DER Integration - OpenADR
The Grid Evolution from Uni-directional and Top-Down to Bi-directional and Distributed triggered the development of two major independent Systems

1. **Distributed Energy Management**
   - Applying traditional optimization concepts for energy generation to distributed generators
   - Virtual Power Plant (VPP) as best known concept

   “How can we bundle distributed Generation and optimize it?”

2. **Demand Response Management**
   - Event based management of Demand and Generation with distributed Grid Assets
   - Load balancing / grid stability as overarching goal

   “How can we manage loads and ensure grid reliability with distributed grid assets?”

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Aditya Aggarwal / DG SWS SP PE VPP
New markets evolving around Distributed Energy Resources DER
New roles & new market actors

Political discussion:
Public interface between DSO & Aggregator as Smart-Platform (Grid-traffic-light concept)

DSO ➔ DSP
Distribution System Provider

Transactive Grid
How do we go from theoretical to application?
Distributed Energy Resource Management Systems (DERMS)

- Demand Response
- Virtual Power Plant
- Many DER (hundreds of thousand) Statistic View
- Few DER (couple of hundred) Deterministic View
Technical structure

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Distributed Energy Resource (DER)
Remote Terminal Unit (RTU)

DEMS
- Record and create groups
- Aggregation
- Forecasting
- Controlling
- Optimization
- Communication

OpenADR
- Controller (cloud)
- EV Controller (cloud)

IEC 104
- RTU
- Asset (DG)
Connecting DERs Using Standard Protocols…

ISO

DNP3/IEC104/HTTP (non-standard)

Siemens DEMS

OpenADR

Smart thermostat
Cloud

Water heater
cloud

Thermostat
Baseboards

Water heater
groups

Water heater

BMS/EMS

Gateway
Controller

Controllable
Systems (HVAC) < 100 kW

Controllable
Systems (Thermal storage) < 100 kW

Controllable
Systems (DG) > 100 kW - MW

IEC 104

RTU
Experience connecting DERs...

**OpenADR**
- Large scale targeted emergency dispatches
- Support for various program and device types using simple strategies
- Flexibility in defining and capturing asset specific data
- Security between OpenADR VTN-VEN
- Event driven (DER control)
- Heartbeat support
- Scalability of reports for large number of assets
- Payload size over networks with less bandwidth

**OpenADR (DNP3, IEC104)**
- Closed loop control
- Low network footprint
- Real time feedback with asset status
- Require dedicated communications infrastructure.
- Restricts deployments at scale
- Security is an after thought (Private WANs, VPNs, encryption).
OpenADR Evolution...

• Signal strategies cover a wide variety of use cases (DERs included)

• Focus on preferred deployment models when dealing with different market segments

• Options to enable communications over low to high bandwidth connections

• Review reporting requirements for scaling across thousands of connected DERs

• Flexibility to support closed loop control

• DR Tag in the name
Thank You!

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