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OpenADR 2.0b Open Source Virtual Top Node – VTN User's Manual

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Technical Update, November 2014

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NOTE

For further information about EPRI, call the EPRI Customer Assistance Center at 800.313.3774 or e-mail askepri@epri.com.

DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITIES

Software:	OpenADR 2.0b Open Source Virtual Top Node (OpenADR VTN) Version 9.3
Developed for:	 Electric Power Research Institute (EPRI) 3420 Hillview Ave. Palo Alto, CA 94304
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PRODUCT DESCRIPTION

The EPRI OpenADR 2.0b Virtual Top Node VTN server is an implementation of the OpenADR 2.0 Profile B specification. This application was designed to implement the role of a virtual top node (VTN) as defined in the OpenADR Alliance's *OpenADR 2.0 Profile Specification B Profile*, updated July 1, 2013. OpenADR is a machine-to-machine interface that defines the information model, transport and security mechanisms, and the manner in which data is exchanged between two endpoints. OpenADR 2.0 defines what and how information is communicated between an electricity service provider and customers, but it does not purport to define how either endpoint uses the information. This server application is one example of how the OpenADR 2.0 specification can be applied. It includes a graphical user interface used to set up user accounts, assign clients (Virtual End Nodes, or VENs), define resources and market contexts, and create and schedule demand response events.

This open-source application was developed to provide the electric power industry with an open-source research tool to demonstrate and test OpenADR 2.0. It provides utilities with a tool to research the potential use of OpenADR 2.0 in different use cases. The intent of making the source code available is to help expose any gaps in the OpenADR 2.0 specification that can only be identified through implementations.

EPRI's OpenADR VTN was developed and tested on an Ubuntu 12.04 desktop and server. Limited testing has been done on Mac OS X. The software has not been tested on Windows Server, though all of the software used to run the OpenADR VTN runs on Windows.

This manual describes VTN software version 9.3.

REVISION HISTORY

January 2014	Initial Release
November 2014	Updated images to reflect UI changes Updated installation instructions Added the section *Set up and Configure Apache with SSL* General cleanup throughout

ABSTRACT

The open-source OpenADR Virtual Top Node (VTN) application was developed to provide stakeholders with source code and an application that the industry could use to advance automated demand response research. The VTN was developed to conform to OpenADR 2.0 Profile B and has been certified by the OpenADR Alliance. It has a graphical user interface designed to set up user accounts, assign clients (Virtual End Nodes, or VENs), define resources and market contexts, and create and schedule demand response events. This user manual describes how to install and operate EPRI's open-source OpenADR VTN application.

Keywords

Demand Response
Automated Demand Response
OpenADR 2.0b
Profile B
Virtual Top Node (VTN)
Virtual End Node (VEN)

CONTENTS

SOFTWARE INSTALLATION INFORMATION

Installation of EPRI Software at Client Site

EPRI develops software using a number of third party software products and tools that run on various operating systems and server platforms. Reports from the software industry suggest there are known security issues with some products and systems. EPRI recommends that, if you are using EPRI software, you review its use with your Information Technology (IT) department and their overall strategy to ensure that all recommended security updates and patches are installed as needed in your corporation. If you have any concerns please call the EPRI Customer Assistance Center (CAC) at 1-800-313-3774 (or email askepri@epri.com).

If you experience difficulties accessing the application

If you experience difficulties accessing the application after standard installation on Windows XP, Windows Vista and Windows 7, please consult your IT department personnel to have proper access permissions setup for your use. If the problem can not be resolved, please call the EPRI Customer Assistance Center (CAC) at 1-800-313-3774 (or email askepri@epri.com).

1
GETTING STARTED

This manual assumes the user has access to an installed version of EPRI's OpenADR VTN server (*VTN* stands for *V*irtual *T*op *N*ode). For installation instructions, see the *Installation* section at the end of this document.

This manual covers the functions of the web interface and is not intended to be a full description of the OpenADR protocol. This document demonstrates how VTNs and Virtual End Nodes (VENs) interact through the OpenADR protocol using EPRI's VEN and VTN software.

The VTN web user interface (UI) has been tested with Firefox on Linux, Microsoft Windows, and OS X; with Internet Explorer 10 on Microsoft Windows 7; and with Safari on OS X.

Logging into the Server

The login screen is shown in Figure 1-1.

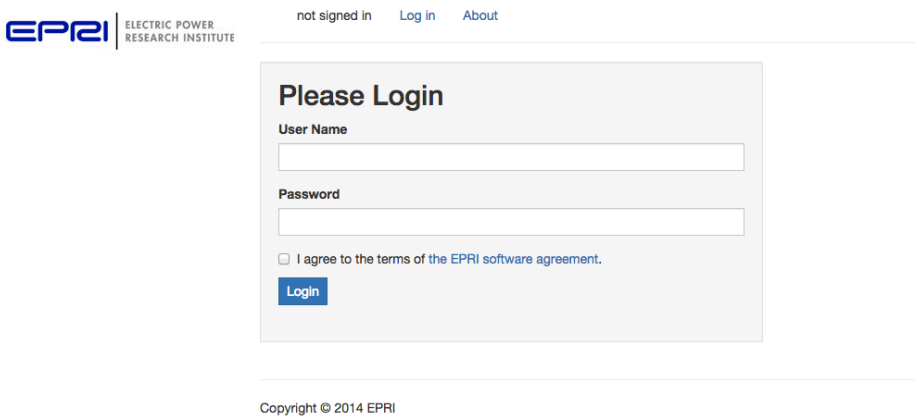

Figure 1-1
The login screen

If you are accessing the server from a fresh install, login as the default admin user:

User Name: admin

Password: testing

If you are logging into EPRI's server, your EPRI representative will supply you with a user name and password.

Once logged into the server, you will be redirected to the dashboard. The dashboard shows which VENs are configured for the logged-in user and what events target those VENs. Figure 1-2 shows a dashboard with two VENs ("Test_VEN_Name" and "TH_VEN") and neither VEN has an event associated with it.

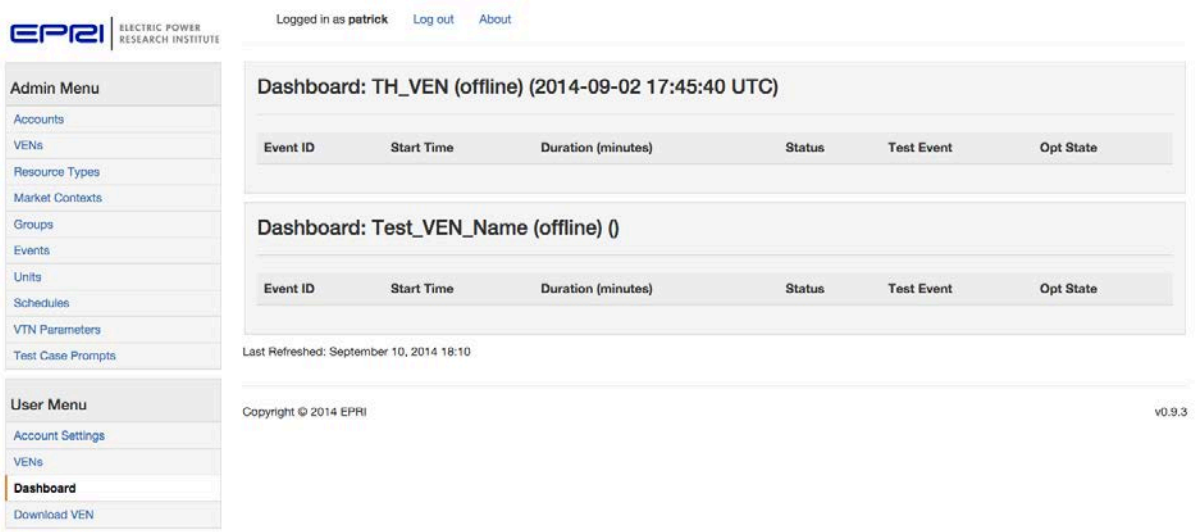

Figure 1-2
The dashboard

Non-admin users will see the User Menu only. Admin users will see both the Admin Menu and the User Menu.

Download the VEN

The User Menu contains a Download VEN link (see Figure 1-3). The software included in this download is a certified implementation of an OpenADR 2.0b VEN. This software can be used to test against the EPRI VTN or any compliant VTN implementation.

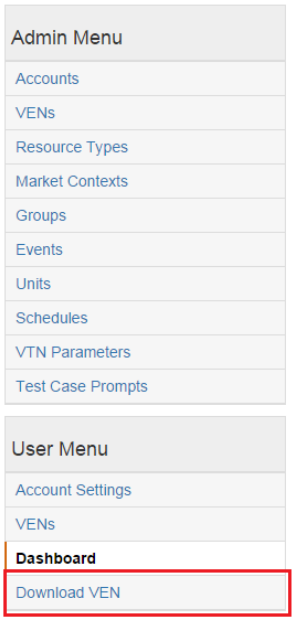

Figure 1-3
The Download VEN link

A Note on Accounts and VENs

The EPRI OpenADR VTN treats an account as a high-level entity that is used to manage any number of VENs. Non-admin accounts can create any number of VENs (but for their account only). Admin accounts can create VENs for any account.

2
CONFIGURING THE SERVER

The main purpose of a VTN is to schedule and manage events for demand response programs. In OpenADR, the three main entities involved are VTNs, Events, and VENs. The VTN is the main application that supplies Events to a VEN. All of the configuration options covered below are intended to support sending Events to VENs.

The Admin Menu consists of the following options: Accounts, VENs, Resource Types, Market Contexts, Groups, Events, Schedules, VTN Parameters, and Test Case Prompts. Each of these options is covered below.

Accounts

Clicking on the Accounts link brings up the account list page. From this page the user can edit or view the details of an account, destroy an account, create a new account, or add a VEN to an account.

Figure 2-1
The Account List page

VENs

Clicking the VENs link brings up the VEN list page. From this page the user can view or edit a VEN, destroy a VEN, or create a new VEN.

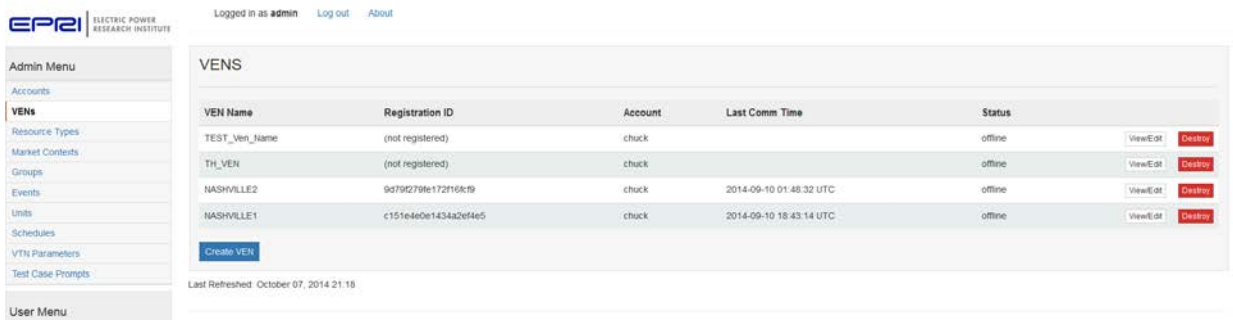

Figure 2-2
The VEN List page

Resource Types

From the Resource Types page the user can add and remove resource types. From the VEN edit/view page (covered under Configuring/Managing VENs), a user can add a resource to a VEN and assign a particular resource type to the resource. When scheduling an event, the user can target specific resource types. Any VEN with a resource associated with the selected target resource type will receive the event.

For example, an admin user can create a WATER_HEATER resource type and associate the WATER_HEATER resource with a set of VENs. The admin user can then create an event that targets VENs with a WATER_HEATER by selecting WATER_HEATER as a target resource.

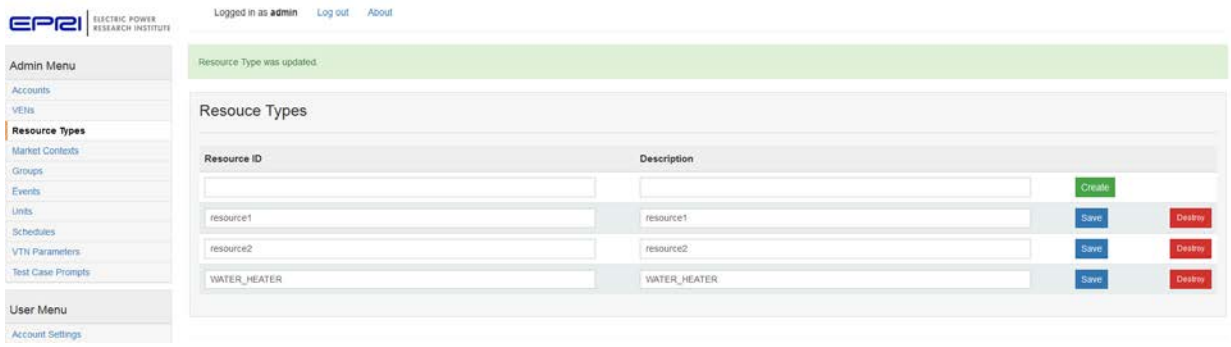

Figure 2-3
The Resource Types List

Market Contexts

Market Context is the OpenADR term for demand response programs. The Market Context items defined on this page can be assigned to an event through a dropdown list on each event's view/edit page.

VENs can subscribe or unsubscribe to/from a Market Context from the VEN view/edit page. Subscribing to a Market Context assigns a unique party ID to the VEN and allows an event to target that party ID.

The OpenADR protocol does not define how details of a demand response program are exchanged between a VTN and VEN. All that can be configured for a Market Context is a name (intended to be a URL) and a description. The description is informational only and is not used by the protocol.

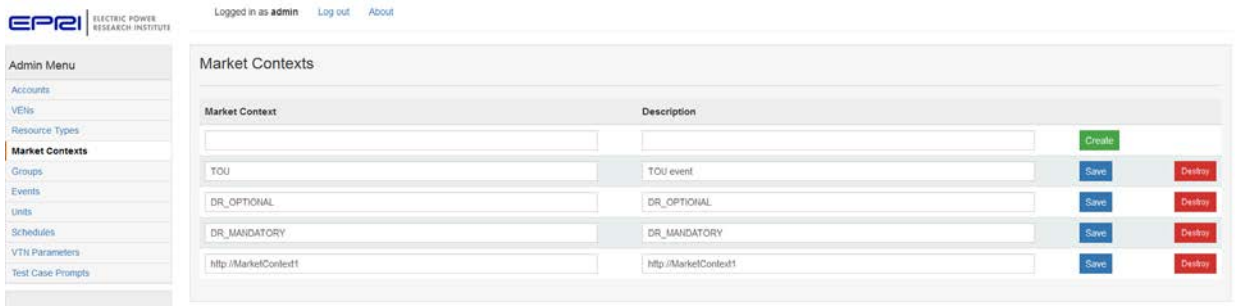

Figure 2-4
The Market Contexts list

Groups

Admin users can create groups of VENs from the Groups page. The name of the group is arbitrary. By placing VENs into groups, an event can target multiple VENs by selecting the group as a target.

Groups in EPRI's OADR VTN are based on accounts. Because a single account can have multiple VENs associated with it, adding an account to a group effectively adds all VENs in the account to the selected group.

A group can be created by entering a unique name and a description, and then clicking the create button.

Group membership can be modified by clicking the Edit button next to the group. After clicking edit, a list of members and non-members will appear below the list of groups. To remove members from a group, select the checkbox next to the accounts that should be removed and click the Remove Accounts button. To add accounts, select the checkbox for the accounts to add and click Add Accounts. See Figure 2-5.

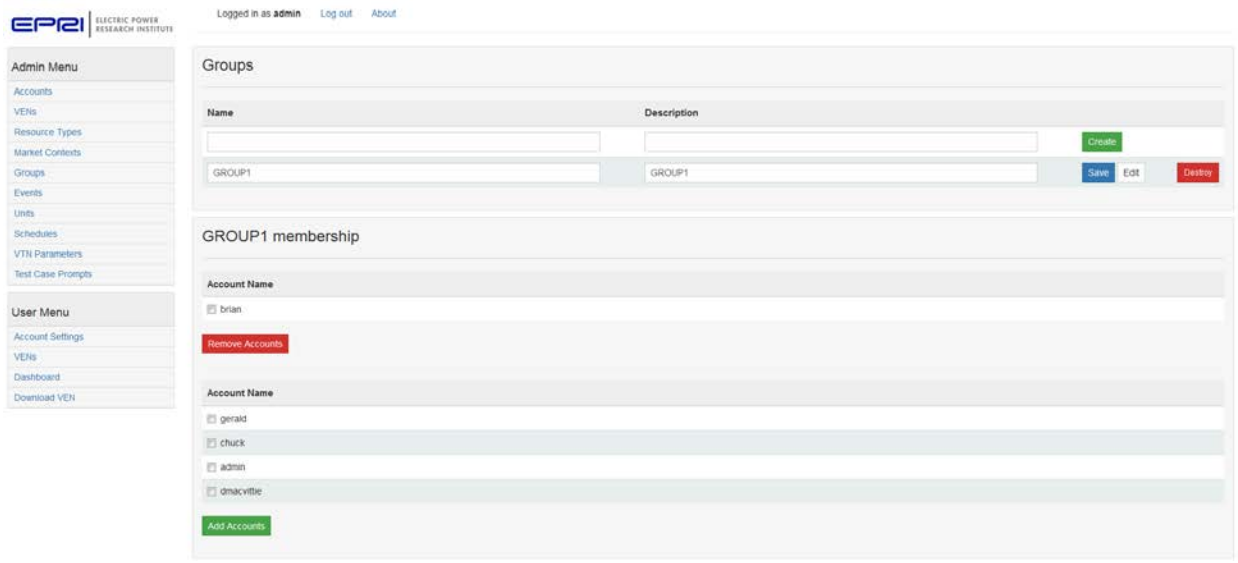

Figure 2-5
Editing Group Membership

Events

From the Events List page the user can view/edit and destroy existing events or create a new event. See Figure 2-6.

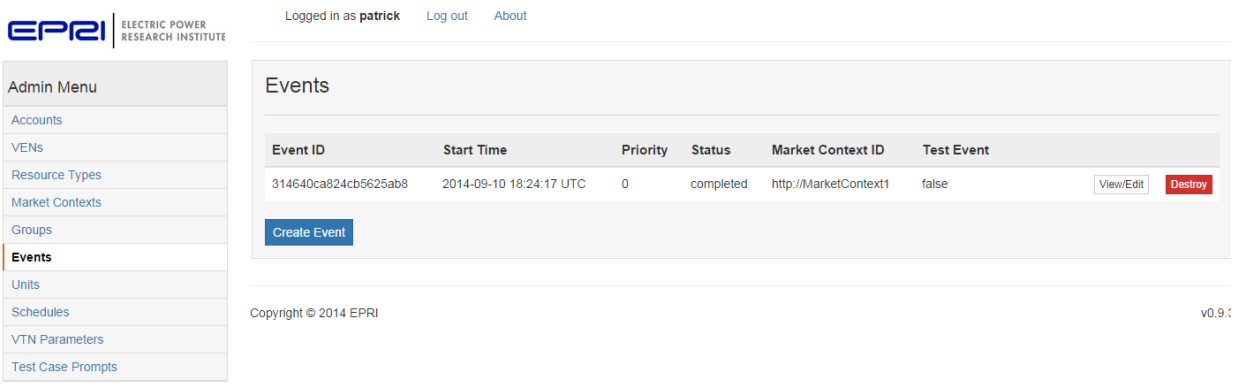

Figure 2-6
The Events list

See *Creating an Event* for more information.

Schedules

The Schedules link shows a list of schedules. The user can view/edit or destroy existing schedules or create a new schedule from this page.

Schedules are used to create recurring events. A schedule has all of the same properties as an event, with the addition of the schedule properties. The schedule determines on what days of the week the event will be created. See Figure 2-7.

After an event is created from a schedule, the event will appear in the list of events and can be edited like any other event. See Figure 2-6.

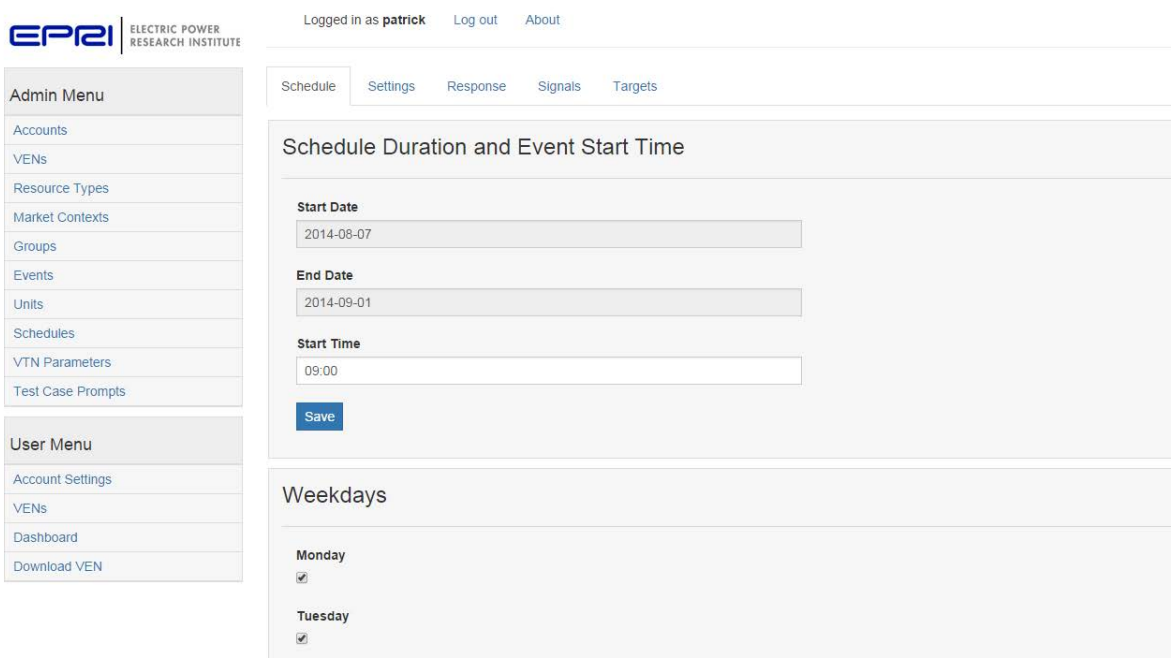

Figure 2-7
Editing a Schedule

Because editing the other properties of a schedule is identical to modifying an event, readers should refer to *Creating an Event* for information on editing other properties of a schedule.

VTN Parameters

The VTN Parameters page contains three sections: VTN Parameters, End Points, and Test VEN. See Figure 2-8.

VTN Parameters

A VTN has two parameters that can be set:

VTN ID: ID used to identify this VTN. Once the ID is set and VENs have been registered, the ID should not be changed.

Poll Interval: Minimum poll time. Poll VENs should poll the VTN at this interval.

Profile B VENs receive these values as part of the registration process.

End Points

The URLs under End Points provide example service URLs that VENs will use to communicate with the server.

Test VEN

The Test VEN section provides a dropdown list of VENs that are configured in the system. The VEN selected on this page will be used for testing with the QualityLogic test set. Events created under the Test Case Prompts link will be created for the VEN that is selected here.

Be sure to select a VEN that can be used for testing. With each new test case, all previous events for the VEN are removed from the system.

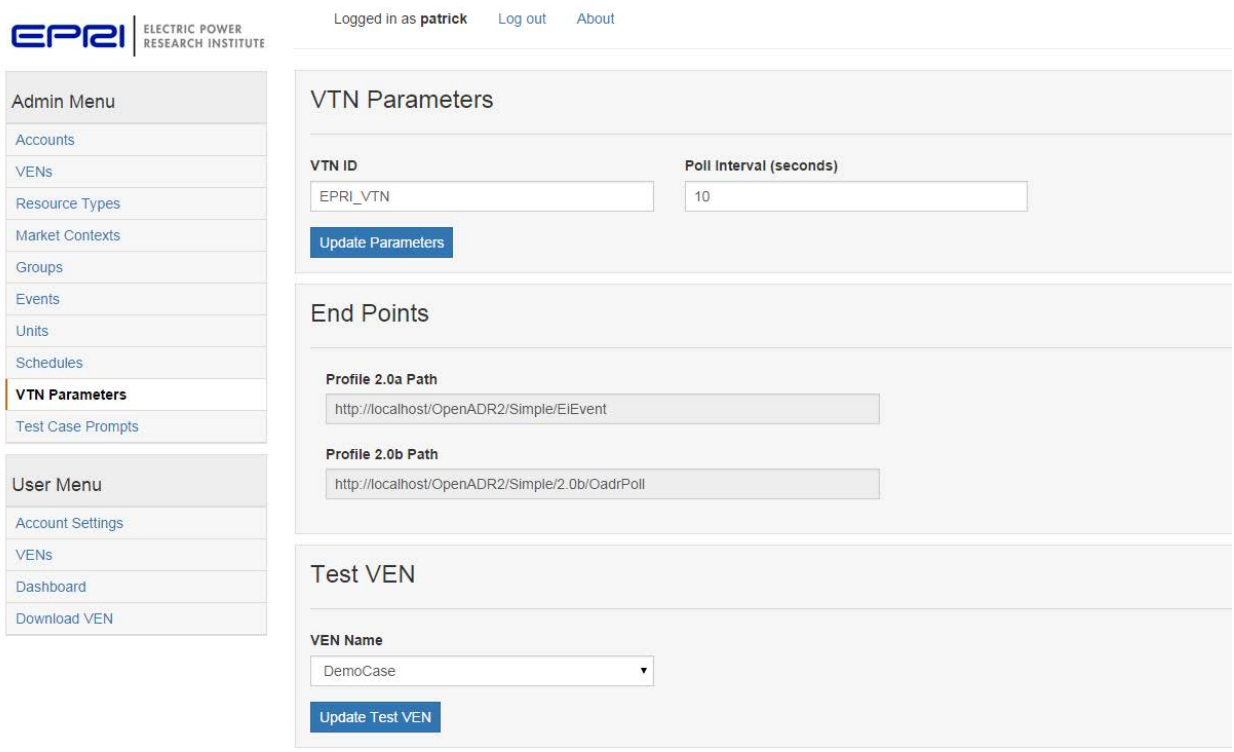

Figure 2-8
VTN parameters

Test Case Prompts

Test case prompts aid in testing the VTN with the QualityLogic test harness event tests. If the prompts were not loaded during installation, only the Prompt Filter will be visible. See Figure 2-9. See the *Set up the Application* section of the installation instructions for information on how to load the test prompts.

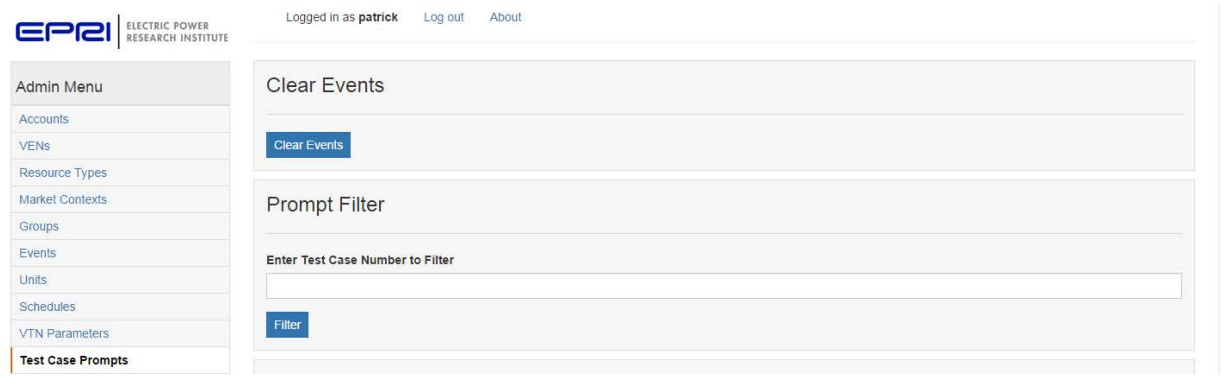

Figure 2-9
The test case prompts view if no prompts were loaded

If the prompts have been loaded, the screen will look like Figure 2-10. For brevity, only the first prompt is shown in the image.

The filter at the top of the Test Case Prompts page can be used to quickly find a test case prompt to execute. Simply type the test case number into the filter and click the Filter button. Test case prompt numbers can be retrieved from the QualityLogic test case prompts. See Figure 2-11.

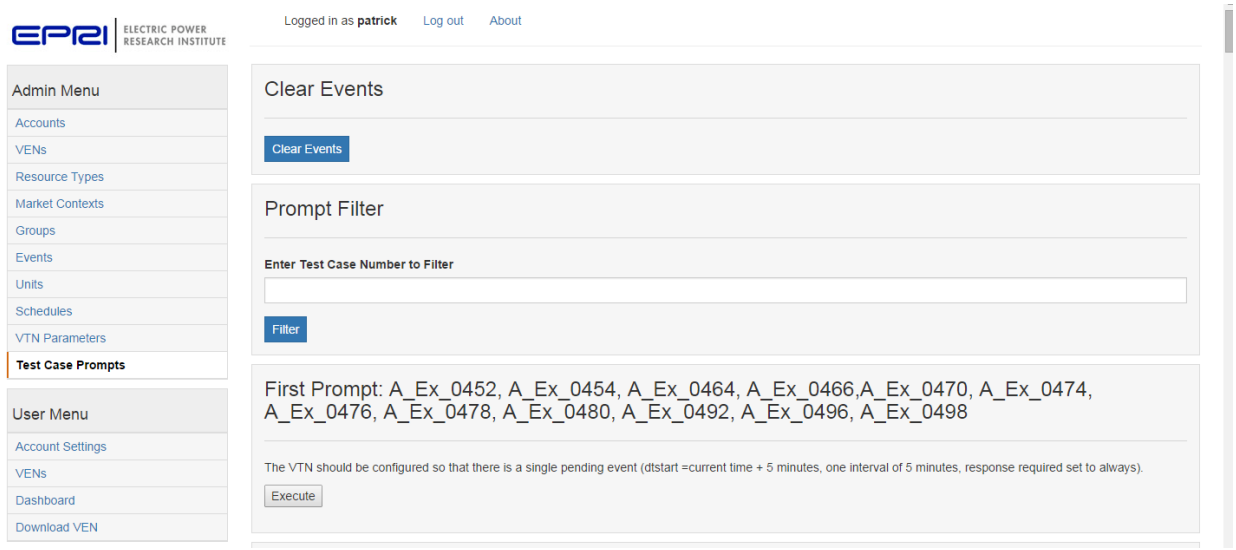

Figure 2-10
Test case prompts view when the prompts have been loaded

Figure 2-11 shows a sample prompt from the test harness (the user would type 0430 into the filter to find the test case prompt(s) to execute in the EPRI OpenADR VTN). See *Running Test Cases against the Test Set* for more information.

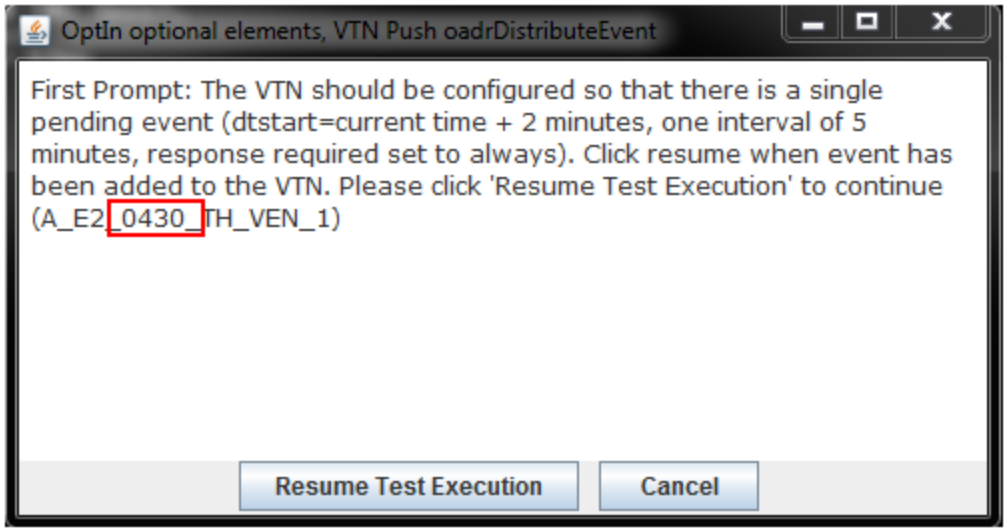

Figure 2-11
Example prompt from the test harness

3
CONFIGURING AND MANAGING VENS

The tabs on the VEN view/edit page are described below.

VEN Settings

VEN Settings contains sections covering Identification, OpenADR Profile Settings, Capabilities, and VEN location. See Figure 3-1.

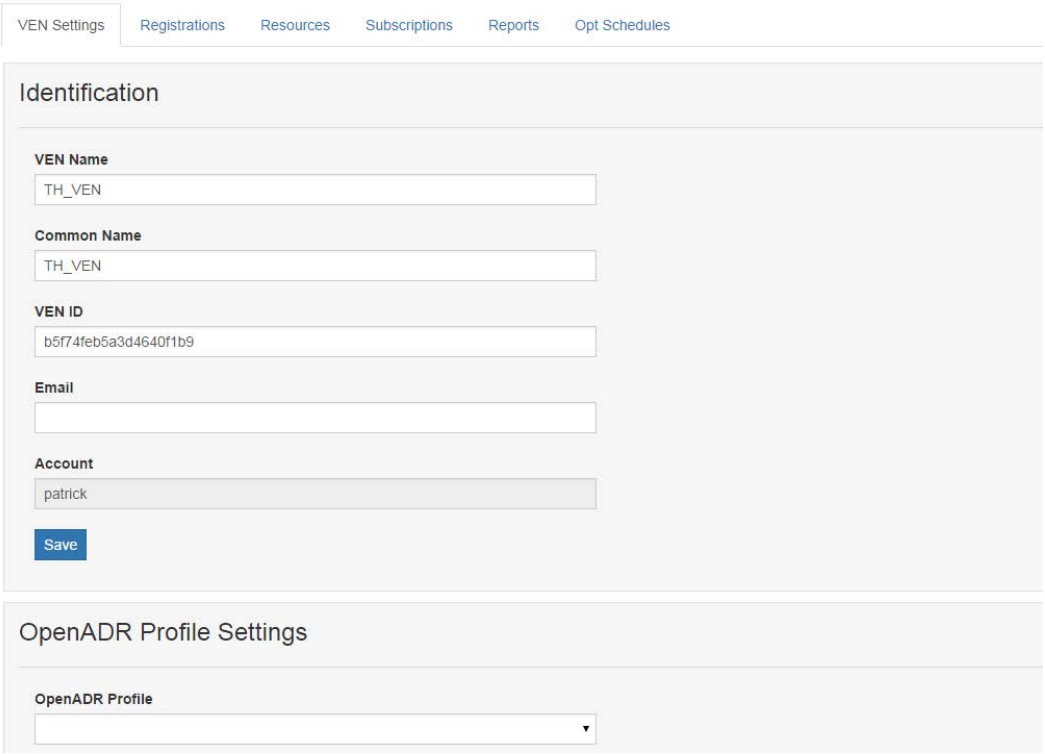

Figure 3-1
VEN Settings

The identification parameters uniquely identify a VEN. The VEN name is a human-readable string that is assigned to the VEN. When a VEN registers with a VTN, the VEN will present its VEN Name or VEN ID. The VTN validates the SSL common name and sends the VEN ID in response. After registering, the VEN will use its VEN ID in all communications with the server.

The Common Name field is only used when communicating over SSL. When SSL is used, the VTN will validate that the common name found in the VEN certificate matches the common name configured in the database. The combination of a common name and a VEN ID should be unique, meaning that an SSL certificate is assigned to a particular VEN and not shared among multiple VENs.

Under the OpenADR Profile Settings section, the user can select the OpenADR Profile, whether or not the VEN is a push VEN, and set the transport address. These settings are only needed for Profile A VENs since Profile A does not have a registration service.

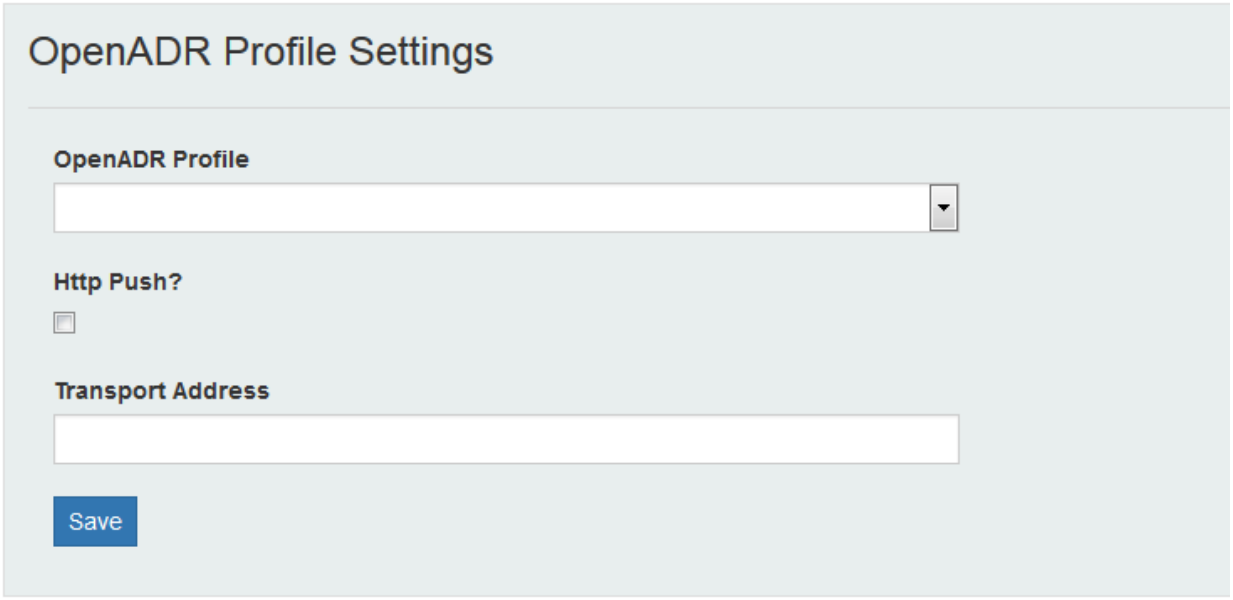

Figure 3-2
The OpenADR Profile Settings used when configuring Profile 2.0a VENs

The Capabilities and VEN Location parameters are currently not used by the system.

Registrations

The top of the page contains the following buttons: Queue VEN Reregister, Cancel VEN Registration, and Clear VEN Registration. See Figure 3-3.

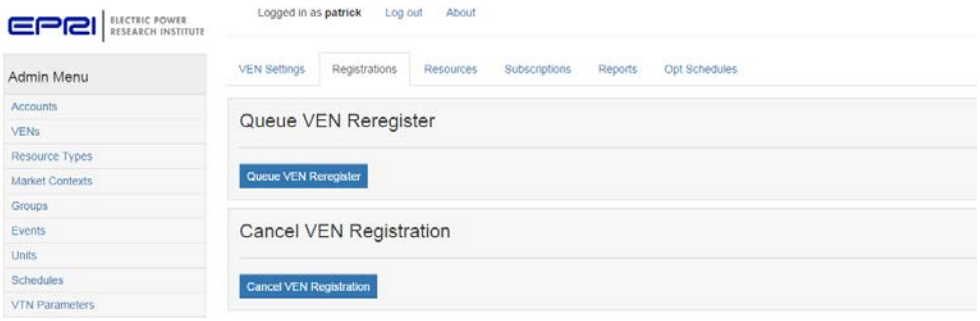

Figure 3-3
Reregister and cancel registration

The first button will queue a reregistration message for poll VENs or push a reregistration message for push VENs. This message forces a VEN to go through the registration process again. If VTN registration information is changed, this feature can be used to force the VEN to reregister in order to receive the updated information.

The second button queues a cancel registration message for poll VENs and pushes a cancel registration message for push VENs. It is unclear how this exchange should be used by the VTN. If a VEN has a valid SSL certificate and the VEN has an entry in the EPRI VTN, the VEN will be able to reregister. Canceling a registration does not block the VEN from communicating with the server.

The Clear VEN Registration button will clear the registration locally but not notify the VEN.

The final section of this tab contains the registration details. If a VEN is not registered, there will be no information in the VEN Registration Details box. See Figure 3-4.

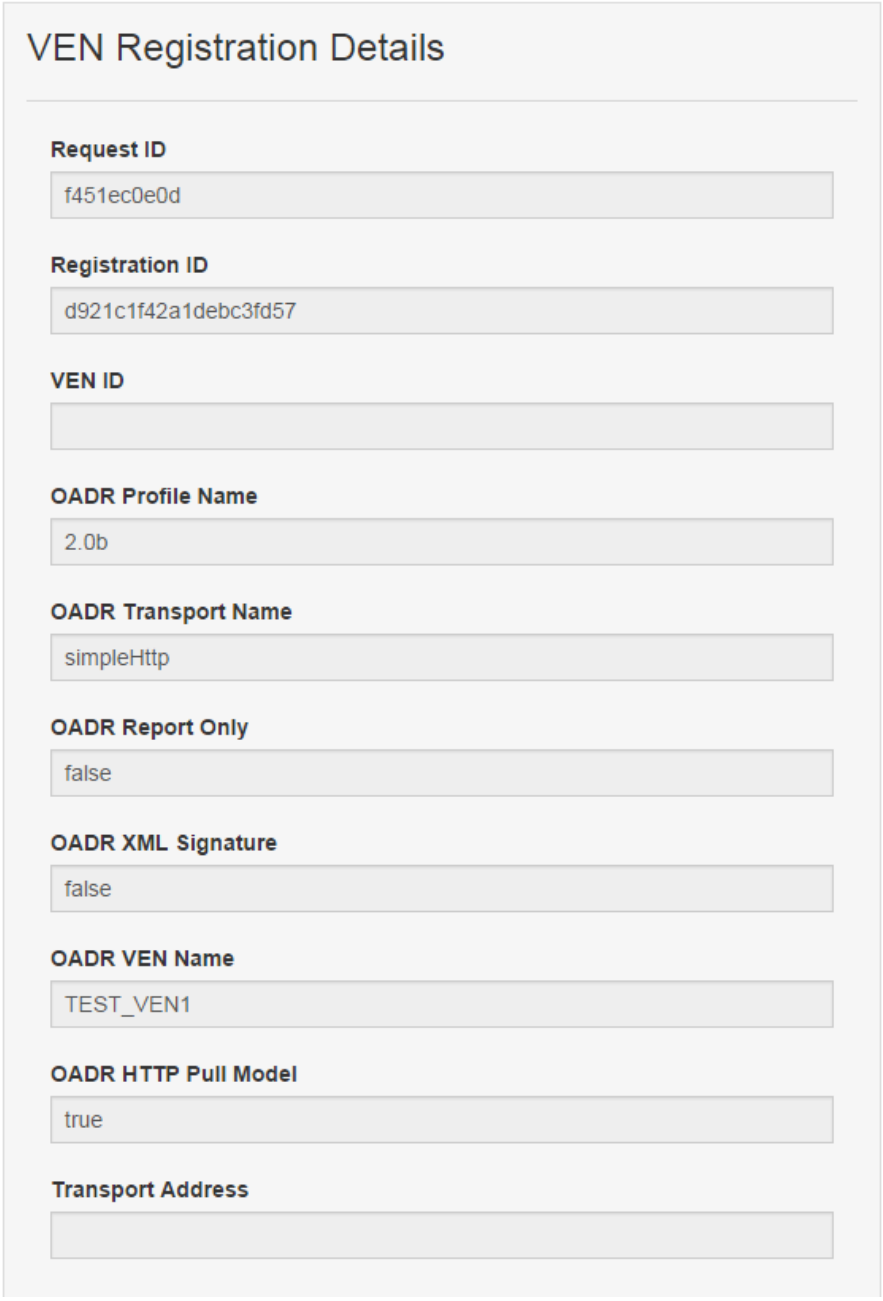

Figure 3-4
VEN Registration Details

Resources

The VEN Resources tab shows a list of resources that are associated with the VEN.

In Profile 2.0b, a VTN can target certain resources in an event or a signal in an event can target certain resources, and a VTN can request reports for resources. From this list, the user can view/edit or destroy a resource or add a resource to the VEN. See Figure 3-5.

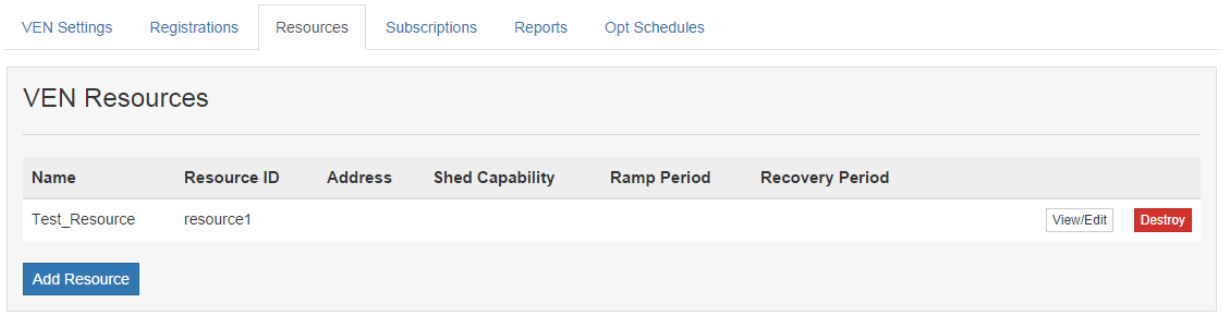

Figure 3-5
VEN Resources list

Clicking the view/edit link brings up the view/edit page for a resource. See Figure 3-6. The Resource ID can be used to target VENs with a certain resource type. The name of the resource is to help the VEN administrator identify the resource.

The other fields are not used by the system at this time, but they could be used to determine the impact of an event. Additionally, the location fields could be used to group VENs by location.

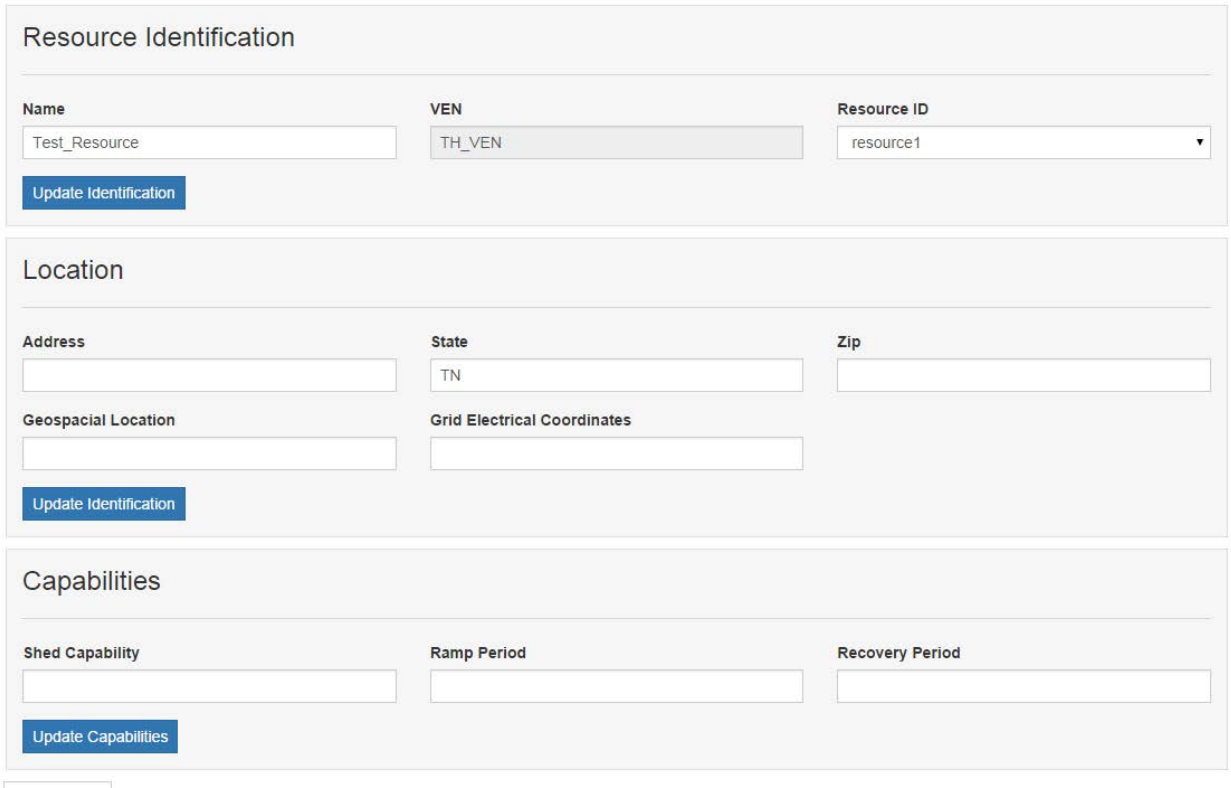

Figure 3-6
Resource edit

Clicking the Add Resource button (see Figure 3-5) brings up the display shown in Figure 3-7. A VEN can have any number of resources.

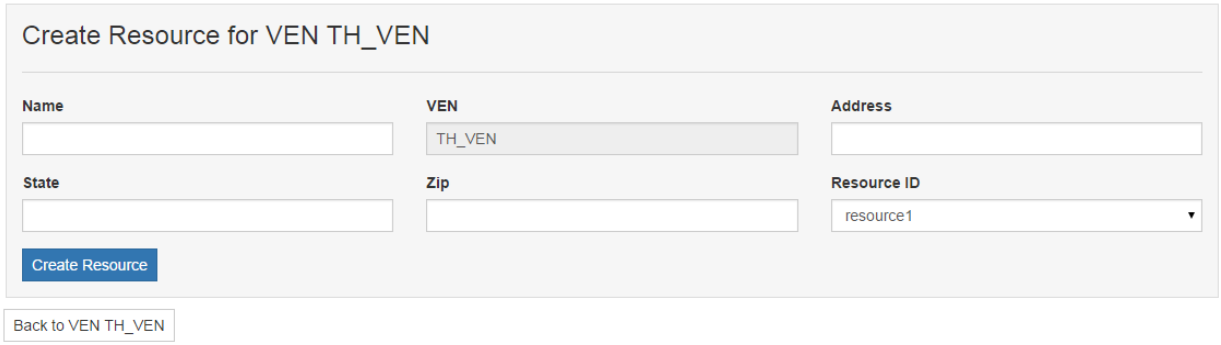

Figure 3-7
New Resource

Subscriptions

The Market Context Subscriptions list shows which market contexts the VEN is subscribed to (see Figure 3-8). In Figure 3-8, the VEN is subscribed to context "TOU" and not subscribed to the other contexts ion the list. The user can subscribe or unsubscribe by pressing the associated button.

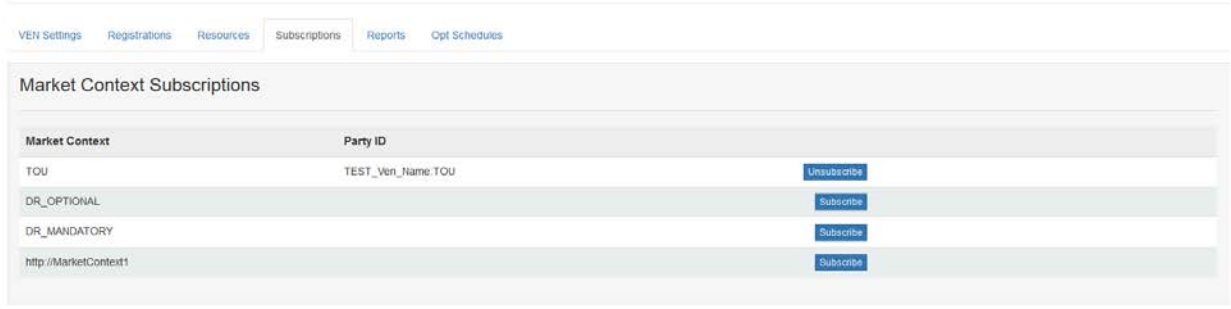

Figure 3-8
Market Context Subscriptions

When subscribed to a market, the VEN is assigned a unique Party ID, which is a combination of the VEN Name and the Market Context ID. This Party ID can be selected by the admin user when selecting Party ID targets (see *Creating an Event).*[1]

Reports

The Reports list consists of reports that the VEN registered during the registration process.

[1] This is probably not how the Alliance envisioned using Party ID. When a VEN subscribes to a Market Context, that VEN should automatically receive events that are created in that Market Context. In other words, the admin user creating an event should not have to manually select specific party IDs. There are also other implications to consider. For example, is a party ID something that should be kept private? In other words, when party IDs are added to an event, should every VEN that receives the event see every party ID?

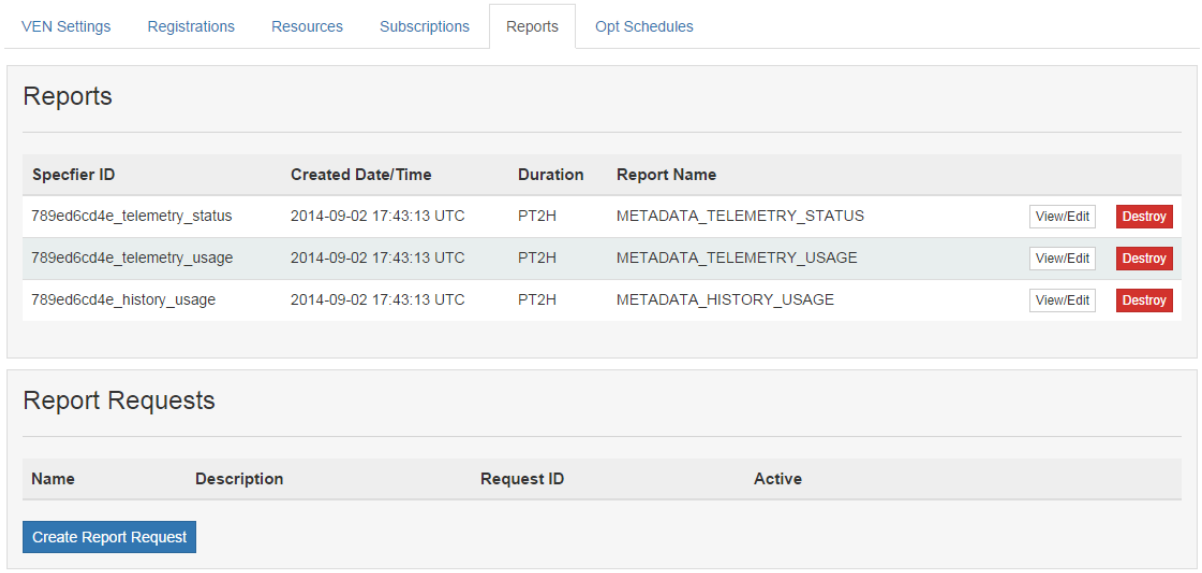

Figure 3-9
The Reports list

The view/edit screen shows the details of a report, including a description of the report intervals and the most recent values for each interval as reported by the VEN. See Figure 3-10.

The report view page has three sections: Report Identification, Report Description, and Report Instance.

Report Identification

The Report Identification fields show the type of report (telemetry or history), duration, and the date and time when the report was created (as reported in the Open ADR message).

Report Description

The Report Description section shows what intervals are available in the report.

Report Instance

Report instances are actual data reports. While a report description describes the data points (or intervals) in a report, report instances report data values. The Report Instance section shows a list of the five most recent reports.

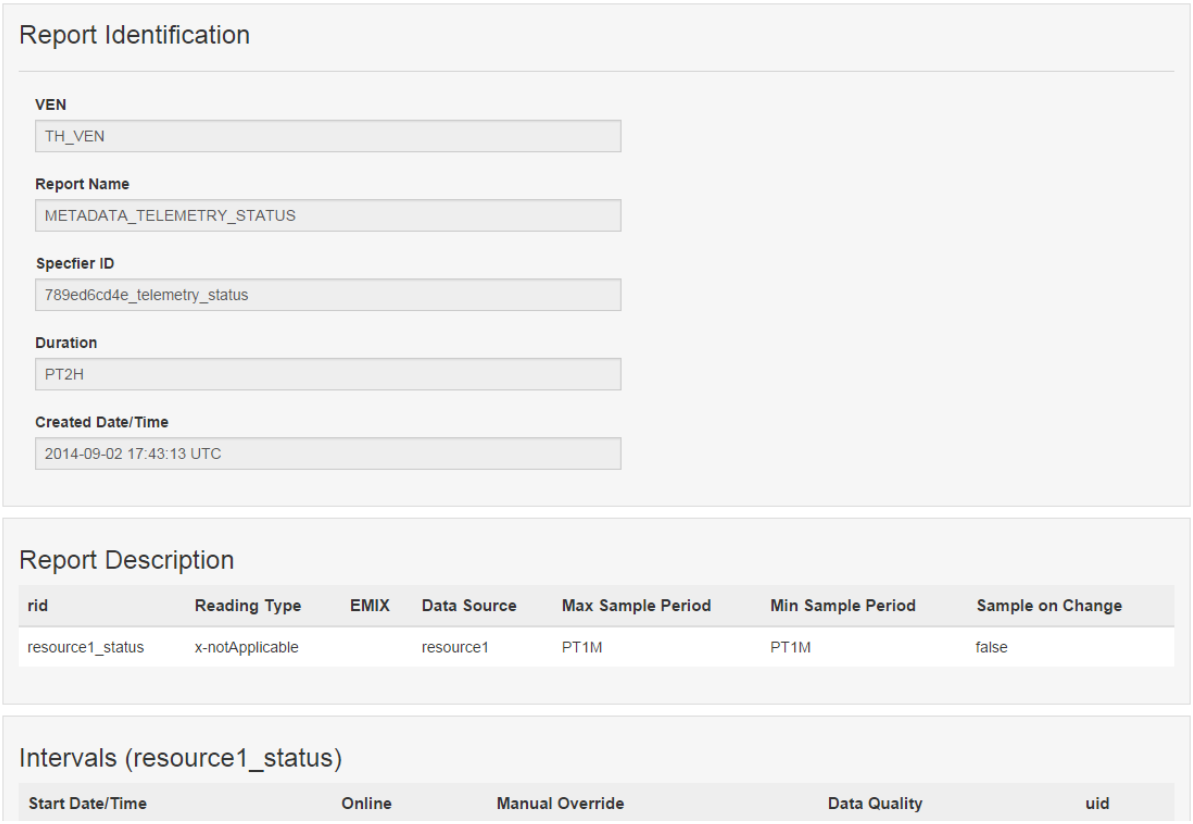

Figure 3-10
Report view

Report Requests

The VTN can request that the VEN report on any interval from any registered report by creating a Report Request. Figure 3-11 shows an example list of Report Requests.

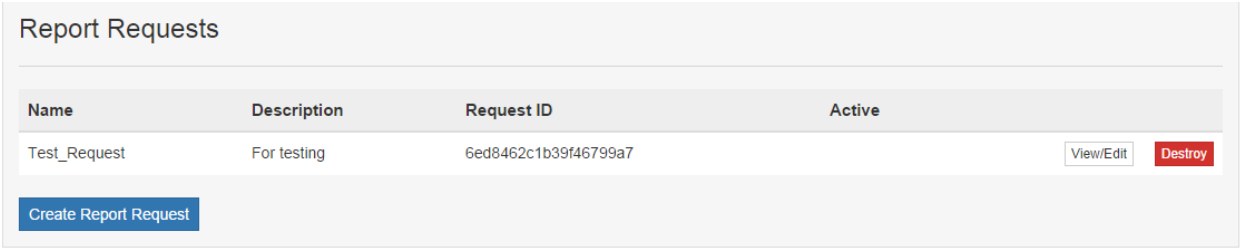

Figure 3-11
The Report Requests list

If a report request is active, the request has been sent to the VEN, causing the VEN to send the report to the VTN at the interval requested in the report request.

The following three sections describe how to create and edit requests, how to send requests to a VEN, and how to cancel requests.

Create Report Request

Clicking the Create Request Report button opens the new Request Report screen. See Figure 3-12.

Figure 3-12
New Report Request

To create a new request, click the Create Report Request button in the Report Requests list (see Figure 3-10). The new Report Request screen is displayed. See Figure 3-12.

Both the name and description fields are informational only, to aid in identifying report requests on the VTN. These fields are not used by OpenADR. Clicking the Create Report Request button opens the new Request Report in the edit/view page.

View/Edit Report Request

The top of the Report Request view/edit page is a list of Report Requests identical to the list of requests displayed on the VEN Report Requests page (see Figure 3-11). The list is repeated here as a convenience.

The next section, Report Request Identification, identifies the Report Request that is being viewed/edit. See Figure 3-13.

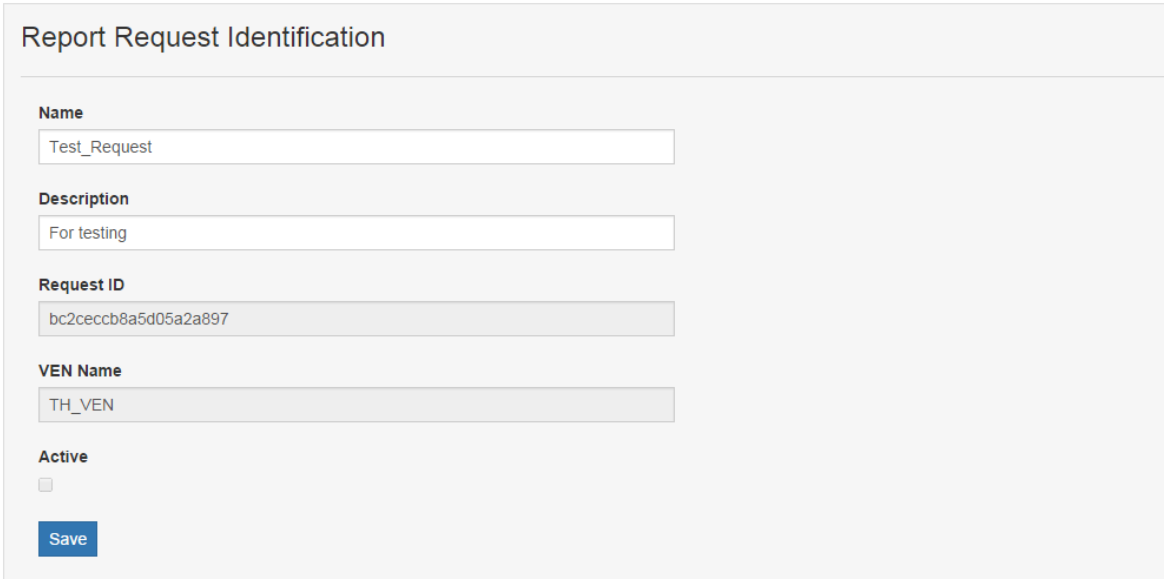

Figure 3-13
Report Request Identification

In the Report Request Identification section, the user can modify the Name and Description. The Request ID is a unique ID used by the VEN to identify a request.

Send and Cancel a Report Request

The next section contains a buttons for sending Report Requests to the VEN or cancelling a previous request. See Figure 3-14.

Once the Report Request is configured, the user should send the request to the VEN by clicking the Send Report button.

To cancel a report request that was previously sent to a VEN, click the Cancel Report button. If the VEN should still send the next report, select the checkbox under Report to Follow.

Figure 3-14
Send and cancel report request

Opt Schedules

The Opt Schedules list displays all of the opt schedules that the VEN has sent to the VTN. See Figure 3-15.

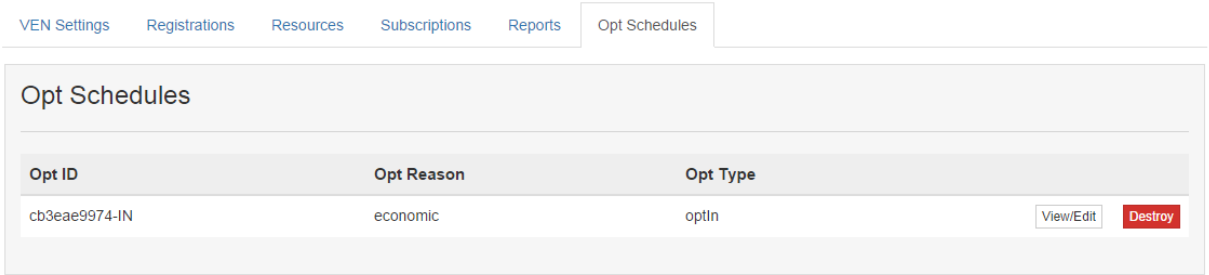

Figure 3-15
The Opt Schedules list

To view the details of an Opt Schedule, click the View/Edit link in the Opt Schedules screen (see Figure 3-15). Figure 3-16 shows an example Opt Schedule view/edit page.

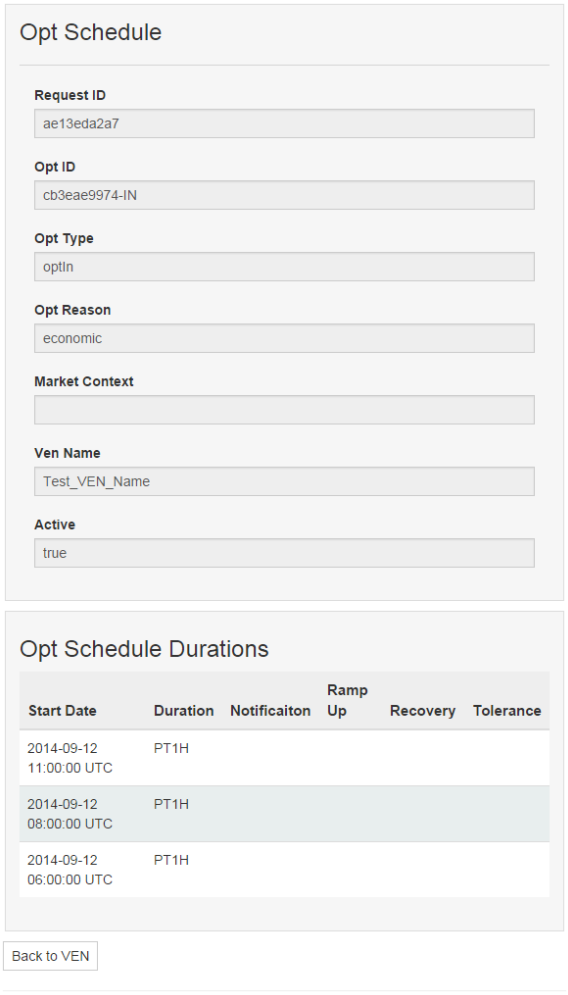

Figure 3-16
Opt Schedule view

Opt schedules provide a mechanism for a VEN to indicate to the server its availability to respond to an event. In Figure 3-16, the VEN states that it is available (Opt Type is “optIn”) with a reason of “economic.” The VEN is available during three time periods, each of which is one hour long.

If a VEN cancels an opt schedule, the Active flag will switch to false.

4
CREATING AN ACCOUNT

Only admin users can create an account. To create an account:

1. Select the Accounts link from the Admin Menu. See Figure 4-1.
2. Click the Create Account button.
3. In the New Account screen, enter the User Name, Email (optional), Password, and Password Confirmation. See Figure 4-2. The password must be at least six characters long and the Password and Password Confirmation entries must match.
4. Once the account is created, the user is redirected to the view/edit page of the new account. See Figure 4-3. From the view/edit page the user can be promoted to admin or demoted to non-admin.
5. The user's password can be changed. The other fields are informational only and are not required.

Non-admin users will not see the Administrator Settings, and are actively blocked from changing these settings.

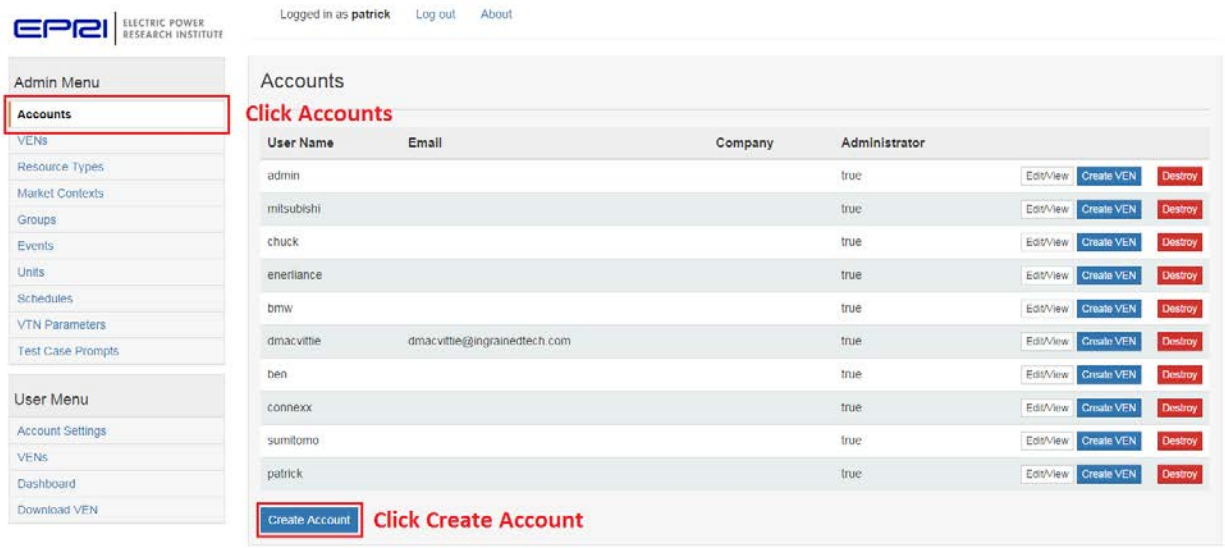

Figure 4-1
Create account step 1: click *Accounts* and step 2: click *Create Account*

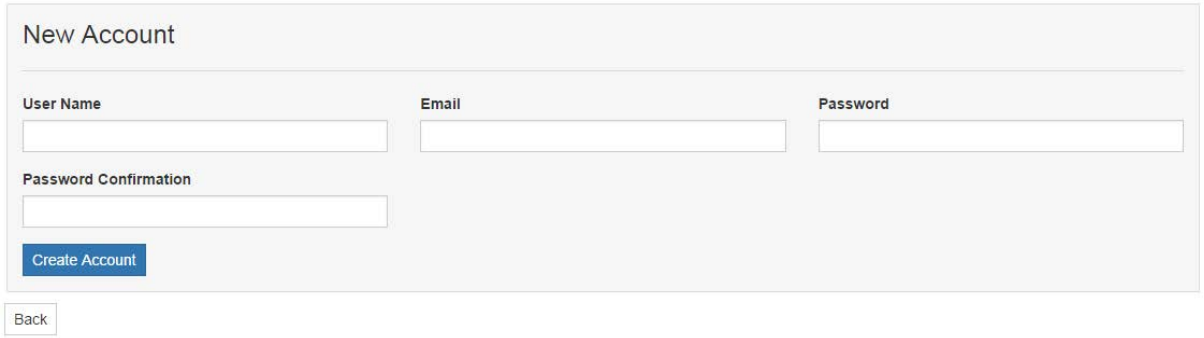

Figure 4-2
Create account step 2: fill out the form

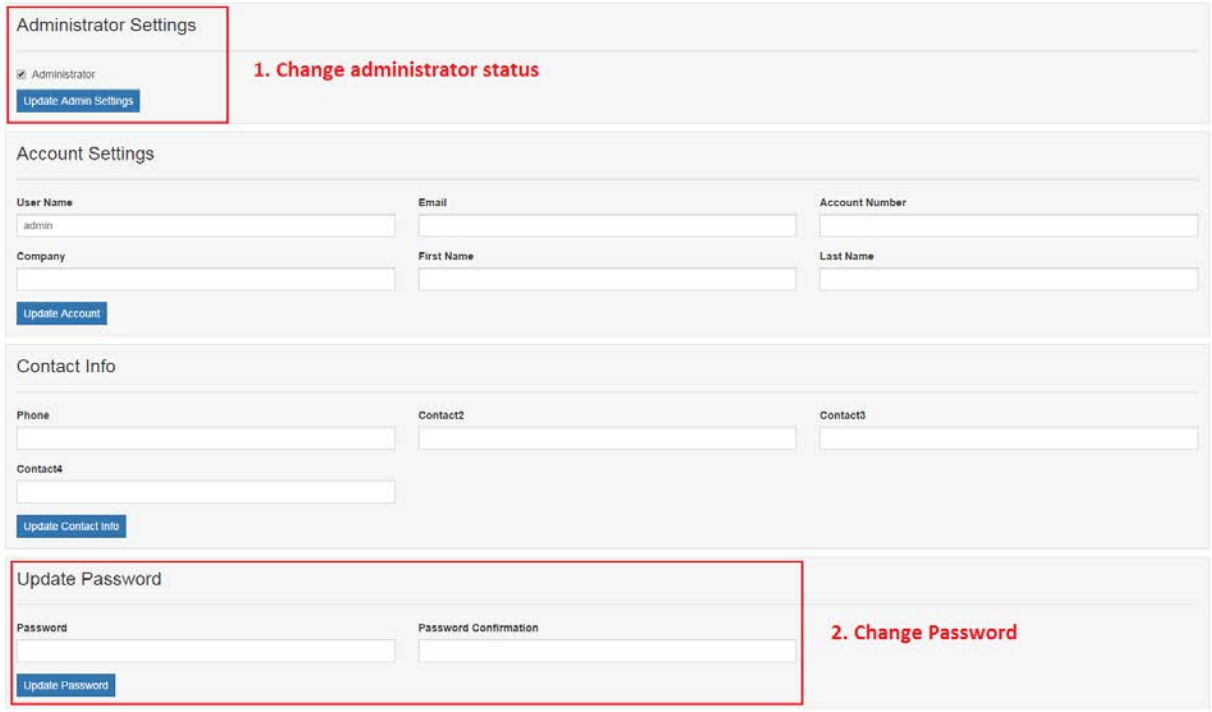

Figure 4-3
Create account step 3: change password or promote/demote to/from admin

5
CREATING A VEN

Create a VEN by following these steps:

Access the Create New VEN screen in one of two ways:

a. Admin users can: (1) select Accounts and then (2) click Create VEN to create a VEN for a particular account, as shown in Figure 5-1.

OR

b. Admin users and regular users can: (1) select the VENs link under the User Menu and then (2) click the Create VEN button at the bottom of the VEN list, as shown in Figure 5-2. This button will create a VEN for the logged-in account.

Following (a) or (b) above opens the new VEN page, as shown in Figure 5-3.

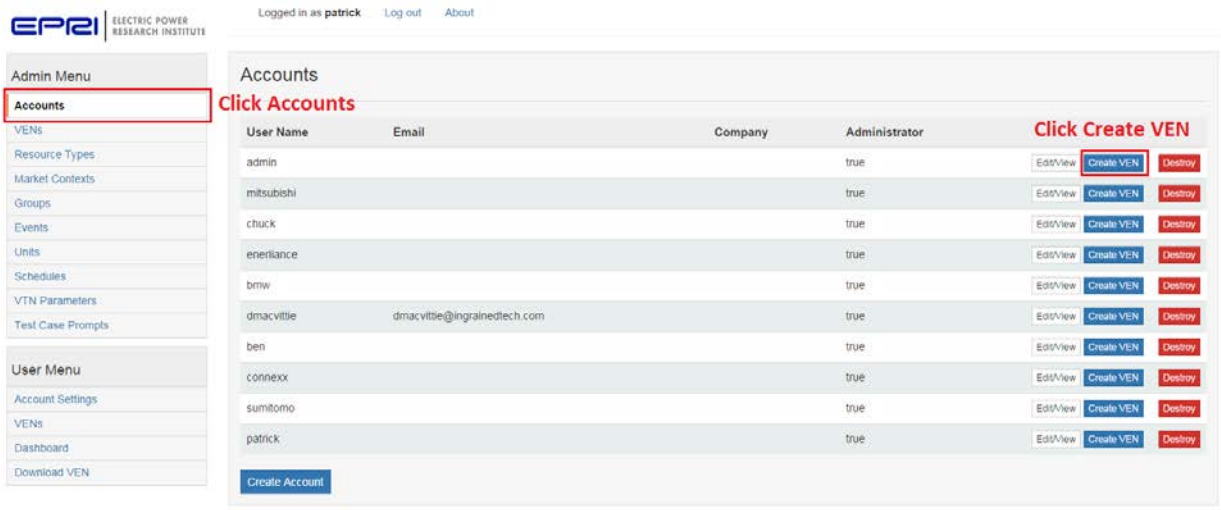

Figure 5-1
Create a VEN step 1 (admin): click *Accounts* and then click *Create VEN*

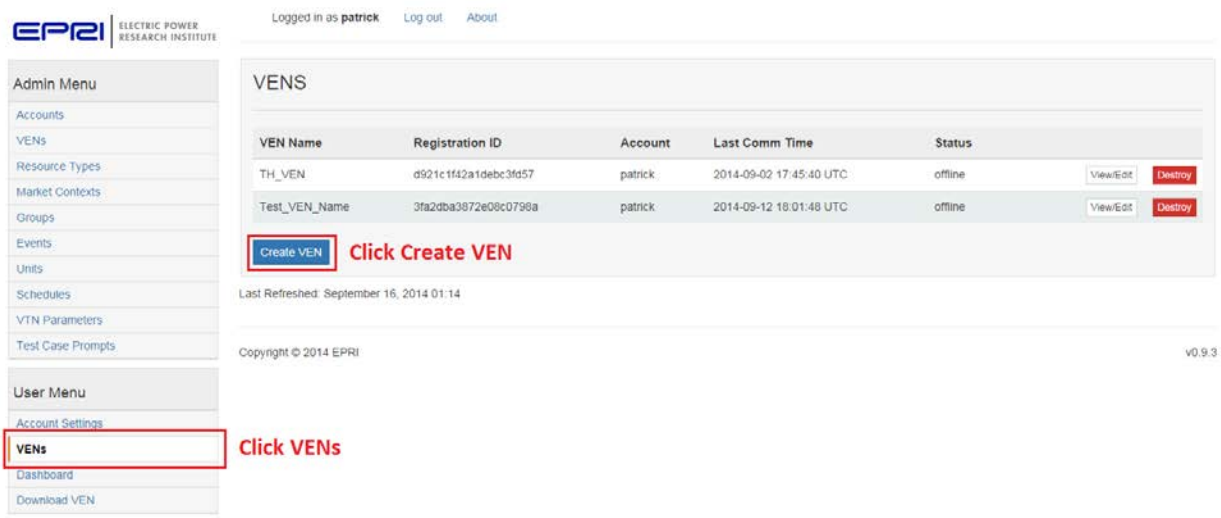

Figure 5-2
Create a VEN step 1 (non-admin users): click *VENs* and then click *Create VEN*

Figure 5-3
Create VEN step 2: fill in a unique VEN Name

In the new VEN screen, fill in a unique VEN Name and click Create VEN. The VEN view/edit page is then displayed. See Section 3, *Configuring and Managing VENs*.

6
CREATING AN EVENT

Only admin users can create an event. Non-admin users can create test events by following the Create Test Event link (see Figure 6-1), but the user cannot modify any details of the event (for security reasons) after it has been created.

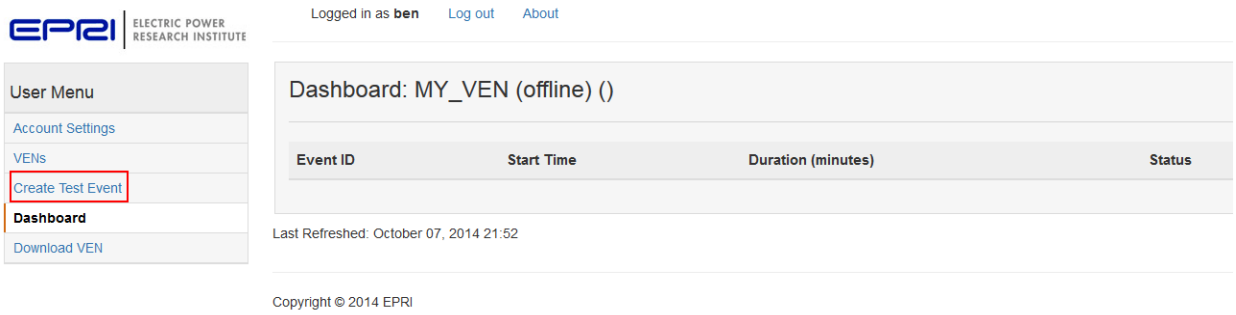

Figure 6-1
Creating a test event

1. Click Create Event, as shown in Figure 6-2.

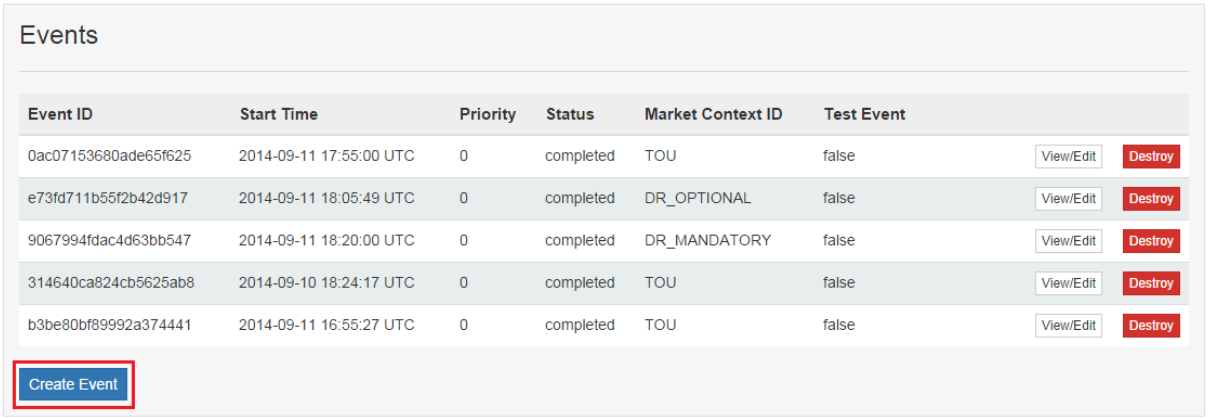

Figure 6-2
***Create Event* button**

2. Configure the time at which the event should start and the duration of the event (Event Details, as shown in Figure 6-3). Next, select the appropriate Signal Name, Signal Type, and Payload Value, and then click Create Event. At this point the event has not yet been made available to VENs. The next step is to publish the event.

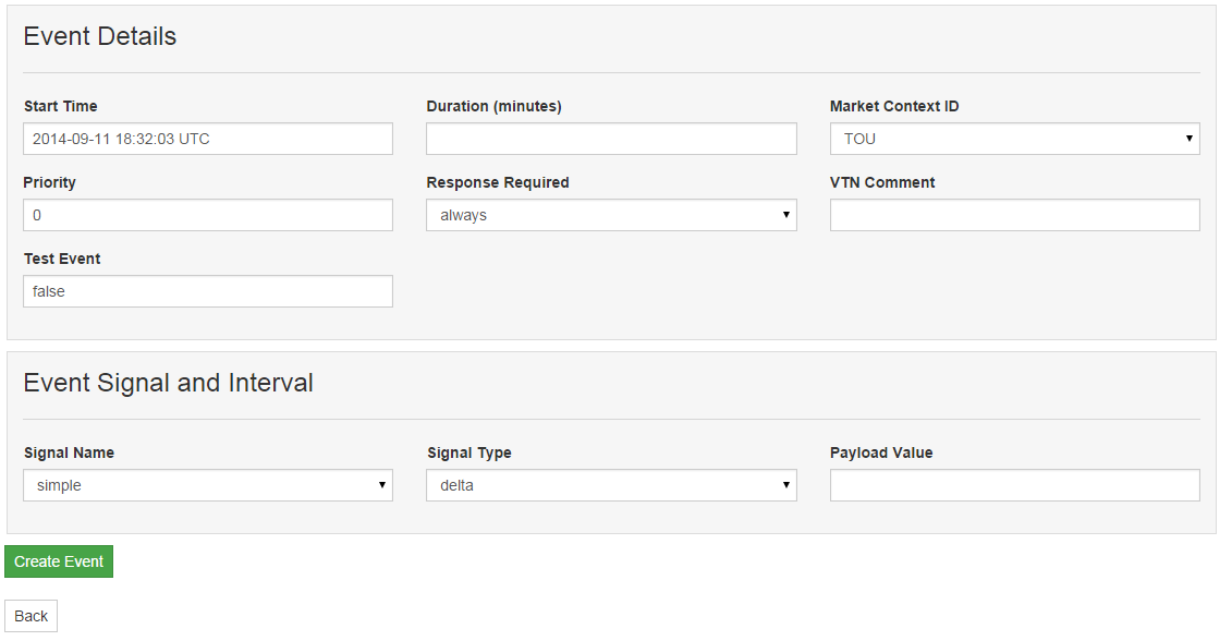

Figure 6-3
Event configuration

3. After the event has been created, the user can configure the event settings. The Event Settings fields are included in five different functional screens:
    a. Fields of the Event Descriptor screen include Event ID, Priority, Market Context ID, Status, VTN Comment, Test Event, Created At (date/time of event creation), and event Modification Number. See Figure 6-4.
    b. Fields of the Active Period screen include details of when the event should begin, event Duration, Tolerance, Notification, Ramp up, and Recovery. See Figure 6-4.
    c. The Response Required screen has one field to indicate whether the VEN is required to respond to the event.
    d. Fields of the Event Signals screen include Signal Name, Signal Type, and Current Value for the event. Multiple signal names, types, and levels can be assigned to an event.
    e. In the Targets screen, events can be disseminated to a specific VEN or to a set of Groups, Resources, VENs, or Parties. See Figure 6-5.

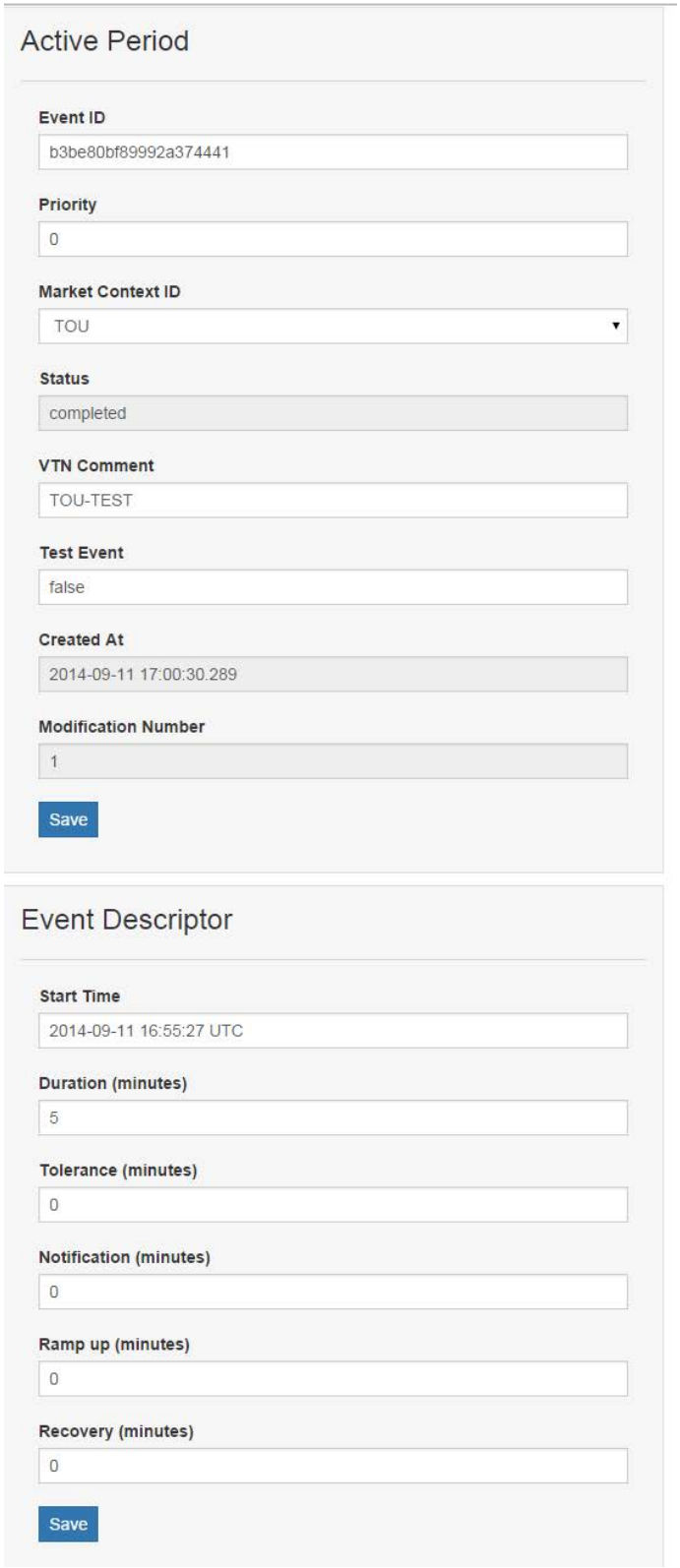

Figure 6-4
Active Period and Event Descriptor

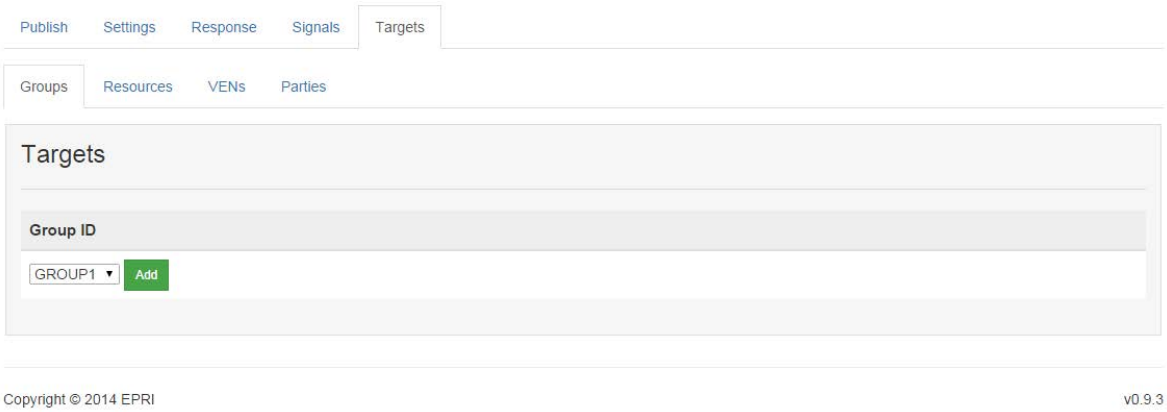

Figure 6-5
Targets

4. After the event is configured, the Event can be Published or Cancelled. See Figure 6-6. Note: The screen shots below precede the Event Settings screen.

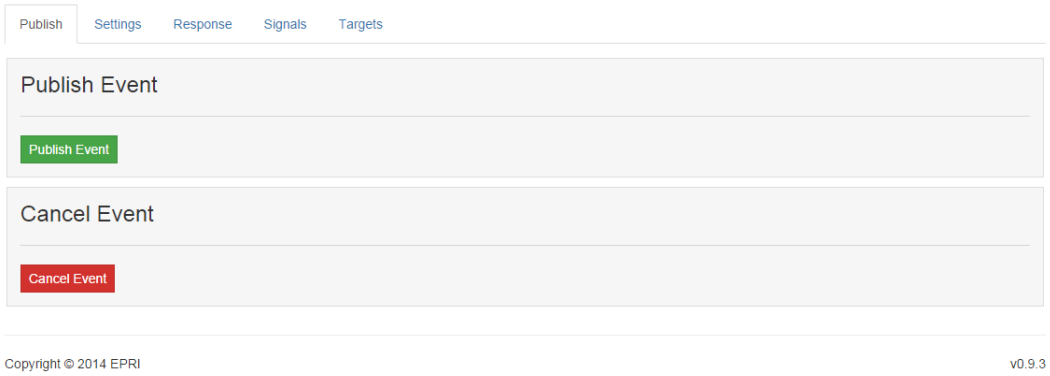

Figure 6-6
Publish Event and Cancel Event

Signals and Intervals

Intervals in a signal become active in an order based on the interval's UID. The UID must start with 0 and increment by 1 (though the system does not enforce this rule).

A single event can target Profile 2.0a and Profile 2.0b VENs. When an event is generated for a Profile 2.0a VEN, the following rules apply:

1. Profile 2.0a supports only one signal, so only the first signal will be included in the event message sent to the VEN
2. Profile 2.0a supports the "simple" Signal Name only. Signals are hard-coded to use this name.
3. Profile 2.0b introduces a few new signal types. If a signal type is selected that is not supported by Profile 2.0a, the Signal Type field defaults to LEVEL.
4. Profile 2.0a limits the payload values to numbers between 0 and 3 (inclusive). To support these payload values, intervals contain a "Profile 2.0a Payload" field that is sent to Profile 2.0a VENs.

The UID field in an interval determines the order in which intervals become active. The active interval determines the Current Value field of an Event Signal.

See the OpenADR profile specification for more information on compatibility between profiles 2.0a and 2.0b.The documents can be downloaded from the alliance website at http://www.openadr.org.

7
CREATING A SCHEDULE

Creating a schedule is similar to creating an event. Schedules add two new sections to the event view/edit page: *Schedule Duration and Event Start Time* and *Schedule.* See Figure 7-1 and Figure 7-2.

The list of schedules can be accessed by clicking the Schedules link (see *Schedules* under Section 2). Besides these two additional sections, editing a schedule is the same as editing an event.

A service that executes on the server watches the schedules and determines when an event should be created. An event is created when the current time matches the start time of the event minus the max of (0, Notification, Ramp up) (in minutes). For example, if a schedule is created with a Notification of 5, a Ramp Up of 6, and a start time of 10:00, the event will be created at 9:54 (10:00 – 6 minutes). Since Notification and Ramp up can be negative, a 0 is added to the max function to ensure the events are created at the event start time at the latest.

The server time zone is used for schedules.

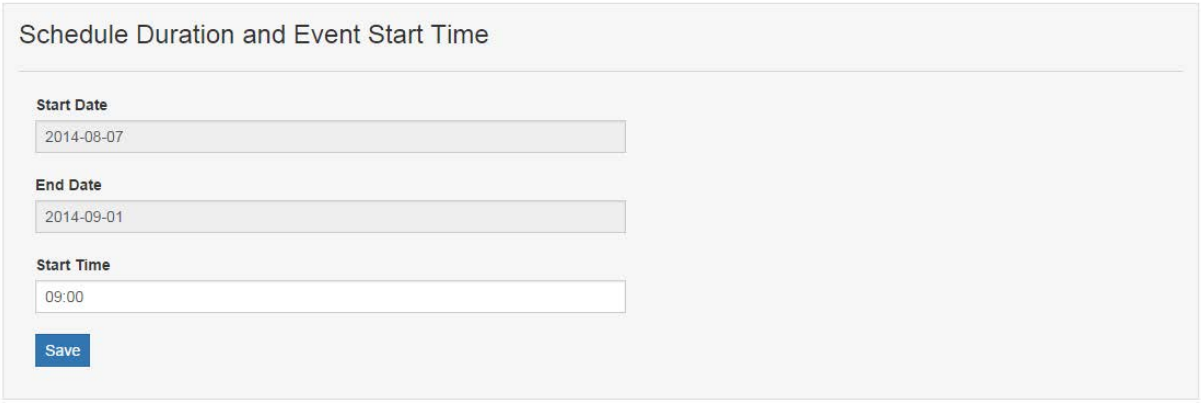

Figure 7-1
Schedule Duration and Event Start Time

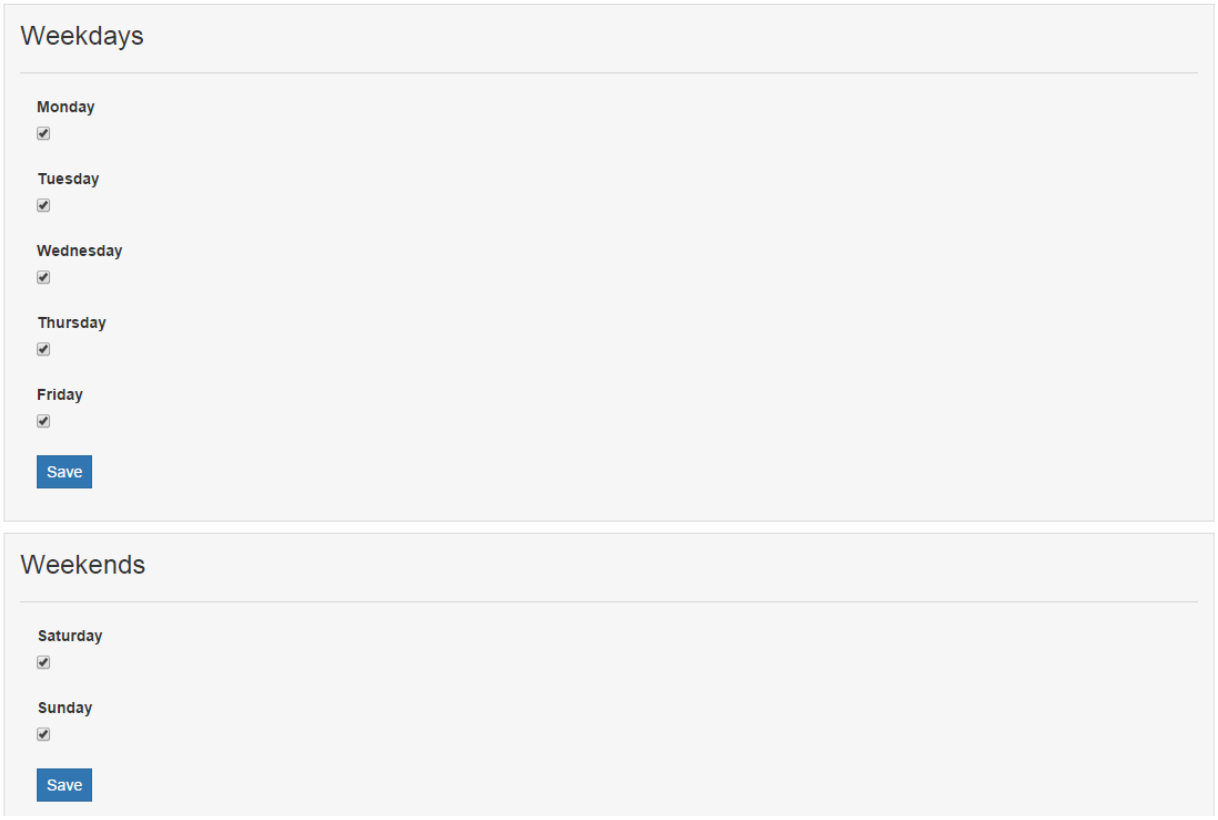

Figure 7-2
Event schedule

8
USER MENU

Non-admin users have limited access to the system. The User Menu consists of five links: Account Settings, VENs, Create Test Event, Dashboard, and Download VEN. See Figure 8-1.

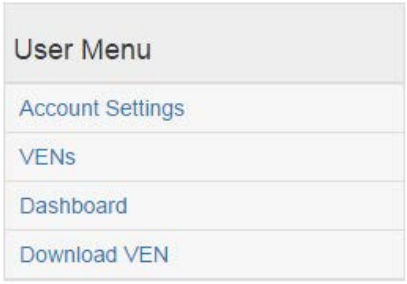

Figure 8-1
The non-admin User Menu

Account Settings

Users can modify their account details and change their password from the Account Settings page. Users will see the same information shown in Figure 4-3, minus the admin settings at the top of the page.

VENs

The user VENs link lists all of the VENs associated with the logged-in account. The user can manage existing VENs, create a new VEN, or delete an existing VEN. See Section 3 for information on managing VENs.

Create Test Event

Users can create test events through the Create Test Event link. The Create Test Event page has the same options as the Create Event page (see Figure 6-1).

Once a test event is created, non-admin users cannot modify any aspects of the event. The event will be marked as a test event, and all VENs registered with the account will be listed as targets.

Dashboard

The dashboard provides an overview of the status of the logged-in user's VENs. For each VEN, the dashboard shows: (1) the VEN Name and Status as well as (2) the Last Communication Time. Below the VEN status is a list of events that target that VEN.

The dashboard page refreshes automatically every five seconds. The bottom of the screen shows the last time the page was refreshed.

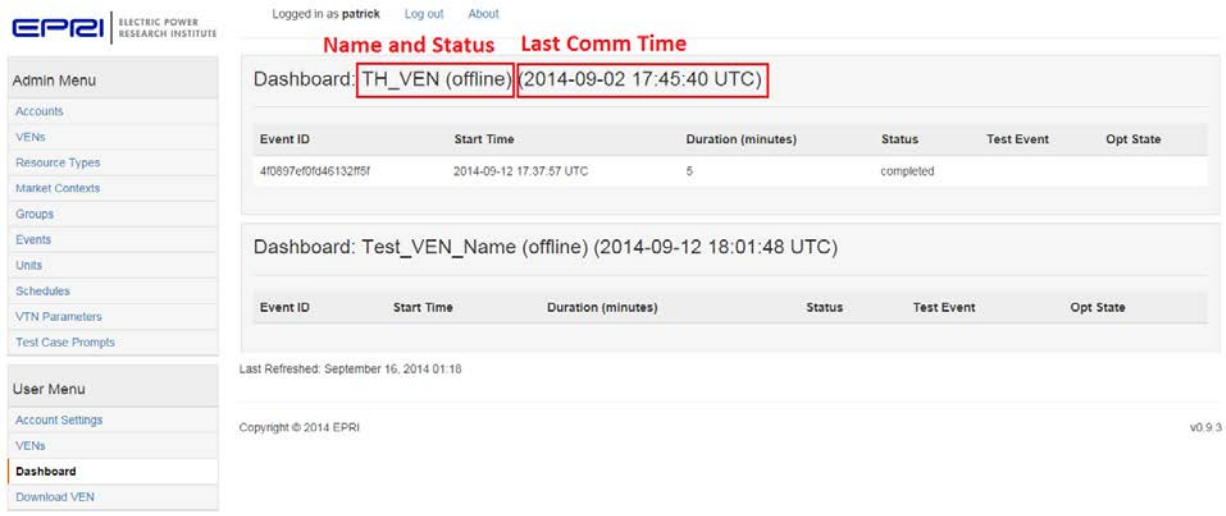

Figure 8-2
The dashboard

Download VEN

The final link under the user menu is a link to download a VEN. Please see *Download the VEN* under Section 1 for more information.

9
RUNNING TEST CASES AGAINST THE TEST SET

The Test Case Prompt link aids in testing with the QualityLogic test harness. The test harness has more than 60 EiEvent test cases, each of which has requirements for creating and modifying events. The prompts on this page will automatically create and modify events as needed by the test set.

To configure the VTN for testing with the test harness, follow the instructions under *VTN Parameters* and *Test Case Prompts* in Section 2.

10
INSTALLATION

Installation Notes

EPRI's OpenADR VTN was developed and tested on an Ubuntu 12.04 desktop and server. Limited testing has been done on Mac OS X. The software has not been tested on Windows Server, although all of the software used to run the OpenADR VTN runs on Windows. The following instructions are for Ubuntu Server 12.04.

Configuring TorqueBox, MySQL, and the Apache HTTP Server is a complex process. The following instructions are meant as a guideline for running the OpenADR VTN, not a template for securing a production environment.

It is advisable not to expose the OpenADR VTN outside your firewall if SSL is not turned on, because the OpenADR services (EiEvent, EiReport, EiOpt, and EiRegisterParty) do not perform authentication. The services assume that SSL authentication with client-side certificates has been performed before messages reach them. The OpenADR VTN is designed to be deployed behind an Apache reverse proxy HTTP server, which handles SSL. A sample Apache config file is included in the server documentation directory.

The following commands should work on most flavors of Linux, though they were only tested on Ubuntu.

Setup and Configure the Server

1. Install Java 7:

   sudo apt-get install openjdk-7-jdk.

   This will install the OpenJDK version of Java, not the Sun (Oracle) version. Some features may not be available in the OpenJDK version. If you experience issues, please follow your operating system instructions for installing Java from Oracle.

2. Install a database:

   a. The default database for the application is PostgreSQL. Ubuntu installation instructions can be found here: https://help.ubuntu.com/community/PostgreSQL. A database that supports Any Active Record can be used, but the application was written and tested with PostgreSQL.

   b. Create a database for the application.

   c. Create a user for the application and give the user full rights to the database created in the previous step.

3. Set up a torquebox user and install TorqueBox:

   sudo adduser torquebox –disabled-login

   sudo mkdir /opt/torquebox

   sudo chown torquebox:torquebox /opt/torquebox

wget http://torquebox.org/release/org/torquebox/torquebox-dist/3.0.2/torquebox-dist-3.0.2-bin.zip

sudo su torquebox

unzip torquebox-dist-3.0.2-bin.zip –d /opt/torquebox/

cd /opt/torquebox

ln –s torquebox-3.0.2 current

4. Add the following lines to the torquebox user's ~/.bashrc file:

   export TORQUEBOX_HOME=/opt/torquebox/current

   export JBOSS_HOME=$TORQUEBOX_HOME/jboss

   export JRUBY_HOME=$TORQUEBOX_HOME/jruby

   PATH=$JBOSS_HOME/bin:$JRUBY_HOME/bin:$PATH

   export RAILS_ENV=production

5. To make the changes in step 4 available to the current terminal, run the following command:

   source ~/.bashrc

   Alternatively, restart the console. These paths are needed for the next section.

Set up the Application

The following commands should all be run as the torquebox user. To switch to the torquebox user, run

sudo su torquebox

1. Copy oadr.knob to /home/torquebox/oadr and unzip the file:

   unzip oadr.knob

2. Switch to /home/torquebox/oadr. If you receive errors running the following commands, double-check that the export paths above (steps 4 and 5) are set correctly and that TorqueBox is installed correctly.
3. Install rails:

   gem install rails

4. Install the application gems:

   bundle install

5. Prepare the application assets (this command will take a few minutes: be patient):

   rake assets:precompile

6. Configure the application database:

   a. Copy config/database.yml.example to config/database.yml.

b. Edit config/database.yml. Under production: set the appropriate database, username, password, and host.

7. Configure TorqueBox services:

   c. Copy config/torquebox.yml.example to config/torquebox.yml

   The default settings will work for most applications. If you require XMPP or need to enable or disable host name validation on push VENs, this file will need to be modified. Modifying the TorqueBox config file requires the service to be restarted before changes will take effect.

8. Set up a secret token:

   d. Generate a secret:

      rake secret

   e. Copy the output from the above command to: config/initializers/secret_tokent.rb.

   f. The last line in secret_tokent.rb should look like this:
   Oadr::Application.config.secret_token = “place token here”

9. Set up the database:

   rake db:schema:load

10. Seed the database:

    rake db:seed

11. Load test case prompts (if desired):

    rake db:loadtests

12. Deploy the application to production:

    torquebox deploy --env=production. # (note: there are two dashes in front of env)

13. Test the installation by running TorqueBox:

    torquebox run –b 0.0.0.0

    This will start TorqueBox listening on all local interfaces on port 8080, allowing you to test that the application is working. Load the login screen in a browser by visiting http://localhost:8080. After verifying that the login screen loads, hit <ctrl+c> to stop TorqueBox.

14. Next, install the TorqueBox upstart script. The oadr/documentation directory contains a script called torquebox.conf. Copy this file (as root) to /etc/init/.

15. Start TorqueBox through upstart:

    sudo start torquebox.

    Similarly, to stop TorqueBox, run

    sudo stop torquebox

    Note that the upstart script will start TorqueBox when the server restarts.

16. Verify that TorqueBox is running by tailing the log file:

    tail –f /var/log/torquebox/torquebox.log.

17. By default, TorqueBox will listen on 127.0.0.1.To make the application available outside the localhost, change the inet-address parameter in /opt/torquebox/current/jboss/standalong/configuration/standalone.xml.

18. After starting TorqueBox, check that the application started without issue by looking at the TorqueBox log file in /var/log/torquebox/torquebox.log. Look for errors like this:

    (NameError) missing class or uppercase package name
    ('epri.oadr2b.lib.OadrPayload')

    This error indicates that TorqueBox is finding the wrong JVM; the application will not run under Java 6. You may need to uninstall Java 6. On Ubuntu, run the following command to make Java 7 the default:

    sudo update-alternatives –config java

    After running the above command, you will be presented with a list of options. Type the number that corresponds to Java 7 and press Enter.

Log Files

Should you run into issues, the following log files should be examined:

- Application: /home/torquebox/oadr/log/[production | error | info].log.
- Apache HTTP Server: /var/log/apache2/*
- TorqueBox: /var/log/torquebox/torquebox.log

The log files in /home/torquebox/oadr/log can grow very large. It's advisable to manage the files with logrotate.

Set up and Configure Apache with SSL

OpenADR2.0 certification requires a server to be configured with TLS1.2. EPRI's VTN uses an Apache HTTP Server reverse proxy to handle SSL. A sample Apache config file can be found in the documentation directory. The file is called oadr-ssl.conf**.**

This file configures Apache to use RSA and ECC certificates, restricts the cipher suites to those listed in the OpenADR2.0 specification, and requires client-side certificates for all requests using the OpenADR2.0 service end points. Certificates have only been tested in PEM format, but other formats may work as well.

Test and production certificates can be obtained from NetworkFx (http://www.networkfx.net/netfx/). Certificate packages from NetworkFX include a private key and certificate and a few root certificates (see Figure 10-1). The root certificates are signified by the letters CA (certificate authority) in the name.

Applications that use SSL (such as Apache) require three files: a CA bundle, a private key, and a certificate. Before a NetworkFX private key and certificate can be used with the provided Apache config file, they must be converted from DER encoding to PEM format. The CA bundle can be created by appending all CA files found in one VEN and one VTN certificate package.

First convert the files from DER encoding to PEM format and then append them to the same file. Both RSA and ECC CA certificates can be included in a single bundle.

See the resources below for more information on how configure Apache and convert files from DER encoding to PEM format.

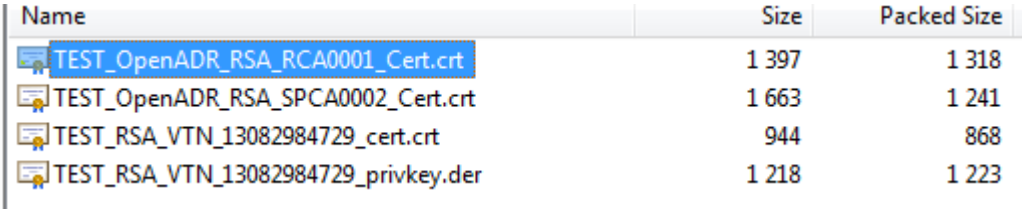

Figure 10-1
VTN test certificates from NetworkFx

Installation Resources

1. Running TorqueBox on Debian: http://www.headlondon.com/our-thoughts/technology/posts/installing-torquebox-application-server-on-debian
2. Apache in front of Rails: http://www.scatmania.org/projects/ssl-client-certificate-authentication-in-ruby-on-rails/
3. Additional Apache with SSL sites:

   http://dev.mensfeld.pl/2013/06/jenkins-behind-apache-with-https-proxy-pass-with-ssl/

   http://whatimean.wordpress.com/2008/02/20/ssl-for-apache-and-rails
4. Verifying certificates with OpenSSL:

   https://kb.wisc.edu/middleware/page.php?id=4064

   https://kb.wisc.edu/middleware/page.php?id=4543
5. OpenSSL (see the bottom of the page for converting cipher strings from the RFCs to the values expected by OpenSSL)

   https://www.openssl.org/docs/apps/ciphers.html

Export Control Restrictions

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