

DOCKETED

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INSIGHTS ON INTEROPERABILITY IMPACT TO NON-CHARGE EVENTS AND MEASURING UPTIME (SAE J2953 STANDARD)



EV-Smart Grid Interoperability Center at ANL

THEODORE BOHN

Principal Electrical Engineer
Argonne National Laboratory
tbohn@anl.gov, 630-816-7382

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CEC Charging Reliability Workshop

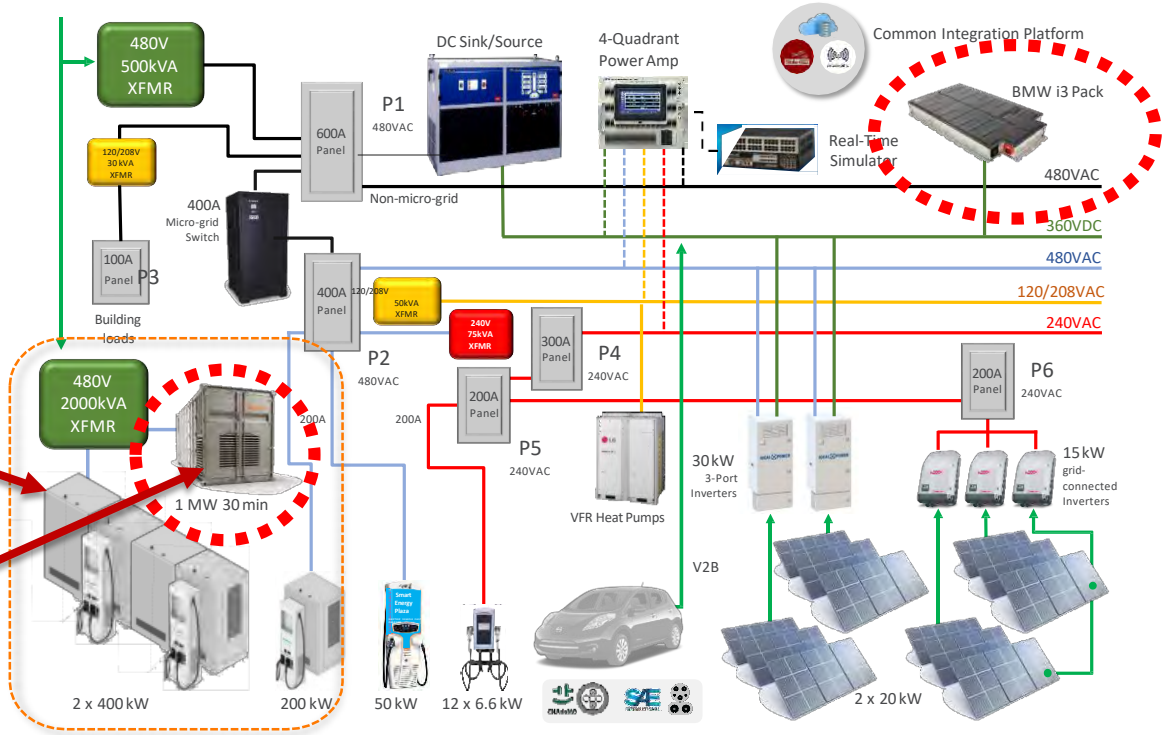
ANL SMART CHARGING PLAZA; AC AND DC COUPLED STORAGE, MW CHARGE

Big and small charging ports, energy storage, arrays of OCPP EVSEs



1+MW Total DC EVSEs (2x400kW+1x200kW +50kW..)

- 2667kVA transformer and switchgear
- 1 MW/500kWhr AC coupled Y-Cube storage
- 33kWhr DC coupled BMW i3 pack on DC busway



GRID INTERFACE MANAGEMENT SIDE OF RELIABILITY/INTEROPERABILITY ANL AC COUPLED MW (COMBINED) DC CHARGING/BATTERY, MCS SOON

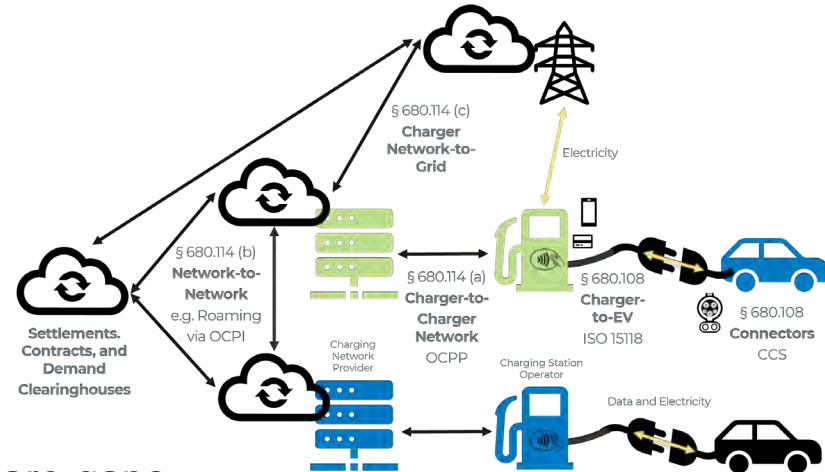
- 5x 200kW power conversion cabinets, 3x 500A dispensers (1500A/1MW total)
- Aggreko 1 MW 480vac coupled storage system, 80kW on PV canopy
- Dedicated metering (Schneider SCADA) on each branch/device



MCS Near future?

ANL SUPPORTS DOE-DOT JOINT OFFICE; NEVI

- Joint Office issued RFI (DE-FOA-0002797): *REQUEST FOR INFORMATION ON ELECTRIC VEHICLE NO-CHARGE EVENTS, INCLUDING OPERABILITY*
- Four Principles In Joint Office/NEVI deployments:
 - Convenient
 - Affordable
 - Reliable
 - Equitable
 - (that create jobs, increase EV adoption,...)
- DOE National Labs are tasked to help industry measure, improve, and maintain reliability as well as ensure interoperability.
- Backward compatibility and PKI trusted solutions are gaps
- Mechanisms to collect and share data from consumer experience, diagnostic data, identified root causes (and resolving/addressing root cause of non-charge events)



INTEROPERABILITY IS A SUBSET OF RELIABILITY

- SAE J2953 covers EV-EVSE interoperability. (Chaired by Ted Bohn-ANL)
- It presently does not cover EV-EVSP/grid integration interoperability.
- ANL facilitated the first SAE coordinated AC charging round-robin J2953 testing
- ANL hosted the first DC charging interoperability testing symposium (2014); most recent event in Portland at Electric Island with 26 pairing stations; trucks, buses and cars
- A motion was made at the SAE Hybrid committee to open a **new work area on J2953/5** to assess charging reliability metrics, test procedures and transaction/CPO related parts of EV charging. (TBD on when it will be launched- 2023?)
- ANL is working with test tool manufacturers on integrated power system features (V2X-ish) as well as J2953/other testing procedures and pass/fail criteria.



{BACKUP}- RFI NO-CHARGE EVENT TOPICS

Category 1: The occurrence of no-charge events

1) *The frequency of no-charge events (as a percentage of total events) at non-residential locations by charging type:*

- a. *AC Level 2 chargers,*
- b. *DC Fast Chargers (50kW-200kW), and*
- c. *Extreme Fast Chargers (XFC >200kW).*

Category 2: The causes of no-charge events

1) *Please identify the cause of no-charge events:*

- a. *EV component failure,*
- b. *EVSE component failure*
- c. *Internet connection (Wi-Fi/cellular),*
- d. *Payment system failure (e.g. authentication, authorization),*
- e. *Charging network operator system disruptions (Information Technology/Operational Technology),*
- f. *EVSE network-to-network interoperability (roaming transaction errors),*
- g. *Power failure or interruption (lack of charge restart),*

{BACKUP}- RFI NO-CHARGE EVENT TOPICS

h. Cybersecurity compromises,

i. EV/EVSE Interoperability, please specify charging connector type,

j. Operator error, and

k. Other, please specify.

*2) For the causes identified above, what percentage of no-charge events result from each cause, by charger type?
(a. AC Level 2 chargers, b. DC Fast Chargers (50kW-200kW), and c. Extreme Fast Chargers)*

3) For the causes identified above, can they be tracked? If so, how and to what level of detail are they tracked?

Category 3: Solutions to overcome no-charge events

1) For the causes identified above, what are the potential solutions to address each?

Please describe solutions for

a. The existing vehicles and chargers already deployed in the field,

b. The current production vehicle and charging products, and

c. The future production vehicle and charging products.

2) Does the Federal government have a role in supporting these solutions through research, development, and/or demonstration? Please explain. xplain.

{BACKUP}- RFI NO-CHARGE EVENT TOPICS

Category 4: Testing and services to verify compatibility and functionality and prevent no charge events

- 1) What is the adequacy of testing standards/protocols, testing tools and services to detect, understand, and prevent the causes of no-charge events? Please explain.*
- 2) How can design verification and testing be efficiently scaled as the number of EVSE and EVs coming to market increases? Please explain.*
- 3) Is there a need for additional testing tools, services, and facilities (similar to the Vehicle-Grid Innovation Laboratory being developed by the State of California)? Please explain.*