



Avaya Solution & Interoperability Test Lab

Application Notes for Empirix OneSight Voice Quality with Avaya Aura® Communication Manager 6.0 – Issue 1.0

Abstract

These Application Notes describe the configuration steps required for Empirix OneSight Voice Quality to interoperate with Avaya Aura® Communication Manager 6.0. Empirix OneSight Voice Quality is a voice quality monitoring and management solution. In the compliance testing, Empirix OneSight Voice Quality used the H.323 station interface from Avaya Aura® Communication Manager to provide voice quality monitoring.

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 for Empirix OneSight Voice Quality to interoperate with Avaya Aura® Communication Manager 6.0. Empirix OneSight Voice Quality is a voice quality monitoring and management solution. In the compliance testing, Empirix OneSight Voice Quality used the H.323 station interface from Avaya Aura® Communication Manager to provide voice quality monitoring.

The Empirix OneSight Voice Quality solution consists of the Empirix OneSight server, and two or more Empirix Voice Quality (VQ) Probe clients. Each VQ Probe client registers with Avaya Aura® Communication Manager as a H.323 station. Scripts are launched on the OneSight server to initiate bi-directional calls between the VQ Probe clients. A preconfigured prompt is played from one VQ Probe client to the other, with the receiving client comparing the received audio with the original and producing voice quality scores to send to the OneSight server. The resultant scores from both clients are monitored and reported by the OneSight server.

1.1. Interoperability Compliance Testing

The interoperability compliance test included feature and serviceability testing.

The feature testing focused on verifying the proper analysis and reporting of voice quality by Empirix OneSight Voice Quality. The scenarios included registration, G.711 and G.729 audio codec with and without media shuffling, and injection of VoIP impairments such as packet delay, jitter, and loss.

The serviceability testing focused on verifying the ability of Empirix OneSight Voice Quality to recover from adverse conditions, such as disconnecting/reconnecting the Ethernet cable to the OneSight server, and to each of the VQ Probe clients.

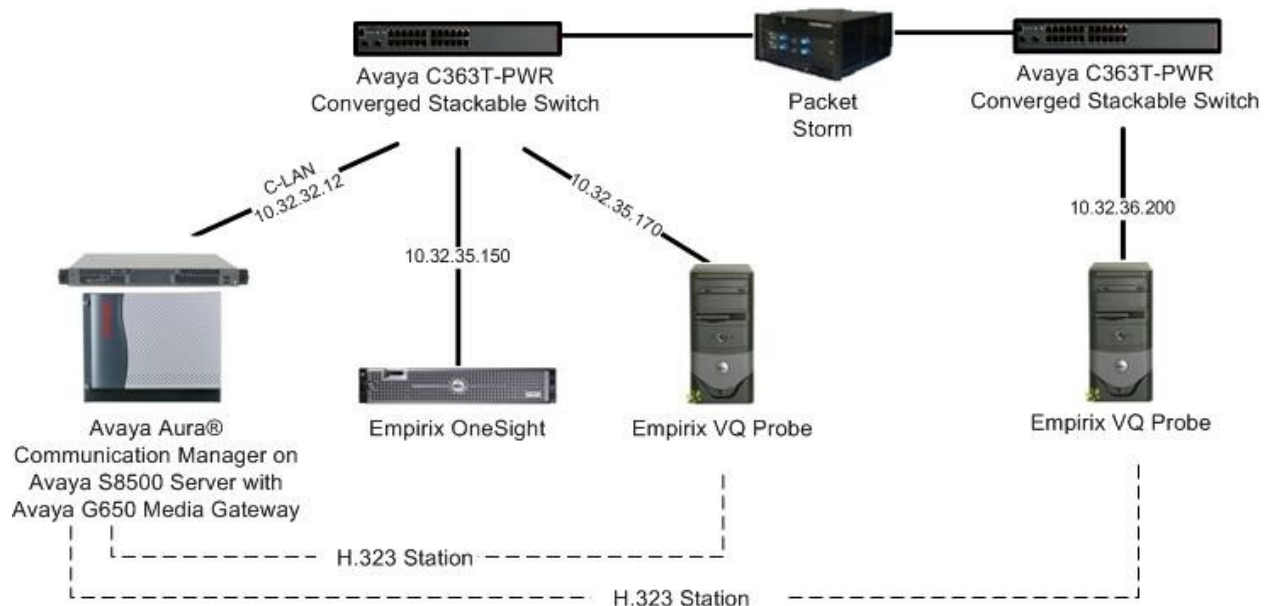
1.2. Support

Technical support on Empirix OneSight Voice Quality can be obtained through the following:

- **Phone:** (866) 367-4749
- **Email:** support@empirix.com
- **Web:** <http://esupport.empirix.com>

2. Reference Configuration

The configuration used for the compliance testing is shown below. The Packet Storm was used as a tool to inject VoIP impairments, such as packet delay, jitter, and loss, into the network for calls between the two Empirix VQ Probe clients.



3. Equipment and Software Validated

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

Equipment	Software
Avaya Aura® Communication Manager on Avaya S8800 Server	6.0 (R016x.00.0.345.0-18246)
Avaya G650 Media Gateway <ul style="list-style-type: none">TN799DP C-LAN Circuit Pack	HW01 FW038
Empirix OneSight on Windows 2003 Server with Service Pack 2 <ul style="list-style-type: none">Database ServerProfile Voice Quality - Basic	7.3 SR1 Build Number 2135 Microsoft SQL Server 2005 7/8/10 10:49
Empirix VQ Probe	1.1.483

4. Configure Avaya Aura® Communication Manager

This section provides the procedures for configuring Avaya Aura® Communication Manager. The procedures include the following areas:

- Verify Communication Manager license
- Administer IP network region
- Administer IP codec set
- Administer H.323 stations

4.1. Verify Communication Manager License

Log into the System Access Terminal (SAT) to verify that the Communication Manager license has proper permissions for features illustrated in these Application Notes. Use the “display system-parameters customer-options” command. Navigate to **Page 2**, and verify that there is sufficient remaining capacity for IP stations by comparing the **Maximum Concurrently Registered IP Stations** field value with the corresponding value in the **USED** column.

The license file installed on the system controls the maximum permitted. If there is insufficient capacity, contact an authorized Avaya sales representative to make the appropriate changes.

change system-parameters customer-options		Page 2 of 11
OPTIONAL FEATURES		
IP PORT CAPACITIES		USED
Maximum Administered H.323 Trunks: 100		6
Maximum Concurrently Registered IP Stations: 18000		4
Maximum Administered Remote Office Trunks: 8000		0
Maximum Concurrently Registered Remote Office Stations: 18000		0
Maximum Concurrently Registered IP eCons: 10		0
Max Concur Registered Unauthenticated H.323 Stations: 10		0
Maximum Video Capable H.323 Stations: 100		0
Maximum Video Capable IP Softphones: 100		0
Maximum Administered SIP Trunks: 100		10
Maximum Administered Ad-hoc Video Conferencing Ports: 0		0
Maximum Number of DS1 Boards with Echo Cancellation: 0		0

4.2. Administer IP Network Region

Use the “change ip-network-region n” command, where “n” is the existing network region number to be used for integration with Empirix.

Enter “yes” for **Intra-region IP-IP Direct Audio** and **Inter-region IP-IP Direct Audio**, as shown below. Make a note of the **Codec Set** number.

```
change ip-network-region 1                                     Page 1 of 20
                                                              IP NETWORK REGION
    Region: 1
Location:      Authoritative Domain: mproom18.com
    Name: Main
MEDIA PARAMETERS                                           Intra-region IP-IP Direct Audio: yes
    Codec Set: 1                                           Inter-region IP-IP Direct Audio: yes
    UDP Port Min: 2048                                     IP Audio Hairpinning? y
    UDP Port Max: 65535
DIFFSERV/TOS PARAMETERS
    Call Control PHB Value: 46
    Audio PHB Value: 46
    Video PHB Value: 26
802.1P/Q PARAMETERS
    Call Control 802.1p Priority: 6
    Audio 802.1p Priority: 6
    Video 802.1p Priority: 5      AUDIO RESOURCE RESERVATION PARAMETERS
H.323 IP ENDPOINTS                                         RSVP Enabled? n
    H.323 Link Bounce Recovery? n
    Idle Traffic Interval (sec): 20
    Keep-Alive Interval (sec): 5
    Keep-Alive Count: 5
```

4.3. Administer IP Codec Set

Use the “change ip-codec-set n” command, where “n” is the existing codec set number used by the IP network region from **Section 4.2**. Enter the desired audio codec in the **Audio Codec** field, in this case “G.711MU”. The compliance testing included the G.711MU and G.729 audio codec.

```
change ip-codec-set 1                                         Page 1 of 2
                                                              IP Codec Set

    Codec Set: 1

    Audio      Silence      Frames      Packet
    Codec      Suppression  Per Pkt   Size(ms)
1:  G.711MU      n           2         20
2:
3:
4:
5:
```

4.4. Administer H.323 Stations

Use the “add station n” command, where “n” is an available extension number. Enter the following values for the specified fields, and retain the default values for the remaining fields.

- **Type:** “H.323”
- **Name:** A descriptive name.
- **Security Code:** A desired four digits security code.
- **DTMF over IP:** “in-band”

Note that Empirix OneSight Voice Quality only supports four digits security codes.

```
add station 65771                                     Page 1 of 4
                                                    STATION
Extension: 65771                                     Lock Messages? n      BCC: 0
  Type: H.323                                       Security Code: 5771  TN: 1
  Port: IP                                           Coverage Path 1:      COR: 1
  Name: Empirix VQProbe1                         Coverage Path 2:      COS: 1
                                                    Hunt-to Station:      Tests? y
STATION OPTIONS
                                                    Time of Day Lock Table:
  Loss Group: 19                                     Message Waiting Indicator: none
                                                    Authentication Required? y
                                                    IP Video? N
  Survivable COR: internal
  Survivable Trunk Dest? y
  DTMF over IP: in-band
```

Repeat the “add station n” command to add the desired number of H.323 stations. In the compliance testing, two H.323 stations were created as shown below.

```
list station 65771 count 5
```

STATIONS									
Ext/ Hunt-to	Port/ Type	Name/ Surv GK NN	Move	Room/ Data Ext	Cv1/ Cv2	COR/ COS	Cable/ TN Jack		
65771	S00010	Empirix VQProbe 1				1			
	H.323		no			1	1		
65772	S00016	Empirix VQProbe 2				1			
	H.323		no			1	1		

5. Configure Empirix OneSight Voice Quality

This section provides the procedures for configuring Empirix OneSight Voice Quality. The procedures include the following areas:

- Launch web interface
- Administer VQ Probes
- Administer monitor group
- Administer monitor

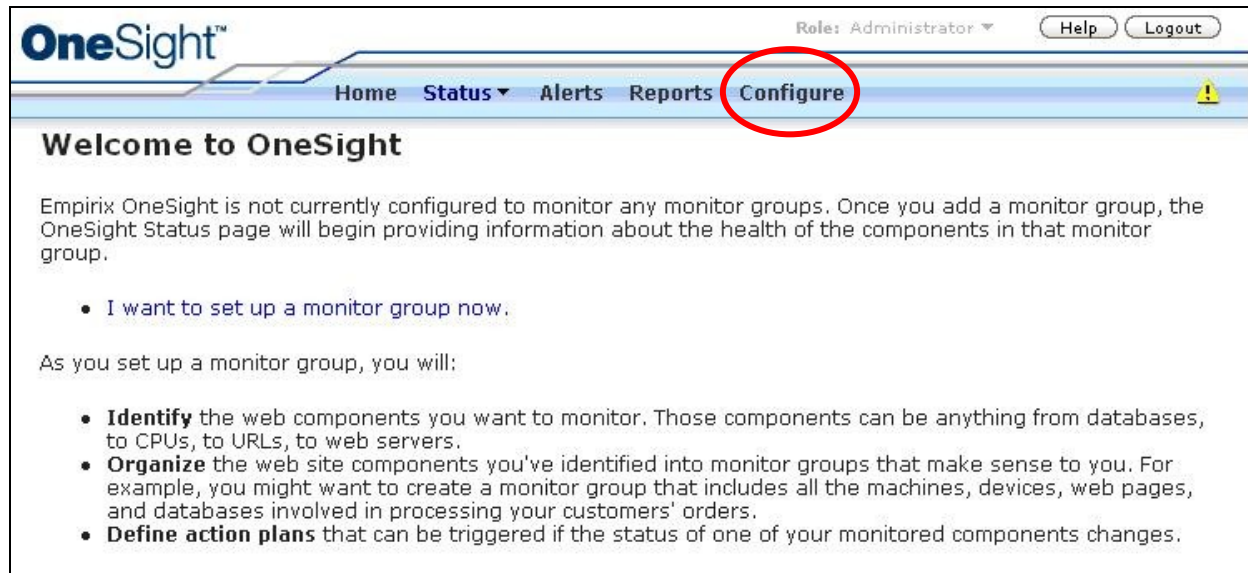
5.1. Launch Web Interface

Access the OneSight web interface by using the URL “http://ip-address:8080” in an Internet browser window, where “ip-address” is the IP address of the OneSight server. Log in using the appropriate credentials.

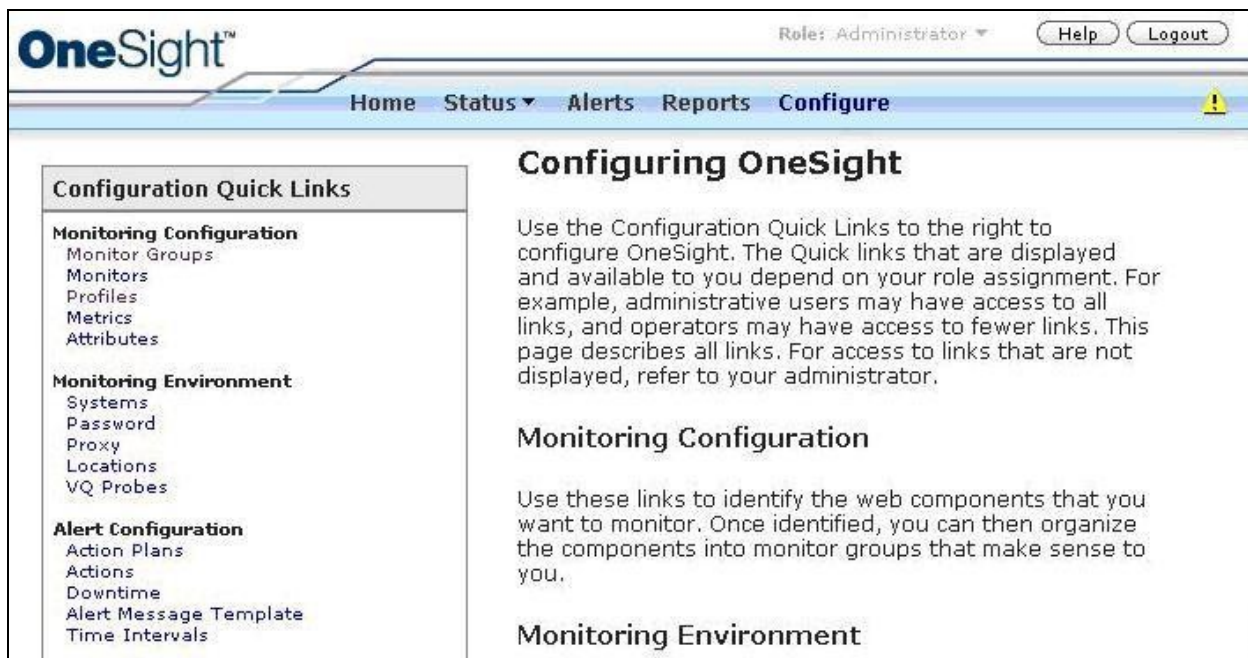


The screenshot displays the Empirix OneSight web interface. On the left, the Empirix logo is accompanied by the tagline "When Quality Matters™". Below this, the text "for Contact Centers" is shown, followed by a paragraph describing the integration of customer Quality of Experience performance data with infrastructure-level performance data. Further down, the text "for Web Applications" is displayed, followed by a paragraph describing the ease of managing web applications and infrastructure. On the right side of the interface, there is a "OneSight Login" box. This box contains a prompt to enter a valid user name and password, input fields for "User Name:" and "Password:", and a "Log In" button. Below the login fields, the version information "Version: 7.3 SR1 Build Number: 2135" and "Explorer 6.0" is shown. At the bottom of the login box, a note states: "If you have just installed, please type **admin** for user name and password."

In the subsequent screen, select **Configure** from the top menu.



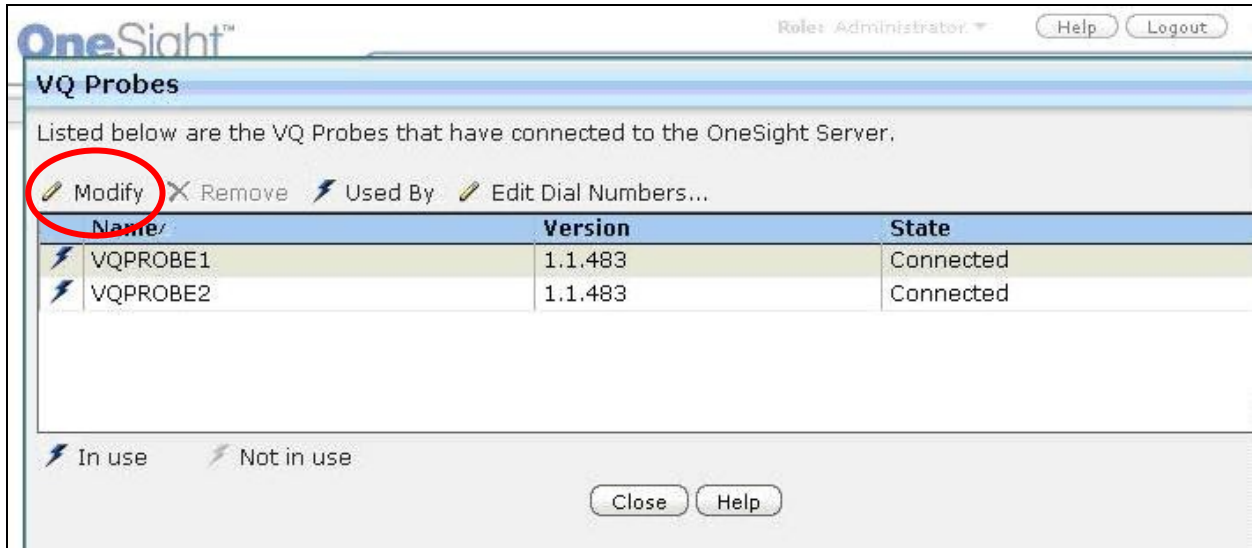
The **Configuring OneSight** screen is displayed. Select **Monitoring Environment > VQ Probes** from the left pane.



5.2. Administer VQ Probes

The **VQ Probes** screen is displayed, and shows the two VQ Probes clients that were automatically connected to the server. Note that the hostname and IP address of the OneSight server was configured as part of the VQ Probes client installation, which allowed for the automatic connections. In the screen shown below, “VQPROBE1” and “VQPROBE2” are the name of the VQ Probes clients, which were also configured as part of the client installation.

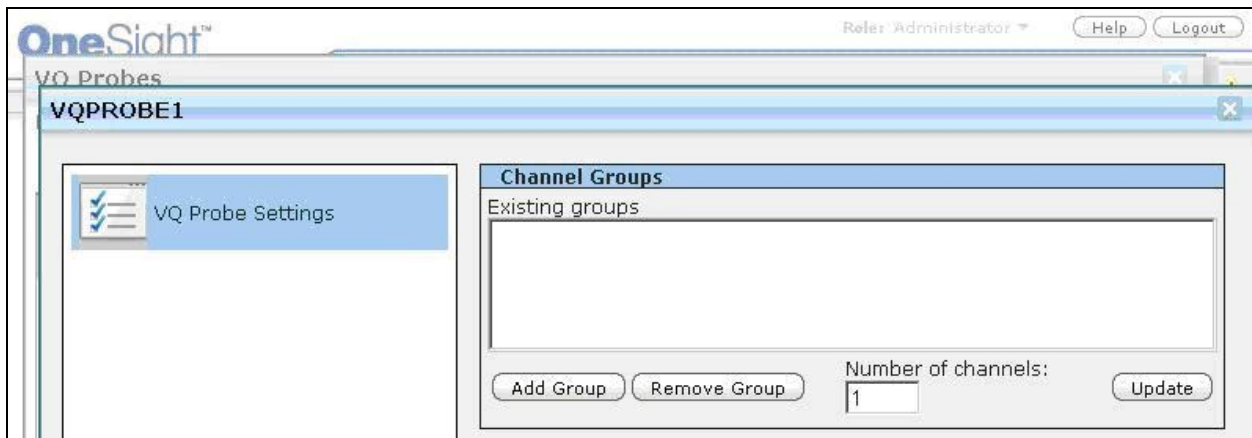
Select the first client entry, and click **Modify**.



The screenshot shows the OneSight VQ Probes administration interface. At the top, the role is set to 'Administrator'. Below the title bar, a message states: 'Listed below are the VQ Probes that have connected to the OneSight Server.' A toolbar contains icons for 'Modify' (pencil), 'Remove' (X), 'Used By' (lightning bolt), and 'Edit Dial Numbers...' (pencil). Below this is a table with three columns: 'Name', 'Version', and 'State'. The table lists two entries: 'VQPROBE1' and 'VQPROBE2', both with version '1.1.483' and state 'Connected'. At the bottom, there are status indicators 'In use' and 'Not in use', and 'Close' and 'Help' buttons.

Name	Version	State
VQPROBE1	1.1.483	Connected
VQPROBE2	1.1.483	Connected

The **VQPROBE1** screen is displayed, Click **Add Group**.



The screenshot shows the OneSight VQPROBE1 configuration interface. On the left, there is a sidebar with 'VQ Probe Settings'. The main area is titled 'Channel Groups' and contains a section for 'Existing groups' with an empty list box. Below the list box are buttons for 'Add Group' and 'Remove Group'. To the right of these buttons is a 'Number of channels:' label with a text input field containing the value '1', and an 'Update' button.

The **VQPROBE1** screen is updated with one channel showing in the left pane. Click on **Channel 1** in the left pane, to display additional parameters in the right pane. Configure the parameters as shown in the screenshot below, and retain the default values in the remaining fields.

- **IP Address:** The applicable local IP address of the VQ Probe client PC.
- **Extension:** A station extension number from **Section 4.4**.
- **Codec:** The audio codec from **Section 4.3**.
- **Interpacket Delay:** The audio codec packet size from **Section 4.3**.
- **PBX:** The CLAN IP address for station registration from **Section 2**.
- **Security Code:** The station security code from **Section 4.4**.

Repeat this section to configure all connected VQ Probes.

The screenshot displays the OneSight VQ Probes configuration interface for VQPROBE1. The left sidebar shows a tree view with 'VQ Probe Settings' and 'Channel 1' (H.323 / G.711 U-Law, #: 65777). The main area is divided into three sections: General, Media, and H.323 Configuration. The General section includes Protocol (H.323), IP Address (10.32.36.200), and Extension (65771). The Media section includes Codec (G.711 U-Law), Interpacket Delay [ms] (20), and DTMF Type (In Band (Audio)). The H.323 Configuration section includes H.323 Type (H323 Avaya Station), PBX (10.32.32.12), Register with PBX (Yes), Authentication (Enabled), Security Code (5771), and Media Shuffling (Enabled). The top of the window shows the OneSight logo, 'VQ Probes', and user information 'Role: Administrator' with 'Help' and 'Logout' buttons.

General	
Protocol	H.323
IP Address	10.32.36.200
Extension	65771

Media	
Codec	G.711 U-Law
Interpacket Delay [ms]	20
DTMF Type	In Band (Audio)

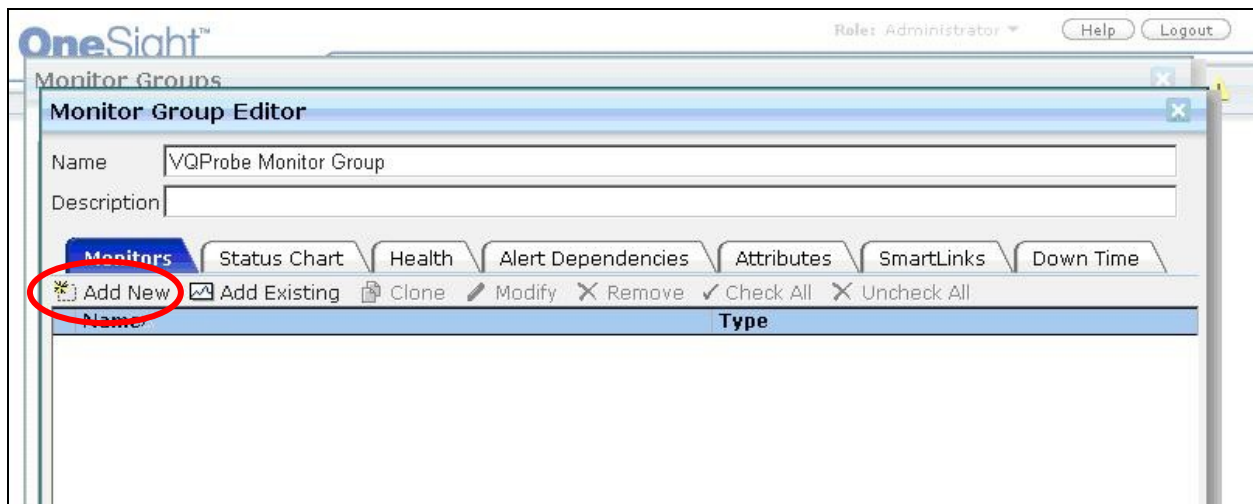
H.323 Configuration	
H.323 Type	H323 Avaya Station
PBX	10.32.32.12
Register with PBX	Yes
Authentication	Enabled
Security Code	5771
Media Shuffling	Enabled

5.3. Administer Monitor Group

From the **Configuring OneSight** screen shown in **Section 5.1**, select **Monitoring Configuration > Monitor Groups** from the left pane to display the **Monitor Groups** screen. Click **Add** to create a new monitor group.



The **Monitor Group Editor** screen is displayed next. Enter desired **Name** and **Description**, and click **Add New**.



5.4. Administer Monitor

The **Add Monitor** screen is displayed. Select **Profiles > OneSight Voice Quality - Basic** from the left pane.

Select the **General** tab in the right pane. Select the appropriate **Originate Probe**, **Originate Extension**, **Answer Probe**, and **Answer Extension** as shown below, and the **Monitor Name** will be updated by the system accordingly. Set the desired interval between the samples in the **Sample Every** field.

The screenshot displays the OneSight Monitor Group Editor - Add Monitor screen. The interface is divided into two main panes. The left pane, titled 'Monitor Types', contains a list of various monitoring options, including Microsoft IIS, Microsoft SQL Server, Netscape Enterprise Server, and several OneSight Voice Quality and Transaction monitors. The right pane, titled 'Add Monitor', contains configuration fields. The 'Monitor Name' field is populated with 'OneSight Voice Quality Transaction (VQPROBE1-65771;VQPROBE2-65772)'. The 'Profile' dropdown is set to 'OneSight Voice Quality - Basic'. The 'General' tab is selected, showing fields for 'Originate Probe' (VQPROBE1), 'Originate Extension' (65771), 'Answer Probe' (VQPROBE2), and 'Answer Extension' (65772). The 'Sample Every' field is set to 5 minutes. The 'Advanced...' button is visible at the bottom right of the configuration area.

6. General Test Approach and Test Results

The feature test cases were performed both automatically and manually. The Empirix OneSight server automatically launched the script for the bi-directional calls on a regular configurable interval. The Packet Storm was used to inject VoIP impairments into the network. The reported voice quality by the Empirix OneSight server was compared to the injected impairment by the Packet Storm.

The serviceability test cases were performed manually by disconnecting/reconnecting the Ethernet cables to the Empirix OneSight server, and to each of the VQ Probe clients.

All test cases were executed. The following were the observations on Empirix OneSight Voice Quality from the compliance testing.

- The OneSight server only supports four digits security codes for the emulated H.323 stations.
- Total received packets may differ slightly from the total transmitted packets due to packets being sent for audio silence.
- The injected delay and jitter impacted the average round trip time and not the PESQ score.
- When the injected delay is 100ms or more, then the samples may not always complete successfully.
- After a link recovery on the OneSight server, the first couple of reported samples will fail.
- After a link recovery on the VQ Probe client, a manual reboot of the client machine is required.

7. Verification Steps

This section provides the tests that can be performed to verify proper configuration of Avaya Aura® Communication Manager and Empirix OneSight Voice Quality.

7.1. Verify Avaya Aura® Communication Manager

From the SAT interface, verify the registration of the H.323 stations by using the “list registered-ip-stations” command. Verify that all H.323 stations from **Section 4.4** are registered, as shown below.

```
list registered-ip-stations
```

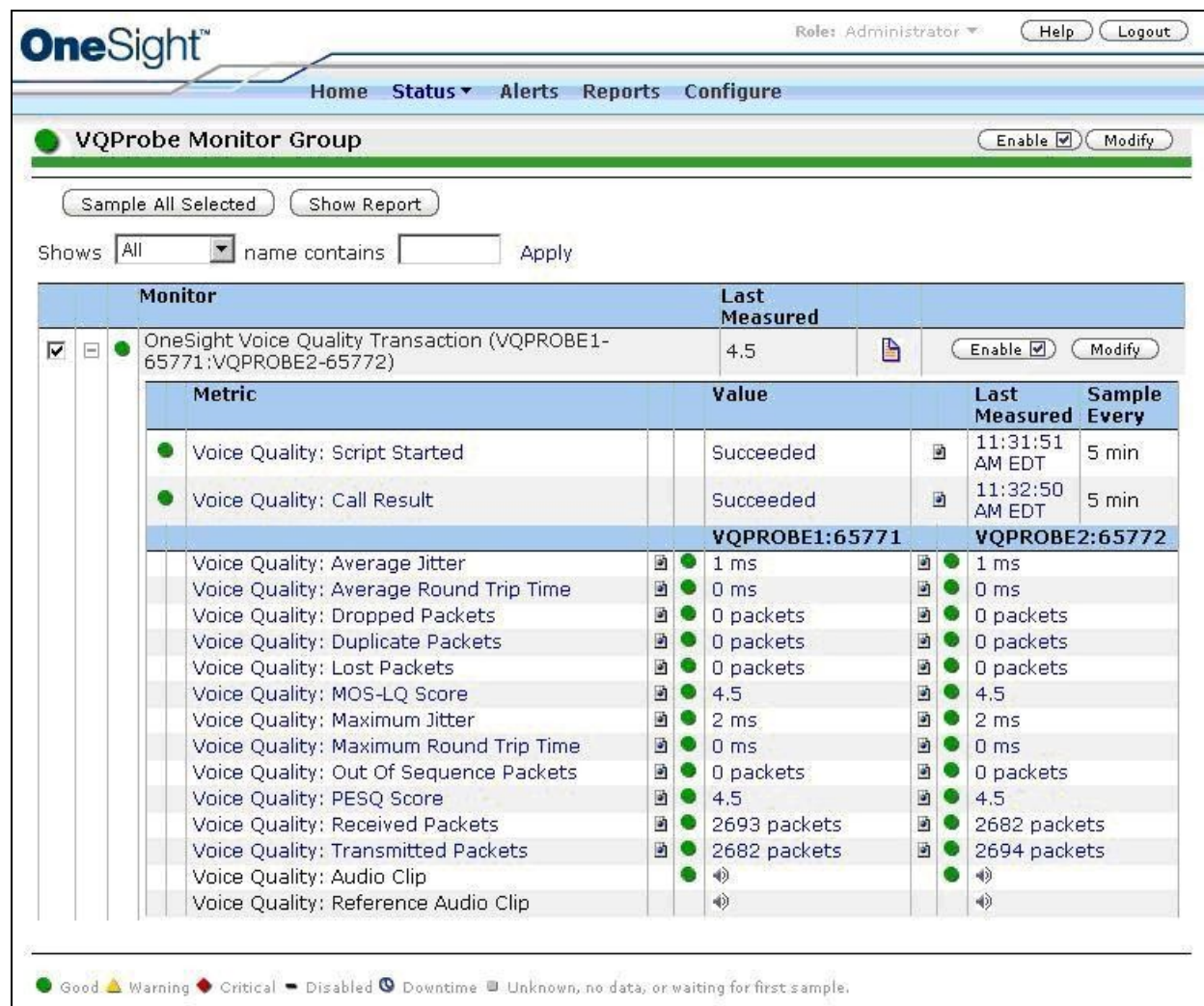
REGISTERED IP STATIONS					
Station Ext or Orig Port	Set Type/ Net Rgn	Prod ID/ Release	TCP Skt	Station IP Address/ Gatekeeper IP Address	
65771	H.323		y	10.32.36.200	
	1	0.0000		10.32.32.12	
65772	H.323		y	10.32.35.170	
	1	0.0000		10.32.32.12	

7.2. Verify Empirix OneSight Voice Quality

From the **Configuring OneSight** screen shown in **Section 5.1**, select **Status > General** from the top menu to display the monitors. Select **VQProbe Monitor Group**.

The screenshot displays the OneSight web application interface. At the top, the 'OneSight' logo is on the left, and 'Role: Administrator' with 'Help' and 'Logout' buttons are on the right. A navigation bar contains 'Home', 'Status' (selected), 'Alerts', 'Reports', and 'Configure'. Below this, a 'Group by: Monitor Group' dropdown is on the left, and 'Find' and 'Auto Refresh' (checked) buttons are on the right. The main content area shows a single monitor group: 'VQProbe Monitor Group' with a green status indicator and '(1)' next to it. A legend at the bottom explains the status icons: Green for Good, Yellow for Warning, Red for Critical, Grey for Disabled, Blue for Downtime, and Grey for Unknown. A timestamp at the bottom reads: 'Updated at Nov 02, 2010 11:33:55 AM EDT. To update manually, press the refresh/reload toolbar button.'

The **VQProbe Monitor Group** screen is displayed. Expand on **OneSight Voice Quality Transaction**, and verify that the reported voice quality values are appropriate for the last sample.



OneSight™ Role: Administrator Help Logout

Home Status Alerts Reports Configure

VQProbe Monitor Group Enable Modify

Sample All Selected Show Report

Shows All name contains Apply

Monitor	Last Measured		
OneSight Voice Quality Transaction (VQPROBE1-65771;VQPROBE2-65772)	4.5		Enable Modify

Metric	Value	Last Measured	Sample Every
Voice Quality: Script Started	Succeeded	11:31:51 AM EDT	5 min
Voice Quality: Call Result	Succeeded	11:32:50 AM EDT	5 min
	VQPROBE1:65771	VQPROBE2:65772	
Voice Quality: Average Jitter	1 ms	1 ms	
Voice Quality: Average Round Trip Time	0 ms	0 ms	
Voice Quality: Dropped Packets	0 packets	0 packets	
Voice Quality: Duplicate Packets	0 packets	0 packets	
Voice Quality: Lost Packets	0 packets	0 packets	
Voice Quality: MOS-LQ Score	4.5	4.5	
Voice Quality: Maximum Jitter	2 ms	2 ms	
Voice Quality: Maximum Round Trip Time	0 ms	0 ms	
Voice Quality: Out Of Sequence Packets	0 packets	0 packets	
Voice Quality: PESQ Score	4.5	4.5	
Voice Quality: Received Packets	2693 packets	2682 packets	
Voice Quality: Transmitted Packets	2682 packets	2694 packets	
Voice Quality: Audio Clip			
Voice Quality: Reference Audio Clip			

● Good
 ▲ Warning
 ◆ Critical
 Disabled
 ⌚ Downtime
 Unknown, no data, or waiting for first sample.

8. Conclusion

These Application Notes describe the configuration steps required Empirix OneSight Voice Quality to successfully interoperate with Avaya Aura® Communication Manager 6.0. All feature and serviceability test cases were completed.

9. Additional References

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

1. *Administering Avaya Aura™ Communication Manager*, Document 03-300509, Issue 6.0, Release 6.0, June 2010, available at <http://support.avaya.com>.
2. *Empirix OneSight Administrator Guide*, Version 7.3, available upon request from Empirix technical support.
3. *Empirix OneSight Operator Guide*, Version 7.3, available upon request from Empirix technical support.

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