

The Demand Response Automation Server (DRAS)

Ed Koch
CTO Akuacom

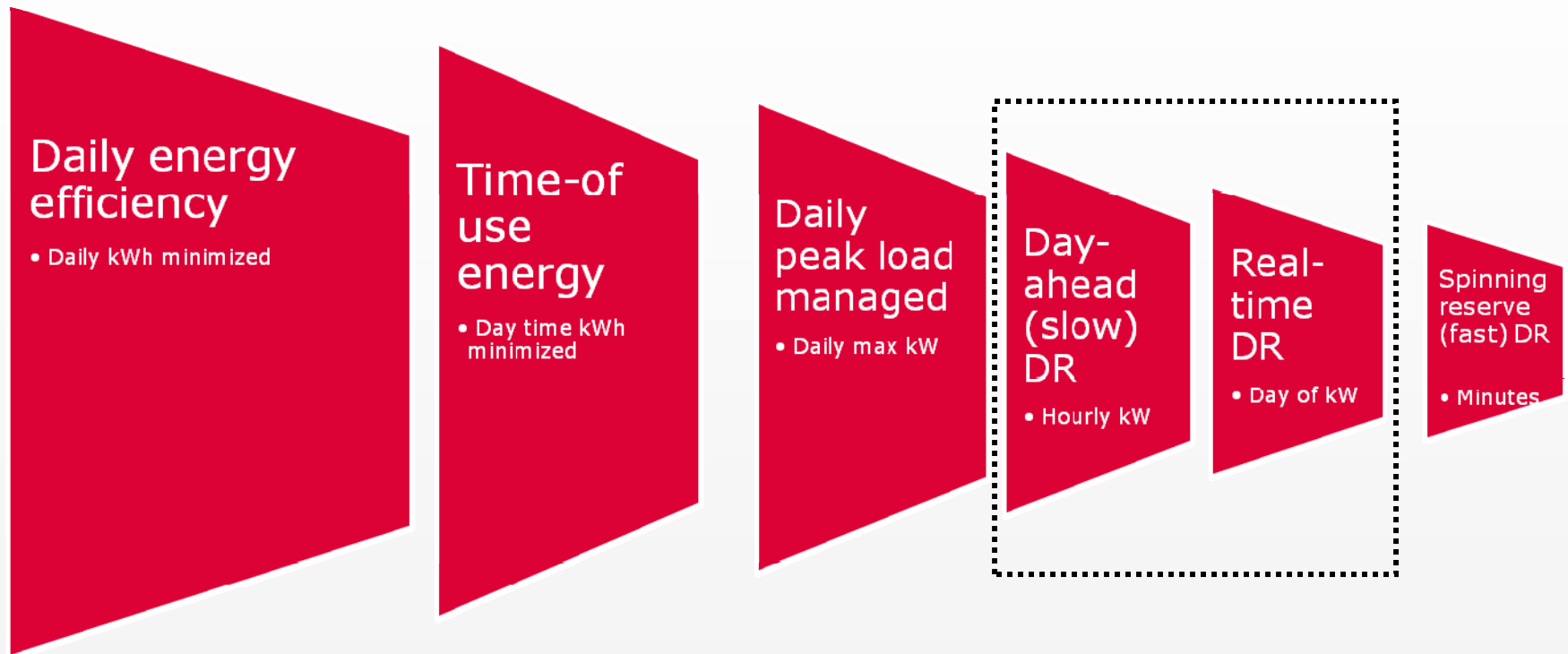


Building
Performance

Agenda

- Definition and history of Open Automated Demand Response (OpenADR) concept
- Empirical results from Automated Demand Response in CA
- DRAS concept and what is being standardized with OpenADR
- Standards effort and status

Energy Management/DR Spectrum



Service Levels Optimized

Service Levels Temporarily Reduced

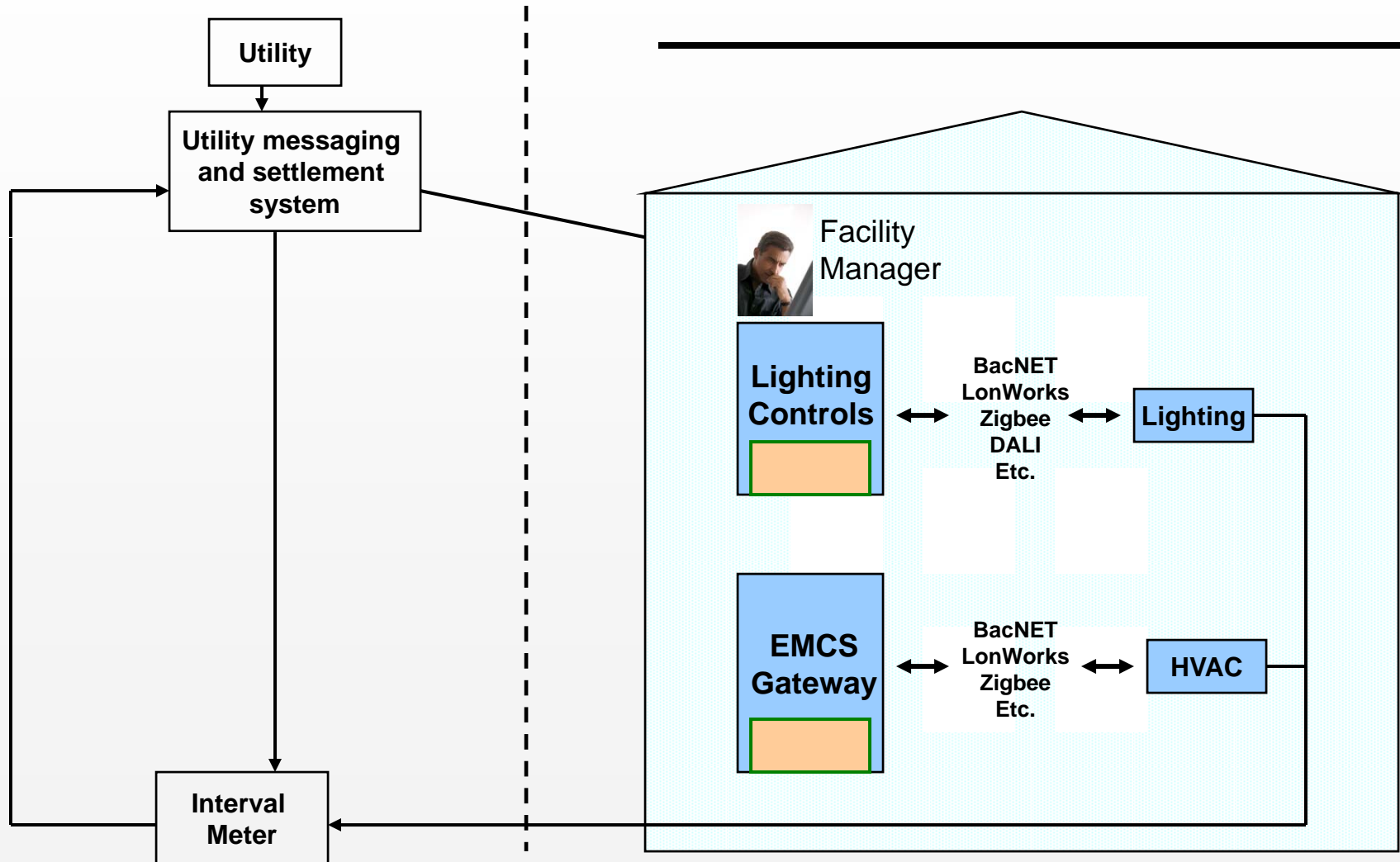
History

- 2002 - Research begun at LBNL Demand Response Research Center (DRRC) into automated DR. Funded by CEC and PIER.
- 2003 – Initial development at DRRC using XML exchange of information with limited field trials.
- 2004 – Use of internet relays in field trials to support automation with simple EMCS, scaled up field tests.
- 2005 – Development of DRAS concept. Collaboration with PG&E’s CPP DR program.
- 2006 – Expanded field trials and use in PG&E’s Pilot DR programs. Development of CLIR box for use as Simple DRAS Client.
- 2007 & 2008 – Commercialization and use of DRAS in PG&E, SCE, and SDG&E DR programs.
- **2007 – Standardization effort for Open-ADR begins**

Manual DR

Utility Owned

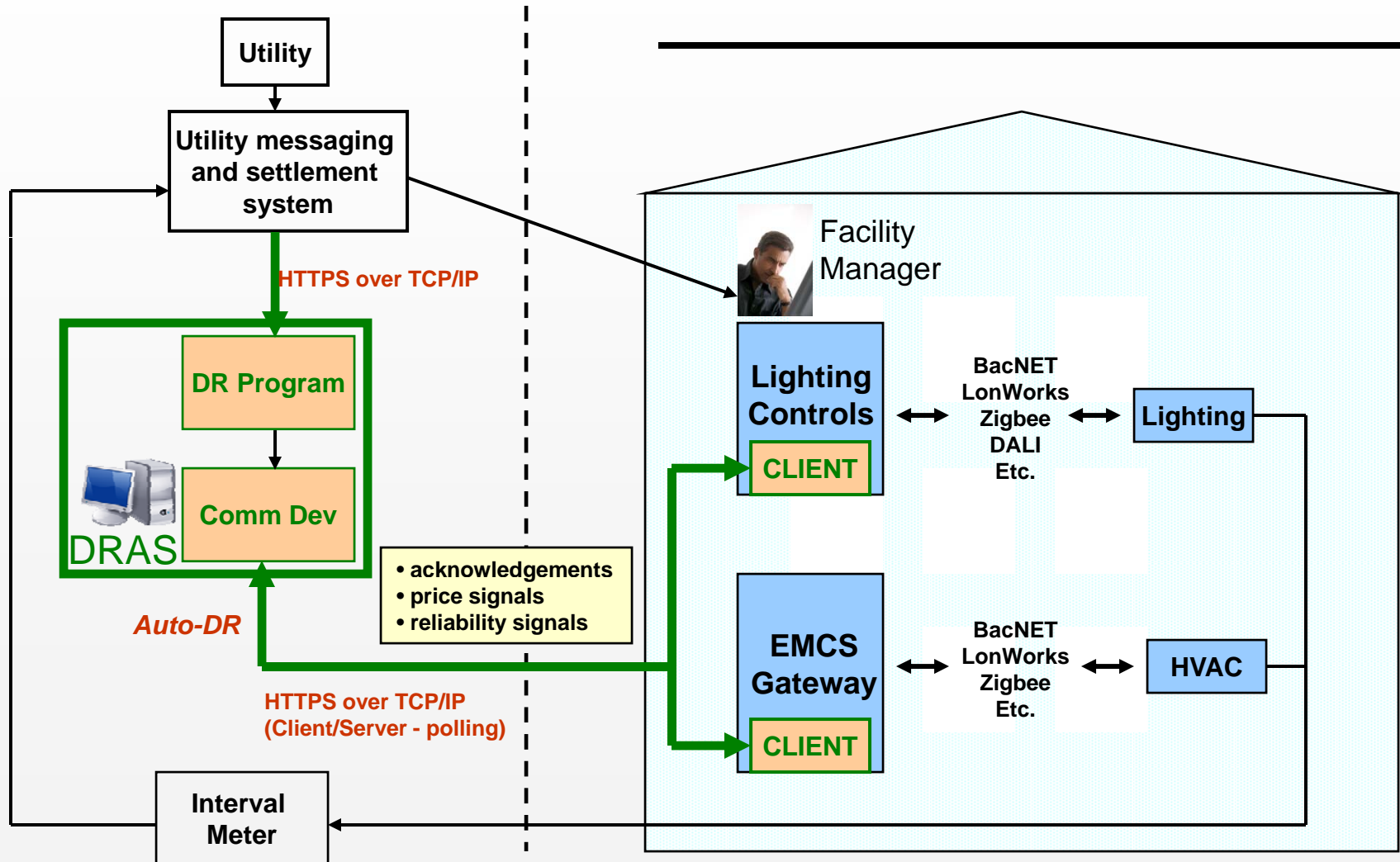
Consumer Owned



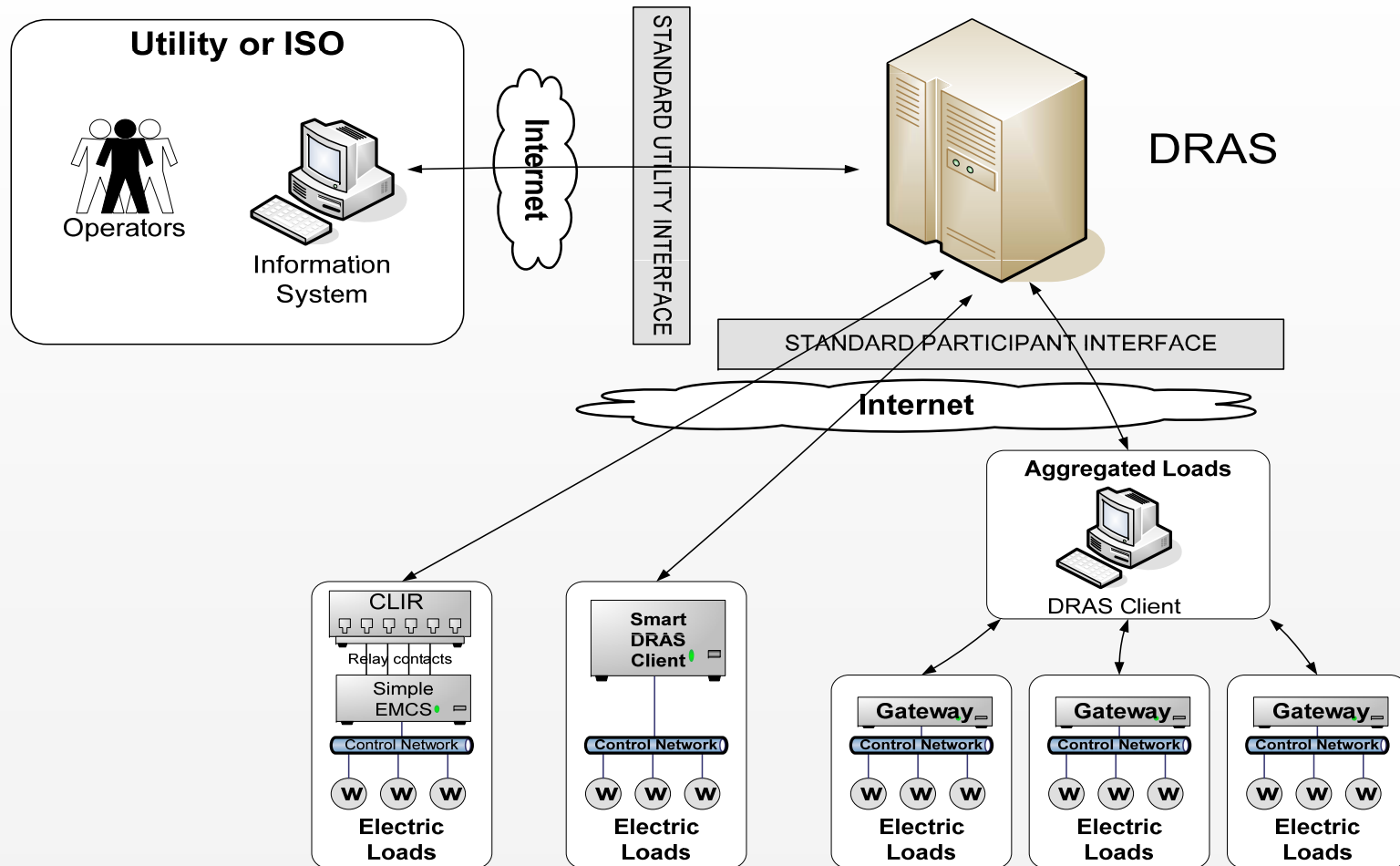
Automated DR with DRAS

Utility Owned

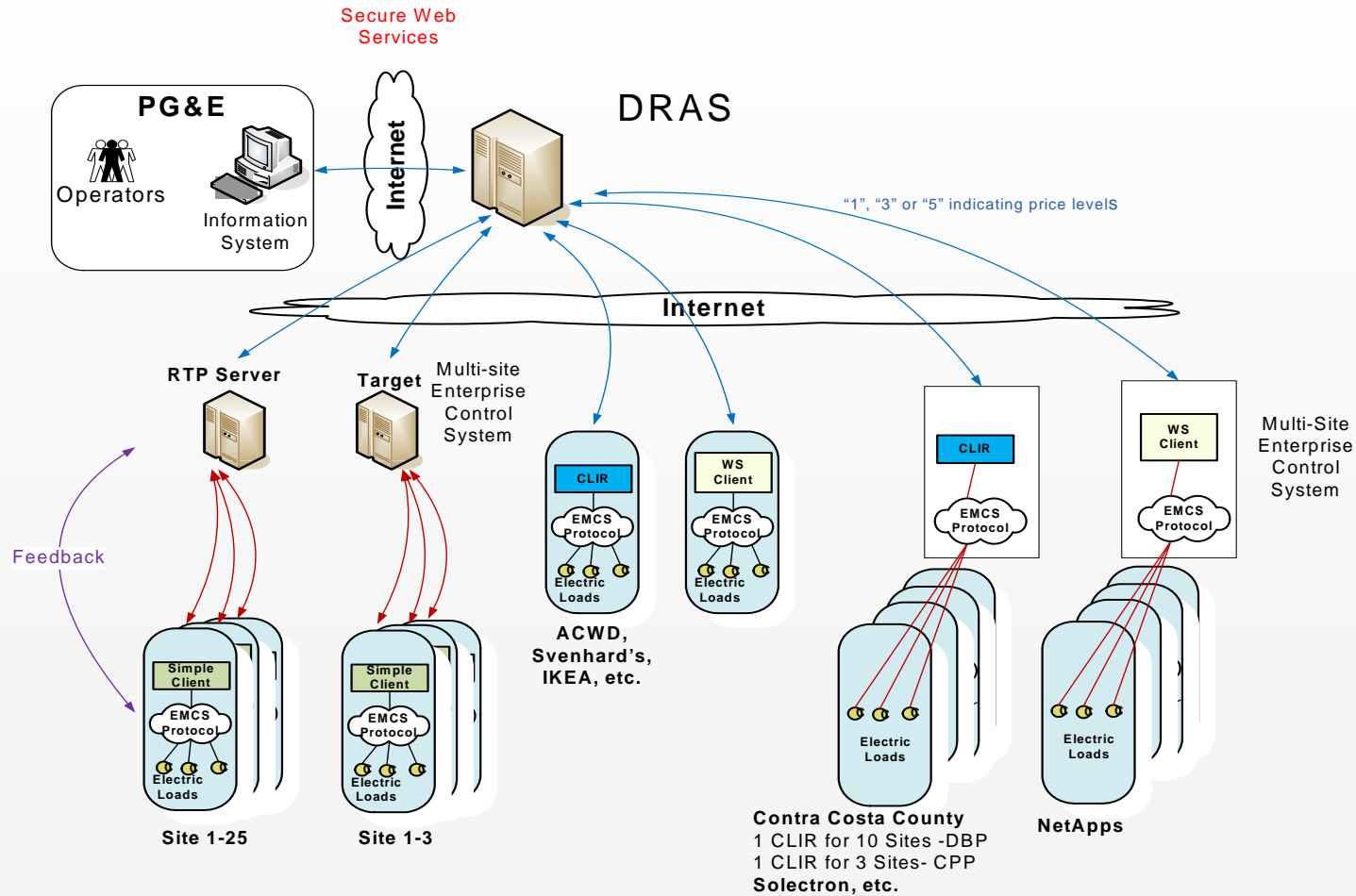
Consumer Owned



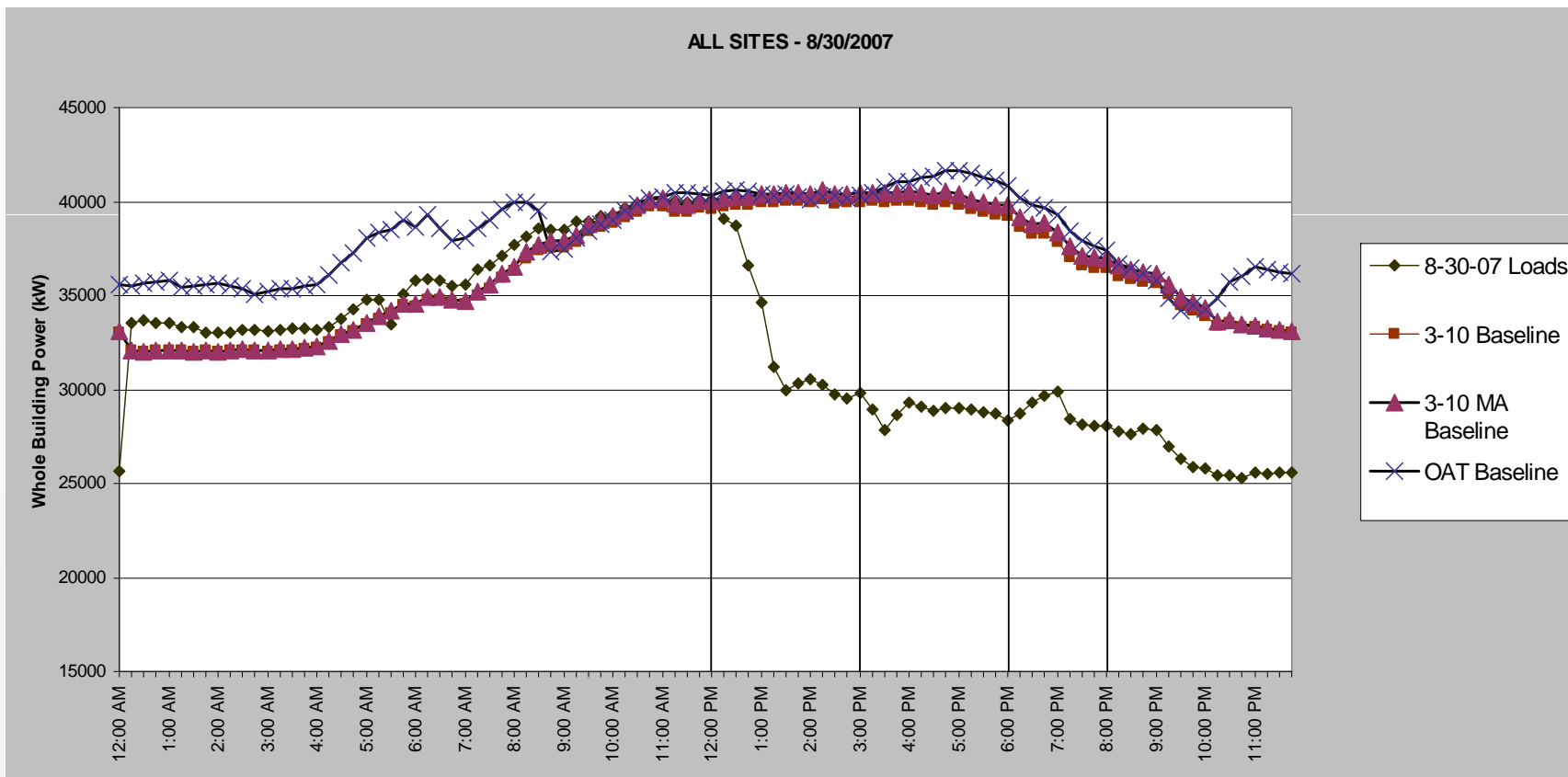
OpenADR and DRAS Concept



Actual Deployment Scenarios (PG&E)

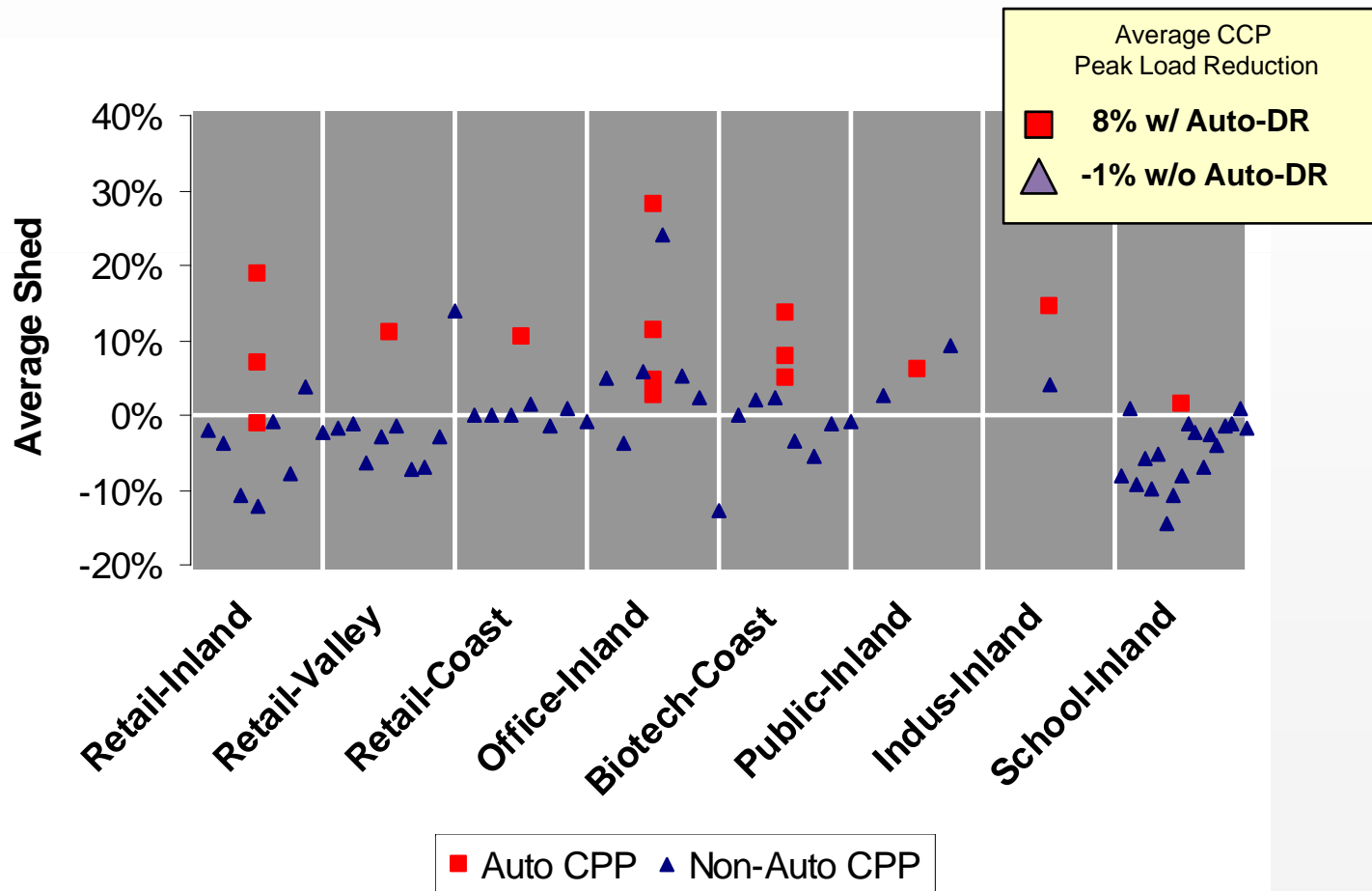


PG&E Load Shape Impacts for August 30th CPP and DBP Events



Reductions represented nearly 12 MW!

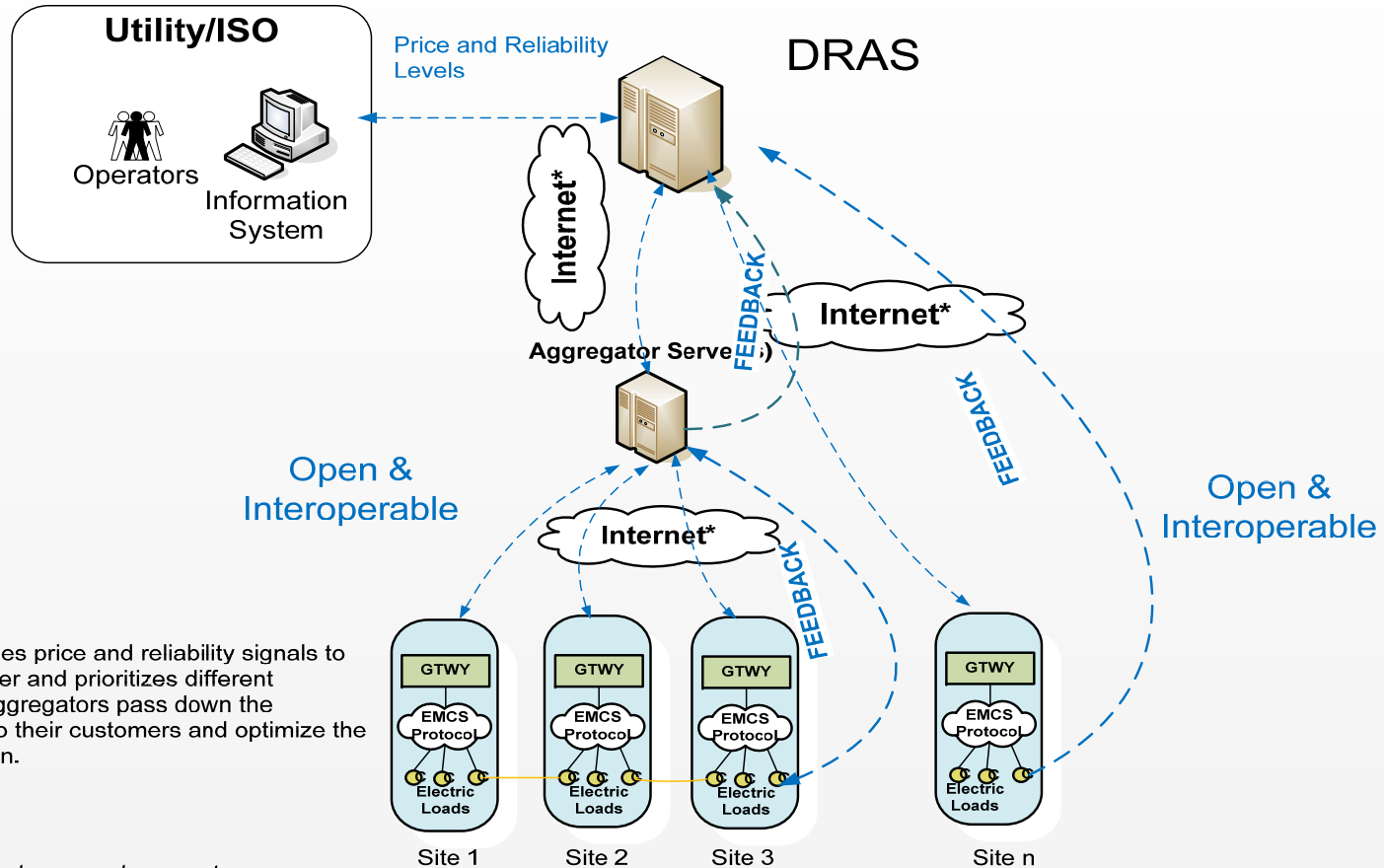
Auto-DR Effectiveness



OpenADR Communications Standardization

- **Impact interoperability**
 - Reduces “vendor lock-in”
 - Increases innovation
 - Lowers technology costs
- **Change a utilities current business practices**
 - Allows DR technology specifications to be interoperable
- **Impact reliability**
 - AutoDR can be used for price or reliability DR
 - Standards are secure and reliable
- **Impact pricing or financial planning for a utility**
 - CORNERSTONE of technology development is to enable DR with dynamic tariffs – facilitate ubiquitous response capabilities

Vision for Open Automated Demand Response (OpenADR) Communication Standards



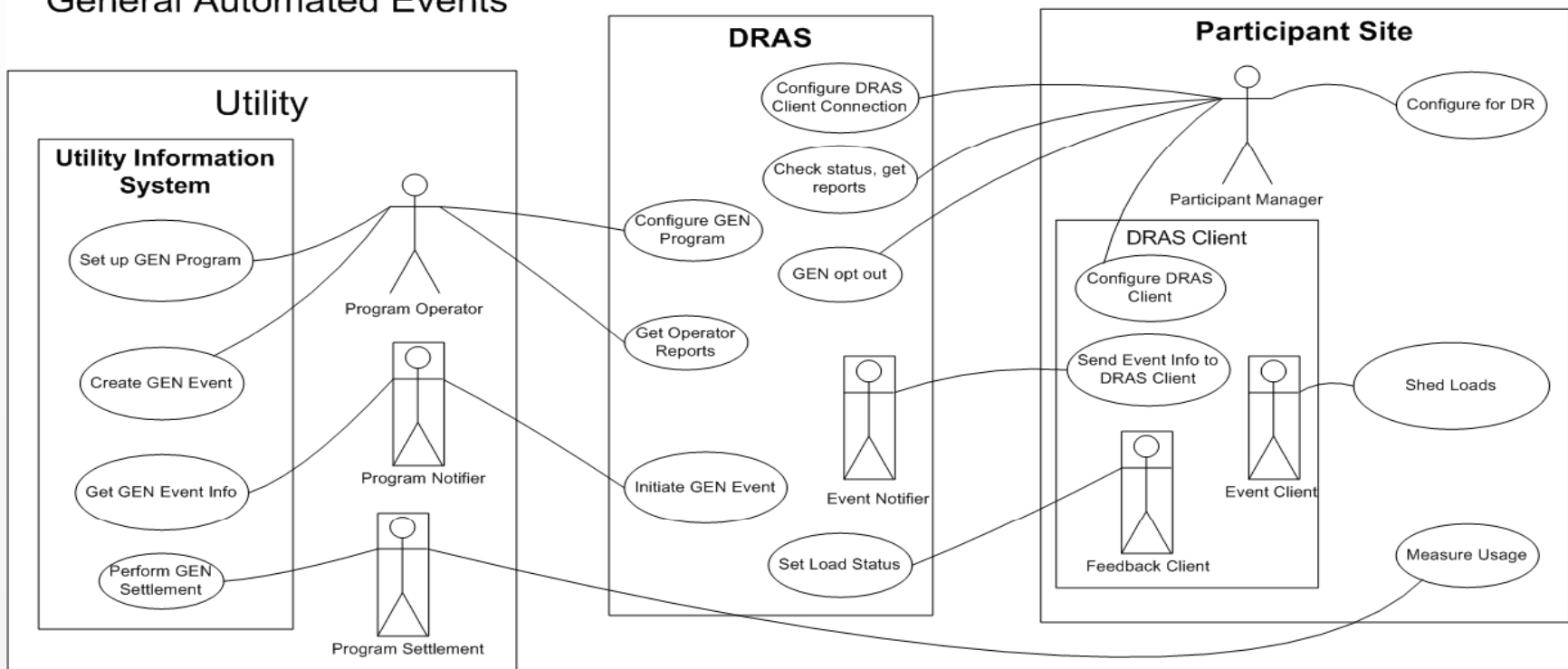
DRAS provides price and reliability signals to each customer and prioritizes different programs. Aggregators pass down the information to their customers and optimize the load reduction.

With or without aggregators, customers can participate in Auto-DR because of the Open and Interoperable infrastructure

* Secure Web Services

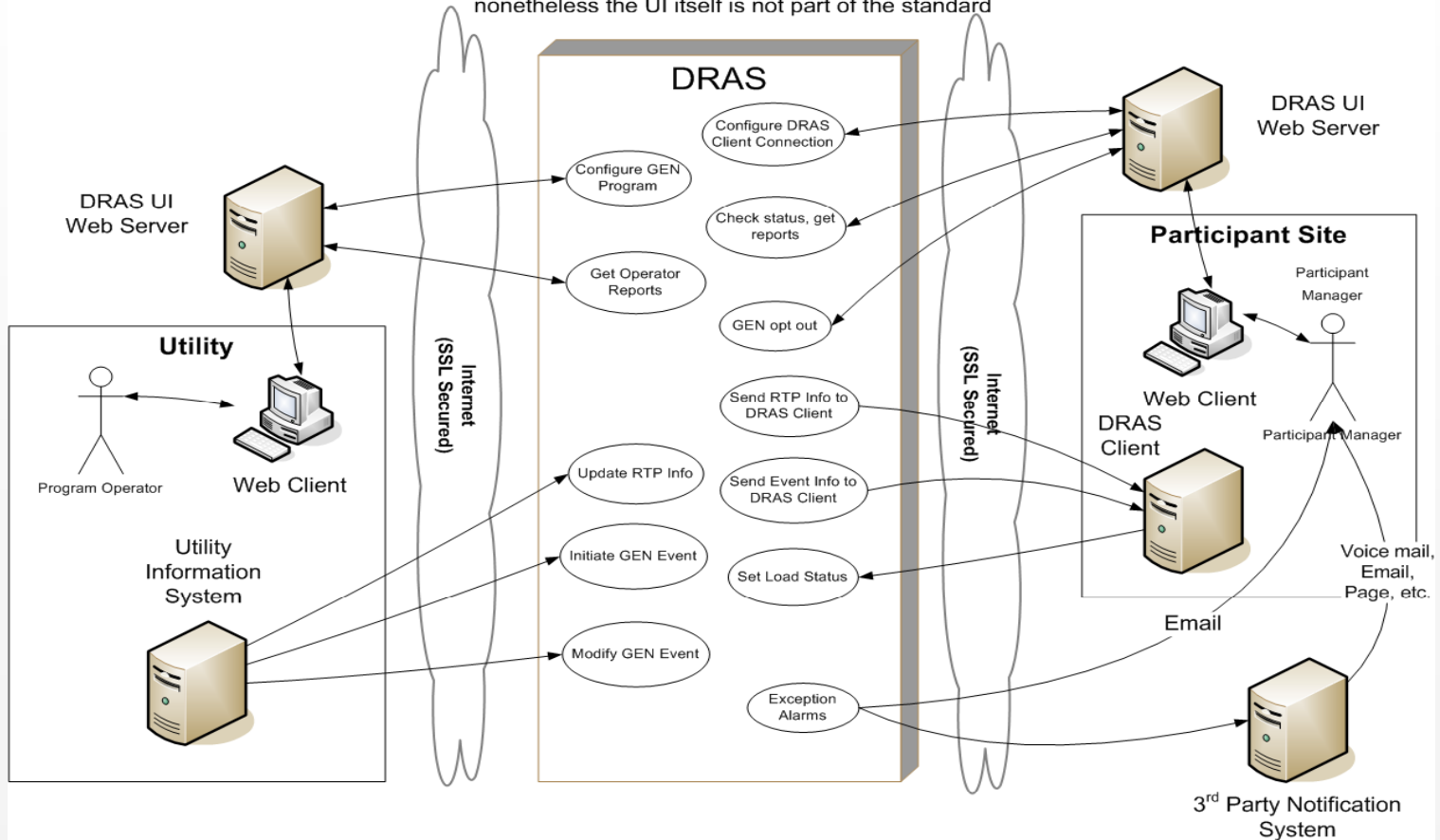
Automated DR Events Uses Case

General Automated Events

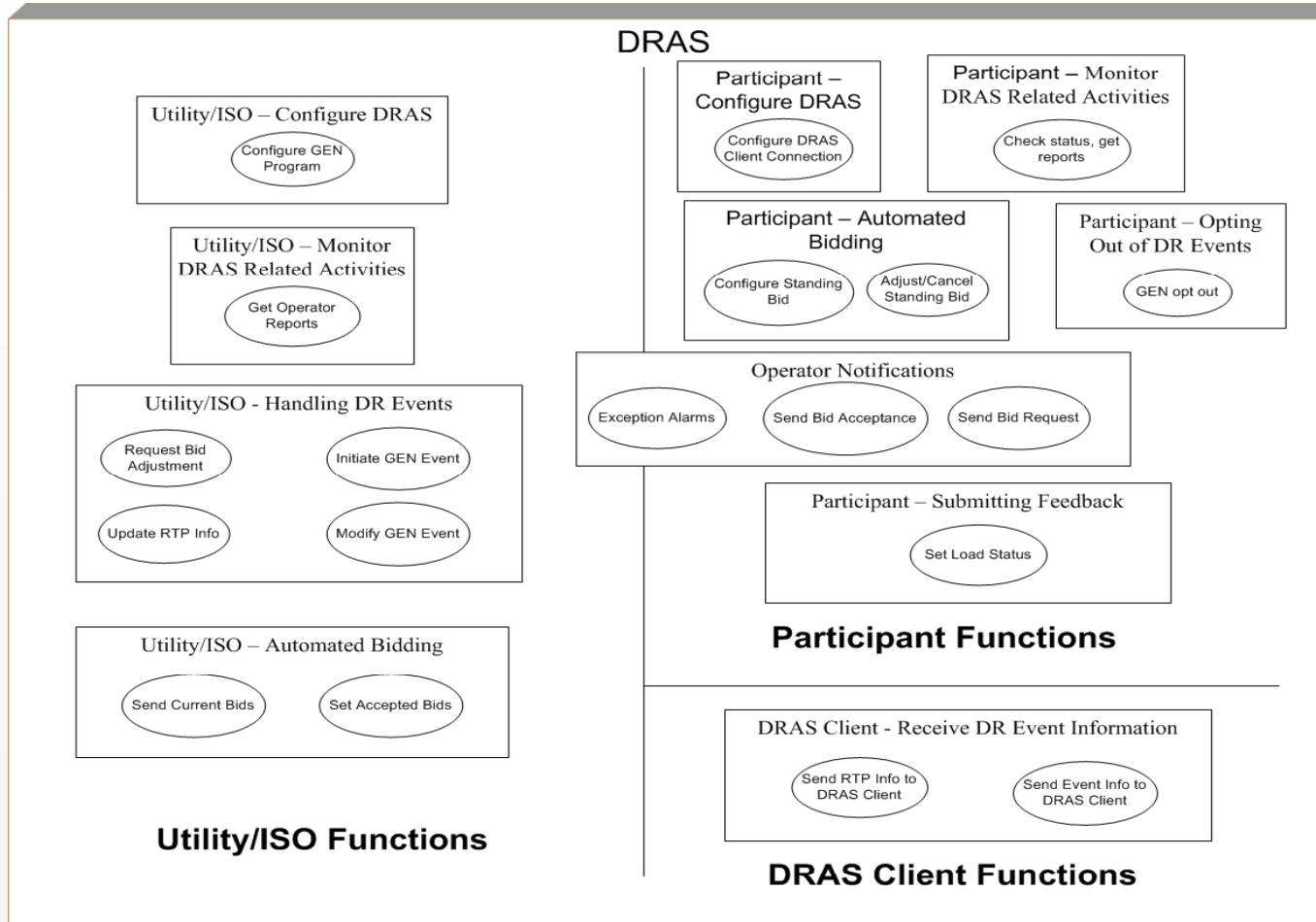


Automated DR Event Architecture

Note that for a specific DRAS implementation the DRAS UI Web Server may be in the DRAS, but nonetheless the UI itself is not part of the standard



DRAS Interfaces



OpenADR Standardization Status

- Recruited participation from major stake holders including:
 - Utilities and ISO's including CAISO, PG&E, SCE, SDG&E, etc.
 - Variety of national standards bodies including NIST, OpenAMI, OpenHAN, IEC TC-8, etc.
 - Facility controls vendors and organizations including BACnet, LonMark, OASIS/oBIX, etc.
 - End user organizations including aggregators and Retail Energy Alliance (Big box retailers representing 3B square feet of retail space)
- First draft released for public review (ending 7/15/08):
 - <http://drrc.lbl.gov/openadr>

Future Directions

- Enabling technologies for Small Commercial facilities
- Integration with AMI efforts for residential DR
- Prediction of facility responses to future DR events
 - Feedback of facility state
 - Better models for predicting facility response
- Real-time monitoring of facilities responses to DR events