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Price Messaging Using OpenADR 2.0b

Prepared for the California Energy Commission

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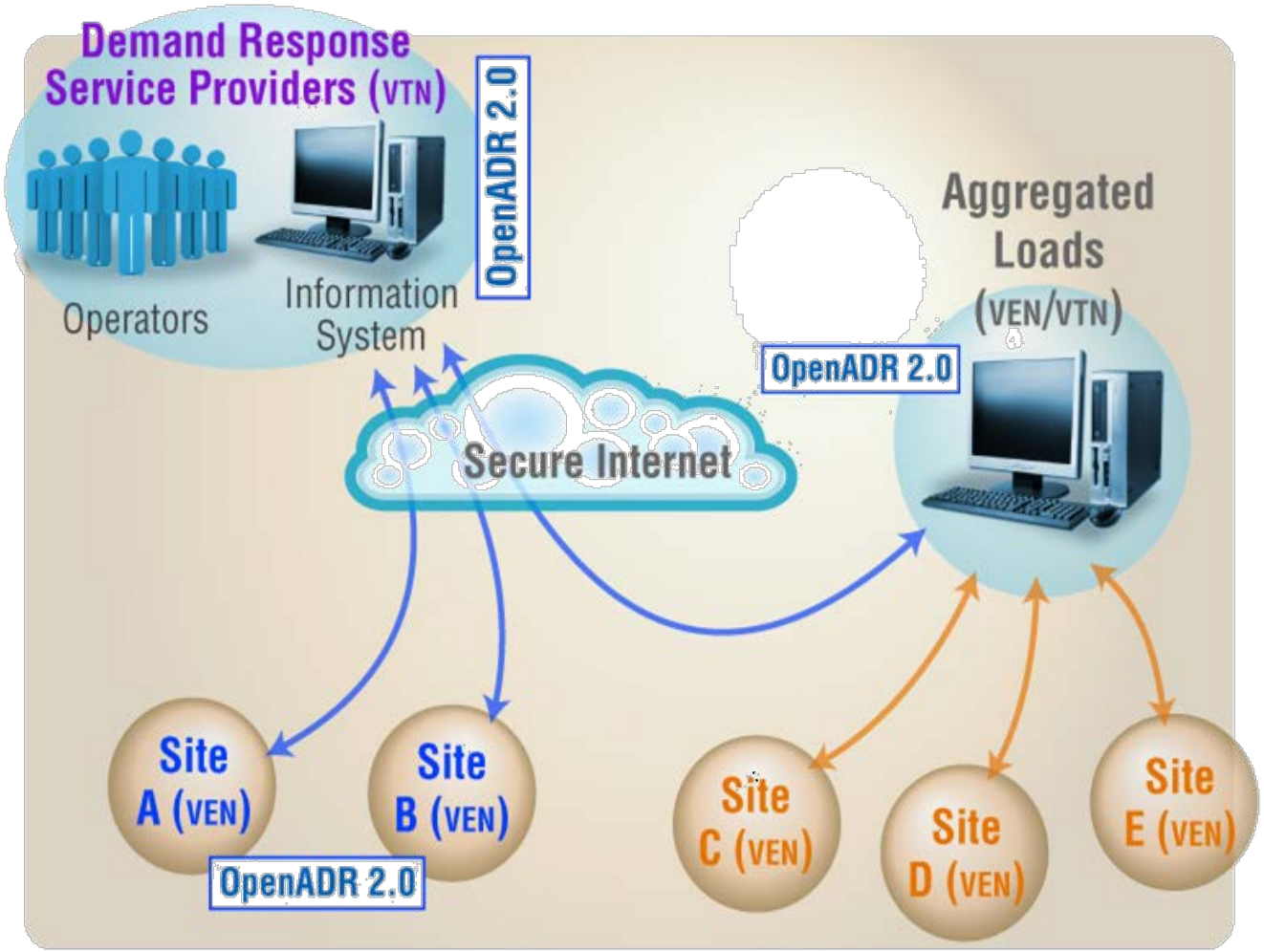
OpenADR in a Nutshell

OpenADR provides a non-proprietary, open standardized interface that allows utilities and other service providers to communicate demand response (DR), distributed energy resource (DER), and transactive energy (TE) signals directly to existing customers using a common language and existing communications such as the Internet.

OpenADR 2.0b is now published as IEC 62746-10-1 Ed.1 as of November 2018.

https://webstore.iec.ch/publication/26267



Price Messaging with OpenADR

General Overview

- One of the basic functionalities in OpenADR is the transmission of energy prices
- Price values can either be sent as four levels (1,2,3,4) which correspond to pre-defined values or as specific values (e.g. 14 cents/kWh)
- OpenADR 2.0 events can be compared to a calendar notice
  - Start time, intervals, end time, “agenda”
  - Different intervals can contain different signals for different time frames

Typical high-level architecture

ISO/Utility/Operator

Virtual Top Node (VTN)

Messages:
- Day, hour, minute, second ahead
- Price or curtailment events

OpenADR

OpenADR

OpenADR

Virtual End Node (VEN)

Aggregator/Facilitator

Typical resources:
- Pumps
- EVSEs
- Batteries
- Water heaters
- Factory equipment

Available Signal Types for Price Messages

- OpenADR 2.0b includes different signal types to communicate prices
- Each signal type may have different variants

Price of electricity	currency/kWh	Cost of electricity expressed in absolute or relative terms
Price of energy	currency/kWh	Cost of energy expressed in absolute or relative terms
Demand charge	currency/kW	Demand charge expressed in absolute or relative terms
Customer bid levels	currency/XX (2)	The price that was bid by the resource

Examples of events that could be used for TOU or RTP

- Example 1: Single price with specific duration (RTP)
- Example 2: Single price that remains applicable until changed (RTP)
- Example 3: Group of prices intended for different times or purposes (RTP)
- Example 4: Group of prices for different times of the day/week/month (RTP)
- Example 5: Group of prices for different times of the day/week/month active over a long period of time like months, seasons, years, etc. (TOU)

See backup slides for details

Summary

- OpenADR offers a very flexible way to communicate prices
- RTP
- All currently known use cases are covered
- Future use cases can be discussed and satisfied by –
  - Creating a best practices notice
  - Adding small components like signal types or report types to OpenADR (this could impact interoperability with previously certified products so it will need to be reviewed and discussed)
- Transactive Energy Addendum started – Opportunity now to influence

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Thank you!

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Backup Slides

Example 1: Single Price Event

- OpenADR can send a single price in the context of an encapsulated event. This means that there is a specific duration during which this price is valid
- For example
  - Applicable time frame: “Today from 2PM to 4PM”; “Starting now for 2 hours”; “Next Monday for a whole week”; etc.
  - Signal: Any price signal available; see previous slide 6
  - Duration: Specified in the applicable time frame. In this case it spans the entire event time.
- Could also communicate change in seasonal pricing, daily pricing, etc.
- Applicable for RTP

Example 2: Single Price that remains applicable until changed

- OpenADR can send a single price which remains applicable until it is being changed or the event is cancelled & the price goes back to “normal”.
- For example
  - Applicable time frame: “Today from 2PM until further notice”; “Starting now until cancelled or changed”; “Next Monday for until changed”; etc.
  - Signal: Any price signal available; see previous slide 6
  - Duration: In the code, the duration is set to “0”. This means that the price event remains active until further notice (either a change or cancellation)
- Could also communicate change in seasonal pricing, daily pricing

Example 3: Sending Groups of Prices

- OpenADR can send a group of different prices. Either applicable at different times of for different purposes (e.g. a price for EV charging vs price for water heating etc.)
- For example
  - Applicable time frame: “Today from 2PM to 4PM”; “Starting now for 2 hours”; “Next Monday for a whole week”; etc.
  - Signal: Any price signal available; see previous slide 6
  - Duration: Specified in the applicable time frame. Each price can be applicable for a certain part of the event duration (interval) or the whole event time.
- Could also communicate change in seasonal pricing, daily pricing
- This can be done with multiple price signals in the same event, using the signalID to differentiate each price for its purpose, such as pricing tiers or customer classes

Example 4: Sending a Price Baseline Forecast

- OpenADR can send a group of different prices that are applicable at different times of the day/week/month
- For example
  - Applicable time frame: Any of the previously mentioned time allocations. In this example it could be from midnight to midnight of the upcoming day
  - Signal: Any price signal available; see previous slide 6
  - Duration: In this example, we could send a 24h long event with as many different intervals as we want. Let's say the price might change every 30 minutes during the day. Then we would send 48 intervals for the 24h period. This can be extrapolated to weeks, months, years, etc.
- Real time price forecasts to customers

Example 5: Semi-static TOU rates

- OpenADR can send a group of different prices that are applicable at different times of the day/week/month and remain active over a long period of time like months, seasons, years, etc. (considered static as opposed to constantly changing dynamic prices)
- For example
  - Applicable time frame: Could vary in this case
  - Signal: Any price signal available; see previous slide 6
  - Duration: This could be done as a daily event with the different times and rates. The event repeats indefinitely until there is a change in price tiers. Alternatively it could be an open-ended event with different prices that are allocated to certain tiers.
- If this use case becomes more significant, OpenADR could create a new signal type or report template to send these price tables

OpenADR 2.0 Event Structure - Example

- OpenADR events can be compared to a calendar notice
- Start time, end time, “agenda”
- Different intervals can contain different signals for different time frames