Systemic Control of PCT Networks

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Vision

PCT network reducing peak power demand.

Programmable Communicating Thermostat (PCT):

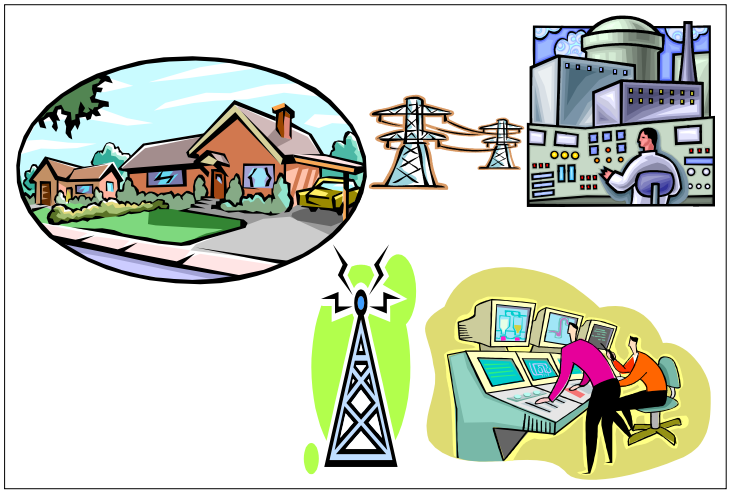
- A replacement thermostat for individual homes.
- Reacts to Demand Response signals by adjusting setpoint.

The PCT network consists of:

- PCT enabled homes.
- DR message dispatch.

Benefits

- **On demand load reduction.**
- **Eliminate rolling blackouts.**



Research Questions

How does the network respond to DR signals?

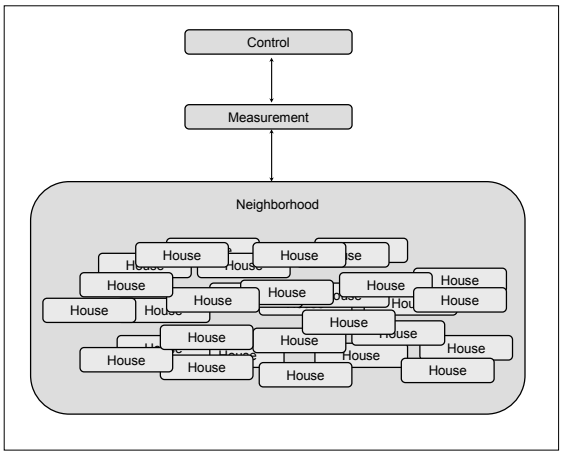
- The system is complex and stochastic.
- Power systems require high reliability.
- Load control introduces an additional level of complexity.
- Reliability requires predictable response.

What control methods provide the best response?

Method

Load Group Simulation

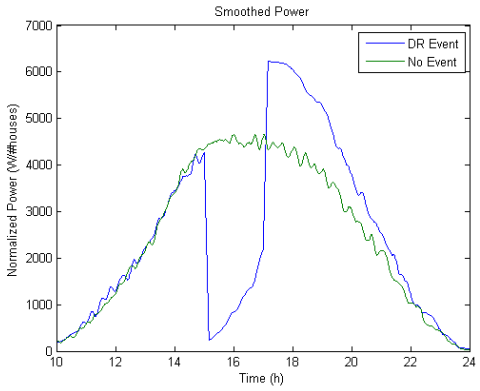
- Neighborhood Task
  - Array of individual PCT homes.
  - House parameters randomly generated.
- Measurement Task
  - Takes power measurements.
- Control Task
  - Implements control algorithm.



Findings

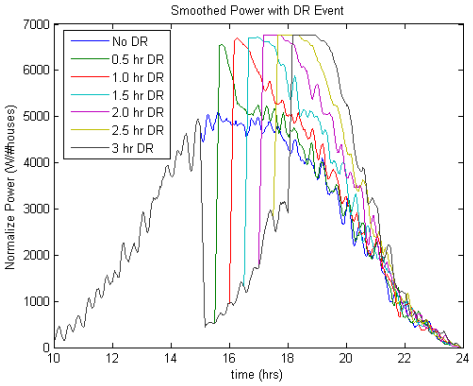
Response to static setpoint change.

- 500 random houses
- 4° F setback



Response to different length setpoint changes.

- 100 random houses
- 4° F setback
- Different length events



Future Work

- Examine different types of DR signals – price, feedback control…
- Examine alternative event end strategies – random end time, ramped setpoint end, controlled end…

Demand Response Enabling Technology Development
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