Innovation & Interoperability via Adoption of OpenADR 3.0

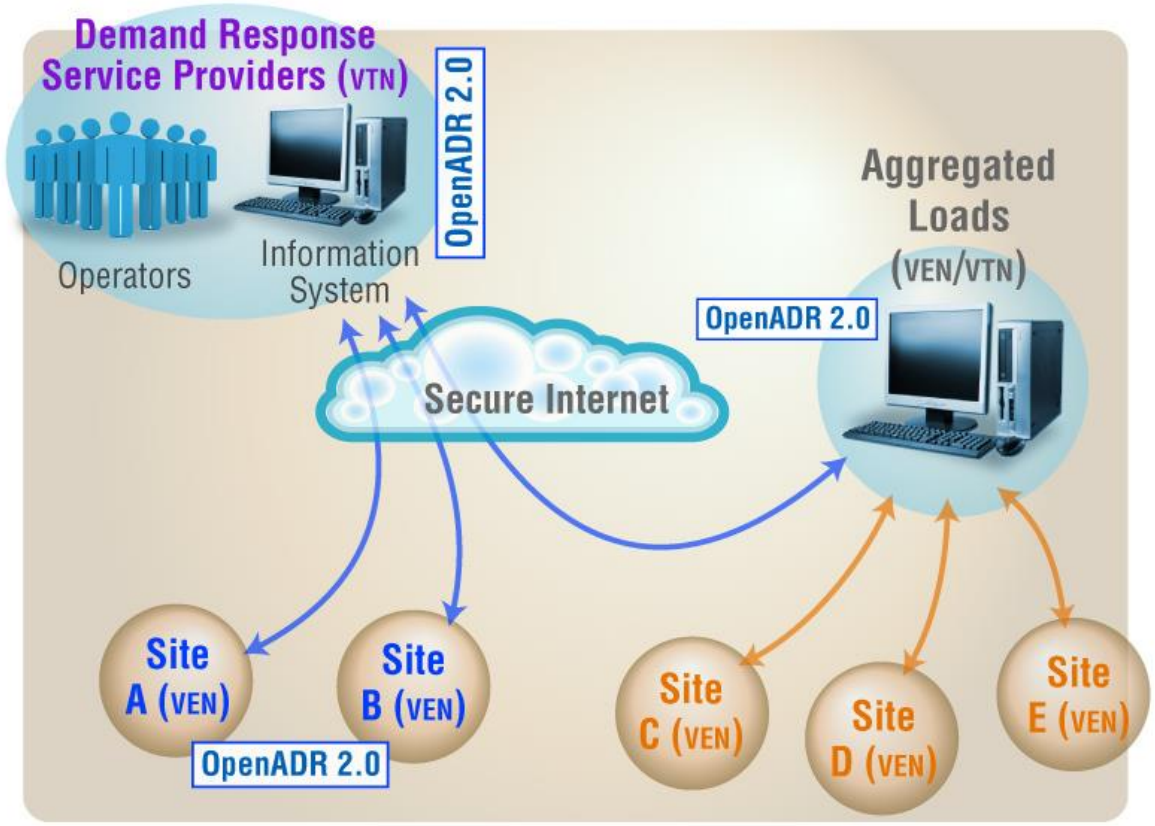
Robert Anderson, Olivine, Inc.
Albert Chiu, PG&E
July 2025

Housekeeping

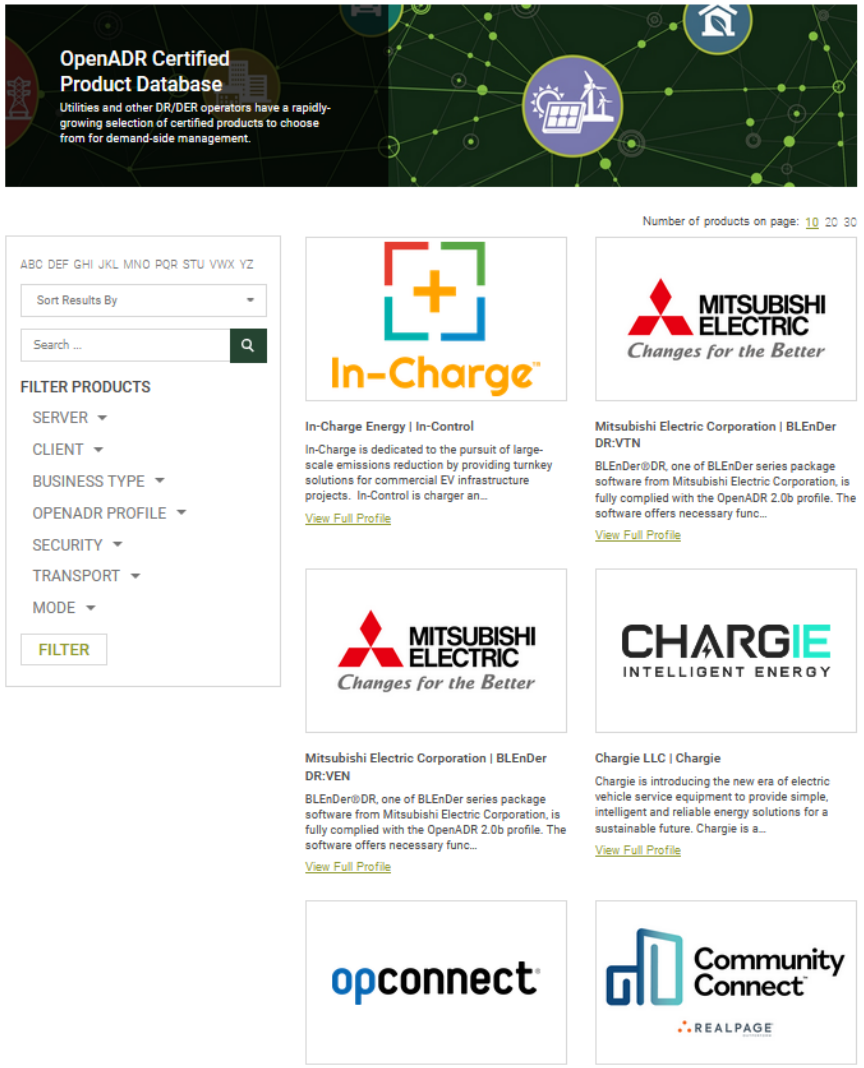
- The webinar is being recorded
- Slides and Recording will be made available on https://www.openadr.org/webinar-series
- All attendees are in listen only mode
- To ask questions, please enter them in the Questions tab of the Webinar Tool
  - We will field as many questions as possible at the end of the presentations

OpenADR in a Nutshell

OpenADR (also IEC 62746-10-1) provides a non-proprietary, open standardized Demand Response (DR) & Distributed Energy Resources (DER) interface that allows DR service providers to communicate DR, DER, and TE (Transactive Energy) signals directly to existing customers using a common language and existing communications such as the Internet.



Where are we today?



The OpenADR Alliance is a non-profit member organization. We do not manufacture products.

- Two completed specifications
  - >13 years for 2.0a
  - >12 years for 2.0b
- 10 test houses validated
- Over 325 certified systems
- Over 200 member companies
- Certification (openadr.org)
- OpenADR – Product Database

The ‘Entities’ of OpenADR

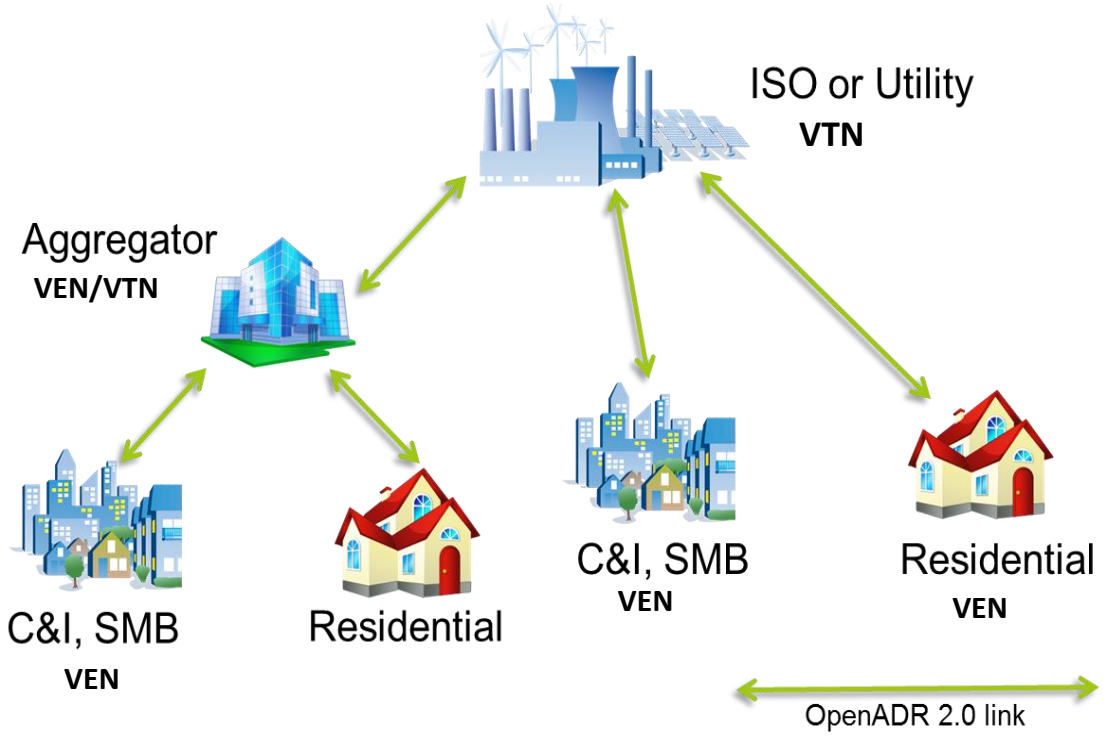
OpenADR is a message exchange protocol with two primary actors aka ‘entities’

Virtual Top Nodes (VTN)

- Manages Resources
- Creates/Transmit events
- Request Reports

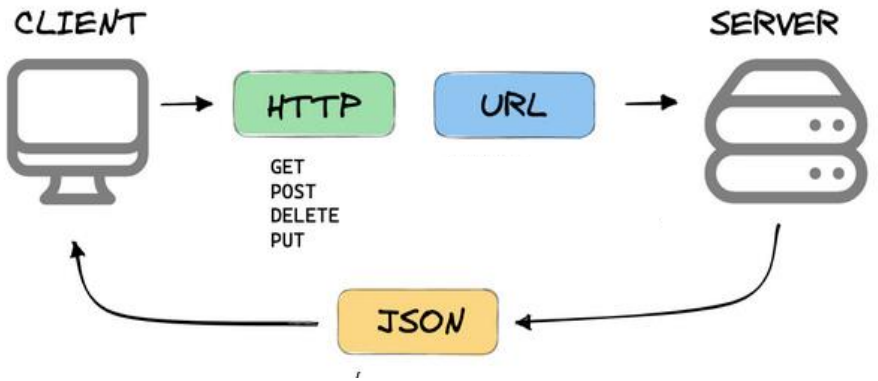
Virtual End Nodes (VEN)

- Receive events and respond to them
- Generate reports
- Control demand side resources



A new addition – OpenADR 3.0

- Created in addition, instead of changing the existing 2.0 standards
  - Maintain interop, 2.0 remains in place
- REST API for simpler implementation
- JSON
- Maintains concepts of OpenADR (inform & motivate) but simplifies and increases flexibility
  - E.g., could be resource server in building gateway



Panel Overview

1. OpenADR Standard Basics
2. PG&E, Olivine & ADR
3. Differences Between OpenADR 2.0 & 3.0
4. Timelines, Implementation & the Future

About PG&E

We are focused on providing safe, reliable, clean and affordable natural gas and electricity to our customers

Service Area
70,000
SQUARE MILES

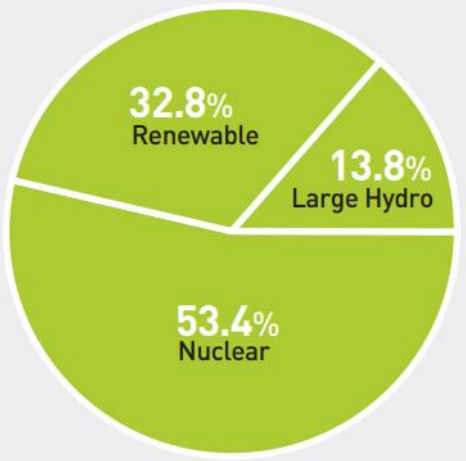
Service area population
16 million CALIFORNIANS
(That's 1 in 20 Americans!)

27,000
EMPLOYEES WHO LIVE AND WORK
in the communities we serve

MORE THAN
715,000
SOLAR CUSTOMERS
representing **>6,900 MW**
of solar energy generated

MORE THAN
560,000
ELECTRIC VEHICLES
registered in our service area

2023 POWER MIX
PG&E-owned generation and power purchases



Greenhouse gas free and/or renewable resources

GOAL: Net Zero by 2040

2,100+ MW energy storage capacity

467 MW load reduction thru DR

1 in 6 solar rooftops in the US

1 in 7 Electric Vehicles

About Olivine

- Founded in 2010, privately held, certified woman-owned Disadvantaged Business Enterprise (DBE) and a mission driven certified Small Business.
- Recognized leader in load flexibility and management of BTM DER assets – currently serving over 13 million customers and managing ~3GW of flexible loads.
- Offering include technology + services, program administration, wholesale energy market participation and DER optimization for customers, utilities & energy providers, and government entities.

About OpenADR

An open standard to automate and simplify Demand Response (DR) and Distributed Energy Resources (DER) to:

- Enable utilities and aggregators to ***cost-effectively*** manage growing energy demand and decentralized energy production.
- Customers adopt tech tools to control their energy use daily [savings] and during DR events.
- Provide an ***open***, highly secure, and two-way information exchange model and Smart Grid standard.

openADR ALLIANCE

OpenADR Alliance Website

PG&E's Commitment to OpenADR

[PG&E's Automated DR Program Website]

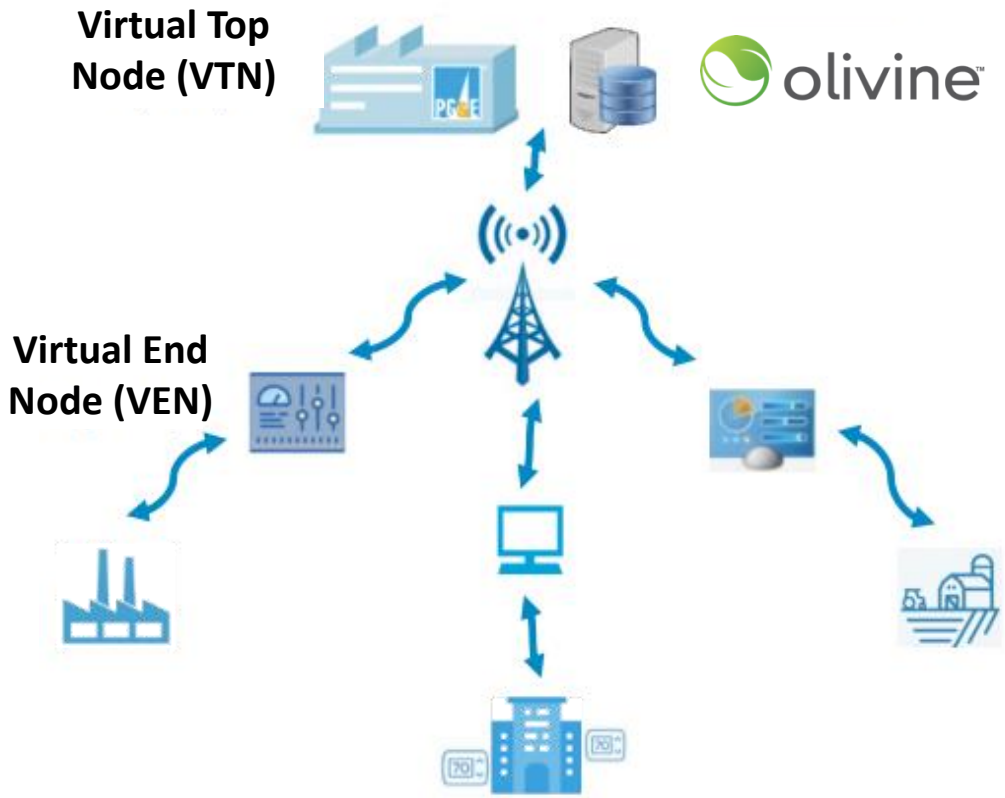
[ADR Program Manual]

PG&E's Automated Demand Response Program has provided incentives to non-residential customers since 2006.

- A statewide program, however, SDG&E does not currently have a program
- Offsets the cost of control technologies that can benefit customers every day
  AND during DR events
  - Up to 75 percent off start-up costs
  - $200 incentive per kW for approved projects
- Can help customers to reach their sustainability goals through credits towards LEED, NetZero and more

PG&E & Olivine's Work Together on ADR

- Olivine DER™ is PG&E's Virtual Top Node
  - Integrated with PG&E's Customer / DR systems
  - For AutoDR and PG&E Emergency Programs
- Energy Solutions implements PG&E's AutoDR Program
  - Reviews applications
  - Guides customers/sponsors thru the process
  - Calculates incentives
  - Conducts audits and verifications
  - Customer support
  - Enters customers and devices into Olivine's DER
- Olivine is PG&E's ELRP Implementer
- Olivine dispatches tech during events



olivine™ Energy Solutions

What is OpenADR 3.0

More than an incremental version

- Supports the same fundamental needs, with new usage models
- A more accessible Application Programming Interface (API)
- 3.0 isn't compatible with 2.0!

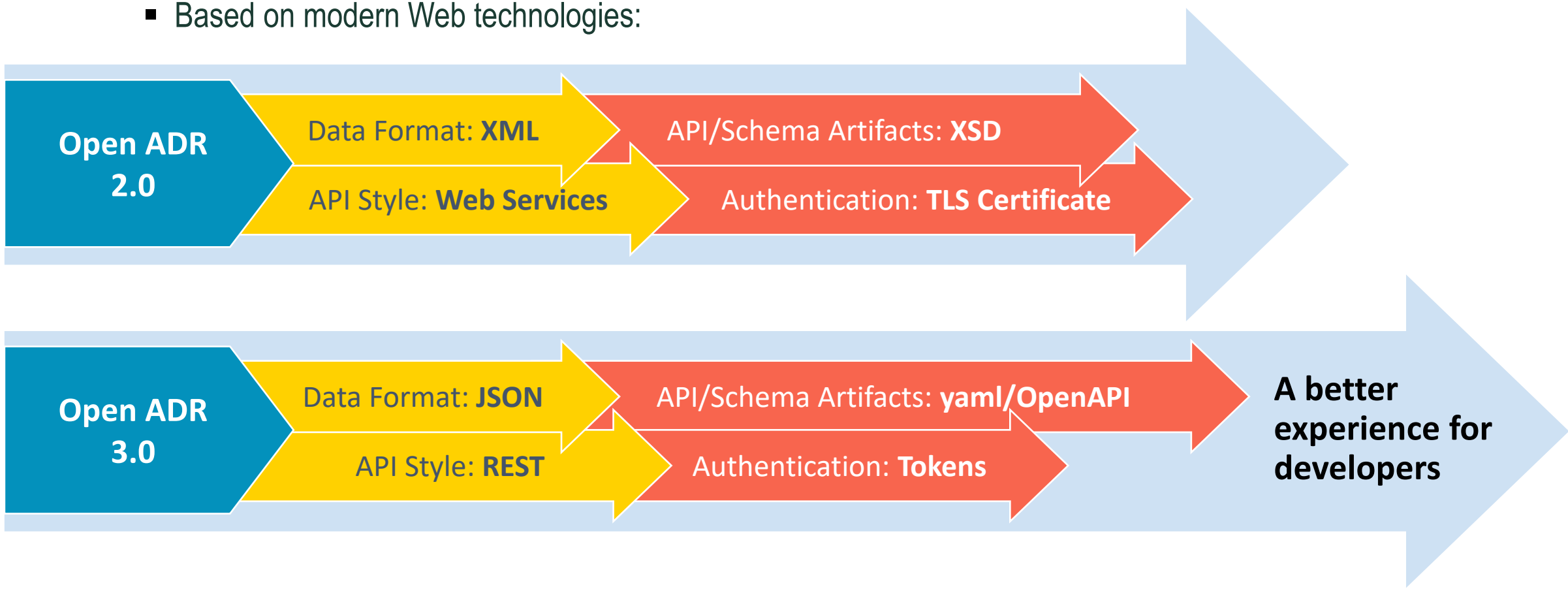
Why make these changes?

- The new APIs can dramatically reduce costs and time to adopt
- Simplifies support and broadens access patterns for dynamic pricing, GHG signaling
- Addition of grid code and capacity management use cases

What's the Difference Between 2.0 & 3.0?

Accessible APIs ➔ A better experience for developers

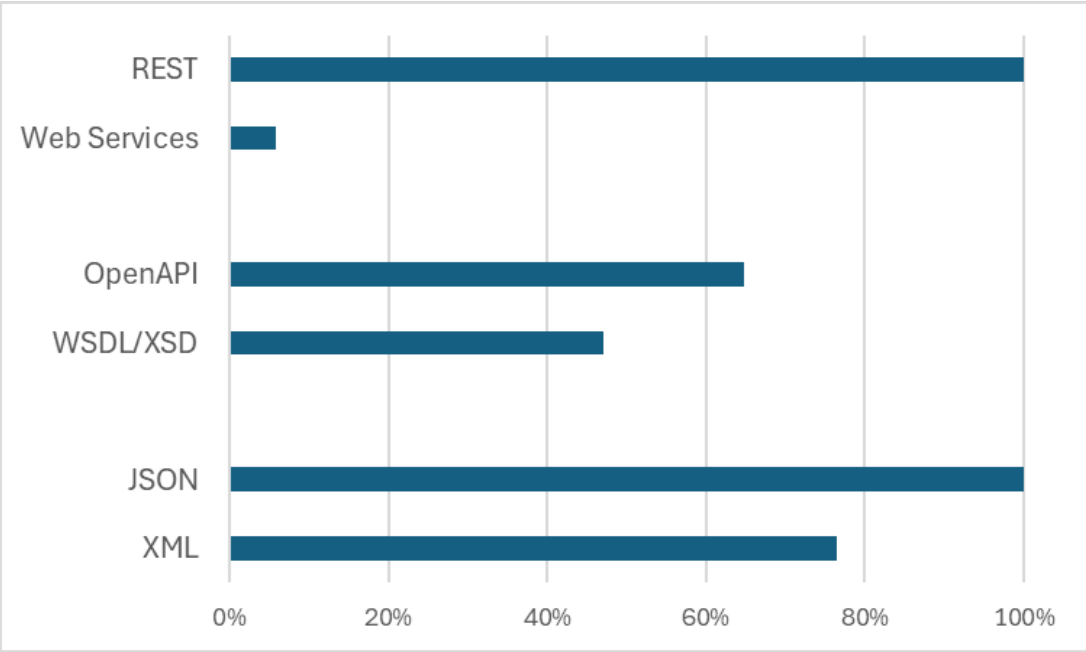
- Based on modern Web technologies:



What is the Impact?

Uses Current Standards

- Many more developers have professional experience with these newer constructs:



Better Tool Support

- The WS/XML/XSD toolsets are mostly available for “enterprise languages”
- OpenAPI code generators support a broad and growing set of languages

Olivine’s experience: these changes will increase adoption!

What is the Impact?

- Mutual Certificate Authentication (OpenADR 2.0)
  - VENs use client certificates to identify themselves to VTNs
  - A fundamental to Transport Level Security (TLS)
  - Conceptually simple . . .

- However… this requirement of 2.0 results in over 90% of integration issues Olivine has with VENs
  - Lack of education on public-key cryptography and TLS
  - Lack of documentation on how to use client certificates
  - Lack of clarity on how to procure them
  - Lack of knowledge on how to troubleshoot and diagnose issues

Programmatic Enhancements

Enabled Use Cases

Signals & Rates

More natural representation of dynamic pricing and GHG signals

Capacity Reservation

Capacity reservation and negotiation

Utility-Side Business Logic

Manage resources, events and reporting in standard ways

- Creation of rates, prices, or other signals
- Event creation using OADR

Public Access

Supports consuming public pricing and GHG signals for any receiver application without requiring credentials

But Wait a Minute…

- Utility Concern:
  - 3.0 is not backward compatible with any other versions!
  - OpenADR is about plug and play, but also about avoiding stranded assets!
  - Utilities likely want to support both 2.0 and 3.0

- VTNs will need to accommodate any versions of OADR in your portfolio
  - We want more connected flexible load, not less!
  - Green field implementations might still consider 2.0 given its broad existing adoption

Now and on the Horizon

- **Version 3.0 (2024)**
  - Initial version
- **Version 3.1 (2025)**
  - TLS hardening and enforced object privacy
  - MQTT for push notifications
  - Updated query parameters for advanced request filtering
- **Version 3.x**
  - OpenAPI specifications for optional 3.X supported features
  - Enhanced filtering capabilities

- **Certifications**
  - Available for 3.0 and 3.0.1
  - Online certification process available with Alliance issued license
  - Fully functional test tool
- **Growing List of Certified Products**
  - E.ON Energy Networks VTN
  - Evoke Systems Oadr 3.0 integration platform
  - Universal Devices open source VTN
  - Olivine, in 2025!

Other Protocols

IEEE 2030.5

- IEEE Adoption of ZigBee SEP 2.0
- Primary leverage appears to be on smart inverters
- Enables direct device management
  - Utility DERMS signals devices directly
- Both protocols cover full DR program management features
- 2030.5 is a more complex protocol
- 2030.5 does NOT include filtering or access to historic events

CSA Matter 1.4

An emerging OPEN STANDARD *for inside the home*

- Complementary to OpenADR which brings the signal into the premise
- Evolved from ZigBee
- Localizes device control
  - Site level optimization
  - Reduces complexity for utility DERMS
- Unifying smart home protocol
- Uses in in-home Hub that connects devices to cloud based systems
- Royalty free Software Development Kit for certified devices
- 1.4 includes “generic energy management features”
- Bridging devices translate matter into new/legacy protocols
- Utilized in pilots to manage peak power through load limitation
- Requires device data sharing (state, forecast, energy/power)
- Device specific control schemes similar to 2030.5

Relevant Projects

- CEC CalFlexHub uses OpenADR 3 for dynamic pricing
- PG&E and SCE are using OpenADR 3 for dynamic pricing
- SCE is initiating the addition of OpenADR 3 to their programs
- PG&E OpenADR 3.0 Matter Study
  - Evaluating the efficacy of CSA Matter 1.4 for utility programs
- UK Department of Energy Security and Net Zero (DESNZ) has started adding 3.0 to the PAS 1878 and 1879
- Dutch utilities are developing a 3.0-based EV charging program for the entire company

Robert Anderson
Olivine, Inc.

Albert Chiu
PG&E

Thank you!

Contact:
Rolf Bienert
Managing & Technical Director OpenADR Alliance
rolf@openadr.org

Education Programs
Don Dulchinos
don@openadr.org

Marketing
Shannon Mayette
shannon@openadr.org