



**Avaya Solution & Interoperability Test Lab**

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**Application Notes for Deploying a VoiceXML Application  
Using Avaya Interactive Response and Audium Studio -  
Issue 1.0**

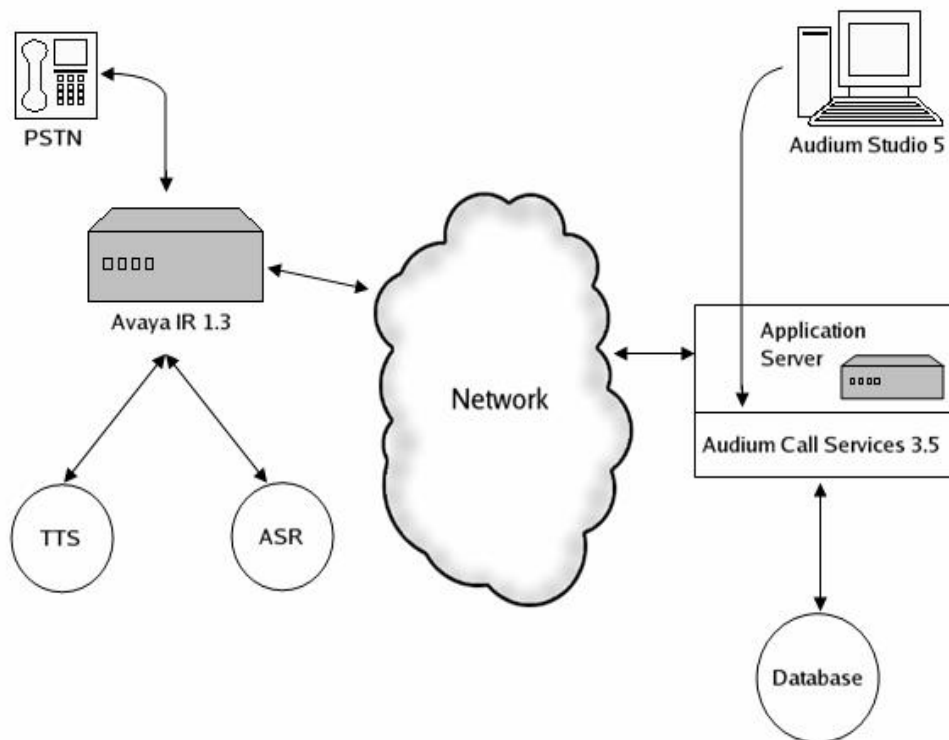
**Abstract**

These Application Notes provide an overview of how to deploy a VoiceXML application using Avaya Interactive Response and Audium Studio with Call Services. Information in these Application Notes has been obtained through compliance testing and additional technical discussions. Testing was conducted via the *DeveloperConnection* Program at the Avaya Solution and Interoperability Test Lab.

# 1. Introduction

These Application Notes describe how to deploy a VoiceXML application using Avaya Interactive Response and Audium Studio with Call Services.

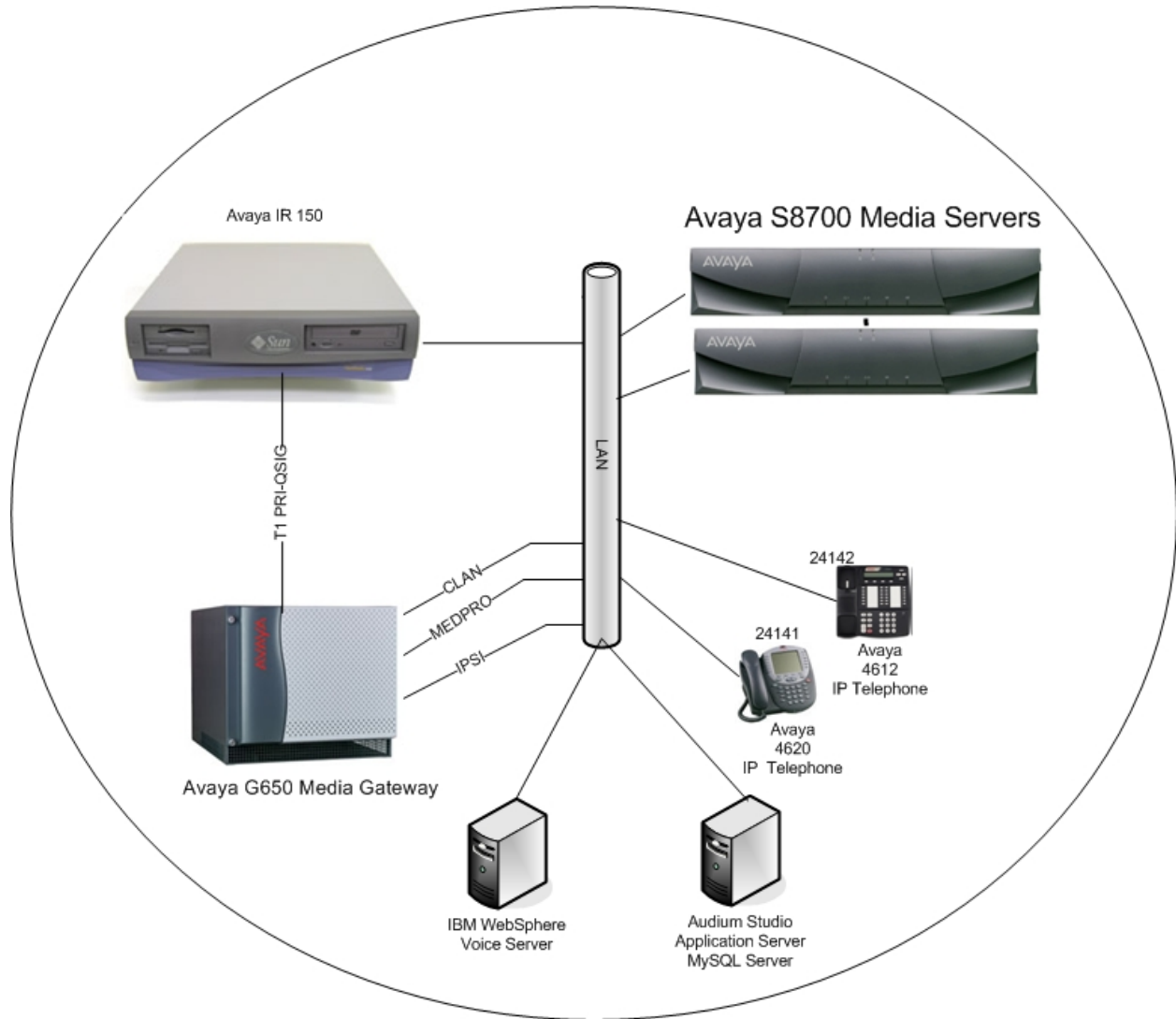
**Figure 1** illustrates a typical configuration of an Audium solution. Audium Studio is an integrated development environment powered by Eclipse<sup>1</sup> that combines a full-featured suite of development tools with a graphical user interface for drag-and-drop development. After a VoiceXML application is developed in the Audium Studio, the application then gets published as a web application in the J2EE/J2SE application server. The Audium Call Services provide the voice application with a gateway service to interact directly with Avaya Interactive Response, and external applications and databases in order to dynamically manage and interact with callers. IBM WebSphere Voice Server was used in the test configuration to provide text-to-speech and speech recognition services.



**Figure 1: Typical Audium VoiceXML configuration.**

<sup>1</sup> Eclipse is an open source community whose projects are focused on providing an extensible development platform and application frameworks for building software.

**Figure 2** illustrates a test configuration that was configured for the compliance test.



**Figure 2: Compliance Test Configuration**



## 2. Equipment and Software Validated

Equipment	Software
Avaya Interactive Response	1.3
Avaya S8700 Media Servers with G650 Media Gateway	Avaya Communication Manager 3.0.1 (R013x.00.1.346.0)
CONTROL-LAN	HW01 FW015
IP MEDIA PROCESSOR	HW12 FW104
IP SERVER INTFC	HW10 FW021
Avaya 4620 IP Telephone	2.3
Avaya 4612 IP Telephone	1.8.3
IBM WebSphere Voice Server	5.1.3
Audium Call Services	3.5
Audium Studio	5.0

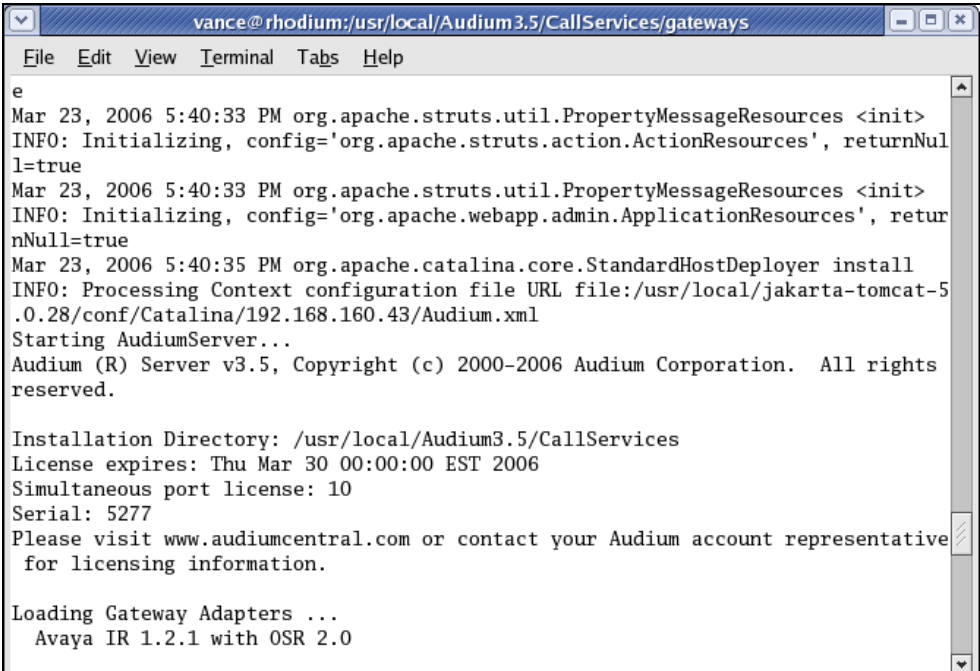
## 3. Configure Avaya Interactive Response

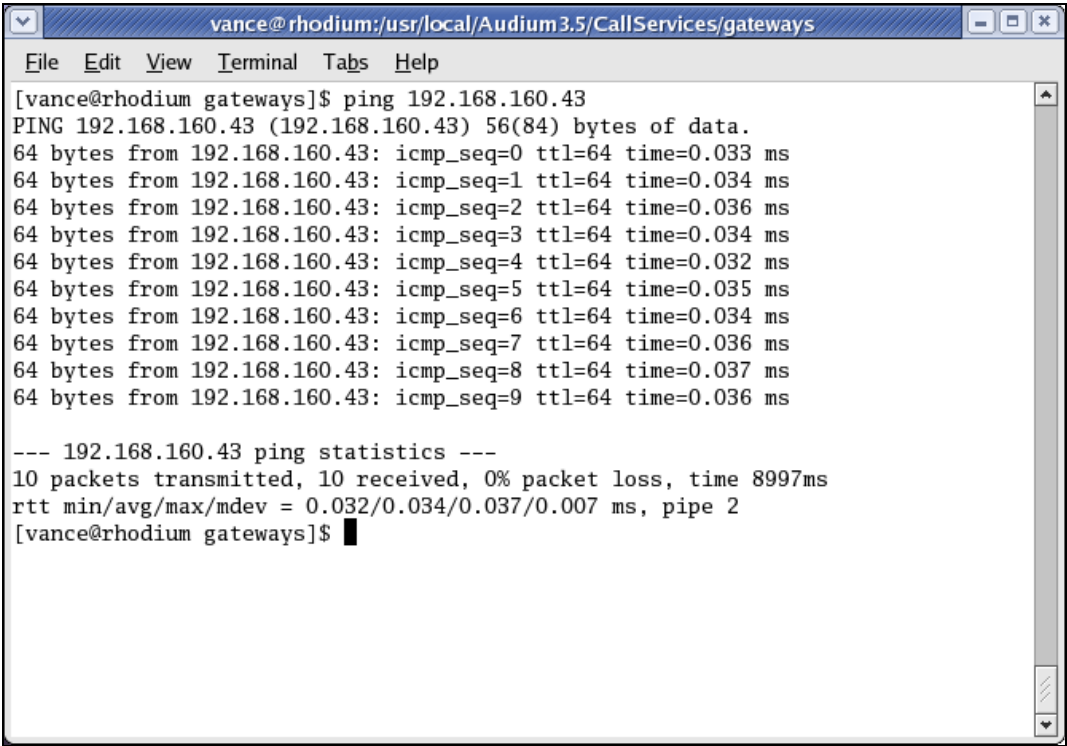
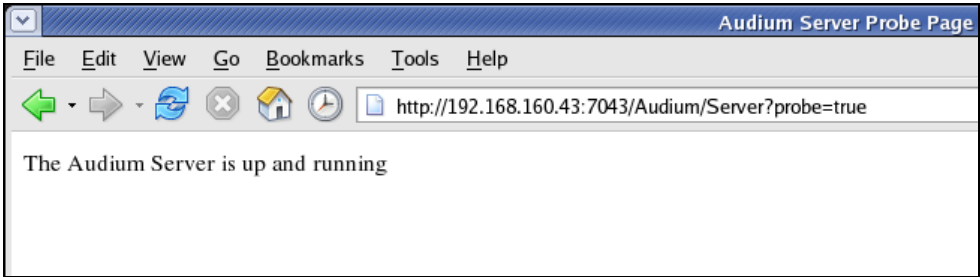
The following steps show how to configure Avaya Interactive Response to invoke the Audium VoiceXML application. These Application Notes do not explain how to configure the T1 PRI-QSIG integration between Avaya Interactive Response and Avaya Communication Manager. Configuration for the IBM WebSphere Voice Server is also not included in these Application Notes.

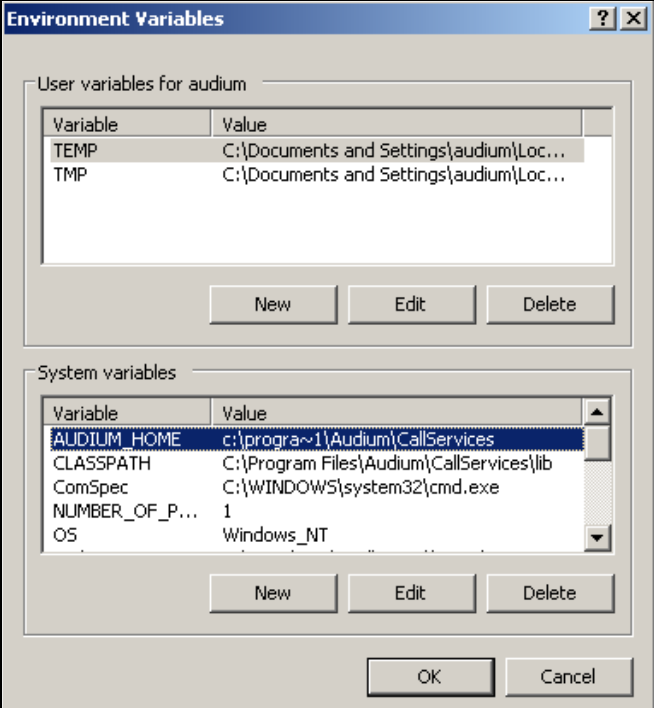
Step	Description
1.	Log in to the Avaya Interactive Response web console.
2.	<p>Click on the <b>Channel Services</b> under the Voice Equipment group.</p> <ul style="list-style-type: none"> <li>• Voice Equipment <ul style="list-style-type: none"> <li>○ <a href="#">Display Equipment</a></li> <li>○ <a href="#">Equipment State</a></li> <li>○ <a href="#">Channels to Groups</a></li> <li>○ <a href="#">Phone Number</a></li> <li>○ <a href="#">Display Passwords</a></li> <li>○ Voice Services <ul style="list-style-type: none"> <li>■ <a href="#">Channel Services</a></li> <li>■ <a href="#">Number Services</a></li> </ul> </li> </ul> </li> </ul>

Step	Description																																																																													
3.	<p>Click on the <b>Assign Selected</b> button.</p> 																																																																													
4.	<p>Select <b>VXML</b> URI for Assign. Enter the URI of the Audium voice application. Enter the range of channels to assign to this voice application. Click <b>Submit</b>.</p> <p style="text-align: center;"><b>Assign Services to Channels</b></p> 																																																																													
5.	<p>The <b>Channel Services</b> page should display all the channels associated with the Audium voice application.</p> <p style="text-align: center;"><b>Channel Services</b></p> <table border="1" data-bbox="402 1413 1360 1703"> <thead> <tr> <th>Select</th> <th>Chan</th> <th>Service/URI</th> <th>Type</th> <th>Startup</th> <th>Service/URI</th> <th>Type</th> </tr> </thead> <tbody> <tr><td><input type="checkbox"/></td><td>60</td><td>http://192.168.160.43:8080/Audium/Server?application=CellPhoneService</td><td>VXML</td><td>-</td><td></td><td>unassigned</td></tr> <tr><td><input type="checkbox"/></td><td>61</td><td>http://192.168.160.43:8080/Audium/Server?application=CellPhoneService</td><td>VXML</td><td>-</td><td></td><td>unassigned</td></tr> <tr><td><input type="checkbox"/></td><td>62</td><td>http://192.168.160.43:8080/Audium/Server?application=CellPhoneService</td><td>VXML</td><td>-</td><td></td><td>unassigned</td></tr> <tr><td><input type="checkbox"/></td><td>63</td><td>http://192.168.160.43:8080/Audium/Server?application=CellPhoneService</td><td>VXML</td><td>-</td><td></td><td>unassigned</td></tr> <tr><td><input type="checkbox"/></td><td>64</td><td>http://192.168.160.43:8080/Audium/Server?application=CellPhoneService</td><td>VXML</td><td>-</td><td></td><td>unassigned</td></tr> <tr><td><input type="checkbox"/></td><td>65</td><td>http://192.168.160.43:8080/Audium/Server?application=CellPhoneService</td><td>VXML</td><td>-</td><td></td><td>unassigned</td></tr> <tr><td><input type="checkbox"/></td><td>66</td><td>http://192.168.160.43:8080/Audium/Server?application=CellPhoneService</td><td>VXML</td><td>-</td><td></td><td>unassigned</td></tr> <tr><td><input type="checkbox"/></td><td>67</td><td>http://192.168.160.43:8080/Audium/Server?application=CellPhoneService</td><td>VXML</td><td>-</td><td></td><td>unassigned</td></tr> <tr><td><input type="checkbox"/></td><td>68</td><td>http://192.168.160.43:8080/Audium/Server?application=CellPhoneService</td><td>VXML</td><td>-</td><td></td><td>unassigned</td></tr> <tr><td><input type="checkbox"/></td><td>69</td><td>http://192.168.160.43:8080/Audium/Server?application=CellPhoneService</td><td>VXML</td><td>-</td><td></td><td>unassigned</td></tr> </tbody> </table> <p style="text-align: center;"> <input data-bbox="423 1717 521 1745" type="button" value=" &lt; Prev "/>     Channel Range: (60-69) <input data-bbox="922 1717 1019 1745" type="button" value=" Next &gt; "/>     Display 10 <input data-bbox="1096 1717 1295 1745" type="button" value=" channels. "/> </p> <p style="text-align: center;"> <input data-bbox="495 1770 602 1797" type="button" value=" Select All "/> <input data-bbox="654 1770 846 1797" type="button" value=" Assign Selected "/> <input data-bbox="898 1770 1122 1797" type="button" value=" Unassign Selected "/> <input data-bbox="1182 1770 1263 1797" type="button" value=" Refresh "/> </p>	Select	Chan	Service/URI	Type	Startup	Service/URI	Type	<input type="checkbox"/>	60	http://192.168.160.43:8080/Audium/Server?application=CellPhoneService	VXML	-		unassigned	<input type="checkbox"/>	61	http://192.168.160.43:8080/Audium/Server?application=CellPhoneService	VXML	-		unassigned	<input type="checkbox"/>	62	http://192.168.160.43:8080/Audium/Server?application=CellPhoneService	VXML	-		unassigned	<input type="checkbox"/>	63	http://192.168.160.43:8080/Audium/Server?application=CellPhoneService	VXML	-		unassigned	<input type="checkbox"/>	64	http://192.168.160.43:8080/Audium/Server?application=CellPhoneService	VXML	-		unassigned	<input type="checkbox"/>	65	http://192.168.160.43:8080/Audium/Server?application=CellPhoneService	VXML	-		unassigned	<input type="checkbox"/>	66	http://192.168.160.43:8080/Audium/Server?application=CellPhoneService	VXML	-		unassigned	<input type="checkbox"/>	67	http://192.168.160.43:8080/Audium/Server?application=CellPhoneService	VXML	-		unassigned	<input type="checkbox"/>	68	http://192.168.160.43:8080/Audium/Server?application=CellPhoneService	VXML	-		unassigned	<input type="checkbox"/>	69	http://192.168.160.43:8080/Audium/Server?application=CellPhoneService	VXML	-		unassigned
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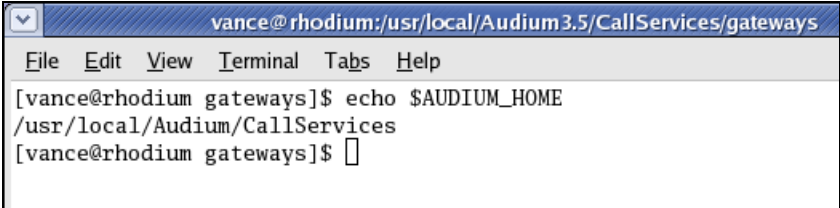
## 4. Configure Audium Call Services 3.5

Step	Description
1.	<p>Audium Call Services 3.5 requires suitable gateway adapter software to be installed in order to communicate with Avaya Interactive Response. The software can be downloaded from Audium Customer Care (<a href="http://www.audiumcorp.com/CustomerCare">http://www.audiumcorp.com/CustomerCare</a>). For the tested configuration the adapter is “Avaya IR 1.2.1 with OSR 2.0”.</p> <p>Follow the installation instructions as indicated in release notes for the gateway adapter, and follow the following steps to complete the installation:</p> <ol style="list-style-type: none"> <li>1. Stop the application server where Call Services is deployed by closing the Tomcat console window.</li> <li>2. Copy the avaya_osr_01 directory into the AUDIUM_HOME/gateways directory.</li> <li>3. Copy the required licenses into the AUDIUM_HOME/license directory.</li> <li>4. Restart the application server.</li> </ol> <p>Note that AUDIUM_HOME refers to the directory where CallServices is installed.</p> <p>Once installation is complete, and the application server is restarted, verify that it displays the new gateway adapter has been loaded:</p>  <pre> vance@rhodium:/usr/local/Audium3.5/CallServices/gateways File Edit View Terminal Tabs Help e Mar 23, 2006 5:40:33 PM org.apache.struts.util.PropertyMessageResources &lt;init&gt; INFO: Initializing, config='org.apache.struts.action.ActionResources', returnNull=true Mar 23, 2006 5:40:33 PM org.apache.struts.util.PropertyMessageResources &lt;init&gt; INFO: Initializing, config='org.apache.webapp.admin.ApplicationResources', returnNull=true Mar 23, 2006 5:40:35 PM org.apache.catalina.core.StandardHostDeployer install INFO: Processing Context configuration file URL file:/usr/local/jakarta-tomcat-5.0.28/conf/Catalina/192.168.160.43/Audium.xml Starting AudiumServer... Audium (R) Server v3.5, Copyright (c) 2000-2006 Audium Corporation. All rights reserved.  Installation Directory: /usr/local/Audium3.5/CallServices License expires: Thu Mar 30 00:00:00 EST 2006 Simultaneous port license: 10 Serial: 5277 Please visit www.audiumcentral.com or contact your Audium account representative for licensing information.  Loading Gateway Adapters ... Avaya IR 1.2.1 with OSR 2.0 </pre>

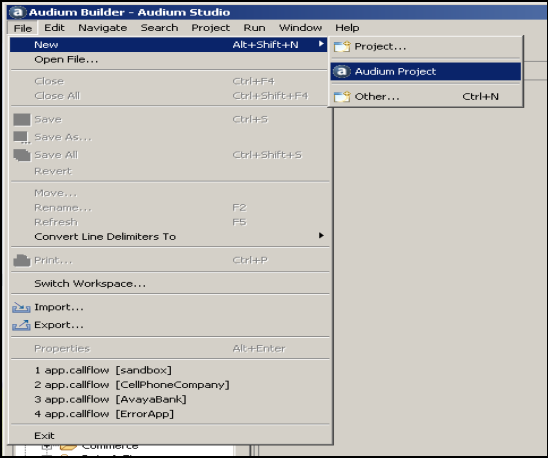
Step	Description
2.	<p data-bbox="310 268 1446 336">Ping the server Audium Call Services server from Avaya IR 1.3, to ensure that the server is reachable.</p> <div data-bbox="349 373 1409 1115" style="border: 1px solid black; padding: 5px;">  <pre data-bbox="349 373 1409 1115"> vance@rhodium:/usr/local/Audium3.5/CallServices/gateways File Edit View Terminal Tabs Help [vance@rhodium gateways]\$ ping 192.168.160.43 PING 192.168.160.43 (192.168.160.43) 56(84) bytes of data. 64 bytes from 192.168.160.43: icmp_seq=0 ttl=64 time=0.033 ms 64 bytes from 192.168.160.43: icmp_seq=1 ttl=64 time=0.034 ms 64 bytes from 192.168.160.43: icmp_seq=2 ttl=64 time=0.036 ms 64 bytes from 192.168.160.43: icmp_seq=3 ttl=64 time=0.034 ms 64 bytes from 192.168.160.43: icmp_seq=4 ttl=64 time=0.032 ms 64 bytes from 192.168.160.43: icmp_seq=5 ttl=64 time=0.035 ms 64 bytes from 192.168.160.43: icmp_seq=6 ttl=64 time=0.034 ms 64 bytes from 192.168.160.43: icmp_seq=7 ttl=64 time=0.036 ms 64 bytes from 192.168.160.43: icmp_seq=8 ttl=64 time=0.037 ms 64 bytes from 192.168.160.43: icmp_seq=9 ttl=64 time=0.036 ms  --- 192.168.160.43 ping statistics --- 10 packets transmitted, 10 received, 0% packet loss, time 8997ms rtt min/avg/max/mdev = 0.032/0.034/0.037/0.007 ms, pipe 2 [vance@rhodium gateways]\$ </pre> </div> <p data-bbox="310 1155 1446 1297">Verify that Audium Call Services is running by accessing the URL <a href="http://IP:PORT/Audium/Server?probe=true">http://IP:PORT/Audium/Server?probe=true</a>. The PORT is the TCP port number that is configured in the Audium Call Services to listen to the incoming requests. This will output the status of Audium Call Services as shown below:</p> <div data-bbox="391 1369 1365 1644" style="border: 1px solid black; padding: 5px;">  </div>

Step	Description
3.	<p data-bbox="326 275 1414 373">On a Windows Server, open /Installpath/Audium/WEB-INF/web.xml to set the value of the initial parameter named "AUDIUM_HOME" to the location of Audium Home. The parameter would look something like the following:</p> <pre data-bbox="326 415 1299 531"> &lt;init-param&gt;   &lt;param-name&gt;AUDIUM_HOME&lt;/param-name&gt;   &lt;param-value&gt;\usr\local\Audium\CallServices&lt;/param-value&gt; &lt;/init-param&gt; </pre> <p data-bbox="326 573 1149 604">Use the techniques below to locate the AUDIUM_HOME value:</p> <ol data-bbox="326 646 1406 898" style="list-style-type: none"> <li data-bbox="326 646 1406 793">1. Check the application server for a Java system property named "Audium.Home" pointing to the location of Audium Home. Some application servers (such as WebSphere) allow administrators to set Java properties. Such application servers allow Java system properties be set on a per-web application basis.</li> <li data-bbox="326 835 1406 898">2. Check for an OS-level environment variable that points to the location of Audium Home. On Windows, this can be checked by doing the following steps:</li> </ol> <ul data-bbox="326 940 1044 1119" style="list-style-type: none"> <li data-bbox="326 940 732 972">- Open <b>Start -&gt; Control Panel</b>.</li> <li data-bbox="326 978 662 1010">- Double-click on <b>System</b>.</li> <li data-bbox="326 1016 662 1047">- Go to the <b>Advanced</b> tab.</li> <li data-bbox="326 1054 789 1085">- Click on <b>Environment Variables</b>.</li> <li data-bbox="326 1092 1044 1123">- Check under <b>System variables</b> for AUDIUM_HOME.</li> </ul> 

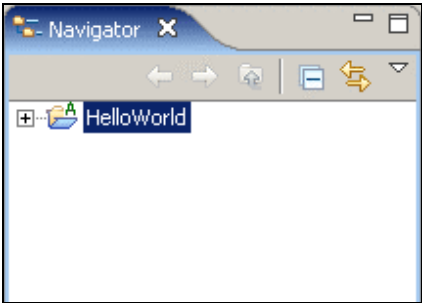
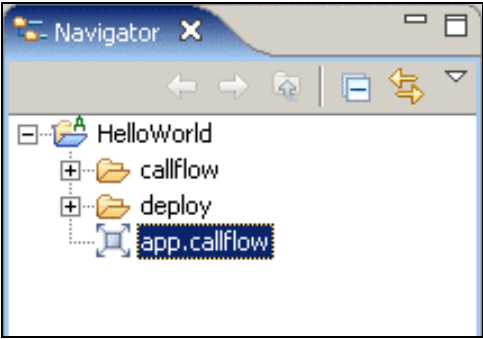


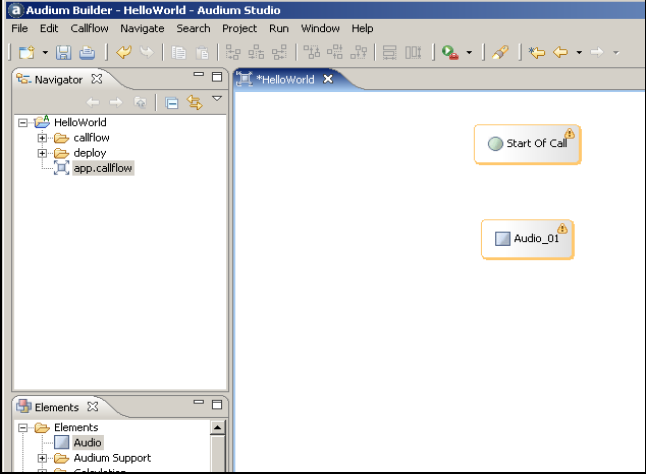
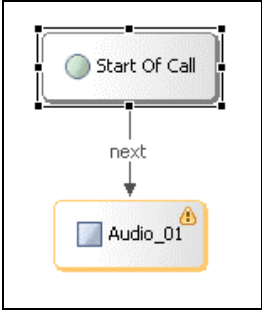
Step	Description
	<p>On a Linux server, include the following command in the application server's startup script:</p> <p><b>export AUDIUM_HOME=/usr/local/Audium/CallServices</b></p> <p>To display the current environment variable, run the following command:</p> <p><b>echo \$AUDIUM_HOME</b></p> 

## 5. Develop an Audium Application in Audium Studio 5

Step	Description
1.	Start Audium Studio. Double-click <b>Audium Studio 5</b> shortcut on the desktop, or click on <b>Start -&gt;All Programs -&gt; Audium -&gt; Audium Studio 5</b> .
2.	<p>Create a new Audium project. Click on <b>File -&gt; New -&gt; Audium Project</b>, click on the <b>New</b> icon on the toolbar, or right-click in the Navigator pane and choose <b>New -&gt; Audium Project</b>.</p> 

Step	Description
3.	Enter the project name "HelloWorld" and click Next. <div data-bbox="638 338 1118 789" data-label="Image"> </div>
4.	Select Avaya IR 1.2.1 with OSR 2.0 for VoiceXML Gateway. Click Finish. <div data-bbox="586 898 1170 1446" data-label="Image"> </div>

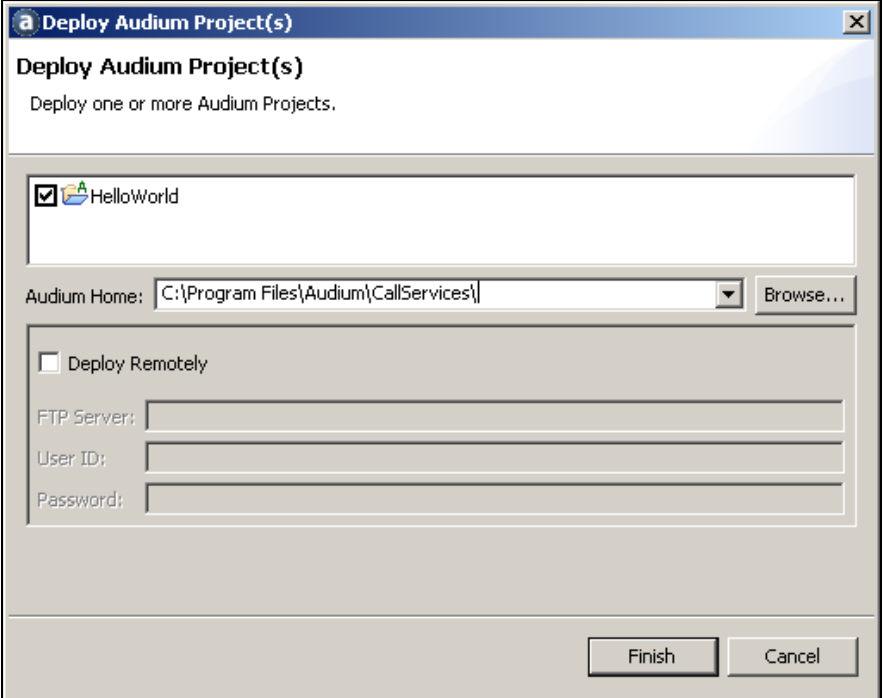
Step	Description
5.	<p>Notice that the HelloWorld project is now listed in the Navigator pane in the upper-left portion of the window.</p>  <p>The screenshot shows a window titled 'Navigator' with a toolbar containing navigation icons. Below the toolbar, the project name 'HelloWorld' is listed with a plus sign (+) to its left, indicating it is collapsed.</p>
6.	<p>To open the new application's call flow, click on the plus sign (+) next to the project name, and then double-click on <b>app.callflow</b>.</p>  <p>The screenshot shows the 'HelloWorld' project expanded in the Navigator pane. It contains three sub-items: 'callflow', 'deploy', and 'app.callflow'. The 'app.callflow' item is highlighted with a blue selection box.</p> <p>A new workspace is now visible, including a Start of Call element, as shown in Step 7. A Start of Call element is automatically included whenever an application is created. There is only one Start Of Call element per application and the element does not have any settings. However, if the Call Start element is deleted, a new element can be re-created by adding a Page Entry element to the workspace, right-clicking the element and choosing <b>Start Of Call -&gt; Yes</b>.</p>

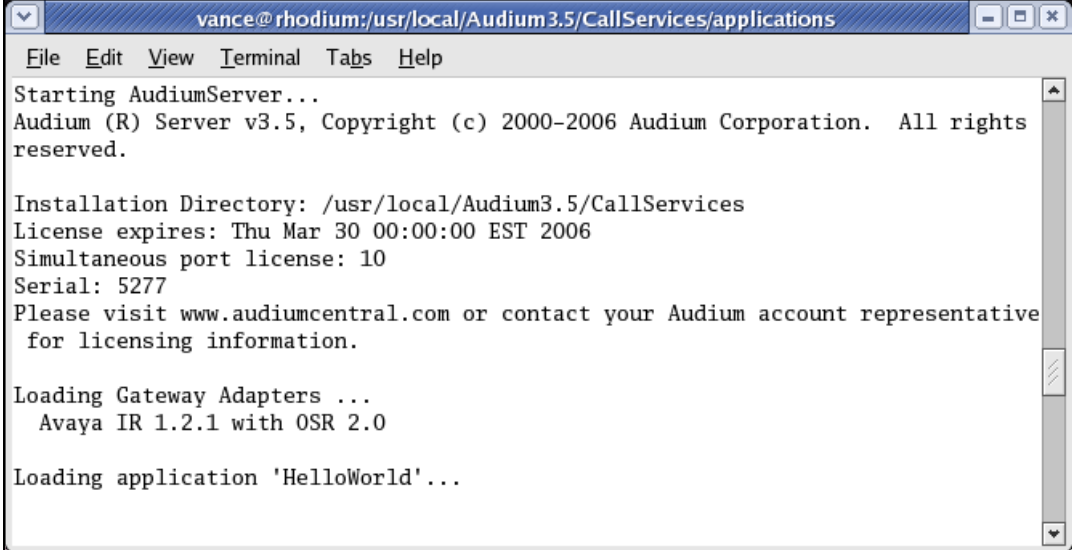
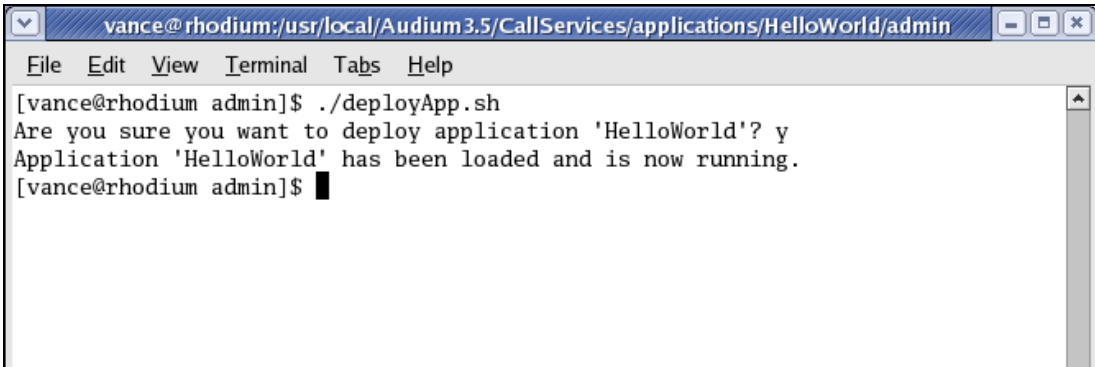
Step	Description
7.	<p>Drag an Audio element onto the workspace. The Audio element is listed in the Elements pane in the lower-left portion of the Audium Studio window.</p>  <p>The Audio element is an example of a Voice Element. Voice Elements interact with the caller: giving information, asking questions, and accepting responses. Voice Elements are completely configurable to behave exactly as the developer requires.</p>
8.	<p>Connect the Start of Call element to the new Audio element with an Exit State. Right-click on the Start of Call element, and choose <b>Exit States -&gt; next</b>. Notice that a line is now attached to the mouse cursor. Left-click in the middle of the new Audio element. Notice that the line attaches to the Audio element, with an arrow indicating the direction of the call flow.</p> 
9.	<p>Drag a Hang Up element onto the workspace. The Hang Up element is in the same pane as the Audio element, but further down the list.</p>

Step	Description
10.	<p>Connect the Audio element to the Hang Up element. Right-click on the Audio element, choose <b>Exit States -&gt; done</b>, and attach the exit state to the Hang Up element.</p> <div data-bbox="750 375 1005 669" data-label="Diagram"> </div>
11.	<p>Select the Audio element. Rename the element to “SayHelloWorld”.</p>
12.	<p>Configure the SayHelloWorld Audio element to say "Hello World".</p> <ul style="list-style-type: none"> <li>• Click on the SayHelloWorld Audio element, and notice that the Element Configuration pane on the right of the screen displays settings for this element.</li> <li>• Click on the <b>Audio</b> tab in this pane.</li> <li>• Expand <b>Audio Groups</b> by clicking the plus sign (+) next to it, and then expand the Initial audio group the same way.</li> <li>• Click on "<b>audio item 1</b>".</li> <li>• In the text area below, labeled "TTS:", type the text "<b>Hello World</b>".</li> </ul> <div data-bbox="638 1197 1118 1717" data-label="Image"> </div>
13.	<p>Click on <b>Save</b> from the <b>File</b> menu.</p>

## 6. Deploy the Audium Application to Audium Call Services

### 3.5

Step	Description
1.	<p>In Audium Studio 5, right-click on the <b>HelloWorld</b> project in the Navigator pane, and choose <b>deploy</b>. The “Deploy Audium Projects” dialog will appear. The deploy service packages all the components of the application required by the Audium Call Services. The Audium Studio 5 does not cause the application to go live and accept calls when the application is deployed to the Audium Call Services.</p> 
2.	<p>Verify that the Audium Home directory listed in the “<b>Deploy Audium Projects</b>” dialog box matches the AUDIUM_HOME value in Step 3 of Section 4. Select <b>Deploy Remotely</b> if the Call Services Server is accessible via FTP. Click <b>Finish</b>.</p>

Step	Description
3.	<p>Start the Application server. When Audium Call Services loads, it automatically loads all deployed applications from Audium Home, including the HelloWorld application just deployed.</p>  <p>Alternatively, if the application server is running, run “deployApp.sh” (Linux) or “deployApp.bat” (Windows) from within AUDIUM_HOME/applications/HelloWorld/admin to activate the application just deployed. The application is now available to accept calls, and can be accessed via the following URL:</p> <p><a href="http://APP_SERVER_IP:PORT/Audium/Server?application=HelloWorld">http://APP_SERVER_IP:PORT/Audium/Server?application=HelloWorld</a></p> <p>where APP_SERVER_IP is the IP address of the application server, and PORT is the port of the application server (usually 8080).</p> 

## 7. Verification Steps

When deploying a new application, ensure that it has deployed successfully by visiting its URL in a web browser. If the application is functional, the web browser will display the first page of VoiceXML that the application produces. To verify the application is operational, access the following URL from the web browser:

[http://APP\\_SERVER\\_IP:PORT/Audium/Server?application=HelloWorld](http://APP_SERVER_IP:PORT/Audium/Server?application=HelloWorld)

Load the URL below from the web browser to simulate call hang-up, otherwise the Audium Call Services session continues to be tied up:

[http://APP\\_SERVER\\_IP:PORT/Audium/Server?audium\\_action=hangup](http://APP_SERVER_IP:PORT/Audium/Server?audium_action=hangup)

Verify that the caller hears “Hello World” when the caller is connected to the Avaya IR.

In addition to this test, there are a wide array of administrative and management utilities included with Audium Call Services. These scripts can be found in two locations. Global admin scripts can be found within AUDIUM\_HOME/admin. Admin scripts which apply to a particular voice application can be found in each deployed application’s admin directory (AUDIUM\_HOME/applications/HelloWorld/admin). Refer to the Audium User Guide for details about each of these scripts. The following is a brief description:

Administration Script Name	Description
<b>Application-Level Scripts</b>	
suspendApp	Suspends the application in which this script resides.
resumeApp	Resumes the application in which this script resides.
deployApp	Prompts Audium Call Services to load the application in which this script resides (does nothing if the application is already deployed).
updateApp	Prompts Call Services to reload into memory the configuration of the application in which this script resides.
releaseApp	Prompts Call Services to remove from memory the application in which this script resides so that its folder can be deleted.
status	Displays current information about the application in which this script resides.
<b>Call Services Scripts</b>	
suspendServer	Suspends all applications deployed on Call Services.
resumeServer	Restores the status of each application to what they were at the time Call Services was suspended.



deployAllNewApps	All applications deployed to Call Services since the last time the application server started up or the deployAllNewApps script was called are now loaded into memory and can handle calls.
flushAllOldApps	When called, all applications in Call Services whose folders were deleted are removed from memory.
updateAllApps	Prompts each application deployed on Call Services to load its configuration from scratch from the application files.
updateCommonClasses	Reloads all classes deployed in the common directory of Call Services.
status	Displays current information about Call Services and all the applications deployed on it.
getVersions	Displays the version number of all Audium components installed on Call Services. The location in which the Audium.war file is located must be passed as an argument.
importLogs	Imports the Audium activity logs of an application into a database.

## 8. Conclusion

These Application Notes described how to deploy a VoiceXML application using Avaya Interactive Response and Audium Call Services 3.5. These Application Notes verified the Audium Call Services 3.5 successfully integrated with Avaya Interactive Response 1.3.

## 9. Additional References

1. Audium Knowledge Base, accessible via <http://www.audiumcorp.com/CustomerCare>
2. Audium User Guide, downloadable from the Audium Support Center forums (accessible via <http://www.audiumcorp.com/CustomerCare>)
3. Audium Installation Guide, downloadable from the Audium Support Center forums (which are accessible via <http://www.audiumcorp.com/CustomerCare>)

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