California Public Utilities Commission Submetering Protocol Roadmap Development Update

December 16, 2011

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As Directed by Alternative-Fueled Vehicle Proceeding R.09-08-009, Decision 11-07-029
Ordering Investor-Owned Utilities To Develop Protocols
To Support The Use Of Customer-Owned Submeters
For Use In Billing EV Load

Pacific Gas and Electric Company

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

SDGE
A Sempra Energy utility

A Product of the AFV-OIR Submeter Protocol Working Group

WELCOME

Welcome

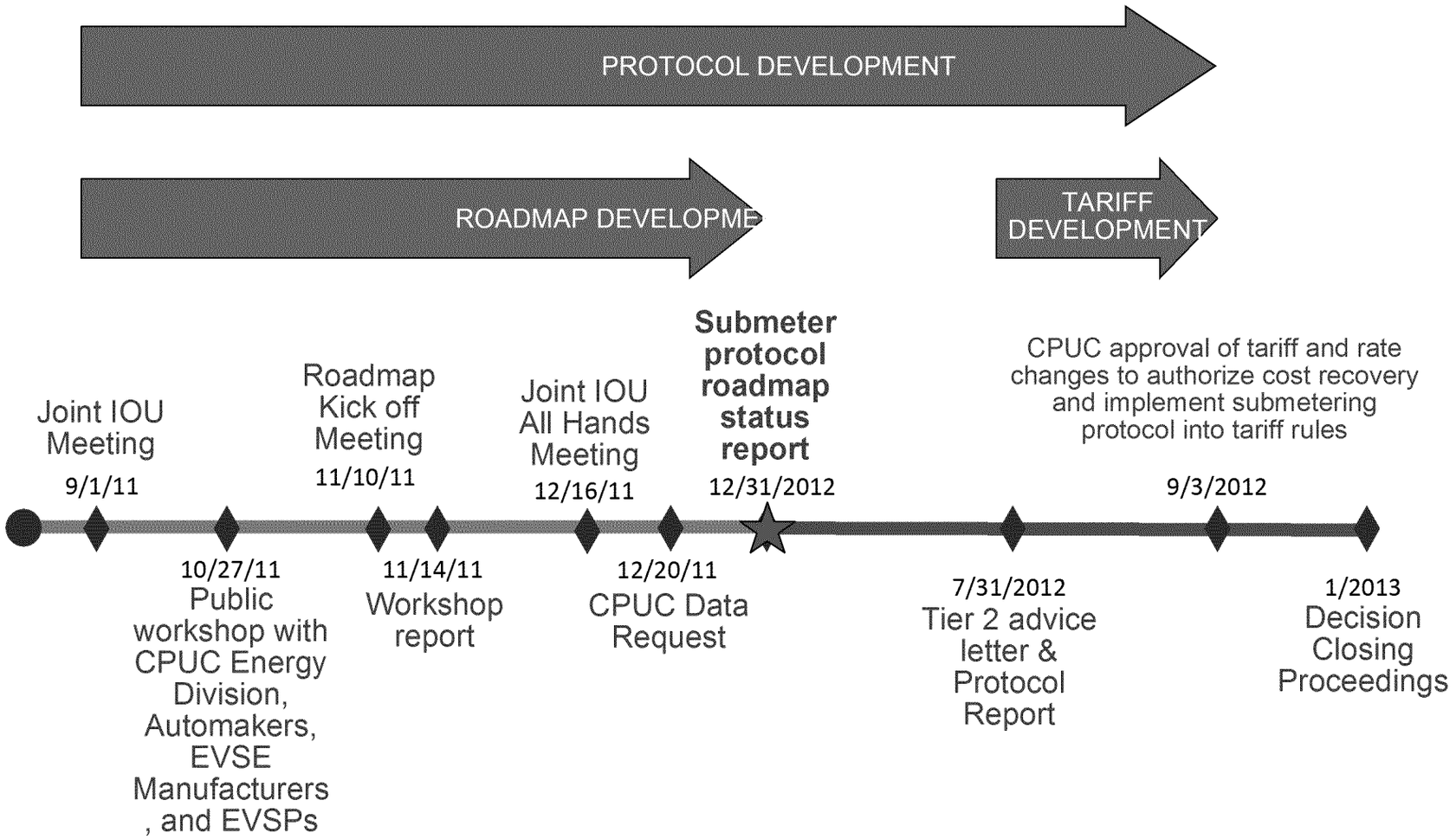
- **Meeting Purpose and Objectives**

  Provide a status update of the joint stakeholder effort to develop a submetering protocol roadmap for the CPUC.

  In today's meeting we will review and discuss:

  - Submetering Protocol background and status
  - Various Use Cases identified by the working teams
  - Issues still to be resolved/clarified
    - Cost Recovery, Billing & Regulatory Requirements
    - Technical Requirements, Compliance, and Standards
    - Communication Functionality, Standards, and Security
    - Market Participation/Development
  - Preliminary Roadmap
  - Closing and Next Steps

CPUC Submetering Protocol Timeline



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Welcome

- **Joint-IOU submeter protocol report must address the following issues:**
  - Use of submeters in various locations
  - Technical performance requirements for submeters
  - Minimum communication functionality and standards
  - Support and protect the security and privacy of EV user data collected by utilities and third party entities
  - Methodology for settling disputes
  - Compliance with national standards for measurement and communication functions
  - Rules for incorporating subtractive billing into submetering tariffs.

Welcome

- **Report on Activity Since November 10 Kickoff**
  - Filed a Joint IOU workshop report on November 14 to memorialize the workshop
  - Formed four teams made up of more than 100 utility, State of California, and 3rd party organizations to develop a submetering protocol roadmap due December 31
  - Held 5 weeks of team meetings to discuss submetering requirements and open issues
  - Provided initial input on consolidated submetering requirements and issues to address the 7 guidelines of the protocol
  - Responded to a CPUC Data Request
  - Began to analyze the feasibility of various use cases identified
  - Began draft reviews of the IOU protocol roadmap report

TEAM PRESENTATIONS

Team Presentations

Description of Use Cases

- **Use Cases 1 - 16**

Still in Progress

Team Presentations

Billing & Regulatory Requirements

- **Relevant CPUC regulatory and legal issues**

Still in Progress

Team Presentations

Billing & Regulatory Requirements

- **Summary of Required Action Steps, Responsibility, and Time Estimates**
  - Amend tariffs or develop new rules
    - Identify needed tariff provisions – e.g., registration, enrollment, billing arrangements, fees, dispute resolution, technical performance, eligibility, etc. – implied by the protocol
    - Modify tariffs (rate schedules and rules) or create a new tariff (a new rule with reference to a technical protocol, or other solution) to align with approved Protocol
    - Develop any new technical protocol documents via working process as well as new forms to file with Commission
    - File Tier 2 Advice Letter
  - Anticipate and avert – to the extent possible – challenges caused by the complexity of customer-MSP-utility relationships
    - Define roles and responsibilities, rights and obligations, and performance expectations
    - Identify, describe, and develop mitigation steps for anticipated disputes
    - Identify and describe incremental infrastructure needed to address disputes
    - Review adequacy of existing rules and file new rules as necessary

Team Presentations

Billing & Regulatory Requirements

- **Summary of Required Action Steps, Responsibility, and Time Estimates**
  - Anticipate and avert – to the extent possible – challenges caused by the complexity of submetering data collection and subtractive billing for DA and CCA customers
    - Identify rights and obligations of DA customers, CCA customers, and MSPs
    - Expand dispute resolution approaches and steps to address DA and CCA customers
  - Anticipate and avert – to the extent possible – challenges caused by the complexity of combining submetering and NEM services, determining:
    - The technical and regulatory feasibility of combining NEM and submetering services.
    - Measurement needed to integrate NEM and PEV Submetering
    - Tariff requirements resulting from integration
    - Technology capabilities needed to process integrated billing
    - Expand dispute resolution approaches and steps to address NEM customers

Team Presentations

Billing & Regulatory Requirements

- **Summary of Required Action Steps, Responsibility, and Time Estimates**
  - Establish requirements for certification of Data Management Agents providing data for billing purposes
    - IOUs provide recommendations based on Direct Access experience
    - MSPs define requirements and implement policies and procedures
    - CPUC and CDFA/DMS do not have authority in this area
  - Utilities must determine how to recoup incremental costs associated with submetering
    - Identify incremental metering, billing, customer service, and information system costs associated with submetering and submetering by DR, DA, CCA, and NEM customers
    - Identify capital and O&M investments associated with new requirements, and determine whether submetering-related costs are:
      - Incremental or already accounted for in the GRC
      - Overlapping with costs included in MSP business models

Team Presentations

Billing & Regulatory Requirements

3rd Party questions / issues to be determined in or out of scope of protocol development

Question / Issue	Recommendation / Decision	Identified By
Is incorporating Demand Response controls and capabilities into the Submetering Protocol in scope?	Not included in scope of OIR. Determine the necessary steps to implement DR load controls from the technical (standards / communications) and regulatory perspectives for inclusion in future use cases.	Sustainable Unlimited Mobility, Project Green On Ramp & Community Renewable Solutions
Is incorporating Net Energy Metering (NEM) into the Submetering Protocol in scope?	Not included in scope of OIR. Additionally, current net metering process and technology is not sufficient to provide direct PV to PEV measurement	Sustainable Unlimited Mobility, Project Green On Ramp & Community Renewable Solutions
Quick Charge / DR Research - QC installations would be highly desirable to implement as submetered installs	Not included in scope of OIR. Additionally, US standards for quick charge plug not yet developed. Retain for consideration in 2012 Protocol Development Process	Sustainable Unlimited Mobility, Project Green On Ramp
Could there be submeters on submeters, as in mobile home park residents charging EVs?	Not included in scope of OIR. Retain for consideration in 2012 Protocol Development Process	Sustainable Unlimited Mobility, Project Green On Ramp
Should the roadmap report address potential grid savings resulting from the use of submeters to record and communicate EV charging loads?	Not included in scope of OIR. Retain for consideration in 2012 Protocol Development Process	Sustainable Unlimited Mobility, Project Green On Ramp
Will this protocol look at Vehicle to Grid capabilities?	Not included in scope of OIR. Retain for consideration in 2012 Protocol Development Process	Sustainable Unlimited Mobility, Project Green On Ramp

Team Presentations

Billing & Regulatory Requirements

- **Discussion**
  - Complete?
  - Correct?
  - Reasonable?
  - Recommendations?

Team Presentations

Submetering Technical Requirements, Compliance, and Standards

- **Summary of Required Action Steps, Responsibility, and Time Estimates**
  - Develop technical performance and functional design requirements and standards
    - IOUs define in functional design requirements documentation the configuration, usage, and billing parameters necessary to support submetering and subtractive billing, including:
      - Format of usage information
      - Percent error tolerance
      - Submeter/utility meter time and date synchronization methods
      - Local meter reading requirements
      - Meter data estimation requirements
    - CDFA/DMS assumes responsibility for adopting specifications and establishing requirements, with technical support from IOUs and MSPs
    - MSPs assume responsibility for implementation of technical requirements, compliance, and standards

Team Presentations

Submetering Technical Requirements, Compliance, and Standards

- **Summary of Required Action Steps, Responsibility, and Time Estimates**
  - Establish processes to certify and audit submeters and related submetering equipment and sites
    - CDFA/DMS develops certification and audit processes and policies, including:
      - Sampling
      - Testing
      - Recertification
      - How submeter manufacturers can self-certify the submeter
      - How accuracy audits can occur with submeters embedded in other equipment
      - How EVSE, cordset, and automaker submeter manufacturers submit:
        - » New meter types for initial certification
        - » New products as sold to County Weights and Measures
        - » Operating submeters for re-certification
    - IOUs provide functional design requirements documentation
    - IOUs and MSPs provide technical support

Team Presentations

Submetering Technical Requirements, Compliance, and Standards

- **Summary of Required Action Steps, Responsibility, and Time Estimates**
  - Establish requirements for installation, maintenance, and testing of submeter and related equipment compatible with utility meter usage data
    - IOUs provide direction to MSPs on key requirements and how to work effectively with utilities, including recommendations for:
      - De-energizing circuits during submeter installation
      - -Associating each submeter with a particular premises meter/account and network (registration) in fixed and mobile meter scenarios
      - Establishing communication between submeter and premises meter
    - MSPs assume responsibility for defining and implementing submeter and related equipment installation, maintenance, and testing requirements, including determining how to:
      - Obtain data for verification purposes
      - Recognize when a meter is out of tolerance
      - Fix/update submeter software, firmware, and hardware
      - Handle reconfigurations based on changes in utility rates and programs
      - Test and verify submeter testing equipment

Team Presentations

Submetering Technical Requirements, Compliance, and Standards

- **Summary of Required Action Steps, Responsibility, and Time Estimates**
  - Establish requirements for certification of submeter workers/providers
    - IOUs provide recommendations for worker requirements
    - DMS develops guidelines
    - MSPs develop and implement worker training, certification, and auditing processes and content

Team Presentations

Submetering Technical Requirements, Compliance, and Standards

- **Summary of Required Action Steps, Responsibility, and Time Estimates**
  - Establish requirements to address safety risks for customers, workers, and equipment
    - MSPs map existing standards to the type of device based on electrical and connection parameters
    - -CDFA/DMS establishes equipment safety requirements
    - Building code departments establish installation safety requirements
  - Establish requirements for submeter reliability
    - CDFA/DMS and CCWM collaborate with submeter manufacturers on:
      - Developing a reliability statement and parameters specifying requirements for submeter accuracy throughout its expected life
    - CDFA/DMS and CCWM also:
      - Investigate whether meter recertification should be more often than 10 years
      - Build reliability requirements into CDFA/DMS testing, certification, and auditing policies and procedures

Team Presentations

Submetering Technical Requirements, Compliance, and Standards

- **Key Issues, Conclusions, and Decisions**
  - Significant collaboration between the IOUs, submeter manufacturers, automakers, and California inspection and certification authorities will continue throughout the submetering protocol development process, with:
    - IOUs providing technical requirements, guidelines, recommendations, and support to MSPs, CDFA/DMS, and CCWM offices
    - CDFA/DMS and CCWM offices developing equipment accuracy, reliability, installation, testing equipment, worker, and safety requirements based on both IOU and MSP input
    - MSPs engineering functionality and building equipment meeting the requirements of CDFA/DMS and CCWM and factoring in the recommendations of the IOUs

Team Presentations

Submetering Technical Requirements, Compliance, and Standards

- **Key Issues, Conclusions, and Decisions**
  - To future-proof submeter designs, functionality should include:
    - Bi-directional capabilities enabling vehicle-to-grid functionality
    - Demand response capabilities enabling load control
    - NEM capabilities enabling the combined measurement of self-generation and battery charging
    - Remote firmware and configuration update capabilities
  - CDFA/DMS and CCWM have not in the past worked with time of use submeters, submeters embedded in other equipment, or submeters relying on remote communication
    - Putting the required certification, testing, auditing, and recertification requirements, processes, and policies could take a considerable amount of time

Team Presentations

Submetering Technical Requirements, Compliance, and Standards

- **Discussion**
  - Complete?
  - Correct?
  - Reasonable?
  - Recommendations?

Team Presentations

Submetering Communication Functionality, Standards, Security

- **Summary of Required Action Steps, Responsibility, and Time Estimates**
  - Establish an interface between MSPs and utilities to share 3rd party submetering data for billing purposes
    - EV profile will be drafted within Communications team and provided to OpenSG OpenADE
    - Develop 3-way submetering contract for 3rd party submetering
      - The actual three-way contract is most likely to be implemented via a web-portal and should include agreements, disclaimers etc. and stored electronically with the Data Custodian (Data Custodian needs to be determined).
      - What is the role of the communications team vs Billing/Regulatory to set requirements, write up contracts (Terms and Conditions)?
    - Identify requirements for revisions to ESPI (e.g., advanced use cases)?
    - Facilitate the implementation of an ESPI submetering profile on utility and MSP systems
    - Ensure testing, certification, interoperability, security
      - Scope of team related to testing, certification, and security/privacy TBD

Team Presentations

Submetering Communication Functionality, Standards, Security

- **Summary of Required Action Steps, Responsibility, and Time Estimates**
  - Participate in UCAIug and OpenSG OpenADE committees and activities to maximize time and efforts
    - ESPI conformance certification and interoperability
    - Interoperability testing
    - Test plan and requirements
    - Other necessary submetering profile work (requirements identification, revisions, etc.)
  - Communication standards for submeters
    - Define which use cases could involve standardized communications
    - Determine how requirements defined, put in place, and enforced (contractual agreements, privacy and security, certification, etc.)

Team Presentations

Submetering Communication Functionality, Standards, Security

- **Summary of Required Action Steps, Responsibility, and Time Estimates**
  - Establish mechanisms to assure privacy and security of customer and energy consumption data, determining:
    - Who owns the "global effort" of ensuring data security
    - What level should be attained (e.g., HIPAA, PCI credit cards)
    - Responsibility and where this work should be completed
    - Whether existing standards available or in place are sufficient
    - Other (Liability, connection to ongoing CPUC work, scope, etc.)

Team Presentations

Submetering Communication Functionality, Standards, Security

- **Key Issues, Conclusions, and Decisions**
  - Developing communication functionality for the submetering protocol is best served by leveraging existing standards and standards development organizations, including…
    - NAESB ESPI
    - OpenSG OpenADE
    - UCAIug
    - Oauth

    …as well as benchmarking functionality and security approaches used in other industries:
    - HIPAA
    - PCI

Team Presentations

Submetering Communication Functionality, Standards, Security

- **Discussion**
  - Complete?
  - Correct?
  - Reasonable?
  - Recommendations?

PRELIMINARY ROADMAP

Preliminary Protocol Development Roadmap

- **High-Level Approach**
  - Phase 1 – Define/Plan for the protocol
    - Define the Submetering Protocol Roadmap
      - Goals, objectives, scope, guidelines
      - List of Issues and/or Requirements and Preliminary Recommendations
      - Key tasks or activities and timing for each
      - Responsible organizations and individuals for each
    - Complete and submit the Submetering Roadmap Report
  - Phase 2 – Design/Develop California Submetering Protocol
    - Need to complete market assessment and cost effectiveness criteria regarding 3rd party product, service, market plans, and customer needs
    - Based on market assessment and cost-effectiveness critieria, choose preferred use case(s) and:
      - Develop business requirements and specs for utilities, customers and 3rd party meter service providers
      - Develop technical, security, privacy requirements, specs, and standards aligned with national standards
      - Develop architectural design for end-to-end systems (including back office integration)

Preliminary Protocol Development Roadmap

- **High-Level Approach (continued)**
  - Phase 3 – Obtain CPUC Authorization and Cost Recovery to Build Interim Solution During EV Market Development Period (2013- 2016)
    - Build, test, and refine the necessary processes, systems, and system interfaces
    - Pursue development of national standards for submeters and subtractive billing
    - Establish tariff governing utility, customer, and 3rd party meter service providers
    - Develop certification process for 3rd party devices, systems, processes
    - Develop and carry out customer information campaign
  - Phase 4 – Build Scalable Long-Term Solution to Support Mature EV Market (Post- 2015) Consistent with Other IOU Smart Grid Functionality
    - Upgrade utility systems to handle automated, standardized communications and billing services if supported by EV market participants

Key Objectives and Activities Planned for Protocol Development

(Sequencing and timing to be determined)

Establish requirements for submeter accuracy and reliability
- IOUs define submeter configuration, usage, and billing parameters
- IOUs deliver functional design requirements documentation
- CDFA/DMS, CCWM, MSPs collaborate on requirements

Establish requirements to address safety risks for customers, workers, and equipment
- MSPs map existing standards to their devices
- CDFA/DMS develops guidelines for equipment
- Building code departments develop guidelines for installation

Establish requirements for installation, maintenance, and testing of submeter and related equipment compatible with utility meter usage data
- IOUs provide direction to MSPs on key requirements and how to work effectively with utilities
- MSPs define and implement submeter and related equipment installation, maintenance, and testing requirements

Establish requirements for certification of submeter workers/providers
- IOUs provide recommendations
- CDFA/DMS develops guidelines

Anticipate and avert – to the extent possible – challenges caused by the complexity of customer-MSP-utility relationships (prior to 9.5.12 filing)
- Define roles and responsibilities, rights and obligations, and performance expectations
- Identify, describe, and develop mitigation steps for anticipated disputes
- Identify and describe incremental infrastructure needed to address disputes
- Review adequacy of existing rules and file new rules as necessary

Anticipate and avert – to the extent possible – challenges caused by the complexity of submetering data collection and subtractive billing for DA and CCA customers
- Identify rights and obligations of DA customers, CCA customers, and MSPs
- Expand dispute resolution approaches and steps to address DA and CCA customers

Anticipate and avert – to the extent possible – challenges caused by the complexity of combining submetering and NEM services
- Determine the technical and regulatory feasibility of combining NEM and submetering services.
- Determine measurement needed to integrate NEM and PEV Submetering
- Determine tariff requirements resulting from integration
- Determine technology capabilities needed to process integrated billing
- Expand dispute resolution approaches and steps to address NEM customers

Establish requirements for certification of Data Management Agents providing data for billing purposes
- IOUs provide recommendations based on Direct Access experience
- MSPs define requirements and implement policies and procedures
- CPUC and CDFA/DMS do not have authority in this area

Identify needed communication standards for submeters
- Define which use cases could involve standardized communications

Develop an interface between MSPs and utilities to share 3rd party submetering data for billing purposes while assuring privacy and security of customer and energy consumption data
- Determine ESPI security requirements
- Determine who owns the "global effort" of ensuring data security
- Determine the needed level of security to be attained (HIPAA, PCI, credit cards?)
- Determine responsibility and where this work should be completed
- Determine whether existing standards available or in place are sufficient
- Identify requirements for revisions to ESPI (e.g., advanced use cases)?
- Draft EV profile within Communications team and shared with OpenADE for verification
- Develop 3-way "web-based tool" to authorize 3rd party submetering

Complete testing, certification, interoperability, security

Implement ESPI submetering profile on utility and EVSP systems

Achieve ESPI conformance certification and interoperability
- Participate in UCAIug and OpenSG OpenADE committees

Complete interoperability testing

Establish processes to test, certify, and audit submeters and related submetering equipment and sites, installation, and workers
- CDFA/DMS adopts submeter specifications, and establishes requirements
- CDFA/DMS develops testing, certification and audit processes and policies
- CDFA/DMS and CCWM build requirements into testing, certification, and auditing policies and procedures
- IOUs and MSPs provide technical support

Establish requirements for certification of Data Management Agents providing data for billing purposes
- IOUs provide recommendations
- CDFA/DMS develops testing, certification and audit processes and policies

Amend tariffs or develop new rules
- Identify needed tariff provisions – e.g., registration, enrollment, billing arrangements, fees, dispute resolution, technical performance, eligibility, etc. – implied by the protocol
- Modify tariffs (rate schedules and rules) or create a new tariff (a new rule with reference to a technical protocol, or other solution) to align with approved Protocol (9.3.12)
- Develop any new technical protocol documents via working process as well as new forms to file with Commission
- File Tier 2 Advice Letter (7.31.12)

Utilities determine how to recoup incremental costs associated with submetering
- Identify incremental metering, billing, customer service, and information system costs associated with submetering and submetering by DR, DA, CCA, and NEM customers
- Identify capital and O&M investments associated with new requirements, and determine whether submetering-related costs are covered elsewhere

Implement ESPI on end-device (submeter) to interface with service provider directly (for submetering-only purposes)
- Determine priority vs. other use cases
- Determine OAuth and ESPI implications
- Determine next steps

Use Cases	Billing & Regulatory Requirements	Submetering Technical Requirements, Compliance, and Standards	Submetering Communication Functionality, Standards, Security

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Preliminary Protocol Development Roadmap

- **Discussion**
  - TBS
  - TBS
  - TBS

CLOSING

Conclusions

- **Working group efforts since the October 27 workshop have only reinforced the IOUs' early hypotheses:**
  - Many uncertainties and complexities will need to be overcome to develop and implement a submetering protocol
  - The needed communications interface is not yet available
  - The AMI and billing systems of the IOUs are not capable of providing "revenue grade" submetering for subtractive billing purposes to third-parties who are not the customer of record, such as MSPs
  - EV penetration has been limited to date and has not justified the cost of automating IOU subtractive billing
  - The emerging submetering market will grow slowly until technological advances provide customers with low cost, innovative solutions
  - While the teams attempted to address all the issues identified, in the coming months, further work will be required as the roadmap report cannot fully resolve all of them
  - A phased development approach offers the best strategy for enabling the submetering of EV load while matching development costs with actual, evolving marketplace demand

Next Steps

- Complete CPUC Data Request by December 20, 2011
- Complete feasibility analysis of use
- Finalize protocol roadmap and submit to CPUC on January 3, 2012
- 3rd parties and CPUC to provide comments once roadmap is submitted