCAs.

6.5.2.2 Feature Dependency

CCAs do not operate independently from IOUs on customer services. Hence, for authorization services, CCAs will rely on "existing IOU services provided to CCA to enable SST. CCA does not operate independent of IOU on SST," as described in Section 2.8.[12]

IOUs generally concur with the CCAs but note that IOUs would prefer for CCAs to develop their own system, as needed for the SST.

[11] "CalCCA Comments: Joint IOU Concept Design Document for CEC LMS Single Statewide Tool, Version 0.62, August 14, 2024", issue item "Costs", p.1-2.
[12] "CalCCA Comments: Joint IOU Concept Design Document for CEC LMS Single Statewide Tool, Version 0.62, August 14, 2024", issue item "SST Structure – General", p. 2.

6.5.2.3 Feature Option

No additional feature options were discussed.

6.5.3 IOU/POU/CCA Positions on RIN Delivery

RIN delivery feature of this Concept Design is an explicit feature that enables the SST to associate a specific RIN value of a customer and deliver it, upon request from ASPs.

6.5.3.1 Feature

Bundled customer RIN to be delivered by IOU/POU from its systems.
Unbundled customer related RIN delivery, subject to the reservation of CCA rights to seek approval for changes to the SST set forth in Section 2.8:

IOUs will generally respond back with distribution delivery tariff rate RIN values.

PG&E will deliver CCA RIN for unbundled customer from its cache of CCA customer information within its existing database and IT infrastructure.

SCE does not maintain existing database of unbundled customer RINs from CCAs. No RIN values associated with CCA rates and products are returned to ASP from SCE.

Note: CCAs provide RINs to SCE as required by LMS for placement of RINs on customer bills (SCE places CCA RINs on customer bills). CCAs request that SCE obtain the capability to cache the CCA customer RINS to enable SCE to deliver the CCA RIN for unbundled customers through the SST. Otherwise, each CCA will be required to develop individual systems to deliver the RINs, which will result in duplicative systems and increased costs. At this stage, this issue is unresolved between SCE and the CCAs.

SDG&E does not maintain existing database of unbundled customer RIN from CCAs. No RIN values associated with CCA rates and products are returned to ASP from SDG&E.

Note: CCAs provide RINs to SDG&E as required by LMS for placement of RINs on customer bills (SDG&E places CCA RINs on customer bills). CCAs request that SDG&E obtain the capability to cache the CCA customer RINS to enable SDG&E to deliver the CCA RIN for unbundled customers through the SST. Otherwise, each CCA will be required to develop individual systems to deliver the RINs, which will result in duplicative systems and increased costs. At this stage, this issue is unresolved between SDG&E and the CCAs.

6.5.3.2 Feature Dependency

In general, the IOU billing service obligation does not include handling RIN values of CCAs. Except for PG&E where IT infrastructure system design serendipitously includes some CCA customer information, IOU systems are limited in scope of what they do with respect to CCA related functionality since that IT infrastructure was designed and built in absence of CEC LMS 1623(c) requirements. While IOUs agree to maintaining CCA billing service features to display the current CCA RIN on the bill, the IOUs do not agree to expansion of such services outside of present features with the addition of SST. In addition, CCA RINs to which the customer is eligible to be switched are not supplied today by the CCA to the IOU.

In contrast, CCAs advocate that CCA rate information (through RINs) should be stored by IOUs, as CCAs are already required to provide RIN information to the IOUs for bills – IOUs can then provide RIN information on behalf of CCAs.[13] The CCAs request that SCE and SDG&E obtain the capability to cache the CCA customer RINS to enable the IOUs to deliver the CCA RINs for unbundled customers through the SST. Otherwise, each CCA will be required to develop individual systems to deliver the RINs, which will result in duplicative systems and increased costs.

During the detailed discussions and feedback sessions, CCAs pose the following requests and positions:

What would it take to build systems to cache the RINS
Would likely be more efficient and cost effective than each CCA building system to provide the RINs, thus benefitting ratepayers
Is within existing service agreement between IOUs and CCAs

The joint IOUs respectfully disagree on grounds of cost, system complexity, data accuracy, and in general expansion of IOU billing service obligations not in general scope of existing legacy business processes. Therefore, the specific point of CCA customer RIN value delivery[14] remains an unresolved issue left for further discussion in post Concept Design document submittal to the CEC.

6.5.3.3 Feature Options

Given that the CCA RIN value delivery is an open issue, a feature option was discussed to resolve the feature gap created by lack of IOUs providing CCA RINs. During the review of the RIN feature, IOUs and CCAs discussed reducing the CCA RIN enumerations such that a simple 1:1 mapping becomes possible between IOU mirrored tariff rate RIN for CCA RIN.

One of the fundamental issues is that CCA RIN are n-tuple, and IOU systems do not contain any CCA business logic to assign and keep in synchronization with CCA IT systems to such detailed levels. A potential resolution for purposes of the SST is to simplify or reduce the n-tuple representation of CCA RIN and make the mapping 1:1 with IOU mirrored tariff rate RIN, because, in some cases, CCA rates track IOU rates. However, several downsides exist to this feature option. First, some CCA rates do not actually mirror the IOU rate, and, therefore, there will presently be inaccuracies for customers with the IOU rate presented not actually mirroring the CCA rate. In addition, CCAs are of the view that SCE and SDG&E obtaining the capability to cache the RINs already provided by the CCAs is a simple, cost-effective solution for IOUs providing the unbundled customer RINs.

Given principles of the IOUs and CCAs to keep with existing systems and service obligations of billing services with CCA and to ensure cost effectiveness and affordability for customers, these options require more discussion and resolution after submittal of the Concept Design document to the CEC.

6.5.4 IOU/POU/CCA Positions on Eligible RIN and Bill Comparison

An explicit feature of the SST is to provide all eligible rates and RIN values for the LSE already serving the customer, upon request from the ASP (referred to below as the RIN Comparison). In addition, the SST is required to provide estimated average or annual bill amounts based on the customer's current rate and any other eligible rate for the LSE currently serving the customer, if the LSE has an

[13] "CalCCA Comments: Joint IOU Concept Design Document for CEC LMS Single Statewide Tool, Version 0.62, August 14, 2024", issue item "SST Structure – RIN Presentation", p. 2.
[14] PG&E while its system in fact can deliver CCA RIN values and agree to do so in this Concept Design, nevertheless, support the joint IOU position.

existing rate calculation tool and the customer is eligible for multiple rates (referred to below as the Bill Comparison). Note that there will be limitations to produce such bill comparisons when limited billing information with less than 12 months is available for individual customers.

6.5.4.1 Feature

IOUs will provide bundled customer Rate and annual Bill Comparison and associated RIN using existing system adapted to SST application framework.

POUs that have existing systems for Rate Comparison will adapt it to the SST application framework. POUs that do not have an existing bill comparison feature will not provide this feature.

CCAs generally do not have bill comparison features but reserve rights to seek approval for changes to the SST set forth in Section 2.8.

For unbundled customer Rate and Bill Comparison, subject to the reservation of CCA rights to seek approval for changes to the SST set forth in Section 2.8:

PG&E can provide IOU mirror tariff rates of CCA rates for comparison to all eligible tariff rates.

SCE can provide IOU mirror tariff rates of CCA rates for comparison to all eligible Residential tariff rates. For non-residential rates, SCE can provide a comparison of delivery rates only.

SDG&E can provide IOU proxy generation of CCA rates and IOU UDC rates for comparison to all eligible tariff rates.

6.5.4.2 Feature Dependency

Given that most CCAs do not maintain Rate and Bill Comparison and rate analysis specific to any customer, the IOUs' systems for Rate and Bill Comparison will be the sole system available in SST for such functionality, subject to the reservation of CCA rights to seek approval for changes to the SST set forth in Section 2.8. The scope of the SST Rate and Bill Comparison is therefore limited to existing IOU system and functional scope and will not include any specific CCA rates, but rather deliver responses to ASPs based on either eligible IOU mirrored tariff rates or delivery rates only, as is done for existing purposes of billing agent service, and subject to the reservation of CCA rights to seek approval for changes to the SST set forth in Section 2.8.

6.5.4.3 Feature Options

No additional feature options were discussed.

6.5.5 Consensus on Rate Change

Rate change feature of this Concept Design is an explicit feature that enables the SST to provide rate change request service between eligible rates for customers, upon request from ASPs. Rate changes will only occur within each Load Serving Entity, and opting out of a Load Serving Entity's service or switching between Load Serving Entities will not be supported.

6.5.5.1 Feature

Bundled customer Rate Change using existing system adapted to SST application framework. Unbundled customer Rate Change:

PG&E only asynchronous request processing and notification for bundled customer rate change; unbundled customer rate change shall adhere to existing Billing Service provider process and scope

SCE only asynchronous request processing and notification for bundled customer rate change; unbundled customer rate change shall adhere to existing Billing Service provider process and scope

SDG&E only asynchronous request processing and notification for bundled customer rate change; unbundled customer rate change shall adhere to existing Billing Service provider process and scope

6.5.5.2 Feature Dependency

IOUs and CCAs agree on scope and functionality of Rate Change feature. CCAs state "All rate changes are initiated by customer, which flows through IOU, as is currently done (CCA changes product after rate change) – actions taken by ASP therefore actuated by IOU and transmitted to the CCA (ex., through PG&E through ShareMyData system). Consistent with current billing systems". In general, IOU/POU/CCAs will give particular care and attention to communication associated with rate change request from ASPs, and care shall also be taken as to customer experience.

CCAs questioned how eligibility issues will be managed by the SST. Questions include but are not limited to scenarios for: 12-month rate change restriction & exceptions, 6-month CCA ineligible period after opt-out, 12-6p peak legacy rates, NEM eligibility & export rates.[15] IOU systems in general manage the CCA concerns based on existing billing process and eligibility checks that will also need to be included in the scope of rate change requests through the SST. However, it was identified and also emphasized by a POU that push notification, proper information on mandatory rates, and customer experience education and knowledge of processes at IOU/POU/CCAs is critical to thwart any negative impacts and harm that may be caused by ASPs, sometimes predatory, onto unbeknownst customers.

6.5.5.3 Feature Options

Emphasis on communication and education onto ASPs and customers on limits and impacts of rate change is deemed critical to implementing the feature in the SST.

[15] "CalCCA Comments: Joint IOU Concept Design Document for CEC LMS Single Statewide Tool, Version 0.62, August 14, 2024", issue item "SST Structure – Rate Change", p. 4

7.0 Concept Design Feature Details

The following sections describe each feature element in detail along with information relevant to give context to the feature and options. Refer to section 6.5 for actual design decision by stakeholder participants in the workshop process.

7.1 Implicit Feature: IOU/POU/CCA Customer Onboarding onto SST

Onboarding is defined as the process of

a) identifying user as an IOU/POU/CCA known customer,
b) IOU/POU/CCA customer authorizing specific ASP, and
c) IOU/POU/CCA customer controlling access of ASP

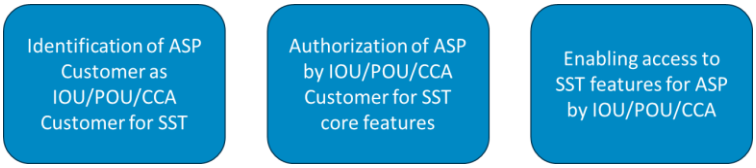

Figure 9 Onboarding Process

It is important for the SST to reduce customer user experience difficulties, or "barriers". Typically, customer onboarding presents user experience barriers that need management for any online automation service. Once a customer is "onboarded", SST business value can be delivered by IOU/POU/CCA to ASPs, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

The journey to onboard customers onto the IOU/POU/CCA supported services of SST can start when a person interacts with the IOU/POU/CCA system, or when an ASP customer interacts with SST related features at the ASP. ASP customers may want to onboard onto the SST from multiple ASPs or interact through an ASP with multiple IOU/POU/CCAs. In this onboarding context, ASPs are often interested to:

Topic	Description
1	Minimize SST onboarding barriers as their ASP customer interact with their systems
2	Accomplish single onboarding at ASP onto multiple IOU/POU/CCA for SST services
3	Quick response of results after ASP customer is onboarded onto SST via IOU/POU/CCA

Table 11: ASP interests for Onboarding

7.2 Implicit Feature: Onboarding Paths

An IOU/POU/CCA customer can start onboarding to SST services from various paths with different starting points, and this SST Concept Design document attempts to lay out the descriptions of such paths. This Concept Design document does not advocate making all paths available as an option, but rather select the most viable paths out of available options, such that quickest roadmap to

deployment of SST becomes possible for the IOU/POU/CCAs. Therefore, while the following description lays out the various paths, it also describes the design considerations and choice factors of each. Also note that the following may involve the IOUs performing certain tasks on behalf of the CCAs, as described in Section 2.8.

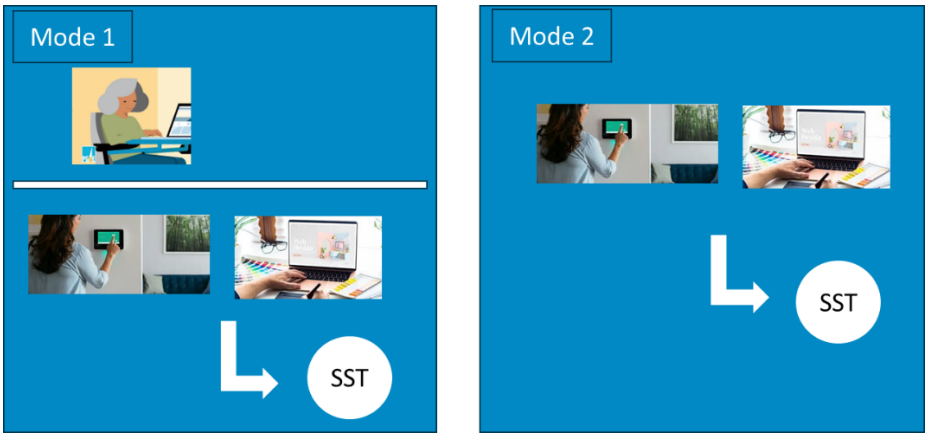

Figure 10 Mode 1 and Mode 2 paths for Onboarding

In the Concept Design, two possible paths are imagined for onboarding of an ASP user onto the SST, Modes 1 and 2.

Mode 1: A 2-step onboarding method, where a user interacts first with the SST at the IOU/POU/CCA as its customer, and then subsequently engages the ASP as their customer to enable ASP for services related to SST.

Mode 2: An ad hoc method of onboarding, where the user as ASP customer interacts with the ASP services and onboard onto the SST via their associated IOU/POU/CCA.

Per the descriptions of CEC LMS CCR 1623(c)(1), "Third parties authorized and selected by the customer…upon the direction and consent of the customer, modify the customer's applicable rate…" both Mode 1 and Mode 2 onboarding methods comply with the intent that customers are involved to enable ASP access to SST features.

Irrespective of any onboarding paths available to the user and ASP, authorization is a central concern of the SST. Identification of a user as an IOU/POU/CCA customer is a requirement to enable ASP access to SST services for that customer, and this is an implicit requirement for anyone to authorize anything at the IOU/POU/CCA systems. Per Mode 1 and Mode 2, the IOU/POU/CCA customer identification adds a layer of complexity proportional to the respective methods, and it that requires careful inspection to weigh the pros and cons of design preference for either Mode 1 and/or Mode 2.

The IOU/POU/CCAs agree that it is not a reasonable assertion to enable their customers to blanket authorize for all acts and actions an ASP can do for the customer at any time. A clear and concise authorization is required, and as such, a scope of authorization and durability of that authorization need to be defined for each onboarding occurrence based on the nature of the ASP interaction. In this Concept Design, the IOU/POU/CCA consider specific categories of actions to be especially impactful to IOU/POU/CCA customer contracts, and therefore warrant extra care to complete authorizations. As such, the Concept Design further separates authorizations as Class 1: scope-based data access authorizations, and Class 2: non-repudiated authorizations for bill impacting

actions by ASP. Class 2 is applied to authorizations involving contractual changes. Class 1 and Class 2 authorizations are covered in more detail in Section **Error! Reference source not found.**

7.2.1 Mode 1: 2-Step User Onboarding

As a first step, a person can start their SST customer onboarding journey at the IOU/POU/CCA SST service, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. Here the first interaction with the SST service is at the feature or function of the tool at SST-related online experience of the IOU/POU/CCA.

There is no a priori assumption nor need that a person, an IOU/POU/CCA customer, be a customer of specific ASP(s). In fact, the typical customer journey imagined here is for an IOU/POU/CCA customer to interact with an IOU/POU/CCA's SST related online portal, select specific ASP from a list of qualified ASPs, and then specify the scope of authorization and its applicability and expiration conditions. The minimum requirement is that the IOU/POU/CCA customer can sign-in to the hosted service at their IOU/POU/CCA. No identification of IOU/POU/CCA customer as ASP customer is assumed nor required for this step.

From an IOU/POU/CCA perspective, we assume that the authorization defined for a qualified ASP in Mode 1 applies to informational services of the SST, namely rate analysis, rate/bill comparison feature. This is designated as Class 1 type authorization in this document.

The joint IOUs also require positive confirmation of the customer of any Service Agreement (contractual) change action performed by the ASP on behalf of an IOU/POU/CCA customer. This is because changes of financial and participating program enrollment contractual requirements are a consequential change of relationship between the IOU/POU/CCA and the customer and carries specific obligations on both IOU/POU/CCA and customer than what any ASP may be aware or prepared to undertake. Thus, we designate this type of authorization as Class 2 type.

With regard to Mode 1, Step 1 consists of a customer authorizing an ASP at an IOU/POU/CCA SST portal service. Step 2 follows at some other undefined timeframe, where the ASP interacts with the IOU/POU/CCA SST service on behalf of an ASP customer, intent here on providing SST services to the ASP customer.

The following processes are expected as part of onboarding action in this Mode 1 Step 2:

i) IOU/POU/CCA Customer Identification, and ASP status verification
ii) Authorize ASP based on either or both of Class 1 and Class 2 authorizations

7.2.1.1 Mode 1 IOU/POU/CCA Customer Identification of ASP Customer and ASP status verification

An initial ASP verification is performed upon a qualified ASP interacting with an SST on behalf of a specific ASP customer. The information of the ASP customer may be presented as an ASP user profile.

The SST feature at the IOU/POU/CCA, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs, needs to identify the ASP customer as its own customer so that the IOU/POU/CCA can know it is safe to interact with the ASP for this customer and release data or give access to SST services that impact the IOU/POU/CCA customer. Therefore, the starting point of any interaction in and through the SST is to identify, of a

given ASP customer, that the same person is also an IOU/POU/CCA customer. It follows that the Concept Design principles below are needed:

1) ASP Customer must be identified as IOU/POU/CCA customer (NFR13)
2) Only ASP Customers identified as IOU/POU/CCA customers may be onboarded onto SST services (NFR13)

In general, the identification of a customer involves identifying the interacting person to a known identity pool using a specific Identity Provider system (IdP). Thus, during Onboarding, the combined system of IOU/POU/CCA for SST, and ASP need to identify the user against existing IdP at respective organizations. When the user in question is identified within the respective IdP, and shown to be sufficiently equivalent, i.e. the same person, and appropriate cyber, privacy, and business controls are activated for the user as effectively authenticated, the user can be said to be "onboarded" onto the SST through the IOU/POU/CCA. This Concept Design implies also that those IOU/POU/CCA customers without online accounts at the utilities cannot be onboarded onto the SST services.

7.2.1.2 Mode 1 IOU/POU/CCA Customer Authorization of ASP

When the ASP Customer has been identified as identical to the IOU/POU/CCA customer that authorized the ASP ahead of the ASP interaction of concern, it is possible for the IOU/POU/CCA in the SST to enable ASP authorization to proceed, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

For Class 1 authorizations, no extra step is needed because the IOU/POU/CCA customer as SST user has already authorized ASP to specific scope and duration. For Class 2 authorizations, if ASP is authorized in Class 1 and if specific ASP interaction requests actions on rate change for example, then IOU/POU/CCA's SST function must receive confirmation that their customer explicitly permits the ASP action. More details follow in Section 7.4 for Class 1 and Class 2 authorizations.

Upon such specific Class 1 authorization, SST shall issue access tokens to enable ASP to interact with IOU/POU/CCA's SST feature on behalf of the specific customer. More details follow in Section 7.7.

7.2.2 Mode 2: ASP Centric (Ad Hoc) Customer Onboarding

It is possible that an ASP Customer can start their journey to onboard onto IOU/POU/CCA's SST service, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs, at an ASP run service or device directly without ever interacting about the IOU/POU/CCA SST service first. The implication of this is a one-shot interaction that includes:

Ad hoc user identification as IOU/POU/CCA Customer
Impromptu ASP authorization by identified IOU/POU/CCA Customer

7.2.2.1 Mode 2 IOU/POU/CCA Customer Identification of ASP Customer

An ad hoc user identification does not have the benefit of an asynchronous scope authorization of an ASP by an IOU/POU/CCA Customer at an SST service. Therefore, it is necessary to identify the ASP customer as IOU/POU/CCA Customer but immediately follow with Class 1 authorization at a minimum.

The process of IOU/POU/CCA Customer identification should be identical with that of Mode 1 and details are deferred to Section 7.3.

7.2.2.2 Mode 2 IOU/POU/CCA Customer Authorization of ASP

Given that Mode 2 Onboarding does not have an associated scope of authorization for an ASP, it is critical to sequence authorizations tightly with IOU/POU/CCA Customer identification. Here, the presentation of authorization scope to the identified IOU/POU/CCA Customer will necessarily be constrained depending on the design framework available for authorization scope presentation. Please refer to Section 7.4 for details on possible authorization methodologies.

7.3 Implicit Feature: IOU/POU/CCA Customer Identification Management

A major component of onboarding is the identification of the user as a customer, a known (or unknown) person to the stakeholder organization. A successful onboarding means a smooth and relatively effortless verification of a customer on the ASP and IOU/POU/CCA SST information technology systems, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs, and assigning a category to that user as either a customer or a non-customer (guest user, for example). A completed onboarding process, whether it be Mode 1 or Mode 2, also means that customer PII data protection is in place to a certain level of assurance through the lifetime of the customer interaction with the SST feature at IOU/POU/CCA, and that the relationship of the customer can and will be fully manageable within the IOU/POU/CCA for SST features.

Ideally, customer accounts across stakeholder organizations such as IOU/POU/CCAs and ASPs should remain compatible and interoperable to allow for SST and a myriad of other future services to be smoothly rendered, such that business processes like enrollments and enrollment conflicts can be processed systematically. Such an interoperable environment is an ideal state for the industry at large because independent organizations run decoupled systems without methods, coordination, nor contracts to enforce synchronization of user authentication data.

Ideally, customer data and records custodianship operations are idempotent[8] onto a set of critical business data and records common across all stakeholders. At minimum, a certain level of interoperable data model of the user and user profile is required. In such a scenario, it is crucial to compare the IOU/POU/CCA and ASP user and determine them as one and the same and communicate information about that user across all stakeholders as appropriate. The mechanism to realize this management is the cross referencing of User Profiles between the IOU/POU/CCA and the ASP. This is a case of customer identification that is bilateral with respect to user profile evaluation, where user profiles of IOU/POU/CCA and ASP are compared to enable SST feature access.

In a less than ideal but practical case, a unilateral customer identity verification would be the default capability. A prime example is the typical data access situation by third parties from IOU data access systems such as Green Button Connect (in case of PG&E, it is Share My Data), where only the IOU's customer identity verification is of importance, and an ASP's customer identity information is of cursory value in the whole process.

In this Concept Design, the shortest path to deployment for the IOU/POU/CCA's SST feature would be to implement unilateral customer identity verification.

7.3.1 User Profile Verification (Bilateral)

Identifying a user within an IdP can vary in degrees of confidence. For the SST to be effective, IOU/POU/CCAs and ASPs all need to agree on who the user is and agree to transact requests on behalf of the user, subject to the specifications outlined in Section 2.8 of the IOUs performing certain

functionalities of the SST on behalf of the CCAs. For such agreement to happen, business process interoperability and verifiable user equivalence need to be achieved for any given user identity.

Typically, an IdP maintains information about the user in the form of user pool and profile data. The data values within the user profile and pool are evaluated against ASP user assertions to arrive at a level of confidence about the identity of a particular user at the IOU/POU/CCA. This mechanism shall be in effect through appropriate APIs at the IOU/POU/CCA SST feature to respond to ASP requests. The default requirement for IOU/POU/CCA SST is for customers to have online accounts at the IOU/POU/CCA.

7.3.2 Comparison of Customer User Profiles

Cross-referencing ASP customer profile information from its user pool and comparing it with the IOU/POU/CCA IdP user pool & profile is a process that requires some agreement as to the required level of verification. This Concept Design presents the requirement but defers to the actual system development stage for the individual data elements and comparison algorithm to be specified.

7.3.3 Interoperability of IdP

To identify user profiles across IOU/POU/CCA and ASPs involved, a minimum level of well-defined interoperability is mandatory, such that the parties and systems involved may exchange data in a meaningful and secure manner, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. As a Concept Design requirement, the joint IOUs takes the position that the IOU/POU/CCA IdP requirements set the standard of interoperability and equivalence evaluation of user profiles; in no way does this Concept Design endorse use of Federated Identity as in the implementation of OpenID Connect nor SAML, Single Sign-on (SSO) with ASPs. IOU/POU/CCA shall be able to define SST user profile comparison and evaluation mechanism with ASPs at large independently within this SST use case.

7.3.4 Customer User Profile Verification (Unilateral)

If the IOU/POU/CCA SST were to drop the ideal concept to cross-referencing ASP customer user profile information, and not be concerned with assuring equivalence of users across IOU/POU/CCAs and the ASP, a unilateral user profile verification approach may be taken. The negative aspect of this approach is that in general, customer experience may suffer when ASP Customers interact with the ASP system for SST purposes, and thus there is risk of lower adoption of ASP's SST services.

The positive aspect of unilateral customer identity management is that the customer user profile verification remains IOU/POU/CCA-centric, and innately less complex during either Mode 1 or Mode 2 onboarding paths. The main reason for this is that unilateral customer user identity management is the default process existing at many IOU/POU/CCAs in general for the cases of data access with third parties. An example of this case is the enablement of usage data to third parties, when IOU customers authorize third parties in the Green Button Connect system, and especially in the Electric Tariff Rule 24/32 scenario where third-party users are redirected to IOU user identification frameworks.

7.3.5 Customer Identity Verification for Unbundled Customers (CCA)

The preferred method for customer identification between the IOU/CCA is unilateral customer verification, because existing customer credential validation within the respective IOU/CCA online

account systems can be leveraged, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

This also means that when an ASP requests onboarding, there is no user profile data as in the case of bilateral verification, and instead is simply a routing of the customer session to appropriate and presumed IOU/CCA processing endpoints for customer verification. In other words, unilateral verification implies that the ASP has a priori knowledge or assumption of the appropriate LSE to target in SST routing at the SST API Proxy Gateway.

Important to note here is that ASPs may route a request to the wrong LSE/UDC. While IOU/CCAs recognize it is ideal for ASPs and customers to not need knowledge of the target LSE or UDC to interact with when onboarding onto SST services, SST customer identification would need specific provisions to handle such cases, to help reroute to the proper CCA.

However, CCAs may not maintain customer online accounts to begin with, and therefore even with proper routing, CCAs may not have any system to unilaterally verify customer identities at the CCA.

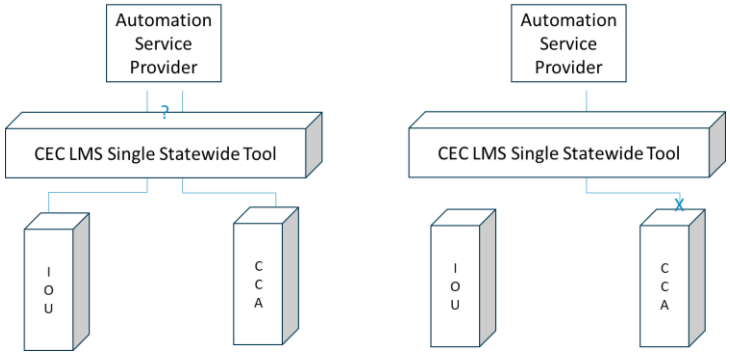

Figure 11: ASP may not have capability to route properly, or CCA may not be able to verify customer identity

For the situation where ASPs route to incorrect IOU/POU/CCA, a unilateral onboarding error response is needed to notify ASP of erroneous routing. A certain onus is assumed to be placed on the ASP to correct the routing upon an error response.

However, when an ASP routes to an IOU when intending for a CCA, the IOU is nevertheless the UDC in the IOU-CCA relationship. Therefore, an ASP routing to IOU is in of itself not incorrect. Hence in such a case, the following possibilities arise:

- Customer is onboarded onto SST as IOU-as-UDC customer for UDC core functions only
- Customer is onboarded in general to SST as an CCA LSE and IOU UDC customer

In the converse case where the CCA is directly routed, it is also the case that the customer is an IOU-as-UDC customer. Hence in such situation the ASP routed customer is always an IOU-as-UDC customer, and the IOU should verify customer identity using its system.

Therefore, at minimum, this Concept Design determines that in the unbundled situation, IOU-as-UDC customer identity verification is made available and CCA-as-LSE customer verification may or may not be present. If upon ASP routing, CCA-as-LSE customer verification is not available, an SST error response may be appropriate to return to the ASP.

7.3.6 Customer Identity Verification by IOU on behalf of Unbundled Customers (CCA)

Current reality implies, without any intent to prejudice future revisions and progress on CCA customer online account handling, that IOU customer online accounts of corresponding CCA customers serve to provide online processing capability as the IOU proxy of those CCA customers. Such processing is considered generally consistent with Billing Service Obligations of IOU to CCAs per CPUC Resolution E-5059. Expanding this service to SST onboarding operations is a new scope of activity, distinct and separate from existing Billing Service Obligations.

For IOUs to expand verification of identity of online accounts for unbundled customers to SST feature set, the cost must be marginal to existing CCA billing service costs and not force modification of established cost recovery mechanisms, nor assess an undue burden on customer bills. Utilization of existing business rules and service agreements between IOUs and CCAs for purposes of SST functionalities performed by the IOUs on behalf of the CCAs, as described in Section 2.8, may improve SST cost effectiveness.

This Concept Design identifies IOU consent or dissent with, and CCA preferences for (subject to the reservation of rights to request approval for changes to the SST design set forth in Section 2.8), IOU proxy of unbundled customer verification as a critical design element. The scope of this feature includes:

Identification of unbundled customers as part of specific LSE CCA where relevant
Association of customer verification instance for use in authorization action
Association of customer verification instance for RIN Processing
Association of customer verification instance for Rate and Bill Comparison
Association of customer verification instance for Rate Change processing

7.4 Implicit Feature: Authorization Management

As part of onboarding onto IOU/POU/CCA's SST service, the customer is required to authorize their ASPs. As was touched upon in earlier sections, Class 1 and Class 2 authorizations are considered in this Concept Design. Furthermore, especially for Class 2 there are several types of authorizations: Types 1, 2, and 3 authorization methods. The following describes the classes and types in more detail.

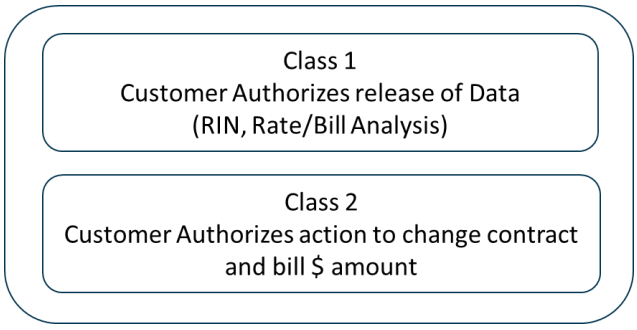

Figure 12 Two classes of authorizations by an IOU/POU/CCA Customer onto ASP

To implement either Class 1 or especially Class 2 authorizations, the methods employed by IOU/POU/CCA can vary based on design choices and are subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. The following three types of methods are known to be options for customer interaction that involves Class 1 or Class 2 authorization.

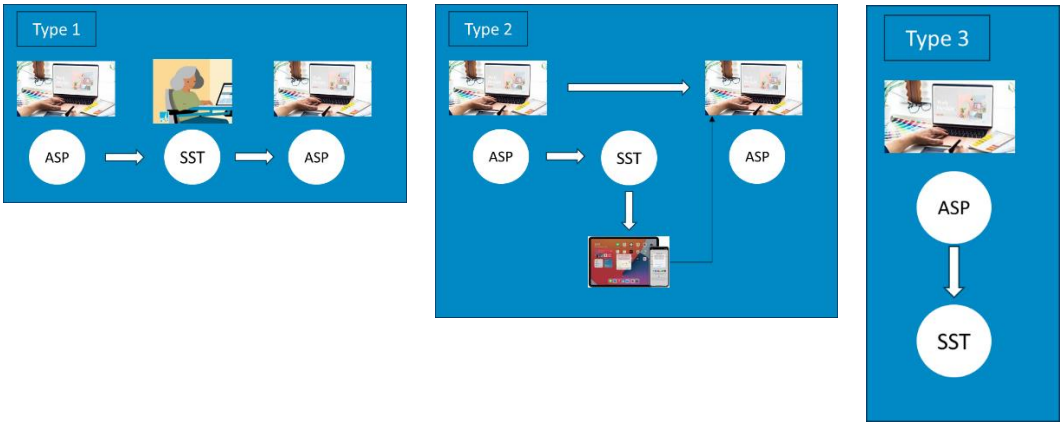

Figure 13 Type 1, 2, 3 methods for Interaction

Type 1 Interaction has the IOU/POU/CCA customer at ASP application/portal, but at authorization stage, IOU/POU/CCA portal modal page appears to accept authorization inputs.

Type 2 Interaction has the IOU/POU/CCA customer stay on ASP application, but IOU/POU/CCA at appropriate time after customer identification, transmits alternate channel message to inform and receive response on authorization details directly from the customer.

Type 3 Interaction has the IOU/POU/CCA customer on ASP application and ASP implement presentation and collect customer input to respond back to IOU/POU/CCA SST feature, and IOU/POU/CCA SST never interacts directly with the customer.

In this Concept Design, the Joint IOUs are in opinion that IOU/POU/CCA shall implement Class 1 and Class 2 authorizations and apply Type 1 and Type 2 Interaction methodologies but shall not support Type 3 Interaction method.

For all authorizations in effect, customer shall be notified directly from the IOU/POU/CCA, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

7.5 Implicit Feature: Authorization Terms and Conditions, Education, and Awareness

Customer's act of authorizing a scope of actions for ASP, and specific task authorizations shall make clear the terms and conditions under which the ASP is permitted to perform such actions and tasks on behalf of the customer. To this end, upon authorization confirmation notification from the IOU/POU/CCA, the notification shall include the necessary terms and conditions applied to the customer as well as the ASP, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

Upon authorization by customer for specific actions and tasks, the ASP shall be notified by the IOU/POU/CCA notification upon authorization, that a customer has authorized the ASP. As part of the notification, the IOU/POU/CCA shall make clear the scope of actions and tasks such that intent of customer is explicit.

Customer authorization shall be recorded in IOU/POU/CCA systems as a controlled record, with associated scope of tasks and actions that the ASP is permitted under the applicable terms and conditions.

7.6 CPUC Tariff Electric Rule 27 (PG&E), Rule 25 (SCE), and Rule 33 (SDG&E) Applicability

Secondary purpose. The application of Class 1 and Class 2 authorization explicitly results in ASPs being responsible for the custodianship of customer data and records once IOU releases customer data to the ASP, in its capacity as a service provider to the customer. Therefore, the ASP is responsible for complying with CPUC Tariff Electric Rule 27 for secondary purposes and must take care to handle customer information accordingly.

7.7 Implicit Feature: Customer Data Access Management

The IOU/POU/CCA SST feature shall create a record of authorization of the ASP being permitted by the IOU/POU/CCA customer for specific scope of operations, presentations, and functions, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. The authorization record shall be bound explicitly to the authorization scope and duration, and the specific task-oriented API endpoint. The endpoint shall be defined by specific URL endpoint, and its access by ASP controlled by an access token.

The access token shall be bound to specific users and with specific scope defined. There shall be as many access tokens as there are IOU/POU/CCA Customer-ASP combinations.

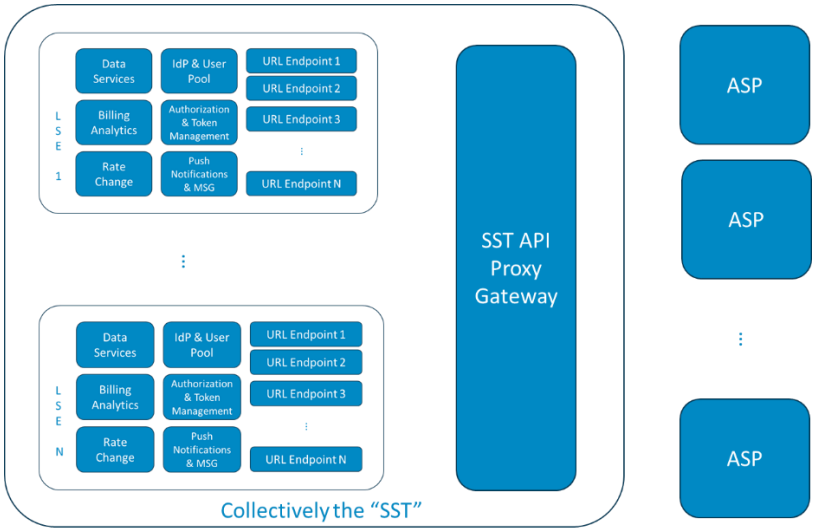

Figure 14 Representative High Level Functional Blocks of SST features at an IOU/POU/CCA

7.8 Implicit Feature: Authorized Access of ASP

An ASP gains access to IOU/POU/CCA SST features based on customer authorized access, managed at the API endpoints of specific URLs. This structure is standard to OAuth2 mechanisms; API gateway effects management of URL endpoint by access tokens issued; the token issuance is based on the customer identification and authorization.

Details of the enterprise architecture for endpoint management using access tokens are left to detailed development design and sample design is presented in the appendix.

7.9 Implicit Feature: Authorized Actions of ASP

The API endpoints shall be designed to give access to specific functions of existing rate comparison and rate change. Specifically for Class 2 authorizations, additional access control shall be applied based on customer confirmation that involves messaging and push notifications. Only upon reception of a specific response via ASP of one-time passcodes (OTP) per messages to authorization channels by IOU/POU/CCA customer, the IOU/POU/CCA SST function shall grant access to specific rate change APIs, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

7.10 Implicit Feature: Customer Offboarding

A customer may offboard or discontinue to use the services of an ASP for a variety of reasons. The customer may also offboard from the IOU/POU/CCA for many reasons as well.

IOU/POU/CCA SST shall have provisions to offboard customers from ASP SST services as appropriate based on Type 1, 2, and 3 authorization methods, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. In cases of Type 1 and Type 2, the customer should be enabled to cancel their authorization at the IOU/POU/CCA portal.

Likewise, for authorizations that have Type 3 capability, customers shall be enabled to cancel their authorization through the ASP portal and functionality.

Furthermore, if the expiration date is reached for authorizations given by a customer, the IOU/POU/CCA SST system shall automatically end the ASP authorized access.

Likewise, if the customer closes their relevant service agreement, the IOU/POU/CCA shall automatically end the ASP authorized access for that customer.

Notification shall be issued to customer from IOU/POU/CCA upon offboarding customer from an ASP.

7.11 Implicit Feature: Ongoing Data and Feature Access

The ability for an ASP to access any customer data, RIN information, or rate analysis information, shall be based on authorized access to data that is in custody of IOU/POU/CCA. Per CPUC Electric Tariff Rule 27, all such data is transacted from IOU/POU/CCA to ASP with requisite security tokens, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. The ASP must be in possession of valid bearer token as proof of valid authorized status.

The industry best practice that realizes this access control is to use OAuth2 mechanism, per IETF RFC 6749[16]. The same access control is implemented in Green Button Connect standard.

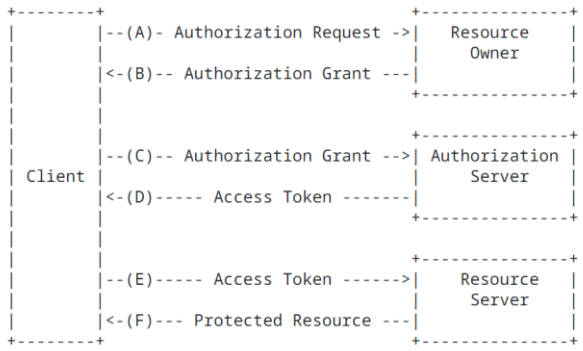

Figure 15: OAuth2 protocol for token issuance and usage

In this way, customer data can be transmitted to an ASP per customer in a secure way. All this is contingent upon the Customer having granted authorization through Mode 1 or Mode 2 onboarding using Type 1, 2, or 3 authorization.

7.12 Separation of Concerns in an IOU/POU/CCA SST Solution

The SST core features of RIN, Rate/Bill analysis, and Rate change are explicit features; the implicit features are all related to onboarding (authentication, authorization, and data access). The implicit features could be part of the IOU/POU/CCA SST application, but in general, separation of concerns should be practiced enabling decoupling of implicit and explicit features. This is especially the case here since multiple LSE/UDCs are required to implement the core features in their unique infrastructures yet provide those explicit features in a unified way as the SST, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

[16] RFC 6749 - The OAuth 2.0 Authorization Framework (ietf.org)

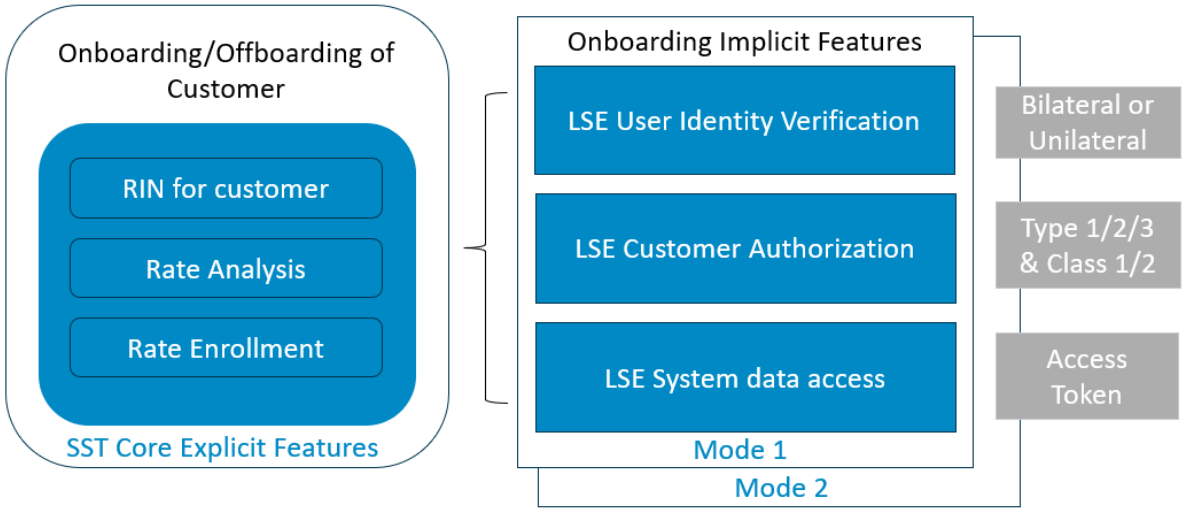

Figure 16 Overall Solution framework at the LSE/UDC for SST support including explicit requirements and implicit feature options

The bearer token mechanism is a particular method that is general best practice in the industry, but nevertheless there are multiple mechanisms for authorized data access. The SST needs to implement one way of data access for the sake of interoperability and be the "single" tool in addition to unifying the data model of the core functionality. As such, it is important to recognize that even with token-based data access, much variability exists unless and until one model implementation is chosen. With that caveat, the following sections describe the actual explicit core feature of the SST.

7.13 Explicit Feature: RIN presentation

The association of RIN to a specific service agreement is one of the main purposes of SST. This can be realized by enabling the issuance of RIN values when an ASP interacts with IOU/POU/CCA SST for a specific customer, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. Typically, this can be accomplished if an ASP holds a bearer token specific to access permission for the customer of interest. An IOU/POU/CCA is required to maintain the RIN in a database or data warehouse and have it associated with individual service accounts and have it ready to be extracted for query from a middleware application, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

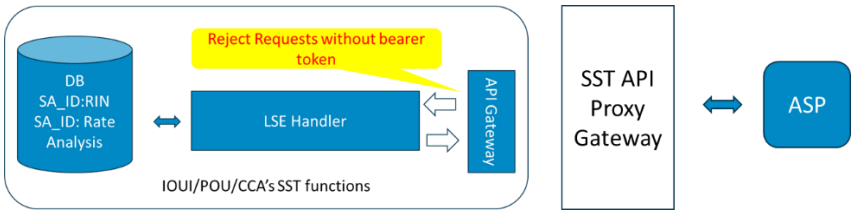

Figure 17: RIN extraction by ASP

The main problem to solve here is the application-level presentation of RIN. Whereas the ongoing assumption is that the network and transport layer of the ASP-SST connection is based on internet protocol such as IPv4 or IPv6, the SST must be an application that communicates at application-level to its counterpart application at the ASP.

The most important consideration is probably the protocol and syntax to transmit and represent the RIN in a particular data model. Recall that RIN is a string value; however, that RIN must be encapsulated in a datagram to transfer from IOU/POU/CCA SST API, through the SST API Proxy Gateway on to the ASP. A priori standardization of the datagram is a must for the RIN core functionality to be interoperable across different IOU/POU/CCAs. To this end, the context of the RIN data transmission, its metadata need to be considered and rules and norms established.

This Concept Design document need not specify the protocol for RIN exchange, but list in Appendix examples of such protocol and any additional metadata.

7.13.1 Explicit Feature: RIN for Unbundled Customers

As described in Section 6.3, Table **10**, the explicit feature for SST providing customer specific RINs to an ASP is described in terms of operation and ownership, and the responsibilities of IOUs and CCAs vary depending on the established operational coupling between IOU and CCA, as described in Section 2.8.

Customer Type	RIN Operation	RIN Ownership
Bundled Customer	IOU/POU	IOU/POU
Unbundled Customer	UDC: IOU LSE: IOU proxy or CCA	UDC: IOU LSE: CCA

Table 12: SST RIN feature

Table 12 reiterates the dependency. While for bundled customers, the IOU is solely responsible to provide the RIN value per customer, upon ASP request, for unbundled customers, the feature operation has dependencies on the manner of existing IOU and CCA systems.

7.13.1.1 Cached CCA RIN

When existing IOU systems store CCA RIN values and can correlate a specific customer to CCA rates upon ad hoc requests, the IOU may have the technical capability to proxy for a CCA to respond to an ASP request with not only the IOU UDC RIN but also the CCA LSE RIN. Such provisioning of RIN values as the SST shall be governed by a business-to-business agreement between the relevant IOU and CCA, as such functionality is not within the scope of CEC LMS 1623(c) and therefore is surfaced here as a matter to be addressed for providing a seamless SST service to customers.

7.13.1.2 Non-Cached CCA RIN

Certain IOUs do not cache individual CCA RIN values in their internal systems by design. The CEC LMS 1623(c) does not mandate nor scope in any change of existing RIN related information infrastructure of IOUs and CCAs. Therefore, such IOU system cannot provide CCA RIN values upon ASP request and thus CCA's obligation to fulfill the CEC LMS 1623(c) mandate on RIN may fall onto CCA system directly or on SST CCA Routing mechanism. The non-caching of RINs is an unresolved item between SCE, SDG&E, and the CCAs. The CCAs continue to request that SCE and SDG&E build the capability to cache and provide the RINs on behalf of CCAs, given CCAs currently already provide the RINs to SCE and SDG&E for the IOUs to place the CCA RINs on unbundled customer bills. In addition, it is the opinion of the CCAs that IOUs storing and providing the RINs is more cost-effective than each individual CCA building this capability, likely duplicating systems and increasing overall costs.

7.14 Explicit Feature: Rate and Bill Comparison Feature

LMS requires LSEs to both provide any RINs for the LSE currently serving the customer to which the customer is eligible to be switched (the Rate Comparison). LMS also requires a calculation of annual bills for all eligible rates for the LSE currently serving the customer (the Bill Comparison). The Bill Comparison is an SST capability that is required only if the corresponding IOU/POU/CCA already has such functionality. For IOU/POU/CCAs such as PG&E, SCE, etc., the service exists whereby a customer's interval data is examined once a billing cycle, and comparison calculations are made over a span of a year and recorded in tables for customer look up. As an example, the bill comparison may contain the following information, depending on the IOU:

Rate	Total	Savings	Over a year
E1			
TOUC			
TOUD			
EV2A			

Table 13: Response table for Bill Comparison / Rate Analysis

In this Concept Design, a given customer's bill comparison shall not change across one billing cycle, and hence at most 31 days shall be placed between requests on to the same service agreement, to lessen complication of mid-billing cycle change comparisons.

Access control to this information shall be based on authorized scope by customer and initiated by ASP access to IOU/POU/CCA API with requisite bearer tokens, brokered through the SST API proxy gateway, to the extent the LSE has an existing bill comparison tool.

Bill comparison features will apply to existing capability related to available rates, and any real-time bill comparison feature shall become available when bill comparison capability is expanded for LSEs that do not have the bill comparison. The expansion of capabilities is beyond the scope of the SST and not required by LMS, and the SST shall acquire capabilities as available on general bill comparison service.

7.14.1 Variations of Existing Bill Comparison functionality across IOU/POU/CCA

CEC LMS 1623(c) specifically allows bill comparison features to not be modified upon use in SST. Therefore, existing variations in bill comparison online functionality are to be accepted and allowed in the SST.

In general, batch calculations or on-request calculations are possible for bill comparison, and either one or both shall be enabled for SST. The Concept Design shall allow for a set of request-response message sequence prototypes such that batch bill comparison or on-request bill comparison can be requested from the ASP.

Bill comparison in general is available only if the corresponding IOU/POU/CCA have such capabilities and SST will not require the capability anew.

7.14.2 Explicit Feature: Bill Comparison for Unbundled Customers

Based on Section 6.3, Table 10, bill comparison on SST has three possible output response scenarios, IOU-as-UDC bill comparison, CCA-as-LSE bill comparison, and IOU-as-UDC with proxy LSE rates having no LSE rate.

Customer Type	Bill Analysis Operation	Bill Analysis Ownership
Bundled Customer	IOU/POU	IOU/POU
Unbundled Customer	UDC: IOU LSE: IOU proxy or CCA	UDC: IOU LSE: CCA

Figure 18: Bill Comparison feature for unbundled Customers

Specifically for IOU proxy responses for unbundled customers, these are only available if current IOU systems for bill comparison include such functions; if not, then the SST for that IOU-CCA relationship will not have the IOU proxy capability.

7.15 Explicit Feature: Rate Change (enrollment) Feature

Rate change and enrollments are handled by typically complex and large enterprise systems at IOU/POU/CCAs and inextricably connected to the billing systems. The complexity often arises when a tariff rate contains a myriad of regulatory requirements and options. A request to change a rate based on a presented rate/bill analysis data may be "simple", but the task of evaluating the request can involve multiple layers of personal data, usage, and tariff conditions. Some rates also involve enrollment into utility sponsored programs and their enrollment and disenrollment requirements also need to be examined.

Based on the high degree of complexity, in general SST-based rate change requests cannot be assumed to complete upon request, just as any such request may or may not complete on LSE/UDC native rate change tools even from direct customer requests.

By nature of the complexity involved in the enrollment eligibility upon change request, the default Rate Change feature of SST will need to be asynchronous. This means that execution of rate changes cannot be immediately processed but must go through existing rate change processes and appropriate levels of verifications even for customer eligible rates.

7.15.1 Class 1 & Class 2 Authorizations

As touched upon in Section 7.4, the SST authorization may be of Class 1 or Class 2. Specifically in Class 2, an additional verification mechanism is required with the Customer. A Type 2 customer interaction will be required, where an out-of-band messaging and response will be mandated of ASP and customer interaction. This is specifically to ensure that customers are indeed agreeing to the specific and financially impacting change of a customer's service agreement.

It is important to note that Class 2 authorization and Type 2 interaction adds a significant layer of complexity to the IOU/POU/CCA SST and ASP systems but is generally considered best-in-class to protect customers from potential harm.

7.15.2 Rate Change and Enrollment Implementation

The details of the rate change and enrollment will be based on asynchronous submittal of a change request, given that ASP has drawn customer RIN and Rate Analysis data as a prerequisite step. The extraction of the rate analysis data provides the ASP with the eligible rates onto which the customer may be changed or enrolled onto. As noted above, eligibility is not equivalent to acceptance, and only upon submittal of a change/enrollment request, and when the verification is run through the enrollment mechanism of the IOU/POU/CCA billing system can the ASP receive an indication of success or rejection, subject to the specifications outlined in Section 2.8 of the IOUs performing

certain functionalities of the SST on behalf of the CCAs. Thus, the system is necessarily asynchronous, and a corresponding API endpoint will be designed for the SST and supported by the relevant LSE/UDC.

It is important to note that this function of rate change/enrollment is dependent on enterprise billing systems and presents an extremely high hurdle for full implementation at any IOU/POU/CCA in terms of complexity, cost, and time.

7.16 Basic Structure and Cybersecurity

SST must be structured and built in such a way that assures strong security posture of the service against public clients and ASPs connecting to SST services. SST is at its heart an API service of the supporting IOU/POU/CCA systems, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. A split of responsibilities is needed to balance the protections between the outwardly facing attack surfaces of SST API proxy gateway and backend IOU/POU/CCA services. The common cybersecurity attack vectors are listed below along with mitigation methods:

Attack Vectors	IOU/POU/CCA SST Portal application security posture	SST API Proxy Gateway & application security posture
Fake Credentials	Multifactor Authentication	Bearer token access control
Cross-Site Scripting	CORS protection	Token cycling
Injection Attacks	Security patching	Security patching
Credential Stuffing & Brute Force Attacks	Rate limiting / throttling at load balancer	Rate limiting / throttling at load balancer
Man-in-the-middle-Attack	TLS1.2+	TLS1.2+
Denial Of Service Attacks	Load balancer / CDN	Load balancer / CDN

Table 14: Common attack vectors on IT service infrastructure & related security posture

The following figure shows required security posture across the various components of presumed SST.

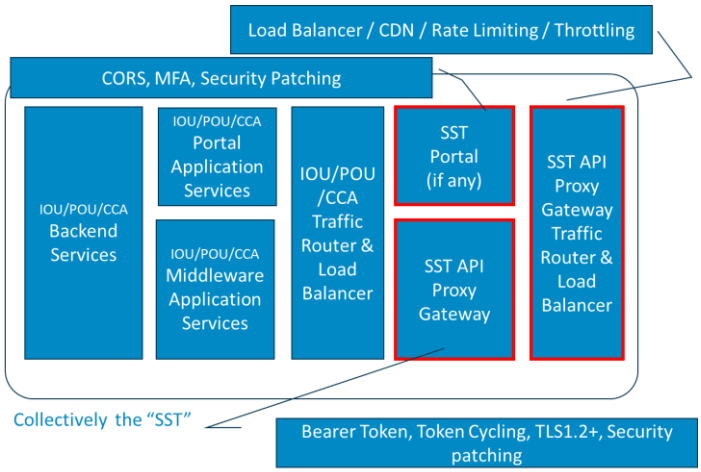

Figure 19: Security posture needed for SST on component basis

Of note here is that the entire SST need not at all be a single system but be composed of contributing participating systems from the IOU/POU/CCA, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs. Those specific boxes in Figure **19**19 assume an SST API Proxy Gateway setup as outward facing SST supported by IOU/POU/CCA backend SST applications.

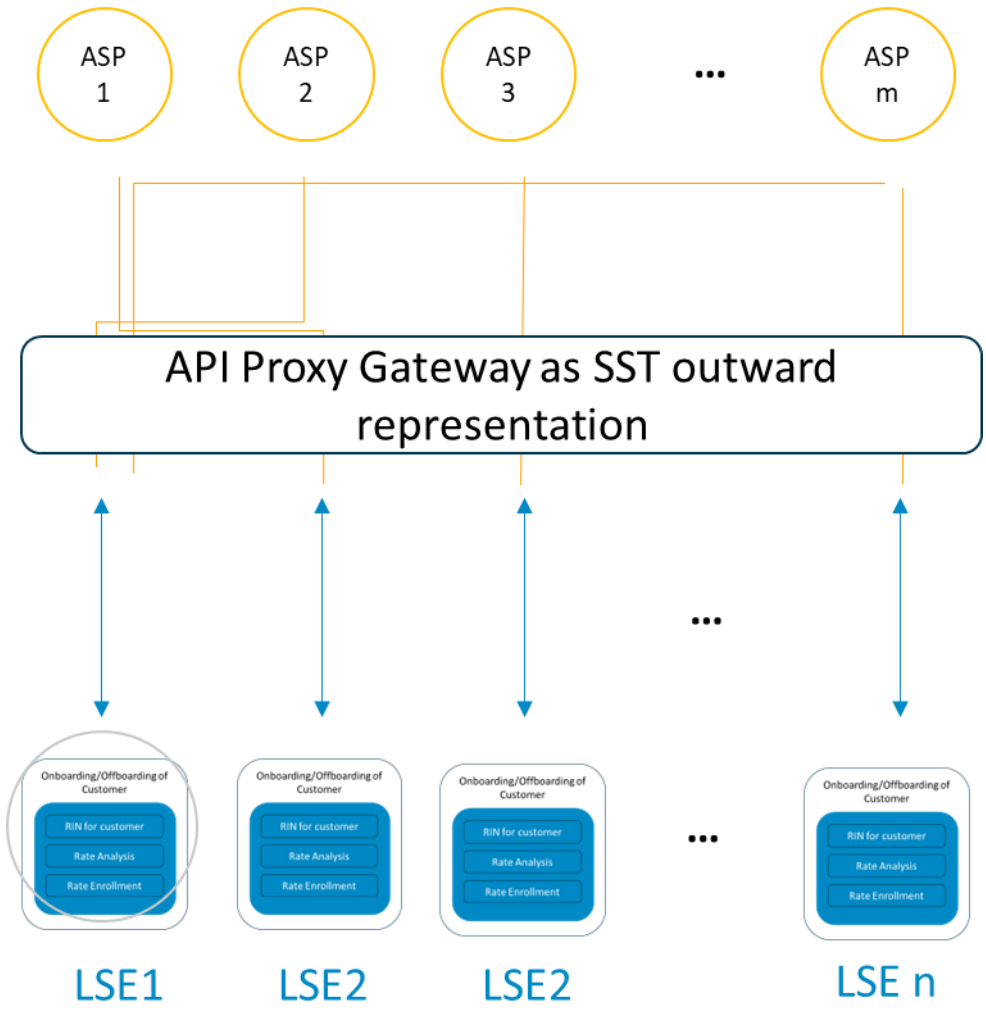

Figure 20: Independent API Proxy Gateway for SST

The SST system in its entirety, as illustrated in Figure 20Figure **20**, maintains a certain level of cybersecurity vigilance as the API Proxy Gateway, while the remainder of cybersecurity and privacy protection concerns are handled at individual supporting LSE/UDC. This configuration allows for LSE /UDC customers to be managed directly by relevant LSE/UDC and the SST API Proxy Gateway layer has no awareness nor responsibility to manage access of ASP on behalf of customers of specific LSE/UDCs.

8.0 Transactional Description of SST

The detailed request – response message sequence is described here to provide needed **sample** details for subject matter experts and to help align all stakeholders to the expected behavior and level of complexity when interacting with the SST. The description herein is by no means fixed but subject to change. Only after approval and extensive development and Plug Fest process can a workable and efficient system be constructed. Here, the "SST" is the system collectively called the SST built from API proxy gateway and IOU/POU/CCA SST applications, subject to the specifications outlined in Section 2.8 of the IOUs performing certain functionalities of the SST on behalf of the CCAs.

In this description, the Concept Design introduces details of actual request/response pairs with addition of an *optional* Proof Key Code Exchange (PKCE) flow and further interaction options for onboarding based on Mode 1 and Mode 2.

General Request-Response Message Sequence:

1. ASP App as Native or Web Application interacts with User and prepares an Authentication Request as the ASP API and request contains the desired request parameter (scope indicates the out-of-band agreed upon authenticating factor field labels). PKCE code verifier and code challenge are generated to prepare for the request if PKCE option is in effect.
2. ASP API sends the request to the SST API proxy gateway endpoint (Authorization Server) at …/SST/v1/authorize (GET request with query parameters, response_type indicates OpenID and id_token (PKCE option); token scope shall be rejected; code_challenge and code_challenge_method if PKCE option selected)
3. ASP and SST interact via HTTPS to exchange HTML for authentication (and authorization for Mode 2 onboarding). SST API proxy gateway endpoint (Authorization Server) interacts with the LSE/UDC Interface API; LSE/UDC Interface API interacts with corresponding IdP to verify user submitted credentials. ASP API sends uncached username/password pair for specific authenticating user to SST API proxy gateway (…SST/v1/authorize) and using the nonce (PKCE option) and state values for this session.
4. Authentication is complete when response is sent with OIDC 1.0 id_token (PKCE option)
5. SST API proxy gateway (Authorization Server) sends Authorization Code and includes JWT containing the id_token (for PKCE option)
6. ASP API requests an access token using the Authorization Code at the SST API proxy gateway Token Endpoint together with the verifier code (for PKCE option).
7. ASP API receives a response from SST API proxy gateway with id_token (PKCE option), access token and refresh token for data access upon verification of the verifier code by SST API gateway based on the challenge method (for PKCE option; indicates that a data access authorization is now active. Resource_URL value includes the subscription ID for this specific data authorization).
8. ASP API validates the ID Token and retrieves the End-User's Subject Identifier, using the userInfo endpoint at SST API proxy gateway, and thus receives other user information as needed and as allowed (for PKCE option)[17].

[17] RFC 7636 - Proof Key for Code Exchange by OAuth Public Clients (ietf.org)

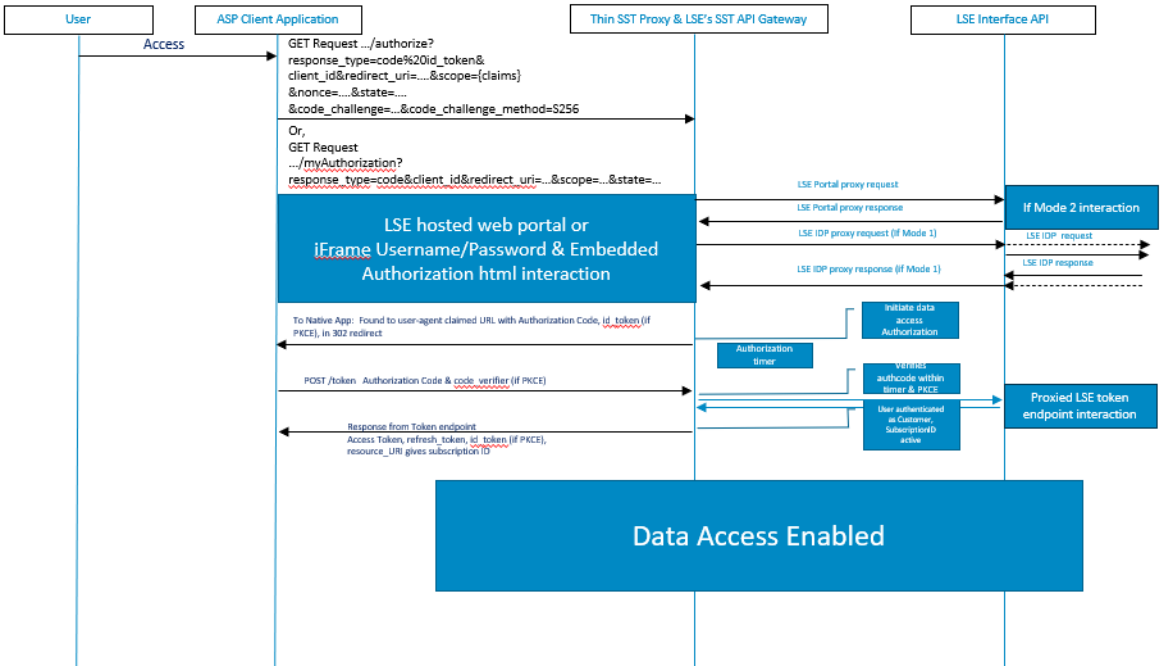

Figure 21: Model interaction of Request-Response between ASP and Concept Design SST API Proxy Gateway

8.1 PKCE Option: Proof Key Code Exchange

For ASP Onboarding to happen in either Mode 1 or Mode 2, it is important to ascertain the security posture of the ASP client application that interacts with SST. Since the ASP client is effectively a "public" client where the SST is not dealing with a mutually authenticated TLS connection but one that is operating with a public certificate for network security, an additional application-level security posture is sought on the client side, so that the SST can increase its confidence for interacting with a security uncompromised public client. One way to accomplish that assurance level at the SST is to use Proof Key Code Exchange (PKCE) mechanism, per IETF RFC 7636.[18]

8.2 SST API Proxy Gateway /authorize Endpoint

The Mode 2 onboarding initial interaction of ASP onto the SST takes the following HTTP method call with PKCE option.

GET Request
…/authorize?response_type=code%20id_token&client_id&redirect_uri=….&scope={claims}&nonce=….&state=….&code_challenge=…&code_challenge_method=S256

A Mode 1 onboarding option can also be considered and modeled after Green Button Connect type interaction.

GET Request …/authorize?response_type=code &client_id&redirect_uri=….&scope…&state=….

[18] RFC 7636 - Proof Key for Code Exchange by OAuth Public Clients (ietf.org)

Both Modes and optionality are included in the request-response message sequence in Figure **21**. The request to the /authorize endpoint starts the onboarding process either by Mode 1 or Mode 2; the interaction following the request varies based on whether Mode 1 is applicable or Mode 2.

In Mode 1, authorization is achieved out-of-flow in a presumed portal session with SST and user, whereby the user authorizes the ASP for specific scope. If so, the user interface interaction is minimal between the ASP and SST, and any HTML interaction completes in short order when the SST-LSE/UDC portal application finishes the user identification process.

In Mode 2, authorization is achieved in-flow, i.e. "Click Through" between the SST and user, and ASP scope of authorization is determined at that time and part of the HTML interaction.

Both Mode 1 and Mode 2 are possible, and the user interface interaction is further possible with native applications when PKCE optionality is in effect.

In general, the above description assumes a unilateral user identity verification model, whereby the LSE/UDC IdP is leveraged as the sole system to verify the user for the purposes of SST. The identity of the user submitted by ASP purposes does not figure into the concerns of the design in the unilateral user verification case.

For bilateral user identity verification, the process prior to 302 redirect will be modified according to set methods for a more sophisticated verification scheme that would involve a complex interchange of identity verifying information and responses. For the purposes of the Concept Design, such descriptions are abridged to target SST for interests of lowering design complexity.

8.3 SST API Proxy Gateway /token Endpoint

Upon completion of user identification steps at the /authorize endpoint interaction, and upon a 302-redirect response message being sent from SST with Authorization Code, the ASP API client submits the Authorization Code to the Token endpoint with requisite parameters per OAuth2 specification, and if needed, per the PKCE specification. The token request-response interaction results in a set of bearer tokens being issued to the ASP API client. With the bearer tokens, the ASP is given access to the user's data at IOU/POU/CCA SST per authorized scope from the user.

At this point, the ASP can interact with the IOU/POU/CCA SST to extract authorized data, including RIN and Bill Comparison information.

8.4 Data Access for Customer RIN and Bill Comparison

The SST is not assumed to maintain any customer information nor data. The interaction between ASP API and SST is solely for the purpose of SST to proxy for the LSE/UDC system. Upon authorization of ASP and issuance of relevant bearer tokens, the ASP can draw data from LSE/UDC via SST.

For LSE/UDC customer data such as RIN and Bill comparison, this Concept Design assumes that the values for RIN and data for Bill Comparison of the verified user is already available within the LSE/UDC backend systems. With this assumption, the delivery of RIN and bill comparison is reduced to access to user data in much the same way that data is accessed by third parties in Green Button Connect.

8.4.1 RIN Request and Response

Upon data access and issuance of a bearer token for data access to specific customer information, the ASP shall maintain the validity of the bearer token, i.e. the access token by managing the token validity through its own infrastructure and utilizing the SST token endpoints. Typically, the bearer token is single use in exchange for a valid refresh token, and ASP is responsible to exchange for a new bearer access token. A REST based API request and response protocol for customer specific RIN shall be designed upon detailed design at Phase 1, and PlugFest tested between participating ASPs and IOU/POU/CCAs before end of Phase 1.

8.4.2 Bill Comparison Request and Response

Upon data access and issuance of a bearer token for data access to specific customer information, the ASP shall maintain the validity of the bearer token, i.e. the access token by managing the token validity through its own infrastructure and utilizing the SST token endpoints. Typically, the bearer token is single use in exchange for a valid refresh token, and ASP is responsible to exchange for a new bearer access token. A REST based API request and response protocol for customer eligible tariff rate and Bill Comparison shall be designed upon detailed design at Phase 2, and PlugFest tested between participating ASPs and IOU/POU/CCAs before end of Phase 2.

8.5 Rate Change Interaction

The rate change and enrollment interaction generally involve IOU/POU/CCA billing system modifications, and descriptions will need to wait until further and more detailed analysis can be accomplished with relevant enterprise billing systems of concern.

8.5.1 Rate Change Request and Response

Upon data access and issuance of a bearer token for data access to specific customer information, the ASP shall maintain the validity of the bearer token, i.e. the access token by managing the token validity through its own infrastructure and utilizing the SST token endpoints. Typically, the bearer token is single use in exchange for a valid refresh token, and ASP is responsible to exchange for a new bearer access token. A REST based API request and response protocol, typically asynchronous for customer rate change shall be designed upon detailed design at Phase 3, and PlugFest tested between participating ASPs and IOU/POU/CCAs before end of Phase 3.

Key to access of this SST feature by ASP is the implementation of a push message broadcasting and timer system at IOU/POU/CCA, such that Class 2 authorization can be implemented and tracked, due to the sensitive nature of the account change request interaction of the customer by the ASP.

9.0 SST Complexity and Summary of Choices in Concept Design

The implicit features of onboarding, authorization, interaction model, and user identity verification present a complex choice to determine a single consensus for the SST Concept Design. The tables below illustrate the combinatorial options available for design.

	Onboarding	Authorization Class	Interaction Type	User Identification	PKCE
1	Mode 1	Class 1	Type 1	Unilateral	Yes
2	Mode 1	Class 1	Type 1	Unilateral	No
3	Mode 1	Class 2	Type 2	Unilateral	Yes
4	Mode 1	Class 2	Type 2	Unilateral	No

	Onboarding	Authorization Class	Interaction Type	User Identification	PKCE
5	Mode 1	Class 1	Type 2	Bilateral	Yes
6	Mode 1	Class 1	Type 2	Bilateral	No
7	Mode 1	Class 2	Type 2	Bilateral	Yes
8	Mode 1	Class 2	Type 2	Bilateral	No

	Onboarding	Authorization Class	Interaction Type	User Identification	PKCE
9	Mode 2	Class 1	Type 1	Unilateral	Yes
10	Mode 2	Class 1	Type 1	Unilateral	No
11	Mode 2	Class 2	Type 2	Unilateral	Yes
12	Mode 2	Class 2	Type 2	Unilateral	No

	Onboarding	Authorization Class	Interaction Type	User Identification	PKCE
13	Mode 2	Class 1	Type 2	Bilateral	Yes
14	Mode 2	Class 1	Type 2	Bilateral	No
15	Mode 2	Class 2	Type 2	Bilateral	Yes
16	Mode 2	Class 2	Type 2	Bilateral	No

Table 15: Combination of Options for Concept Design of SST

Table 15Table **15** above indicates some of the key choices available, and the optionality can be bundled into two general categories as in the following description.

Features related to stronger cybersecurity, personal information protection, and user consent all relate to Class 2 authorization and PKCE security. Features that relate to user experience are Mode 2 onboarding, and bilateral user identification. To illustrate the relative merits of the 16 combinatorial choices, the colored graph in Figure 22Figure **22** below shows the strengths and weaknesses of each option combination.

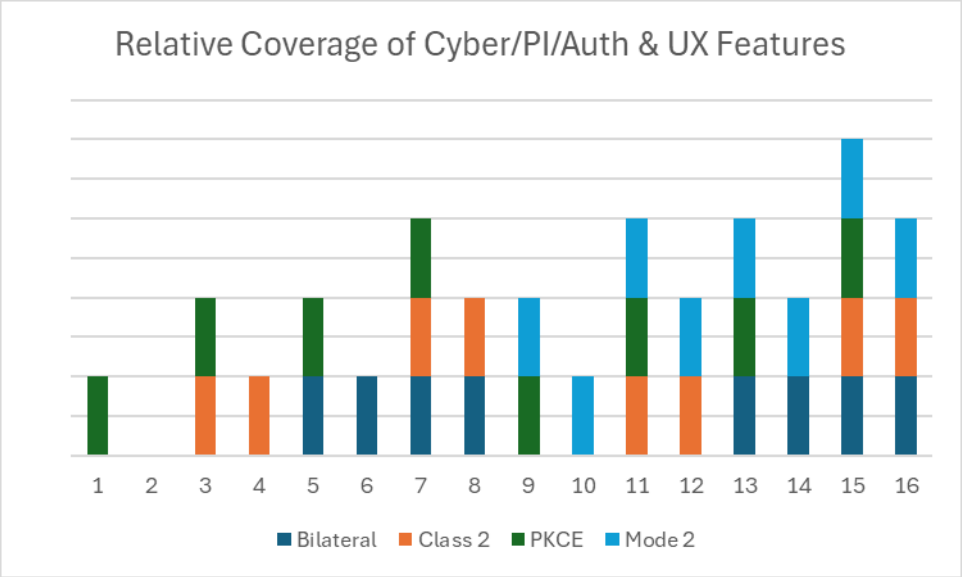

Figure 22: Illustration of relative strengths and weaknesses of each combination option

As a relatively known implementation for comparison, PG&E's Share My Data system would be identified as No. 2 and No. 10. Ideally, a service that represents minimal barrier to all stakeholders would be No. 15. However, note that technical hurdles to No. 15 are not insignificant.

As a minimal implementation of SST, No. 2 and No. 10 can be sufficient for purposes of mandated features. A choice of design should be considered based on known shortcomings when compared to the entirety of options. Implementation complexity, resources needed, and total cost must be considered when implementing the SST upon design approval.

Note that the above assumes that the SST has an API proxy gateway with supporting LSE/UDCs with its own implementations for implicit and explicit features of the SST.

10.0 Appendix A | Definitions

Term/Concept	Description
CEC	California Energy Commission
LMS	Load Management Standard
SST	Single Statewide Tool
Customer	Retail customer served by LSE for energy supply or UDC for delivery service
ASP	Automated Services Provider
IOU	Investor-Owned Utility
POU	Publicly Owned Utility
CCA	Community Choice Aggregator
UX	User Experience
UI	User Interface
API	Application Programming Interface
PKCE	Proof Key Code Exchange
TLS	Transport Level Security
mTLS	Mutually Authenticating TLS
RFC	Request For Comments
IETF	Internet Engineering Task Force
PI	Privacy Information
LSE	Load Serving Entity
CDN	Content Delivery Network
RIN	Rate Information Number
Mode 1	Onboarding method where user authorizes ASP independently at LSE/UDC
Mode 2	Onboarding method where ASP is authorized in the flow of ASP-customer interaction
Type 1	Customer interaction where LSE /UDC systems interact directly within ASP customer flow
Type 2	Customer interaction where LSE/UDC systems interact indirectly with ASP customer flow
Type 3	Customer interaction where ASP customer flow does not have any LSE/UDC interaction
Class 1	Blanket authorization of ASP for all activities for customer
Class 2	Authorization where LSE /UDC implements additional verification with customer upon sensitive transactions
NFR	Non-functional Requirements

Idempotent	An operation onto SST about a customer account where the change affects a system of record, and that change is available and consistent across all who access the record, thus ensuring consistency of record change across stakeholders.
Bundled Customer	Customer of LSE that includes generation, distribution, delivery
Unbundled Customer	Customer of LSE where generation and distribution are from different utility (i.e., UDC + LSE), as in the case of IOU and CCAs
UDC or Utility Distribution Company	IOU that provides delivery service to unbundled CCA or direct access customers in the IOU's service area

11.0 Appendix B | Informational - If SST were built on existing Green Button Connect (GBC)

***Note**: The joint IOU/POU/CCAs do not endorse this design in any capacity, and it is not considered part of the Concept Design. This section is included to help illustrate details of SST implementation from a technical perspective.*

The mostly abstract Concept Design is intended to provide individual IOU/POU/CCA requirements to implement a fully interoperable infrastructure to interact within a framework of the SST. Per Section 6.0, the following description makes specific choices for design to mitigate implementation risks to focus on most effective path to realize a specific SST version.

GBC assumes a unilateral user identification management and realizes Modes 1 and 2 of onboarding paths. Specifically, it is an example implementation description based on an extension of the Green Button Connect (hence "GBC") data access system, with prioritization for presentation of RIN and Bill Comparison features. The following description takes the example of PG&E's Share My Data, if we imagine it were functionally expanded for SST.

11.1 Example: GBC Expansion and Conformance to CEC LMS CCR 1623(c) (1)

The following sections detail the high-level architecture design and its conformance to CCR 1623(c)(1) as outlined in Section 4.3, Interpretation and Assumptions from the CEC Load Management Standard if the SST were included as an extension of GBC.

Some IOU/POU/CCAs have Green Button Connect data access capabilities already operating for a certain number of third-party data access partners operating within CPUC Electric Tariff Rule 25 and Rule 27 regime. The following are basic high-level features to implement for GBC as SST.

Function
Link of LSE at SST portal hosted at agreed upon service.
LSE link redirects SST user to LSE hosted customer sign-in portal page
Sign-in enabled by LSE IdP to verify customer account at the LSE
Upon successful sign-in, user can navigate to selection of third-party ASP to authorize
Upon successful sign-in, user can navigate to modification or cancellation of existing third-party ASP authorizations
Link of LSE at SST portal hosted at agreed upon service.
Authorization portal presents customer with scope of authorization of SST functions and features
Authorization portal presents customer with service contracts subject to authorization
Authorization portal presents customer with duration of authorization
Authorization portal presents submission or cancellation of authorization process

Table 16: Customer perspective features

Function
Upon getting registered onto the SST and therefore onto LSE approved list of ASPs:
ASP can access its own management portal page to maintain its registered information at each LSE
ASP can receive authorization notifications from LSE upon its customer authorizing it for SST features

ASP can obtain RIN for the customer via GBC usage summary API for customer who authorized them
ASP can obtain bill comparison data via specific URL endpoint for customer who authorized them
ASP can submit rate change requests via specific URL endpoint for customer who authorized them

Table 17: ASP perspective features

11.2 Example: GBC Expansion – Modification Feature to Link Device Rates

Upon a customer signing on to an LSE site upon redirection from the SST, the customer may be able to select and authorize scope related to SST. This scope may include release of RIN to specific ASP.

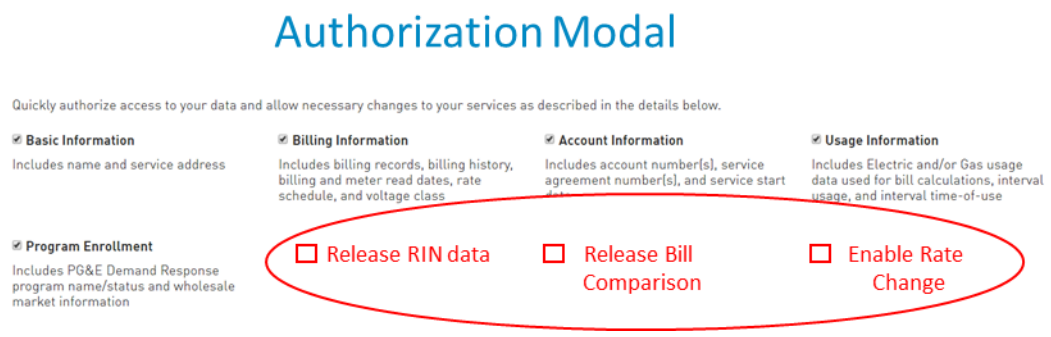

Figure 23 Customer authorization portal scope expansion of LSE's existing GBC for SST may be in red

The effect of selecting the "Release of RIN data" is to let the LSE's GBC system deliver the RIN data in the Usage Summary API as part of rate information.

In current LSE implementations of GBC, the API URL endpoint for a specific customer authorization (SubscriptionID, and for a specific energy contract (UsagePointID) may deliver billing related information by performing a GET request with a bearer access token obtained through an OAuth2 interaction with the LSE server:

.../espi1_1/Resource/Subscription/{SubscriptionID}/UsagePoint/{UsagePointID}/UsageSummary/{UsageSummaryID}

The returned response includes an XML formatted data file with a schema according to the Green Button Connect standard.

11.3 Example: GBC Expansion - Third-Party Automation Services Provider

Currently, third parties undergo a registration process to get onboarded onto an LSE's GBC data access system. It is recognized that third parties may wish to submit once and register with all relevant LSEs serving SST. A central submission process would need to be established whereby a registration request is distributed to all IOU/POU/CCA of concern simultaneously, and such requests are processed by corresponding individual IOU/POU/CCA entities to vet the ASP for onboarding onto their supported functionality of SST through their respective GBC.

By the very nature of GBC, it may be impossible for an ASP to onboard once and be able to access all GBC instances, as that would completely break the cybersecurity of the OAuth2-based token management system. Therefore, ASPs may be limited to registering individually to each GBC OAuth2

implementations of the IOU/POU/CCA even if the initial registration application is a single submittal to a representative SST entity.
Upon registration and passing evaluation and obtaining approval from corresponding LSEs, the ASP may interact with the SST via individual LSE's token management system supporting the underlying API access.

The general flow of data access for both RIN and Bill Comparison, for available API URL endpoints, is given by the following sequence in Figure 24Figure **24**.

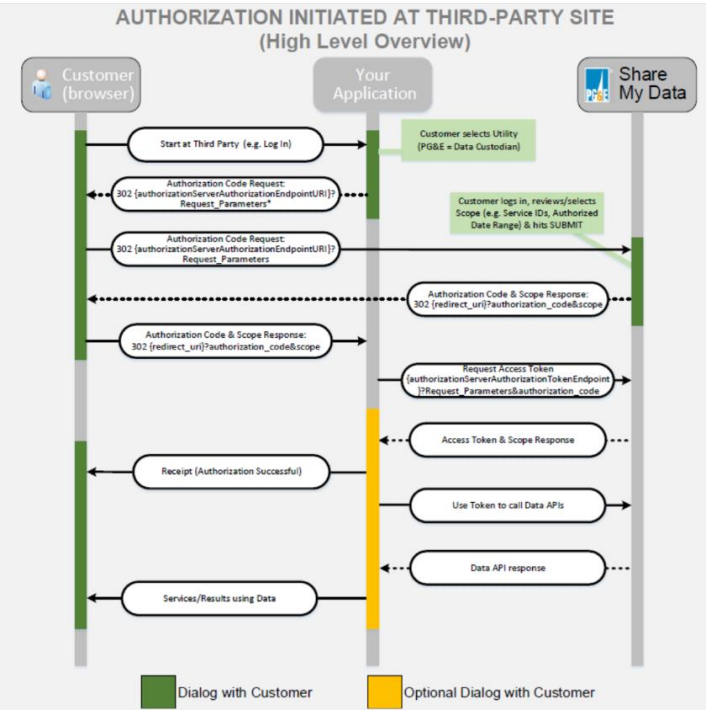

Figure 24 General interaction pattern between ASP and SST/LSE

11.4 Example: GBC Expansion - Feature to correlate individual customer RIN with MIDAS

As has been described in Section 7.137.13, the specific RIN may be delivered through existing API mechanism and in rough accordance with the data model used in GBC.

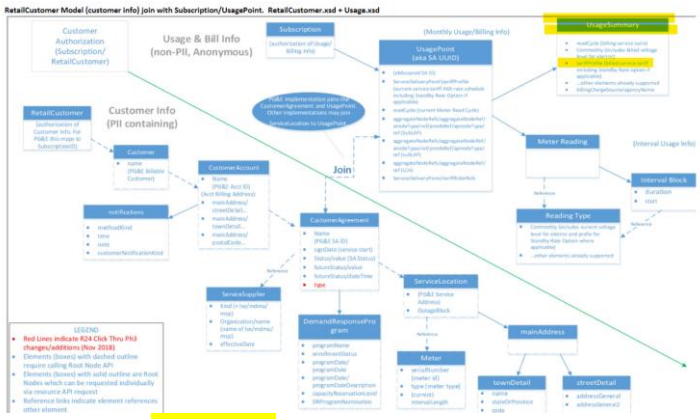

Figure 25 Highlighted data model will co-list RIN

The specific section of the schema to be modified is shown below:

```
<ns0:statusTimeStamp>1584389667484</ns0:statusTimeStamp>
<ns0:commodity>1</ns0:commodity>
<ns0:tariffProfile>A10SX</ns0:tariffProfile>
<ns0:readCycle>M</ns0:readCycle>
<ns0:billingChargeSource>
   <ns0:agencyName>PGE</ns0:agencyName>
</ns0:billingChargeSource>
<ns0:bundledRin>USCA-PGPG-0505-0000<ns0:bundledRin>
```

The GBC Expansion example would implement an additional value within the schema above such that a returned value co-lists the service agreements' Rate Identification Number (RIN) that corresponds to the tariff rate of the customer's contract with the LSE.

The returned XML file unambiguously associates the RIN to the UsagePointID of the customer. The ASP would be able to then determine the RIN to assign a load management device installed the UsagePointID physical location, and then separately query MIDAS to obtain pricing information.

11.5 Example: GBC Expansion - Feature to Rate Compare Individual Customer Service Agreements

The GBC expansion may add new API endpoint query parameter or entirely new URL endpoint to enable a request/response using the HTTPS GET method, to obtain a customer's bill comparison information. The URL endpoint will be specific down to the UsagePointID. For example,

.../espi1_1/Resource/Subscription/{SubscriptionID}/UsagePoint/{UsagePointID}/UsageSummary/{UsageSummaryID}?SST={<BillComparison>}

could additionally return a file with a complete annual ill comparison between eligible rates of a customer.

11.6 Example: GBC Expansion - Feature to Rate Change Individual Customer Service Agreements

Out-of-scope

11.7 Example: GBC Expansion - Implementation, Operation and Maintenance of compatible LSE systems for the Single Statewide Tool

Out-of-scope