

Open Automated Demand Response Communication Standards

Presentation on version 1.0

At CW 2008

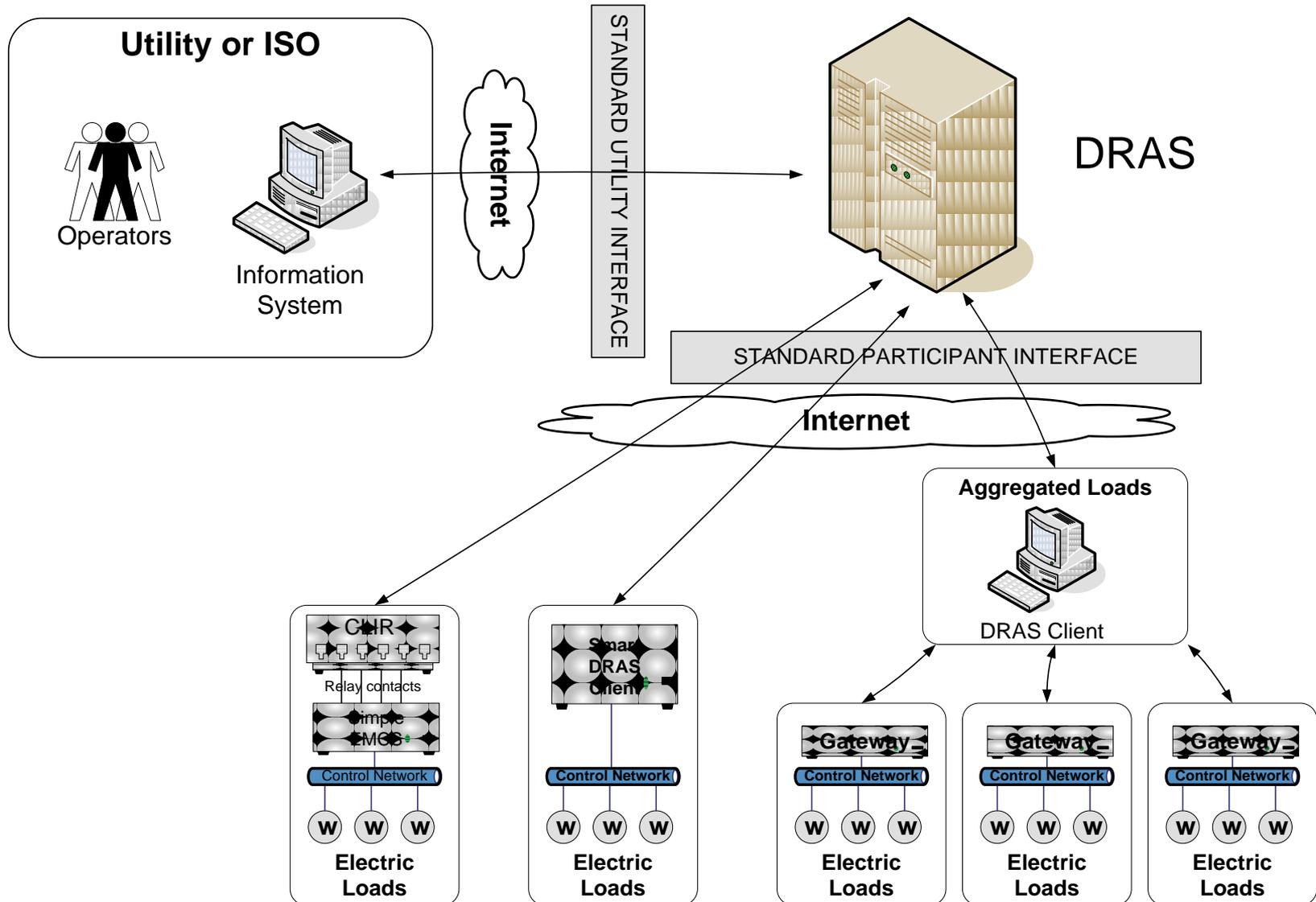
Definitions

- Utility/ISO – offering supplying asset (electricity) and offering DR programs
- Participant – Entity with business agreement with Utility/ISO to participate in DR programs
- DRAS – Demand Response Automation Server, automates delivery of messages between the Utility/ISO and the Participant.
- DRAS Client – entity owned by the Participant that communicates with the DRAS to receives DR Event information (MM communications).

TAG Affiliations (need to update)

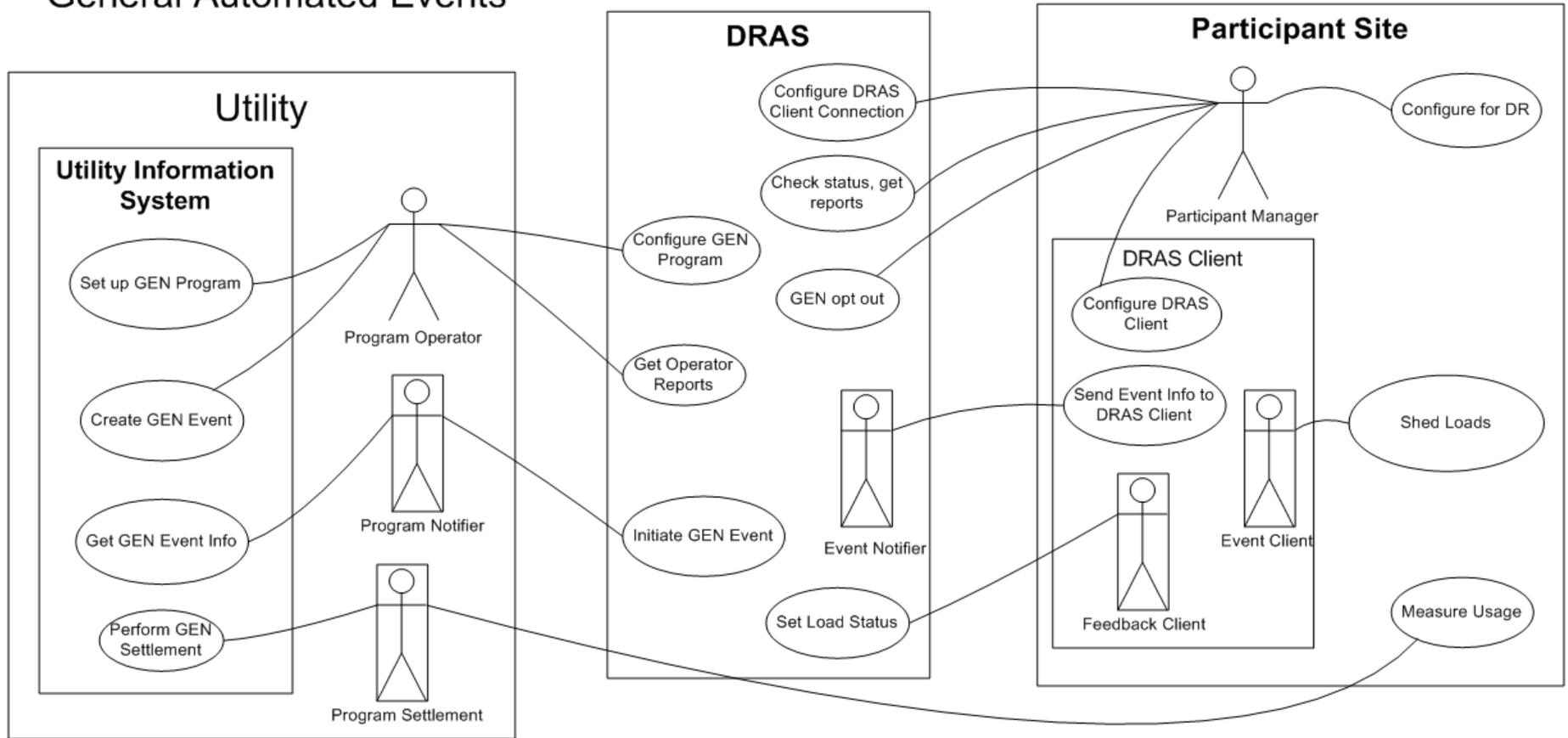
- NIST - BACnet
- CA ISO
- CEC/PIER
- CIEE
- Enernex
- EPRI
- Gridnet
- Gridwise
- Infotility
- LBNL
- OpenAMI
- OpenHAN
- PG&E
- SCE
- SDG&E
- UCB - PCT

DRAS Concept



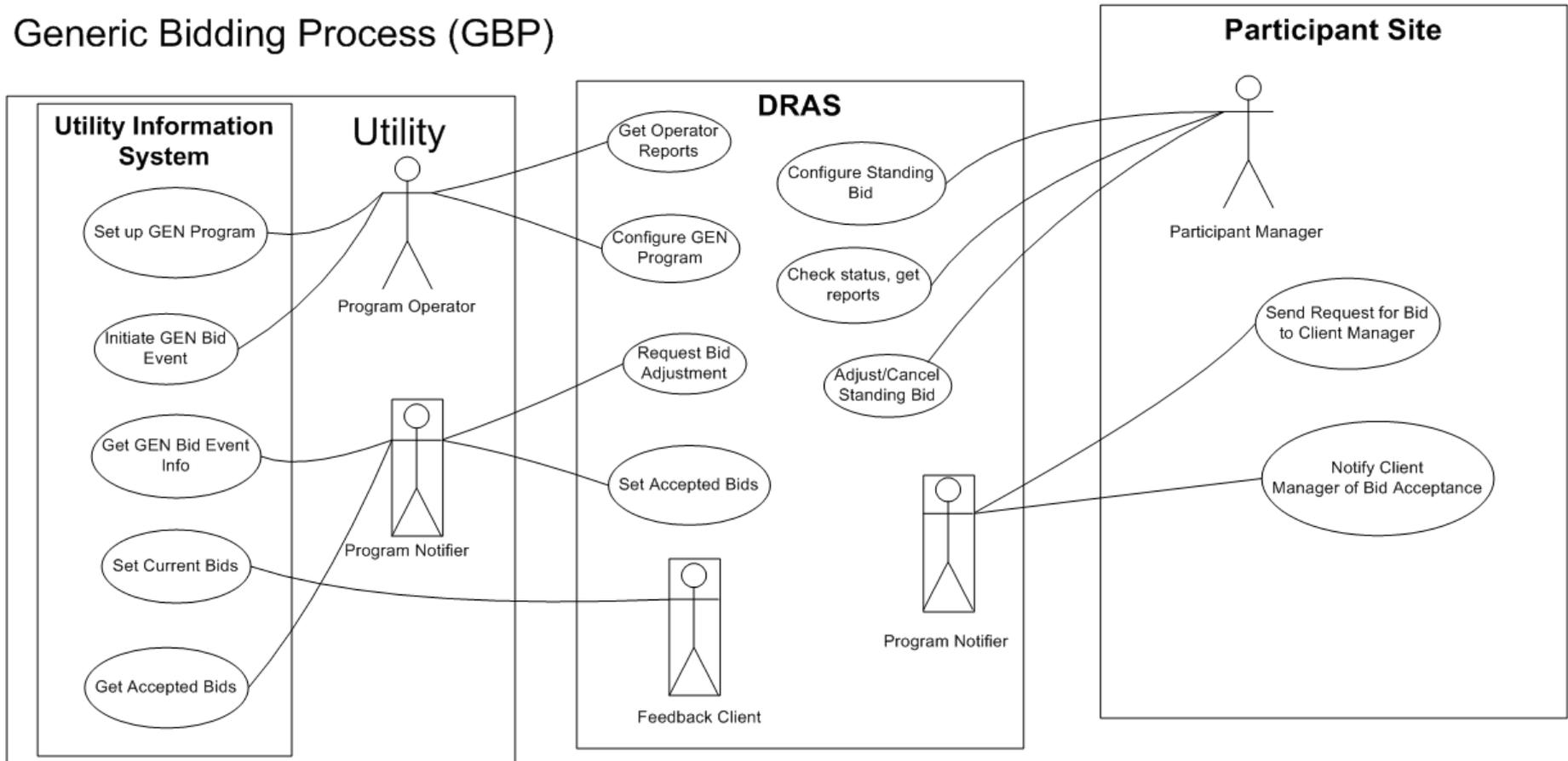
Automated DR Events Uses Case

General Automated Events



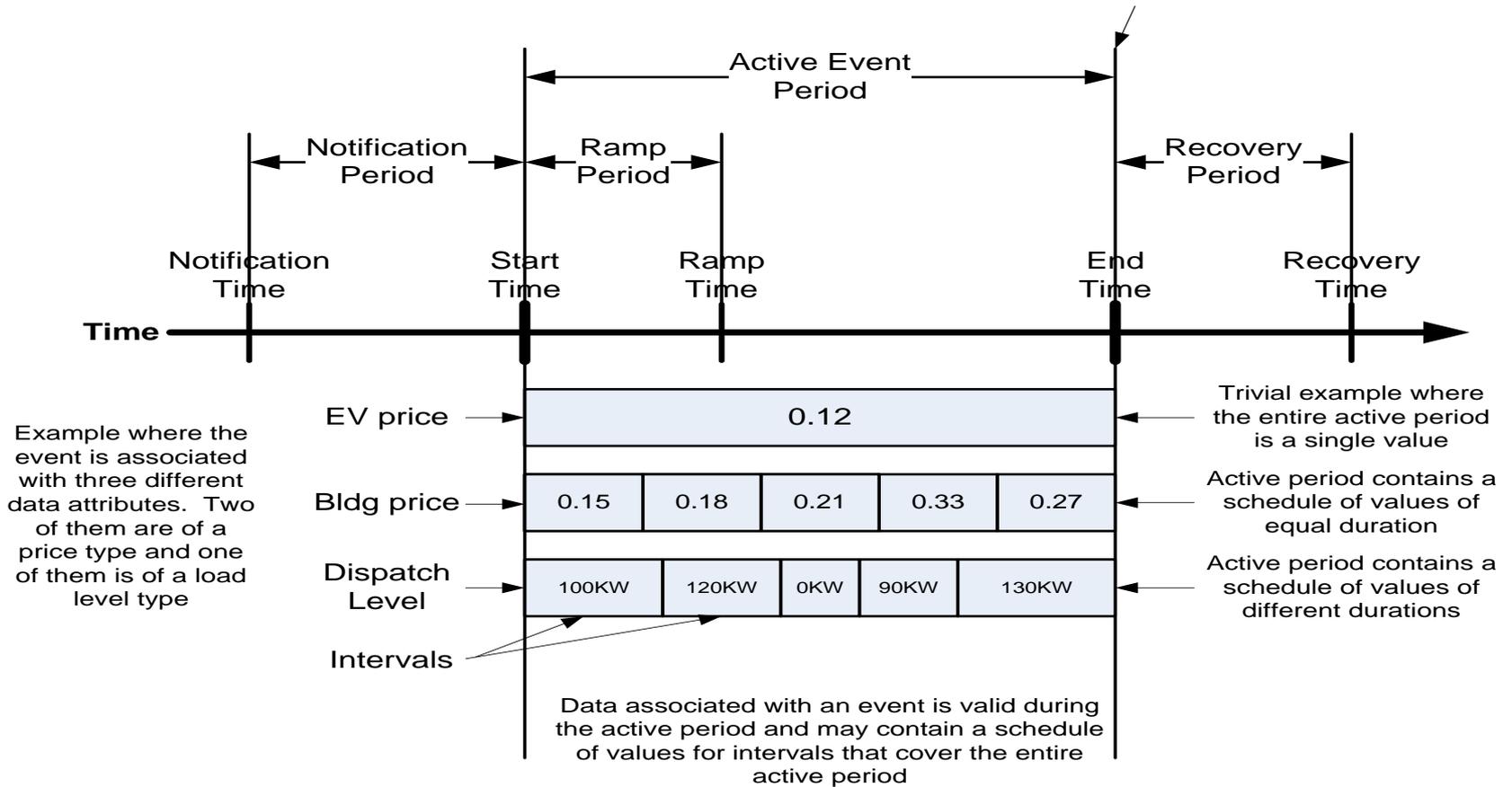
Automated Bidding Use Case

Generic Bidding Process (GBP)



Core Event Model

Note that it is possible to specify events with no end time, i.e. open ended.



Example where the event is associated with three different data attributes. Two of them are of a price type and one of them is of a load level type

Trivial example where the entire active period is a single value

Active period contains a schedule of values of equal duration

Active period contains a schedule of values of different durations

Note: In this example each element is a simple scalar, but the structure still holds even if each instance is a more complex type with multiple attributes

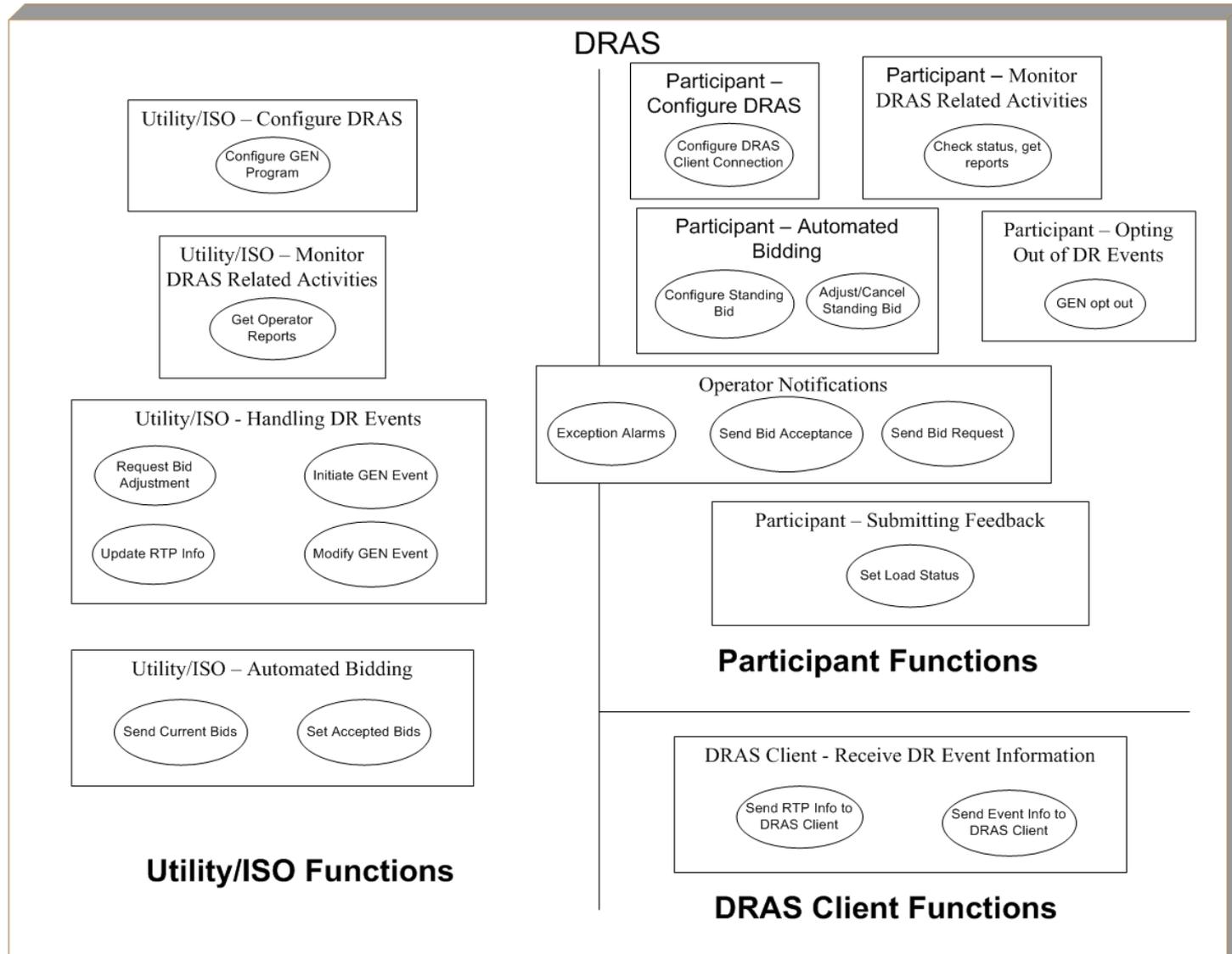
DRAS Requirements

- Communications with the DRAS should use readily available and existing networks such as the internet.
- The DRAS interfaces should be platform independent and leverage existing standards such as XML and Web Services.
- The DRAS communications should use a security policy that enables non-repudiation and encryption of the communications with the DRAS.
- The DRAS should support communications with a variety of control systems that may range from a very simple EMCS (Simple DRAS client) to those with sophisticated data processing and programming capabilities (Smart DRAS client).

DRAS Requirements (cont)

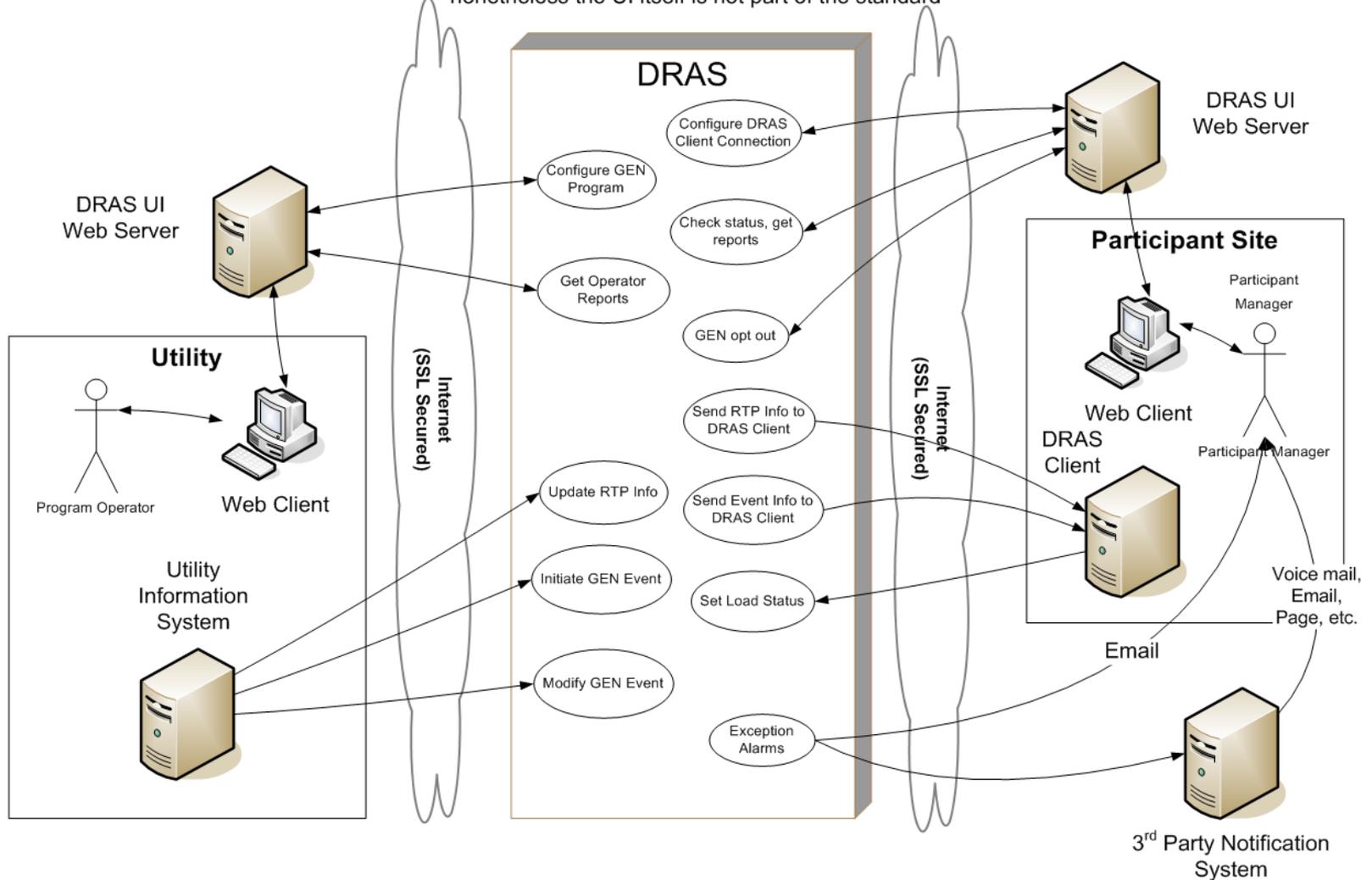
- The DRAS should not be dependent on specific control systems within the facilities.
- DRAS Clients that communicate with the DRAS should easily integrate with existing facility networks and IT infrastructures.
- The DRAS should support aggregated loads that may be managed by third party aggregators.
- Reconciliation of DR Event participation is outside the scope of the DRAS. There are a number of methods such as aggregators, AMI, etc. that can and will handle the measurement of sheds for the purposes of the reconciliation of DR programs.

DRAS Interfaces

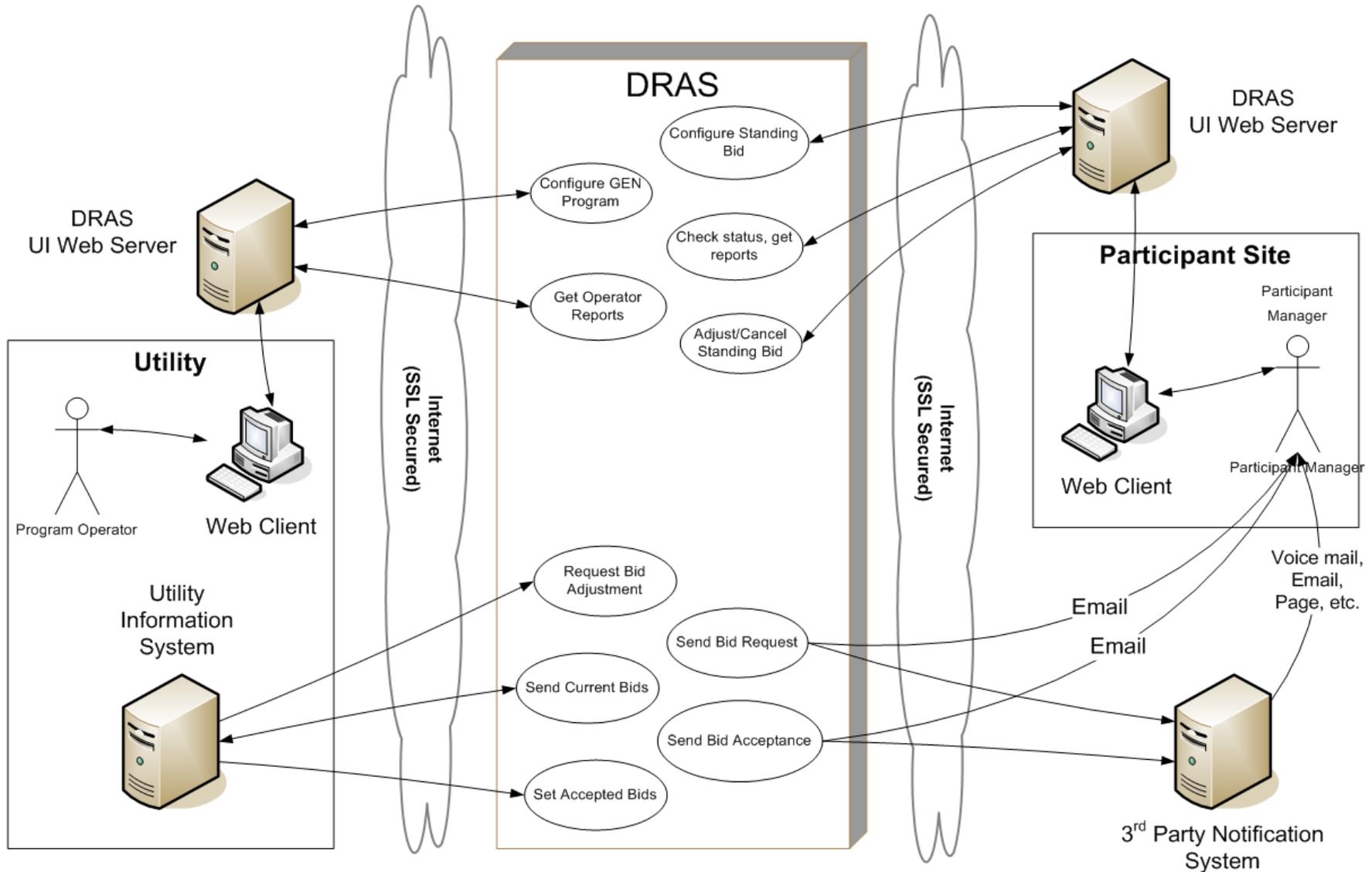


DRAS Event Architecture

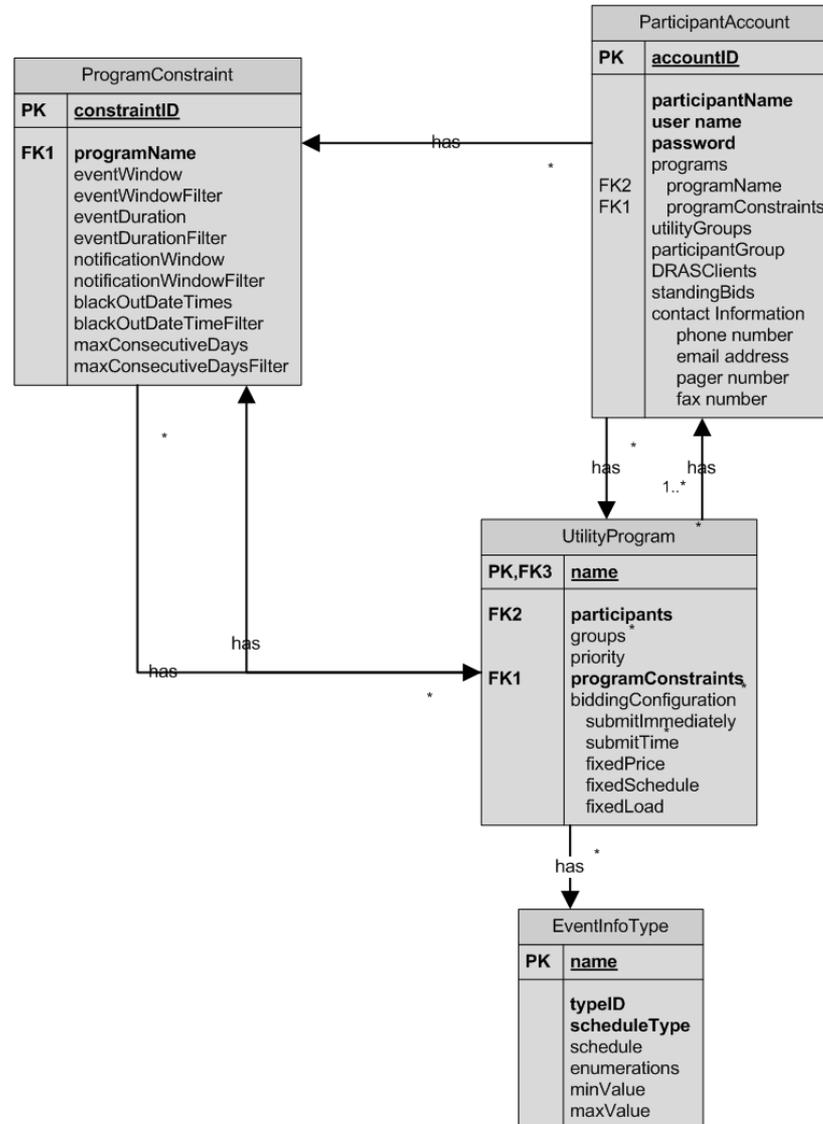
Note that for a specific DRAS implementation the DRAS UI Web Server may be in the DRAS, but nonetheless the UI itself is not part of the standard



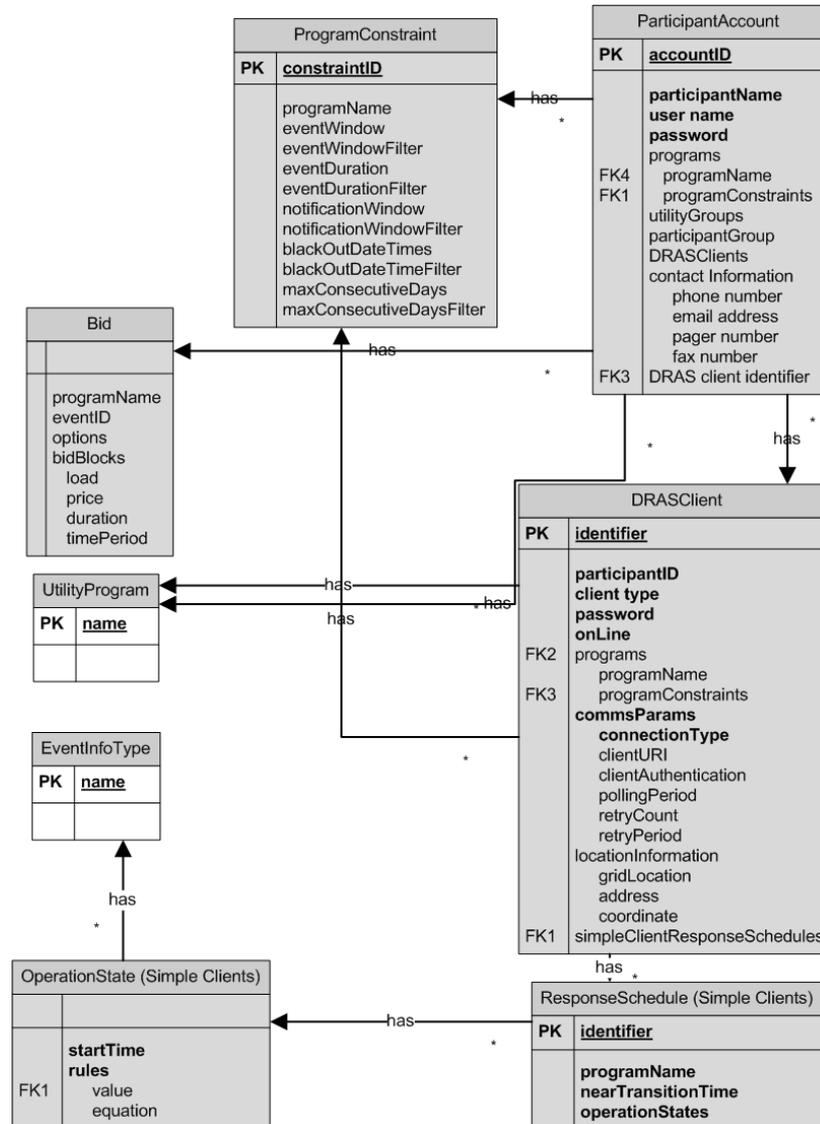
DRAS Bidding Architecture



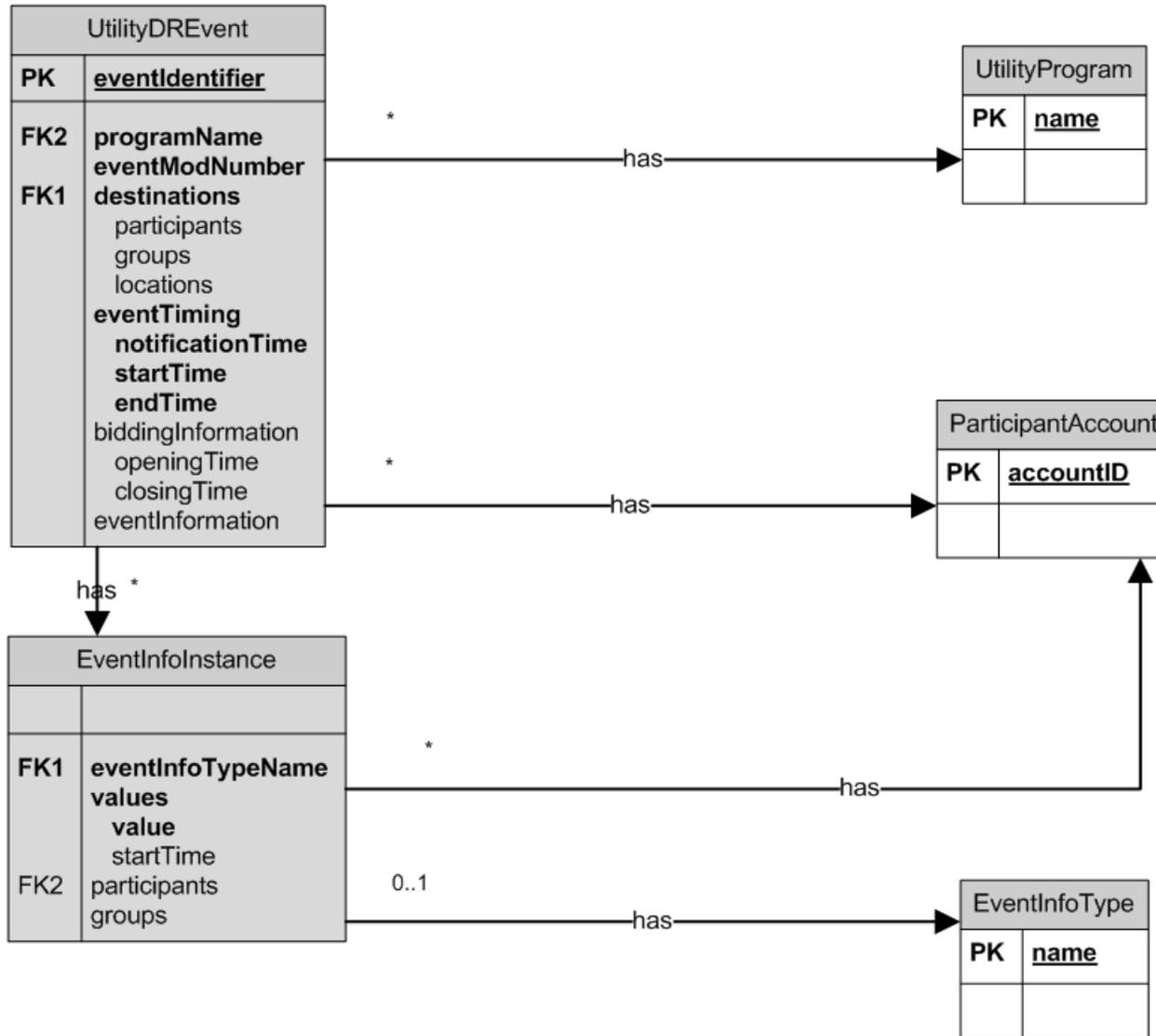
Utility Configuration Entities



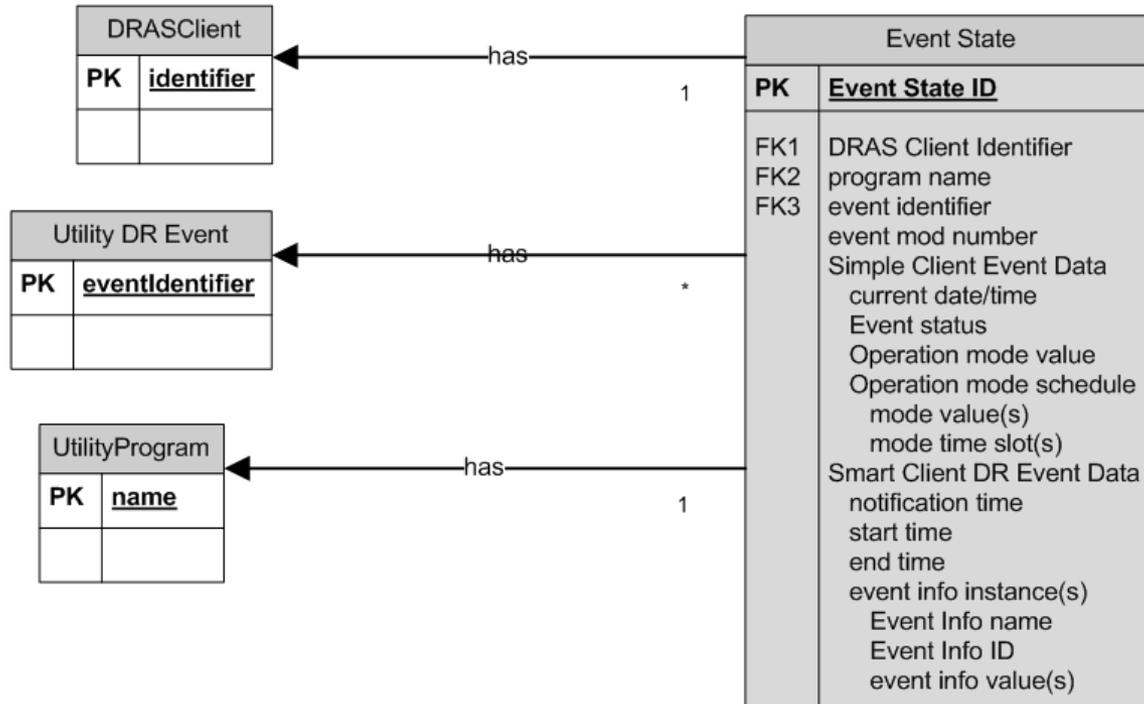
Participant Configuration Entities



Utility Issues DR Event

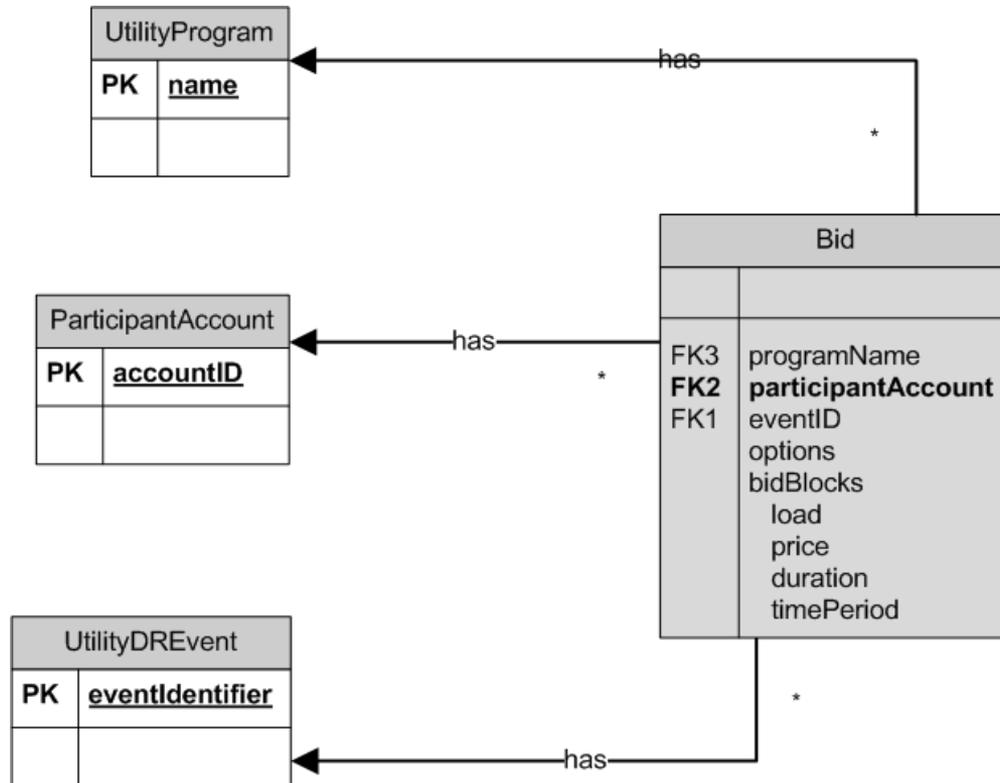


DRAS Client DR Event State

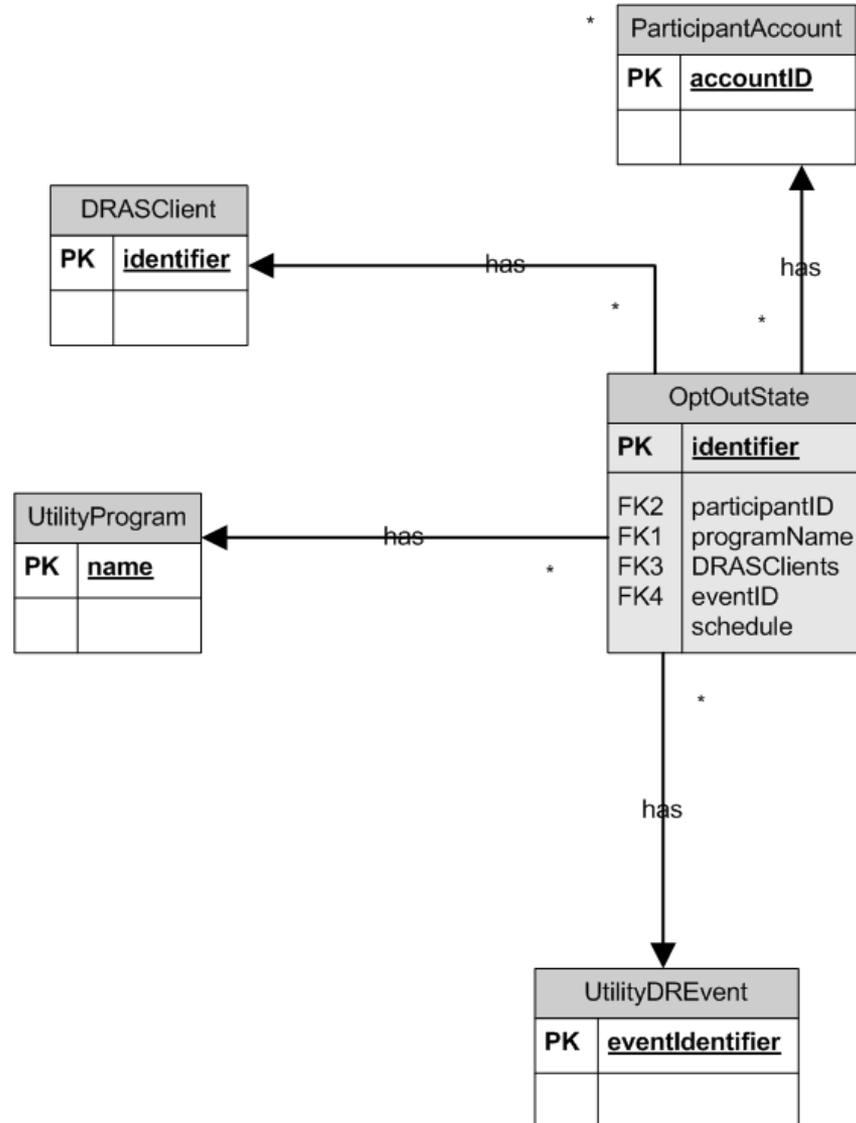


Event State Confirmation	
PK	<u>Event State ID</u>
	DRAS Client Identifier program name event identifier event mod number current date/time operation mode value opt-in

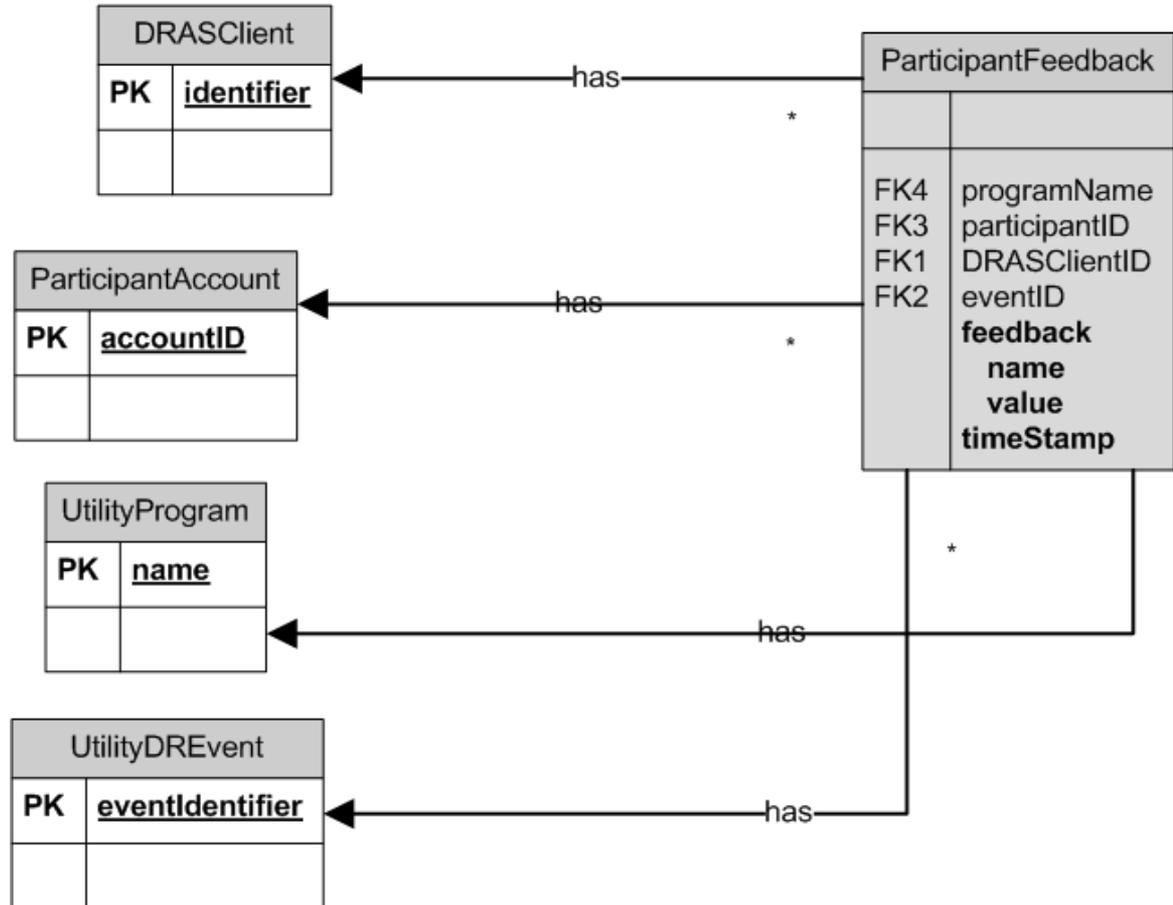
Participant Submits Bid



Participant Opt-Out



Participant Feedback



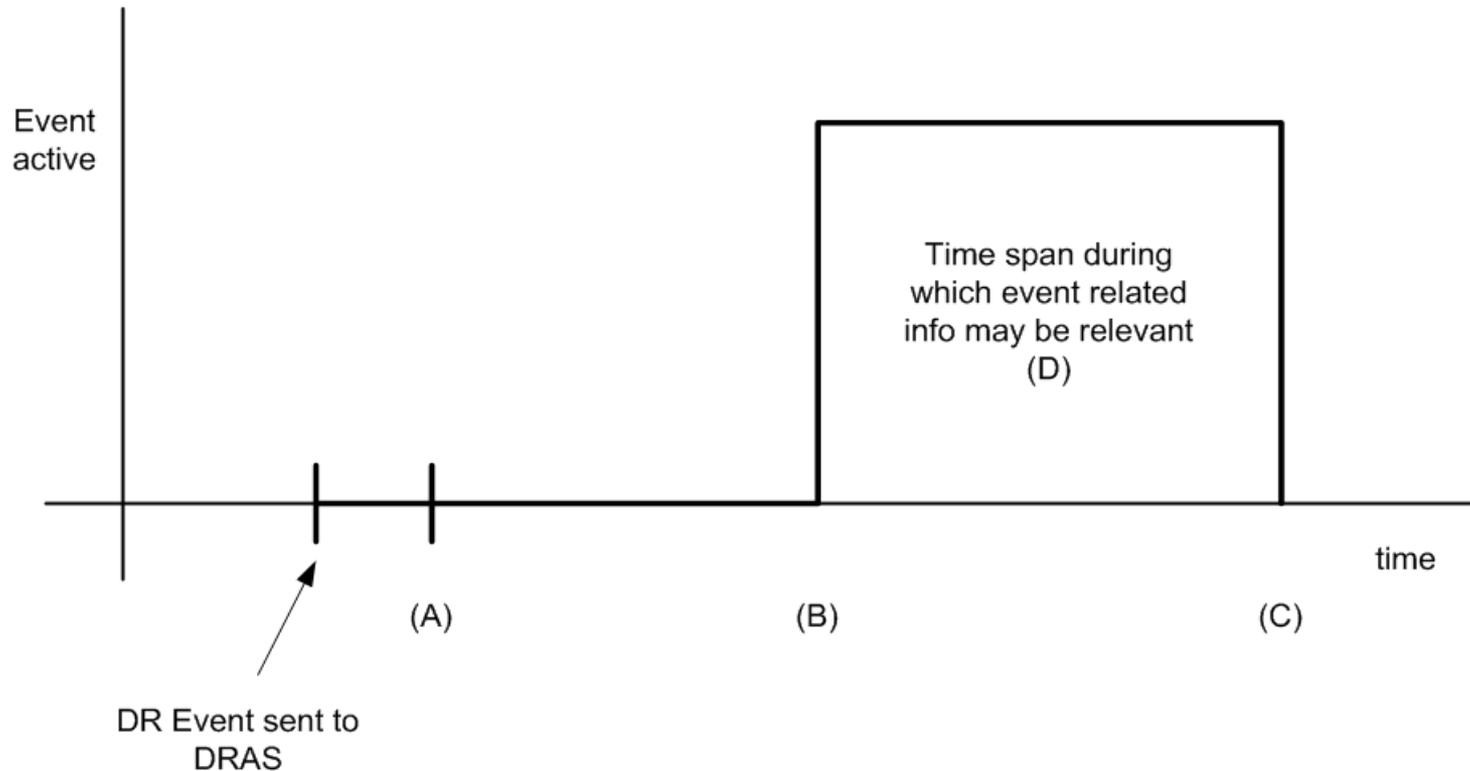
Logs and Alarms

Transactions Logs	
	user name role date/time stamp method name description result

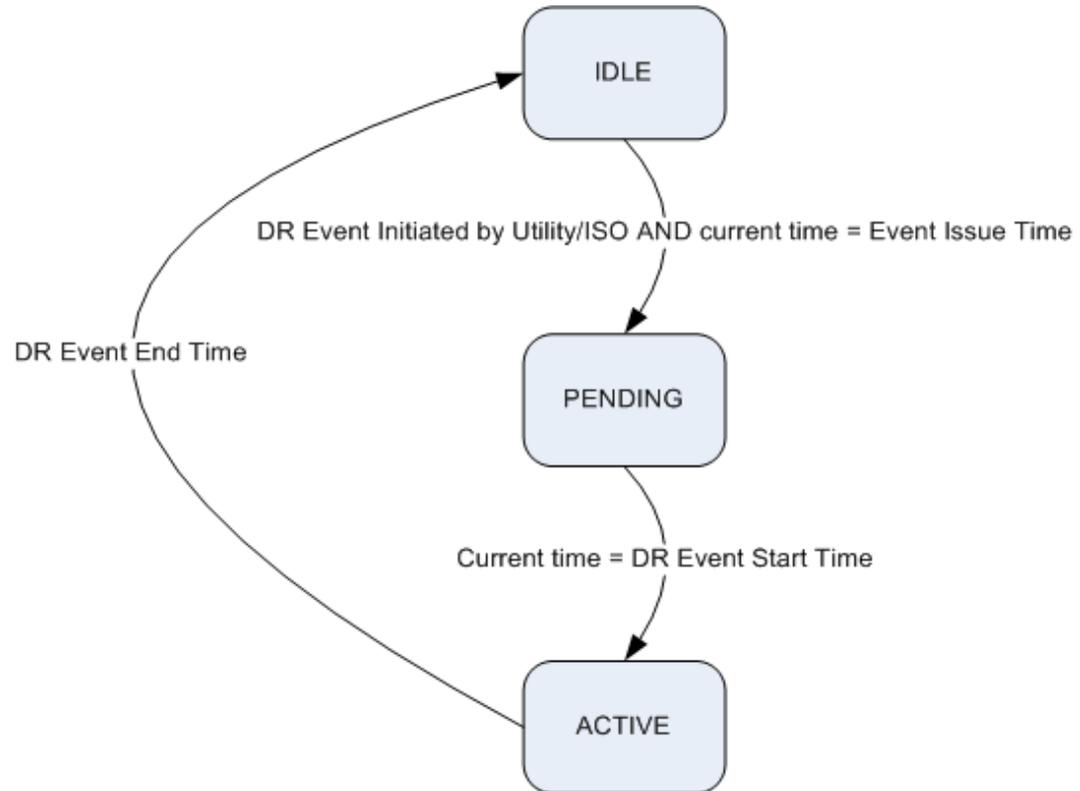
DRASClientAlarms	
	date/time stamp DRAS Client ID Description status

DR Event Model

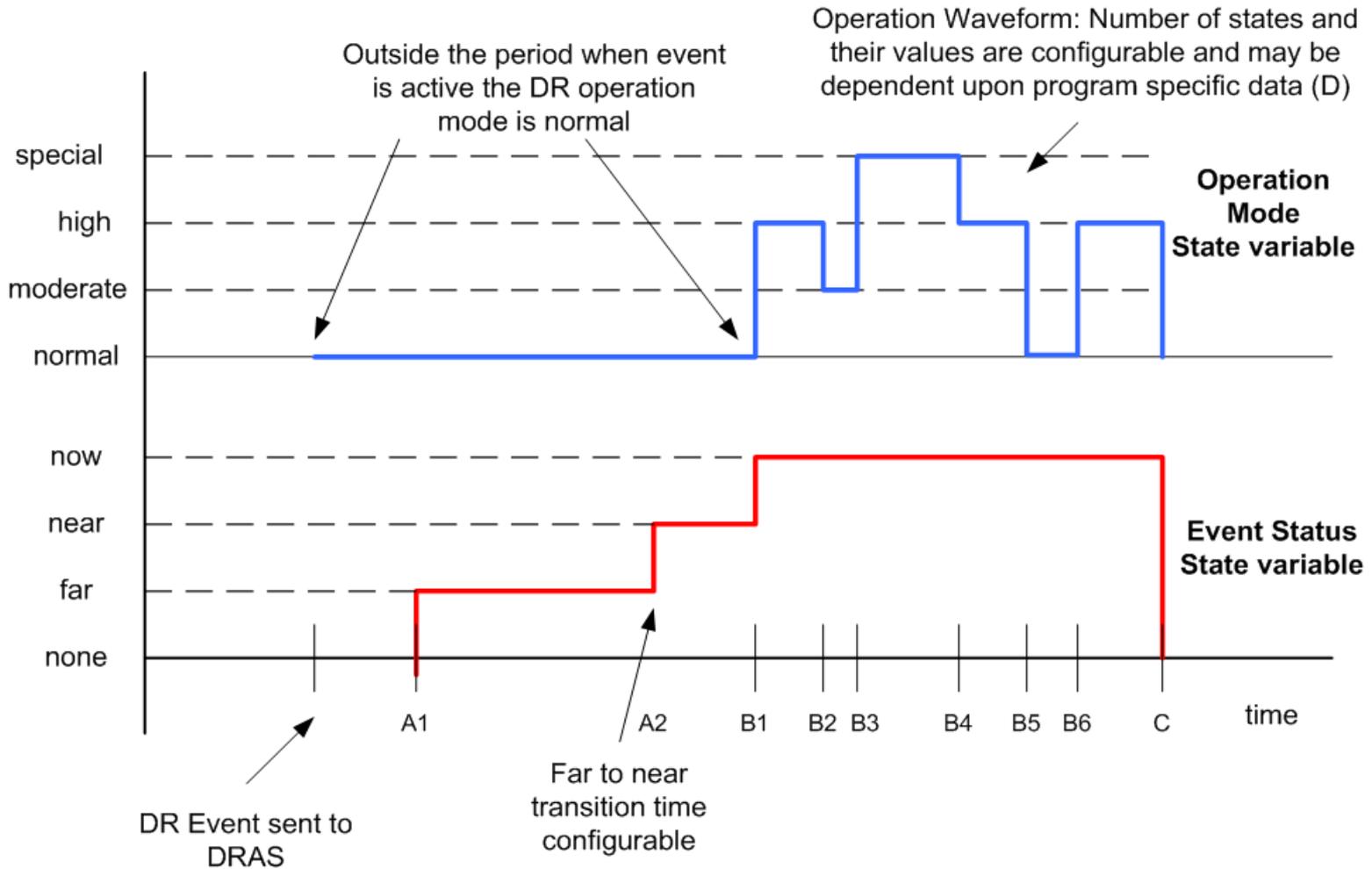
- (A) Issue Time – Time at which participants should be notified of an upcoming event.
- (B) Start Time – Time at which the event starts.
- (C) End Time – Time at which the event ends.
- (D) Event Info – Program specific information that is related to the event, e.g. RTP or level.
name value pair, start/end time, (constrained within event period). Note that the Event Info may also be used to set up conditional events.



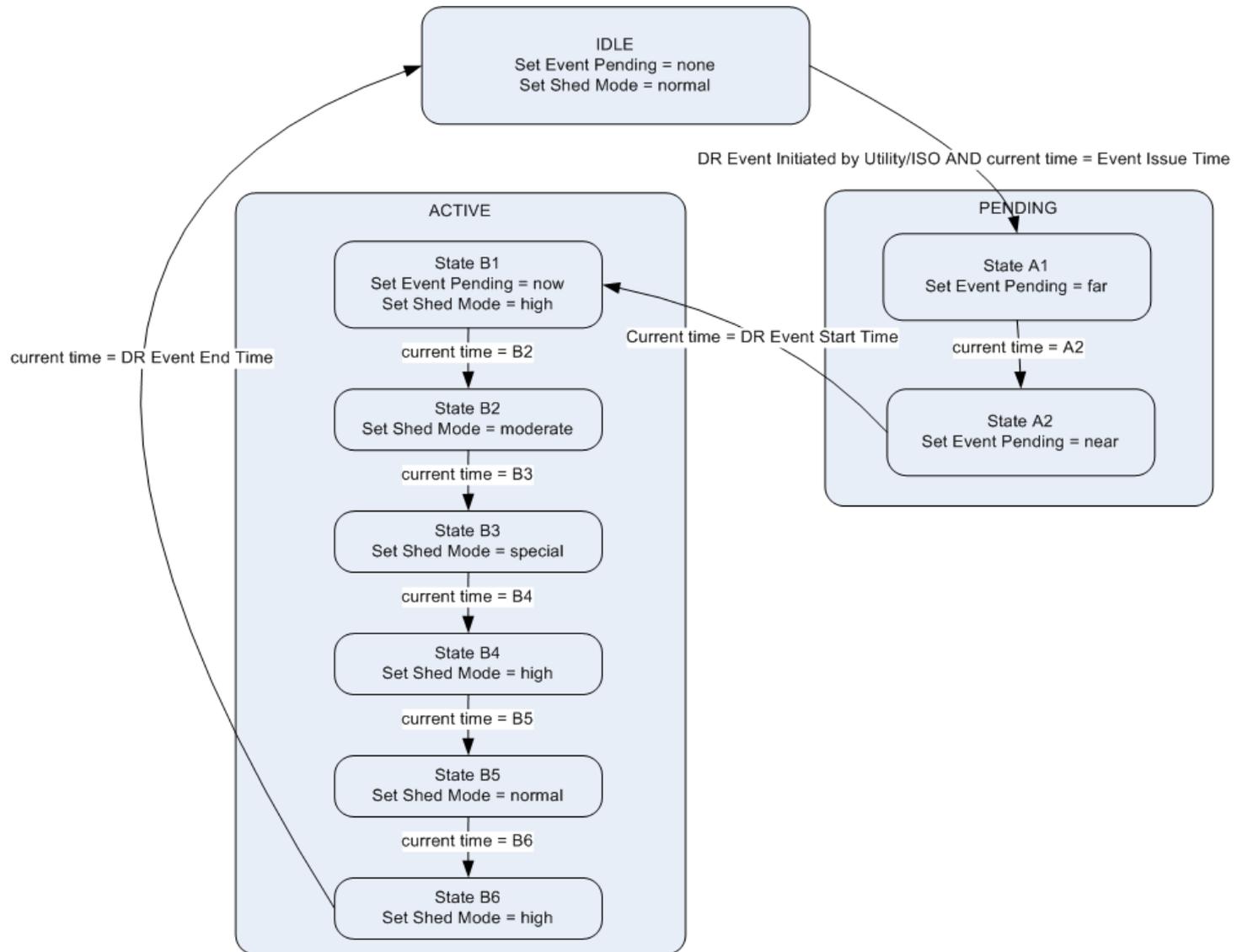
Event States



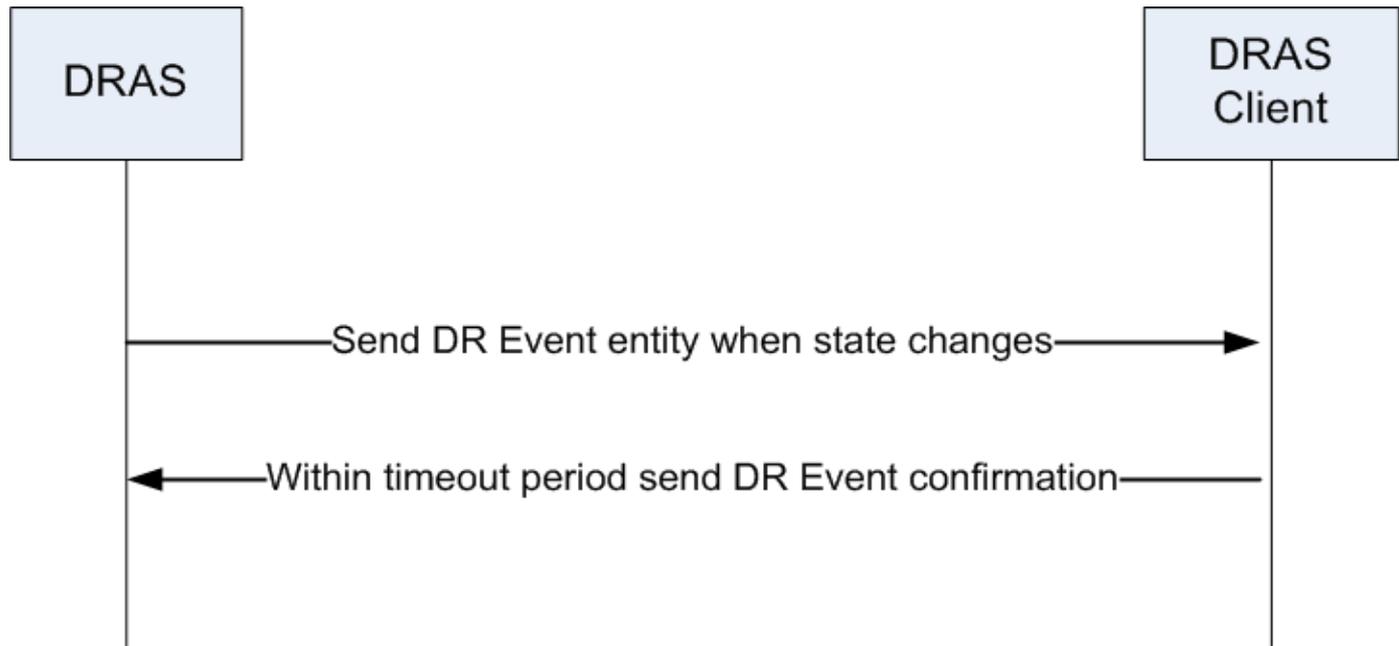
Simple DRAS Client Model



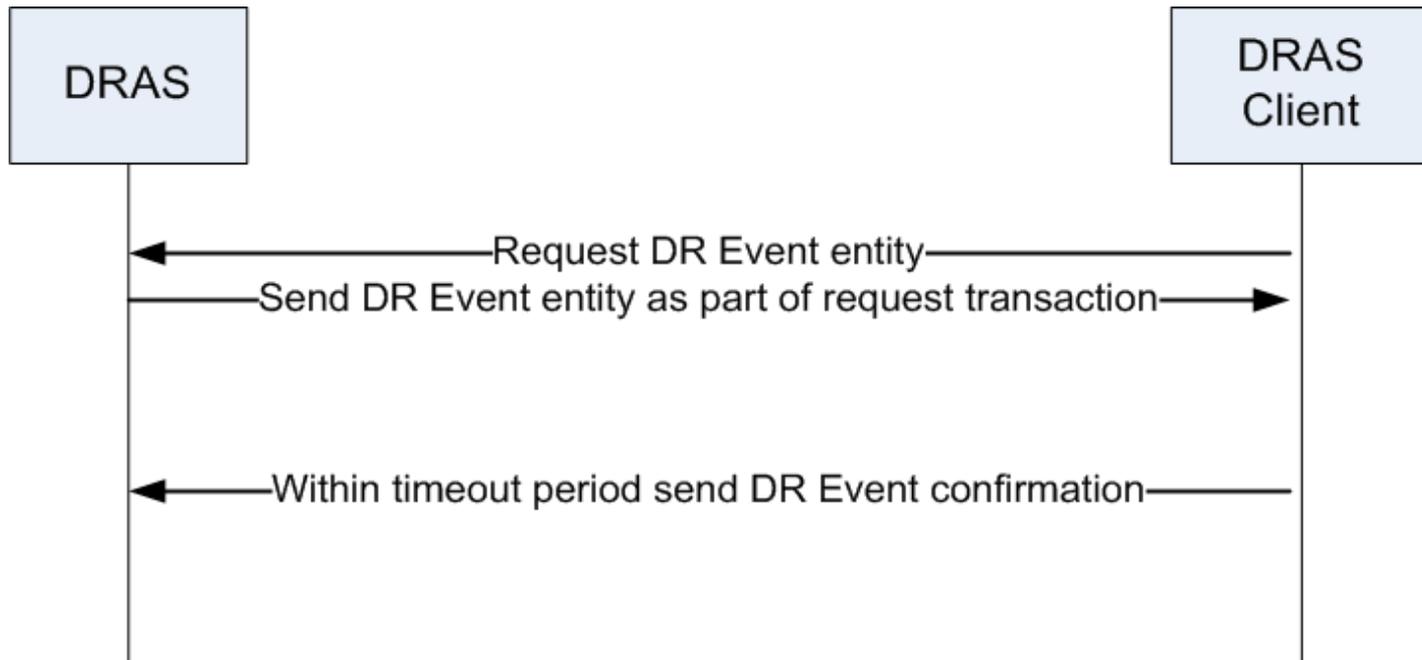
Simple DRAS Client States



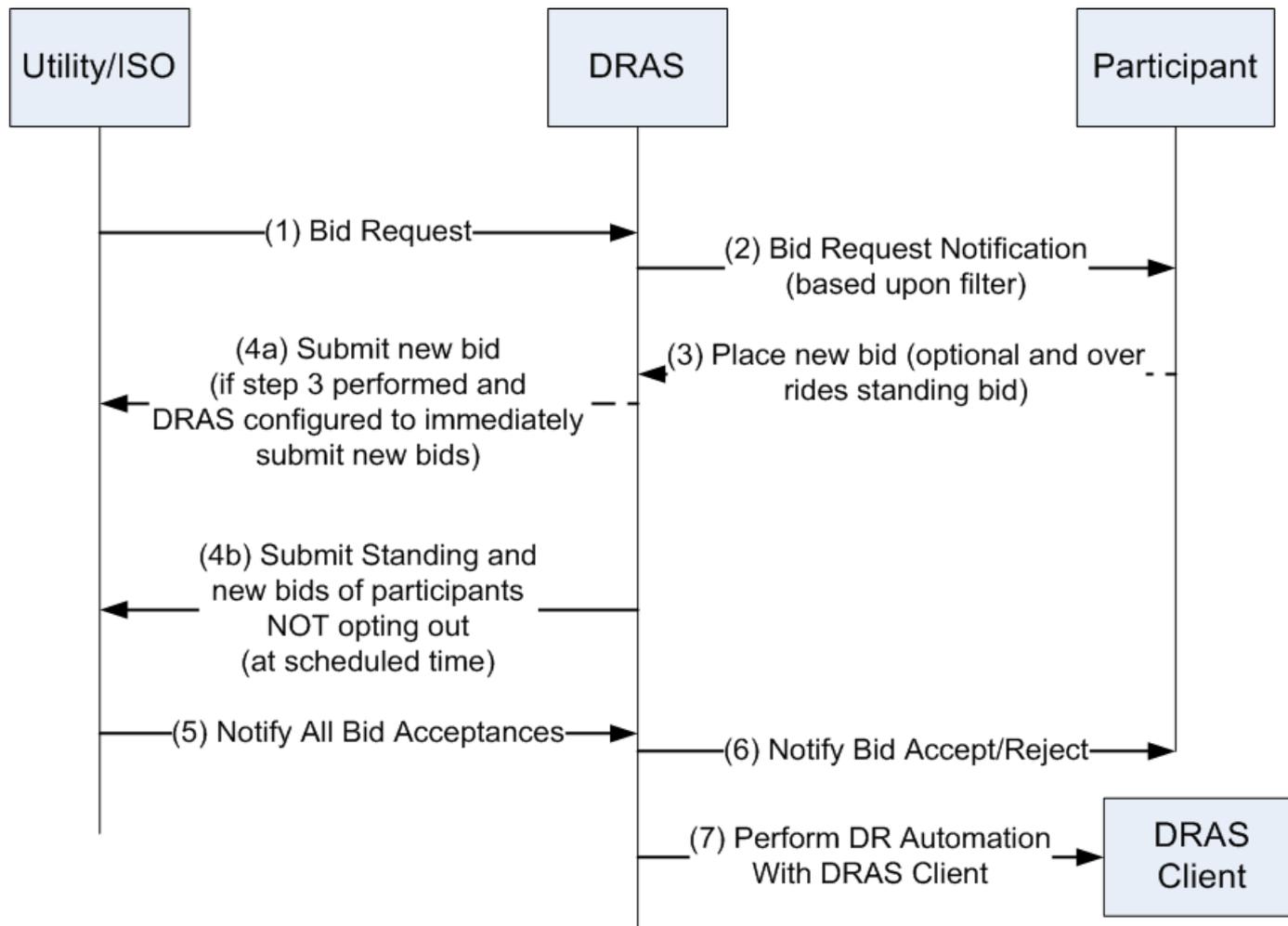
DRAS Client Interaction (PUSH)



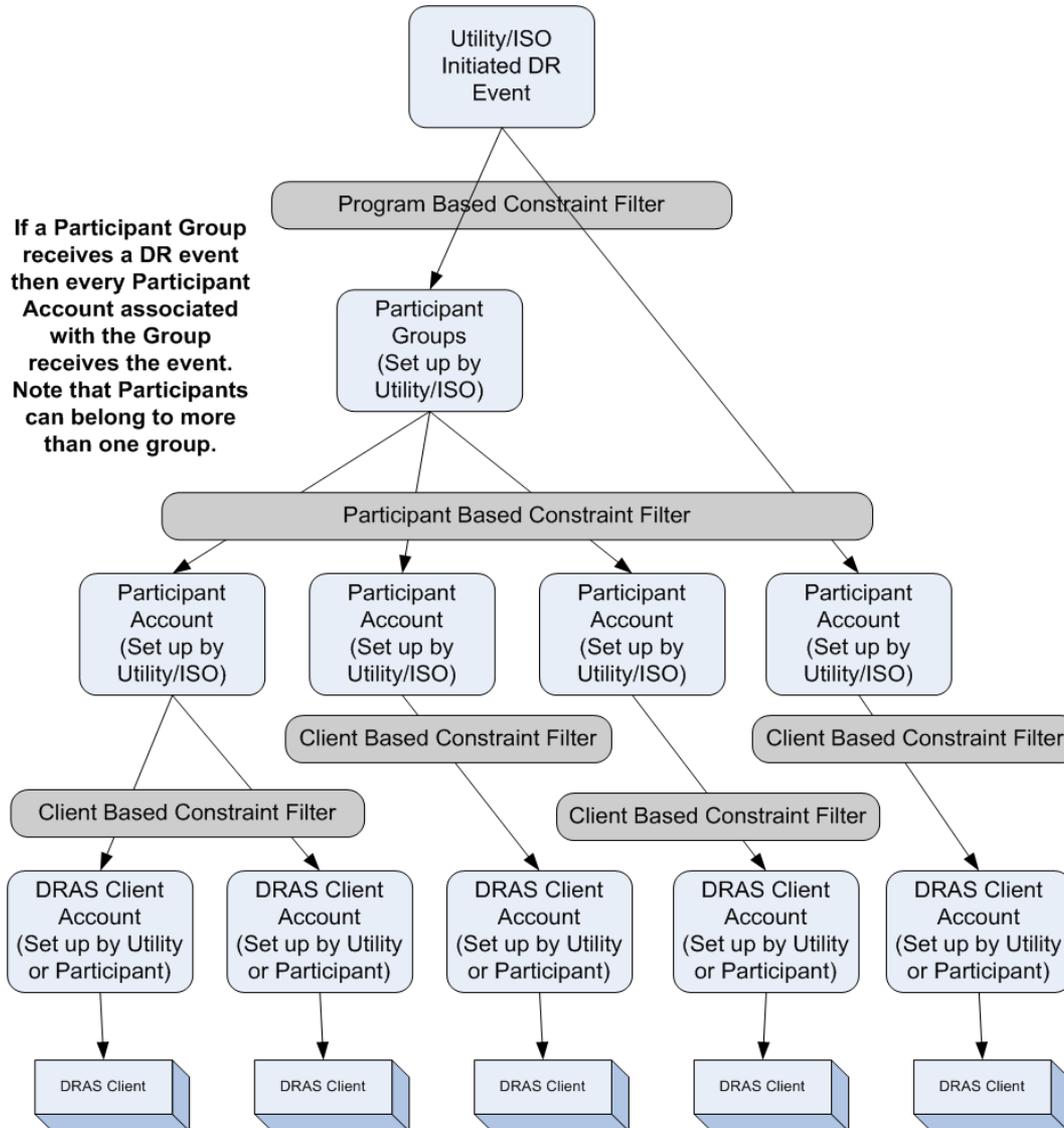
DRAS Client Interaction (PULL)



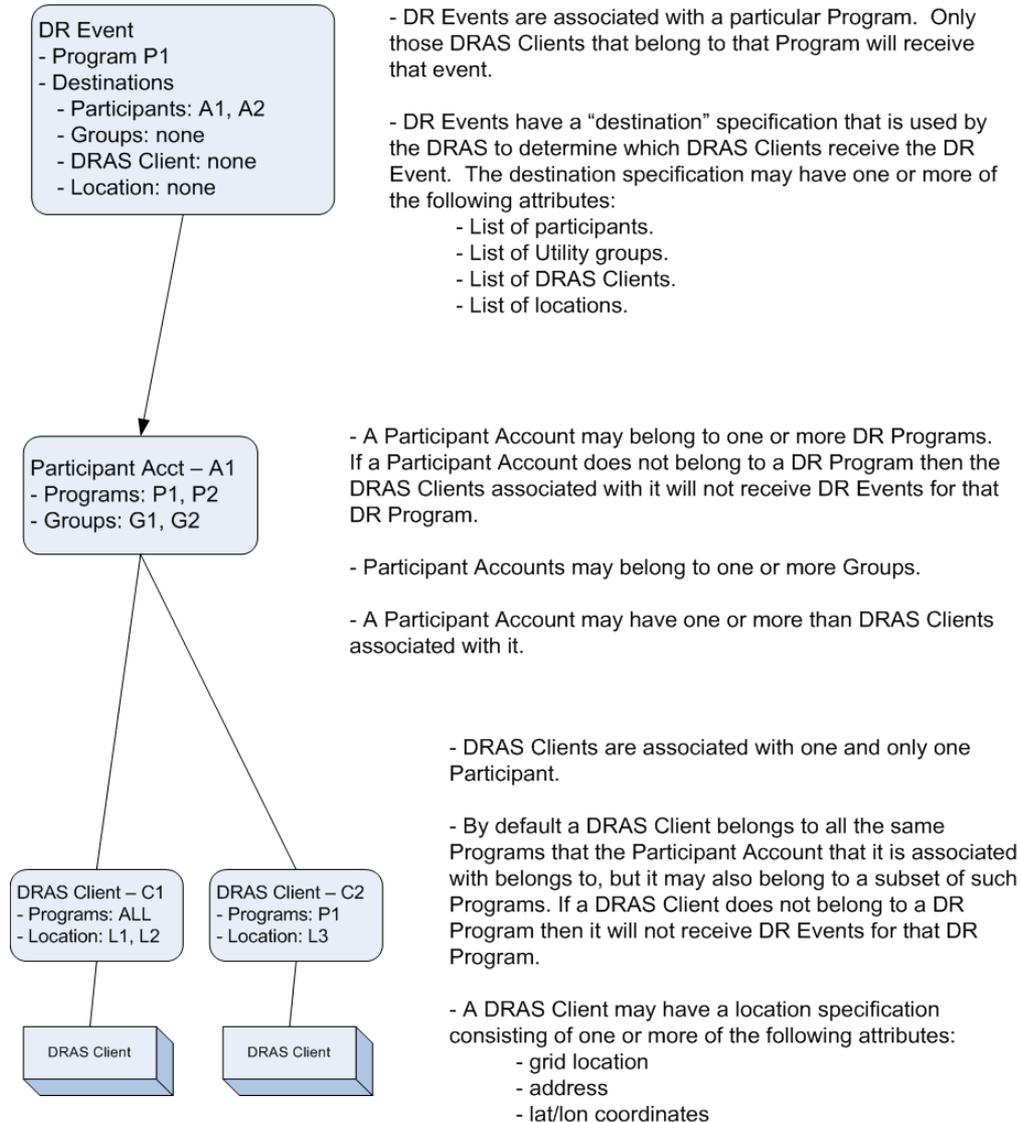
Bidding Sequence Diagram



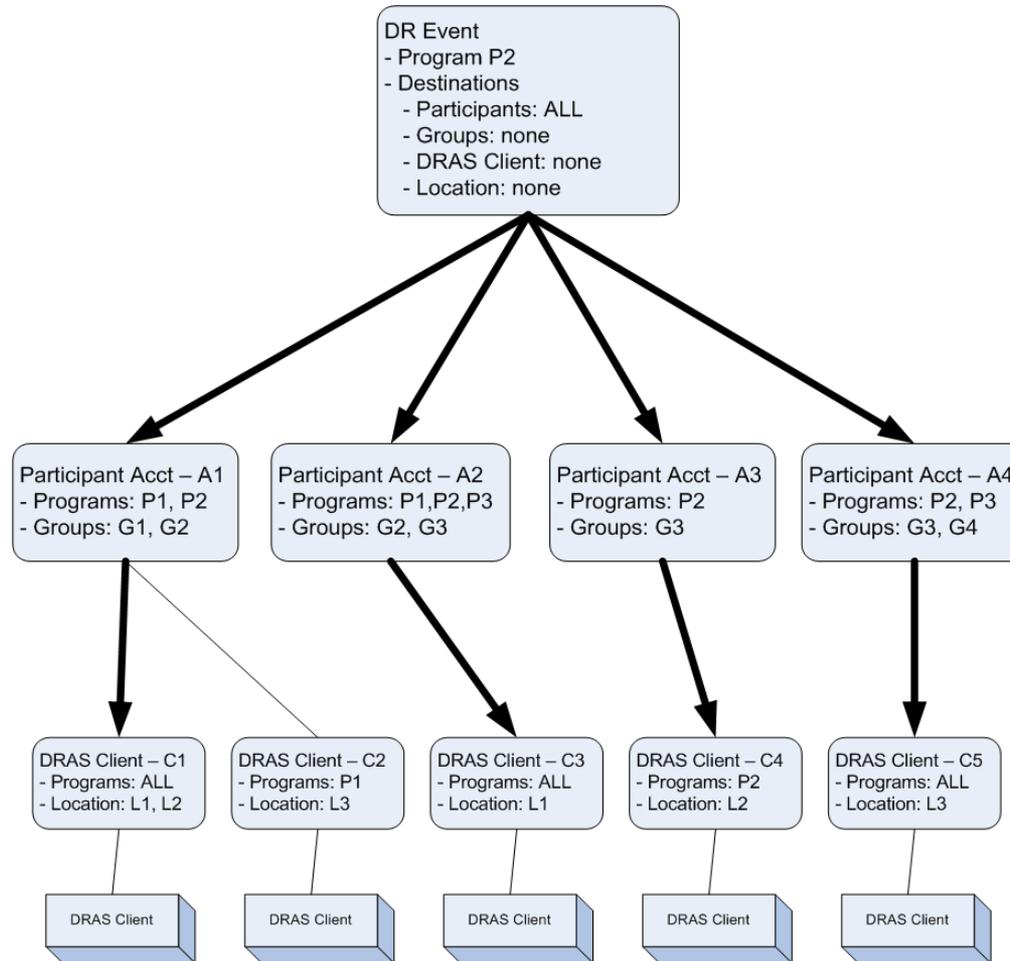
Event Propagation Model



Event Propagation

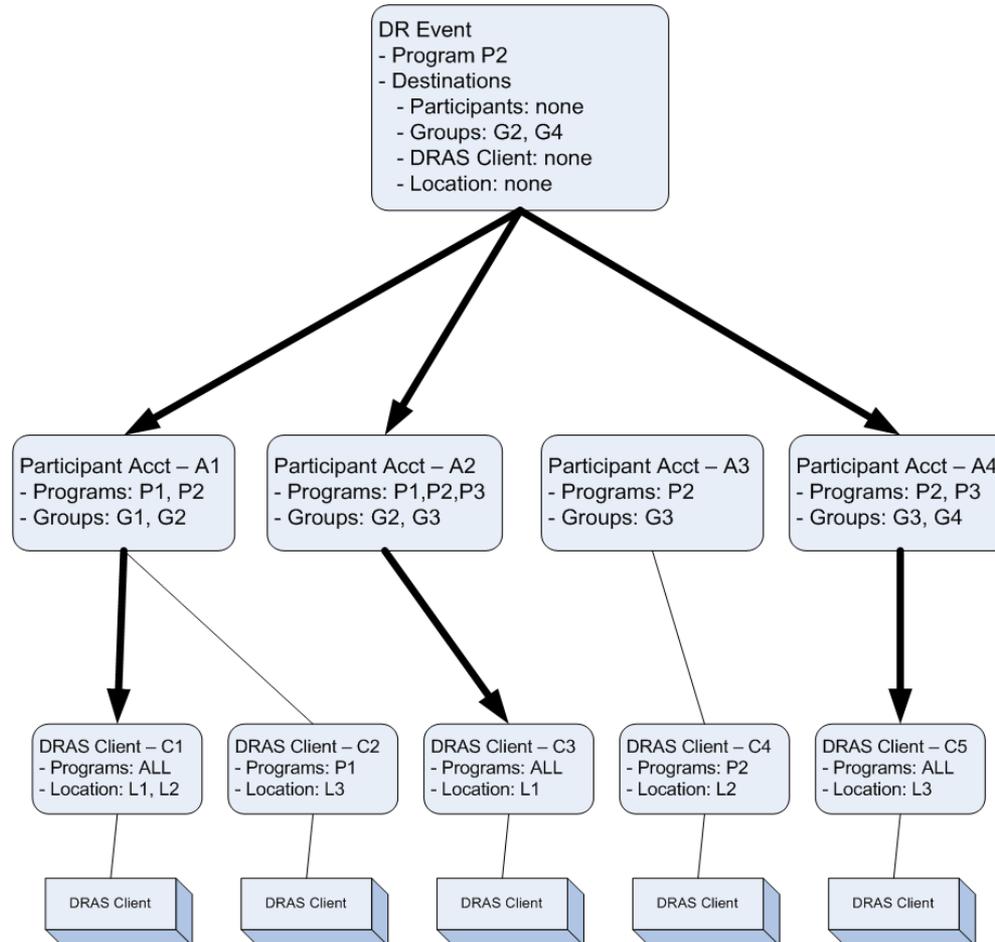


Event Propagation Example



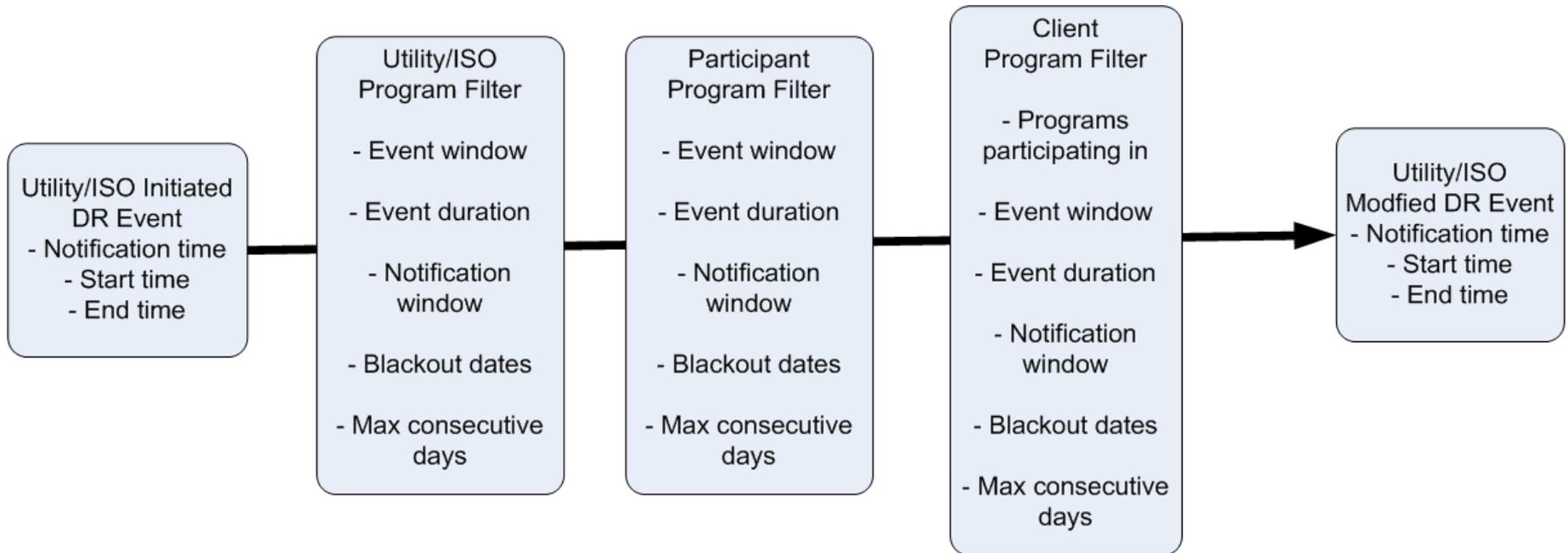
Example: DR Event for Program P2 - All Participant Accounts

Example Event Propagation

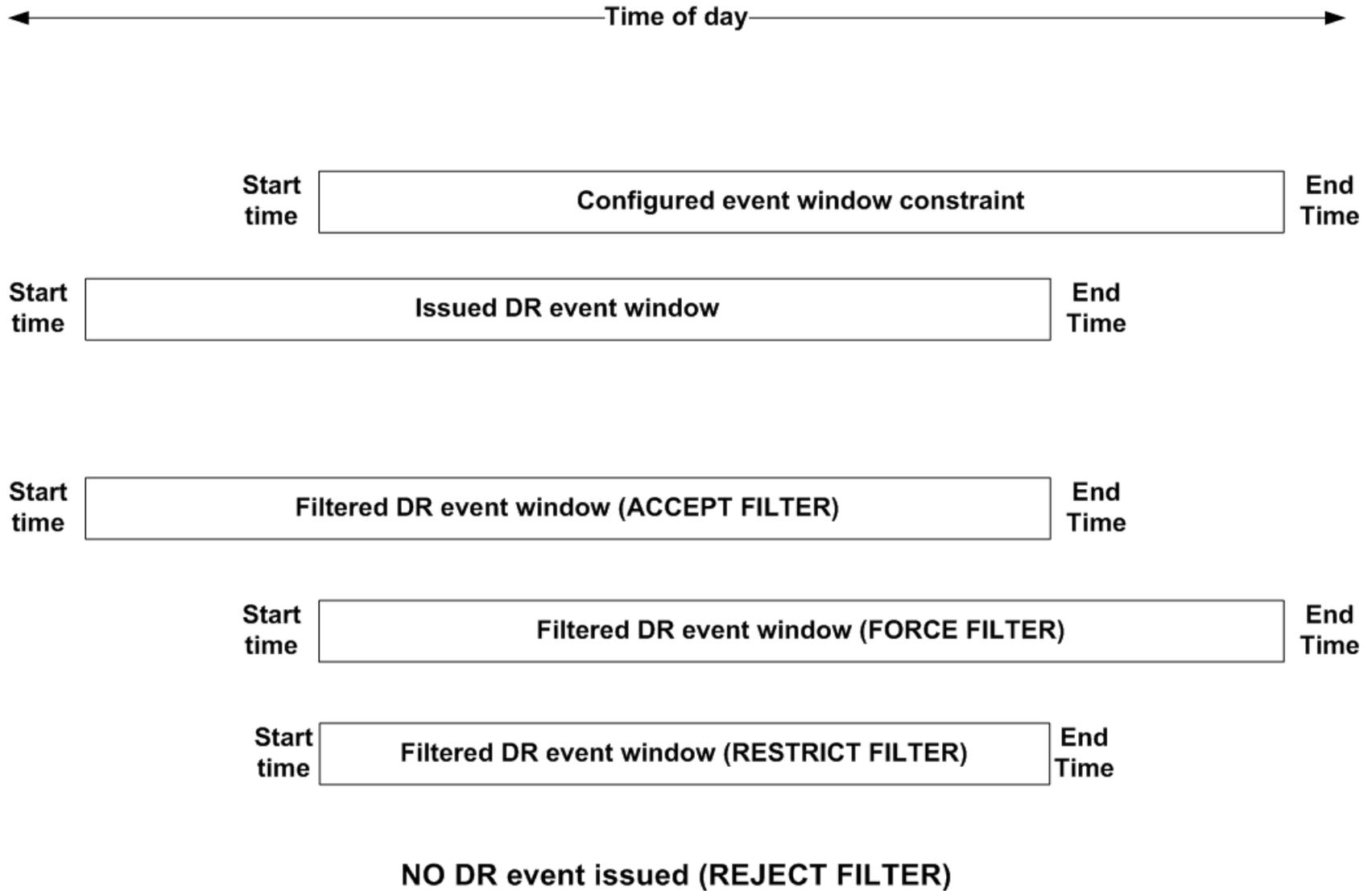


Example: DR Event for Program P2 –
Groups G2, G4

Program Constraints



Event Window Constraint



API Interfaces

- Utility/ISO Interface
- Participant Interface
- DRAS Client Interface

Utility/ISO Interface Functions

ConnectivityWeek

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