



ELECTRIC POWER
RESEARCH INSTITUTE



Overview of DER Interactions

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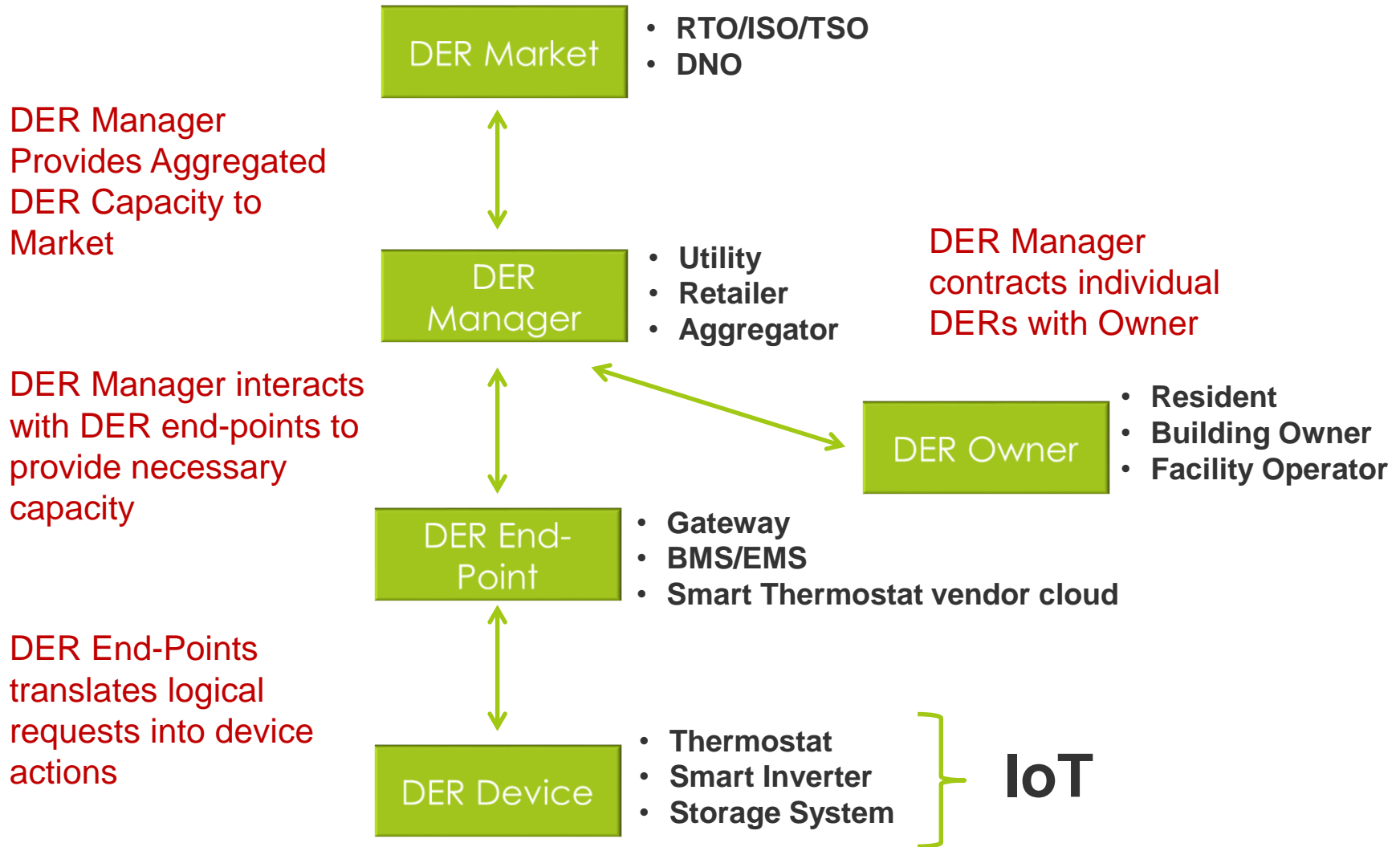
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Background

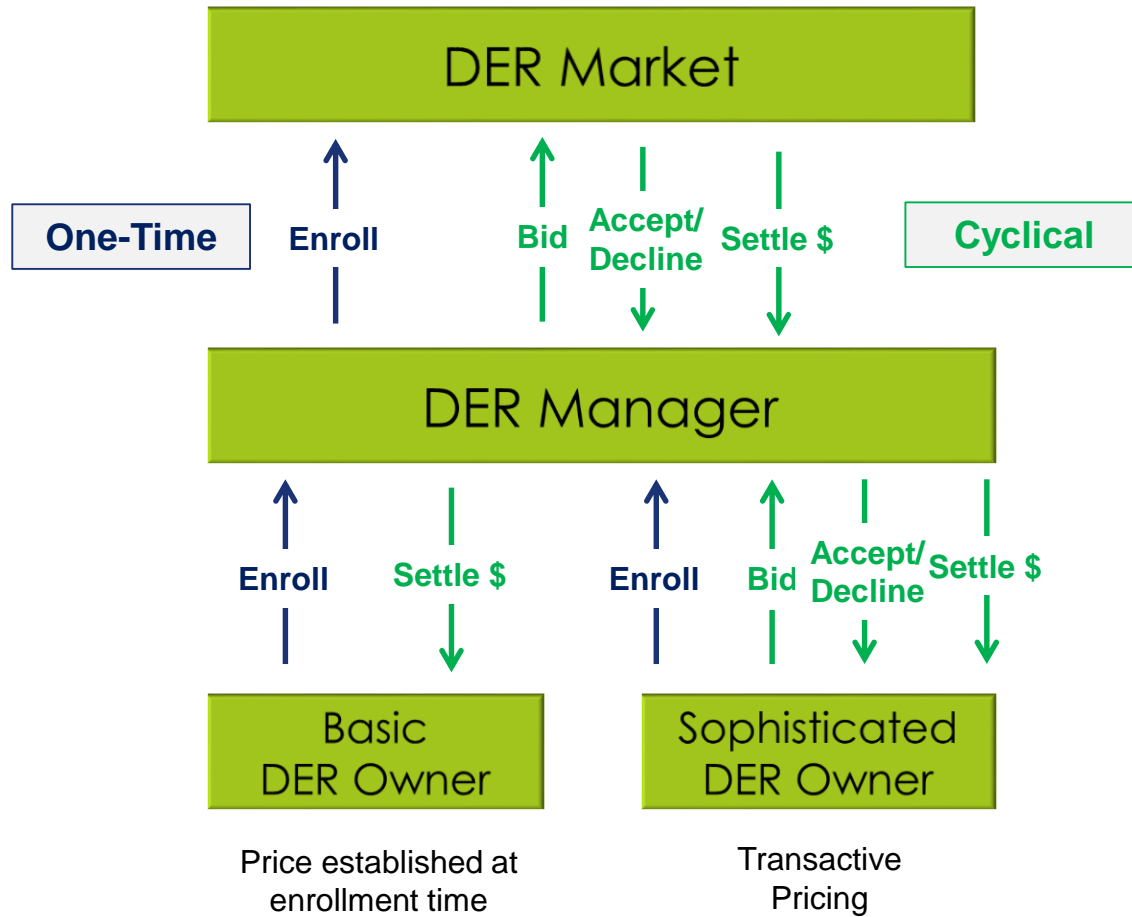
- Opportunities to leverage demand-side resources have expanded from demand response into a broad range of DER (Distributed Energy Resource) applications
- These applications include:
 - Economic DR within the scope of a utility
 - Aggregating and bidding DR resources into RTO/ISO markets
 - Leveraging DERs for grid protection/reliability/power quality
- The scope of DER technologies includes:
 - Controllable loads, including residential, commercial and industrial
 - Distributed generation, including customer owned solar systems, backup generators*, biomass, CHP, etc.
 - Energy Storage systems, including battery and mechanical technologies
 - Hybrid systems that incorporate several of the above technologies combined with intelligent local optimization and control

* Fossil fuel generators may or may not be able to participate in DSM (demand side management) programs in some jurisdictions

Actors & High-Level Interactions



Business Transactions



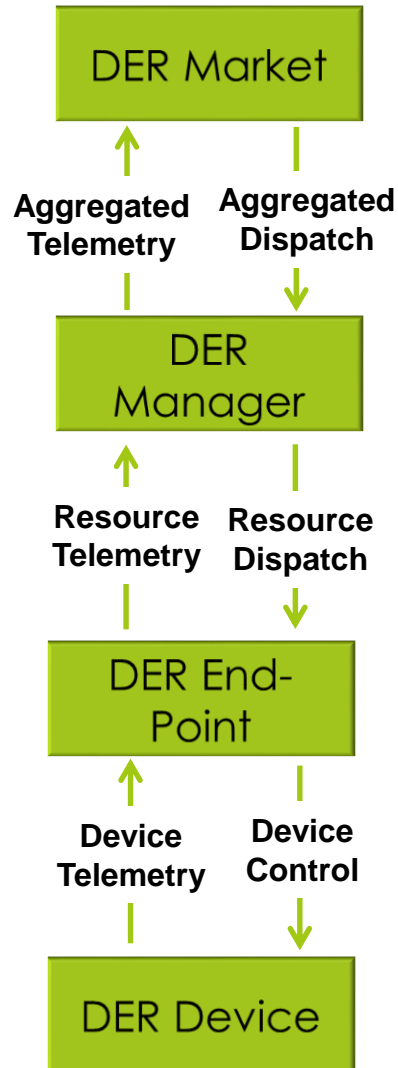
Common Technical Interactions & Protocols

Grid level optimization,
scheduling and
dispatch

Resource pool optimization,
scheduling and dispatch in
alignment with resource
availability and forecasted
behavior

Optimization of local
devices to meet dispatch
requests in alignment with
occupant needs

Compliance with device
control commands within
safety and operational
parameters



- ICCP
- DNP3
- IEC 60870-5-104
- Proprietary Web Service

- OpenADR
- DNP3
- IEC 60870-5-104
- IEC 61850?

- Zigbee/Zwave/Insteon/Thread/Bluetooth LE
- Modbus/BACnet/OPC
- Wi-Fi/Proprietary
- IEEE 2030.5 (SEP2)

The IT/OT Divide: There is only one resource!

