

Work Plan for Vehicle-Grid Integration Communications Protocol Working Group
CPUC, CEC, CARB, CAISO Staff

Background and Summary:

Per feedback gathered in advance of and during the April 24 Launch Meeting of the VGI Communications Protocol Working Group (“Working Group”, WG), the interagency staff has revised the structure of the Straw Proposal. Major revisions to the approach are multi-fold:

1. To avoid attempting to address issues less germane or tangential to the agencies’ jurisdictional authorities within the limited timeframe.
2. To focus and segment the scope of work to answer the:
 - a. CPUC’s questions relating to engineering design and functionalities of charging infrastructure equipment proposed for ratepayer funding under the investor-owned utilities’ SB 350 applications.
 - b. Broader policy, valuation, and business-model considerations potentially barring VGI market development
3. To map the Straw Proposal questions to the State’s existing statements developing VGI policy and technology
4. To propose a more precisely defined trajectory of Working Group meetings to enable more efficient discussions considering travel, efficacy of online conferences, and deliverables from active participants and interests.

Required Reading and Supporting Documentation:

- Foundational Documents
 - CPUC Energy Division, Vehicle-Grid Integration: A Vision for Zero-Emission Transportation Interconnected throughout California’s Electricity System, 2013. (“[VGI Whitepaper](#)”)
 - CAISO et al., California Vehicle-Grid Integration Roadmap: Enabling vehicle-based grid services, 2014. (“[VGI Roadmap](#)”)
 - CPUC, Appendix B to the Assigned Commissioner Ruling Regarding the Filing of Transportation Electrification Applications Pursuant to Senate Bill 350, 2016 (“[Appendix B](#)”)
 - CEC and CPUC Joint Workshop, Vehicle-Grid Integration Communications Standards – [Interagency Presentation, 2016](#)
 - CEC, Annual Multi-Agency Update on Vehicle-Grid Integration Research, [2014](#), [2015](#), [2016](#)
 - Vehicle-Grid Integration Communications Protocol Working Group, CPUC and CEC Staff Straw Proposal, 2017 (“[Straw Proposal](#)”)
 - ElaadNL, EV Related Protocol Study, 2017 (“[Protocol Study](#)”)
- Key Terms and Definitions
 - ElaadNL Protocol Study Section 1.4
 - VGI Roadmap Appendix E
 - (Additions to be developed by stakeholders as needed)

Expectations for Active Participants Contributing to Products/Deliverables:

- The Working Group expects that subgroups will form to assist in the development of material needed to answer the questions identified below and use the foundational documents to avoid duplication of prior work. The Facilitator will assist these subgroups in establishing a reasonable and timely review process to determine the level of agreement among stakeholders for delivered products.

Stakeholder Viewpoints to be Examined

- EV user (driver/rider)
- Electric Vehicle (EV) Original Equipment Manufacturer (OEM)
- Distribution System Operator (DSO or Utility) and Independent System Operator
- Electric Vehicle Service Provider (EVSP) or E-Mobility Service Provider (EMSP)
- VGI Resource Aggregator or other Market Participant
- Non-Participating Ratepayer or Society

The interagency staff recommends using Figure 16 from the ElaadNL Protocol Study to group the examination of protocols per the following Deliverables.

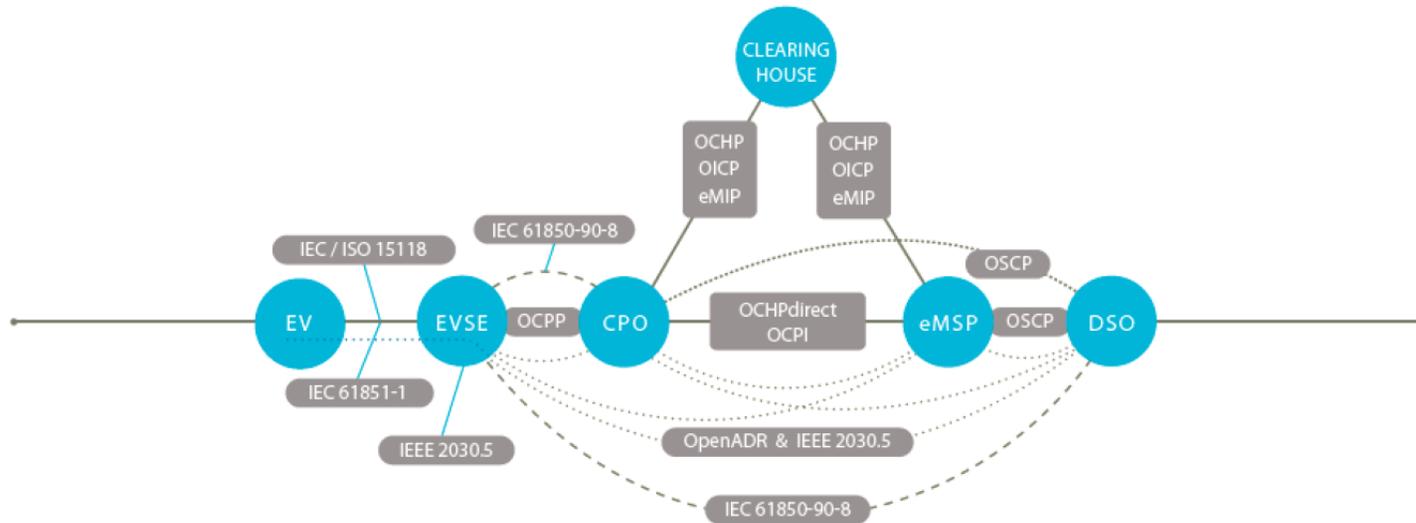


Figure 16: overview of protocols and market roles

Deliverable 1: Map VGI Use Cases with existing Communication Protocols to Network Architectures

(Refer to Straw Proposal Questions 2, 4, 5a, 5b, 6, 8, 10)

- a. Referring to the ElaadNL Protocol Study, define the **Network Architecture(s)** necessary to enable the **VGI Use Cases** defined in the VGI Roadmap and Whitepaper, or additions of interest to participants. For what timeframes are these architectures applicable (e.g. vehicle model years, private charging infrastructure investments)?
- b. Provide feedback on the appropriateness of the Exemplary Criteria in Appendix B to use for examination of **Communications Protocols**. If additional **Criteria** should be considered, specifically substantiate their addition by comparing their function to the VGI use cases defined and enabled in the network architectures or protocols identified above.

Subgroup Focus Domains

- c. Which VGI use cases require communications between the Electric Vehicle (EV) and EV Service Equipment (EVSE)?
 - i. Which existing communication protocols apply to these use cases?
 - ii. For which VGI use cases are communications between the EV and EVSE optional?
- d. Which VGI use cases require communications between the Charge Point Operator (CPO) and the EVSE?
 - iii. Which existing communication protocols apply?
 - iv. For which VGI use cases are communications between the CPO and the EVSE optional?
- e. Which VGI use cases require communications between the E-Mobility Service Provider (eMSP) and the Clearing House and the Charge Point Operator (CPO)?
 - v. Which existing communication protocols apply to these use cases?
 - vi. For which VGI use cases are communications between the eMSP and the Clearing house and the CPO optional?
- f. Which VGI use cases require communications between the Distribution System Operator (DSO) and E-Mobility Service Provider (eMSP)?
 - vii. Which existing communication protocols apply to these use cases?
 - viii. For which VGI use cases are communications between the DSO and eMSP optional?

Deliverable 2: Analyze Opportunity Costs from Stakeholders' Perspectives

(Refer to Straw Proposal Questions 1, 7)

- a. If stakeholders have a recommendation whether the CPUC should require the utilities to specify a standard in their ratepayer-subsidized infrastructure, is there a consensus recommendation on the specification? If not, is there a ranking of the considered specifications?
- b. Quantify the opportunity costs, per 1a and 1b, associated with the adoption or absence of the standard. If specific cost assumptions are unavailable, propose a framework for analysis.

Subgroup Focus Domains

- c. For use cases that require a communication protocol between the EV and EVSE analyze the following from various stakeholder perspectives:

- a. Evaluate the implications of requiring a *single* or requiring *multiple* communication protocols to be designed and operated between the EVSE and EV. How should this affect a utility's infrastructure investment? For both options, list pros, cons, tradeoffs, and mitigating factors.
- d. For use cases that require a communication protocol between the CPO and the EVSE analyze the following from various stakeholder perspectives:
 - a. Evaluate the implications of requiring a *single* or requiring *multiple* communication protocols to be designed and operated between the CPO and EVSE. How should this affect a utility's infrastructure investment? For both options, list pros, cons, tradeoffs, and mitigating factors.
- e. For use cases that require a communication protocol between the eMSP and the Clearing House and the CPO analyze the following from various stakeholder perspectives:
 - a. Evaluate the implications of requiring a *single* or requiring *multiple* communication protocols to be designed and operated between the eMSP and Clearing House and CPO. How should this affect a utility's infrastructure investment? For both options, list pros, cons, tradeoffs, and mitigating factors.
- f. For use cases that require a communication protocol between the DSO and eMSP analyze the following from various stakeholder perspectives:
 - a. Evaluate the implications of requiring a *single* or requiring *multiple* communication protocols to be designed and operated between the DSO and eMSP. How should this affect a utility's infrastructure investment? For both options, list pros, cons, tradeoffs, and mitigating factors.

Deliverable 3: Value Proposition and Enabling Policy

(Refer to Straw Proposal Questions 1, 3, 9, 11)

1. What market or policy actions do stakeholders recommend to more appropriately value, procure, or put into operation VGI resources?

Meeting Trajectory

To assist working group participants' ability to schedule their participation and in consideration of the technical and multi-disciplinary nature of this task, the interagency staff propose that the working group meetings generally follow the following sequence:

1. Exposition of issue and proposals to solve problem, identification of preparatory items for in-person working session
2. In-Person workshop, alternating between San Francisco and Sacramento, stakeholder presentations, discussions and working sessions
 - a. Follow-up in deliverable-specific subgroup break-outs working teams
3. Report-Out from Subgroups and Submission of Documents for Review
4. Feedback and Discussion, Resolution of Issue.

Identifier (Deliverable, Meeting#), Date, Location	Objective and Purpose Draft Agenda Topics	Needs Identified	Follow Up Assignments for Participants or Agencies	Applicable Excerpts from Supporting Documents
0.1 4/24/17 In-person San Francisco	<ul style="list-style-type: none"> • <i>Introductions</i> • <i>Level setting</i> • <i>Present and receive Feedback on straw proposal</i> • <i>Initial identification of stakeholder interests in use cases and business</i> 	<ul style="list-style-type: none"> • <i>Clearer understanding of scope</i> • <i>Clearer understanding of process</i> • <i>Common understanding of terms</i> 	<ul style="list-style-type: none"> • <i>Sponsoring agencies will:</i> • <i>Present a work plan to WG</i> • <i>Identify foundation documents and research</i> 	<ul style="list-style-type: none"> • <i>N/A</i>
Deliverable 1: Map VGI Use Cases with existing Communication Protocols to Network Architectures				
1.1 5/15/17 Webex	<ul style="list-style-type: none"> • ElaadNL Presentation on EV Protocol Study • Feedback and agreement on work plan • Establish subgroup composition, form of deliverables, and communications and documentation 	<ul style="list-style-type: none"> • Confirm and self-assemble subgroup teams and establish timeline for work deliverables • Participants propose for consideration other documents, definitions, or Criteria 	<ul style="list-style-type: none"> • <u>WG participants to:</u> • Additional key definitions • Begin discussing Deliverables 1c, 1d, 1e, 1f in Subgroups • Presenters for 1a and 1b 	<ul style="list-style-type: none"> • Protocol Study Sections 4, 5, Appendix B • VGI Whitepaper Part 2 and 3 • VGI Roadmap Section 2, 3.2, 3.3, 4.3 • Presentations from Research Reviews
1.2 5/30/17 Webex	<ul style="list-style-type: none"> • Agreement on terms and definitions • Presenters/Discussion on Network Architectures (1a) and Criteria (1b) • Subgroups present any major 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • <u>WG participants to:</u> • Finalize key definitions, criteria • Continue subgroup dialogue in solving Deliverables 1c, 1d, 1e, 1f 	<ul style="list-style-type: none"> • Appendix B Part 2

	findings			
1.3 6/12/17 All Day Sacramento	<ul style="list-style-type: none"> Finalize 1b Subgroups present any divergence in positions on deliverables 1a, 1b, 1c, 1d, 1e, 1f Working Session 	<ul style="list-style-type: none"> Participants supply evidence documents for positions on use cases, standards body roadmaps identifying timelines or technical differences 	<ul style="list-style-type: none"> <u>WG participants to:</u> Begin outlining proposed findings, agreements, disagreements to be in draft solution for WG's consideration 	<ul style="list-style-type: none">
1.4 6/26/17 Webex	<ul style="list-style-type: none"> Present outlines and technical paths forward to resolve divergence in positions (if any) on 1c, 1d, 1e, 1f 	<ul style="list-style-type: none"> Participants supply evidence documents for positions on use cases, standards body roadmaps identifying timelines or technical differences 	<ul style="list-style-type: none"> <u>WG participants and agencies to:</u> Identify gaps in past discussions Prepare presentations or bring supporting documents to be discussed at next meeting 	<ul style="list-style-type: none">
1.5 7/10/17 Webex	<ul style="list-style-type: none"> Review and discuss subgroup recommendations Finalize Deliverable 1c, 1d, 1e, 1f Tee up discussion for Deliverable 2 	<ul style="list-style-type: none"> Participants self-identify where their company fits into each use case Subgroups Draft Summary 	<ul style="list-style-type: none"> <u>WG participants to:</u> Complete Draft Summary of Deliverable 1 for WG's consideration Develop presentations for opportunity cost analysis 	<ul style="list-style-type: none">
Deliverable 2: Analyze Opportunity Costs from Stakeholders' Perspectives				
1.6 7/24/17 San Francisco	<ul style="list-style-type: none"> Last technical discussion on Draft Summary document for Deliverable 1 Kickoff Deliverable 2 Presentations on Opportunity 	<ul style="list-style-type: none"> Confirm 4 subgroup teams and establish timeline for work deliverables 	<ul style="list-style-type: none"> Re-assemble into working teams and add market analysis to technical analysis completed in Deliverable 1 	<ul style="list-style-type: none"> Protocol Study Sections 6, 7, Appendix A VGI Whitepaper Part 4 and 5 VGI Roadmap Section 3.1, 4.2

	Costs and discussion			<ul style="list-style-type: none"> • Appendix B • Presentations from Research Reviews
2.1 8/7/17 WebEx	<ul style="list-style-type: none"> • EVSE/EV Subgroup Presentation & Discussion • EVSE/CPO Subgroup Presentation & Discussion 	<ul style="list-style-type: none"> • Participants supply evidence documents for positions on use cases, e.g. costs or expected market forecasts or product roadmaps 	<ul style="list-style-type: none"> • Begin outlining proposed findings, agreements, disagreements to be in draft solution for WG's consideration 	<ul style="list-style-type: none"> •
2.2 8/21/17 WebEx	<ul style="list-style-type: none"> • eMSP/Clearing House/CPO Presentation & Discussion • eMSP/DSO Presentation & Discussion 	<ul style="list-style-type: none"> • Participants supply evidence documents for positions on use cases, e.g. costs or expected market forecasts or product roadmaps 	<ul style="list-style-type: none"> • 4 subgroups begin preparing opportunity cost analysis for Deliverables 2a and 2b 	<ul style="list-style-type: none"> •
2.3 9/4/17 WebEx	<ul style="list-style-type: none"> • Subgroups discuss outlines for analysis, discuss any divergence in positions on 2a and 2b 	<ul style="list-style-type: none"> • Comments and positions on use cases • Identify Gaps in any past discussions 	<ul style="list-style-type: none"> • 4 subgroups add Deliverable 2 opportunity cost analysis to technical analysis from Deliverable 1 	<ul style="list-style-type: none"> •
2.4 9/18/17 Sacramento	<ul style="list-style-type: none"> • Subgroups present recommendations and opportunity cost analysis and discussion • Finalize Deliverable 2 • Agree to form of work product and mechanism for convening on Deliverable 3 	<ul style="list-style-type: none"> • Subgroups Draft summary 	<ul style="list-style-type: none"> • Complete Draft Summary of Deliverable 3 for WG's consideration • Initiate proposals for organization's actions to enable VGI value proposition and suggestions for policymakers • Prepare presentations on position for Deliverables 3.1 and related Questions 	<ul style="list-style-type: none"> •

Deliverable 3: Value Proposition and Enabling Policy				
<p>3.1 10/2/17 Webex</p>	<ul style="list-style-type: none"> Stakeholders present on Deliverable 3.1 and related Straw Proposal questions 	<ul style="list-style-type: none"> Comments on positions on industry actions or policy Supporting documentation 	<ul style="list-style-type: none"> Complete proposals on Deliverable 3.1 	<ul style="list-style-type: none"> Appendix B VGI Whitepaper Part 5 VGI Roadmap Section 4.2
<p>3.4 10/16/17 San Francisco</p>	<ul style="list-style-type: none"> Stakeholders present on Deliverable 3.1 Discuss any divergence in positions 	<ul style="list-style-type: none"> Draft Summary for Deliverable 3.1 for WG consideration 	<ul style="list-style-type: none"> Agencies compile recommendations and draft summary on Deliverable 3 	<ul style="list-style-type: none">