Avaya Solution & Interoperability Test Lab

Application Notes for INI EQuilibrium™ with Avaya Voice Portal – Issue 1.0

Abstract

These Application Notes describe the configuration steps required to integrate Interactive Northwest, Inc. (INI) EQuilibrium with Avaya Voice Portal.

INI EQuilibrium is a load-balancing solution for distributing VoiceXML and CCXML page fetch requests from Avaya Voice Portal to multiple application servers. EQuilibrium maintains application server status for all the application servers within its control and directs page fetches only to available application servers. EQuilibrium supports several distribution strategies, such as ordered and round-robin, for selecting an appropriate application server for the next request. EQuilibrium is a software-only solution integrated with Avaya Voice Portal platform. Its administrative menus are integrated into the administrative menus of Voice Portal Management System (VPMS) and alarm events are generated directly into Avaya Voice Portal's alarm stream. This gives the administrator visibility and control over the application servers used by Avaya Voice Portal.

Information in these Application Notes has been obtained through DevConnect compliance testing and additional technical discussions. Testing was conducted via the DevConnect Program at the Avaya Solution and Interoperability Test Lab.

1. Introduction

These Application Notes describe the configuration steps required to integrate Interactive Northwest, Inc. (INI) EQuilibrium with Avaya Voice Portal. INI EQuilibrium is a load-balancing solution for distributing VoiceXML and CCXML page fetch requests from Avaya Voice Portal to multiple application servers. EQuilibrium maintains application server status for all the application servers within its control and directs page fetches only to available application servers. EQuilibrium supports several distribution strategies, such as ordered and round-robin, for selecting an appropriate application server for the next request. EQuilibrium is a software-only solution integrated with Avaya Voice Portal platform. Its administrative menus are integrated into the administrative menus of Voice Portal Management System (VPMS) and alarm events are generated directly into Avaya Voice Portal's alarm stream. This gives the administrator visibility and control over the application servers used by Avaya Voice Portal.

EQuilibrium software is installed directly on the Avaya Voice Portal platform. There are two components of Equilibrium, one for VPMS and another for Avaya Voice Portal Media Processing Platform (MPP). The VPMS component includes the EQuilibrium menus, the event/alarm monitor, and the EQuilibrium configuration database. An administrator accesses these menus via the VPMS menu structure to configure EQuilibrium. The EQuilibrium configuration is stored in specific database tables within the PostgreSQL database on VPMS. Application servers, controlled by EQuilibrium, and clusters (discussed below) are configured through VPMS.

EQuilibrium allows application servers to be partitioned into separate clusters each with its own distribution strategy. Clusters can be used to achieve specialized types of resource balancing, such as ordered, round-robin, or random. Every Avaya Voice Portal application that uses EQuilibrium must indicate a cluster name in the URL. EQuilibrium Dispatcher will use the cluster name parameter to select the appropriate application server for a page request.

As mentioned above, EQuilibrium also consists of Equilibrium Dispatcher, a Java application installed on each MPP. When applications are administered on the VPMS, instead of constructing their URLs to point to specific application servers, the URLs are directed to the EQuilibrium Dispatcher on the local MPP. The Dispatcher processes the request by selecting an appropriate application server, rewriting the URL to point to that application server, and forwarding the request. The MPP Dispatcher gets its configuration information from the central VPMS component. Dispatchers can generate alarms when they detect a state change in an application server. Alarms are reported using the standard mechanism on Avaya Voice Portal.

2. General Test Approach and Test Results

DevConnect Compliance Testing is conducted jointly by Avaya and DevConnect members. The jointly-defined test plan focuses on exercising APIs and/or standards-based interfaces pertinent to the interoperability of the tested products and their functionalities. DevConnect Compliance Testing is not intended to substitute full product performance or feature testing performed by DevConnect members, nor is it to be construed as an endorsement by Avaya of the suitability or completeness of a DevConnect member's solution.

2.1. Interoperability Compliance Testing

Compliance testing was performed on two separate configurations.

1. VPMS/MPP on a single server
2. VPMS and MPP on separate servers

The general test approach entailed placing calls manually to Voice Portal and verifying that EQuilibrium dispatched the application to the appropriate application server according to the cluster dispatch method, including *Random*, *Ordered* and *Round-Robin*. Testing was performed with application servers running Apache Tomcat 5.x and 6.x. In addition, various states of the application servers were tested to verify that EQuilibrium would indicate the correct state in the **Monitor** screen, that calls would not be dispatched to offline application servers, and that the appropriate alarms were generated in the VPMS. Finally, the fail-over URL feature in Voice Portal was used together with EQuilibrium to verify that it would be used if the application servers in the cluster were not available.

The compliance test included feature and serviceability testing. Feature testing focused on verifying the following features and functionality:

- Installing EQuilibrium software on the VPMS and MPP.
- Removing EQuilibrium software from the VPMS and MPP.
- Licensing the product.
- Enabling EQuilibrium to report alarms.
- Configuring EQuilibrium with application servers and clusters.
- Generating alarms related to application server state changes.
- Configuring Voice Portal applications to use EQuilibrium.
- Using EQuilibrium in conjunction with a Voice Portal fail-over URL.
- Verifying that the Voice Portal application is dispatched to the appropriate application server according to the cluster distribution strategy and the application server's availability.
- Verifying that the EQuilibrium detects application servers in various states, such as online, offline, or in maintenance mode.
- Verifying that EQuilibrium detects the cluster state, such as online, offline, or degraded.

Serviceability testing focused on verifying the ability of EQuilibrium to recover from adverse conditions, such as VPMS and MPP server restarts.

2.2. Test Results

All test cases were passed.

2.3. Support

To obtain technical support for INI EQuilibrium, contact Interactive Northwest via phone, email or through their website.

- **Web:** http://www.interactivenw.com/support.php
- **Email:** support@interactivenw.com
- **Phone:** (800) 808-8090

3. Reference Configuration

The following diagram shows the configuration where VPMS and MPP were running on a single server.

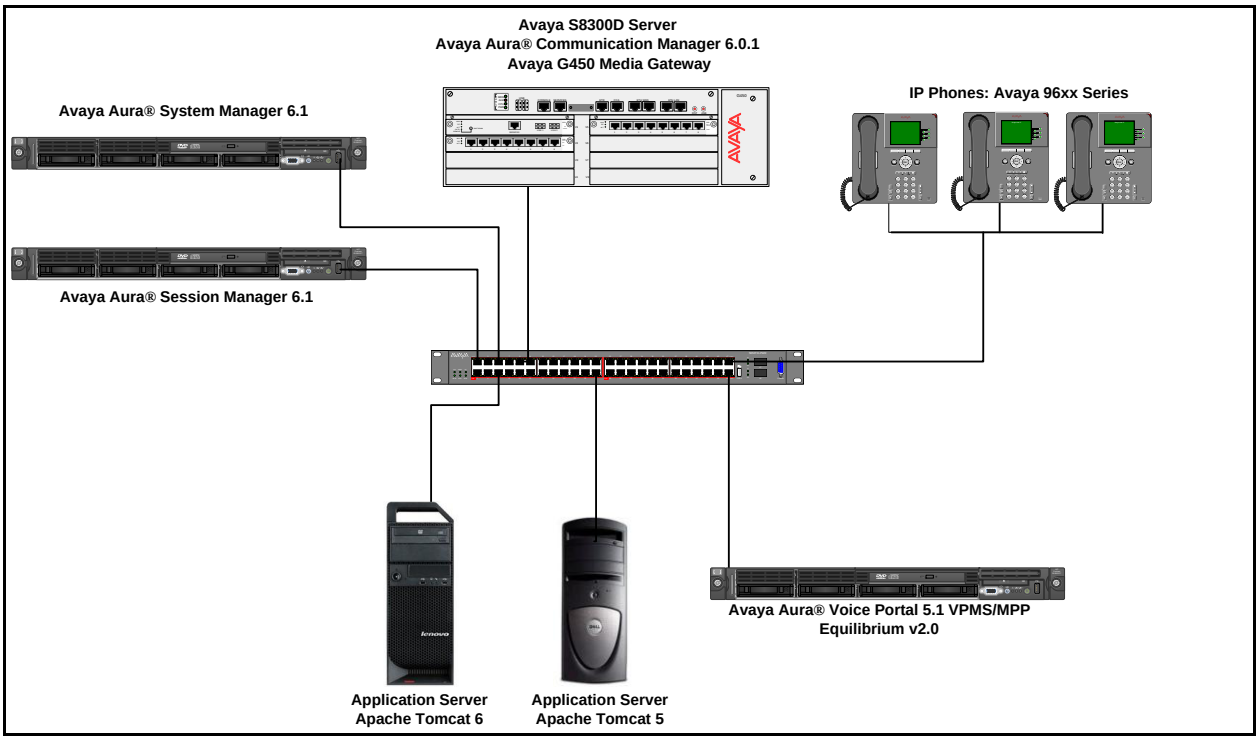


Figure 1: VPMS/MPP on a single server

The following diagram shows the configuration where VPMS and MPP were running on separate servers

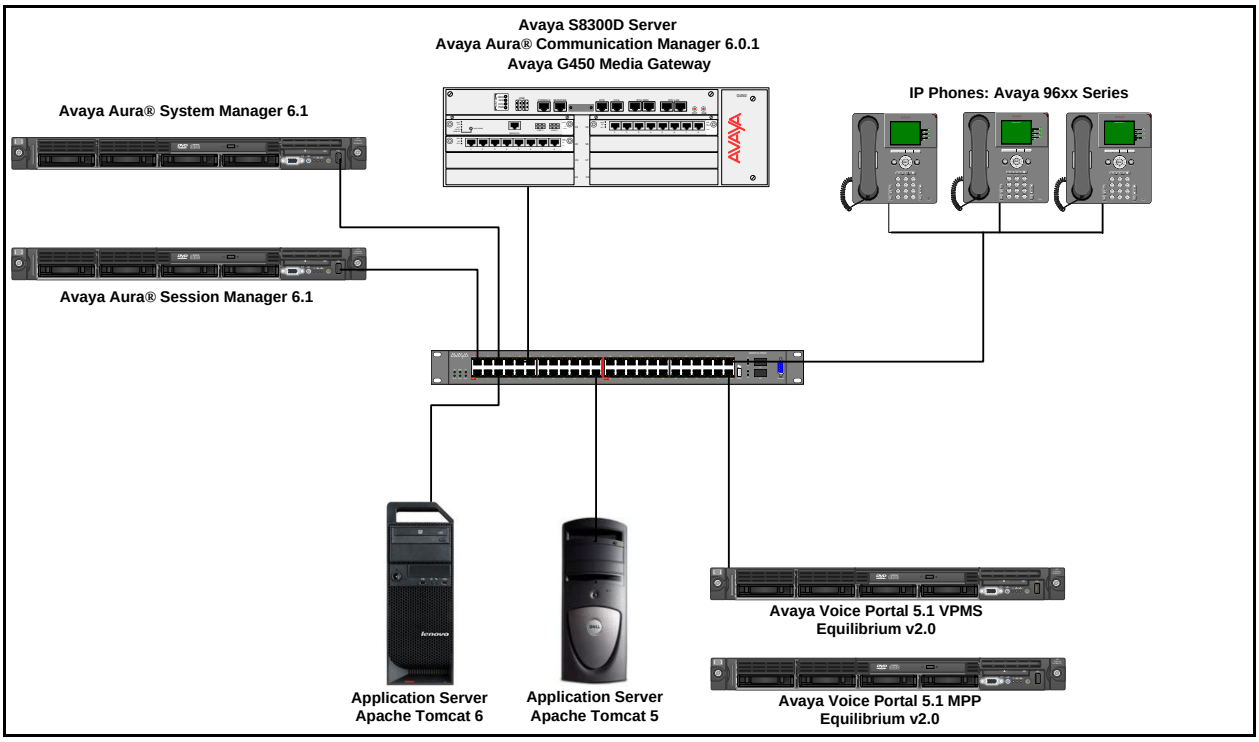


Figure 2: VPMS and MPP on separate servers

3.1. Equipment and Software Validated

The following equipment and software were used for the sample configuration:

Equipment/Software	Release/Version
Avaya Voice Portal running on IBM xSeries 306m Server	5.1 (5.1.0.0.4201)
Avaya G450 Media Gateway	31.20.1
Avaya Aura Communication Manager running on Avaya S8300D Server	6.0.1 SP7
Avaya 9600 Series IP Telephones	3.011b (H.323)
INI EQuilibrium[1]	INI-EQ-EPM-2.0.4-1 INI-EQ-MPP-2.0.4-1
Apache Tomcat running on Microsoft Windows 7	6.x
Apache Tomcat running on CentOS 6.2	5.x

[1] The INI EQuilibrium version can be checked by running the "rpm –qa | grep EQ" command on the VPMS and MPP.

4. Install and Configure INI EQuilibrium

This section covers the installation and administration of INI EQuilibrium. The procedures include the following areas:

- INI EQuilibrium Software Installation on VPMS and MPP
- License EQuilibrium
- Configure EQuilibrium to Report Alarms
- Configure Application Servers
- Configure Cluster
- Configure Voice Portal Application

Note: It is assumed that the Voice Portal system has already been installed and configured as described in [1] or [2] and [3].

4.1. INI EQuilibrium Software Installation on VPMS and MPP

The VPMS component should be installed on the primary VPMS and the MPP component should be installed on every MPP. In this example, only one MPP was used. Refer to [4] for more information on the EQuilibrium installation process. Also detailed installation instruction can be found in [4].

Note: The Voice Portal system used in the configuration was using Avaya Enterprise Linux.

4.1.1. Install the VPMS Component

The following procedure installs the VPMS component:

1. SSH to the VPMS server Linux shell with a *root* login.
2. Insert the INI EQuilibrium CDROM into the CDROM drive.
3. Mount the EQuilibrium installation CDROM by entering the `mount /mnt/cdrom` command, where `/mnt/cdrom` is the mount point directory.
4. Change to the mount point directory using the `cd /mnt/cdrom` command.
5. Determine whether Java is installed on the server by entering the `rpm –qa | grep jdk` command. If the package `jdk-1.6.0_18-fcs` is not present, load Java on the VPMS. Change to the `/mnt/cdrom/Java` directory and run the `rpm –ivh jdk*.rpm` command.
6. Enter the `rpm –ivh INI-EQ-VPMS-2.0.4.rpm` command to start the installation.

When the installation completes, the location of the installation log file is provided.

4.1.2. Install the MPP Component

The following procedure installs the MPP component:

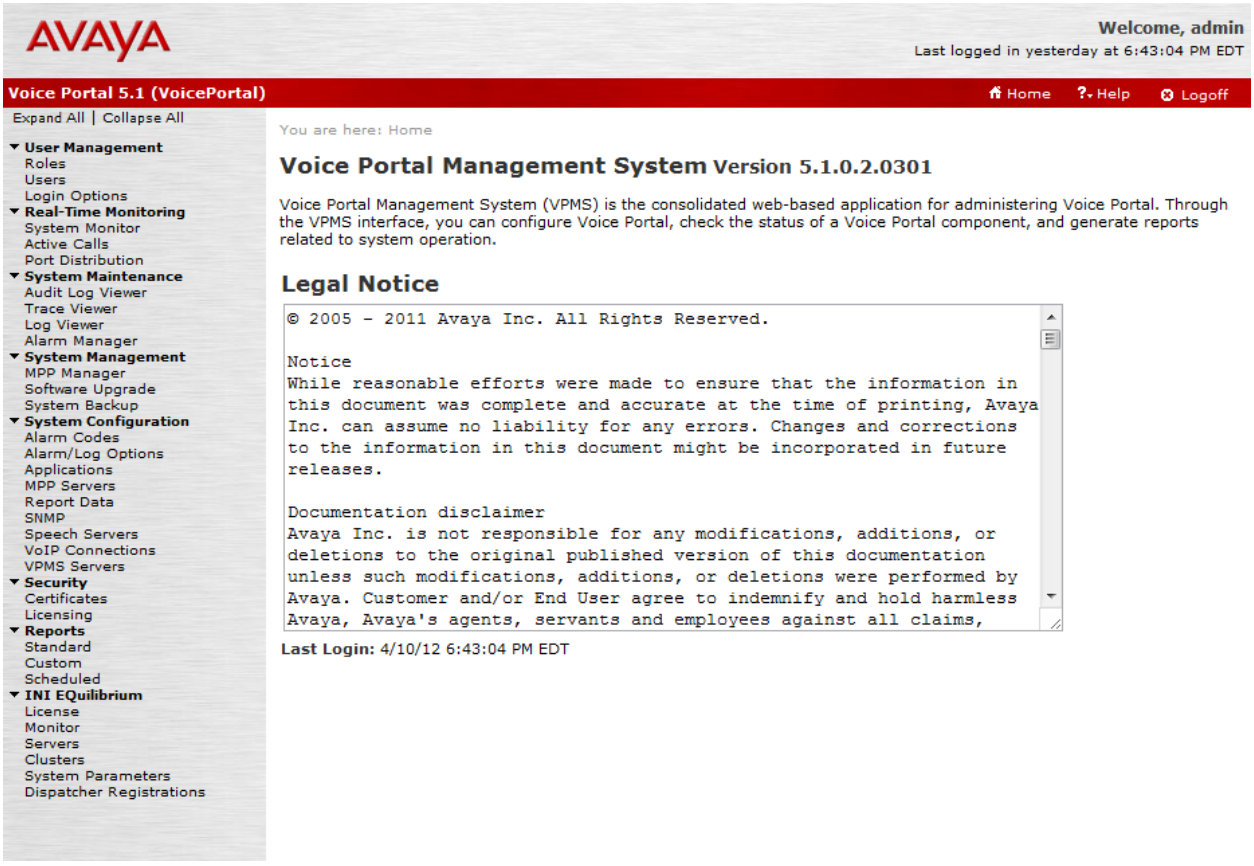
1. SSH to the MPP server Linux shell with a *root* login.
2. Insert the INI EQuilibrium CDROM into the CDROM drive.
3. Mount the EQuilibrium installation CDROM by entering the `mount /mnt/cdrom` command, where `/mnt/cdrom` is the mount point directory.

4. Change to the mount point directory using the `cd /mnt/cdrom` command.
5. Determine whether Java is installed on the server by entering the `rpm -qa | grep jdk` command. If the package `jdk-1.6.0_18-fcs` is not present, load Java on the MPP. Change to the `/mnt/cdrom/Java` directory and run the `rpm -ivh jdk*.rpm` command.
6. Add an entry in the `/etc/hosts` file for the EQVPMS alias. The following entry should be added: `10.64.10.31 EQVPMS`, where `10.64.10.31` is the VPMS IP address.
7. Change to the `/mnt/cdrom` directory and enter the `rpm -ivh INI-EQ-MPP-2.0.4.rpm` command to start the installation.

When the installation completes, the location of the installation log file is provided.

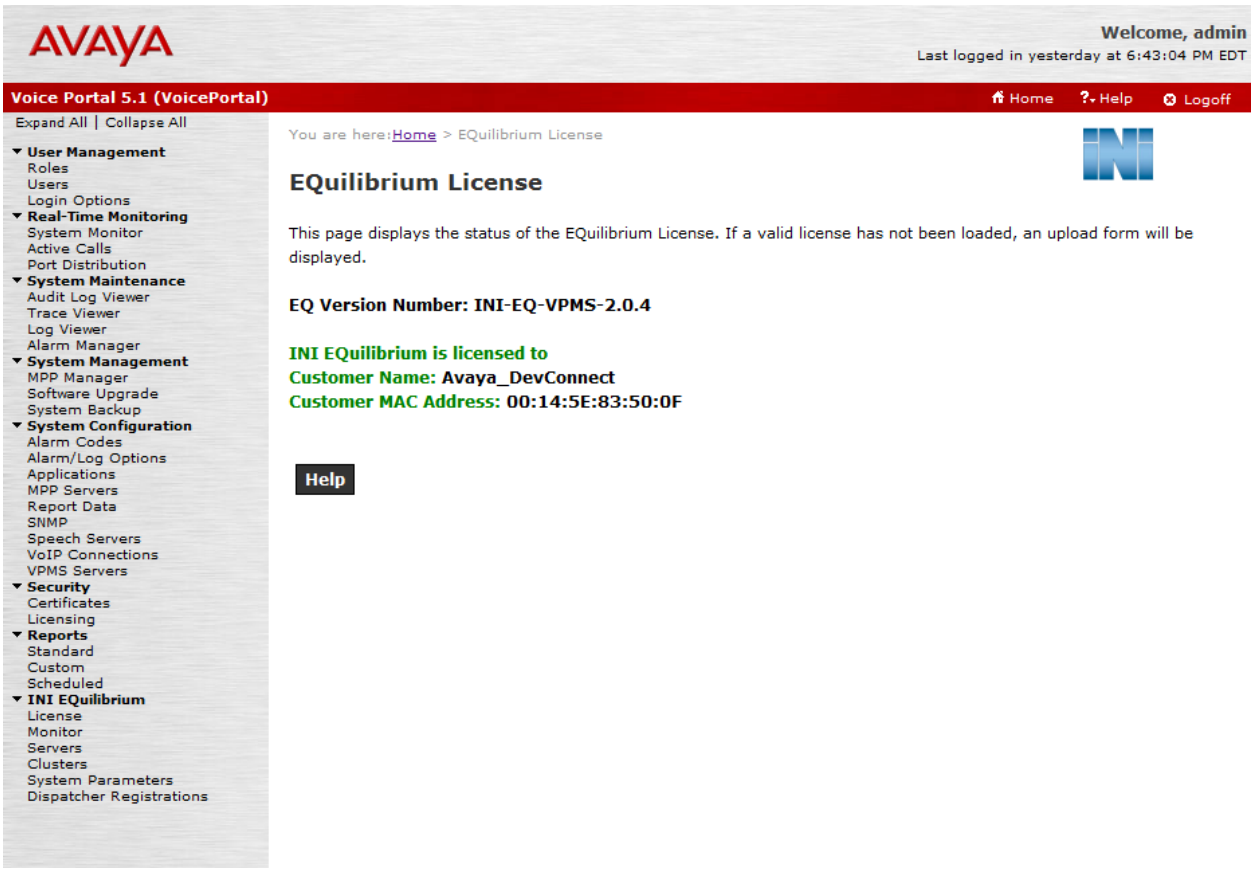
4.2. Configure INI EQuilibrium

EQuilibrium is configured via the Voice Portal Management System (VPMS) web interface. To access the web interface, enter http://<*ip-addr*>/ as the URL in a web browser, where <*ip-addr*> is the IP address of the VPMS. Log in using the Administrator user role. The screen shown below is displayed with the INI EQuilibrium menu options in the left pane after the software is installed on the VPMS. Refer to [5] for more information on configuring EQuilibrium.



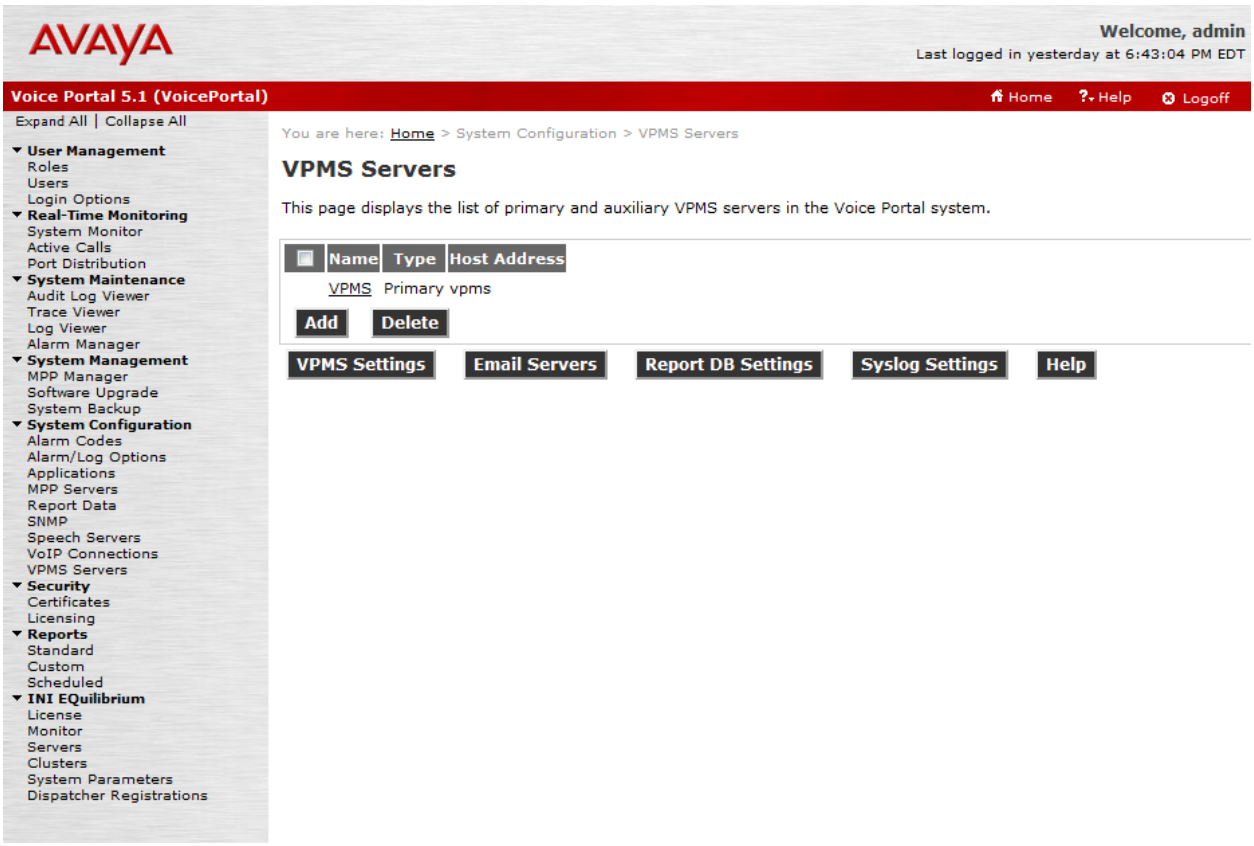
4.2.1. License EQuilibrium

Navigate to **License** under **INI Equilibrium** menu and specify the **License File** (not shown)**;** click **Upload**. After the license has been installed, the screen should display an "INI EQuilibrium is licensed to …" message.

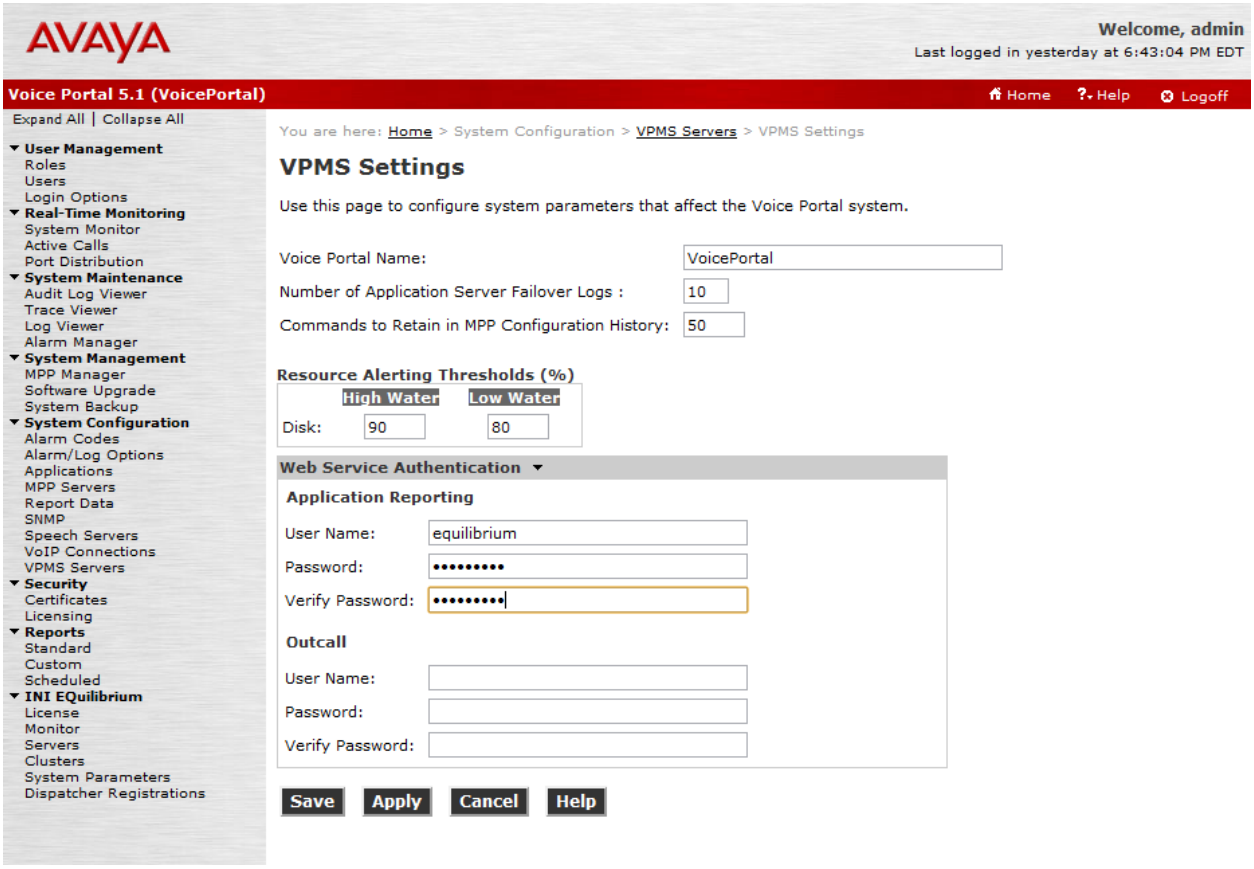


4.2.2. Configure EQuilibrium to Report Alarms

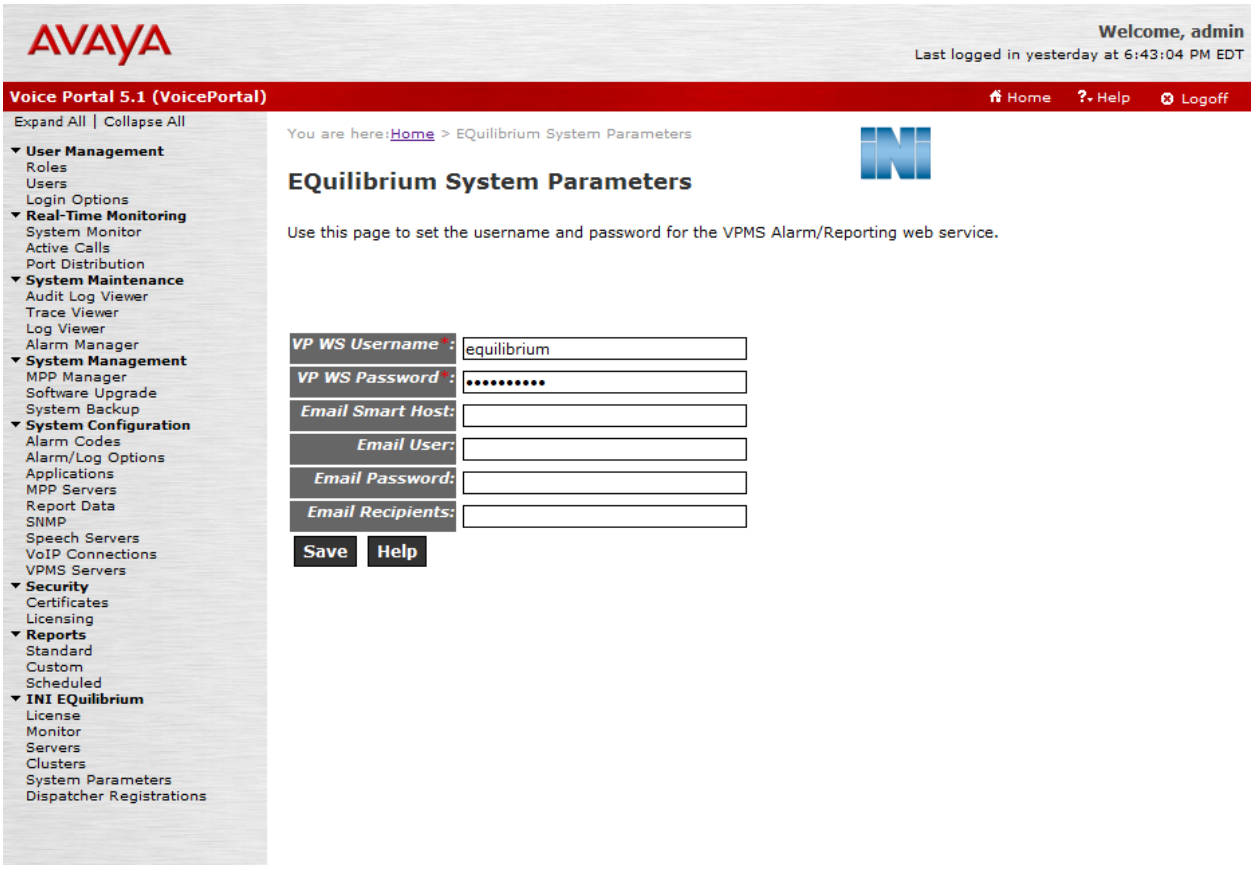
After EQuilibrium is licensed, the next step is to configure alarm reporting for EQuilibrium. Select **VPMS Servers** under **System Configuration** in the left pane to display the screen below. Click on the **VPMS Settings** button to display the **VPMS Settings** screen.



In the **VPMS Settings** screen, specify a **User Name** and **Password** under **Application Reporting** as shown below. Click **Save**.



Next, configure the same **User Name** and **Password** in EQuilibrium. Select **System Parameters** under **INI EQuilibrium** in the left pane and specify **VP WS Username** and **VP WS Password** as shown below. Click **Save**.



4.2.3. Configure Application Servers

Click on **Servers** under **INI EQuilibrium**. In the **EQuilibrium Servers** screen (not shown), click on the **Add** button. The **Add EQuilibrium Server** screen is displayed. Configure the following fields:

Name: Specify a descriptive name for the application server (e.g., *AES1*).

Protocol: This is the protocol used when EQuilibrium redirects the page fetch to the application server. In this example, *http* was used.

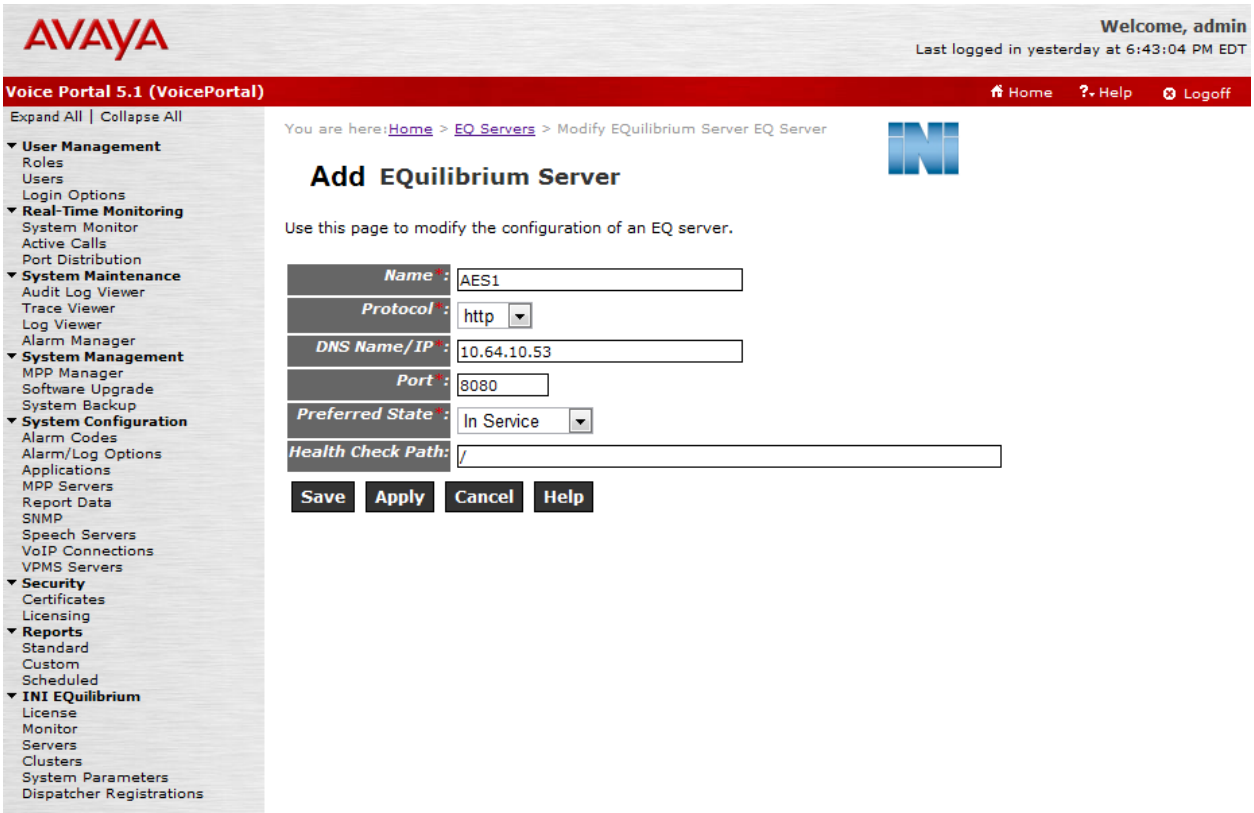
DNS Name/IP: This is the IP address of the application server (e.g., *10.64.10.53*).

Port: This field specifies the http port used by the application server running Apache Tomcat (e.g., *8080*).

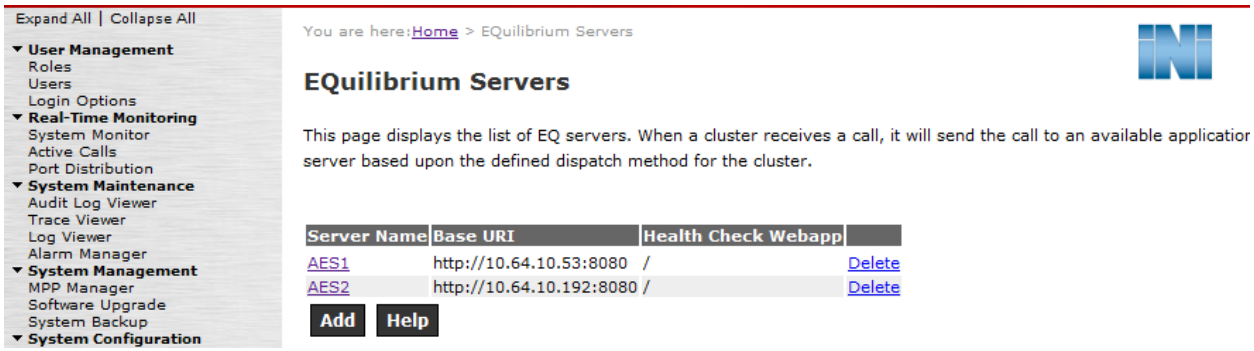
Preferred State: This selection indicates the state the application server is placed into when the EQuilibrium Dispatcher initializes.

Health Check Path: This is the URL path to the health check application on the application server. When a forward-slash (/) is used, the root node of the application erver will be polled. As long as the application server is alive, the root node should respond and the application will be considered online. However, a special health check application may be used.

After the EQuilibrium server is configured, click **Save**.

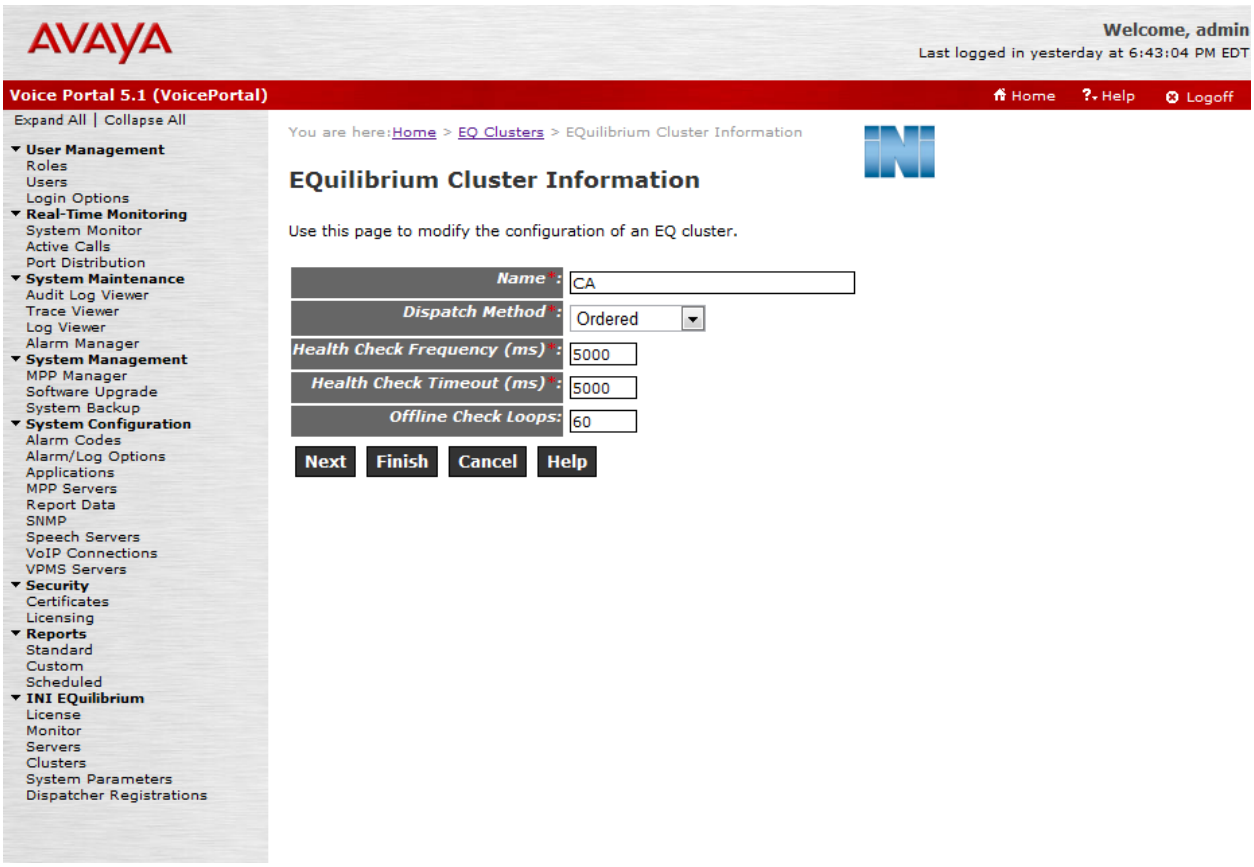


Repeat the above procedure for the second application server. Once the application servers have been configured, they will be listed in the **EQuilibrium Servers** screen shown below.



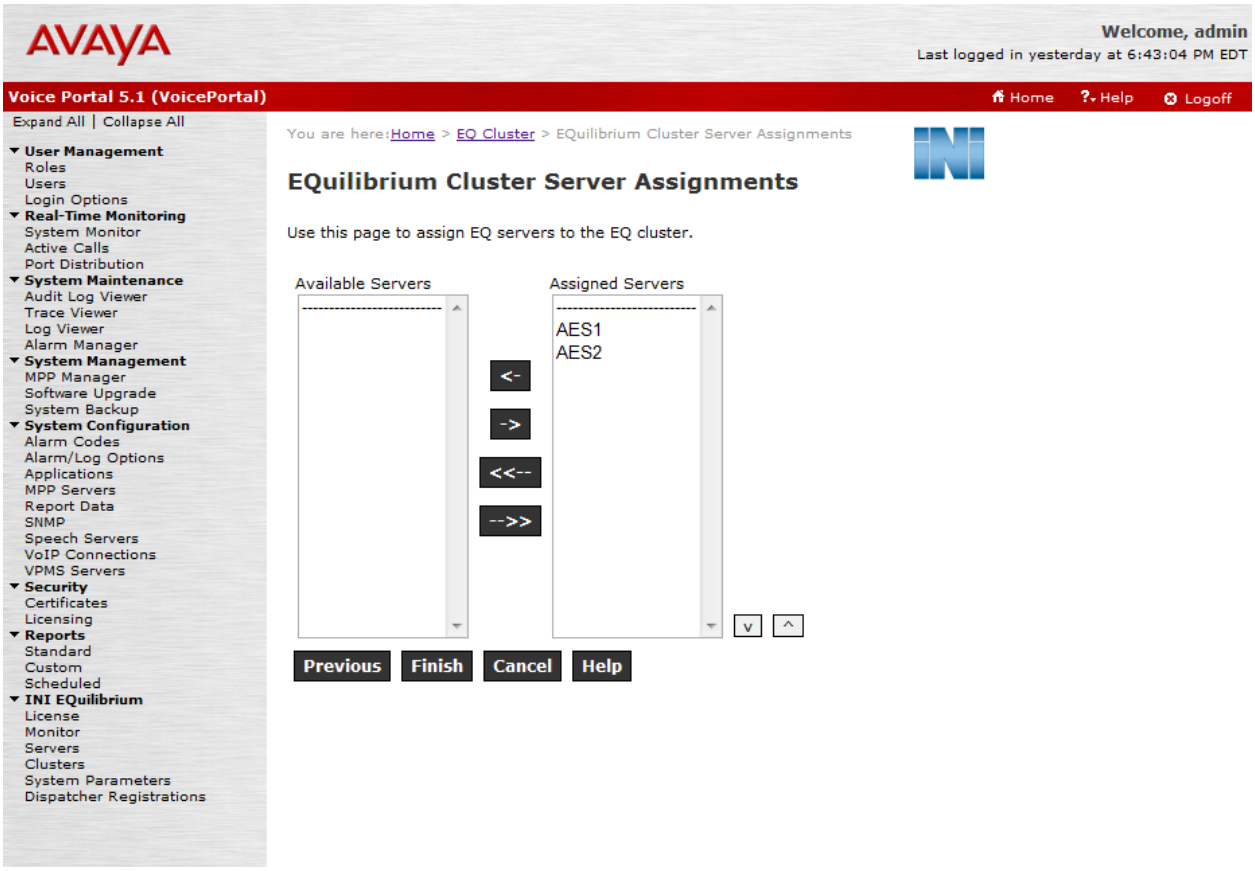
4.2.4. Configure Cluster

To create a cluster that groups application servers, click on **Clusters** under **INI EQuilibrium**. In the **EQuilibrium Clusters** screen (not shown), click on the **Add** button. The **EQuilibrium Cluster Information** screen is displayed. Provide a descriptive name for the cluster and select a **Dispatch Method**, such as *Ordered*, *Round-Robin*, or *Random*, as shown below. Refer to [5] for a description of the dispatch methods. Accept the default values for other fields or fine-tune according to customer requirements. Click **Next**.



In the **EQuilibrium Cluster Server Assignments** screen shown below, select the application servers to be added to this cluster. Click **Finish**.

In this example, the *Ordered* dispatch method was used (see previous screen). This means that page fetch requests are distributed to application servers based upon the listed order. If the first server is available, the call will be routed to that server.



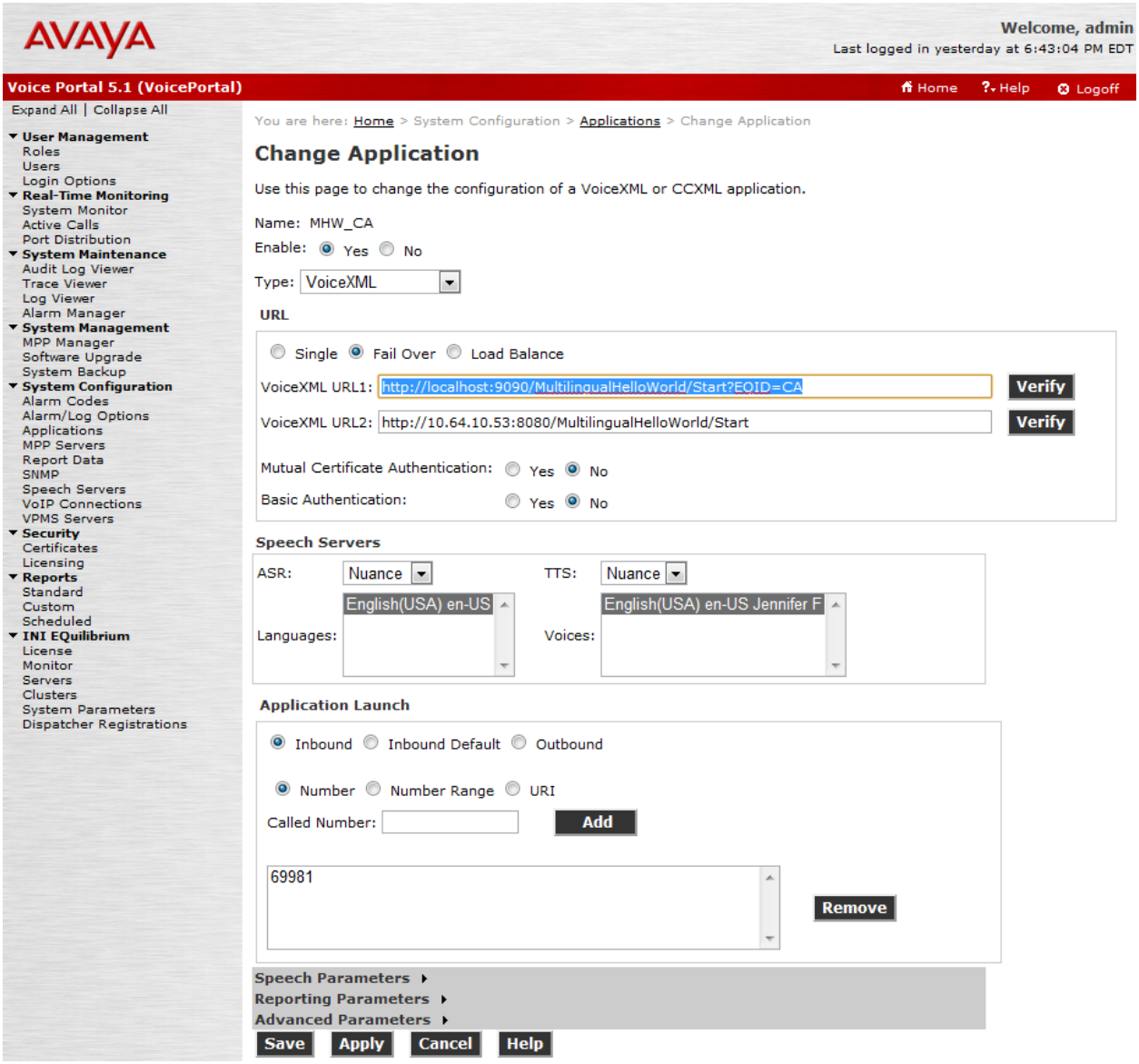
4.2.5. Configure Voice Portal Application

Once EQuilibrium has been installed and configured, EQuilibrium is ready to provide application dispatch. This section covers the configuration of a Voice Portal application that uses EQuilibrium. On the left pane, navigate to **Applications** under **System Configuration** (not shown).

- Click on an application that needs to be configured
- Change the application URL to point to EQuilibrium, example:

http://localhost:9090/MultilingualHelloWorld/Start?EQID=CA

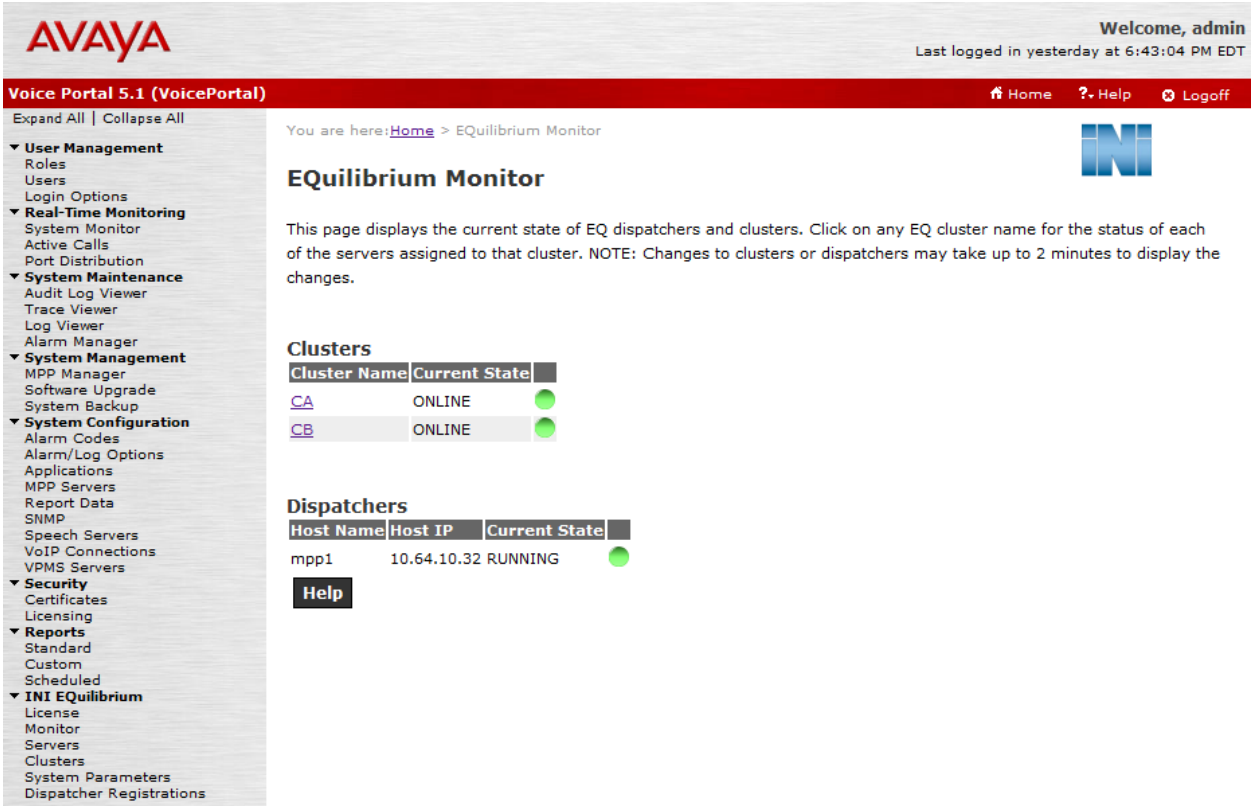
This example points out two things. First, the URL for this application points to "localhost:9090", meaning that EQuilibrium listens to port 9090 on the local MPP ("localhost"). Secondly, the URL requires the EQID parameter that specifies the name of the cluster. In this example, the name of the cluster is "CA". If desired, a second fail-over URL may be configured in the application that will be used if the application servers in the specified cluster are not available.



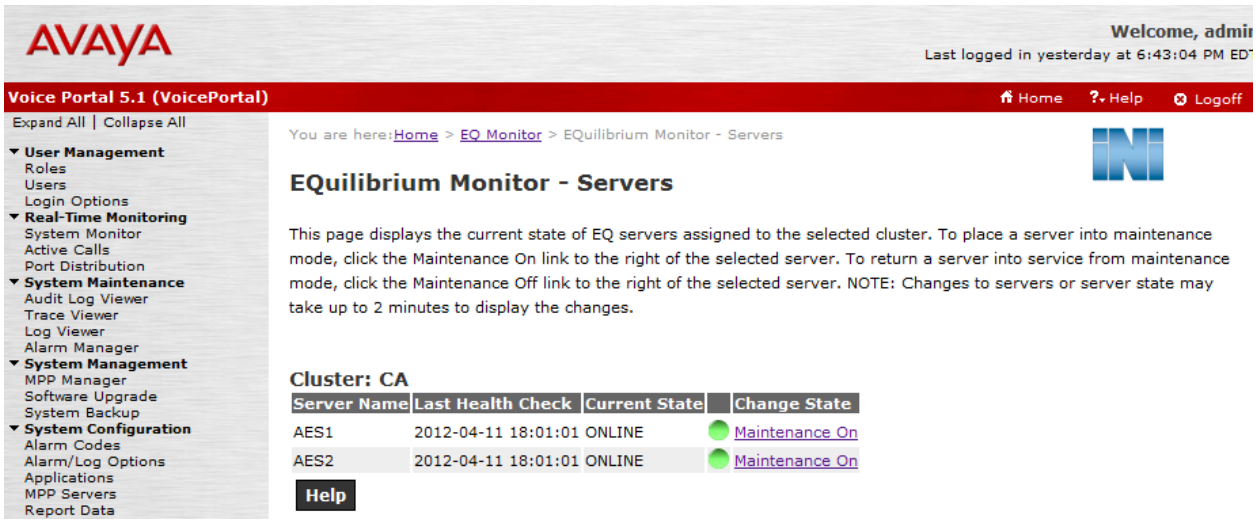
5. Verification Steps

This section provides the verification steps that may be performed to verify that EQuilibrium is able to dispatch applications to the application servers under its control.

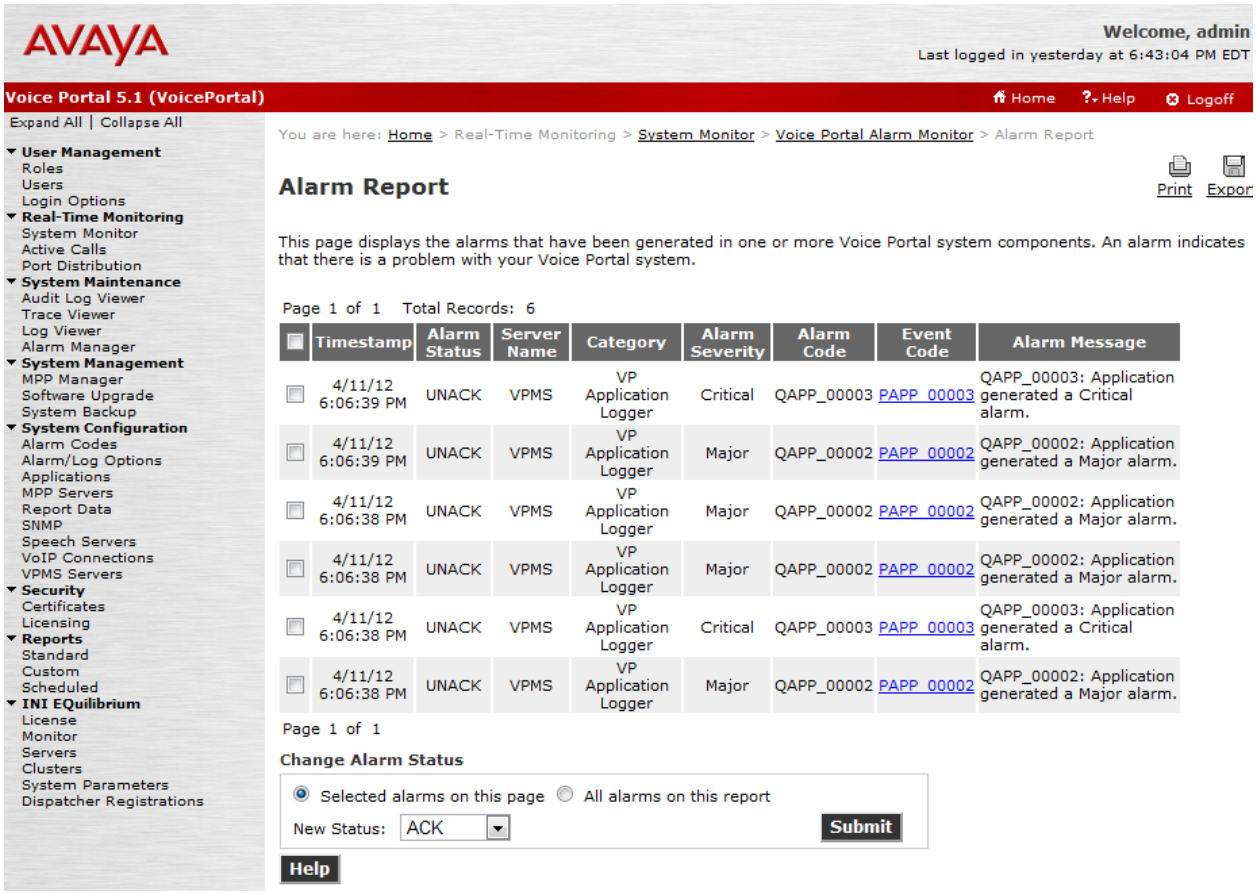
1. Verify that the EQuilibrium cluster is **ONLINE** and that the EQuilibrium Dispatcher is **RUNNING** on the MPP as shown in the **EQuilibrium Monitor** below. This screen is accessible by clicking on **Monitor** under **INI EQuilibrium**.



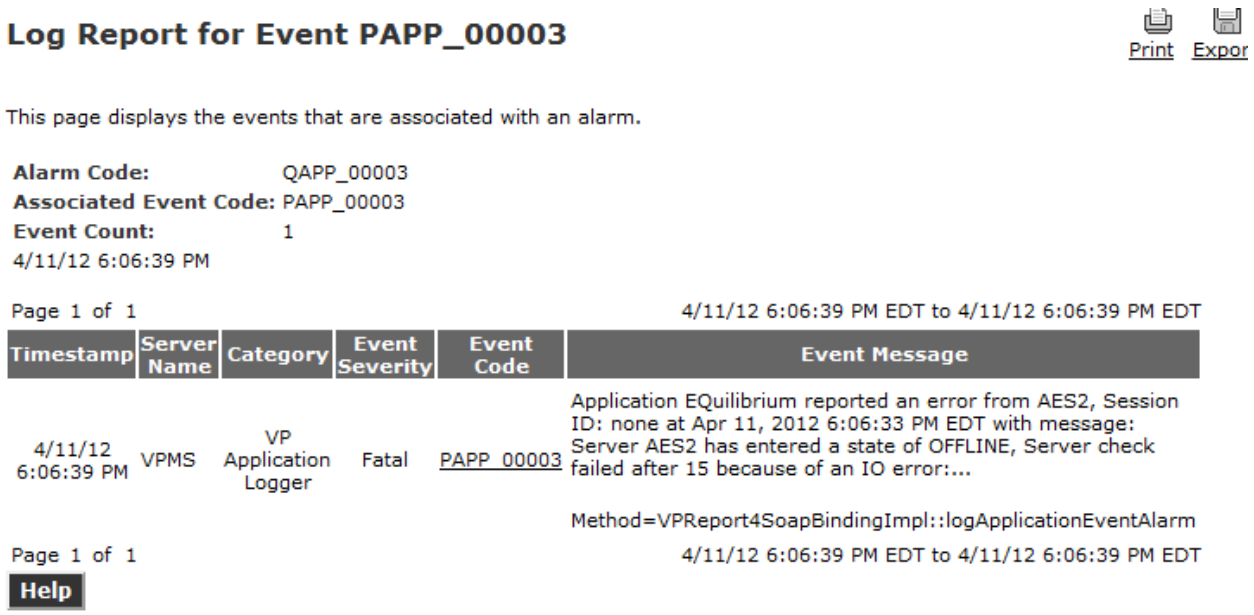
2. From the **EQuilibrium Monitor**, click on the cluster name (e.g., CA) to check the status of the individual application servers in the cluster. The state of each application server should be **ONLINE** as shown below. The application servers can be placed in maintenance mode from this screen.



3. If any application server controlled by EQuilibrium is not available, an alarm will be raised. The Voice Portal Alarm Report may be checked for alarms and will be displayed as shown below. To view alarms, on the left pane, navigate to **System Monitor** under **Real-Time Monitoring**, and select icon under **Alarm** column and **Summary** row (now shown). One the next page, select icon under **Summary** column and **All Categories** row (now shown).



4. Clicking on the **Event Code** of an active alarm (see previous screen) will display more information about the alarm, such as which application server or cluster changed state. The following screen displays the log report for an event.



Log Report for Event PAPP_00003

Print Expor

This page displays the events that are associated with an alarm.

Alarm Code: QAPP_00003
Associated Event Code: PAPP_00003
Event Count: 1
4/11/12 6:06:39 PM

Page 1 of 1 — 4/11/12 6:06:39 PM EDT to 4/11/12 6:06:39 PM EDT

Timestamp	Server Name	Category	Event Severity	Event Code	Event Message
4/11/12 6:06:39 PM	VPMS	VP Application Logger	Fatal	PAPP_00003	Application EQuilibrium reported an error from AES2, Session ID: none at Apr 11, 2012 6:06:33 PM EDT with message: Server AES2 has entered a state of OFFLINE, Server check failed after 15 because of an IO error:... Method=VPReport4SoapBindingImpl::logApplicationEventAlarm

Page 1 of 1 — 4/11/12 6:06:39 PM EDT to 4/11/12 6:06:39 PM EDT

Help

5. Assuming that all application servers and clusters are online, place a call to Voice Portal that invokes an application that uses EQuilibrium. Verify that EQuilibrium dispatches the application to an available application server in the specified cluster. To verify that the appropriate application server was used according to the cluster dispatch method, on the left pane, navigate to **Reports → Standard → Session Details.**

6. Conclusion

These Application Notes describe the configuration steps required to integrate INI EQuilibrium with Avaya Voice Portal for performing load-balancing across the available application servers. All feature and serviceability test cases were completed successfully.

7. Additional References

This section references the Avaya documentation relevant to these Application Notes. The following Avaya product documentation is available at http://support.avaya.com.

[1] *Implementing Voice Portal on multiple servers*, March 2012.
[2] *Implementing Voice Portal on single servers*, March 2012.
[3] *Administering Voice Portal*, January 2011.

The following EQuilibrium documentation is available from INI.

[4] *INI EQuilibrium Installation Guide*, Revision 2.0.4, 10/20/2011.
[5] *INI EQuilibrium Administrator's Guide*, Revision 2.0.4, 10/20/2011.

Please e-mail any questions or comments pertaining to these Application Notes along with the full title name and filename, located in the lower right corner, directly to the Avaya DevConnect Program at devconnect@avaya.com.