

DR17.13: Vehicle Grid Integration

VGI Working Group 2017 Summary Report

In 2015, the Clean Energy and Pollution Reduction Act, Senate Bill 350, directed the California Public Utilities Commission (CPUC) to require the investor-owned utilities (IOUs) to implement Transportation Electrification (TE) programs. In September of 2016, an Assigned Commissioner Ruling was issued that, besides detailing the types of applications the IOUs should propose, also required the applications to comply with the ISO 15118 protocol between the Electric Vehicle (EV) and Electric Vehicle Supply Equipment (EVSE) or to explain why they could not comply. Following a stakeholder meeting in December of 2016, the CPUC decided to convene a Vehicle Grid Integration Working Group (VGIWG) to allow stakeholders to evaluate if requiring one or more protocols was appropriate.

From April until December 2017, the VGIWG investigated, debated, and derived use cases, requirements, architectures, and protocol mappings. At the end of the process, key deliverables had been abandoned and an outcome was unclear. In the end, it took a compromise among all participants to agree to a proposal for the CPUC. Instead of a protocol, the VGIWG proposed future proofing the EVSEs so that when EV manufacturers finally adopt a protocol in masse, the EVSEs can be upgraded to support.

Additionally, further work has been proposed for 2018 and beyond, including conducting large scale pilots, evaluating customer, manufacturer, implementer, environmental, and customer values and benefits that can be derived from the eventual adoption of a protocol, and further VGIWG work to update VGI Roadmaps.

What Is This Technology?

Vehicle Grid Integration

VGI denotes the optimal integration of large and flexible EV loads onto the distribution and transmission grid. At minimum, VGI includes the decision to deploy lower-power chargers or distributed generation to support charging costs. Initiating charging based on price signals as mentioned above, whether through delaying plugging in or using the automated scheduling functionality on an EV or EVSE is also VGI. Remote charging control, whether dynamically or in advance, provides a more advanced type of VGI.



What We Did?

Vehicle Grid Integration Working Group

The CPUC and California Energy Commission (CEC) formed the VGIWG. The stated objective of the working group was assessing “how and whether the adoption of a communications protocol is necessary to enable Plug-In Electric VGI resources to more economically participate in electricity markets at scale.” The pursuit of a standardized method of managing the EV to be deployed by the IOUs in their SB 350 programs led to the original ISO 15118 mandate and the subsequent formation of the VGIWG.

The VGIWG Workplan originally outlined three Deliverables:

Deliverable 1: Map Existing Communication Protocols to the VGI Use Case Requirements

The objective of Deliverable 1 is to determine which protocols are necessary or can be used to meet VGI use cases and requirements. The determination of these protocols was based on use-case identification, architectures development and requirements derivation process.

Deliverable 2: Costs and Benefits of Choosing a Protocol to Enable VGI

- Identify costs and benefits of use cases and protocols from multiple perspectives. The outcome of this task was meant to be a matrix of costs and benefits associated with the use cases and protocols.
- Using the outcome from the first task, determine whether one or more protocols provides the greatest amount of benefits for each use case and the use cases as a whole.

Deliverable 3: Policy Recommendation

The outcome of the final deliverable was to be a recommendation of either one or protocol(s) to the CPUC if there was consensus outcome from Deliverables 1 and 2, further actions related to the utility TE proposals should there not be consensus, and additional work moving forward based on issues that arose during the course of the VGIWG.

As part of Deliverable 1, 55 functional requirements were identified and categorized as follows:

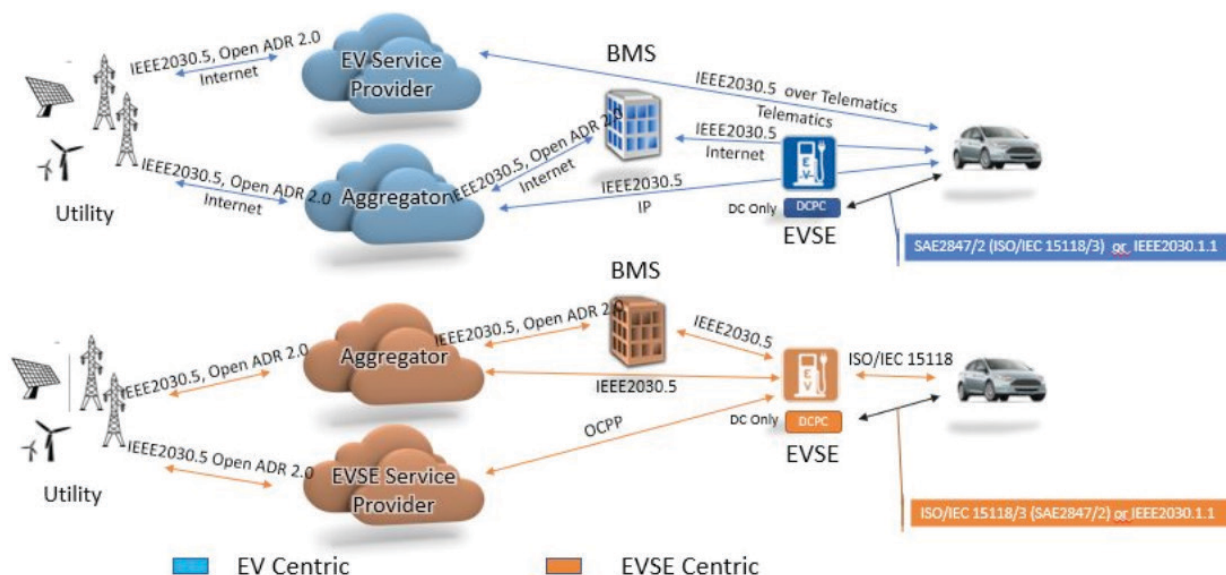
- Rule 21 (distribution interconnection and support)
- Pricing
- Load Control
- Smart Charging (negotiated charging)
- Monitoring (metering)
- Restart and Miscellaneous (Support GPS Location and Sending Renewable Mix)

Each of the requirements were additionally mapped to a specific interface in order to complete Deliverable 2 which looked at the cost and benefits of different protocols.

Currently, Level 1 charging (120V) due to the lack of networking capabilities, Direct Current Fast Charging (DCFC) because of the quick turnover, as well as Level 2 (240V) charging deployed in Residential scenarios due to costs have been removed as candidates for VGI implementation.

The multi-use L2 EVSE, such as those deployed at Workplaces and Public locations, are left as options. In addition, the remaining protocols under discussion are OpenADR 2.0, IEEE 2030.5, OCPP 1.6 and ISO 15118. An architecture presented by the IOU/OEM group showed the contrast. This is shown in Figure 1.

FIGURE 1.



VGIWG Staff presented another compromise that while still leaving the protocol decision to the market, proposed additional processing power on the EVSE so that protocol translation can occur. This will allow both the EV or EVSE Centric architecture and thus ISO 15118. VGIWG agreed to reference the existing Handbook 44 (HB 44) requirements, which are already required on the multi-use EVSEs where electricity is offered for sale. HB 44 requires meter accuracy of 1% at time of certification and 2% during the life of the system.

What We Concluded?

It is possible that the VGI standard space will remain fractured. It is also possible that, as is often the case, the protocol that is first to market will corner the market. However, until then there may be more valuable work to be done.

In January 2018 the IOU/OEM group submitted a proposal to the CPUC commissioner. The letter stated that due to the fact that not all of the VGIWG scope was completed, the group recommended a VGI Value Study to examine the benefits and value streams provided by VGI and Large Scale Demonstrations that can further support the determination of valuable and desired pathways and protocols that should be implemented. Additional recommendations, include updating the VGI Roadmap and further VGI work in 2018. It is debatable whether the VGIWG time and efforts spent to reach the compromise proposal were worth it. However, if the IOU/OEM proposals are realized then there would be no doubt that this was a worthwhile effort.