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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Continue the Development of Rates and Infrastructure for Vehicle Electrification.	Rulemaking 18-12-006

FINAL PLUG-IN ELECTRIC VEHICLE SUBMETERING PROTOCOL OF SOUTHERN CALIFORNIA EDISON COMPANY (U-338-E), PACIFIC GAS AND ELECTRIC COMPANY (U 39-E), AND SAN DIEGO GAS & ELECTRIC COMPANY (U 902-E)

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December 21, 2020

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Pursuant to the August 19, 2020 Administrative Law Judge's ("ALJ") E-Mail Ruling Resetting the Procedural Schedule to Continue the Development of a Plug-In Electric Vehicle Submetering Protocol, Southern California Edison Company, Pacific Gas and Electric Company, and San Diego Gas & Electric Company ("Joint Utilities") submit the final Plug-In Electric Vehicle Submetering Protocol ("EVSMP") as Attachment A.

Respectfully submitted,

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December 21, 2020

ATTACHMENT A

PLUG-IN ELECTRIC VEHICLE SUBMETERING PROTOCOL ("EVSMP")

Proposed Electric Vehicle Submetering Protocol (EVSMP)

Dec 21, 2020

A California Investor-Owned Utilities joint initiative.

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PEVSMP CONTENT

INTRODUCTION

The Electric Vehicle Submetering Protocol (EVSMP) is applicable to the residential market sector, which is defined as customers that can access utility service under any of the residential utility tariffs. The EVSMP is a public document that will be used as a technical reference for any contractual agreements between Utility Distribution Companies (UDCs) providing billing services and third parties providing Electric Vehicle (EV) charging services. It establishes the minimum technical requirements to accurately and reliably measure EV charging load and transmit the information for customer billing and responsibilities to settle issues for EV submetering services.

The EVSMP specifies the minimum standards for safety, accuracy, reliability and security of:

- Submeter Configurations and Certification
- Submeter Data Communications
- Submeter Data Management and Meter Reading
- Submeter Installation, Maintenance, Field Testing, and Calibration

For additional information, visit the appropriate UDC website. Copies of CPUC decisions are available upon request from the CPUC by calling 415-703-1282 or on the CPUC's website at: www.cpuc.ca.gov

For detailed information regarding ANSI standards, please consult the American National Standards Institute website at: www.ansi.org. The standards contained in the EVSMP are subject to change. As such, the UDC should be consulted in case of doubt regarding any standard. The provisions of the National Electrical Code (NEC), Authority Having Jurisdiction (AHJ), or UDC tariffs supersede any provisions contained in the EVSMP that may appear to be inconsistent or contrary.

CHAPTER A. SUBMETER CONFIGURATIONS & CERTIFICATION

I. CONFIGURATIONS & CERTIFICATION TEST STANDARDS

This chapter provides permissible submetering configurations to ensure the submeter is designed to standards that establish the minimum technical and functional requirements in areas of safety, accuracy, reliability, and security such that the submeter can be certified for use in applications under PEV submeter tariffs and rules. Submeters shall be capable of recording interval data and Blondel compliant measurements.[1]

I.1. Submetering Configurations

Acceptable options for utility-approved configurations to submeter Electric Vehicle Supply Equipment (EVSE) usage are as follows:

1. Traditional Separate Meter – A socket-based AMI meter that is utility owned and installed, separate from the EVSE.

2. Non-Traditional Meter – A utility-developed, non-socket-based meter that is utility owned and installed, separate from the EVSE, and read through the utility's AMI network. This could be installed electrically upstream from the EVSE or before the EVSE charging cord and downstream from the utility primary meter.

3. Utility-Integrated – A utility-developed and integrated or a utility-approved 3rd-party manufacturer-developed submeter in an embedded EVSE, certified to meet the utility's submetering and utility's networking data backhaul requirements. The utility owns, operates, and maintains the submeter and reads the submeter through the utility's AMI network. As the submeter is integrated into the EVSE, the load it monitors (EV charging load only or EVSE and charging loads) depends on the electrical design of the EVSE.

4. Non-Utility-Owned – An embedded submeter in the EVSE either owned by the customer or a third-party and operated and maintained by a third-party. The metrology of the submeter must be certified as required in Chapter A. Data backhaul requirements are listed in Chapter B.

For integrated utility-developed submeters, refer to the utility's specific designs. In addition, utility-developed submeters must be certified and compliant with the utility's current AMI system.

I.2. Submetering Certification Standards

A utility-owned submeter, separate from the EVSE, shall follow ANSI C12 specifications as required by the utility for certification.

The following certification standards shall only apply, for utility-integrated and non-utility-owned submeters.

- ANSI C12.1-2014, Code for Electricity Metering
- ANSI C12.19-2012, Utility Industry End Device Data Tables
- ANSI C12.22-2012, Protocol Specification for Interfacing to Data Communication
- ANSI C12.20-2014, 0.5% Accuracy Class Meters
- ANSI C37.90.1 – 2012, Surge Withstand Capability
- FCC Regulations, Part 15, Technical Standards for Computing Equipment
- IEC 61000-4-4: Testing and Measurement Techniques - Electrical Fast Transient Burst Immunity Test (2004)
- IEEE 62.41.1 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000V or Less) AC Power Circuits (2002)
- IEEE 62.41.2 - IEEE Guide on the Surge Environment in Low-Voltage (1000V or Less) AC Power Circuits (2002)

[1] Handbook for Electricity Metering, Ninth Edition, Edison Electric Institute, 1992 page 139

- IEEE 62.45 - IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000V or Less) AC Power Circuits (2002)
- NEMA ESM1, Parts 1 through 9 – Electrical Submeter (when available)
- UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems
- UL 2594, Standard for Electric Vehicle Supply Equipment

I.3 Submetering Certification Tests

Below are the minimum required certification tests for utility-integrated and non-utility-owned submeters that shall be applied in conjunction with Section II: Certification Testing Requirements.

Line No.	Descriptions of Certification Tests	Comments
1	No Load	ANSI C12.20, Test #1
2	Starting Load	ANSI C12.20, Test #2
3	Load Performance	ANSI C12.20, Test #3
4	Effect of Variation of Power Factor	ANSI C12.20 Test #4
5	Effect of Variation of Voltage	ANSI C12.20, Test #5
6	Effect of Variation of Frequency	ANSI C12.20, Test #6
7	Equality of Current Circuits	ANSI C12.1, Test #7
8	Effect of Internal Heating	ANSI C12.20, Test #11
9	Stability of Performance	ANSI C12.1, Test #13
10	Independence of Elements	ANSI C12.1, Test #14
11	Insulation	ANSI C12.1, Test #15
12	Voltage Interruptions	ANSI C12.1, Test #16
13	Effect of High Voltage Line Surges	ANSI C12.1, Test #17
14	Effect of External Magnetic Field	ANSI C12.20, Test #15
15	Effect of Variation of Ambient Temperature	ANSI C12.20, Test #19
16	Effect of Temporary Overloads	ANSI C12.20, Test #20
17	Effect of Voltage Variation Secondary Time Base	ANSI C12.20, Test #23
18	Effect of Variation of Ambient Temp. Secondary Time Base	ANSI C12.20, Test #24
19	Electrical Fast Transient/Burst	ANSI C12.1, Test #25
20	Effect of Radio Frequency Interference	ANSI C12.1, Test #26
21	Radio Frequency Conducted and Radiated Emission	Per FCC, Part 15
22	Effect of Electrostatic Discharge (ESD)	ANSI C12.1, Test #28
23	Effect of Storage Temperature	ANSI C12.1, Test #29
24	Effect of Operation Temperature	ANSI C12.1, Test #30

Line No.	Descriptions of Certification Tests	Comments
25	Effect of Relative Humidity	ANSI C12.1, Test #31
26	Surge Withstand Capability	ANSI C37.90.1
27	Mechanical Shock	ANSI C12.1, Test #32
28	Transportation Drop	ANSI C12.1, Test #33
29	Mechanical Vibration	ANSI C12.1, Test #34
30	Transportation Vibration	ANSI C12.1, Test #35
31	Weather Simulation	ANSI C12.1, Test #36
32	Salt-spray	ANSI C12.1, Test #37
33	Rain Tightness	ANSI C12.1, Test #38
34	Sunlight Interference	ANSI C12.1, 6.3.6

II. CERTIFICATION TESTING REQUIREMENTS

This section describes the certification testing requirements for the qualification of utility-integrated and non-utility-owned submeters. The certification tests specified in Section I-3 shall be the responsibility of the submeter manufacturer and conducted by a 3rd-party laboratory recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and certified to perform accuracy tests as required in Section I.3. The UDC shall determine acceptance of the submeter upon review of the submeter's certification report. In addition, the UDC may also perform its own verification tests before acceptance of the submeter.

II.1. General

II.1.1. The submeter's metrology (metering components) shall have an accuracy class of 0.5% or better and may be certified as a current class of 200.

II.1.2. The submeter shall be tested in a laboratory as a complete unit with the charging cord attached. The burden resistance from any component, including phantom loads of the EVSE, shall not be registered as part of the energy delivered at the end of the charging cord output to maintain an accuracy class of 0.5% or better.

II.1.3. Complete certification testing is required for new and future design changes that affect the form, fit, or function of a submeter. If an incremental hardware change or changes are made to an approved submeter, applicable tests shall be performed to assure the modified submeter meets the certification testing requirements as stated in this section.

II.1.4. Notify the UDC of any metrology firmware changes and provide proof of acceptance as required by the UDC. The UDC must be notified of any firmware change 90 days in advance.

II.1.5. The manufacturer shall provide a certified test report documenting the tests and their results to the UDC. The test report shall be signed by the appropriate manufacturer representative(s) and shall include appropriate charts, graphs, and data recorded during testing.

II.1.6. No submeter shall be used for billing purposes before all tests, as outlined in this section, are conducted and certified test report documentation is provided to the UDC.

II.1.7. Submeters selected for certification testing must be representative of production-run submeters and must meet all applicable FCC regulations.

II.1.8. The following tests shall be conducted in sequence as specified in Section I.3: Insulation, Voltage Interruptions, Effect of High Voltage Line Surges, Effect of Fast Transient/Burst, Effect of Electrostatic Discharge, Effect of Operating Temperature, Effect of Relative Humidity, and Surge Withstand Capability. Other tests required may be done either in parallel or in sequence with the same submeter or a separate group of submeters; however, with the understanding that the same submeters must be used for all test procedures within each numbered test.

II.1.9. All test submeters shall be kept as a certification proof for one year after the conclusion of the testing. These test submeters shall be made available during this period for inspection, if requested.

II.1.10. Submeters that fail during the test shall not be repaired or tested further but can be analyzed to identify the cause of failure.

II.1.11. When the test submeters fail to meet any certification test requirements and after any correction is made on the new test submeters, all tests shall be re-started with the new test submeters.

II.1.12. A minimum of 6 submeters, specific to unique hardware/software specifications with the EVSE, shall be subjected to each test for certification. Test results shall be based on and reported for all submeters tested.

II.2. Submeter Failure Definition

A submeter shall be designated as failed if any of the following events occur during or after any certification test:

II.2.1. Failure of the submeter to perform all functions as specified due to hardware, firmware or software, or a combination thereof.

II.2.2. Failure of the submeter to meet the fundamental technical performance specifications as specified by the manufacturer. The fundamental performance must include safety, accuracy and reliability of the submeter, and any other functions included in the submeter.

II.2.3. Signs of physical damage as a result of a test.

II.2.4. The occurrence of a loss of data or other unacceptable mode of operation for the submeter as a consequence of a test.

II.3. Certification Rejection Criteria

The submeter certification will be rejected if any of the following events occur:

II.3.1 The submeters fail the certification tests as described in ANSI C12.1-2014, 4.6.2.2.1 and in Table II.3.1-a below:

Table II.3.1-a: Table of failures based on Meter Products tested

# Meter Products Tested	Failures in different tests individually			
	0	1	2	3 or more
3				
4			FAIL	
5				
6				
7	PASS			
8				
9 or more				

The following examples explain how to apply Table II.3.1-a. Also, reference to "the series tests" in this paragraph means tests must be performed in the series manner as specified in Section II.1.8., and reference to "the parallel tests" means testing is not required to be performed in any particular sequence (either series or parallel).

Example 1: If 3 submeters are selected for the series testing and one failure occurs in any test procedure, the submeter certification will be rejected, and the entire eight-series tests will start over from the beginning.

Example 2: If 9 submeters are selected for the series tests and the first, second, and third failures occur separately in three different tests or test procedures, the submeter certification will be rejected. An example of the failures described can be a failure of the first submeter during one test procedure, a failure of a second submeter during another test procedure, and a failure of a third submeter during another test procedure different from the tests that the first two submeters have failed previously. Once such failures occur, the entire eight-series tests will be started over from the beginning.

However, if 3 submeters are selected for a parallel test performed concurrently with the 9 submeters selected for the series tests, the rejection criteria for the 3 submeters tested in a parallel test shall not apply to the 9 submeters tested in series, or vice versa. In addition, if a group of submeters tested in a parallel test(s) fails according to the rejection criteria, only the particular failed test(s) needs to be repeated.

II.3.2. The failure of two or more submeters during the same test procedure.

II.4. Test Setup

II.4.1. The submeter shall be connected to its normal operating supply voltage and shall be energized throughout the duration of the test procedures, unless otherwise stated.

II.4.2. Before testing commences, if necessary, the submeter shall be energized for a reasonable period at room temperature to ensure normal operation of the submeter.

II.4.3. Testing for Effects of Operating Temperatures shall be defined as +85° C = T oper-max and -20° C = T oper-min.

III. SECURITY HARDWARE AND LABELING

Sealing and locking hardware is required by the utility for utility-owned, separate submeters. Embedded submeters shall have either security screws, provisions for wire seals, tamper-evident stickers, or tampering alarms from the submeter's communication network.

New submeters shall have permanent and weatherproof labeling on the EVSE exterior with the manufacturing date. Manufacturing date will be established in the Submeter Service Request. In addition, the Submeter shall have, at a minimum, the following labeling:

- Submeter Identification Number
- Operating Voltage Rating
- Current Class
- Rated Current
- Test Amps
- FCC ID
- Communication Information (as applicable)

CHAPTER B. SUBMETER DATA COMMUNICATIONS

I. SUBMETER COMMUNICATION REQUIREMENTS

This section defines minimum requirements for communication pathways and security for transmitting meter data between 3rd-party MDMAs and non-utility-owned submeters. Utility-owned submeters, whether separated or integrated, shall use the current utility AMI or cellular network.

I.1. Network Parameters

The minimum network parameters shall be:

- Raw data throughput rate of 100 kbps
- Frequency band up to 5 GHz

I.2. Communication Security

Communication pathways shall comply with the following standards/protocols:

- Advanced Encryption Standard (AES), minimum 128 bit
- Transport Layer Security (TLS), minimum version 1.2.
- National Security Agency (NSA), Suite B

I.3. Communication Functions

Submeter communication functionalities shall include, at a minimum, the following events / flags:

- Voltage out of range
- Leg out
- Partial interval
- Time drift
- Network connectivity / reliability
- Power outage / restoration

Events / flags shall be compliant with ANSI C12.19 specifications.

I.4. Local Submeter Read

All submeters shall have a means to access raw stored meter data when a manual read is necessary (if the submeter communication system fails, for example) or when retrieved by the customer. In addition to a submeter communication system failure, the submeter must be capable of storing raw and cloud interval data for a minimum of 90 days.

CHAPTER C. BILLING AND OBLIGATIONS

I. SUBMETERING FOR RETAIL SUBTRACTIVE BILLING

EV charges shall be rendered for the same billing period as that of the UDC's electric bill. EV charges shall only be for the EV charging load. The UDC will perform subtractive billing using the submeter usage and the primary meter to bill the customer for their EV usage, as measured by the submeter, under their applicable EV rate, and all other consumption under the primary meter's applicable rate. In addition, the interval size of the EVSE submeter must match the interval size of the primary meter.

II. OBLIGATIONS

For utility-owned submeters, the UDC will perform all functions as the submeter's MDMA. For non-utility-owned submeters, the roles and responsibilities of the non-utility submeter owner, or its 3rd-party MDMA, and the UDC are:

Non-utility Submeter Owner or 3rd-party MDMA:

1. Collect and transmit the submeter usage to the UDC
2. Have approval as an MDMA to provide the UDC with the submeter usage data, as scheduled, in the required format in compliance with the Submeter MDMA Performance Requirements. Refer to the UDC for details of the Performance Requirements.
3. Be the single point of contact for all submeter data issues

UDC:

1. Receive submeter usage from the 3rd-party MDMA
2. Use the submeter usage to separately calculate the energy used for EV charging on the applicable EV rate and all other usage on the primary house meter's current rate. The accuracy of the bill depends on receiving timely and accurate information from the 3rd-party MDMA and the accuracy of the submeter.
3. Work with the 3rd-party MDMA and the customer to resolve any billing disputes.
4. Provide a summary bill reflecting all charges, including the submeter EV usage.

Late, incomplete, or inaccurate submeter usage information will be disregarded. As a result, any EV charging during those intervals will be billed at the primary meter's current rate.

CHAPTER D. SUBMETER DATA MANAGEMENT AND METER READING

I. DEFINITION OF SUBMETERING METER DATA MANAGEMENT AGENT (MDMA) BUSINESS FUNCTIONS

The utility will be the MDMA for submetering configurations where the utility owns the submeter, whether separate or integrated.

3rd-party MDMAs for non-utility-owned, embedded submeters must have approval as an MDMA and comply with the current UDC standards to perform the functions of a MDMA as specified in this Chapter. Refer to the UDC for MDMA approval processes.

I.1. UDC Roles

The UDC is responsible for providing billing services to the MDMA under contract and may provide metering and or interval data backhaul services to the MDMA.

The UDC, upon receiving submeter usage data from the MDMA, will perform validations, as described in Chapter D, Section VII.3, to ensure the validity and completeness of the submeter data.

I.2. MDMA Roles

At a minimum, the MDMA must:

1. Manage the submeter reading schedule
2. Read and retrieve submeter data
3. Submit and store meter data to MDMA server
4. Validate and edit the submeter data
5. Format data as specified by the UDC
6. Transfer data to UDC
7. Manage data on the MDMA server
8. Resolve submetering billing disputes
9. Manage submeter/device data (i.e., when the submeter device was installed, what the device type is, what the service history has been, what the service parameters of the submeter are, etc.)

I.3. MDMA Functions

At a minimum, the MDMA must:

1. Perform MDMA services subject to and in accordance with CPUC regulations and so indicate in the customer's submeter service request.
2. Read, validate, edit, and transfer data pursuant to Commission-approved standards.
3. Provide the UDC with reasonable and timely access to Meter Data as required to allow the proper performance of billing, settlement, scheduling, forecasting and other functions.
4. Retain customer consumption data for each submetering customer for a period of 36 months. Such data must be released to the customer upon request.
5. Confirm that the submeter and its reading system is working properly, and that the billing data gathered is valid.
    - Submeter interval data that fails loading into the UDC's MDMS will be written to an exception file and 3rd-party will be notified.
    - 3rd-party MDMAs must resend the data before the current billing cycle window closes.
6. Perform daily interval register reads, subject to network connectivity.
7. Ensure data is not estimated and 100% of all data will be available by the next billing cycle window.

II. MDMA TECHNICAL/BUSINESS SUPPORT TO CUSTOMERS AND THE UDC

For non-utility-owned submeters subject to a commercial relationship between the submeter owner and the submeter customer, upon request by the UDC, the MDMA at its sole cost will provide a technical help desk through a toll-free number and answer immediately during normal business hours to address questions and concerns on data availability, corruption and adjustments, and systems technical support. Other after-hours support can be deferred to the next business day.

III. CONFIDENTIALITY AND DATA SECURITY

The MDMA must ensure confidentiality agreements and data security measures comply with the requirements described in this section.

III.1. Confidentiality

The MDMA may have access to, or be provided with, the UDC customer and UDC confidential information. The MDMA must agree not to disclose or otherwise make available any confidential information to others, including any affiliate of the UDC that produces energy or energy-related products or services, without the UDC's written consent. The MDMA also must agree not to collect, use, retain or disclose personal information as defined in California Civil Code Section 1798.140(o) for any purpose other than in performing the work as an MDMA. The MDMA shall not sell personal information as defined in California Civil Code 1798.140(o) under any circumstances and comply with the California Consumer Privacy Act.

"Confidential Information" shall mean:

a) the Customer's personal identifiable information, energy use data, billing data, account information and information relating to their facilities, and equipment; and

b) information about the UDC employees and business operations, informational or technological practices, ratemaking, legislative matters, reports, strategies, analysis, specifications, designs, records, data, software programs, finances, computer models, trade secrets, and other documentation or information related to the UDC, its parent company, subsidiaries, affiliates, third parties, suppliers; and

c) any confidential information of any third party disclosing such confidential information to the UDC or Contractor in the course of such third party's engagement, business, or other relationship with the UDC or its parent, subsidiary, or affiliated companies,

d) Personal information as defined in California Civil Code 1798.140(o), and

e) UDC Data including, but not limited to,

- All data or information provided by or on behalf of the UDC, including, but not limited to, personally identifiable information relating to, of, or concerning, or provided by or on behalf of any Customers,
- All data or information input, transferred, uploaded, migrated, or otherwise sent by or on behalf of the UDC to the MDMA,
- Account numbers, forecasts, and other similar information disclosed to or otherwise made available to the MDMA by or on behalf of the UDC and Customers, and
- All data provided by the UDC's licensors, including any and all survey responses, feedback, and reports, as well as information entered by the UDC, MDMA, and Customers.

III.2. Data Security

1. MDMA must complete a UDC third-party security review.
2. MDMA must not use, disclose or allow access to customer data unless the customer consents, or unless the use of the customer data is for a UDC's business purpose, in order to deliver EV submetering services.
3. MDMA must not use, disclose or access the UDC's security sensitive data (including cybersecurity sensitive and physical security sensitive data, any part of the UDC's digital network or controls behind the UDC's firewall) unless the use, disclosure or access is for a UDC's business purpose, in order to deliver EV submetering services.
4. MDMA must not use, disclose or access the UDC's intellectual property, trade secrets, material financial information or plans, without the UDC's approval.

III.3. Utility-Specific Data Privacy Requirements

UDC tariffs govern the release of customer or energy usage data to third parties and protect the privacy and security of customer usage information. Customer data must be safeguarded by the UDC as required by California Assembly Bill No. 1274. These rules apply equally to all vendors that require the transfer or usage of customer Personally Identifiable Information (PII) or interval data.

For Southern California Edison, this information can be found at:

https://library.sce.com/content/dam/sce-doclib/public/regulatory/tariff/electric/rules/ELECTRIC_RULES_25.pdf
https://library.sce.com/content/dam/sce-doclib/public/regulatory/tariff/electric/rules/ELECTRIC_RULES_26_.pdf

For PG&E, this information can be found at:

https://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_RULES_25.pdf

https://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_RULES_27.pdf

https://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_RULES_27.1.pdf

For SDG&E, this information can be found at:

http://regarchive.sdge.com/tm2/pdf/ELEC_ELEC-RULES_ERULE33.pdf

http://regarchive.sdge.com/tm2/pdf/ELEC_ELEC-RULES_ERULE34.pdf

IV. SUBMETER DATA TRANSFER (MDMA to UDC)

Submeter data shall be supplied from the MDMA to the UDC MDMS using the appropriate means of data transfer compliant with the Electric Data Interchange (EDI) and the PEV Profile of the Energy Service Provider Interface (ESPI) data format. ESPI is a North American Energy Standards Board (NAESB) standard with its purpose to standardize the interface for Energy Usage Information (EUI) sharing between a customer's designated data custodian (i.e. UDC) and an authorized 3rd-party MDMA.

IV.1. MDMA Involvement in Submetering Communications

MDMA submetering communications must meet specific criteria including:

1. Certification of communications of meter data transfer
2. Agreement on data transfer methods as specified by the ESPI standard (push by MDMA or pull by UDC)
3. Agreement with UDC Terms & Conditions
4. Data privacy

IV.2. Utilization of ESPI to Transfer Customer Data to MDMAs

As the CPUC Data Privacy Mandate requires access to EUI by third-party vendors using ESPI as the standard interface, the transfer of customer data shall conform to CPUC customer privacy rules. ESPI utilizes the OAuth scheme, which provides a process for end-users (submetering customers) to authorize third-party access to their server resources (e.g., to authorize an MDMA to share its submetering data with the UDC) without sharing its credentials (typically, a username and password pair), using user-agent redirections. OAuth uses request and access tokens for 3rd-parties and customers. An example of a typical OAuth customer flow would conform to the following sequence (TBD):

1. Customer logs into its UDC account with its username and password.
2. Customer chooses its submeter MDMA and allows access to its data (UDC would contact 3rd-party. UDC and 3rd-party must have their own existing arrangement to share data.).
3. The customer is then redirected to 3rd-party site and enters username/password (temporary credentials now become associated with Premises Owner and can be used by the UDC to obtain 3rd-party data belonging to the Premises Owner).
4. Customer directs 3rd-party to provide EUI to UDC at specific intervals or on demand.
5. Customer must periodically renew its authorization (credentials have a lifetime – if it is long, the UDC does not need reauthorizing regularly).

Security shall comply with NAESB REQ.21 such that "All information exchanged by ESPI should be secure in accordance with the security recommendations referenced herein. Such recommendations are subject to the relevant Governing Documents and any requirements of the Applicable Regulatory Authority [REQ.21.3.1.6]".

3rd-parties' use of ESPI/Green Button must be tested and certified by the Certification Authorities (CAs) before implementation.

IV.3. Further Information

The ESPI standard can be found at: http://www.naesb.org/ESPI_Standards.asp.

OAuth details are found at: http://tools.ietf.org/html/rfc5849.

Certification, testing, and further information can be found at:

http://osgug.ucaiug.org/sgsystems/OpenADE,and https://www.nist.gov/el/smart-grid/hot-topics/green-button-initiative

V. VALIDATING AND EDITING

The 3rd-party MDMA will be responsible for performing quality checks on the raw data retrieved from the submeters. The quality checks must include validating and editing the usage data.

V.1. Validating and Editing Data

The minimum required interval data validations are:

- Spike Check
- High Average Daily Usage Check
- Sum Check
- Hardware Checks

Editing shall be limited to resending validated data, when applicable, within the current billing cycle window.

For a complete description and how to perform validation and editing checks, contact the UDC for documentation on the CA VEE Rules.

V.2. UDC Validation of MDMA Submeter Usage Data

In addition to validations being done by the MDMA, the UDC, upon receiving submeter usage data from the MDMA, will perform validations to verify the validity and completeness of the submeter data, including, but not limited to:

1. Associated customer metadata (i.e. account number, meter number) is correct
2. Number of intervals present matches number of intervals expected
3. Time stamps of data file are accurate and match billing window
4. The unit of measure is correct
5. The submeter usage data does not exceed the primary meter usage data for any interval

If the file fails any of the above checks, the file will be rejected and not used for billing purposes. The MDMA will be notified of the rejection and will have the timeline, established with the UDC, to send corrected actual usage data. Otherwise the primary meter data will be used for billing.

CHAPTER E. SUBMETER INSTALLATION, MAINTENANCE, FIELD TESTING & CALIBRATION

I. SUBMETER WORKER QUALIFICATIONS

Where the UDC is the submeter owner, the UDC will determine who shall perform the installation, maintenance, and testing of the submeter.

For non-utility-owned embedded Submeters, the MDMA must certify that installers possess a general electrical contractor's license issued by the Contractors' State License Board and verified by the UDC.

The MDMA must use installers who possess such a license because the installation and removal of any PEV equipment is subject to the Contractors' State License Law. A contractor is defined as anyone who adds materials to, repairs, or subtracts materials from a structure or premises. (Bus. & Prof. Code Section 7026.) An electrical contractor's license is appropriate because of the electrical voltage that is present.

In addition, the MDMA must have qualified electrical technicians to test and re-calibrate the embedded submeter using testing equipment traceable to NIST.

The MDMA may also request the UDC to resolve submeter issues and perform submeter accuracy testing for a service fee charged to the MDMA.

II. MAINTENANCE SCHEDULE

The maintenance schedule for UDC owned submeters shall be determined by the UDC.

For non-utility-owned embedded submeters, a sampling plan compliant with ANSI Z1.4 or Z1.9 Standards shall be submitted by the submeter's MDMA to the UDC for approval. The MDMA must also ensure the submeter's network connectivity is periodically tested and maintained.

III. NEW SUBMETER INSTALLATIONS

A new submeter installation is defined as a submeter service, downstream of the UDC main service meter, installed for the first time and approved by the local AHJ.

For non-utility-owned embedded submeters, the MDMA shall notify the UDC 30 days in advance to avoid delays for the UDC to issue an authorization to add a new EV submetering account in order to sync the UDC billing processes. If any coordination is required, the submeter's MDMA shall use best efforts in meeting the UDC schedule. After completion of the new installation, the EV submetering billing will become effective at the start of the next billing cycle.

IV. FIELD TESTING

The UDC will test the UDC-owned submeter for accuracy based on the UDC's current practices.

Non-utility-owned embedded submeters will be tested as a whole unit, with the charging cord attached, by a qualified electrical technician to ensure the operation and accuracy of the submeter is within the CPUC-required limits by performing the following:

1. Communication Test – Valid submeter network connectivity.
2. Light and Full Load Test – Light load is 10% of test Amp rating and full load is 100% of test Amp rating performed at 100% power factor.

When testing is initiated by the customer, the EVSE submeter owner's MDMA shall be responsible for fulfilling the customer's request.

V. TROUBLESHOOTING & CORRECTIVE ACTIONS

The UDC shall not be responsible for troubleshooting hardware or network connectivity when the submeter is not owned by the UDC. For non-utility-owned submeters, the customer shall contact the submeter's MDMA or the EVSE manufacturer for troubleshooting and corrective actions.

Where the UDC owns the EVSE submeter, the UDC will maintain the submeter and the submeter's network connectivity to the UDC's AMI network. Any hardware not associated to the embedded submeter will be the customer's responsibility.

VI. FAILURE OF COMPLIANCE

Failure is defined as the circumstance wherein the apparent absence of appropriate usage data or testing, conducted by 3rd-party MDMAs, reveals non-conformance with submeter data and/or MDMA services.

Upon the occurrence of undisputed failure, the 3rd-party MDMA, responsible for the non-complying submeter and the MDMA service, must make corrections within 3 calendar days.

Failure to make corrections within 3 calendar days will result in the following sequential series of actions and penalties:

1. The UDC may remediate hardware or network failure at the 3rd-party's expense.
2. Upon a demonstrated pattern of non-conformance, as defined below, and failure to timely cure, the UDC may give written notice of such non-conformance to the 3rd-party, and, after 5 days, default billing to the UDC primary meter
3. Demonstrated pattern of non-conformance by a 3rd-party MDMA is defined as when more than 1% of the service accounts served by a 3rd-party MDMA, or 5 accounts, whichever is greater, are found to be non-conforming and are not remediated during the first 6 months of submetering participation; and when more than 0.5%, or 3 accounts, whichever is greater, are found to be non-conforming and are not remediated during any 6 consecutive months thereafter. The UDC may terminate any 3rd-party MDMA that has a demonstrated pattern of non-compliance.

GLOSSARY OF TERMS AND ACRONYMS

I. GLOSSARY OF TERMS

Adjustment: Any change to a customer's usage data made to correct an error in the original data.

End-Use Customer: A customer that takes final delivery of electric power and does not resell the power

Estimated data: Usage or demand data that has been calculated based on standard estimation rules

Interval data: Metered end-use data from a meter capable of recording actual energy usage for each time interval (e.g., hour, half-hour, etc.) during the billing cycle

Meter Data Management Agent (MDMA): An entity, which may be an existing Customer of Record or a 3rd-party responsible for establishing a subtractive billing arrangement with the UDC for the purpose of billing EV usage for electricity recorded on a 3rd-party-owned submeter, and for providing the submeter data to the UDC for billing purposes.

National Standards: Open standards as adopted by a standards body accredited to a national standards body; in the U.S., ANSI Standards.

Open Standards: Voluntary standards which are: (1) developed in an open forum, (2) sanctioned by an official standards body, (3) vendor-neutral, and (4) readily available to the public at a reasonable cost

Submeter: A device that measures and registers the integral of an electrical quantity with respect to time.

VEE: Validating, Editing, and Estimating. Validation is the process of performing standardization validation checks on usage and demand data. Estimating is the process of using standard estimation rules to calculate usage or demand data. Editing is the process of inserting estimated values into a validated data stream that has errors, gaps or omissions.

II. ACRONYMS

AES: Advanced Encryption Standard

AHJ: Authority Having Jurisdiction

ANSI: American National Standards Institute

AMI: Advanced Metering Infrastructure

CA: Certification Authority

CPUC: California Public Utilities Commission

ESPI: Energy Service Provider Interface

EUI: Energy Usage Information (used in ESPI to reference customer energy usage data)

EV: Electric Vehicle

EVSE: Electric Vehicle Service Equipment

EVSMP: Electric Vehicle Submetering Protocol

FCC: Federal Communications Commission

MDMA: Meter Data Management Agent

NAESB: North American Energy Standards Board

NEC: National Electrical Code

NIST: National Institute of Standards and Technology

NRTL: Nationally Recognized Testing Laboratory

OIR: Order Instituting Rulemaking

PG&E: Pacific Gas and Electric

SCE: Southern California Edison Company

SDG&E: San Diego Gas and Electric Company

TLS: Transport Layer Security

UDC: Utility Distribution Company

VEE: Validating, Editing and Estimating