

Welcome!

- Thank you for joining today's webinar:
Implementing DR Programs Using an Open Standard
- If you have a question please use the question box located on the right side of your screen.
- Questions for our speakers will be addressed at the end of the presentation.
- This webinar will be recorded for future playback.
- We will begin momentarily.



Implementing DR Programs Using an Open Standard

Webinar: October 28, 2014

Introduction

- Jim Zuber -Co-founder and Chief Test Architect, QualityLogic



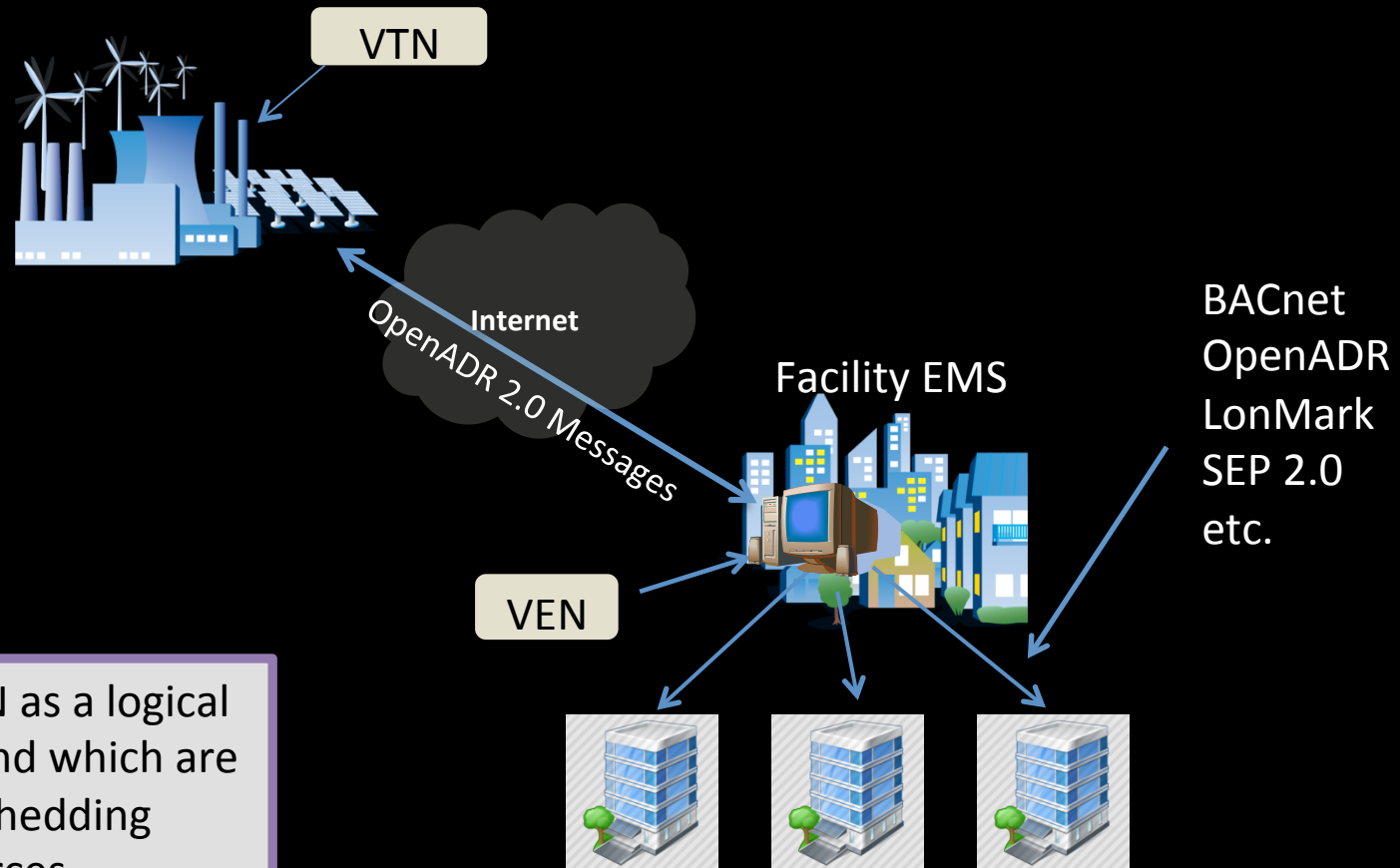
Topics

- OpenADR Overview
- DR Program Guide Objectives
- Demand Response Templates
- Deployment Scenarios

VENs and VTNs

- OpenADR is a message exchange protocol with two primary actors:
 - Virtual End Nodes (VEN)
 - Receive events and respond to them
 - Generate reports
 - Control demand side resources
 - Virtual Top Nodes (VTN)
 - Transmit events other nodes
 - Request Reports

VENs and VTNs



Think of a VEN as a logical interface behind which are the load shedding resources.

Demand Response Information Exchanged

Utility



-DR Schedule
-Price/Load Obj.
-Targeting

Facility



-Opt In/Out
-Reports
-Availability

OpenADR Services

- **Event Service** – Send DR Events
- **Opt Service** – availability, refine targeting
- **Register Party Service** – Registration
- **Report Service** – Request and deliver reports

Services Usage Scenario



VTN
(ISO or Utility)



VEN
(C&I, SMB)



OpenADR Optionality

- Well defined message exchange protocol
- Some characteristics are defined at deployment such as:
 - Event Signals – When, how long, how much
 - Targeting – Who the event for
 - Reports – usage, status, history
- Certification covers typical usage models, but cannot cover all possible usage variations

Program Designs Deployment Scenarios



- DR programs are not standardized
- Each DR program design tends to be unique
- DR programs are deployed in various ways with a variety of actors

Variability

- Reducing variability in...
 - DR program designs
 - Deployment scenario variations
 - OpenADR optionality
- ...will enhance the growth of demand response and the use of OpenADR

Decreasing Variability

- Utilities need..
 - Examples of typical DR Programs to model
- VTN/VEN manufacturers need...
 - Best practices guidelines for typical DR programs

Solution

- The OpenADR Alliance DR Program Guide
 - Define DR program templates modeled after most popular DR programs
 - Define deployment scenarios with actors and roles clearly defined
 - Define best practices recommendations for OpenADR characteristics
 - Provide a decision tree to aide utilities in selecting templates and deployment scenarios

DR Program Templates

- Critical Peak Pricing
- Capacity Bidding Program
- Residential Thermostat Program
- Fast DR Dispatch (Ancillary Services)
- Templates under consideration
 - Real Time Pricing Program
 - Direct Load Control Program

DR Template Drill Down

- Each template is broken down into two sections:
 - Program characteristics
 - Frame of reference, model for utilities
 - OpenADR characteristics for the program
 - Best practices

Critical Peak Pricing 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. |

Critical Peak Pricing Program Characteristics



| 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. |

Critical Peak Pricing Program Characteristics



| Event Constraints | -Typically Monday through Friday, excluding holidays, with consecutive day events typically allowed |
|-----------------------------|---|
| 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 Behaviour | -Typically customers are not required to participate in events |
| Certification Events | -Typically none |

Critical Peak Pricing 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. For CPP programs with multiple pricing components, the smallest price component should be mapped to level 1, with the other price components mapped to levels 2 and 3 in increasing degree of pricing impact.</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> |
|---------------|---|

Critical Peak Pricing OpenADR Characteristics



| Opt Responses | <ul style="list-style-type: none">-VTNs sending events should set the oadrResponseRequired element to "always", requiring the VEN to respond with an optIn or optOut-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.-The oadrCreateOpt payload would typically not be used to qualify resources participating in events. |
|---------------|--|

Critical Peak Pricing OpenADR Characteristics



| Event Descriptor | <p>-The event priority should be set to 1 unless the program rules or VTN configuration specify otherwise</p> <p>-Test events are typically not used with CPP programs. However if they are allowed the testEvent element should be set to "true" to indicate the test event. If additional parameterized information is required in this element it can follow "true" separated by a space with this additional information.</p> |
|------------------|---|

Critical Peak Pricing OpenADR Characteristics



| Event Active Period | - eiRampUp, eiRecovery, tolerance elements are typically not used |
|---------------------|---|
| 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 |

Critical Peak Pricing OpenADR Characteristics



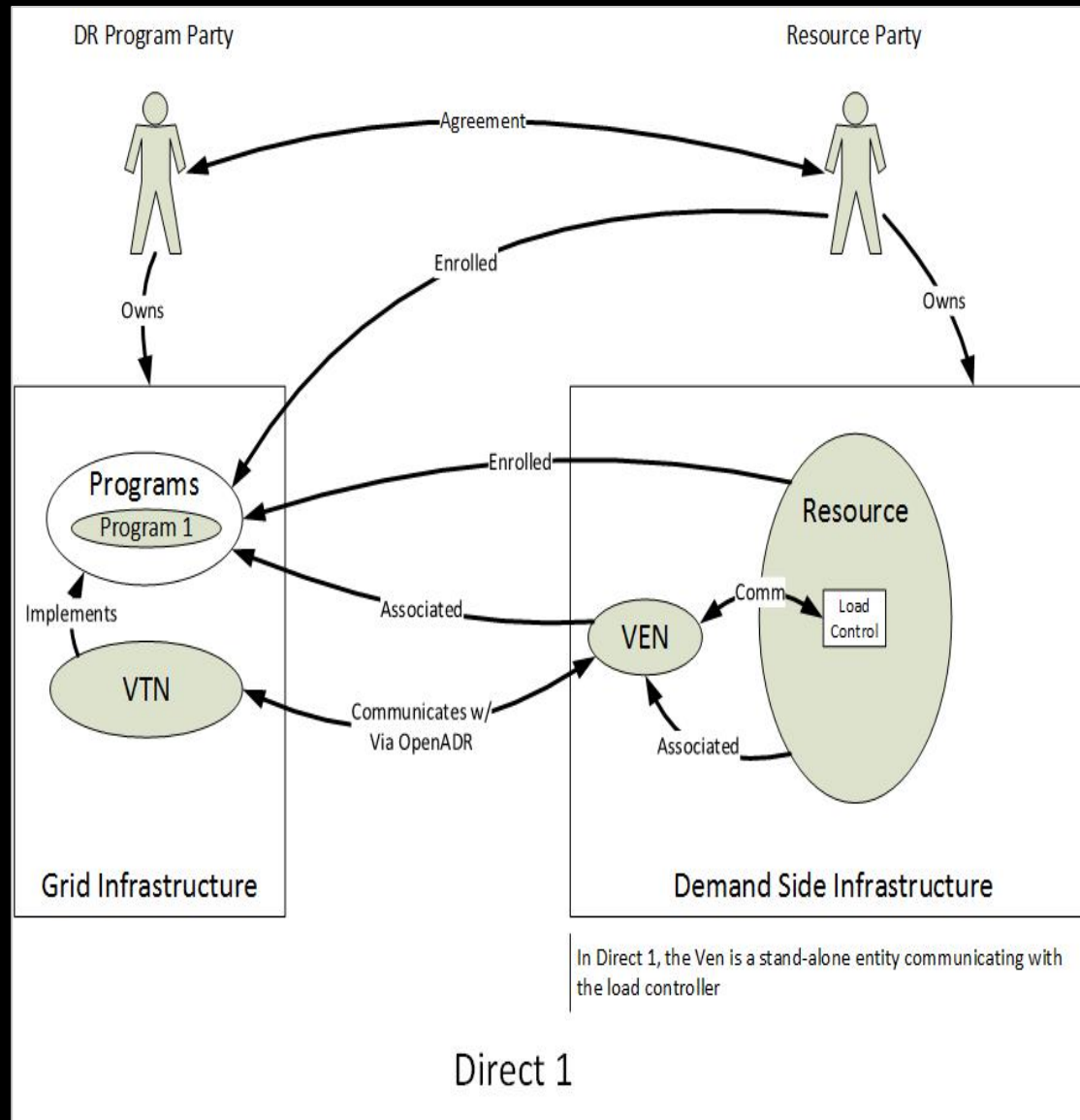
| Opt Services | - Use of the Opt service to communicate temporary availability schedules typically would not be used as part of a CPP program. However, some deployments could use this service to preserve available event days for customers who indicate lack of availability. |
|-----------------------|---|
| 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

- DR Templates are independent of the deployment scenarios
- Program guide deployment scenarios:
 - Direct (1–4)
 - Facilitator Intermediary
 - Aggregator Intermediary
- We will take a brief look at a few of the deployment scenarios

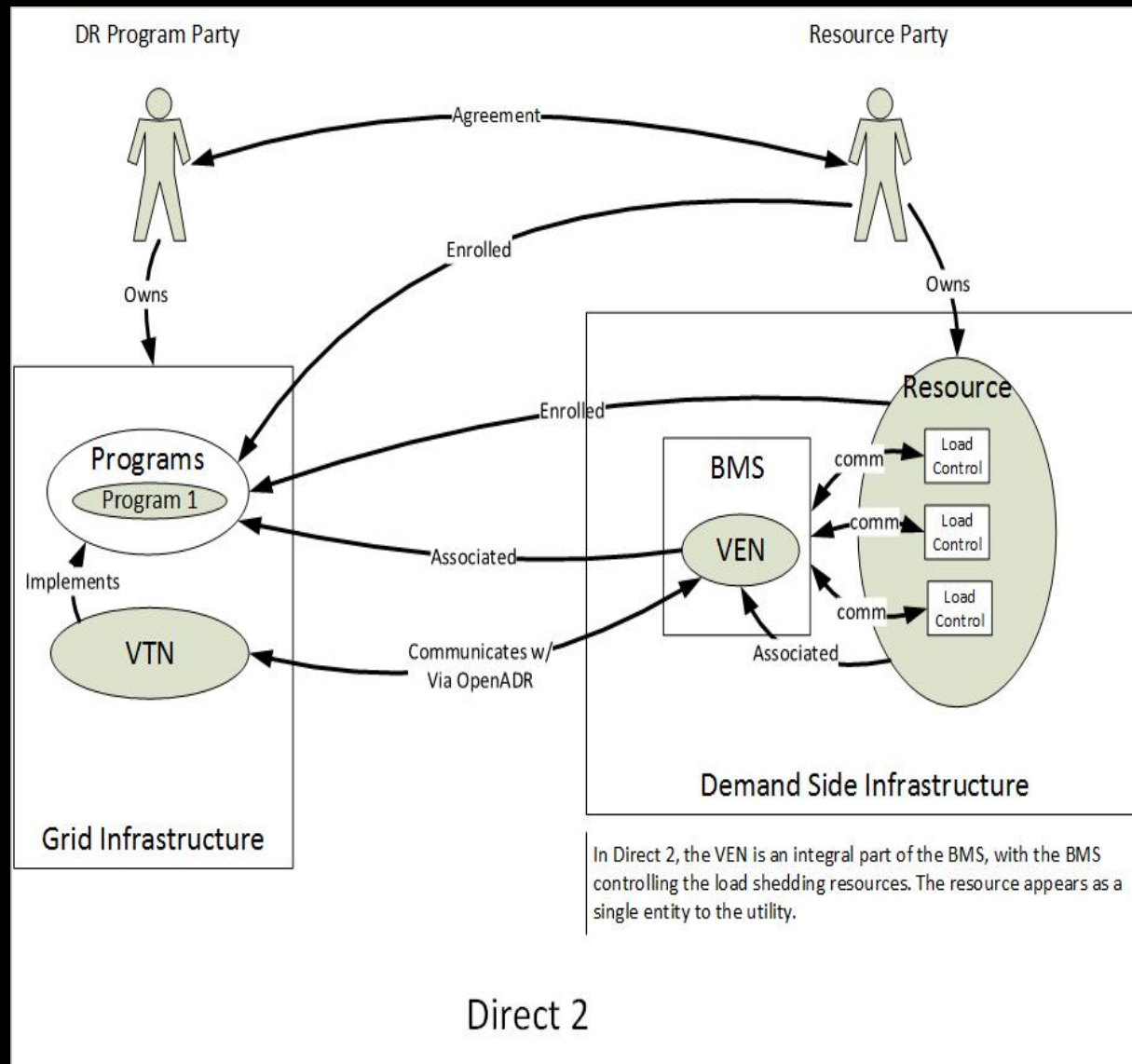
Deployment Scenario

Direct 1

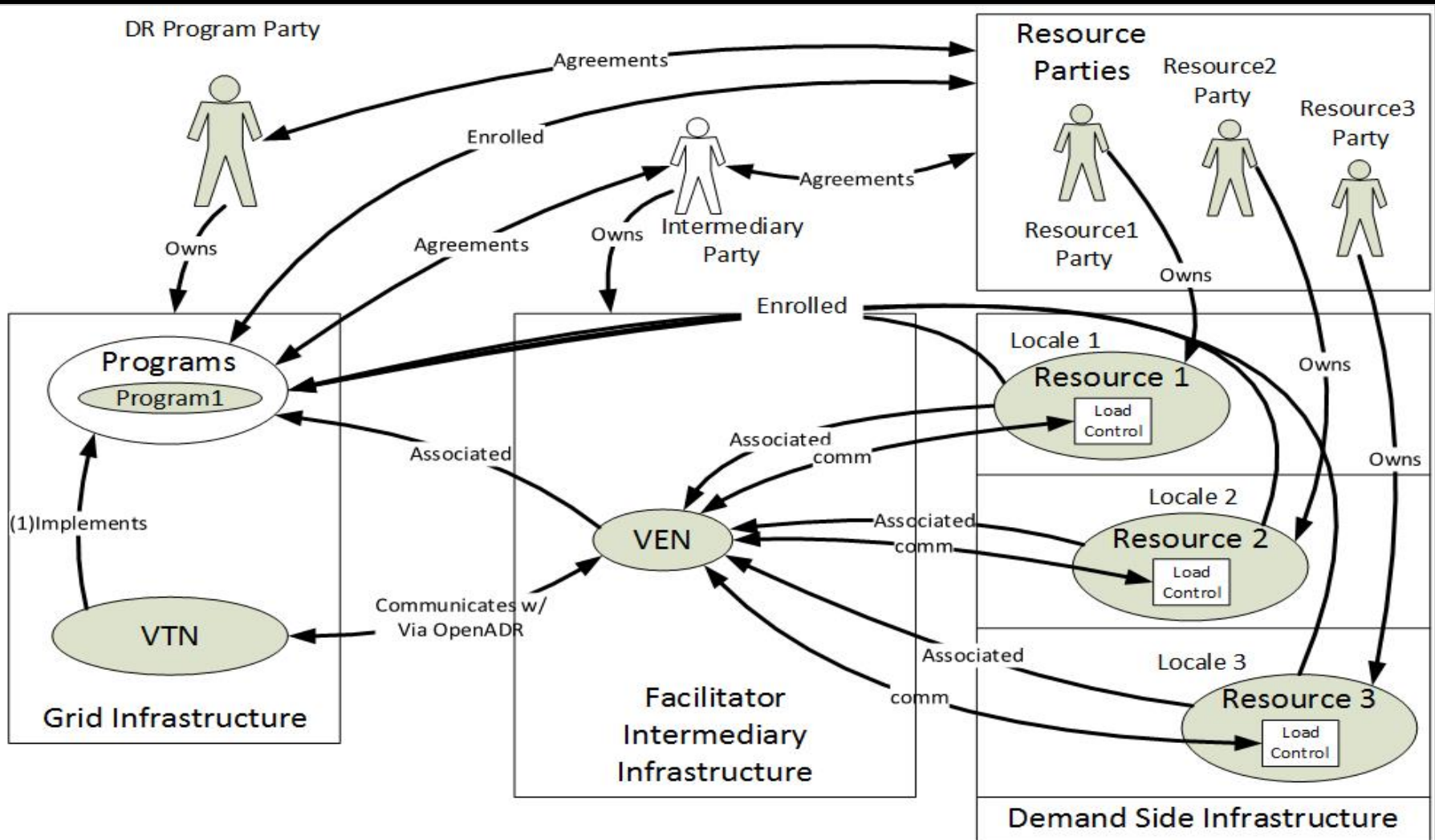


Deployment Scenario

Direct 2

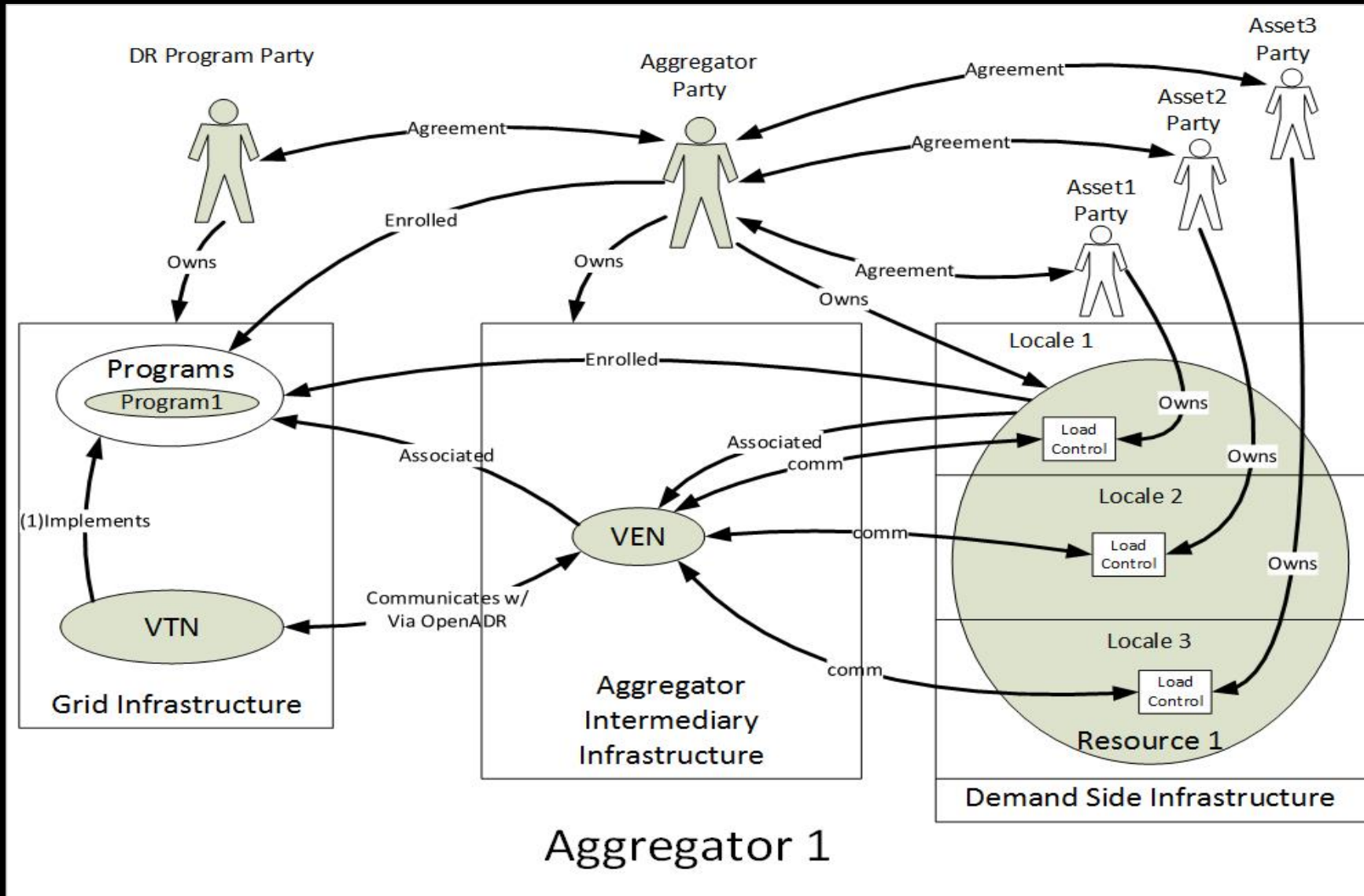


Deployment Scenario Facilitator 1



Facilitator 1

Deployment Scenario Aggregator 1



Template to Deployment Mapping



| | Direct 1 | Direct 2 | Direct 3 | Direct 4 | Facilitator 1 | Aggregator 1 |
|--------------------------------|----------|----------|----------|----------|------------------|-----------------|
| CPP Program | * | | | | | |
| Capacity Bidding Program | | | | | | * |
| Residential Thermostat Program | | | | | * | |
| Dynamic Pricing Program | | | | | | |
| Fast DR Dispatch | | | | | | |

Summary

- Program Guide is still a work in progress.
- Tasks left include:
 - Additional templates (RTP, DLC, etc.)
 - Decision tree for utilities
 - Example template implementation details
 - Sample payloads
 - Possibly test cases that map to each template
 - Very interested in listener feedback what needs to be in the guide to make deploying OpenADR simpler

Upcoming OpenADR webinars

■ Implementing DR Programs Using an Open Standard

- Oct. 28, 2014, 8am-9am PDT. Link will be emailed and recording posted to the OpenADR website.

■ Electric Vehicles and Automated Demand Response

- **Nov. 18, 2014, 8am-9am PST.** Learn how utilities are using the OpenADR standard to better manage EV programs, while capturing more revenue.

TO REGISTER VISIT: www.openadr.org click on upcoming webinars under events section on homepage

For Questions

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Thank You!

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