Enabling DER Integration with OpenADR

- Challenges and opportunities with DER
  - What is it?
  - Why is it becoming more important?
- How does OpenADR enable the integration of DER into grid operations?
- What are some real world examples of OpenADR enabling DER integration?
- What is OpenADR's competition when it comes to DER integration?
- How should the OpenADR Alliance address DER?
  - Do nothing different?
  - DER relevant branding and positioning?
  - Technical improvements to support DER?

Agenda

- Overview – James Mater, QualityLogic
- OpenADR Applications in DER Integration
  - Integrating DER in wholesale markets – Aditya Aggarwal, Siemens Canada
  - OpenADR for DER: CEA-2045 and DER Aggregation – Walt Johnson, EPRI
- Standards Competition – Panel discussion
  - IEC 61850, IEEE 2030.5 (SEP 2), TE and ?
- OpenADR Alliance Strategy and Next Steps – All: James Moderating

What is DER?

What is DER?

- <u>**D**</u>istributed <u>**E**</u>nergy <u>**R**</u>esources include any resource that can add energy to the grid or can modify energy behavior
  - …but is not controlled by a Utility SCADA operator
- Examples include:
  - Rooftop PV
  - Small storage systems
  - EV Charging
  - Adjustable resources (thermostats, lights, HVAC)

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What is the Challenge?

- DER is typically installed and controlled independent of grid operations – e.g., not coordinated
  - In small quantities, not a problem
- But at scale (arguments abound at what level) can pose a problem OR an opportunity (if coordinated)
- Challenges are:
  - Multi-objective optimization (or laminar decomposition)
    - How to meet objectives of both the grid and asset owners
  - How to communicate grid needs in a timely fashion
    - Communications not standardized if they exist
  - How to motivate DER owner behaviors
    - Pricing/regulatory issues

Use Cases

- Perspectives
  - ISO/RTO
  - Distribution Utility
  - Asset Aggregators
  - Asset Owners
- DR Use Cases Modify behavior of loads through specific requests
  - DER in OpenADR is storage
- PV Use Cases modify behavior of inverters through specific autonomous behavior settings

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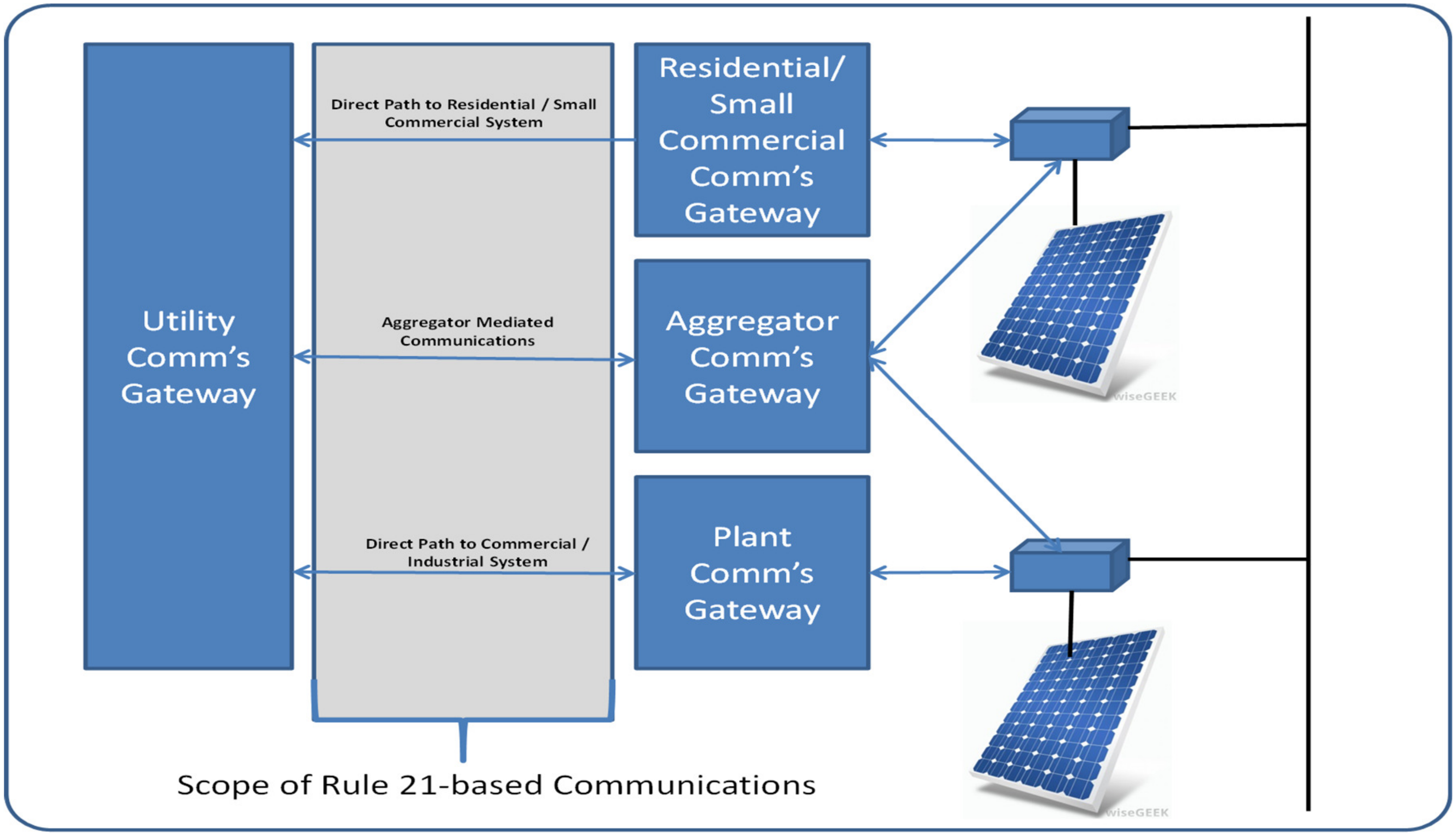
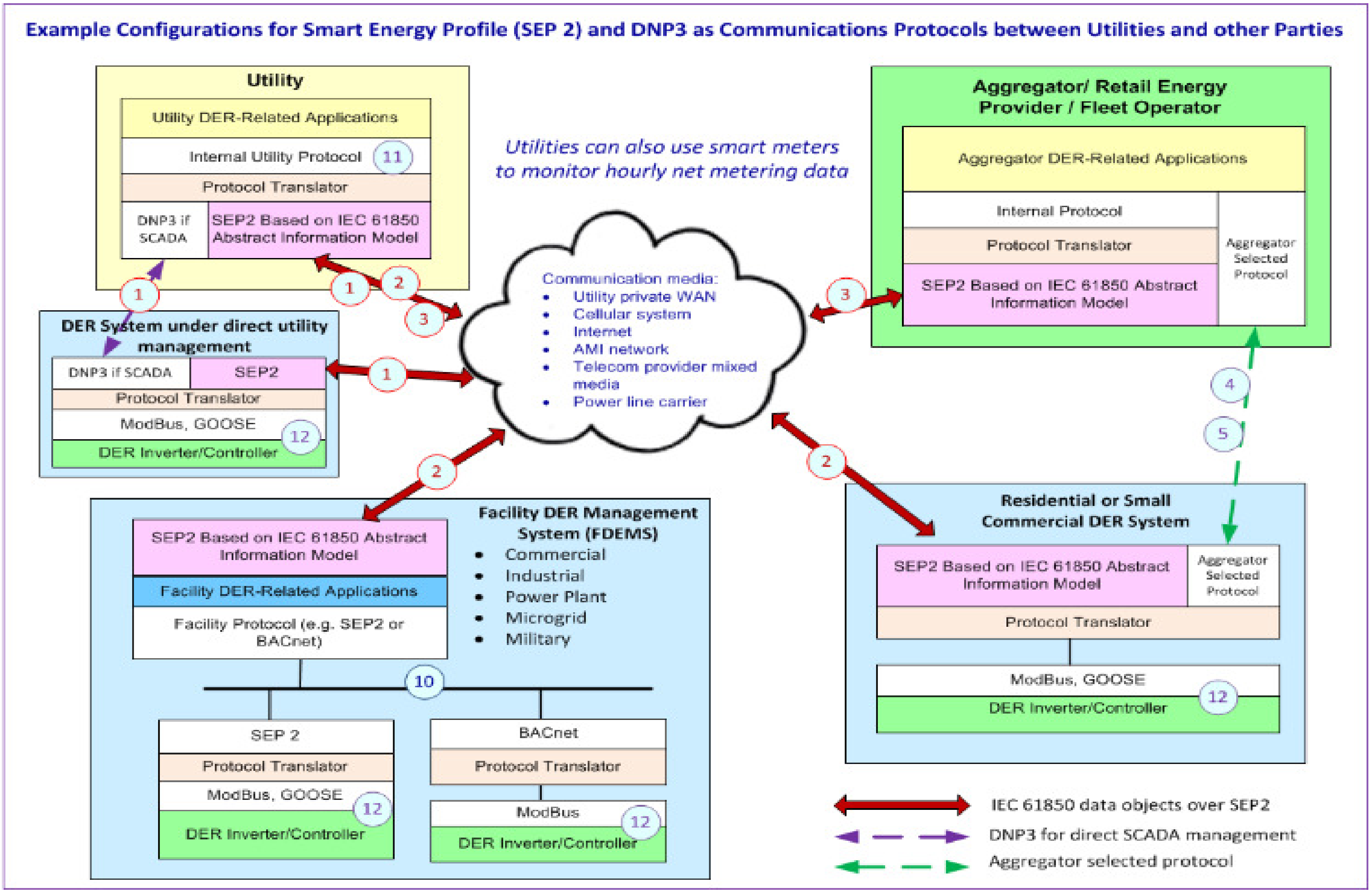
Walt's Use Cases

- Three primary classes of communications with DER
  - Direct device manipulation at the switch and relay level – e.g. Modbus settings
  - Command and Control – direct instructions for behaviors
    - DRLC or start battery discharging and/or
    - Settings for autonomous behaviors (automatic responses to sensed grid conditions)
  - Inform and Motivate
    - Price signals
    - Event signals
    - Transactive Energy Signals

CA Rule 21 Use Cases



CA Rule 21 DER Communications



Smart Inverter Functions

Autonomous Functions	Hawaiian Electric Priority	Effective date of Implementation
Anti-Islanding	Mandated – High Implemented	10/1/2015
TrOV-2	Mandated – High Implemented	2/9/2015
Low-High Volt Ride-Through	Mandated – High Implemented	Full Settings 10/1/15
Low-High Frequency Ride-Through	Mandated – High Implemented	Full Settings 10/1/15
Volt-Var Control	Mandated – Low Phase 2	12 Months after UL 1741 Supplement A is Approved by UL
Ramp Rate	Mandated – Low Phase 2	12 Months after UL 1741 Supplement A is Approved by UL
Fixed Power Factor	Mandated – High Phase 1	January 1, 2016
Soft-Start Reconnection	Mandated – High Phase 2	12 Months after UL 1741 Supplement A is Approved by UL
Frequency-Watt	Mandated – High Phase 1	12 Months after UL 1741 Supplement A is Approved by UL
Voltage-Watt	Mandated – High Phase 1	12 Months after UL 1741 Supplement A is Approved by UL
Command DER to Connect or Disconnect	Mandated – High Phase 2	No UL Certification Required
Remote Configurability	Mandated – High Phase 2	12 Months after UL 1741 Supplement A is Approved by UL

Table ES-1: Mandated High-Priority Advanced Inverter Functions in Hawaiian Electric Rule 14H