

OpenADR DR Program Guide

OpenADR Alliance Webinar
July 28, 2015

Topics

- The need for a Program Guide
- DR programs supported
- DR Template Structure
- Drill into one program (CPP)
- Deployment Scenarios
- Odds and ends

DR Programs

- There is no such thing as a standardized DR program
- Each DR program design tends to be unique based on the structural, regulatory, and regional needs
- And each program has numerous possible deployment scenarios involving a variety of actors

OpenADR Message

- OpenADR 2.0 clearly specifies expected DR message exchange behavior between utilities and downstream resources
- However ...
 - Event signals
 - Report formats
 - Targeting
- ...must be specified on a deployment specific basis

Needs

- Utilities would like:
 - Models of typical DR Programs
 - Guidance on how to use OpenADR with programs
- VEN/VTN vendors would like:
 - Some uniformity in OpenADR usage by utilities
 - A way to validate interoperability with programs
- Both want to move away from the “blank page” starting point when using OpenADR in a DR program deployment

Solution

- The OpenADR Alliance is working on a DR Program Guide to address these issues
- The guide will...
 - Define DR program templates
 - Define OpenADR best practices
 - Define deployment scenarios
 - Aid utilities in selecting templates and deployment scenarios

DR Program Templates



- DR program Templates in Guide
 - Critical Peak Pricing
 - Prices raised during peaks, lower prices non-peak
 - Capacity Bidding Program
 - Pre-committed day of/day ahead load shed capacity
 - Residential Thermostat Program
 - Allow changes to PCT, free PCT/Discount/Rebate
 - Fast DR Dispatch (Ancillary Services)
 - Pre-committed large real time load shed capacity

DR Program Templates

- Residential Electric Vehicle TOU Program
 - TOU pricing with day ahead price notification
- Public Station EV RTP Program
 - RTP influences customer charge decision
- Distributed Energy Resources (DER) Program
 - Uses harvested energy and load shed to offset high prices

DR Program Characteristics

- Load Profile Objective
- Primary Drivers
- Program Description
- Customer Incentive
- Rate Design
- Target Customer
- Target Loads
- Prerequisite
- Program Time Frame
- Event Constraints
- Event Days
- Event Duration
- Notification
- Opt Behavior
- Certification Events

CPP – Program Characteristics



| | |
|-------------------------------|--|
| Load Profile Objective | -Peak demand reduction |
| Primary Drivers | -Reduced capital expenditures and reduced energy costs |
| Program Description | When utilities observe or anticipate high wholesale market prices or power system emergency conditions, they may call critical events during a specified time period (e.g., 3 p.m.—6 p.m. on a hot summer weekday), the price for electricity during these time periods is substantially raised. |
| Customer Incentive | Customers may be offered discounted energy prices during non-peak times as an incentive to participate in the program. |

CPP – Program Characteristics

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| Rate Design | CPP is a price program with rates increasing during critical peaks in energy consumption. Typically CPP rates are an adder or multiplier to flat, tiered, or TOU base rates. |
| Target Customer | -Residential or C&I |
| Target Load | -Any |
| Prerequisite | -Customer must have interval metering -C&I customers may have to meet a demand criterion |
| Program Time Frame | -Typically spans months of the year where peak energy consumption occurs, although may be year round in some cases. |
| Event Constraints | -Typically Monday through Friday, excluding holidays, with consecutive day events typically allowed |

CPP – Program Characteristics



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|-----------------------------|---|
| Event Days | -Typically 9 to 15 per year |
| Event Duration | -Typically during a fixed time frame for all events ranging from 4 to 6 hours during the highest energy consumption times of the day. |
| Notification | -Typically day ahead |
| Opt Behavior | -Typically customers are not required to participate in events |
| Certification Events | -Typically none |

OpenADR Characteristics

- Event Signals
 - Price, level, etc.
- Opt Responses
 - optIn/OptOut
- Event Descriptor
 - Priority, Test Events
- Event Active Period
 - Randomization, etc.
- Baselines
 - Historical Data
- Event Targeting
 - ResourceID, Group, etc.
- Reporting Services
 - Telemetry Reporting
- Opt Services
 - Temporary Schedules
- Registration Services
 - Polling Intervals

CPP – OpenADR Characteristics



| Event Signals | <p>-A SIMPLE signal with levels 1 to 3 mapped to the pricing impact of the CPP event. If a CPP program has a single pricing component it should be mapped to level 1.</p> <p>-If the deployment supports B profile VENs, in addition to the SIMPLE signal, an ELECTRICITY_PRICE signal may be included in the payload with a type of priceRelative, priceAbsolute, or priceMultiplier depending on the nature of the program.</p> |
|----------------------|--|

CPP – OpenADR Characteristics



| | |
|----------------------------|---|
| Opt Responses | <p>-VTNs sending events should set the oadrResponseRequired element to "always", requiring the VEN to respond with an optIn or optOut</p> <p>-As participation in a CPP program is a "best effort" exercise, there is no formal meaning to optIn or optOut beyond a courtesy availability indication of intent to participate. We recommend that VENs respond with optIn unless there has been some specific override action taken by the customer.</p> <p>-The oadrCreateOpt payload would typically not be used to qualify resources participating in events.</p> |
| Event Descriptor | <p>-The event priority should be set to 1 unless the program rules or VTN configuration specify otherwise. Test events are typically not used with CPP programs.</p> |
| Event Active Period | <p>- eiRampUp, eiRecovery, tolerance elements are typically not used</p> |

CPP – OpenADR Characteristics



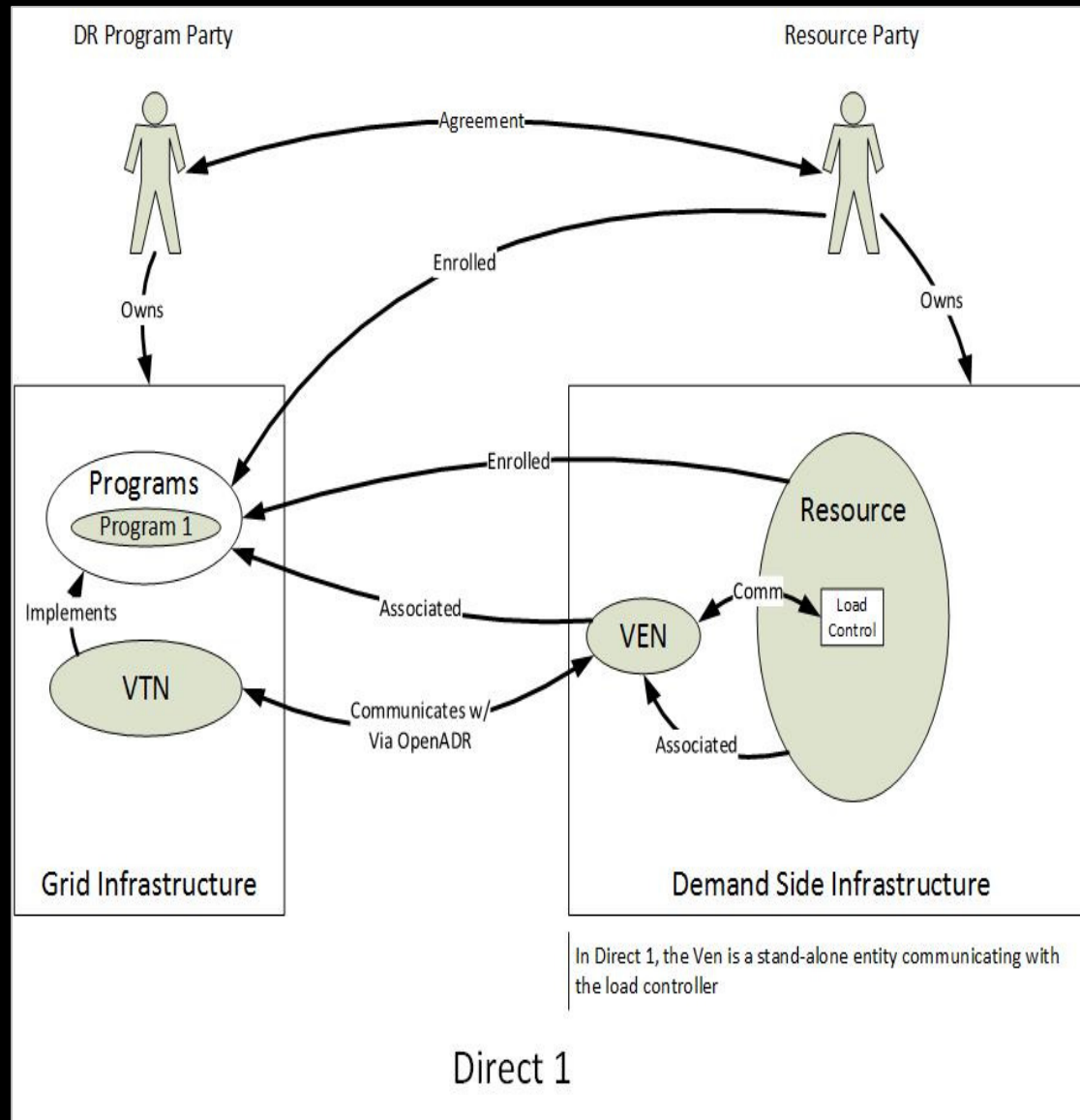
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| Baselines | -Baselines are typically not included in the event payload |
| Event Targeting | -CPP programs typically don't differentiate between resources for a given customer. Targeting typically specifies the venID , indicating that all the resources associated with the VEN should participate, or a list of all the resourceIDs associated with VEN. |
| Reporting Services | - Telemetry reporting is typically not used as it is not absolutely necessary for CPP programs |
| Opt Services | - Use of the Opt service to communicate temporary availability schedules typically would not be used as part of a CPP program. However, some deployments could use this service to preserve available event days for customers who indicate lack of availability. |
| Registration Services | Polling intervals requested by the VTN for typical day-ahead CPP programs are not required to be more frequent than once an hour . However, the use of polling for heartbeat detection may require more frequent polling. |

Deployment Scenarios

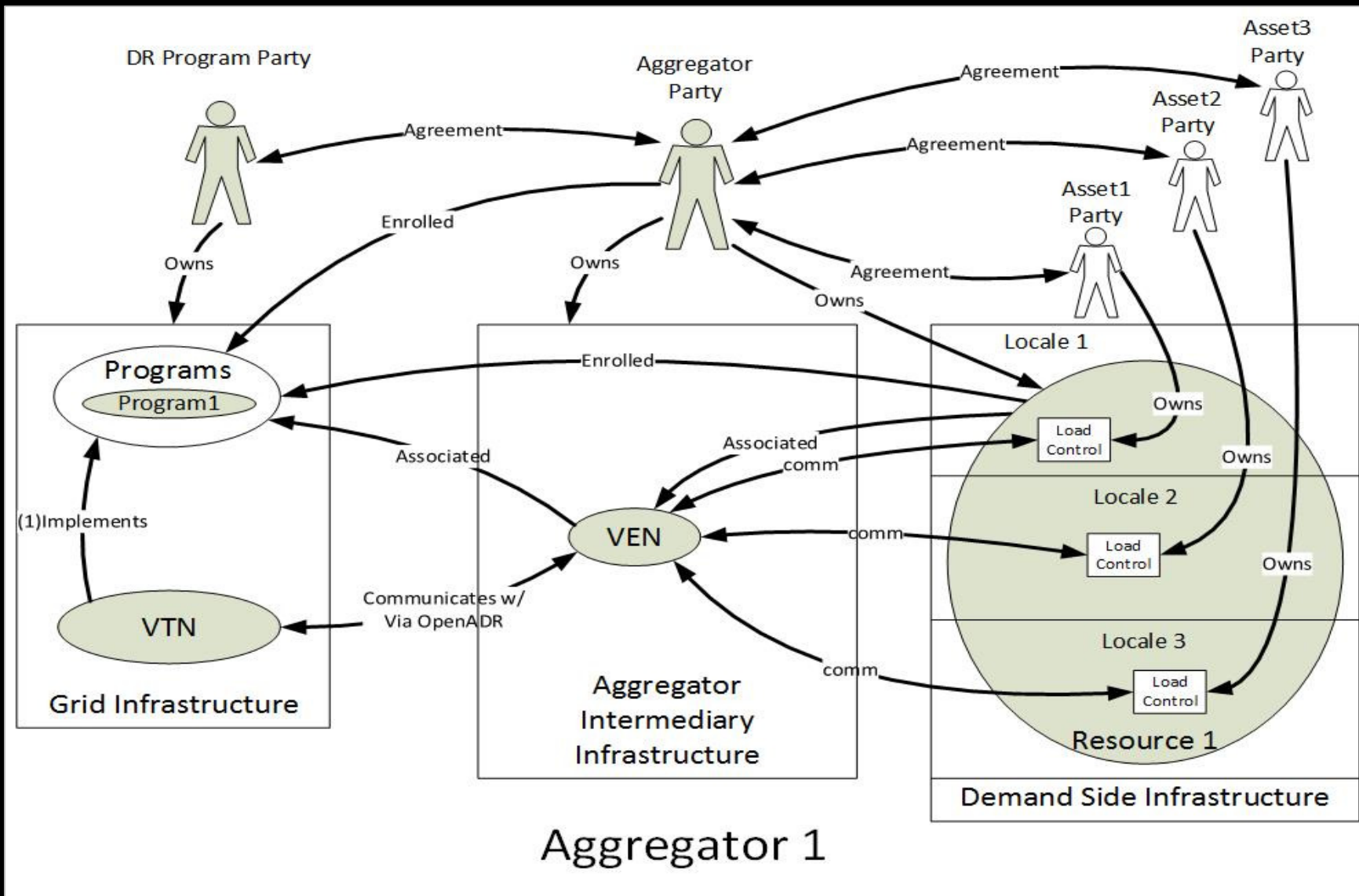
- The way a DR Program is deployed is independent of the characteristics of the program.
- The Alliance Program Guide defines a number of Deployment Scenarios, then provides typical mapping against the DR Program Templates

Sample Deployment Scenario

Direct 1



Sample Deployment Scenario Aggregator 1



Aggregator 1

Signal Recommendations

| Template | A Profile Signal | B Profile Signals |
|---|------------------|---|
| Critical Peak Pricing Program (CPP) | SIMPLE | SIMPLE ELECTRICITY_PRICE (Price or Price Multiplier) |
| Capacity Bidding Program | SIMPLE | SIMPLE BID_LOAD (Setpoint in powerReal) BID_PRICE |
| Residential Thermostat Program | SIMPLE | SIMPLE LOAD_CONTROL (Integer offset, % of capacity) |
| Fast DR Dispatch | SIMPLE | SIMPLE LOAD_DISPATCH (powerReal setpoint or delta) |
| Residential EV TOU Program | SIMPLE | SIMPLE ELECTRICITY_PRICE |
| Public Station EV Real-Time Pricing Program | N/A | ELECTRICITY_PRICE |
| Distributed Energy Resources (DER) DR Program | N/A | ELECTRICITY_PRICE |

Reporting Recommendations



| Template | Reporting |
|---|--|
| Critical Peak Pricing Program (CPP) | Not Used |
| Capacity Bidding Program | ISO Capacity Bidding TELEMETRY_USAGE realPower data point |
| Residential Thermostat Program | Not Used |
| Fast DR Dispatch | TELEMETRY_USAGE realPower data point May include voltage data point May include charge state data point |
| Residential EV TOU Program | Not Used |
| Public Station EV Real-Time Pricing Program | Not Used |
| Distributed Energy Resources (DER) DR Program | Not Used |

Target Recommendations

| Template | Event Targeting |
|---|--|
| Critical Peak Pricing Program (CPP) | <p>venID</p> <p>List of all resourceIDs</p> |
| Capacity Bidding Program | <p>venID</p> <p>resourceID representative of entire load</p> |
| Residential Thermostat Program | <p>resourceIDs of HVACs</p> <p>venID with DeviceClass target of Thermostat</p> |
| Fast DR Dispatch | <p>venID</p> <p>resourceID representative of entire load</p> |
| Residential EV TOU Program | <p>venID</p> |
| Public Station EV Real-Time Pricing Program | <p>No specific targeting</p> <p>May use grid location</p> <p>May use geographic area</p> |
| Distributed Energy Resources (DER) DR Program | <p>venID</p> |

Data Sets, Sample Payloads

- The Program Guide provides data sets and sample payloads for each template

A.1.1 CPP Scenario 1 - Simple Use case, A or B Profile

- Event
 - Notification: Day before event
 - Start Time: 1pm
 - Duration: 4 hours
 - Randomization: None
 - Ramp Up: None
 - Recovery: None
 - Number of signals: 1
 - Signal Name: SIMPLE
 - Signal Type: level
 - Units: N/A
 - Number of intervals: 1
 - Interval Duration(s): 4 hours
 - Typical Interval Value(s): 1
 - Signal Target: N/A
 - Event Target(s): venID_1234
 - Priority: 1
 - VEN Response Required: always
 - VEN Expected Response: optIn
- Reports
 - None

DRAFT
For comments

Program Guide Testing

- Testing methodology in design phase
- Reference implementation interop testing is current design preference

