Networked Plug Loads: Potential and Obstacles

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Carl Besaw

CalPlug Workshop

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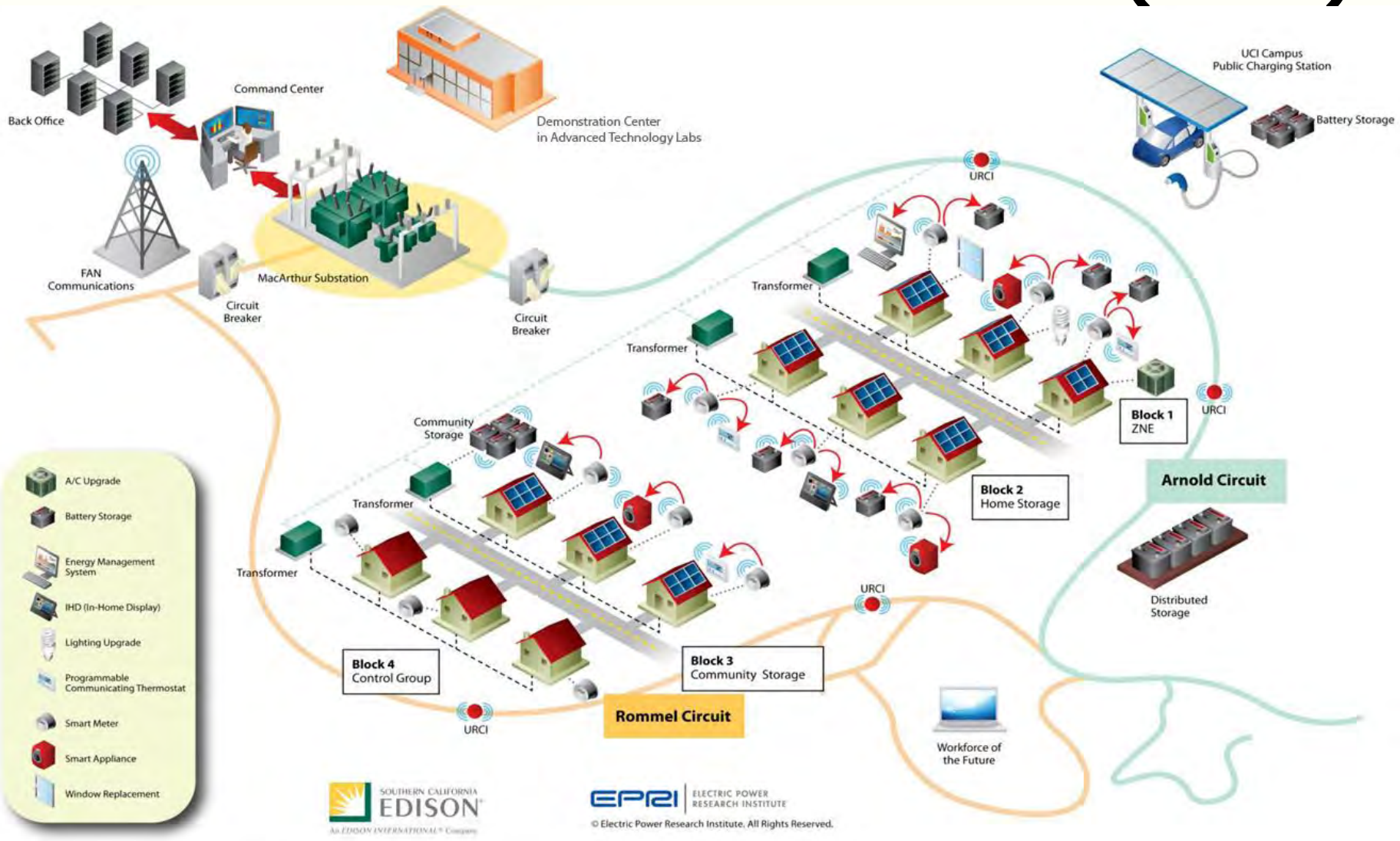
Irvine Smart Grid Demonstration (ISGD)

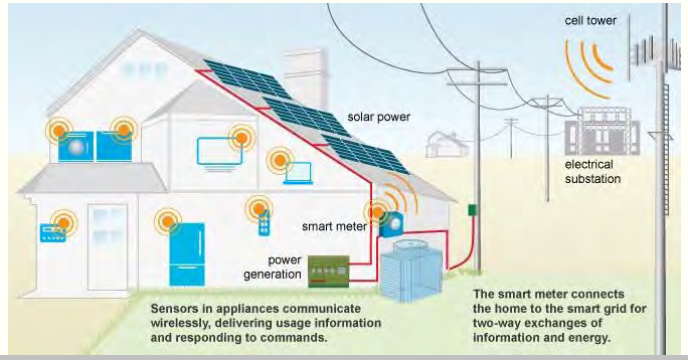
- ARRA funded Smart Grid Demonstration Project
- Utilizes SCE's AMI network and smart meters
- Home Area Network (HAN) devices:
  - Programmable Communicating Thermostat (PCT)
  - Energy Information Display (EID)
  - ZigBee SEP/Internet Gateway
  - Smart Appliances (Refrigerator, Washer, Dishwasher)
  - Residential Energy Storage Unit (RESU)
  - Plug-in Electric Vehicle (PEV)
  - Rooftop Solar
  - Monitoring equipment and sensors

Irvine Smart Grid Demonstration (ISGD)



ISGD Potential

- Individual and Aggregated plug load consumption and control
- Store excess PV generation in RESU
- Utilize RESU for peak shaving
- Display near real time PV generation and aggregate consumption
- Understand home energy use in each home



ISGD Obstacles

- Not a completely integrated system
  - Separate networks for monitoring and control
  - Different communication protocols
  - Proprietary access
- Utility concerns related to control at the outlet
- RESU not compatible with Net Energy Metering
- Energy Information Displays handle PV differently
  - Don't show negative consumption caused by PV generation

Total Home Connectivity

- Integration of:
  - Entertainment
  - Communication
  - Security/Safety
  - Energy
  - Home Automation

Total Connectivity - Potential

- Diagnostics
  - Notification of equipment running improperly or in need of maintenance
- Other Synergies
  - Air conditioning, lights and curtains adjust when alarm is on or motion sensors have no activity
  - Air conditioning turns off when window/door sensors indicate they are open
  - Temperature settings and watering schedules adjust based on weather conditions

Nest

- Thermostat
  - Motion sensor
  - Learning thermostat

- Smoke & Carbon Monoxide Detector
  - Additional sensors for thermostat
  - Intelligence to turn off furnace when Carbon Monoxide is detected

Future

- Home Network uses GPS in phone to monitor proximity
  - Automatically adjust lighting, temperature, etc.
- Integrate other cloud based resources
  - Traffic
    - Account for time
  - Calendar
    - Adjust schedules

Conclusion

- Integration into a single network is a challenge
  - All equipment provided from a single vendor
  - Gateways/bridges needed to handle multiple communication protocols
  - Monitoring and Control need to be combined

- Total Home Connected network has huge potential to integrate energy management with other higher priority areas (Security, Entertainment, etc.)

Q&A

Carl Besaw

Southern California Edison

(626) 302-0926

carl.besaw@sce.com