openADR ALLIANCE

Growth Areas for OpenADR

OpenADR sits at the intersection of DSOs and Flexibility Resources

- The nature of that intersection has evolved over the last ten years.
- Broader array of flexibility resources.
- Changing nature of the flexibility providers.
- Acceleration of developments, particularly in e-mobility.

OpenADR Evolution: Large Commercial and Industrial Loads

Warehousing

Energy Management Success Story

Railex®

Auto-DR Puts Railex® on Energy-Saving Track

The newest mega-trans load refrigerated distribution center operated by Railex® — a nationwide full-service transport, logistics and distribution firm — sees significant savings with use of an energy management system (EMS) to control energy consumption during peak periods and automatically participate in Demand Response (DR) programs.

Located in Delano in Central California, the three-year-old facility includes 225,000 square feet of refrigerated space and loads and ships about 80 to 90 rail cars of perishable goods a week, with the number rising as high as 160 cars a week in summer months. To build the facility, Railex® used the statewide Savings By Design (SBD) program to receive design assistance and a $150,000 energy efficiency incentive for high-performance new building construction.

As the facility's business grew in its first two years of operation, Railex® turned to us to look for opportunities to lower its rising energy costs. "We wanted to make it as economical as possible for us to do business on a grander scale," notes Railex® Senior Systems Analyst James Johnson.

After helping Railex® identify its DR potential, Railex® decided to utilize Automated Demand Response (Auto-DR), which allows customers with an automated load control system, such as an EMS, to participate in DR programs with no manual intervention, providing flexibility and ease of use. Customers pre-select their level of participation and earn incentives for peak-period energy load reductions, which help ensure adequate electricity supplies and also offer environmental benefits.

Railex® received a $72,400 DR technology incentive for the controls needed to utilize Auto-DR. Railex® Maintenance Manager Terrell Estes says the incentive, combined with the money saved through DR event participation, led to a return on investment in just four months.

Summer CPP Savings of Over $32,653

Railex® now participates in both the Critical Peak Pricing (CPP) program (the default rate for SCE bundled service customers with demands greater than 200 kilowatts (kWs)) and in a Demand Response Contract program with a third-party aggregator.

CPP rewards customers for reducing or shifting electricity usage during critical peak events, when the demand and price for electricity climb. During summer

Project Overview

SCE Programs Utilized:

- Technical Assistance and Technology Incentives (TA &TI) Program
- Savings By Design
- Automated Demand Response
- Critical Peak Pricing (CPP)
- Demand Response Contract

Results:

300 kWs load reduction per CPP event, yielding savings of more than $32,653

Incentives:

$222,400

SOUTHERN CALIFORNIA EDISON®

Southern California Edison

Energy Management Success Story

Nordstrom

Nordstrom and SCE's Automated Demand Response (Auto-DR): Showing That Saving Energy Is Always In Fashion

"The Right Thing to Do"

A national retailer that sells the finest apparel, shoes and accessories, Nordstrom always shows its customers the latest in fashion trends. But many customers may not know that the company also stays on top of the latest energy management trends, employing strategies that save energy, money and the environment while helping to ensure adequate electricity supplies for the region.

In the early 2000s, during California's energy crisis, Nordstrom began a voluntary load curtailment program on days when the state reported low operating electricity reserves. Starting with shutting off display window lights, cove lighting, individual merchandise spotlights and some cooling load, Nordstrom stores reduced their energy demand in tiers.

This commitment eventually evolved into participation in Southern California Edison's (SCE's) technology incentives program for Auto-DR. Auto-DR allows customers with an automated load control system, such as an energy management system (EMS), to participate in SCE's Demand Response (DR) Programs with no manual intervention, while providing flexibility, scalability and ease of use.

Customers pre-select their level of participation based on their energy management strategies and program their energy management systems to automatically drop a set energy load during DR events. This earns incentives for peak-period energy load reductions, which help ensure adequate electricity supplies and additional environmental benefits.

Customers also may qualify for incentives of up to $300 per kilowatt (kW) of tested load reduction for system upgrades and technologies that enable Auto-DR. Nordstrom's incentive from SCE totaled more than $526,000. These funds allowed the retailer to install an EMS in stores within SCE's service territory.

Nordstrom uses Auto-DR enabling technologies to participate in the Critical Peak Pricing (CPP) program, which rewards customers for reducing or shifting electricity usage during a few peak periods from June 1 to October 1 when electricity prices climb or demand is high.

Estimated Savings by Managing Energy

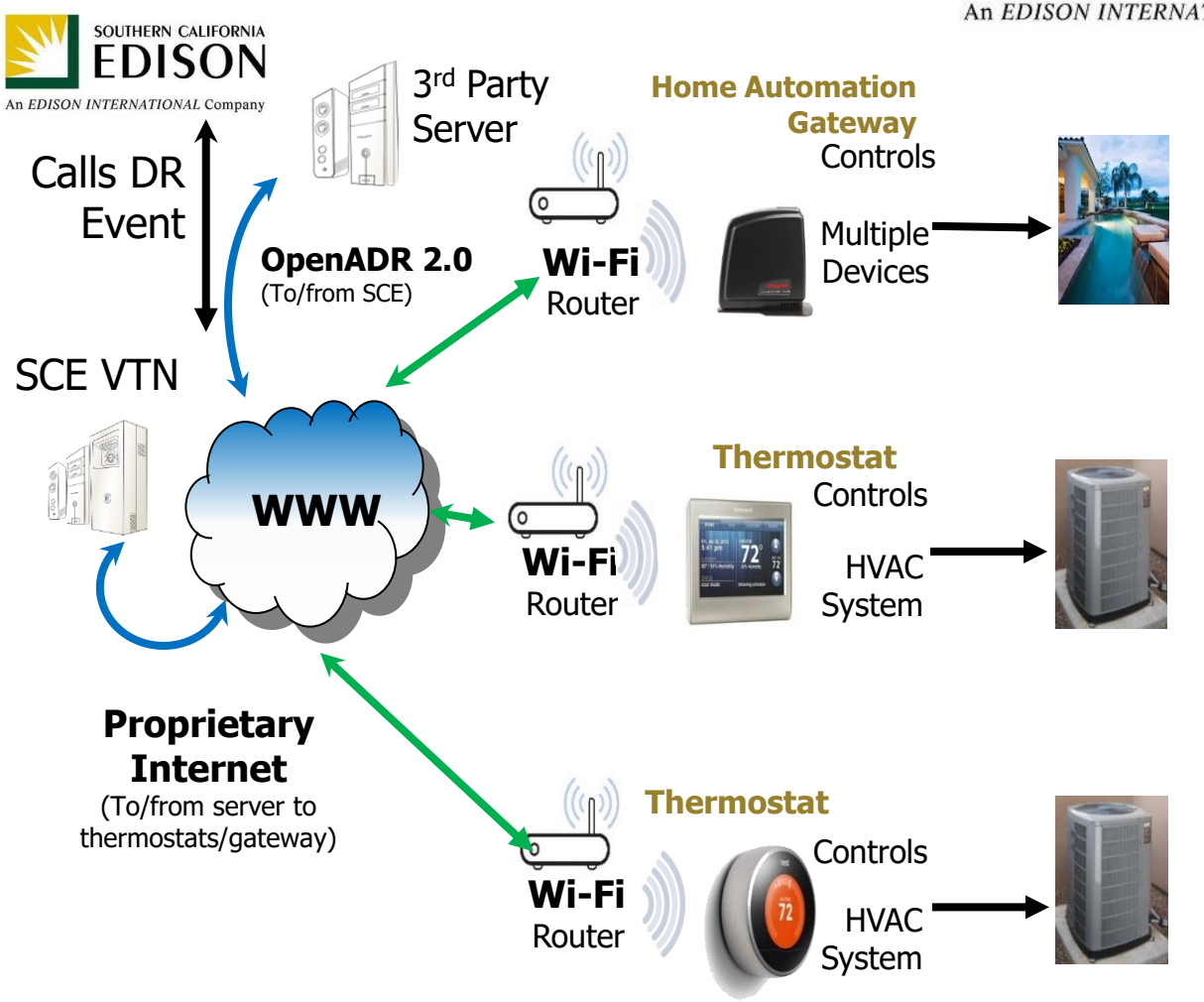
- *Industry:* Retail
- *Description:* A leading fashion specialty retailer, with 11 full-line and seven Nordstrom Rack stores in Southern California Edison's service territory
- *SCE Programs Utilized:* Automated Demand Response (Auto-DR) technology incentives, Critical Peak Pricing (CPP)
- *Results:* A technology incentive of more than $526,000 to pay for Auto-DR equipment, 20 percent load reduction during CPP events in summer 2010 and 3.5% reduction in energy use per square foot annually

SCE TECHNOLOGY INCENTIVES

$526,000+

OpenADR Evolution: Smart Thermostats, IOT

- BYOT model
- Thousands of customers select own devices
- 8 events with an average 750 watts of load reduction per hour per customer
- Energy savings during trial:
  - 3.6MW of average energy reduction per event (peak ~7MW)
  - 115.2MWh of energy saved annually

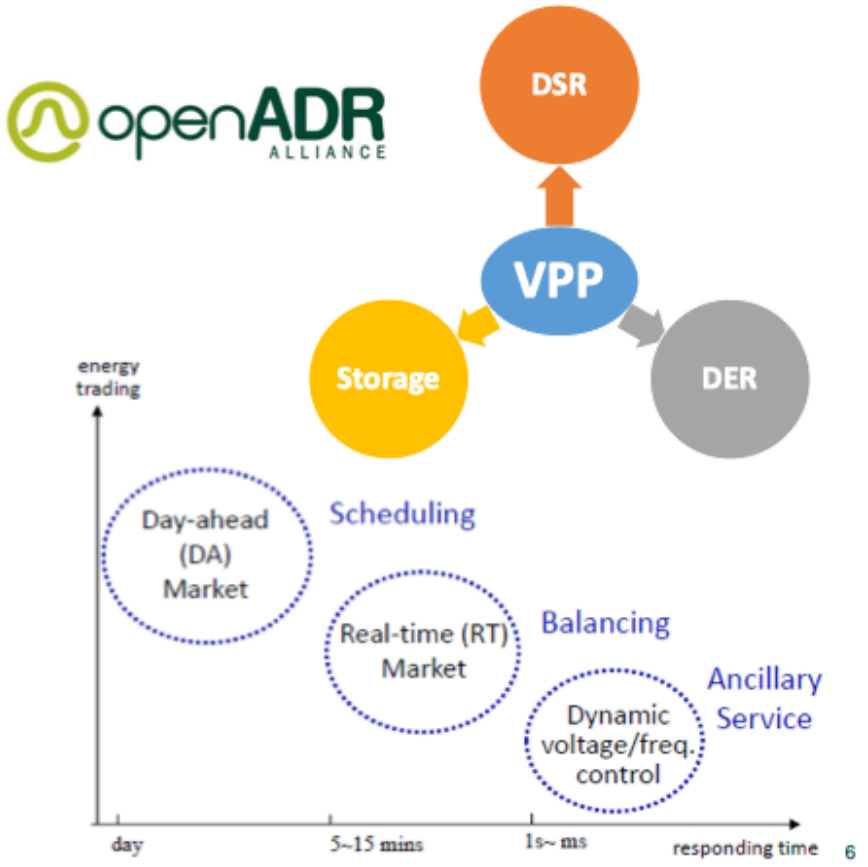


Virtual Power Plants

VPP & OpenADR Alliance

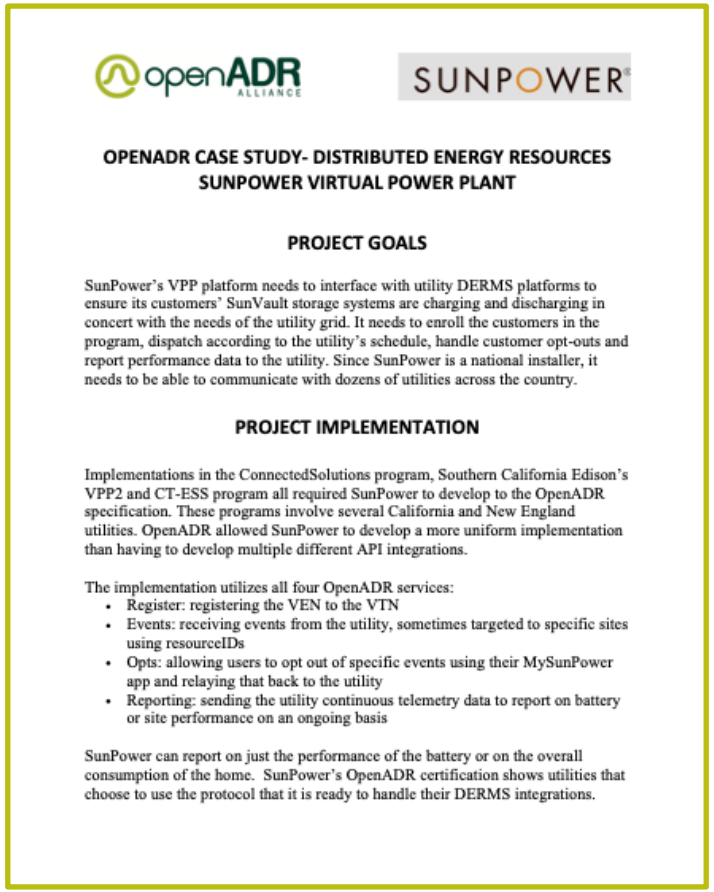
- NGESO is in the process of introducing minimum standards around sales and marketing, cyber security, proposals, contracts and complaints, giving customers the confidence to make an informed decision about the aggregator they work with.
- Our aim is to develop a Virtual Power Plant (VPP) using the OpenADR 2.0b communication protocol to securely and reliably operate Demand Response (DR) and distributed energy resources (DERs) over public Internet infrastructure, providing ancillary services to the TSO and DSO.
- OpenADR benefits are clear. It provides a non-proprietary, open standardised DR & DER interface that allows DSR service providers to communicate DR, DER, and TE (Transactive Energy, Blockchain & IoT) signals directly to existing customers using a common language & existing communications such as the Internet.
- Cyber Security is an important component of the Smart Grid and customers are getting more concerned about it. OpenADR global standards helps to fulfil our role in ensuring strong Cyber Security in the Smart Grid.

pearlstone



VPP - Evolution

- **Rooftop Solar Aggregation**
  - SunPower – Southern California Edison;
  - Swell Energy – Hawaiian Electric
- **Alliance Member Companies Exhibiting at RE+**
  - AutoGrid
  - Ampcontrol
  - Eaton
  - Electriq
  - Energport
  - Franklin WH
  - Fortress Power
  - Outback/EnerSys
  - Sol-Ark
  - SWTCH
  - Schneider
  - Siemens
- **Next Generation VPP Trends**
  - Qcells, SolarEdge, MCE



openADR ALLIANCE SUNPOWER

OPENADR CASE STUDY- DISTRIBUTED ENERGY RESOURCES
SUNPOWER VIRTUAL POWER PLANT

PROJECT GOALS

SunPower's VPP platform needs to interface with utility DERMS platforms to ensure its customers' SunVault storage systems are charging and discharging in concert with the needs of the utility grid. It needs to enroll the customers in the program, dispatch according to the utility's schedule, handle customer opt-outs and report performance data to the utility. Since SunPower is a national installer, it needs to be able to communicate with dozens of utilities across the country.

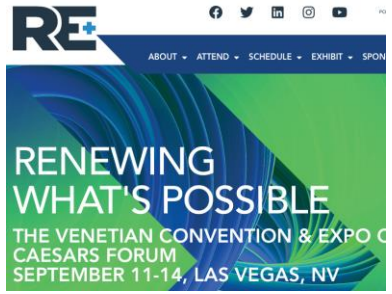
PROJECT IMPLEMENTATION

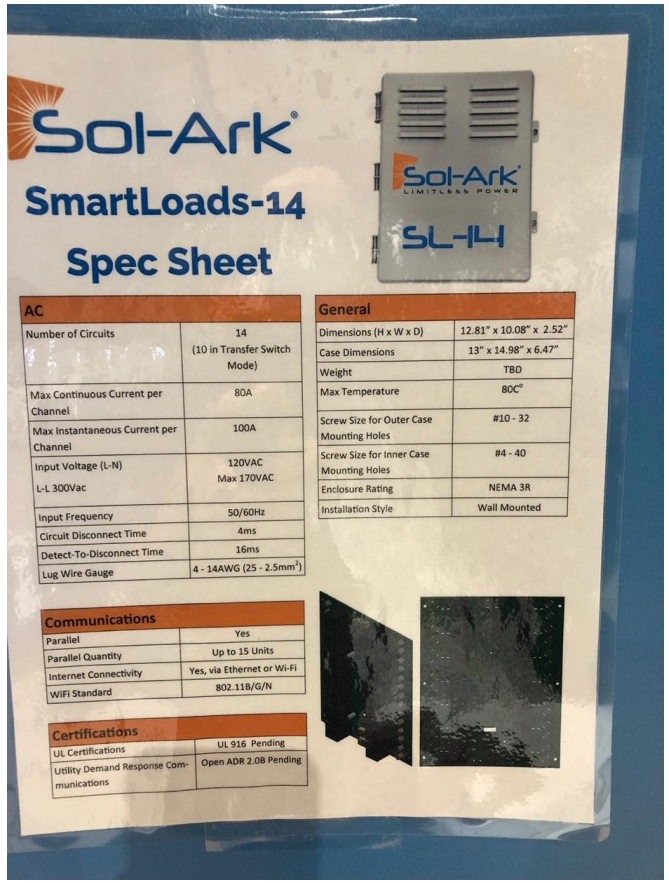
Implementations in the ConnectedSolutions program, Southern California Edison's VPP2 and CT-ESS program all required SunPower to develop to the OpenADR specification. These programs involve several California and New England utilities. OpenADR allowed SunPower to develop a more uniform implementation than having to develop multiple different API integrations.

The implementation utilizes all four OpenADR services:

- Register: registering the VEN to the VTN
- Events: receiving events from the utility, sometimes targeted to specific sites using resourceIDs
- Opts: allowing users to opt out of specific events using their MySunPower app and relaying that back to the utility
- Reporting: sending the utility continuous telemetry data to report on battery or site performance on an ongoing basis

SunPower can report on just the performance of the battery or on the overall consumption of the home. SunPower's OpenADR certification shows utilities that choose to use the protocol that it is ready to handle their DERMS integrations.





VPP – Manufacturer Evolution

- Market leading panel manufacturers are diversifying into grid services.
- Adding utility program development capability.

VPP – Community Choice Aggregators

- Marin Clean Energy won $5 million U.S. DOE grant
- MCE will leverage its status as California's first Community Choice Aggregation (CCA), its work as a load-serving entity (LSE), scheduling coordinator and registered Demand Response Provider (DRP) to demonstrate how CCAs can use Virtual Power Plants to
  - create new opportunities and value for the buildings they serve
  - enhance grid health and reliability
  - increase local resilience and public safety
  - reduce dependency on gas-fired peaker plants
  - decrease carbon intensity
  - support quality local jobs and workforce

https://www.openadr.org/mces-vpp

VPP – Assembling Multiple DER

- SolarEdge Acquires Wevo Energy, EV Charging Optimization and Management Software Startup
- Kraken Technologies and SolarEdge Technologies, Inc. are today announcing a strategic partnership to unlock low-cost, green energy for SolarEdge Home Battery customers around the world.
  - LONDON & MILPITAS, Calif.--(BUSINESS WIRE)--Jul. 25, 2024

E-mobility - Alliance EV Membership

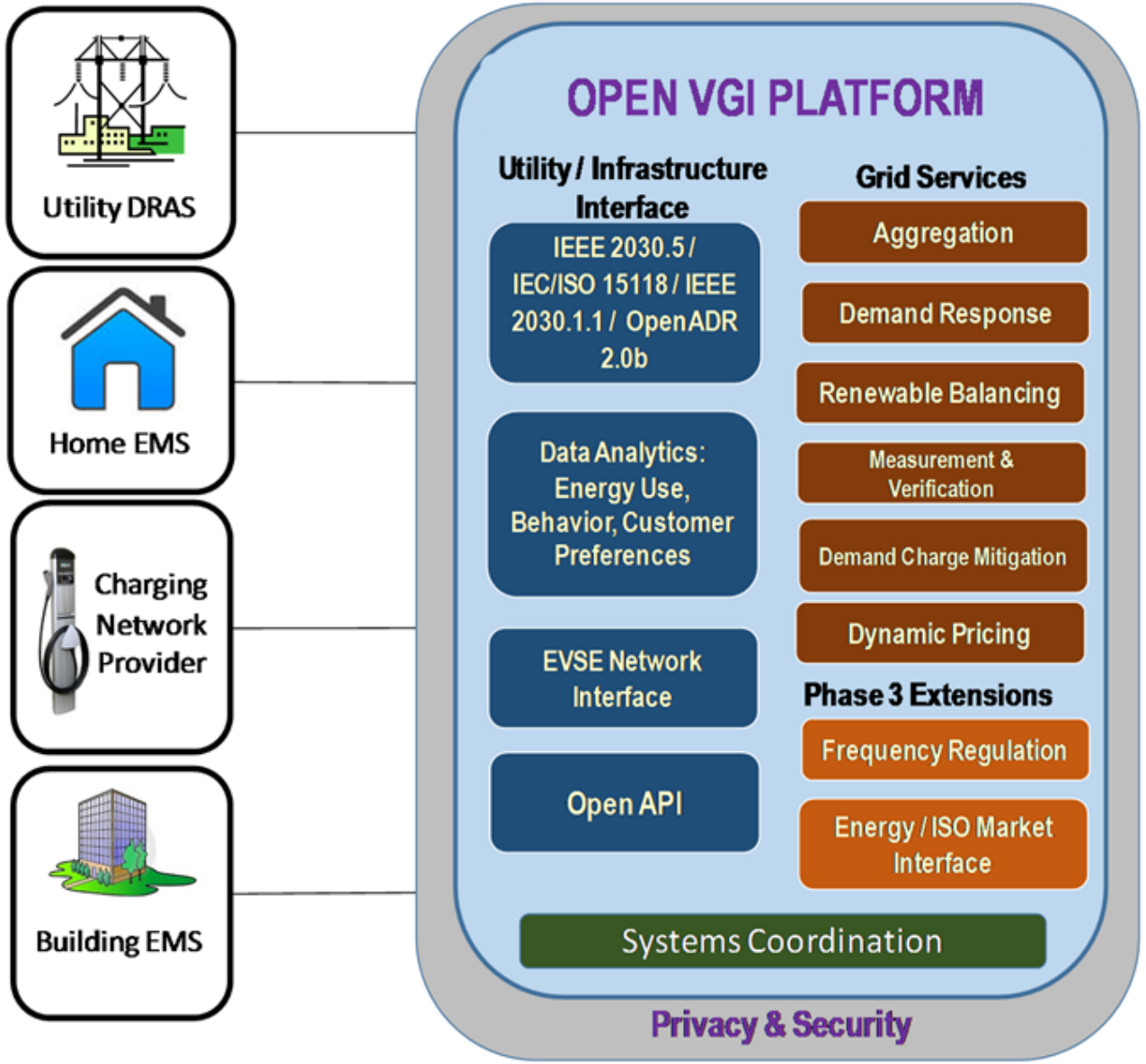
ads-tec Energy
Ampcontrol
AMPECO
AmpedUp! Networks
AmpUp
bp pulse
CarMediaLabs
ChargePoint
Driivz (Centrica)
ElaadNL
Electric Era
eMotorwerksA
Epic Charging (EnerSys)
EVBox
EV Passport
EV Range
EverCharge
EvoCharge
Fermata Energy
Ford Pro Charging
GreenFlux
MOEV Inc.
Powerley
Saascharge
Synop
SWTCH Energy
WattEV
Zerova Technologies

NEW IN 2024

Buzze
Wangbang (StarCharge)
Micro-Star
ELECQ
Monta
AI-RIDER
OpenRoad
Orange Charger
EVCHRON
Payenergy
Wevo Energy

E-mobility and Automotive OEMs

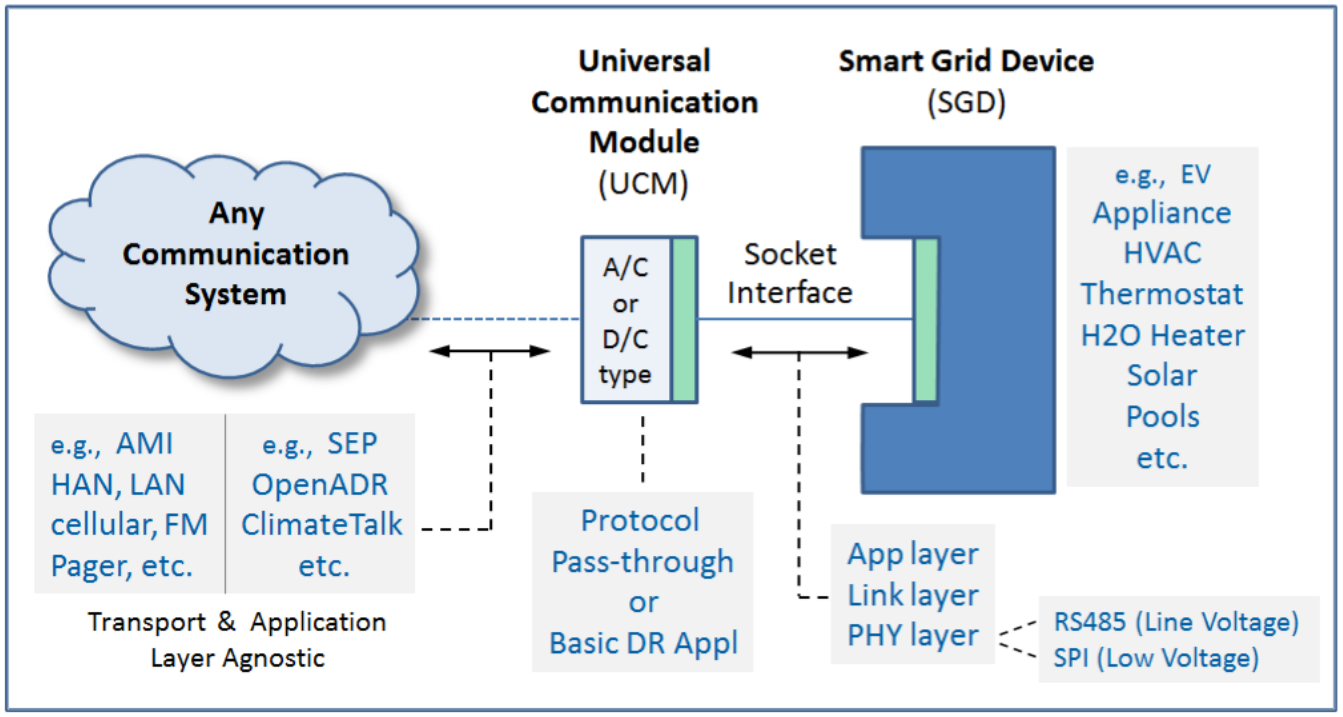
ChargeScape



Smart Appliances now in focus in U.S.

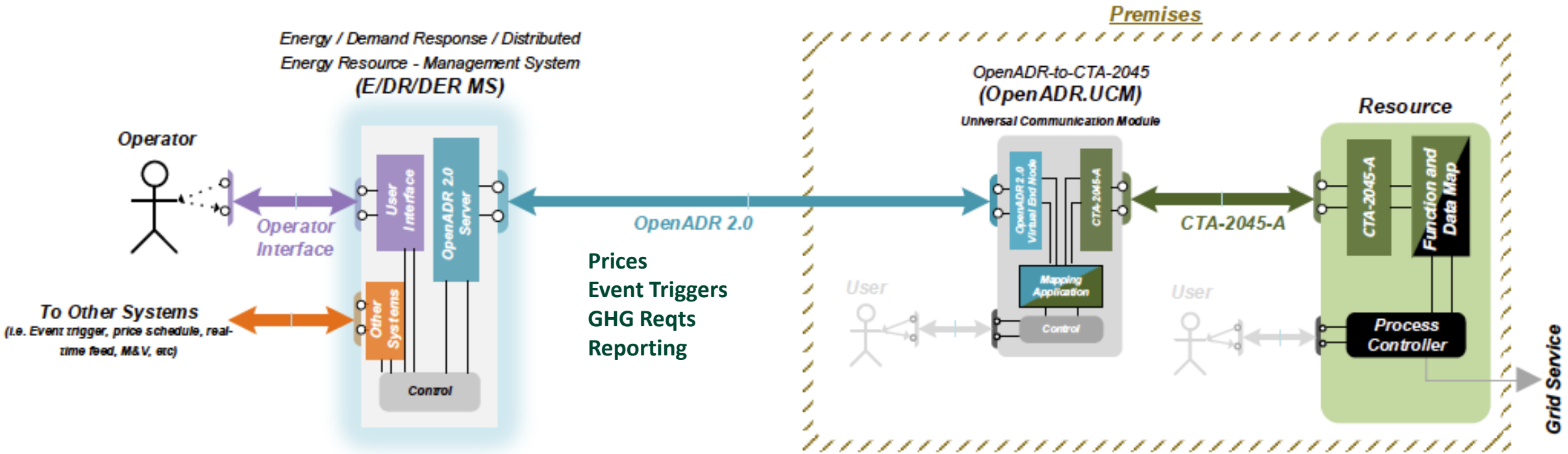
- Discussion in U.S. around smart appliances as untapped grid resource.
- In particular - cost effectiveness and carbon impact of electric heat pump water heaters (HPWH) was recognized.
- But large appliance OEMs weren't focused on the opportunity.
- So, three initiatives:
  - Energy efficiency standards via U.S. Dept of Energy – Energy Star program.
  - State requirements – Washington, Oregon, California
  - Need for connectivity -
    - CTA-2045 – the technical standard.
    - EcoPort ® - testing and certification program.

CTA-2045 Standard



Modular Interface - Block Diagram

EcoPort ® < > OpenADR Interoperability



EcoPort ® Certified Appliances

EcoPort® Update EOY 2024

- Market – Energy Star reports 30% annual growth in HPWH sales
- EcoPort® Certification 2024
  - Rinnai, Colmac, Eco2 Systems, Small Planet USA, Navien, GD Midea
- OpenADR Certifications of Appliances
  - Cielo, GE Appliances, Airzone
- Regulatory – California introducing FDAS water heater docket soon
- U.S. distribution utility programs for grid connected water heaters, appliances pilot programs .
- Work in progress on commercial “Connector Platform” for EcoPort products.

Thank you!

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