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Avaya Solution & Interoperability Test Lab

Application Notes for Empirix Hammer On-Call Load Testing Service with Avaya Interactive Response – Issue 1.0

Abstract

These Application Notes describe the steps required for the Empirix Hammer On-Call Load Testing Service to successfully interoperate with Avaya Interactive Response. The Empirix Hammer On-Call Load Testing Service was used to emulate real world traffic and call volume to test and verify a voice self service application provided by Avaya Interactive Response and Avaya Communication Manager.

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

1. Introduction

The Empirix Hammer On-Call Load Testing Service provides customers with the ability to test and verify voice application, network, and infrastructure under real-world conditions. Real world traffic and call volume are emulated to help pinpoint and eliminate errors and performance bottlenecks.

The compliance testing utilized a fictitious credit union banking application scenario, with Hammer On-Call generating calls to emulate real customers dialing the credit union self service application provided by Avaya Interactive Response and Avaya Communication Manager. Hammer On-Call emulates customer entering of DTMF tones to traverse through different branches of the credit union call flow, such as listening to operational hours and interest rates, or obtaining account balance, or transferring to live agent. The credit union banking application call flow is shown in **Figure 1**.

The credit union banking application was developed using the Avaya Dialog Designer, and deployed to the Apache Tomcat Web Server that interfaced with Avaya Interactive Response. In addition, the application also utilized an IBM WebSphere Voice Server (WVS) with text-to-speech capabilities, and a SQL 2000 Database Server that provided database lookup of account balances. All three servers interfaced with the Avaya Interactive Response.

For the compliance testing, the Empirix Hammer On-Call Load Testing Service placed calls over the PSTN to Avaya Communication Manager. The calls were delivered to Avaya Interactive Response over available lines, administered as IP stations with type "7434ND" on Avaya Communication Manager. The Avaya Interactive Response ran the credit union VoiceXML speech application from the Apache Tomcat Web Server, used the IBM WebSphere Voice Server to provide recordings of announcements such as operational hours, and used the SQL 2000 Database Server to perform account balance retrieval. When the caller entered the DTMF tone that corresponds to transfer to an agent, then the Avaya Interactive Response transferred the call to an announcement extension on Avaya Communication Manager. The announcement extension played a greeting announcement, to emulate a live agent so that Hammer On-Call can detect the audio stream and classify the transferred call as successfully answered. The configuration used for the compliance testing is shown in **Figure 2**.

These Application Notes assume the configuration and connectivity between Avaya Communication Manager and Avaya Interactive Response is already in place and will not be described. Furthermore, the development and deployment of the application scripts for Avaya Interactive Response and Empirix Hammer On-Call are outside the scope of this document. The focus of these Application Notes is on the customer deliverables that are required as input to the Hammer On-Call Load Testing Service, and the navigation of the real-time performance data output provided by Empirix.
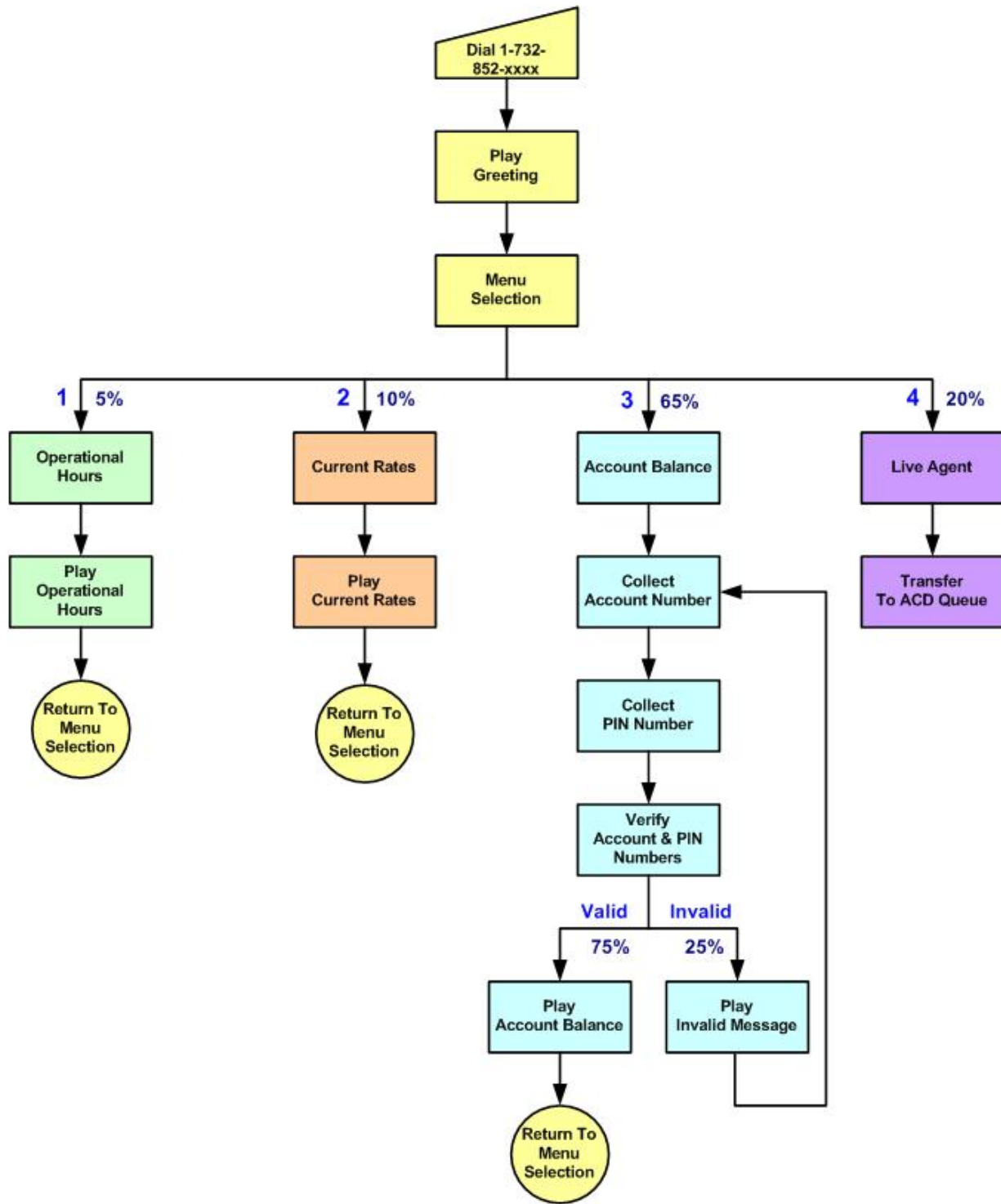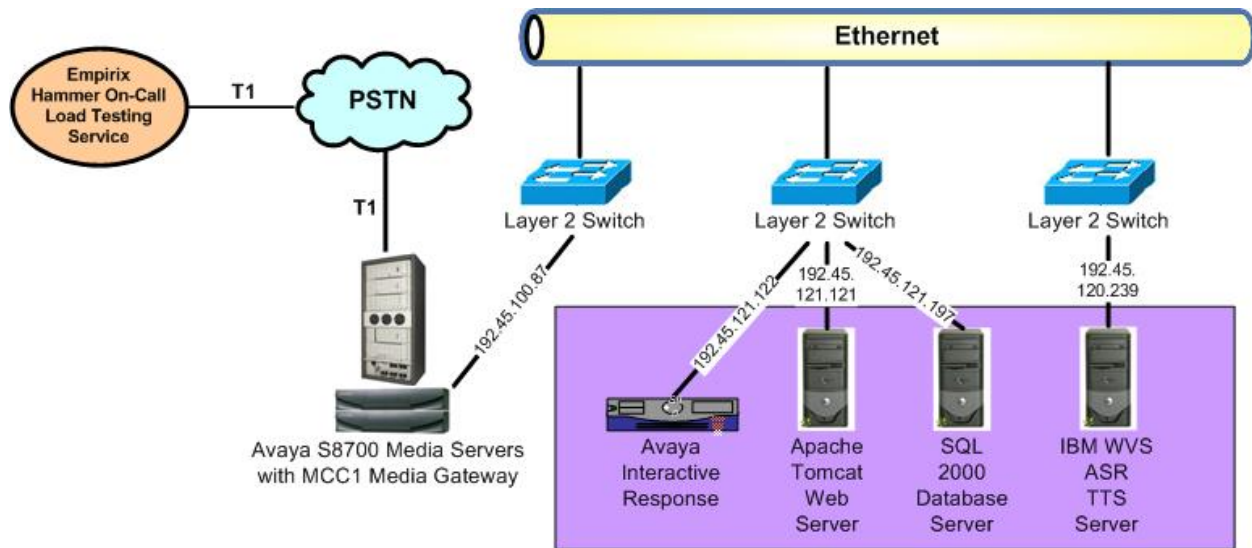
Avaya Empirix Credit Union Call Flow

Figure 1: Avaya Empirix Credit Union Call Flow

Figure 2: Avaya Empirix Test Configuration

2. Equipment and Software Validated

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

Equipment	Software
Avaya S8700 Media Servers	Communication Manager 3.1.2, load 632.1
Avaya MCC1 Media Gateway • TN2302AP IP Media Processor • TN2312BP IP Server Interface • TN799DP C-LAN Circuit Pack • TN750C Announcement Circuit Pack	HW13 FW111 HW03 FW031 HW01 FW017 Vintage 8
Avaya Interactive Response	2.0
Apache Tomcat Web Server	5.0.28, running on Windows 2000, SP4
IBM WVS ASR/TTS	5.1.3, running on Windows 2003, SP1
SQL 2000 Database Server	8.00.761, running on Windows 2000, SP4
Empirix Hammer On-Call	6.1

3. Customer Deliverables

In preparation for the load testing service, Empirix requires the following information to be provided by the customer at least two weeks prior to the actual test:

- Voice application diagram
- Call flow navigation information
- Customer contact for test
- Toll free numbers
- Customer contact for sign-off

3.1. Voice Application Diagram

A diagram of the voice application highlighting the transactional call flow needs to be provided to Empirix. An example would be the fictitious credit union call flow shown in **Figure 1**. Any customer knowledge of the expected call volume and call distribution amongst call flow paths would be beneficial. Without them, Empirix will either utilize its industry experience to set the values, or rely on the customer to select from a set of proposed values.

3.2. Call Flow Navigation Information

The customer needs to provide the user information needed to navigate through the call flow to Empirix. For the compliance testing, this would be the valid account number and PIN combinations, as shown below.

Account Number	PIN	Balance
10001	301	$525.40
10002	302	$1,500.30
10003	303	$4,598.90
10004	304	$29,087.00
10005	305	$3.12

Note that the customer needs to provide an amount of user entries greater than or equal to the simultaneous calls required to be placed. For the compliance testing, the trunk configuration supported four simultaneous calls, and the credit union database had five account entries, thus allowing all four calls to simultaneously access the credit union database.

3.3. Customer Contact For Test

A primary customer contact with knowledge of the application is needed to help answer any questions arising from the test planning and the actual test execution. This primary contact needs to be present during the test execution.

3.4. Toll Free Numbers

The customer needs to provide the toll free numbers to be used for the load test. As an alternative, local or long distance numbers can be used by Empirix, but will be charged back to the customer.

3.5. Customer Contact for Sign-Off

A customer contact with sign-off authority needs to be provided to Empirix for the load test.

4. Empirix Real-Time Performance Data

This section provides the procedures for navigating the Empirix Hammer On-Call real-time performance data from the load test. The procedures include the following areas:

- Access web interface
- Select active test
- Review summary information
- Review errors
- Review performance data
- Review attached data
- Review call information

4.1. Access Web Interface

Access the Hammer On-Call performance data web interface by using the URL http://hoc.empirix.com in an Internet browser window. Enter the **Username** and **Password** supplied by Empirix.
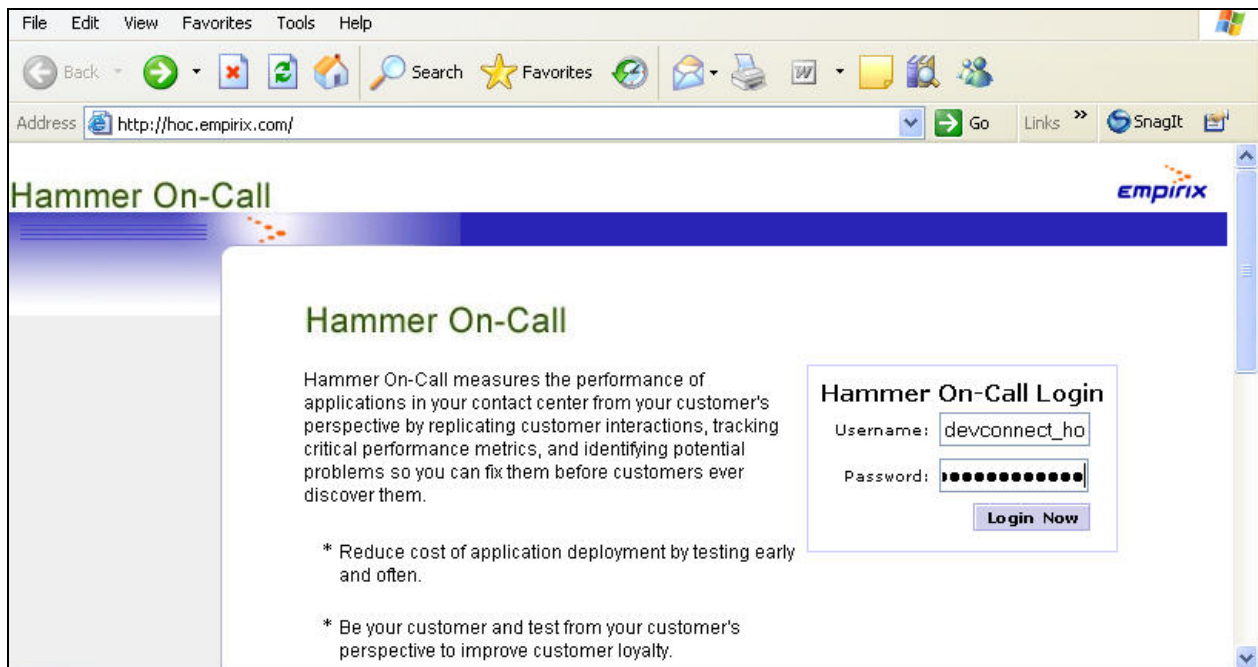
4.2. Select Active Test

The **Hammer On-Call Testing Services** screen is displayed, and provides a list of active tests along with a brief description and the date and time the test was last run. In the compliance testing, several different tests were devised to cover testing in the areas of serviceability, performance, and feature functionality. Under the **Test Information** column, select a test to look further into, such as **Service 1** from below. Note that the name of the tests may vary, and in this case **Service 1** corresponds to the serviceability test scenarios executed during the compliance testing.

The screen is updated with **Service 1** test result, as shown below. The test result information included the total duration of test, equivalent rate of calls per hour, number of calls that passed/failed, total number of calls, and percent of calls that failed. Click on **Service 1** to review further details.

4.3. Review Summary Information

The **Summary Info** screen for **Service 1** is displayed next. This screen displays a graphical chart of average calls per minute versus errors per minute. The table below the chart displays the detail scripts that correspond to the call flow branches, along with statistical information.

As shown in the chart below, there were two distinct intervals of high failures during the serviceability test, and they corresponded to when the incoming trunks and IVR ports were busied out, in order to test the ability of Hammer On-Call to detect such outages.

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4.4. Review Errors

Select the **Errors** tab to review the reported errors. The table below the chart displays the types of errors and the number of occurrences. The table shows that there were **13** detections of the busy tone, and **11** detections of the reorder tone.

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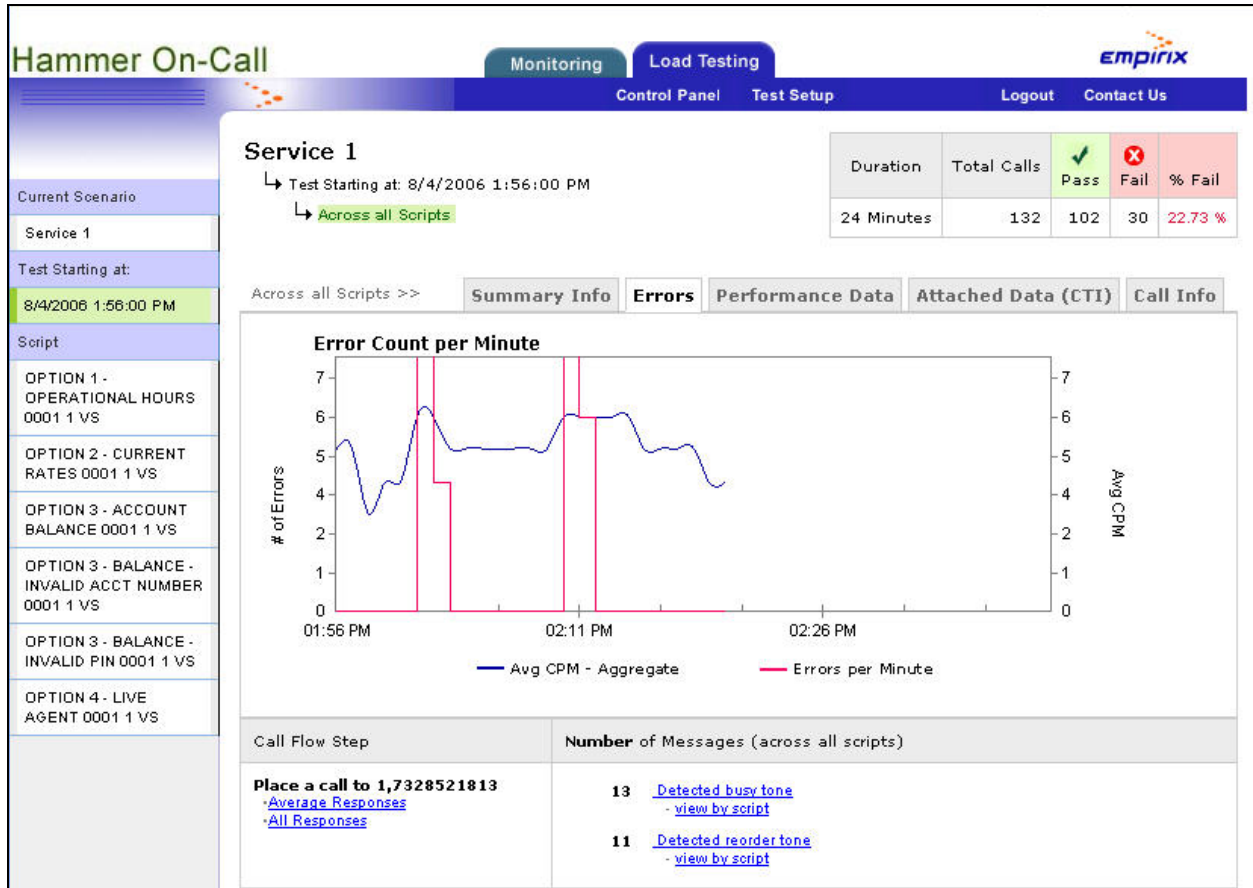
4.5. Review Performance Data

Select the **Performance Data** tab to review the performance data collected for each step in the call flow. The **Call Flow** column in the right side of the table provides a visual display of the portion of the call spent on each step.
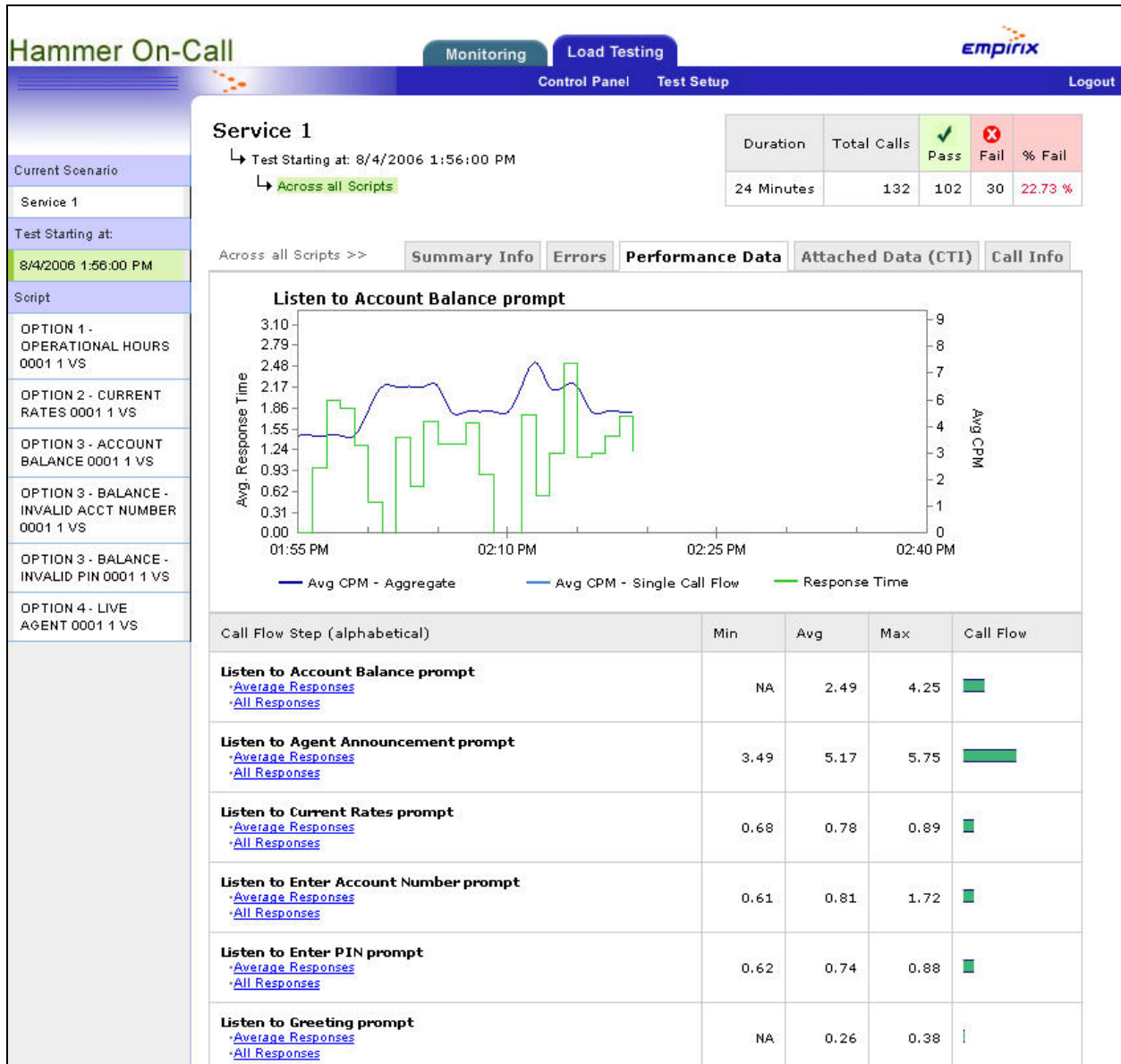
4.6. Review Attached Data

Select the **Attached Data (CTI)** tab to review the specific data attached to the calls. In the compliance testing, this corresponds to the account number and PIN information used to retrieve the account balances. The table below shows the number of times each specific account number was attached to a call.

4.7. Review Call Information

Select the **Call Info** tab to review the detailed call information associated with each call. Select a call of interest from the **CALL INFORMATION** table, and the upper portion of the screen will be updated with the details for the selected call. A **CLICK TO LISTEN** link will appear next to the **TEST STATUS** field when the call has been recorded. Click on **CLICK TO LISTEN** to listen to the recording of the entire call. For the compliance testing, all calls were recorded due to the lower traffic volume. For testing with higher traffic volumes, not all calls may be recorded. Consult with Empirix representatives on the recording capacities.

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5. Interoperability Compliance Testing

The interoperability compliance test included feature, performance, and serviceability testing.

The feature testing focused on verifying Hammer On-Call emulation of proper DTMF tones to traverse through all possible branches of the call flow, including error conditions such as entering of an invalid account number.

The serviceability testing focused on verifying the ability of Hammer On-Call to detect adverse conditions, such as receiving reorder and busy tones from the network connection.

5.1. General Test Approach

Hammer On-Call scripts were written to correspond to the different branches of the call flow. Each script was executed manually to verify proper traversal of each call flow branch. The real-time performance data was reviewed after each manual script run to verify report accuracy.

The performance test cases were executed automatically with Hammer On-Call generating constant traffic to occupy all four incoming trunks, and to traverse through the different branches of the call flow matching to the call distribution percentages mandated for the test.

The serviceability test cases were performed manually by busying out and releasing the incoming trunks and the outgoing IVR ports on Avaya Communication Manager.

5.2. Test Results

All test cases were executed and passed.

6. Verification Steps

This section provides the tests that can be performed to verify proper operation of the developed scripts for Avaya Interactive Response and Empirix Hammer On-Call.

6.1. Verify Avaya Interactive Response

From a telephone with access to the PSTN, dial the number provided to Emprix for the voice application. Manually listen to the prompts and enter DTMF tones, verify that all branches of the call flow are accessible.

6.2. Verify Empirix Hammer On-Call

Manually run the script associated with each branch of the call flow. Follow the procedures in **Section 4** to log into the real-time performance data web site, listen to the recorded call and verify the accuracy in the reporting for each script.

7. Support

Technical support on Empirix Hammer On-Call Load Testing Service can be obtained through the following:

- **Phone:**   (781) 266-3202
- **Email:**   support@empirix.com

8. Conclusion

These Application Notes describe the customer deliverables that are required as input for the Empirix Hammer On-Call Load Testing Service to interoperate with Avaya Interactive Response 2.0, and the navigation of the real-time performance data output provided by Empirix. All test cases were completed successfully.

9. Additional References

This section references the product documentation relevant to these Application Notes.

- *Administrator Guide for Avaya Communication Manager*, Document 03-300509, Issue 2, February 2006, available at http://support.avaya.com.

- *Avaya Interactive Response R2.0 Installation, Migration, and Troubleshooting Guide*, Issue 1, April 2006, available at http://support.avaya.com.

- *Hammer On-Call IVR Testing Service Description,* available upon request from Empirix technical support.