



In-Premise Devices  
and  
Grid Interoperability

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# What is Demand Response?

## ➤ Devices Respond to the Grid

- Direct relationship between demand, load on the grid, green house gases, and the likelihood of blackouts
- Just like any other supply/demand scenarios, the higher the load, the higher the price
- Consumers can use load and/or price information to not only curb demand but also save money and promote energy conservation

## ➤ Signaling

- Flex Alert (*CA Only*) – the most basic tool providing Active/Inactive states
- OpenADR – a complete / standards based set of load, price, and energy consumption signals through the Internet
- AMI – a complete / standards based set of load, price, and energy consumption signals through the Smart Meter (SEP)

# Control Methods

- ***Load Control***: Utility publishes time-of-use (TOU) rates. Control is exercised by consumer
- ***Direct Control***: Utility controls selected appliances remotely
- ***Prices to Devices***: Appliances intercept price signals and act as programmed
- ***Distributed Load Control***: A higher level controller that takes grid signals and makes appropriate decisions based on customer preferences and budget

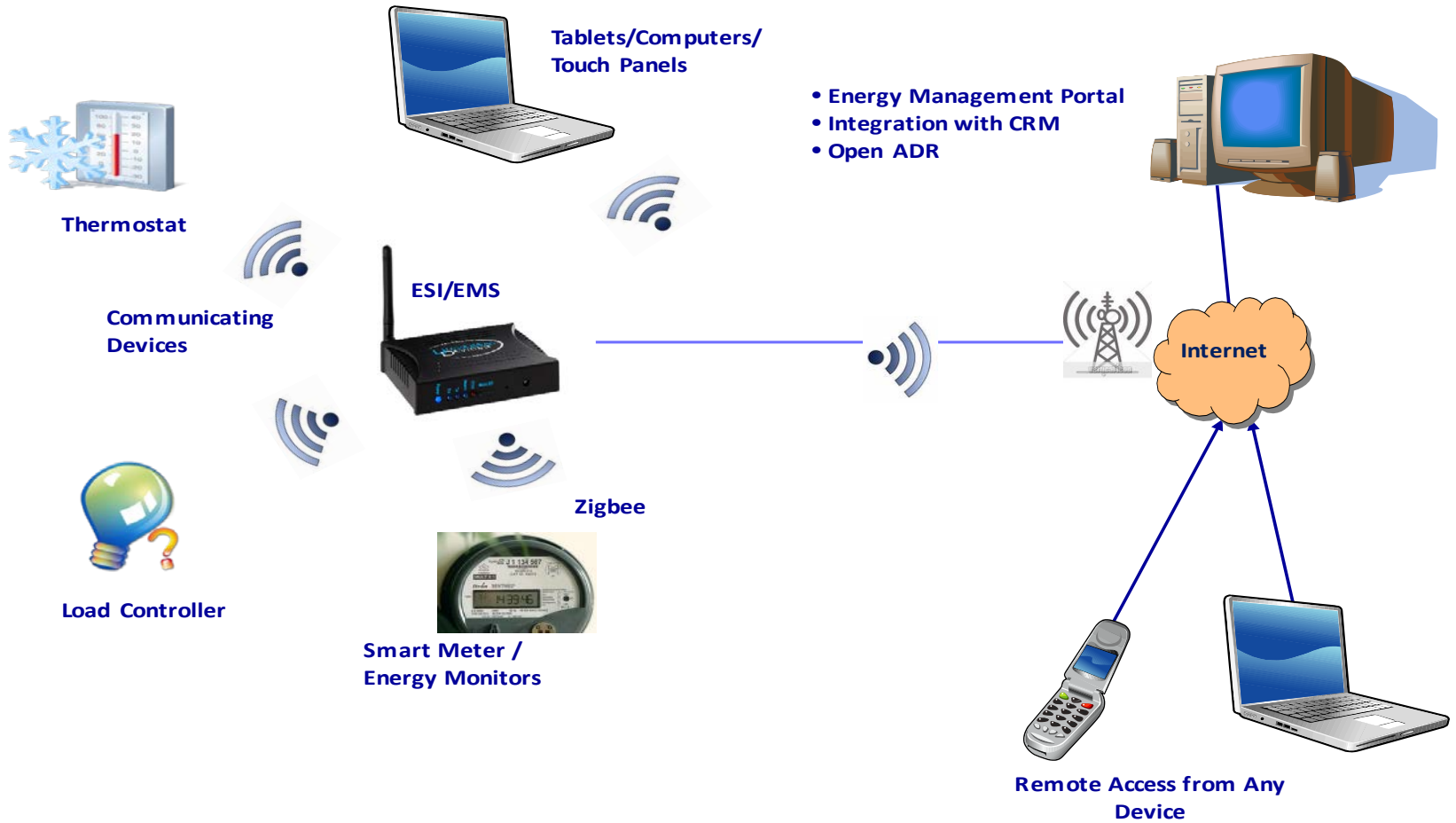
# ESI : Energy Service Interface

- Implements *Distributed Load Control*
  - Based on *ISO/IEC 15067-3*: Model of Demand Response Energy Management System (EMS)
- Facilitates communications between AMI, the consumer, and end devices. customer preferences, budget through automation and learning
- Analogous to routers but for energy-aware resources and AMI interactions

# ESI Characteristics

- **Inexpensive and commercially available**
  - Off the shelf and support for off the shelf communicating protocols
- **Standards based and secure**
  - ISO/IEC 15067-3, OpenADR, and SEP
  - Cyber-security tested and certified
- **Automation**
  - Easily configurable user scenarios based on important events such as price, climate conditions, occupancy, time of day, etc.
  - May learn and suggest energy saving modes based on environmental and user taken actions
- **Autonomous**
  - Losing connectivity should have very limited impact on the correct operations of the system
- **Developer Friendly**

# Topology





*Driving to Grid 2020*

# Questions?

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