



Smart Inverter Working Group Phase 3 Workshop

R.11-09-011

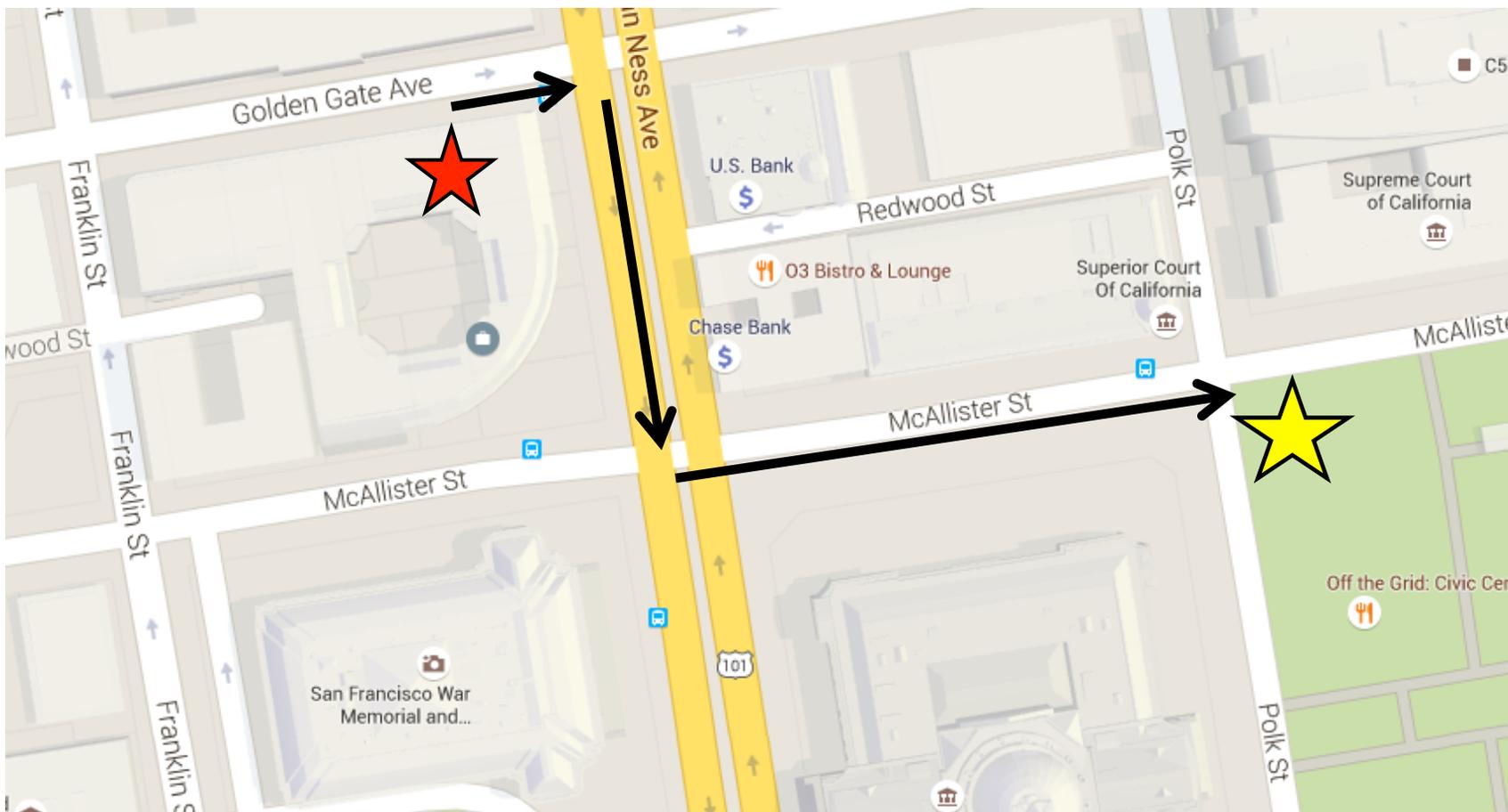
September 25, 2015
10:00 – 4:00

CPUC Auditorium





Evacuation procedure





Other information

WiFi Access:

login: guest

password: password

Restrooms:

Out the doors, through the lobby,
at the far end of the hallway.

Call in information:

Conference line: (866) 830-4003

Participant code: 986 9619

Webcast:

www.californiaadmin.com/cpuc.shtml





Discussion logistics

- Please only ask clarifying questions during presentations, and save substantive questions and comments for designated times
- Please speak into a microphone
- Please introduce yourself when making a comment
- Please keep comments relevant to the development of advanced inverter functionality, to the extent possible





Smart inverters

- Autonomous response to grid conditions
- Communications for monitoring and control
- Insights into grid conditions for system planning purposes





Purpose of SIWG

- CEC and CPUC collaboration to develop advanced inverter functionality to integrate and mitigate impacts of increasingly high penetrations of DERs
- Weekly working group calls since early 2013





Phase 1 autonomous functions

1. Support **anti-islanding** to trip off under extended anomalous conditions
2. **Voltage ride-through** of low/high excursions beyond normal limits
3. **Frequency ride-through** of low/high excursions beyond normal limits
4. **Volt/var control** through dynamic reactive power injection through autonomous responses to local voltage measurements
5. Define **default and emergency ramp rates** as well as high and low limits
6. Provide reactive power by a **fixed power factor**
7. Reconnect by “**soft-start**” methods (e.g. ramping and/or random time within a window)





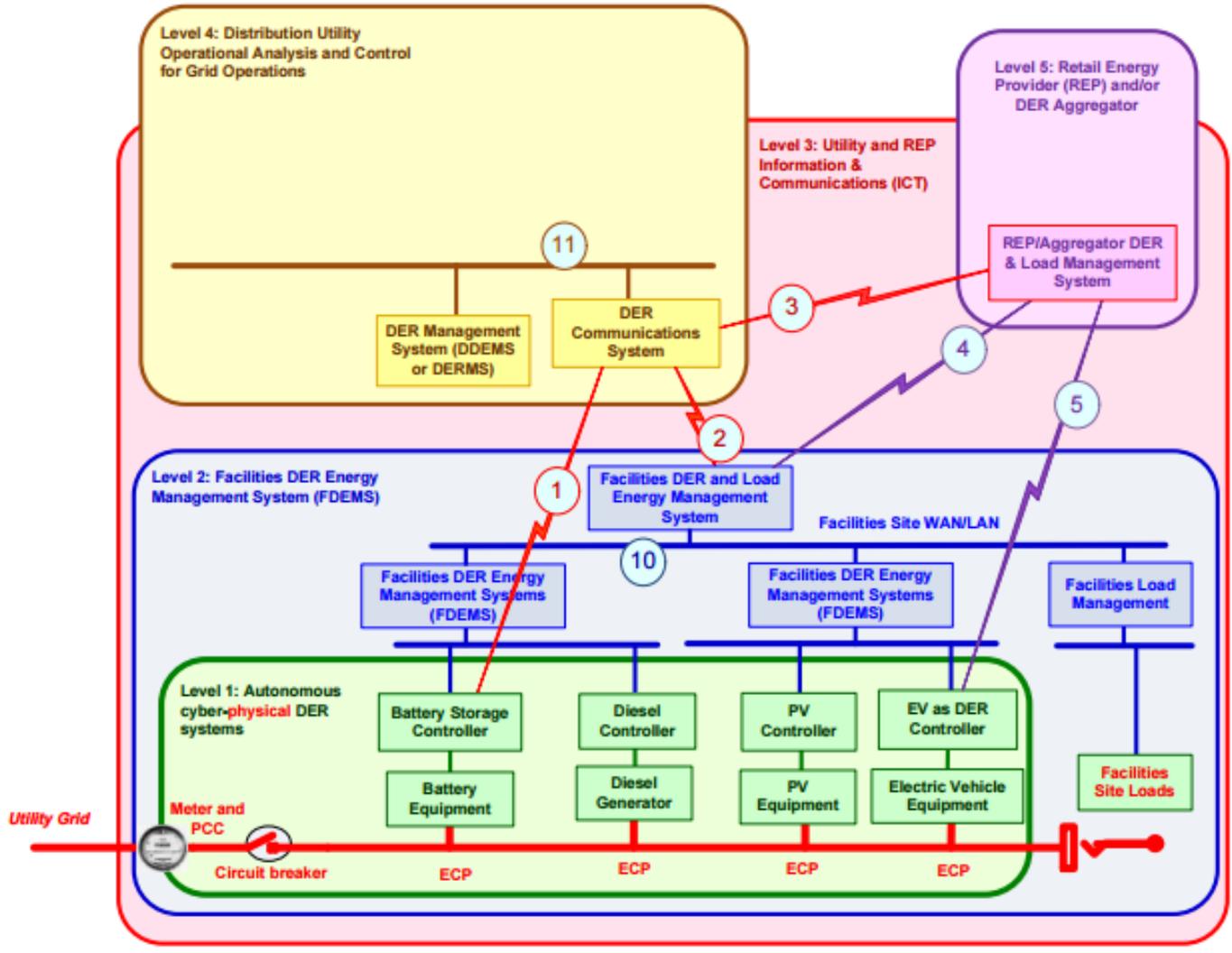
Phase 1 implementation

- D.14-12-035 adopted seven Phase 1 functions into Rule 21
- Mandatory date: one year from adoption of Supplement SA to UL 1741
→ estimated Q4 2016
- Intended to be required functionality for all interconnecting DERs; would not entail compensation





Phase 2 communications





Phase 2 implementation

- Recommendations finalized in February 2015
 - IEEE 2030.5 (SEP 2.0) is default protocol
- Implementation currently in process:
 - IEEE 2030.5 implementation guide
 - Detail technical requirements for Phase 2 use cases
 - Reference in IOU technical interconnection handbooks
 - Rule 21 will mandate DER communication capability
- Timing for Phase 2 is an open question
- Enables communications; would not directly entail a compensation aspect





Phase 3 additional functions

- Monitor DER Status and Output
- Command DER to Connect or Disconnect
- Limit Maximum Real Power
- Set Real Power
 - Set Energy Storage charge and discharge rates
 - Load and generation following
 - Real power smoothing
 - Set Storage Ramp Rate
- Frequency-Watt
 - Storage Frequency-Watt
- Voltage-Watt
 - Dynamic Volt-Watt
- Dynamic Reactive Current Support
- Scheduling settings and modes
- ¹¹ DER Functions “Also Important” to DER Integrators and Other 3rd Parties





Phase 3 scoping considerations

- Some SIWG members calling to develop tariffs and contracts to compensate DER owners for inverter-provided grid services
- Many Phase 3 functions (and volt/var control from Phase 1) entail reductions in real power production





D.14-12-035 within Rule 21 OIR (R.11-09-011)

- **Conclusion of Law 6:** “The next focus of investigation in this proceeding should be on establishing the appropriate level of compensation, if any, for inverter owners providing grid support functions.”





Compensation for DER grid services

- Part of an agency-wide coordination challenge that entails development of:
 - Tariffs
 - Contracts
 - Market framework
 - Business models
- What proceedings are considering how inverter-based grid services are leveraged and compensated?





DRP (R.14-08-013)

- One goal: to animate opportunities for DERs to realize benefits via the provision of grid services
 - “Services”: locational (e.g., T&D or capacity deferral) + operational (e.g., inverter functionality)
- Demonstration and Deployment projects
 - Leverage DERs for operations
 - Obtain new products and services from DERs and specify needed transactional methods
 - IOU serving as Distribution System Operator
- Proposals for leveraging 3rd party DER data





DRP (R.14-08-013), continued

- Business models and utility service platforms not in current scope — “a longer term prospect”
- Learning from quantifying and operationalizing the locational value of DERs in first round of DRPs can provide a foundation to examine future business models and market designs
- Applications filed July 1, 2015





IDER (R.14-10-003)

- Goal: to deploy DERs that provide optimal customer and system benefits
- Will serve as a vehicle to implement the tariffs, contracts, or other mechanisms identified in the DRP to deploy cost-effective DERs





Storage OIR (R.15-03-011); CAISO ESDER + DERP

- Storage OIR - Multi-use storage applications
 - BTM + distribution reliability
 - BTM + wholesale interactions
- CAISO Energy Storage/DER (ESDER) Initiative
 - Tariff provisions for multi-use DER apps
- CAISO DER Provider (DERP)
 - Allows aggregated DERs to bid into CAISO markets





Summary

- Related proceedings are considering how to leverage advanced inverter functionality and communications, as well as the questions surrounding regulatory and market frameworks for DERs
- However, the SIWG can develop all the technical requirements needed to operationalize the provision of grid services





Workshop objectives

- Solidify the scope of Phase 3 functions via:
 - Creating a set of grid service Use Cases that leverage advanced inverter functionality and/or communications
 - Discussion of communication protocols and market interaction models needed to operationalize these grid service Use Cases, and the incremental requirements the SIWG can develop
 - Refining the list of additional inverter functionality to be developed in Phase 3

