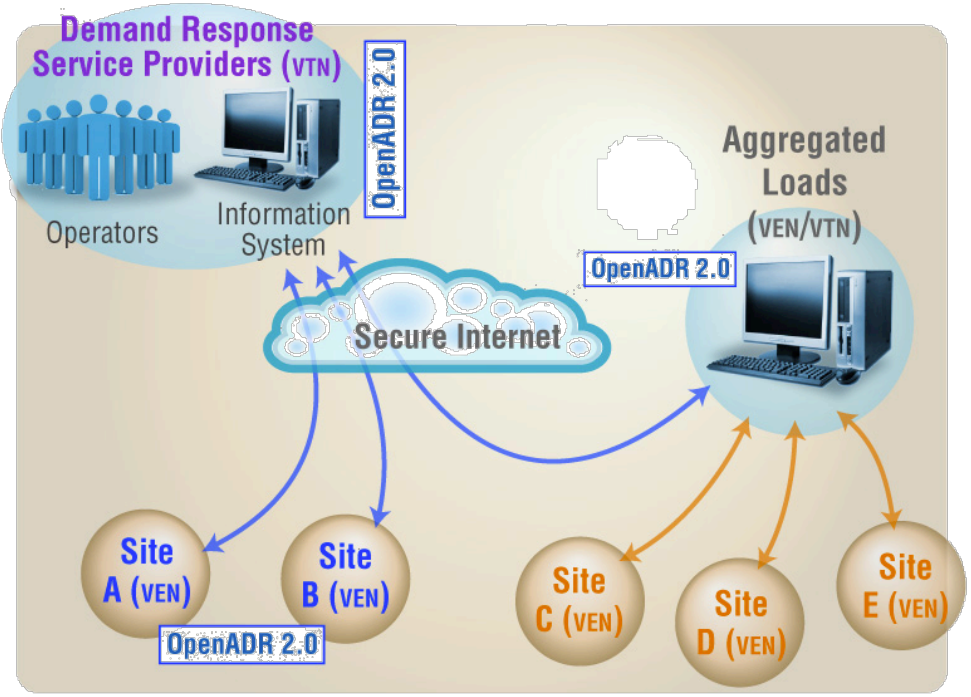
Enabling The Standard for Automated Demand Response

OpenADR 2.0 – Short capabilities review

What is OpenADR – Basic Concept

Open Automated Demand Response (OpenADR) provides:

- a non-proprietary, open
- standardized DR interface that allows electricity utilities and service providers to communicate DR signals directly to existing customers
- using a common language and existing communications such as the Internet.



Certification Process

- Well established Test Labs
  - Currently have ISO 17025 accredited test labs in the US, Japan, and Korea
  - Manufacturers can work directly with the test labs to perform testing of their hardware or software VTN/VEN's
- Robust Testing Tool
  - The Alliance created a test tool for pre-testing and certification
  - The tool can be obtained by members and non-members to pre-test before going to the test house for final testing
- Certification
  - The Alliance certifies and lists products after successful testing
  - Currently there are 92 certified solutions

Compensational methodologies support by OpenADR

- OpenADR has a flexible information exchange structure & has the ability to
  - Send electricity and energy prices
  - Demand Charge and Customer bid levels
  - Used to dispatch storage resources
  - Verify usage and load shed values for M&V
- OpenADR can define a "MarketContext" that is specific to the exchange
  - The same signal can have different meanings depending on the 'context' it is sent in. This adds another layer of flexibility
- OpenADR has a clear point-to-point architecture to ensure a high level of security and fast access

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DER Use Cases and OpenADR

- SEP 2.0 standards are better defined
- OpenADR Alliance is open to talk to SEP2 stakeholders about
  - Leveraging each other's specific expertise in DR and DER
  - OpenADR "probably" ends at the customer premise
  - And SEP 2.0 handles devices inside the premise
  - Establish common certification for end-to-end interoperability
- OpenADR provides for Custom Signal Types
  - 2.0b Profile can be extended to define custom signal types. For example, volt-var-curve
  - VTN and VEN must come to a common understanding of these signals and respond appropriately

Backup slides – Signal types

Signal Category	Name (signal-Name)	Type (signalType)	units (item-Base)	Allowed Values	Description
Simple levels	SIMPLE	level	None	0,1,2,3	Simple levels
Price of electricity	ELECTRICITY_PRICE	price	currency/kWh	any	This is the cost of electricity expressed in absolute terms
	ELECTRICITY_PRICE	priceRelative	currency/kWh	any	This is a delta change to the existing price of electricity
	ELECTRICITY_PRICE	priceMultiplier	None	any	This is a multiplier to the existing cost of electricity
Price of energy	ENERGY_PRICE	price	currency/kWh	any	This is the cost of energy expressed in absolute terms
	ENERGY_PRICE	priceRelative	currency/kWh	any	This is a delta change to the existing price of energy
	ENERGY_PRICE	priceMultiplier	None	any	This is a multiplier to the existing cost of energy
Demand charge	DEMAND_CHARGE	price	currency/kW	any	This is the demand charge expressed in absolute terms
	DEMAND_CHARGE	priceRelative	currency/kW	any	This is a delta change to the existing demand charge
	DEMAND_CHARGE	priceMultiplier	None	any	This is a multiplier to the existing demand charge

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Backup slides – Signal types (2)

Customer bid levels	BID_PRICE	price	currency/XX	any	This is the price that was bid by the resource
	BID_LOAD	setpoint	powerXXX	any	This is the amount of load that was bid by a resource into a program
	BID_ENERGY	setpoint	energyXXX	any	This is the amount of energy from a resource that was bid into a program
Used to dispatch storage resources	CHARGE_STATE	setpoint	energyXXX	any	This is used to either charge or discharge a certain amount of energy from a storage resource until its charge state reaches a certain level.
	CHARGE_STATE	delta	energyXXX	any	This is the delta amount of energy that should be contained in a storage resource from where it currently is.
	CHARGE_STATE	multiplier	None	0 < 1	This is the percentage of full charge that the storage resource should be at.

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Backup slides – Signal types (3)

These instructions are used to set the load to values that can be expressed in terms of the desired load	LOAD_DISPATCH	setpoint	powerXXX	any	This is used to dispatch loads to a specific amount
	LOAD_DISPATCH	delta	powerXXX	any	This is used to dispatch loads to some offset from an agreed upon baseline. Note that the baseline may be the current power consumption.
	LOAD_DISPATCH	multiplier	None	any	This is used to dispatch loads as some multiple of power against some agreed upon baseline. Note that the baseline may be the current power consumption.
	LOAD_DISPATCH	level	powerXXX	integer value from -10 to +10	This is used to specify the load in terms of discrete levels.
These instructions are used to set the load control to values that are relative to the load controller and its output capacity. This does not require the VTN or the VEN knowing precisely what the load consumption level is, but are expressed in ways that the VTN can know that the signal values will either increase or decrease the load consumption regardless of the specific type of device that is performing the load control. These can be used for some aspects of direct load control by mapping these general instructions to specific load control commands in the VEN without the VTN needing to know precisely what device may be con-	LOAD_CONTROL	x-LoadControlCapacity	None	0 - 100% (0.0 - 1.0)	This is an instruction for the load controller to operate at a level that is some percentage of its maximum load consumption capacity. This can be mapped to specific load controllers to do things like duty cycling. Note that 1.0 refers to 100% consumption. In the case of simple ON/OFF type devices then 0 = OFF and 1 = ON.
	LOAD_CONTROL	x-LoadControlLevelOffset	None	integer value	Discrete integer levels that act relative to normal operations where 0 is normal operations. There is no requirement to link the setpoints to specific load consumption values, but the intention is that the higher the setpoint the less load is consumed. Note that these are controller set points that can be mapped at the VEN side to something as simple as thermostat temperature set point offsets.

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Backup slides – Signal types (4)

suming the signal.	LOAD_CONTROL	x-LoadControlSetpoint	None	any value	Load controller set points. There is no requirement to link the setpoints to specific load consumption values. Note that these are generic controller set points and can be mapped at the VEN side to something as simple as specific thermostat temperature set points.
	LOAD_CONTROL	x-LoadControlPercentOffset	None	any percentage, both positive and negative	Percentage change from normal operations. The percentage does not refer to specific load consumptions values, but to load control operation levels. The lower the percentage the less load is consumed.