Enabling The Standard for Automated Demand Response

Welcome to the OpenADR Seminar Austin

Enabling The Standard for Automated Demand Response

OpenADR 2.0

Barry Haaser
Managing Director

Agenda

- *12 noon - 1:00 pm* Lunch

- *1:00 - 2:00 pm* Introduction to OpenADR
  - OpenADR History & Overview
  - OpenADR 2.0 Profile Specifications
  - Testing & Certification
  - Product Availability

- *2:00 – 2:30 pm* Break

- *2:30 – 4:00 pm* OpenADR Programs and Implementations
  - OpenADR Program Support
  - Incentive Based
  - Time Based
  - Implementation Examples

- *4:00 pm* Adjourn

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OpenADR Progression

Research initiated by LBNL/ CEC

Official OpenADR specification (v1.0) by LBNL/CEC*

1. **DR 2.0 Pilots** and field trials
- Wholesale markets, ancillary services
- Dynamic pricing, renewable, EVs
- International demonstrations
2. **All end-uses and sectors**

OpenADR 1.0 Commercialization
(PG&E, SCE, and SDG&E)

Pilots and field trials
Developments, tests (Utilities)

2002	to	2006	2007	2008	2009	2010	2011	2012	2013

1. OpenADR Standards Development
  - OASIS (EI TC), UCA, IEC
2. NIST **Smart Grid**, PAP 09

EI 1.0 standards
- OpenADR profiles**

OASIS

1. **OpenADR 2.0** specifications
- International standards (**IEC**)
- **OpenADR 2.0** products/deployments.
2. **USGBC** national pilots
3. **Codes** (CA T24)

Standards Interoperability _Lifecycle_ Process: An iterative development process for a standard to be deployed In markets.***

1. Research and development
2. Pilots and field trials
3. Interoperability standards development
4. Deployment and market facilitation

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1. Foster Adoption
2. Test/Certify (v2.0)

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Understanding OpenADR

- Open Automated Demand Response (OpenADR) provides a non-proprietary, open standardized DR interface that allows electricity providers to communicate DR signals directly to existing customers using a common language and existing communications such as the Internet.
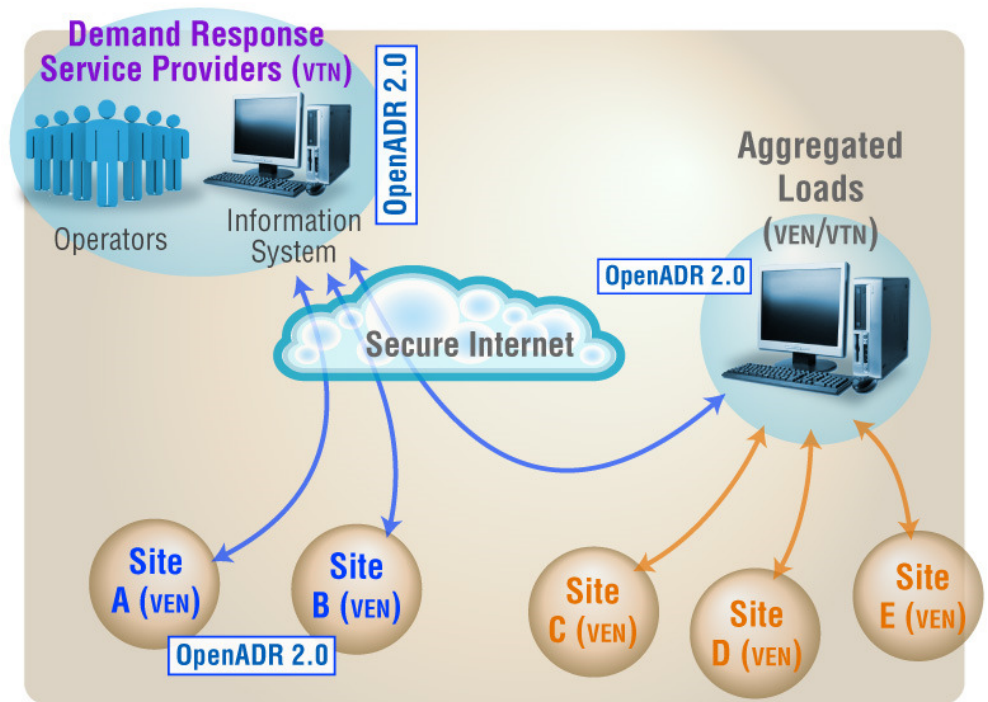
Source: LBNL

OpenADR Deployments

OpenADR Deployments around the World
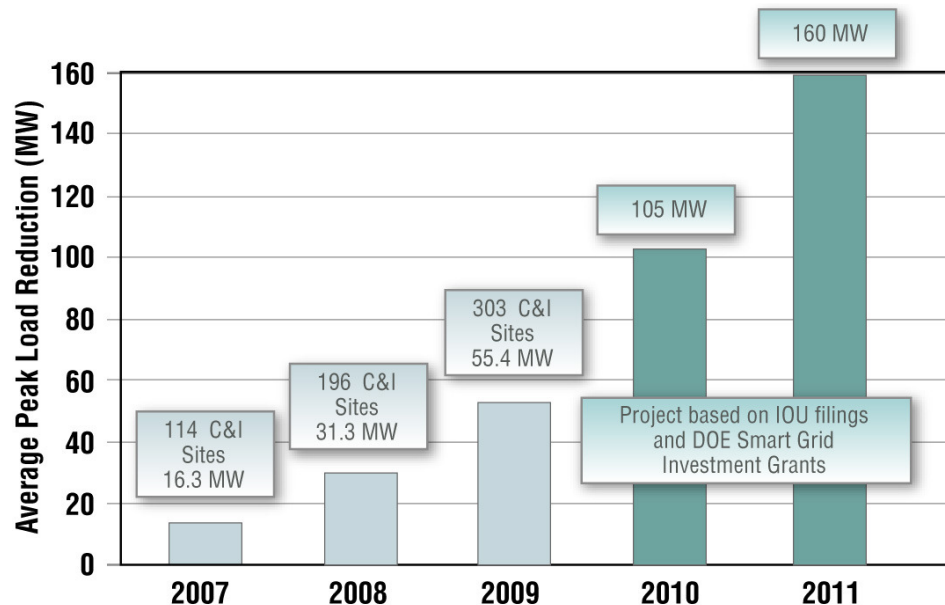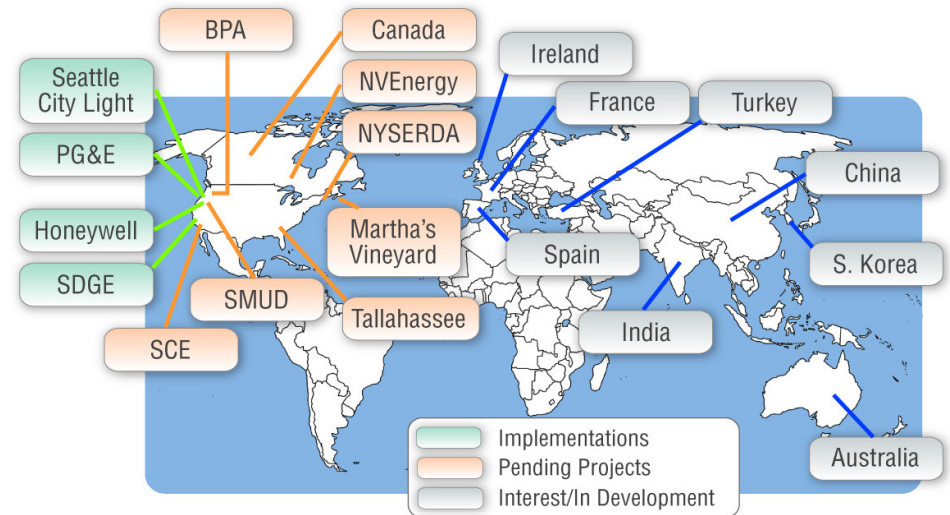
OpenADR Commercial Deployment MW (CA: current enrollment ~260 MW)

OpenADR Deployments

OpenADR 2.0

□ NIST Smart Grid initiative started harmonization project in 2009

□ Priority Action Plans (PAPs) to work on common standards for price models, schedule representation and standard DR Signals (PAP 3, 4 and 9)

□ OpenADR 2.0 uses the standardized output from the above efforts

□ Adds feedback and other price related features
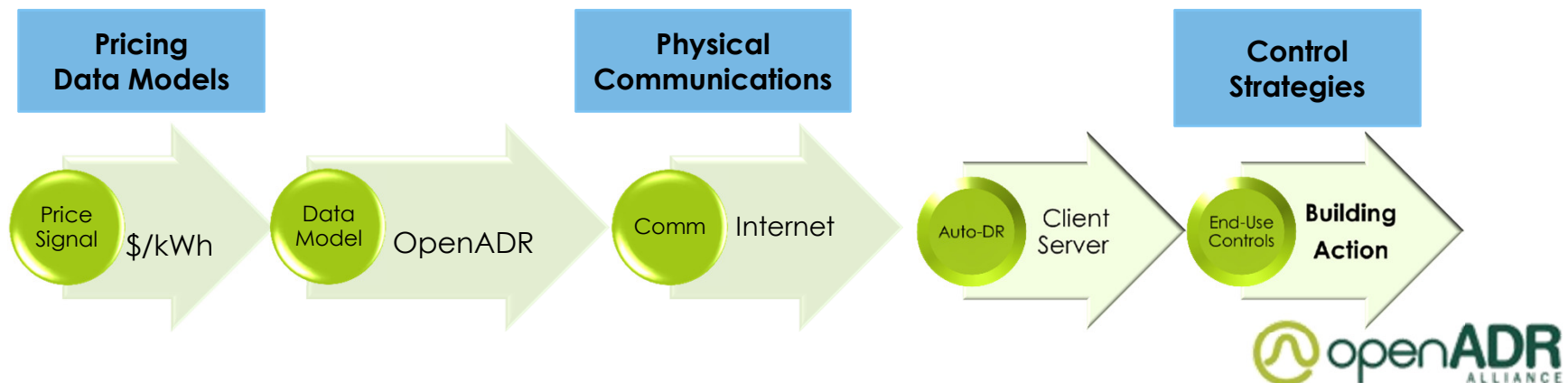
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OpenADR 2.0 Profile Specification

Rolf Bienert
Technical Director

OpenADR 1.0 and 2.0

OpenADR 1.0

- Limited number of vendors

- No certification program

- Geared towards local DR programs

- Not a national or international standard

- Limited to basic DR application

OpenADR 2.0

- Large ecosystem of vendors

- Test tool, test plan & certification

- Flexible to adjust to most DR programs

- Based on OASIS standard

- Expanded architecture to include pricing, telemetry and other services

→ **How did it come together?**

OpenADR Standards Process
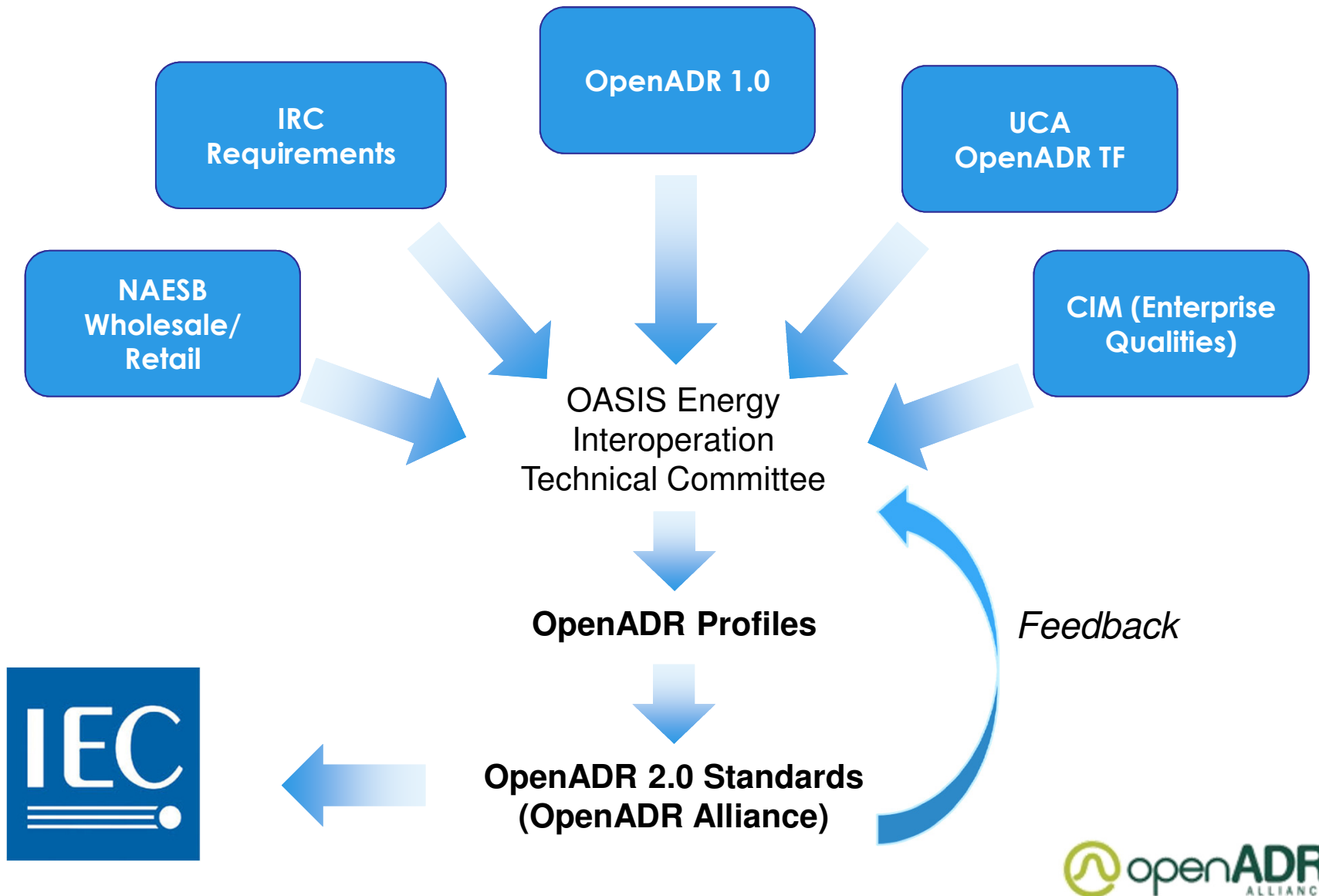
OpenADR 2.0 - OASIS

- Architectural models for
  - Data models for information exchange
  - Information exchange patterns
  - Distributed Energy Resources (DER)

- Use work across Smart Grid domain related to –
  - Price/Reliability DR from OpenADR 1.0
  - Transactive Prices from Energy Market Information Exchange
  - Common schedule from Web Service Calendar (WS-Calendar)
  - NAESB, UCA, ISOs, RTOs, etc.

OpenADR 2.0 - OASIS

- Energy Interoperation Technical Committee (EI TC) works to:
  - Describe information and communication models
  - Define web services

- Create models for –
  - Dynamic price signals
  - Reliability signals
  - Emergency signals
  - Communication re market participation info
  - Load predictability and generation information

OpenADR 2.0 - OASIS

□ OpenADR 2.0 profiles in the EI v1.0

Service	Section	Notes
EiRegisterParty	7.1	Register to identify and receive information
EiQuote	7.2	EiDistributeQuote for distributing dynamic prices (push), other operations for pull including block and tier tariff communication
EiEvent	9	The core event functions and information models
EiReport	10	The ability to set periodic or one-time information on the state of a Resource
EiAvail	11.2	Constraints on the possible time a Resources is available or not
EiOpt	11.3	Overrides the EiAvail; addresses short-term changes in availability
EiEnroll	8	Used to enroll a Resource for participation in Events.
EiMarketContext	12.2	Used to discover program rules, standard reports, etc.

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OpenADR 2.0

- Terminology
  - Server is now a Virtual Top Node (VTN)
  - Client is now a Virtual End Node (VEN)

- Devices can be VTNs, VENs, or combinations thereof
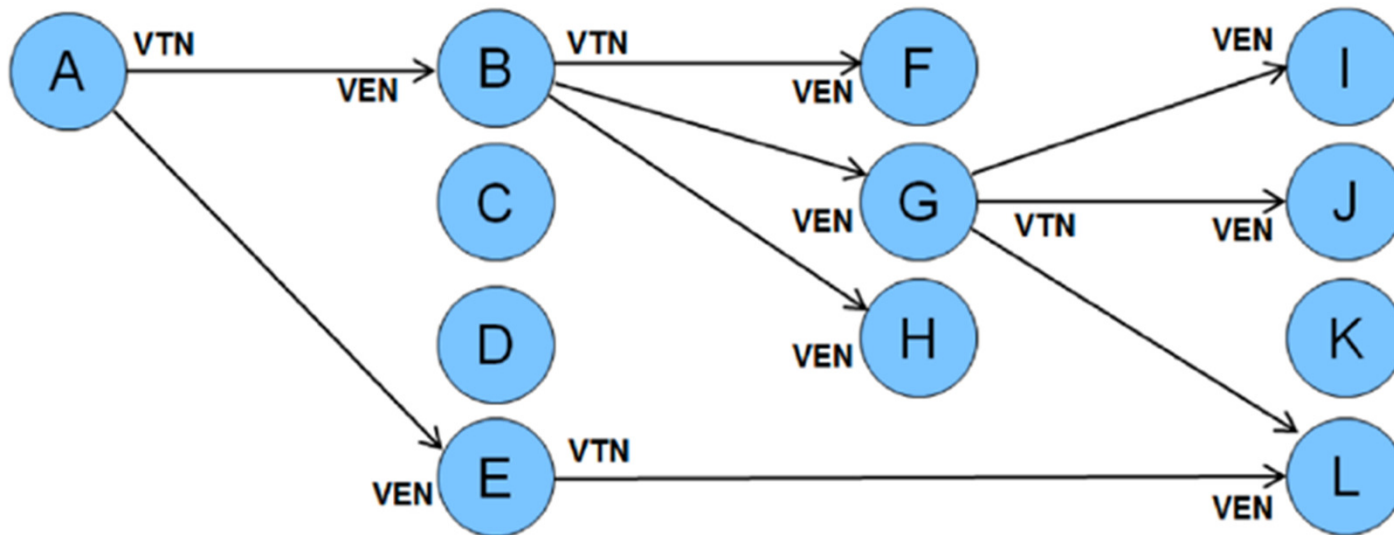
Services

- Web Service like logical request-response services
  - EiEvent Service – Send and Acknowledge DR Events
  - EiOpt Service – Define temporary availability schedules
  - EiReport Service – Request and deliver reports
  - EiRegisterParty Service – VEN Registration, device information exchange

- Each service has a single common endpoint

- XML Payloads – Root element defines service operation

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Services Usage Scenario

VTN

VEN
(C&I, SMB)

VEN registers with VTN

VTN/VEN exchange reporting capabilities

VTN sends event to VEN

VEN opts In to Event

VEN sends temporary availability schedule

VTN requests periodic report from VEN

VEN delivers report to VTN

VTN sends another event to VEN

VEN opts out of event

VEN delivers another report to VTN

VEN cancels temporary availability schedule

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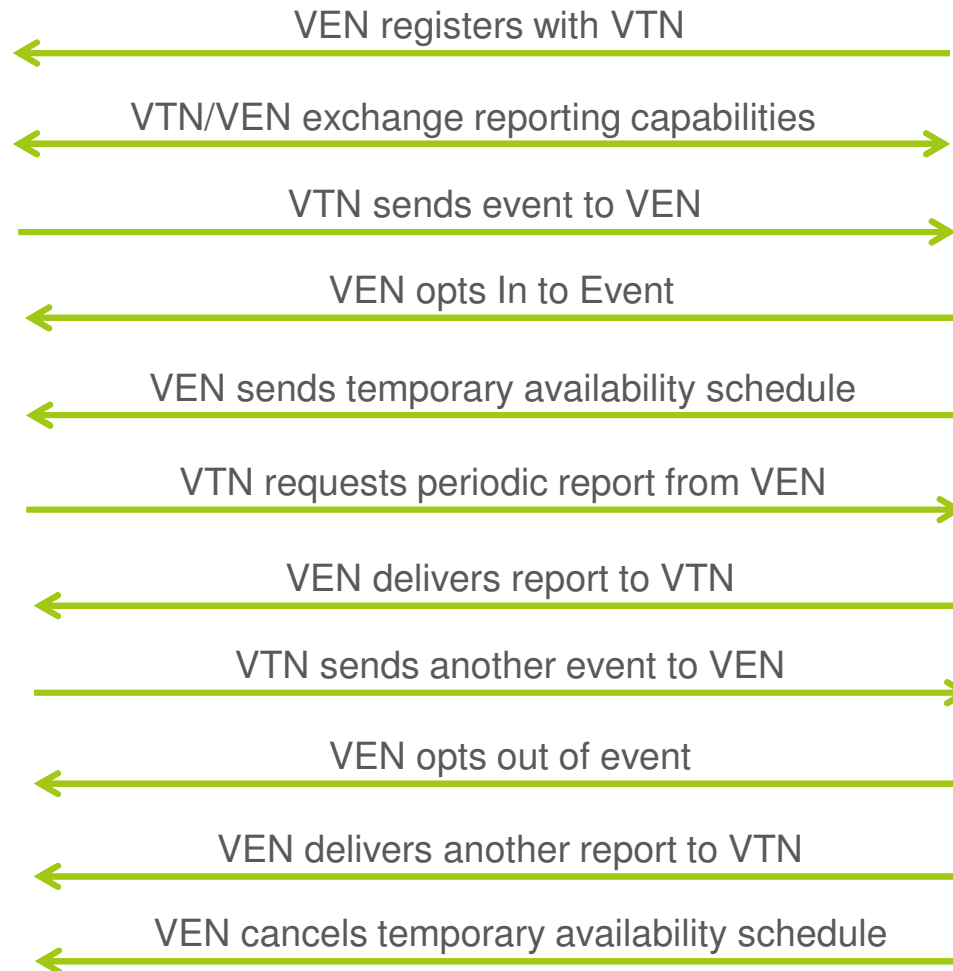
EiEvent Service Payloads

- Initiate demand response events

- oadrRequestEvent
  - VEN requests DR events

- oadrDistributeEvent
  - VTN sends DR events

- oadrCreatedEvent
  - VEN opts in/out of events

- oadrResponse
  - VTN acks VEN opt in/out

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EiOpt Service Payloads

- Communicate temporary availability schedule

- oadrCreateOpt / oadrCreatedOpt
  - VEN sends opt schedule, VTN acks receipt of schedule

- oadrCancelOpt / oadrCanceledOpt
  - VEN cancels opt schedule, VTN acks Cancellation

EiReport Service Payloads

□ Exchange history and telemetry reports

□ oadrRegisterReport / oadrRegisteredReport
  □ Declare available reports, ack receipt of avail reports

□ oadrCreateReport / oadrCreatedReport
  □ Request specific report, ack receipt of request

□ oadrUpdateReport / oadrUpdatedReport
  □ Deliver requested report, ack receipt of report

□ oadrCancelReport / oadrCanceledReport
  □ Cancel requested report, Ack cancellation request

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EiRegistration Service Payloads

- Register VEN with VTN, exchange capabilities information

- oadrCreatePartyRegistration /oadrCreatedPartyRegistration
  - VEN registration request, VTN registration acknowledgement

- oadrCancelPartyRegistration / oadrCanceledPartyRegistration
  - Request cancel registration, Acknowledge Cancelation

- oadrRequestReregistration
  - Request re-registration

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OpenADR 2.0 Profiles
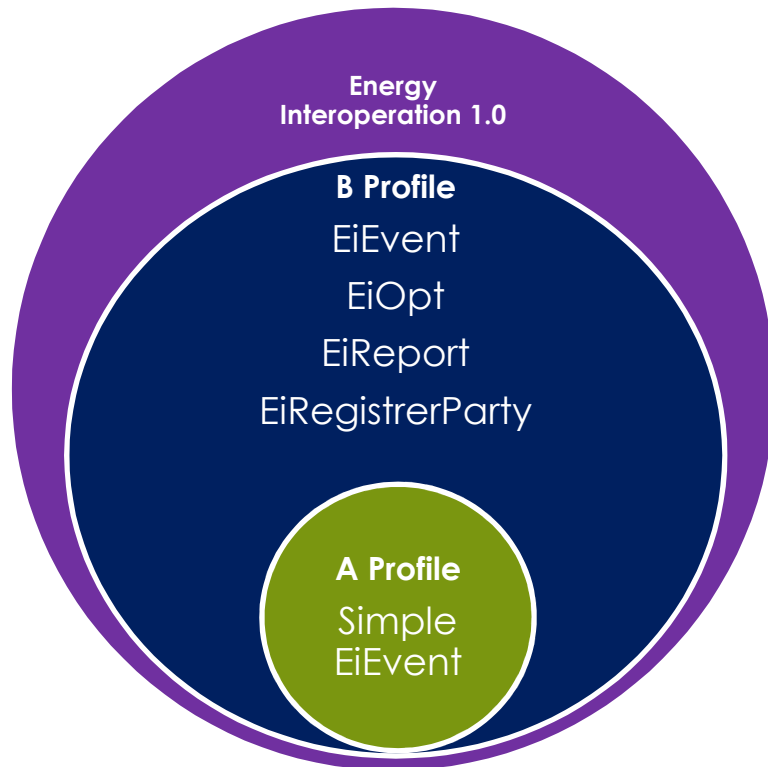
- "A" profile is targeted at limited resource devices and simple DR applications

- "B" profile is targeted at robust devices and sophisticated DR applications

Event Object Characteristics
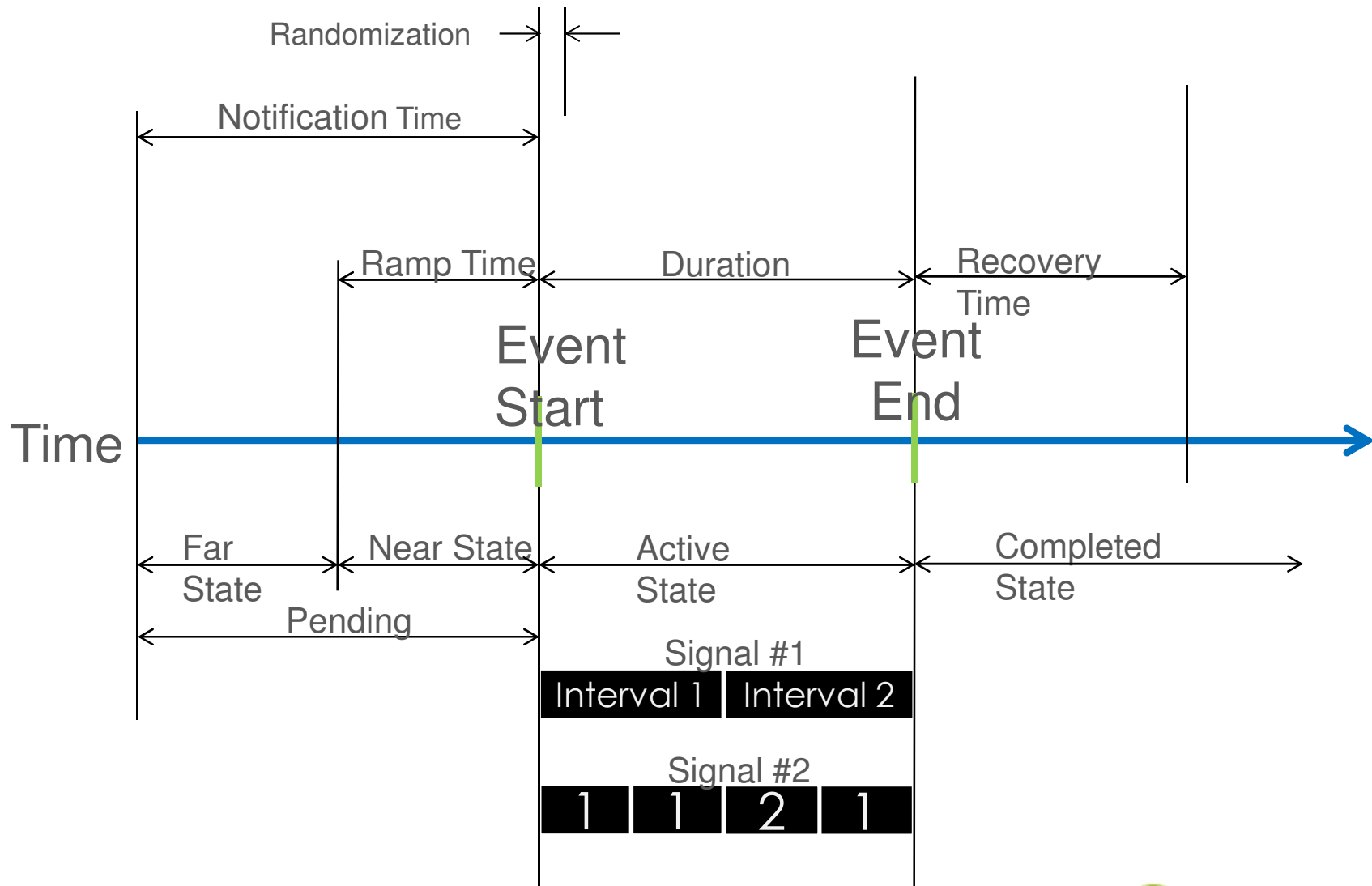
Randomization

Notification Time

Ramp Time   Duration   Recovery Time

Event Start   Event End

Time

Far State   Near State   Active State   Completed State

Pending

Signal #1
Interval 1 | Interval 2

Signal #2
1 | 1 | 2 | 1

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Event Object Characteristics

- Information about the event is contained in 5 groups within the Event object:
  - Event Descriptor– General metadata about the event
  - Active Period – Event start time and overall duration
  - Event Signal(s) – Interval data for the event
  - Event Baseline(s) - Interval data for the baseline
  - Target – resources targeted by the event

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Event Intervals

☐ Intervals carry the actionable information in a DR Event. Example:

	Signal Name Start Time: 10am	Interval 1 20 mins	Interval 2 30 mins	Interval 3 15 mins
Signal 1	SIMPLE (Level)	1 (moderate)	3 (Special)	2 (High)
Signal 2	ELECTRICITY_PRICE (price) CurrencyPerKWh	1.05 (USD)	1.30 (USD)	1.15 (USD)

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Event Targeting Examples

The marketContext specified in the event acts as an overall filter for event targeting

- Target a VEN
- Target a Group
- Target a device class
- Target a service area
- Target a Resource
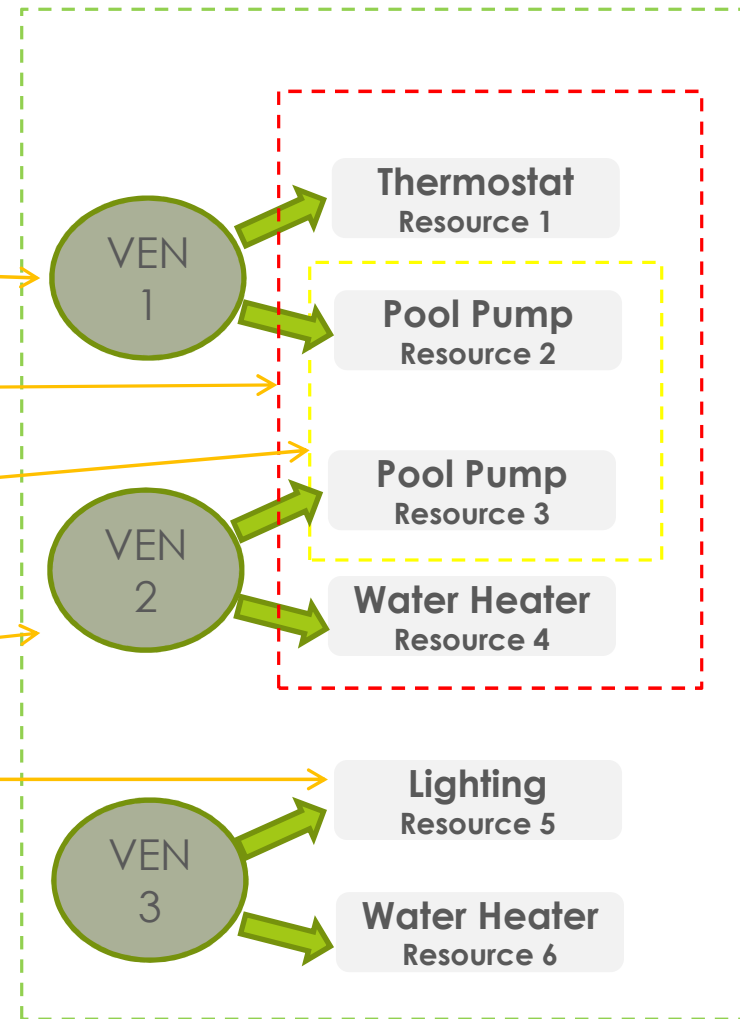
VEN 1
- Thermostat Resource 1
- Pool Pump Resource 2

VEN 2
- Pool Pump Resource 3
- Water Heater Resource 4

VEN 3
- Lighting Resource 5
- Water Heater Resource 6

Certification & Testing

- Alliance created
  - Profile Specification
  - PICS documents
  - Test plan and testing
  - Certification documents
  - Certification test tool

- Test tool built by QualityLogic

- Third party testing performed by Intertek

- Members can obtain test tool for pretesting and do final certification testing at the test lab
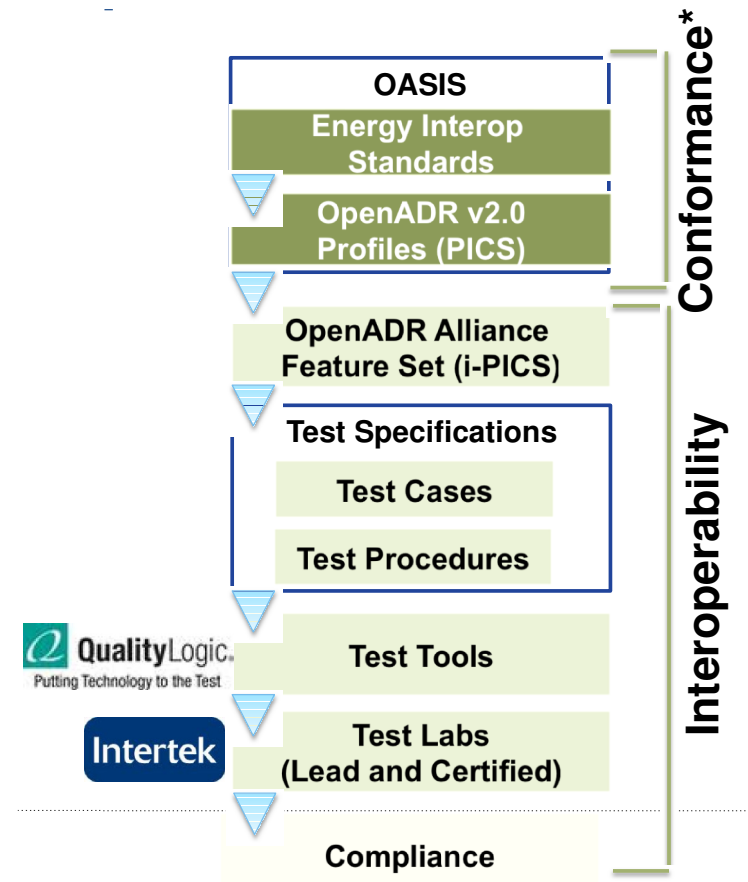
Certification & Testing

	VTN		VEN		
	A	**B**	**A**	**B**	**B (Energy Reporting only)**
Services and Functions Support					
EiEvent					
Limited Profile (2.0a specification)	M	M	M	M	NA
Full Profile	NA	M	NA	M	NA
EiOpt					
Full Profile	NA	M	NA	M	NA
EiReport					
Full Profile	NA	M	NA	M*	M*
EiRegisterParty					
Full Profile	NA	M	NA	M	M
Transport Protocols					
Simple HTTP	M	M	M	O	O
XMPP	O	M	O	O	O
Security Levels					
Standard	M	M	M	M	M
High	NA	O	NA	O	O
M - Mandatory			NA - Not available for profile		
* Optional features available					

- The OpenADR Alliance is working on 2 different feature sets using increasing sets of services and features from EI

- Security: Two Security levels (Standard & High) for the implementer to choose from

- Additional profiles possible in the future

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Certification Process

```
┌──────────────────┐     ┌──────────────────┐     ┌──────────────────┐
│   Manufacturer   │     │   Manufacturer   │     │   Manufacturer   │
│   decides on     │ ──▶ │   uses Spec,     │ ──▶ │  submits to test │
│    Profile       │     │  PICS and test   │     │   lab (Intertek) │
│                  │     │  plan/tool to    │     │                  │
│                  │     │  build product   │     │                  │
└──────────────────┘     └──────────────────┘     └──────────────────┘
                                                            │
                                                            │   ┌──────────────┐
                                                            │   │  ISO 17025   │
                                                            │   │  accredited  │
                                                            │   │ test facility│
                                                            │   └──────────────┘
        ┌───────────────────────────────────────────────────┘
        ▼
┌──────────────────┐     ┌──────────────────┐
│  After passing   │     │   Manufacturer   │
│  test – submit   │ ──▶ │    receives      │
│  documents to    │     │   Certificate    │
│    Alliance      │     │                  │
└──────────────────┘     └──────────────────┘
        │                         │
        │                         │   ┌──────────────┐
┌──────────────┐                  │   │   Phase 1:   │
│   Submits:   │                  │   │ Certification│
│ Declaration  │                  │   │  through the │
│     of       │                  │   │   Alliance   │
│ Conformity,  │                  │   │   Phase 2:   │
│ PICS, test   │                  │   │ ISO Guide 65 │
│   report     │                  │   │  accredited  │
└──────────────┘                  │   │ certification│
                                      └──────────────┘
```

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Development & Test Tool

- Consists of a test harness build-on the Eclipse open source Integrated Development Environment and a set of 4 test suites.

- The test suites provide coverage for the two device types (VTN and VEN) and the two message exchange patterns (push and pull)

- Each 2.0a test suite consists of approximately 40-60 test cases covering positive, negative and functional test scenarios. About 200 test cases for 2.0b

- When a test is run, the test harness plays the role opposite that of the device under test.

- Test coverage includes schema validation, validation of all 66 conformance rules, and validation of each test scenarios intent.

- Test reporting includes transaction exchange logs including transport headers and XML payload listings, conformance checks completed, and detailed failure information.

OpenADR 2.0 Documentation

- OpenADR 2.0 Profile Specification
  - Draft for Alliance members, final version public
  - Overview section
  - Definition of feature sets
  - Conformance statements
  - Transport Mechanism
  - Security
  - UMLs
  - Mapping to other SG standard

OpenADR 2.0
Profile Specification

Revision Number: 0.9
Document Status: Working Text
Document Number: 20110712-1

This is a draft specification which will change. Empty sections are currently being worked on and will be added once completed. This draft is not for publication.

NOTE:

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Download OpenADR 2.0a/b Profile Specifications:
http://www.openadr.org

OpenADR 2.0 Documentation

- **Protocol Implementation Conformance Statement (PICS)**
  - Provides mandatory and optional feature statements
  - Creates a bridge to Test Plan

- **Test Plan**
  - Test cases for all operations
  - Security verification

- **Implementers' Guides**
  - Step by step narrative to implement a client and server

  - Coffee Break -

Communication Architecture

- High level architecture

Aggregator

ISO or Utility

C&I, SMB   Residential   C&I, SMB   Residential
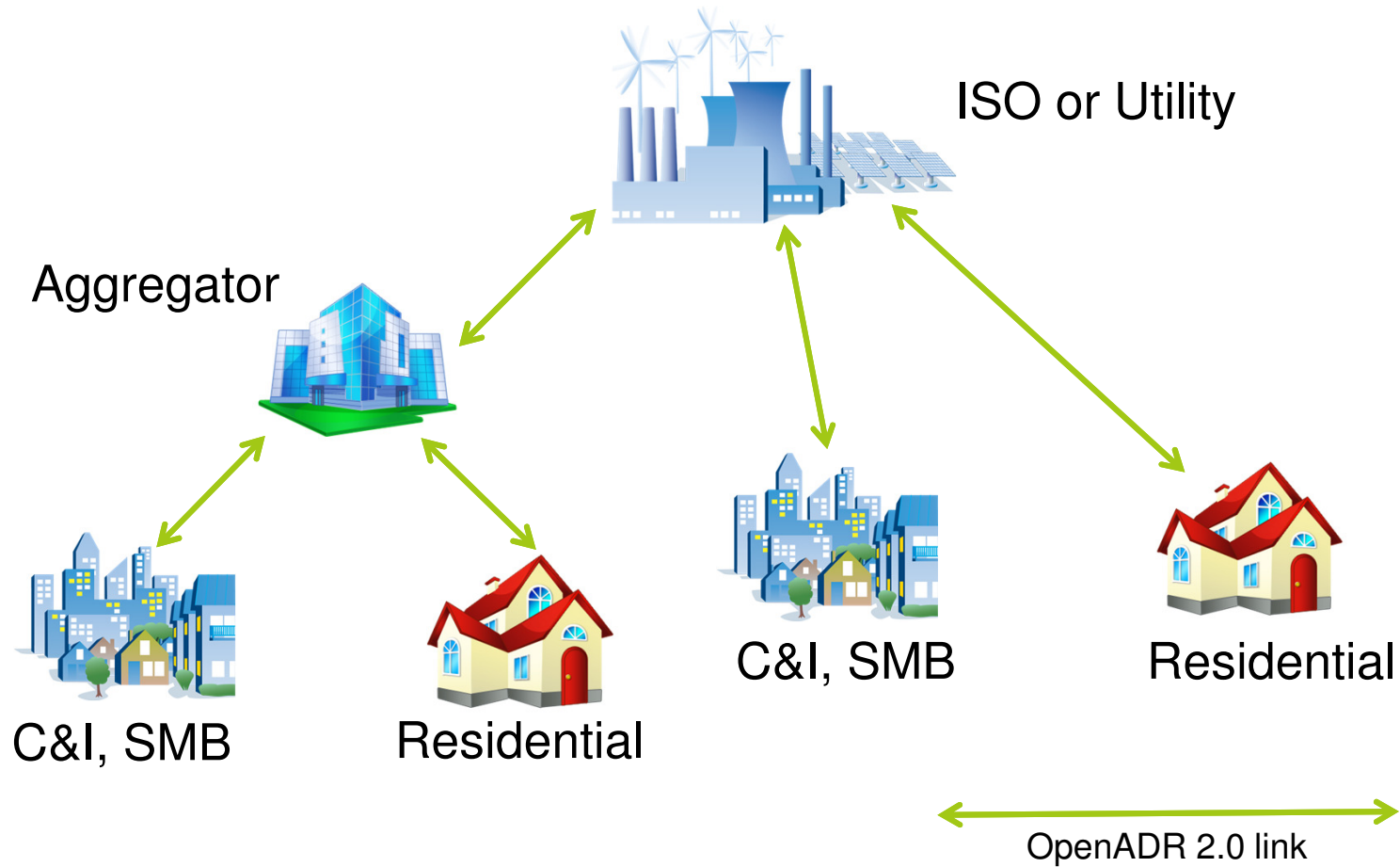
OpenADR 2.0 link

Communication Architecture

- Separation into 3 implementation classes

  - Simple implementations looking to transfer DR event and price information. Low end devices (e.g. thermostats) → OpenADR 2.0**a** profile
  - Higher end implementations adding more complex event and price processes as well as feedback and additional services (e.g. EMS, BAS) → OpenADR 2.0**b** profile

  - "Aggregator" class: ISO to aggregator information exchange → OpenADR 2.0**c**

Profile Architecture

- Transport Protocols

  1. Simple HTTP: Using standard http command. Ideal for pull clients, possible for push but firewall issues need to be taken into account

  2. XMPP: Used in messengers and many other social communication tools. Excels for push applications and fast DR. Pull also possible

- Simple HTTP or XMPP for VEN, both mandatory for VTN
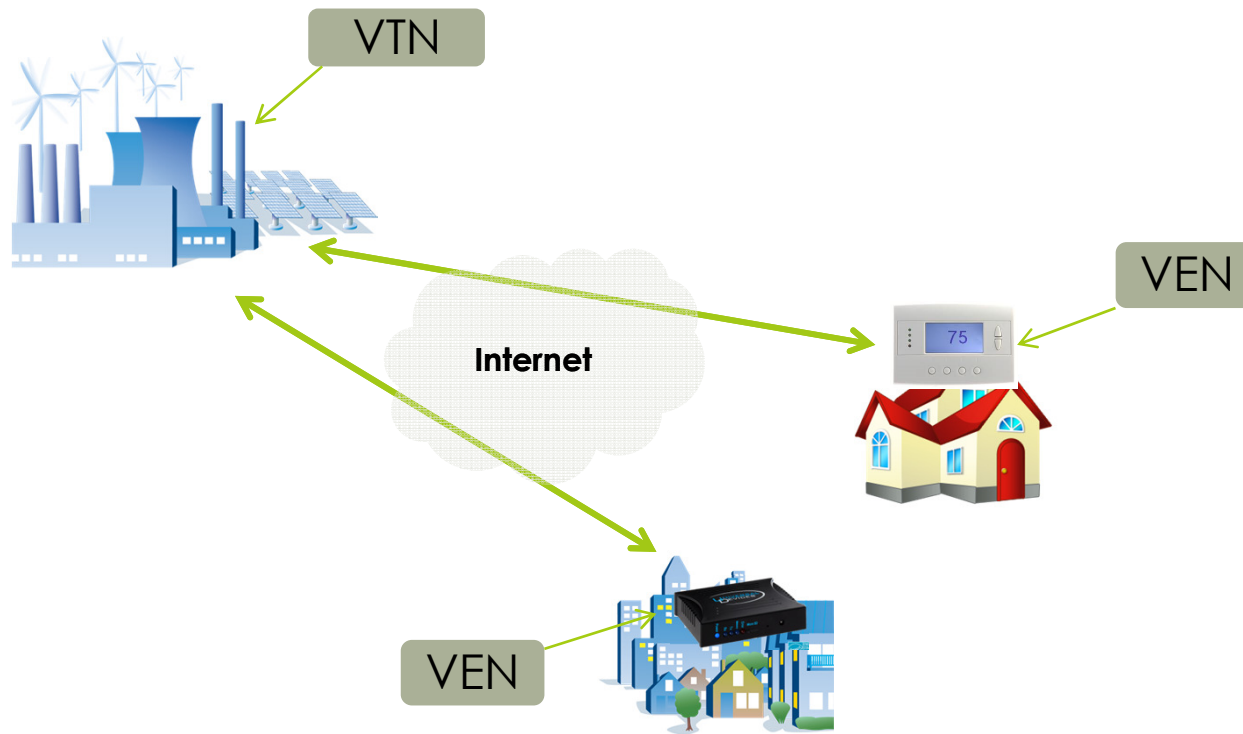
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Profile Architecture

■ Security

1. Standard Security: TLS with server and client side certificates

2. High Security: Standard Security + XML signatures to increase non-repudiation

■ Standard Security mandatory, High Security optional

Implementation configurations

☐ Direct Connect

VTN

VEN

75

Internet

VEN

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Implementation configurations

◻ Direct Connect

VTN

VEN

Internet

VEN
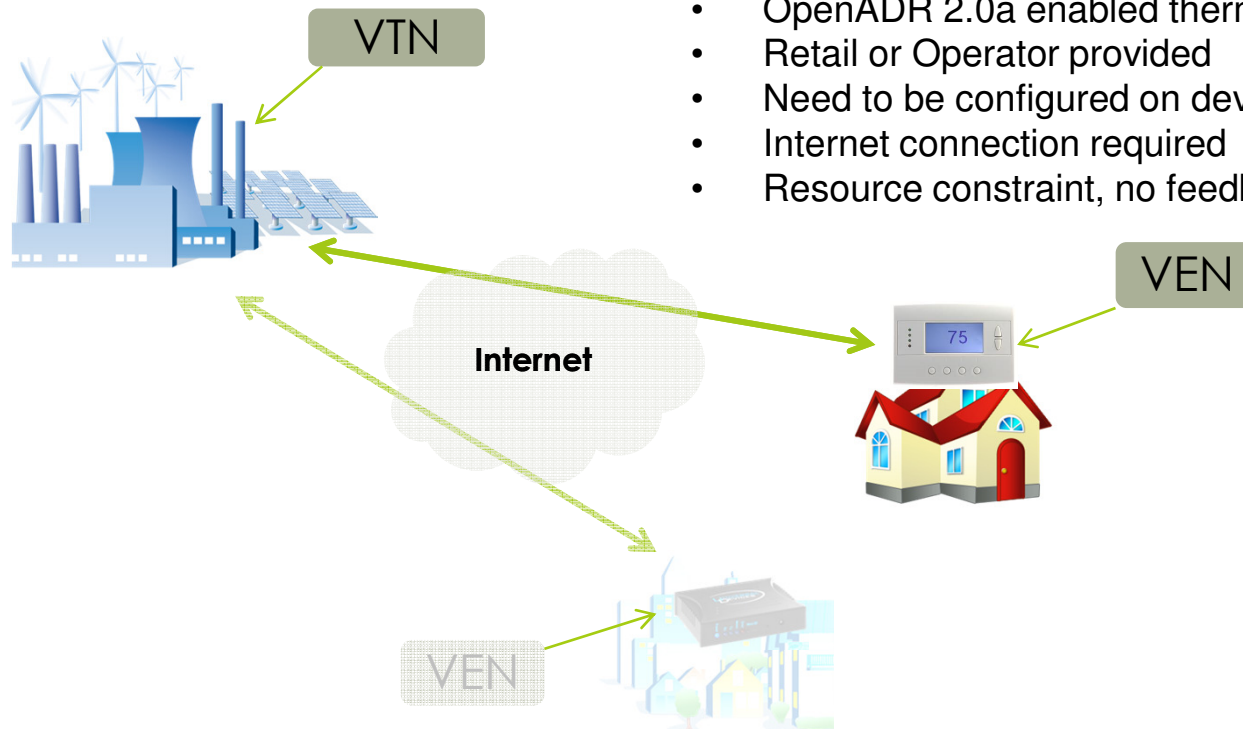
- OpenADR 2.0a enabled thermostat
- Retail or Operator provided
- Need to be configured on device level
- Internet connection required
- Resource constraint, no feedback

75

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Implementation configurations

□ Direct Connect – Cloud Interface (RI)
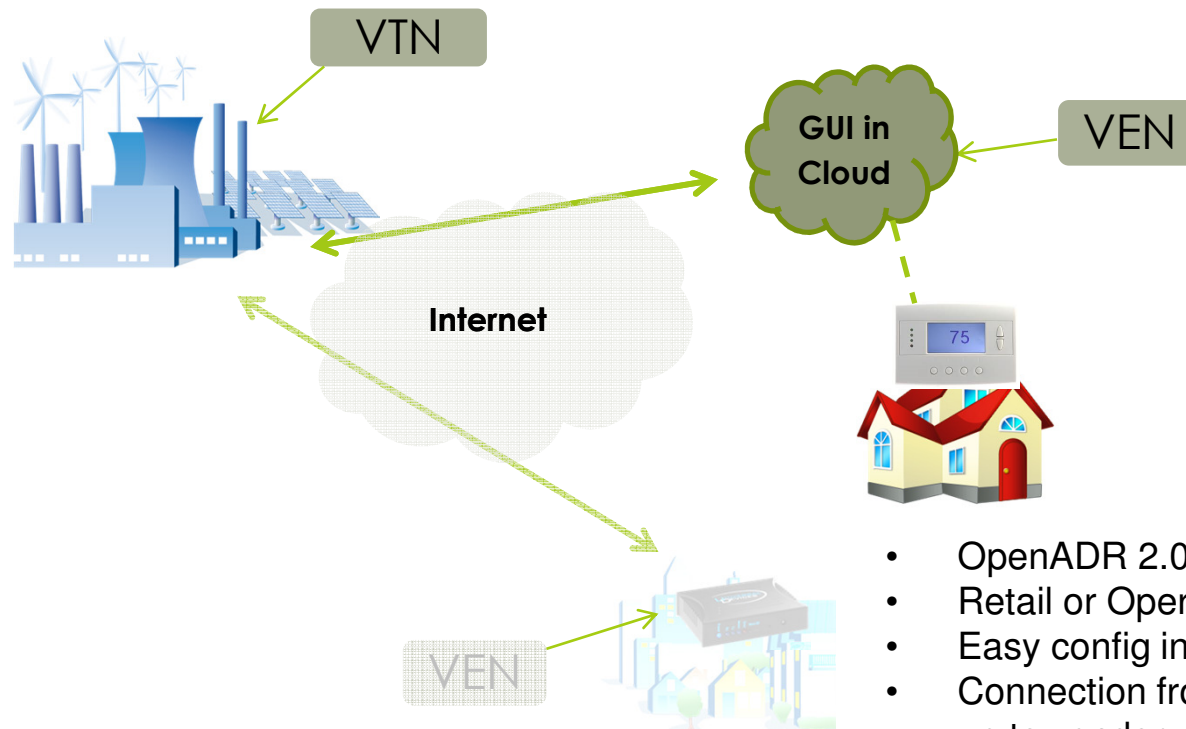
VTN

GUI in Cloud

VEN

Internet

75

VEN

- OpenADR 2.0a or b enabled
- Retail or Operator provided
- Easy config in cloud interface
- Connection from cloud to device up to vendor
- No resource constraints
- Feedback possible

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Implementation configurations

□ With EMS – Energy Management System

VTN

GUI in Cloud or LAN

VEN

ZigBee Wi-Fi etc.
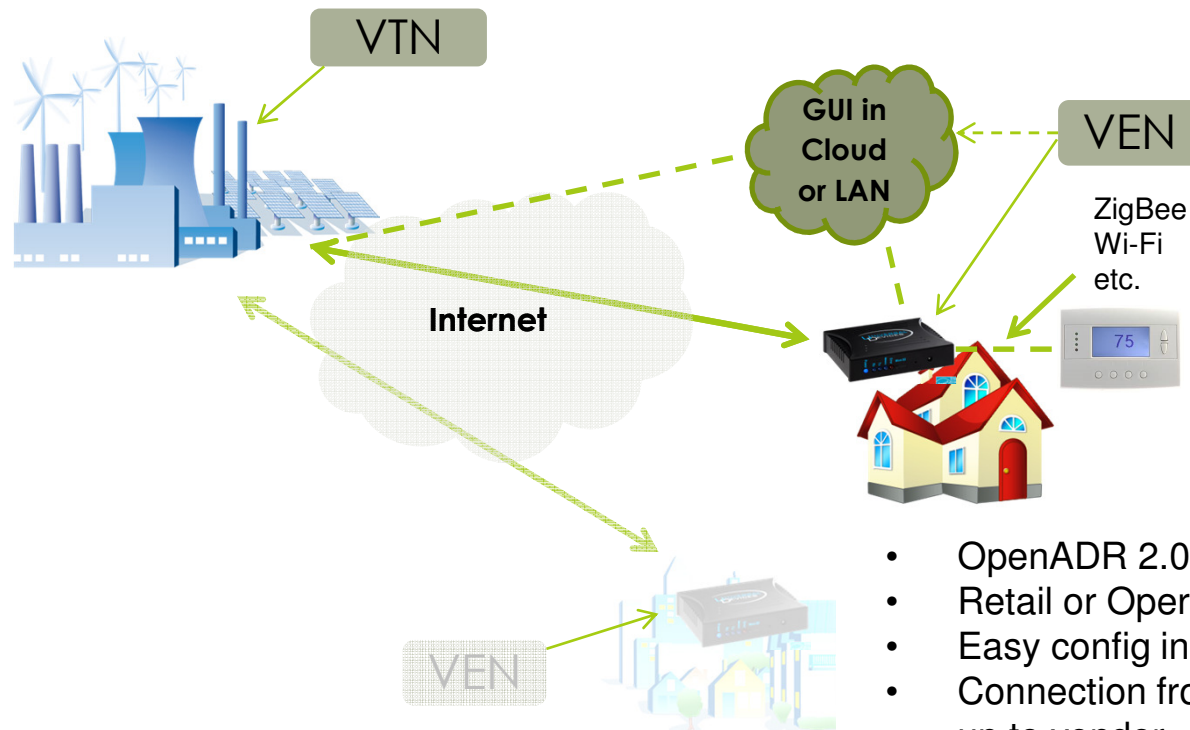
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Internet

VEN

- OpenADR 2.0a or b enabled
- Retail or Operator provided
- Easy config in cloud interface
- Connection from cloud to device up to vendor
- No resource constraints
- Feedback possible

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Implementation configurations

□ Commercial & Industrial

VTN

Internet

VEN

BACnet
LonMark
OpenADR
ZigBee
Wi-Fi
etc.

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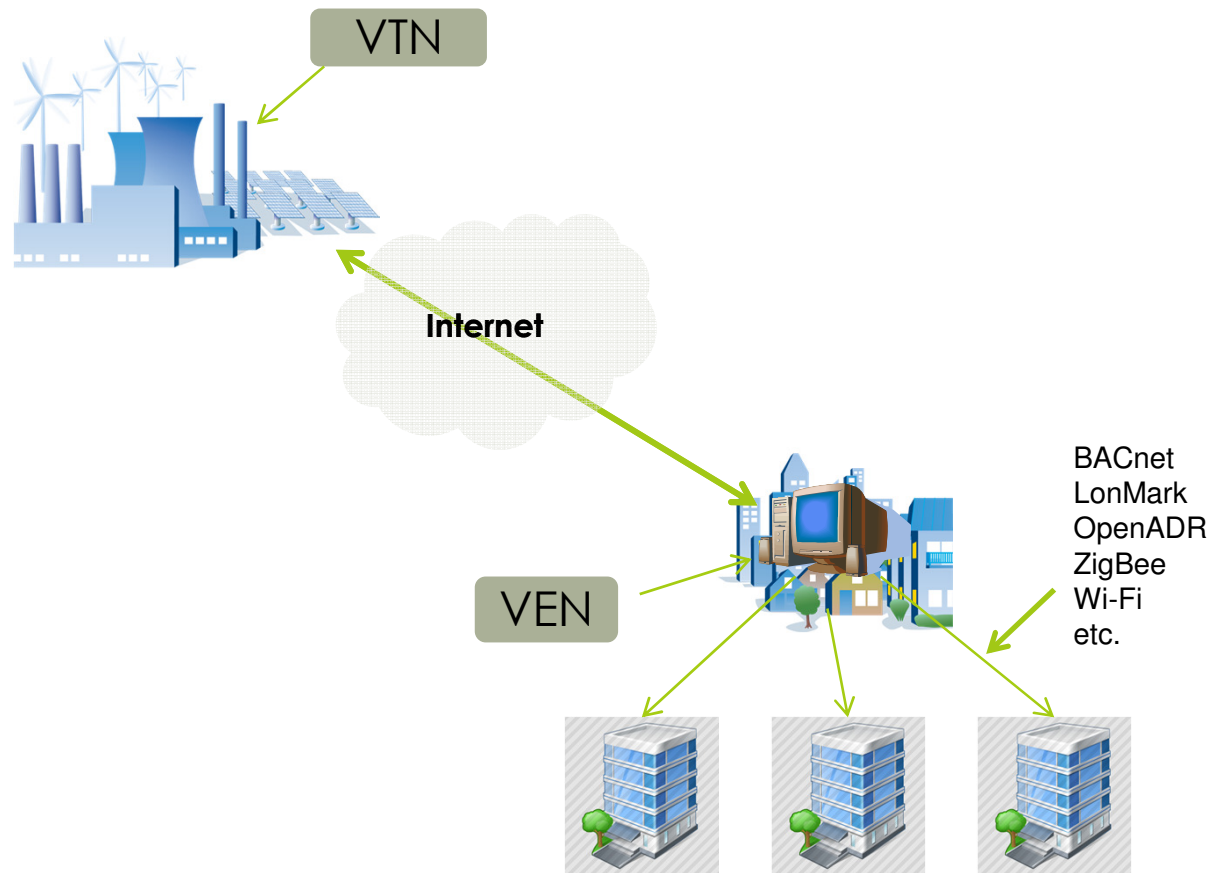
Implementation configurations

□ Aggregator model

Implementation configurations

☐ Aggregator model

VTN

VEN/VTN

Internet

Logical separation

Internet

VEN
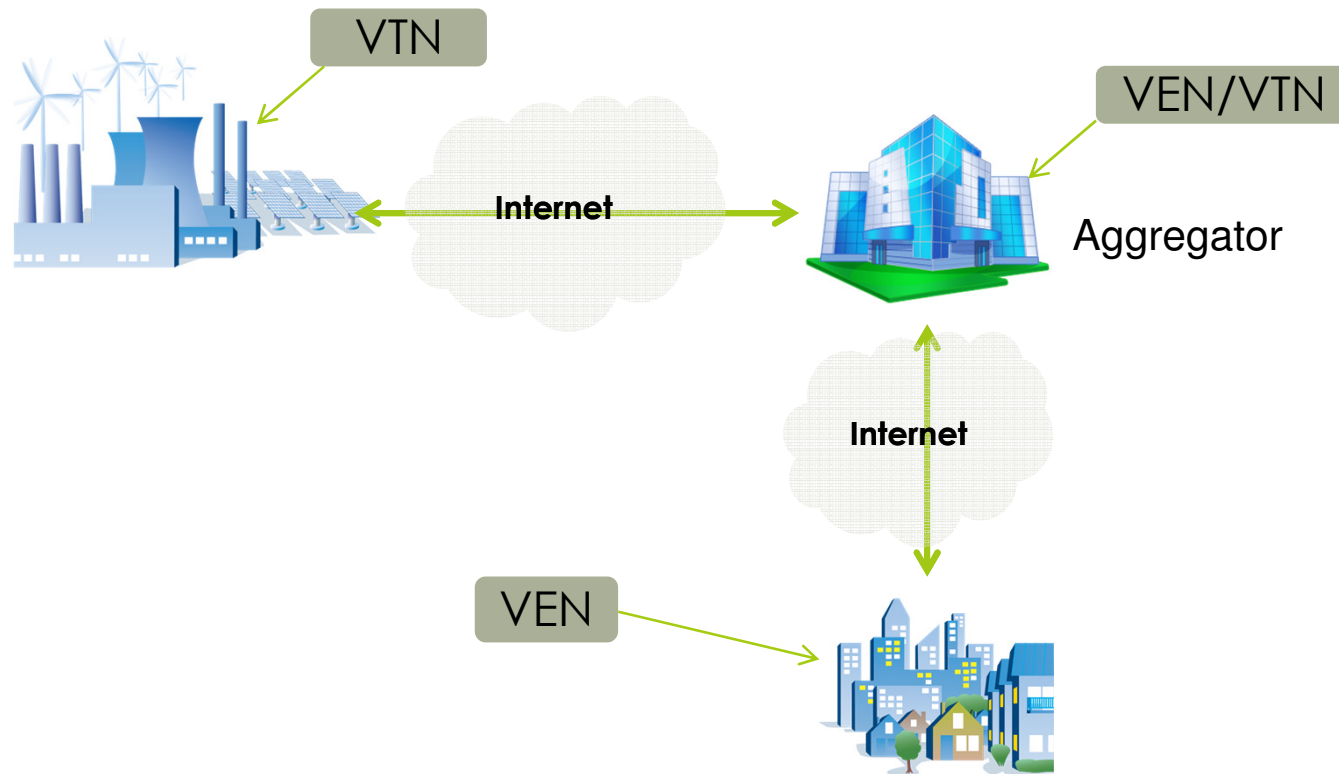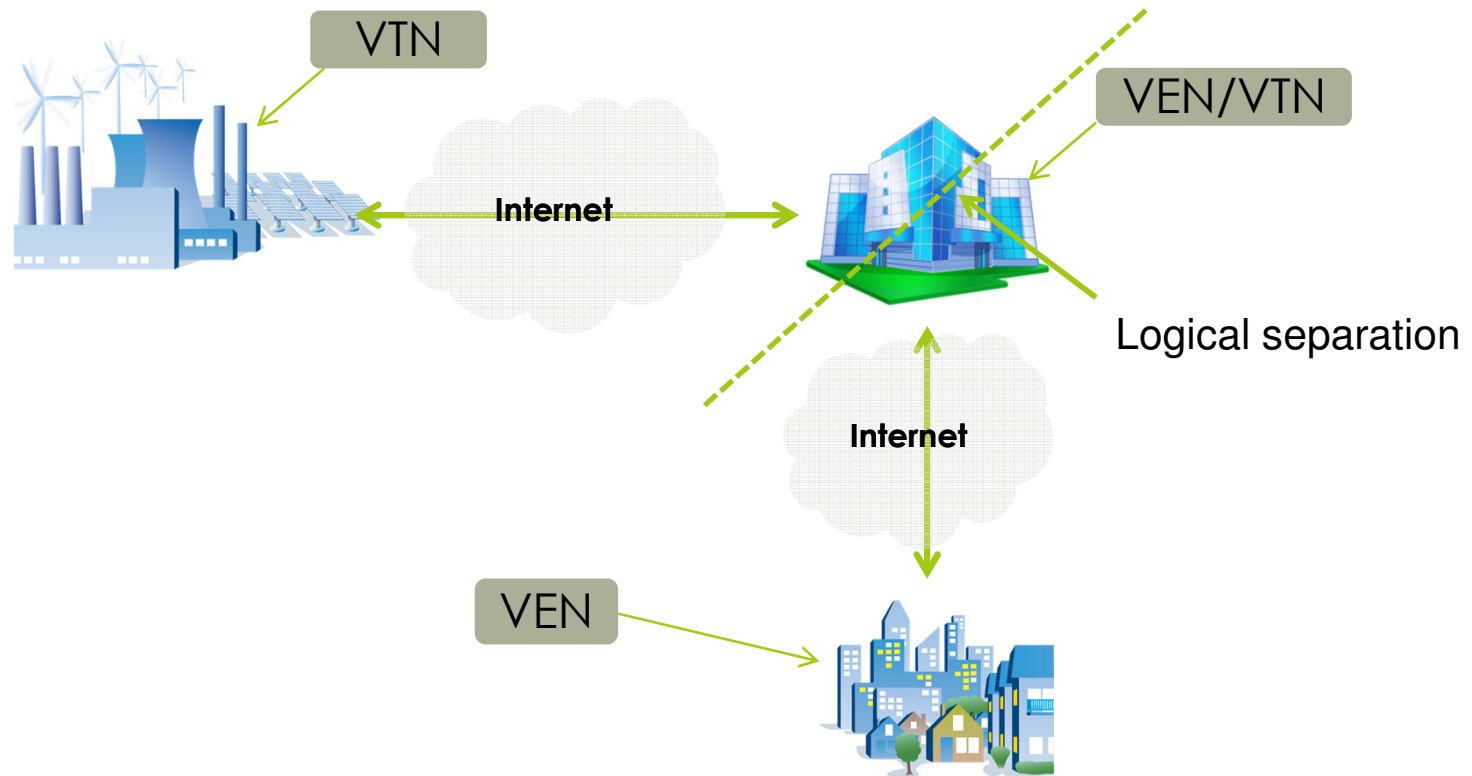
DR Program Support

- **FERC DR programs**
  - ***Incentive Based***
  - Direct Load Control
  - Interruptible Load
  - Critical Peak Pricing with Load Control
  - Load as a Capacity Resource
  - Spinning/Responsive Reserves
  - …..
  - ***Time-Based Programs***
  - Time-of-Use
  - Critical Peak Pricing
  - Real Time Pricing
  - Peak Time Rebate
  - …..

- **Alliance is planning a white paper on program coverage**

DR Program Support

- **Direct Load Control**

  - Covered by OpenADR 2.0a (no feedback)
  - Limited by availability of OpenADR 2.0a load control devices
  - Direct connect to Load control device or HEM
  - Devices likely to be pre-configured
  - No specific device profiles in OpenADR but a basic event response can be discussed

DR Program Support

□ Interruptible Load

- □ Covered by OpenADR 2.0a (no feedback)
- □ Direct connect to Load control device or HEM
- □ Add deployment architectures
- □ OpenADR 2.0b can be used and provides real time feedback and additional granularity of Event management
  - □ Number of events per review cycle
  - □ Dynamic control mechanism

DR Program Support

- **Critical Peak Pricing**

  - Covered by OpenADR 2.0a (no feedback)
  - Direct connect to Load control device or HEM
  - Add deployment architectures
  - OpenADR 2.0b can be used and provides real time feedback and additional granularity of Event management
  - Dynamic control mechanism
  - Pricing information

DR Program Support

- Load as a Capacity Resource

  - OpenADR 2.0b with real time feedback and enhanced Event management

DR Program Support

□ Spinning/Responsive Reserves

    □ Fast DR – Response in seconds

    □ Push scenarios

    □ OpenADR 2.0a in Push mode

    □ OpenADR 2.0b in Push mode with feedback

DR Program Support

- **Non-Spinning Reserves**

  - Covered by OpenADR 2.0a (no feedback)
  - Direct connect to Load control device or HEM
  - Add deployment architectures
  - OpenADR 2.0b can be used and provides real time feedback and additional granularity of Event management
    - Number of events per review cycle
    - Dynamic control mechanism

OpenADR, Dynamic and TOU Prices

- ◻ OpenADR 2.0 client and interfaces

- ◻ Dynamic Pricing: Customer does not know their electricity prices more than a day in advance.
  - ◻ RTP, Peak Pricing (e.g., CPP, PDP)

- ◻ TOU Pricing: Customer knows their electricity prices more than a day in advance, though the prices can vary over time.

Utility / ISO Operator Interfaces		Standalone DRAS w/ Participant Operator Interfaces		DRAS Client Interfaces
Utility or ISO Operator GUI		**OpenADR API (Data Models)**		**OpenADR Client**
Program Operator - Web Client to DRAS **Utility Information Systems**	←→ Secure Internet	**Participant Manager** - Interfaces via DRAS UI - Notifications **3rd. Party Notifications DR Program Profiles Mapping Structure**	←→ Secure Internet	**OpenADR Clients** - Simple Client Information - Smart Client Information **End-Use Sectors** - Commercial and Industrial

Excerpted from LBNL Report

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Dynamic and TOU Pricing Elements

☐ Existing Dynamic Pricing Programs

☐ Dynamic Pricing Sources:

Pricing Structure	Source of Prices Used for Technology Demonstration
Real Time Pricing (RTP)	**CAISO's Wholesale Energy Market Prices**
Peak Pricing	**PG&E's PDP Retail Rates**
Time-of-Use (TOU) Pricing	**PG&E's PDP Retail Rates**

☐ Market-based real-time prices

    ☐ Static (Operator manual entry) interface

    ☐ CAISO real-time market Internet Feeds (OASIS)

☐ Retail Peak Pricing and TOU rates

    ☐ PG&E, SCE, and SDG&E DR programs (CPP and PDP)

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Dynamic Pricing Architecture

☐ Uses OpenADR v1.0 structure

☐ RTP Elements: CAISO OASIS real-time Internet feeds.

Utility / ISO Operator OpenADR Interface	**Standalone OpenADR System**	**OpenADR Client Interface**

Utility or ISO Operator GUI

Dynamic Pricing Models
- RTP
- Peak Price (PDP)
TOU Pricing Model.

OpenADR API (Data Models)

Web Services
Dynamic Pricing Profiles
Mapping Structure

OpenADR Client

Supported OpenADR Clients
- Simple Client Information
- Smart Client Information
End-Use Sectors
- Commercial and Industrial
- Residential, etc.

Secure Internet

Secure Internet

Real-time Internet Feeds via CAISO OASIS

Market Electricity Prices
- DA 24-hr Hourly Prices
- DO 15-mi Hourly Prices

Participant Operator Interface: MySite

Supported Functions
- View Scheduled Events
- Track Dynamic Prices
- Configure Mapping Structure
- Receive Event Notification

Excerpted from LBNL Report

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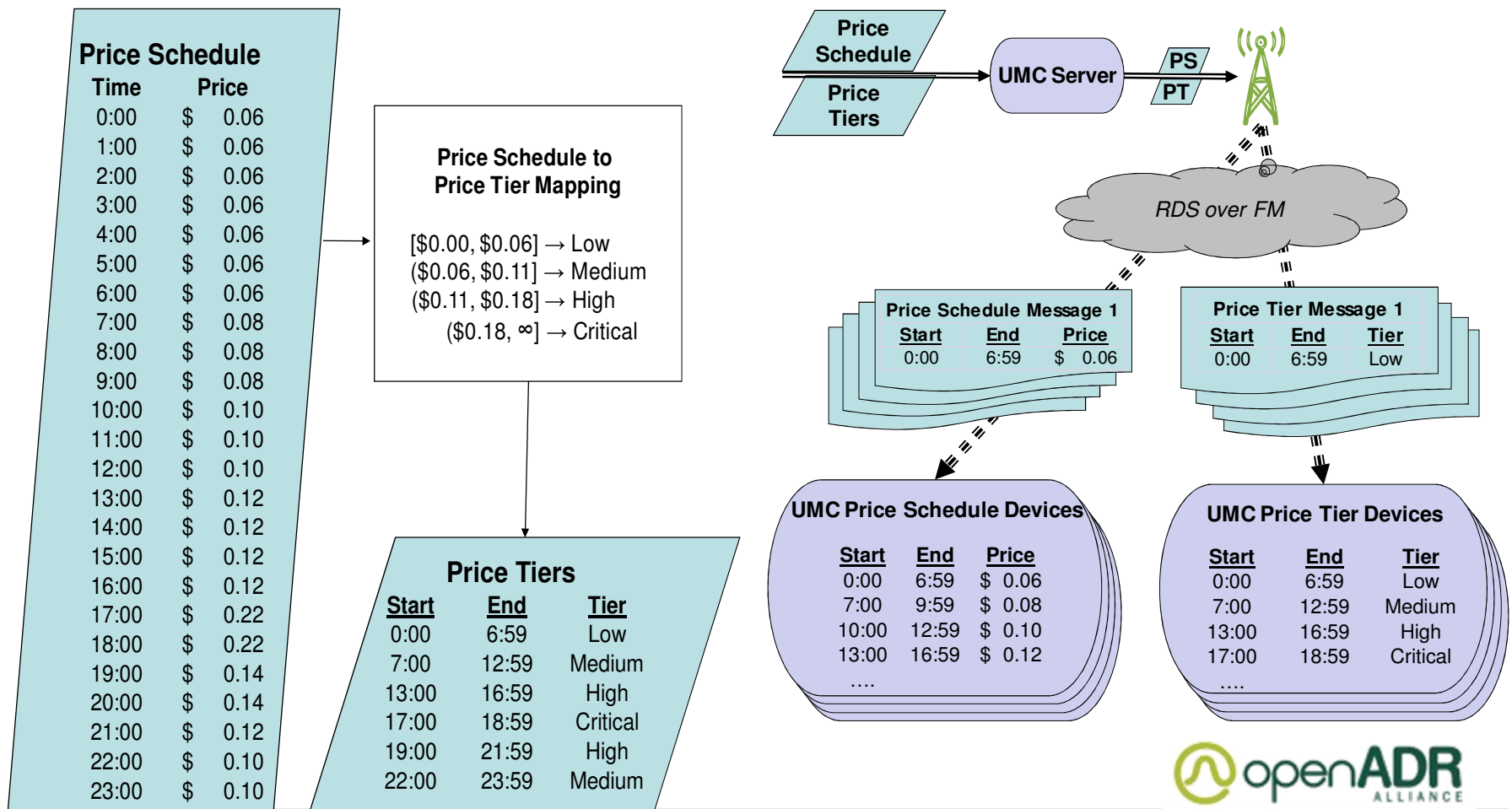
Dynamic Pricing Mapping Strategies

☐ OpenADR concepts for C&I and residential facilities to map Smart-to-Simple Client Information.

☐ <u>Scenario 1:</u> Absolute mapping of price ranges to operation modes.

   ☐ Demonstrations complete: SMUD and EPRI.

☐ <u>Scenario 2:</u> Relative mapping of prices to operations modes.

   ☐ Concept: Customized dynamic price response strategies to varying prices.

Absolute Mapping: Demonstrations

- SMUD: Residential (RDS/FM)
  - Hourly Price Schedule to Price Tier mapping developed

Price Schedule

Time	Price
0:00	$ 0.06
1:00	$ 0.06
2:00	$ 0.06
3:00	$ 0.06
4:00	$ 0.06
5:00	$ 0.06
6:00	$ 0.06
7:00	$ 0.08
8:00	$ 0.08
9:00	$ 0.08
10:00	$ 0.10
11:00	$ 0.10
12:00	$ 0.10
13:00	$ 0.12
14:00	$ 0.12
15:00	$ 0.12
16:00	$ 0.12
17:00	$ 0.22
18:00	$ 0.22
19:00	$ 0.14
20:00	$ 0.14
21:00	$ 0.12
22:00	$ 0.10
23:00	$ 0.10

Price Schedule to Price Tier Mapping

[$0.00, $0.06] → Low
($0.06, $0.11] → Medium
($0.11, $0.18] → High
($0.18, ∞] → Critical

Price Tiers

Start	End	Tier
0:00	6:59	Low
7:00	12:59	Medium
13:00	16:59	High
17:00	18:59	Critical
19:00	21:59	High
22:00	23:59	Medium

Excerpted from LBNL Report

Price Schedule
Price Tiers
UMC Server
PS
PT

RDS over FM

Price Schedule Message 1

Start	End	Price
0:00	6:59	$ 0.06

Price Tier Message 1

Start	End	Tier
0:00	6:59	Low

UMC Price Schedule Devices

Start	End	Price
0:00	6:59	$ 0.06
7:00	9:59	$ 0.08
10:00	12:59	$ 0.10
13:00	16:59	$ 0.12
….		

UMC Price Tier Devices

Start	End	Tier
0:00	6:59	Low
7:00	12:59	Medium
13:00	16:59	High
17:00	18:59	Critical
….		

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Absolute Mapping: Demonstrations

◻ EPRI: C&I and Residential

◻ Mapping criteria for "price multiplier" to price

Price Multiplier (Current Price Multiplier field)	Price ($/kW)	Subroutine	Description
1 or if there is no event and if no information is provided in the current price multiplier variable	Base Price $0.10		Do nothing!
2	$0.20 and < $0.40	Moderate Shed Event	The client should execute a subroutine that sheds 25% of the controllable loads in your test setup
4	$0.40 or >	High Shed Event	The client should execute a subroutine that sheds 75% of the controllable loads in your test setup

*$/kW (Display) = CurrentPriceMultiplier (CPP) * Base Price*

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Ancillary Services Challenges

- ISOs need cleaner, more responsive and location-optimized resources than fossil-based generation for ancillary services

- Market players need a favorable regulatory framework to participate in ancillary services markets – momentum underway

- Utilities need a standards-based, market-driven solution to leverage a vibrant population of customer-owned assets

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OpenADR Meets A/S Needs

Ancillary Services Requirements	OpenADR Capabilities
High scalability, low latency data transport	Web Services architecture
Clear knowledge of participating assets	Secure transport, Registration Service
Flexible event notification	Event Service Cost of energy/demand, customer bid levels, load dispatch/control % requests
Telemetry feedback	Reporting Service Metadata, historical & real-time resource status, forecasts, baselines
Knowledge of short-term changes in asset availability	Opt/Override Service

Enabling a Diverse Market of A/S Solutions

- ☐ OpenADR's formal certification process ensures compliance and product interoperability

- ☐ Market already offers a host of certified products, with a growing list of vendors in the queue

OpenADR solutions can serve all DR markets, including Ancillary Services

Enabling The Standard for Automated Demand Response

OpenADR 2.0

Barry Haaser
Managing Director

What is the OpenADR Alliance?

□ Member-based organization comprised of a diverse set of industry stakeholders interested in fostering global OpenADR adoption

□ Supports development, testing, and deployment of OpenADR technologies across a broad range of services (i.e. real time demand markets)

□ Leverages Smart Grid-related standards efforts from NIST SGIP, OASIS, UCAIug and NAESB (Spell out in footnote)

□ Enables stakeholders to participate in automated DR, dynamic pricing, and electricity grid reliability

Vision Statement

Facilitate the global deployment of OpenADR to reduce the cost of supplying and consuming electricity, while improving energy reliability and reducing environmental impact.

OpenADR Mission

The mission of the OpenADR Alliance is to foster global development, adoption, and compliance of Open Automated Demand Response (OpenADR) standards through collaboration, education, testing, and certification.

Alliance Goals

- Coordination with standards organizations for development of OpenADR technologies

- Implementation of global testing and compliance

- Education on the standards, implementation, policy and markets

- Adoption and market acceptance and of OpenADR

> Enabling Global Scaling of Automated Demand Response To Meet Generation Needs for Peak and Renewable Integration

Sponsor Members

Contributor Members

Adopter Members

Membership Options

- ☐ **Sponsor** membership is extended to industry stakeholders that strongly support the vision, mission, and activities of the OpenADR Alliance who wish to serve on the Board of Directors

- ☐ **Contributor** membership is open to any vendor organization offering hardware, software or services

- ☐ **Adopter** membership is open to organizations such as consumer and government organizations, research agencies, and regulatory bodies not otherwise classified as a vendor community or manufacturer of products, systems, or components

Benefits for You!

- Larger ecosystem of vendors → greater variety

- Different product types to include OpenADR 2.0

- DER systems that are OpenADR 2.0 ready

- Interoperability through testing and certification
  - Look for OpenADR Certified products

- Defined use cases for easier adoption

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Status & Standardization

- Simple Profile completed – OpenADR 2.0a

- Test tool completed for 2.0a

- Finalizing b profile for complex devices with feedback

- Completing NIST SGIP process to add OpenADR to Catalog of Standards

- Pursuing IEC for global standardization

- Expanding presence in Japan through 10 members, Japan Ambassador and Intertek

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2.0a Certified Products

Virtual Top Nodes (VTNs)

- Demand Response Automation Server (DRAS) **Honeywell**
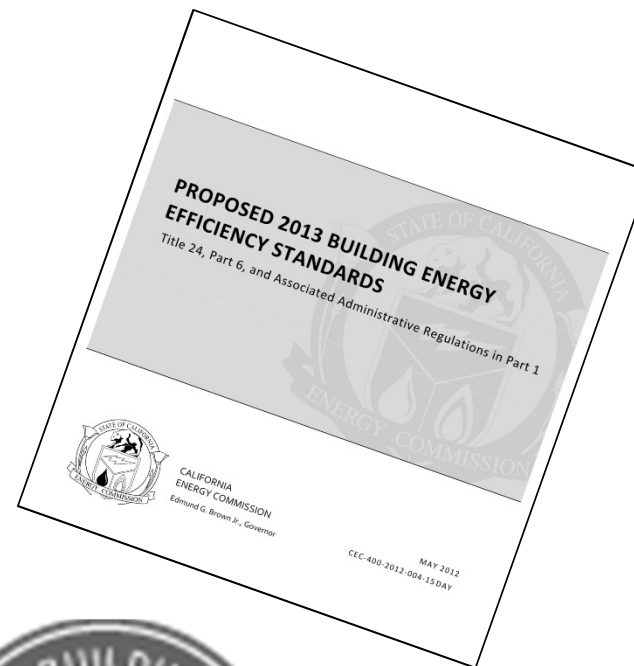
- Energy Interop Server & System (EISS) IPkeys

- AutoGrid DROMS AutoGrid

Virtual End Nodes (VENs)

- Site Server ENERNOC

- EISSBox IPkeys

- ISY99i Z Series UNIVERSAL DEVICES

- Swarm Energy Management REGENENERGY

http://www.openadr.org/certified-products

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Regulatory Changes

- California building energy standards - Title 24

- LEED Credit for Demand Response

PROPOSED 2013 BUILDING ENERGY
EFFICIENCY STANDARDS
Title 24, Part 6, and Associated Administrative Regulations in Part 1

CALIFORNIA
ENERGY COMMISSION
Edmund G. Brown Jr., Governor

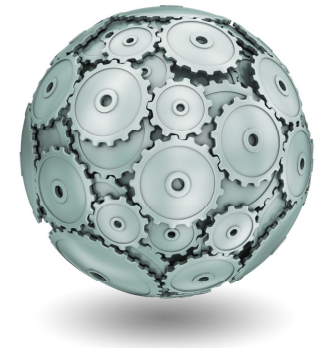MAY 2012
CEC-400-2012-004-15 DAY

Large Market Opportunity
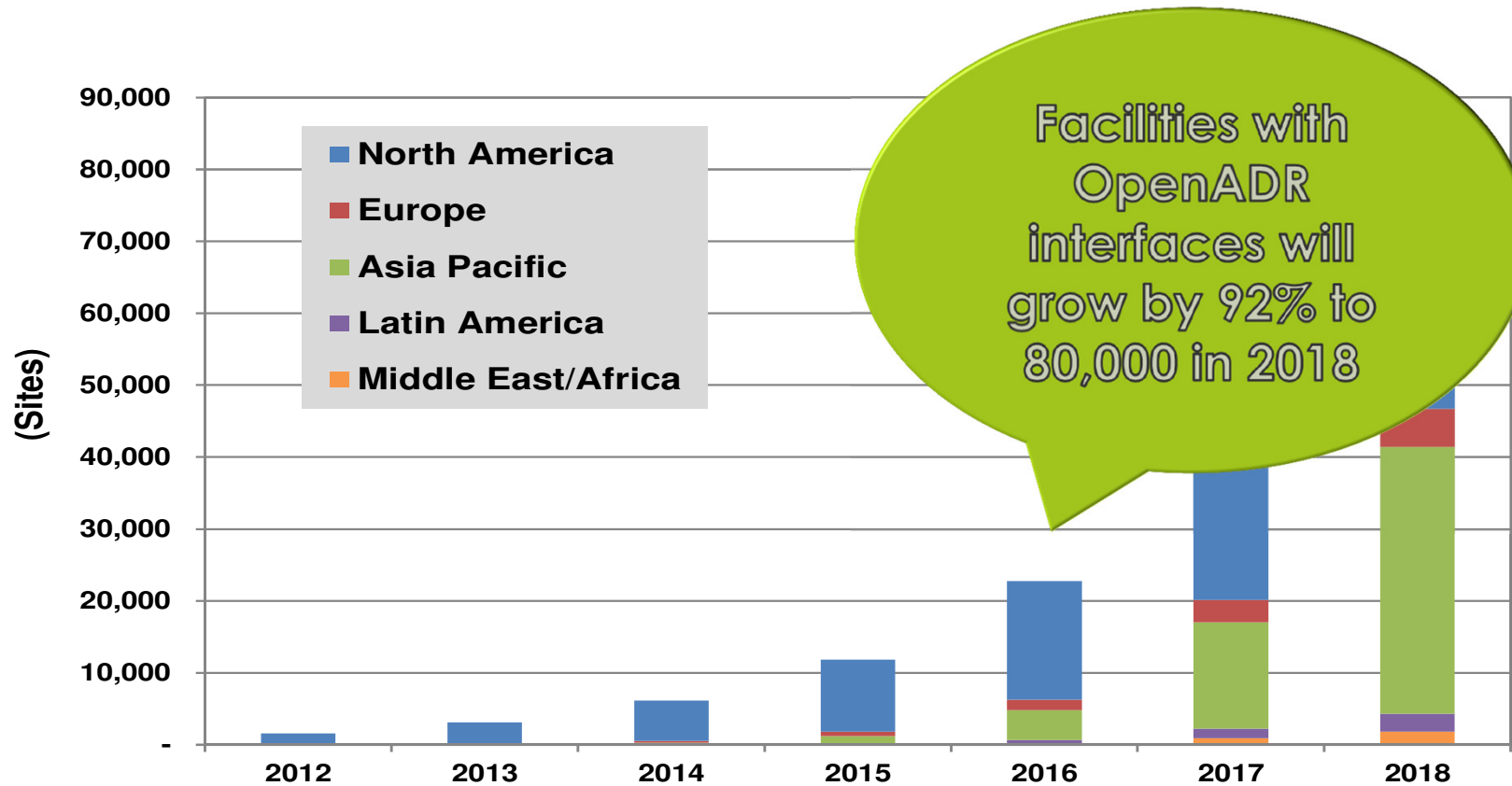
Source: Pike Research

Conclusion

- **Standardize** the interface between electricity markets and customers

- **Automate** the customer resource to fluctuating energy prices and grid instability

- **Simplify** your energy future and maximize the value of your DR capacity

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Thank You!

Q&A

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