Abstract

These Application Notes describe the configuration steps required to integrate the Loquendo Speech Suite with Avaya Voice Portal and Avaya Communication Manager. Loquendo Speech Suite 7.0 uses the Media Resource Control Protocol (MRCP) version 1 for its Text-to-Speech (TTS) and advanced speech recognition (ASR) features to interface with VoiceXML applications running on 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 the Loquendo Speech Suite with Avaya Voice Portal and Avaya Communication Manager. Loquendo Speech Suite 7.0 uses the Media Resource Control Protocol (MRCP) version 1 for its Text-to-Speech (TTS) and automatic speech recognition (ASR) features to interface with VoiceXML applications running on Avaya Voice Portal.

Loquendo’s TTS engine provides synthetic multilingual/multivoice for all types of voice applications such as e-mail reading, real-time news, and self-service applications. Loquendo’s Advanced Speech Recognition (ASR) engine supports speech enabled applications such as automated directory assistance services, mobile public voice ports and embedded applications by providing speaker-independent, large scale vocabulary, barge-in facilities and multi-language capability.

The Loquendo Speech Suite interfaces to Avaya Voice Portal via a TCP/IP connection using two different protocols:

- Signaling requests for call set-up and teardown between servers use Real-time Streaming Protocol (RTSP) connections.
- Audio data (speech delivered to an ASR engine for recognition and synthesized speech delivered from a TTS engine) is carried over a Real-time Transport Protocol (RTP) connection.

![Diagram](image)

*Avaya Voice Portal and Loquendo Speech Suite interoperating.*

**Figure 1** illustrates the configuration used for testing. In this configuration, Avaya Voice Portal interfaces with Avaya Communication Manager via H.323 and the Loquendo Speech Suite via Media Resource Control Protocol (MRCP). VoiceXML scripts were run by Avaya Voice Portal and used the ASR and TTS engines in the Loquendo Speech Suite.
Figure 1: Configuration with Avaya Voice Portal and the Loquendo Speech Suite
1.1. **Equipment and Software Validated**
The following equipment and software were used for the sample configuration:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avaya Voice Portal</td>
<td>4.0.0.0.2901</td>
</tr>
<tr>
<td>Avaya S8700 Servers with a G650 Media Gateway</td>
<td>Avaya Communication Manager 4.0 (R014x.00.1.731.2)</td>
</tr>
<tr>
<td>Loquendo Speech Suite</td>
<td>7.0.12</td>
</tr>
<tr>
<td>Application Server – HTTP Server running Windows Server 2003</td>
<td>N/A</td>
</tr>
<tr>
<td>Avaya 4600 Series IP Telephones</td>
<td>2.8 (H.323)</td>
</tr>
</tbody>
</table>
2. Configure Avaya Communication Manager

This section describes the configuration of H.323 stations and the IP codec set for Avaya Voice Portal. This configuration also requires a C-LAN and Media Processor board for IP communication. This configuration is outside the scope of these application notes, but the reader may refer to [1] and [2] for additional information.

From the System Access Terminal (SAT), add an H.323 station for Avaya Voice Portal. A call to this station will be routed to Avaya Voice Portal which will run a VXML script that uses the Loquendo Speech Suite. In the station form, set the **Type** to 7434ND, provide a descriptive **Name**, set the **Security Code**, and set the **IP Softphone** field to ‘y’.

![Station Form](image)

**Figure 2: Station Form**

In the IP codec set form associated with the IP network region of the H.323 station, configured in **Figure 2**, set the **Audio Codec** field to the appropriate value. In this configuration, **G.711MU** was used.

![IP Codec Set Form](image)

**Figure 3: IP Codec Set Form**
3. Configure Avaya Voice Portal

This section covers the administration of Avaya Voice Portal. The following Voice Portal configuration steps will be covered:

- Configuring an H.323 VoIP connection
- Adding an MPP server
- Configuring the VoIP audio format (mu-law or a-law)
- Adding a speech server
- Adding applications
- Starting the MPP server

Avaya Voice Portal is configured via the Voice Portal Management System (VPMS) web interface. To access the web interface, enter http://<ip-addr>/VoicePortal as the URL in an internet browser, where <ip-addr> is the IP address of the VPMS. Log in using the Administrator user role. The screen shown in Figure 4 is displayed.

Note: All of the screens in this section are shown after the Avaya Voice Portal had been configured. Save the screen parameters during configuration of Avaya Voice Portal.

![Figure 4: VPMS Main Screen](image)
Configure the H.323 VoIP Connection. To configure an H.323 connection, navigate to the VoIP Connections page and then click on the H.323 tab. In the H.323 tab shown in Figure 5, set the Gatekeeper Address to the IP address of the C-LAN in the G650 media gateway and the Gatekeeper Port to 1719. Next, configure the stations for Avaya Voice Portal, which map to the 7434ND stations configured in Avaya Communication Manager. In addition, set the Password for the stations and set the Station Type to Inbound and Outbound. In this configuration, only station 23802 is mapped to the Avaya Voice Portal application that used the Loquendo Speech Suite.

Figure 5: H.323 Connection
Add an MPP Server. Add the MPP server by navigating to the MPP Servers screen by selecting the option from the left pane. In the MPP Server configuration page, specify a descriptive Name and the Host Address of each MPP server. Also, specify the Maximum Simultaneous Calls supported by each MPP server. Figure 6 shows the configuration for the first MPP server.

![Figure 6: MPP Server]

Welcome, admin
Last logged in today at 9:46:27 AM EST

Add an MPP Server. Add the MPP server by navigating to the MPP Servers screen by selecting the option from the left pane. In the MPP Server configuration page, specify a descriptive Name and the Host Address of each MPP server. Also, specify the Maximum Simultaneous Calls supported by each MPP server. Figure 6 shows the configuration for the first MPP server.
Configure the VoIP Audio Format. The VoIP Audio Format for the MPP server is configured in the VoIP Settings screen accessible by selecting MPP Servers in the left pane. The MPP Native Format field in Figure 7 is set to audio/basic for mu-law.

Figure 7: VoIP Settings
The Loquendo Speech Suite is not natively included in the set of speech engines supported by Avaya Voice Portal and will not initially appear in the ASR and TTS configuration screen. To add Loquendo Speech Suite to the list of supported speech engines, log into the VPMS server, either locally or remotely through telnet, and locate the `languages.properties` file which, by default, can be found in `/opt/Tomcat/apache-tomcat-5.0.20/webapps/VoicePortal/WEB-INF/classes/messages/`. Edit the file and add the lines shown below to the appropriate section. Contact Loquendo customer support for the latest languages and voices supported by the Speech Suite.

```properties
# Engine Type options displayed on the page
asrEngines=IBM WVS, Nuance, Loquendo Speech Suite
ttsEngines=IBM WVS, Nuance, Loquendo Speech Suite

# Engine Type conversion from display to internal data in the database
loadspsequence=ct הילדו speech suite
loadspsequencetts=ctellido speech suite

# Engine Type conversion from internal data in the database to display
loadspsequenceasr=Loquendo Speech Suite
loadspsequencetts=Loquendo Speech Suite

# Languages
loadspsequencelanguagesasr=English(USA) en-us, English(British) en-GB, Spanish(Spain) es-ES, Spanish(Colombia) es-CO, Spanish(Argentina) es-AR, Spanish(Mexico) es-MX, Catalan(Spain) ca-ES, German(Germany) de-DE, Greek(Greece) el-GR, French(France) fr-FR, Italian(Italy) it-IT, Dutch(Netherlands) nl-NL, Polish(Poland) pl-PL, Portuguese(Brazil) pt-br, Portuguese(Portugal) pt-PT, Chinese(Simplified) zh-CN, Swedish(Sweden) sv-SE
loadspsequencettslanguages=English(US) en-US Dave M, English(US) en-US Kenneth M, English(US) en-US Susan F, English(British) en-GB Simon M, English(British) en-GB Kate F, English(British) en-GB Elizabeth F, Spanish(Spain) es-ES Jorge M, Spanish(Spain) es-ES Carmen F, Spanish(Spain) es-ES Juan M, Spanish(Colombia) es-CO Carlos F, German(Germany) de-DE Stefan M, German(Germany) de-DE Katrin F, German(Germany) de-DE Ulrike F, Greek(Greece) el-GR Afroditi F, Greek(Greece) el-GR Artemis F, French(France) fr-FR Bernard M, French(France) fr-FR Juliette F, French(France) fr-FR Sophie F, Italian(Italy) it-IT Giulia F, Italian(Italy) it-IT Luca M, Italian(Italy) it-IT Paola F, Italian(Italy) it-IT Fabio M, Italian(Italy) it-IT Marcello M, Italian(Italy) it-IT Matteo M, Italian(Italy) it-IT Roberto M, Italian(Italy) it-IT Silvana F, Dutch(Netherlands) nl-NL Saskia F, Dutch(Netherlands) nl-NL Willelm M, Polish(Poland) pl-PL Zosia F, Polish(Poland) pl-PL Zosia F, Portuguese(Portugal) pt-PT Amalia F, Portuguese(Portugal) pt-PT Amalia F, Portuguese(Portugal) pt-PT Gabriela F, Chinese(Simplified) zh-CN Linlin F, Swedish(Sweden) sv-SE Annika F

# Language Default
loadspsequencelanguagesdefault=English(USA) en-us
loadspsequencettslanguagesdefault=English(US) en-US Susan F

# default base port
loadspsequenceserviceport=554

# default New Connection per Session
loadspsequenceperport=Yes

# default URL
loadspsequencettsurlasr=/recognizer
```
Add an ASR Server. To configure the automatic speech recognition (ASR) server, click on Speech Servers in the left pane, select the ASR tab, and then click Add. Figure 9 shows the screen after the ASR server has already been configured. For the Loquendo Speech Suite, the Engine Type should be set to Loquendo Speech Suite. This engine type option was added by modifying the languages.properties file shown in Figure 8. Set the Network Address field to the IP address of the Loquendo Speech Suite and select the desired Languages supported by the applications. The Total Number of Licensed ASR Resources should also be set to the appropriate value. The other fields were left at their default values.
Add a TTS Server. To configure the TTS server, click on Speech Servers in the left pane, select the TTS tab, and then click Add. Figure 10 shows the screen after the TTS server has already been configured. For the Loquendo Speech Suite, the Engine Type should be set to Loquendo Speech Suite. This engine type option was added by modifying the languages.properties file shown in Figure 8. Set the Network Address field to the IP address of the Loquendo Speech Suite and select the desired Voices supported by the applications. The Total Number ofLicensed TTS Resources should also be set to the appropriate value. The other fields were left at their default values.

![Figure 10: TTS Server](image-url)
Add an Application. On the Applications page, add an Avaya Voice Portal application. Specify a Name for the application, set the MIME Type field to the appropriate value (e.g., VoiceXML), and set the VoiceXML URL field to point to a VoiceXML application hosted in the application server. Next, specify the type of ASR and TTS servers to be used by the application and the called number that invokes the application. The Applications screen is shown in Figure 11.

![Applications Screen](image-url)
Start the MPP Server. Start the MPP server from the MPP Manager page shown in Figure 12. Select each MPP and then click the Start button. After the MPP is started, the Mode of the MPP should be Online and the State should be Running.

![Figure 12: MPP Manager](image-url)
4. Configure Loquendo Speech Suite

This section covers the administration required on the Loquendo Speech Suite server. The Loquendo Speech Suite can be configured through the Management Console, a graphical SNMP-based application, shipped with the Speech Suite. This section assumes that the Management Console is already installed and configured to manage the Loquendo Speech Suite instance that will interoperate with Avaya Voice Portal.

Start the Management Console by navigating to **Start** ➔ **Loquendo** ➔ **Loquendo Speech Suite 7.0** ➔ **Management Console**. The initial screen is displayed as shown in **Figure 13**.

![Figure 13: Initial Screen](image-url)
From the Management Console, access the Basic configuration screen. Enable the \texttt{dtmfCodecAlwaysOffered} field as shown in Figure 14.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{dtmfCodecAlwaysOffered_Parameter}
\caption{\texttt{dtmfCodecAlwaysOffered} Parameter}
\end{figure}

In the Basic configuration screen, scroll down to the \texttt{mrcpHeader} section. Optionally, set the default language and voice.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Default_Language_and_Voice_Parameters}
\caption{Default Language and Voice Parameters}
\end{figure}
Next, access the **Advanced** configuration screen for the **MRCPv1Server** and scroll down to the **speechRecognition** section. Note that this screen contains many parameters and the user needs to scroll to the desired section. The complete screen with all of the parameters cannot be shown in one screenshot. Set the **lasrAudioCodec** to *u-law* or *a-law* according to the Avaya Voice Portal configuration. In this configuration, *u-law* was used. Set the **lasrLooseSISRSemantic** field to *enable* and the **lasrDefaultTagFormat** field to *SISR-semantics(2)*.

![Speech Recognition Parameters](image1)

**Figure 16: Speech Recognition Parameters**

Scroll down to the **textToSpeech** section as shown in **Figure 17** and set the **lttsDefaultAudioCodec** to *u-law* or *a-law* according to the Avaya Voice Portal configuration. In this configuration, *u-law* was used.

![Text-to-Speech Parameters](image2)

**Figure 17: Text-to-Speech Parameters**
In the same **Advanced** configuration screen, scroll down to the **nlsmlResult** section and set the highlighted parameters as shown in **Figure 18**.

![Figure 18: NLSML Parameters](image)

Lastly, scroll down to the **ports** section and configure the **rtspPort** field to ‘554’ as shown in **Figure 19**.

![Figure 19: Ports Parameters](image)
The Management Console will notify the user if a restart is required after changing a parameter. If necessary, the user may issue a restart by setting the \texttt{lifeCycleCmd} field to \texttt{restart(2)} under the \textbf{Administration} screen as shown in \textbf{Figure 20}.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{management-console.png}
\caption{Restarting Loquendo Speech Suite}
\end{figure}

5. **Interoperability Compliance Testing**

This section describes the interoperability compliance testing used to verify Avaya Voice Portal VoiceXML applications that use the ASR and TTS engines in the Loquendo Speech Suite. This section covers the general test approach and the test results.

5.1. **General Test Approach**

The interoperability compliance test included feature and serviceability testing. The feature testing focused on placing calls to Avaya Voice Portal that ran VoiceXML applications that use the ASR engine in the Loquendo Speech Suite. The testing verified Text-to-Speech, speech recognition, and DTMF tone recognition.

The serviceability testing focused on verifying the ability of the Loquendo Speech Suite to recover from adverse conditions, such as power failures and disconnecting cables to the IP network.

5.2. **Test Results**

All test cases passed. Avaya Voice Portal was successful in running applications that use the ASR engine of the Loquendo Speech Suite.
6. Verification Steps

This section provides the verification steps that may be performed to verify that Avaya Voice Portal can run IVR applications that use the Loquendo Speech Suite.

1. From the VPMS web interface, verify that the MPP servers are online and running in the MPP Manager page shown in Figure 21.

![MPP Manager](image)

**Figure 21: MPP Manager**
2. From the VPMS web interface, verify that the ports on the MPP server are in-service in the Port Distribution page shown in Figure 22.

![Port Distribution](image)

**Figure 22: Port Distribution**

3. Place a call to Avaya Voice Portal that runs a VoiceXML script and uses the Loquendo Speech Suite. Verify that the application answers the call and that the application is able to recognize the speech and DTMF tones input provided by the caller.
7. Support
To obtain technical support for the Loquendo Speech Suite, contact Loquendo via email or through their website.

- Email: lss@loquendo.com
- Web: http://www.loquendo.com/customerarea

8. Conclusion
These Application Notes describe the configuration steps required to integrate the Loquendo Speech Suite with Avaya Voice Portal. All feature and serviceability test cases were completed successfully.

9. Additional References
This section references the product documentation that is relevant to these Application Notes.


