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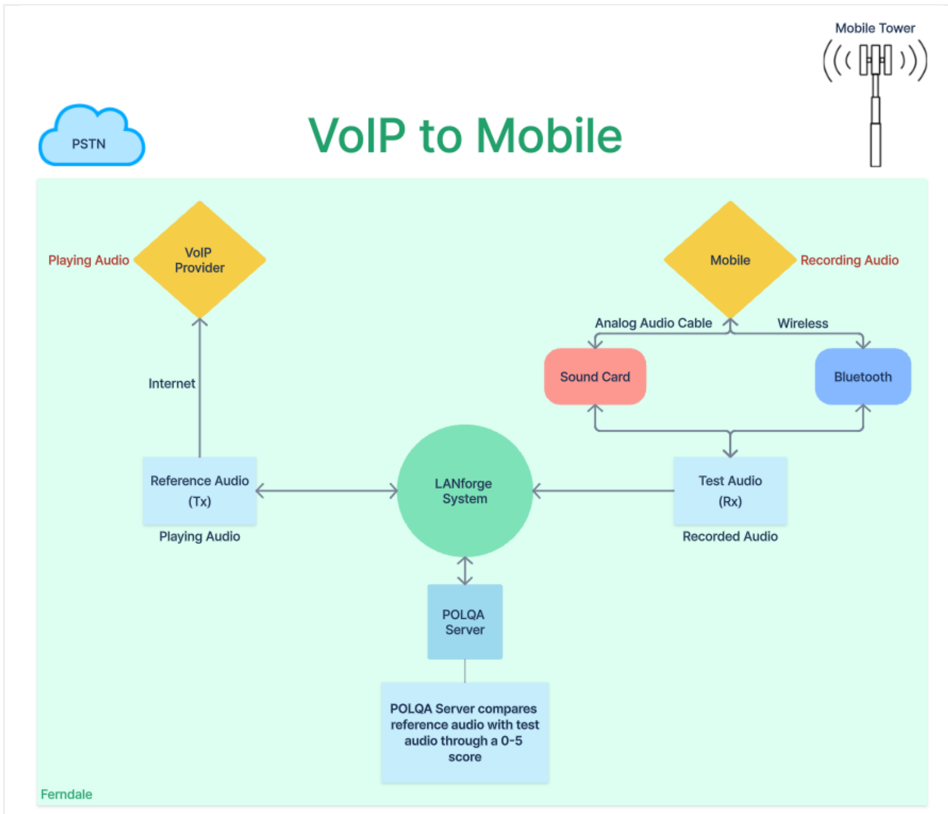
Audio Quality Testing:
VoIP/SIP and mobile calls using POLQA (Basic Setup)

Goal: Evaluate the voice/speech audio quality made between VoIP-SIP and mobile calls through POLQA scoring server where both the endpoints are located on the same LANforge system.

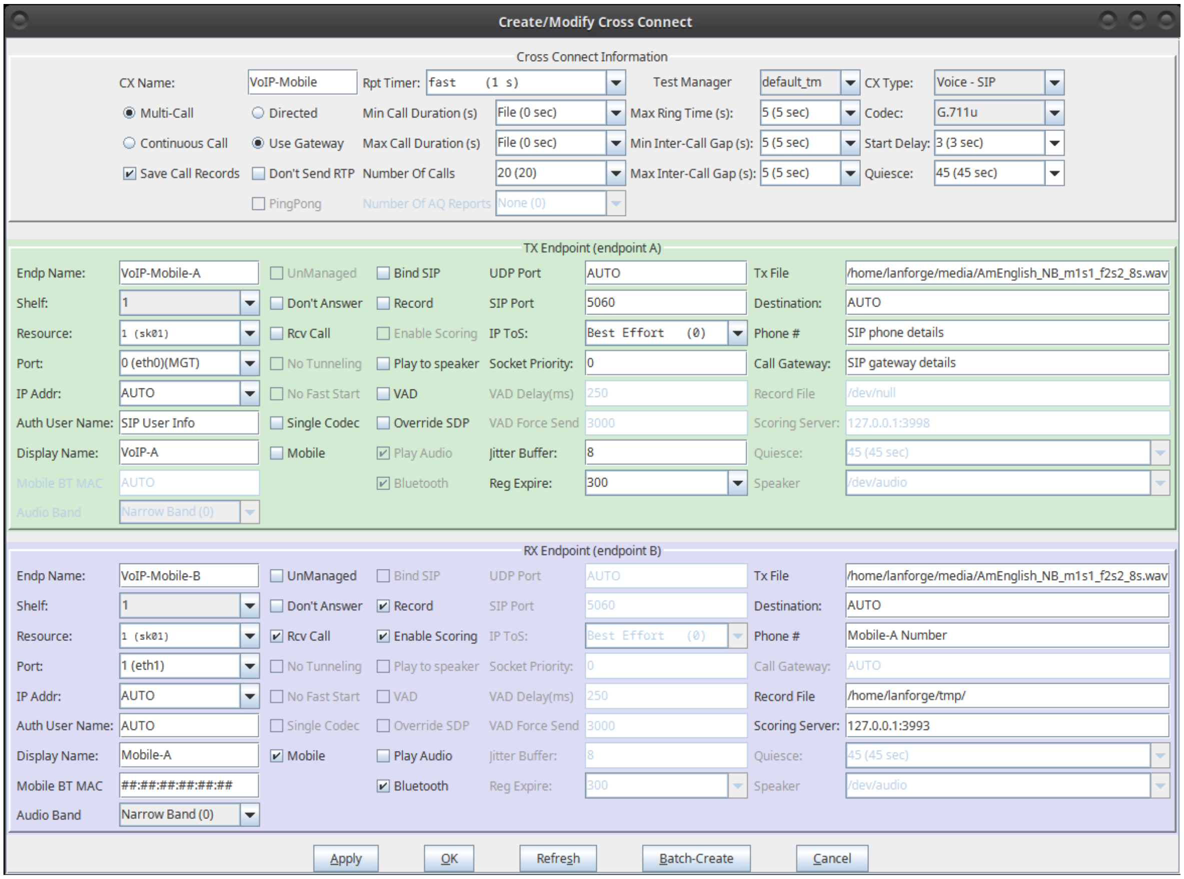
Consider an example:
At Ferndale location, LANforge system makes 20 multiple single calls using VoIP-SIP towards connected mobile device. LANforge system plays a reference audio file over the VoIP-SIP call. The same call is being recorded by LANforge system from the mobile device using Bluetooth or audio cable. After the call completes, both the reference audio file and recorded audio file are evaluated by the installed POLQA server. The POLQA server scores the recording based on audio quality loss during the call.



1. Requirements:
   A. LANforge system. (version 5.4.8)
   B. LANforge licenses.
   C. POLQA server with required licenses
   D. POLQA standard reference audio files.
   E. Bluetooth USB dongle.
   F. Analog sound card and audio cables. (If testing over analog audio cable)
   G. VoIP service provider. *(Customer provided)*
   H. Mobile device (Android or IOS) having Bluetooth and active SIM/eSIM card. *(Customer provided)*
   I. Mobile network like VoLTE, VoNR, etc. *(Customer provided)*

J. Internet access. *(Customer provided)*

2. Configurations:
   A. LANforge and POLQA licenses are installed.
   B. AQ configuration: Follow `/home/lanforge/audio-bluetooth/README.txt`
   C. Then reboot the system.
   D. On the LANforge system, open the **GUI**.
   Under **VoIP/RTP** tab, select **Create**.



A. Cross Connect details to be filled are:

I. **Cross Connect Information:**

i. **CX name:** *VoIP-Mobile*

ii. Select **Multi-Call** checkbox.

iii. Select **Save Call Records** checkbox to save recordings for further analysis.

iv. Select **Use Gateway** checkbox.

v. **Min/Max Call Duration:** *File*

vi. **Number Of Calls:** *20*

vii. **Min/Max Inter Call Gap:** *5 sec*

viii. Rest can remain defaults

II. **TX Endpoint A:** Fill the TX Endpoint A with VoIP-SIP details.

i. **Resource:** *LANforge system Hostname*

ii. **Port:** Management Port with Internet access.

iii. **Auth User Name:** *VoIP-SIP User info*

iv. **Display Name:** *VoIP-SIP Name*

v. Deselect **Rcv Call** checkbox.
(VoIP-SIP is going to make calls and not receive in this case.)

vi. Deselect **Mobile** checkbox.
(VoIP-SIP does not need Mobile checkbox.)

vii. **Tx file:** */home/lanforge/media/AmEnglish_NB_m1s1_f2s2_8s.wav*

viii. **Destination:** *AUTO*

ix. **Phone:** *VoIP-SIP phone number*

x. **Call Gateway:** *VoIP-SIP Call Gateway info*

III. **RX Endpoint B:** Fill the RX Endpoint B with mobile details.

i. **Resource:** *LANforge system Hostname*

ii. **Port:** Management Port with Internet access.

iii. **Auth User Name:** *AUTO*

iv. **Display Name:** *Mobile Name*

v. **Mobile BT MAC:** *Mobile bluetooth mac address*

vi. Select **Rcv Call** checkbox.

vii. Select **Mobile** checkbox.

viii. Select **Record** checkbox.

ix. Select **Enable Scoring** checkbox for POLQA.

x. **Audio Band:** *Narrow Band*

xi. Select **Bluetooth** checkbox.
(Deselect this option for analog sound card option.)

xii. **Tx file:** */home/lanforge/media/AmEnglish_NB_m1s1_f2s2_8s.wav*

xiii. **Destination:** *AUTO*

xiv. **Phone:** *Mobile number*

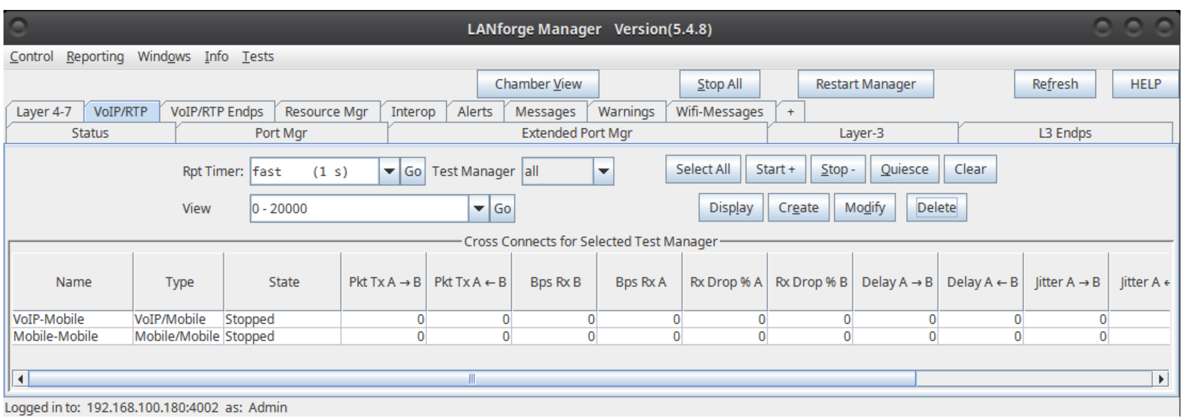
xv. **Record File:** *Recording folder path*

xvi. **Scoring Server:** *POLQA Server Address*

B. Select **Apply**, **OK**

3. Options to start the test:

A. Under **VoIP/RTP** tab, select the test name and click the **Start** button to begin.



B. Using **Command Terminal** and get the test results in **.csv** format.

A. Open a command terminal as a user

B. `cd /home/lanforge/Documents`

C. `git clone https://github.com/greearb/lanforge-scripts`

D. `cd lanforge-scripts/py-scripts/`

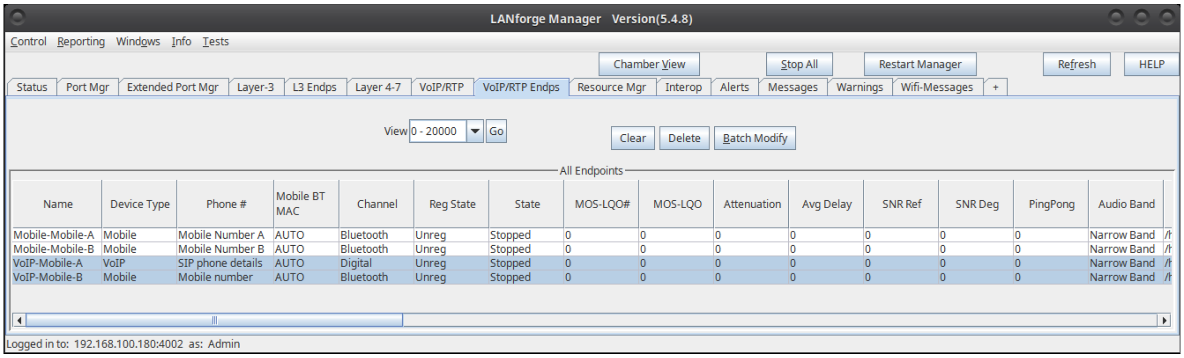
E. `git pull`

F. `./run_voip_cx.py --host localhost --cx_list VoIP-Mobile --csv_file /home/lanforge/report-data/my_test_reports.csv`

G. This command can be integrated for further automation.

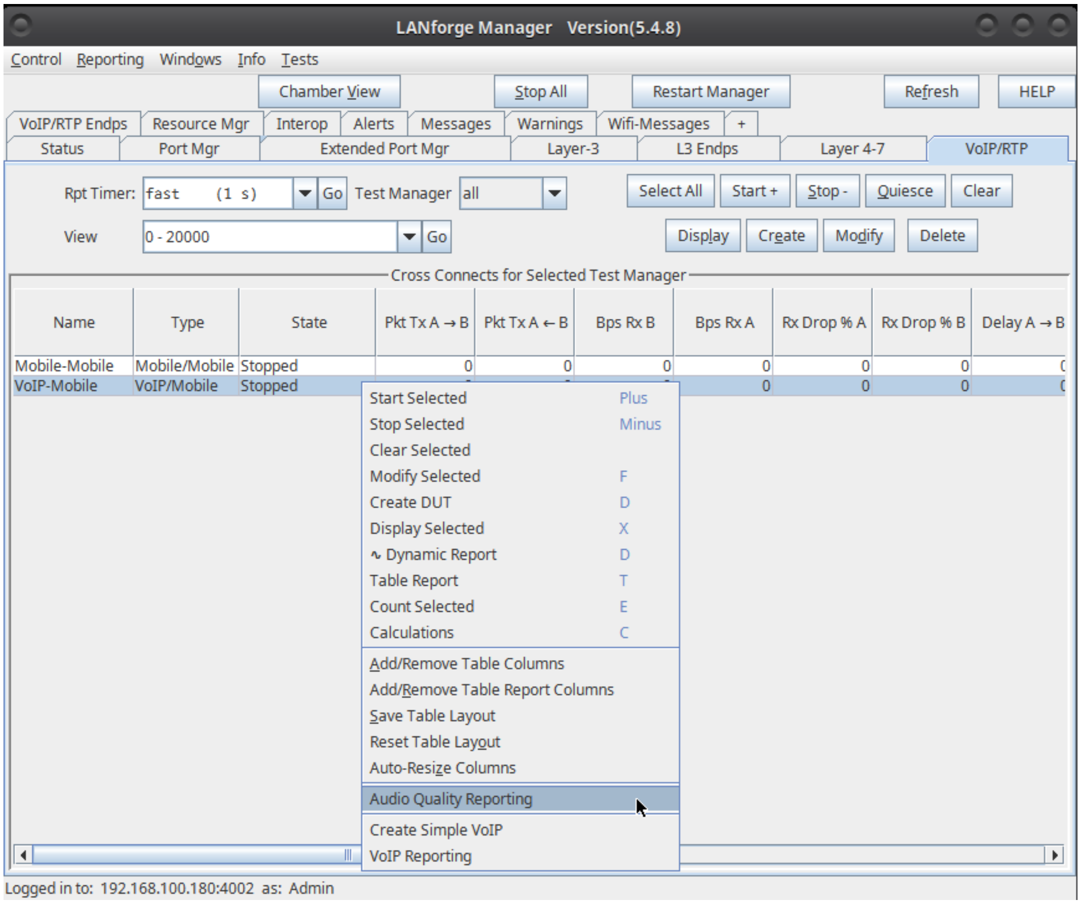
4. AQ Test Results:

A. Option 01: Under **VoIP/RTP Endp** tab, current results will be shown in column/row structure once started.

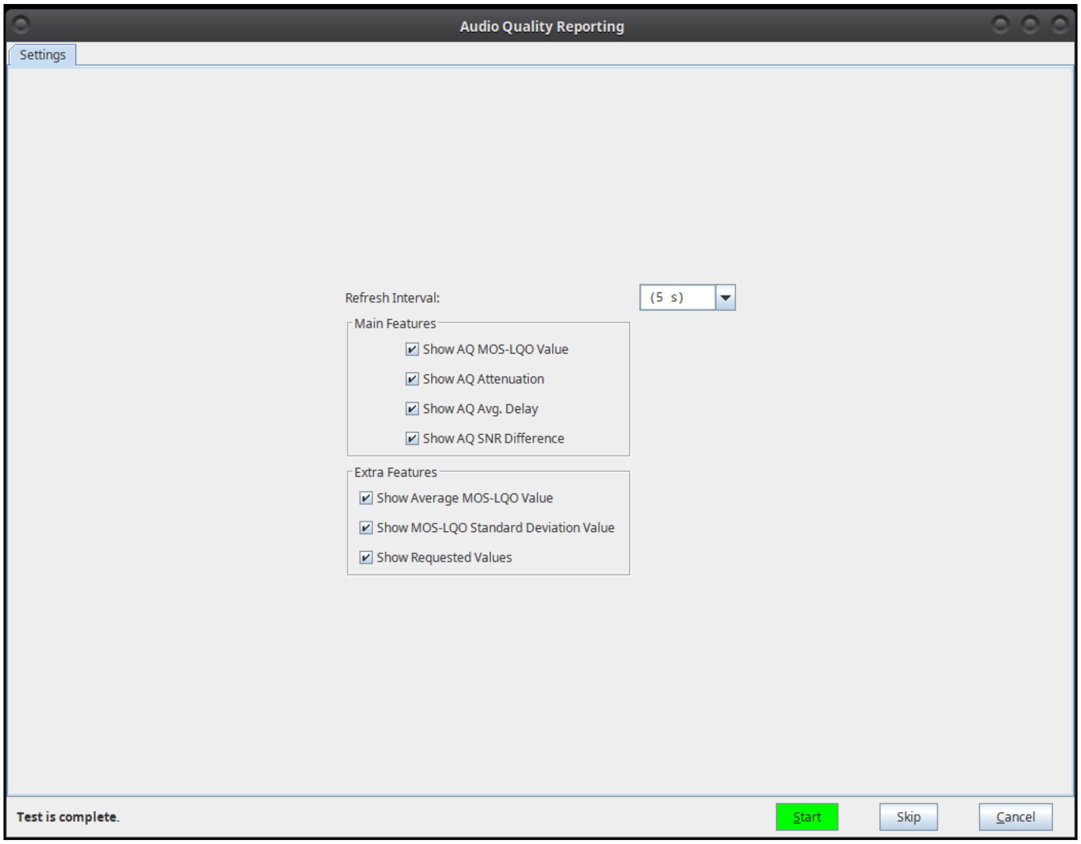


B. Option 02: Using live graphical reporting.

   A. Under **VoIP/RTP** tab, right click on the selected AQ test name, and select **Audio Quality Reporting**.



   B. Select the required configuration and **Start** the monitoring.

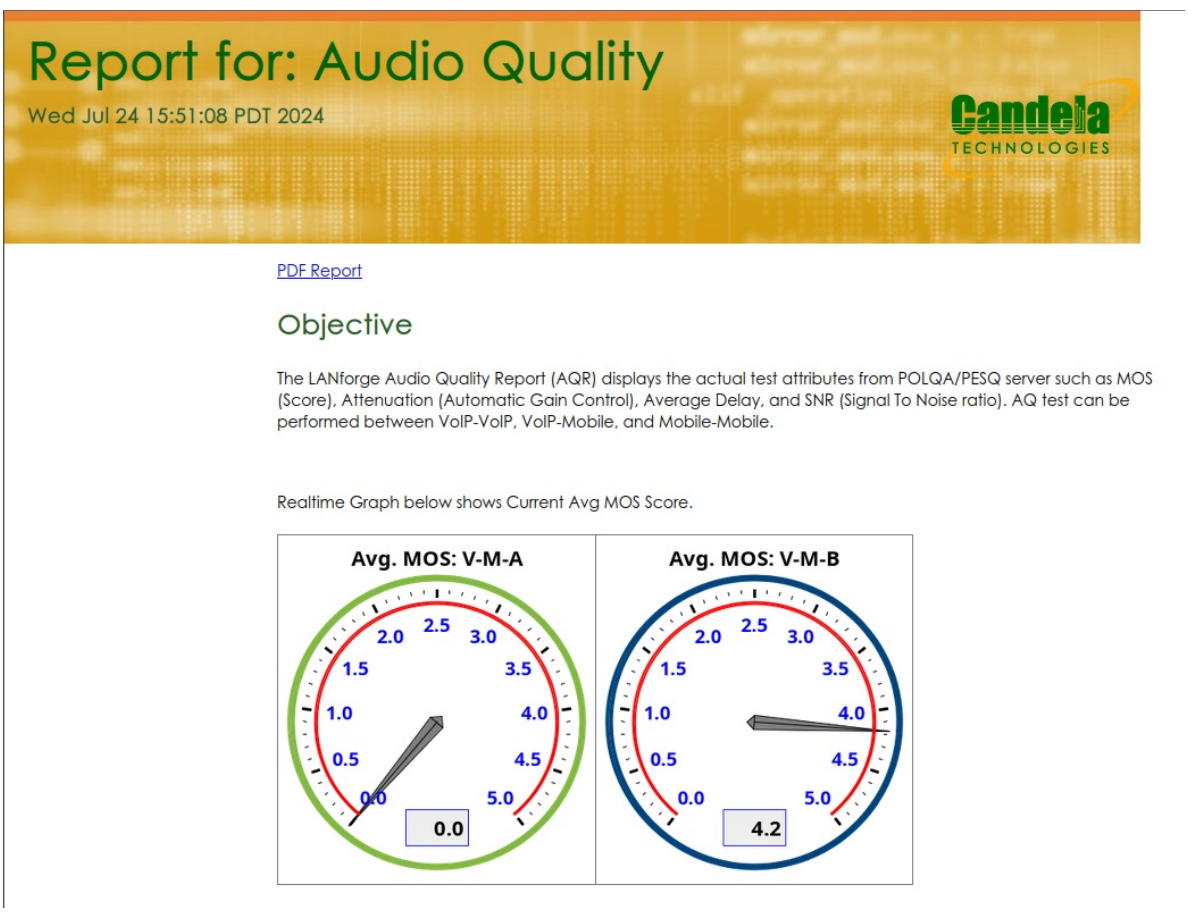


C. Once started, we see Live view of graphical test monitoring which shows detailed reporting.

D. Use **Save HTML** or **Save PDF** to get detailed report including **.csv** data when test is finished.

5. Sample screenshots of Live AQ Reporting.

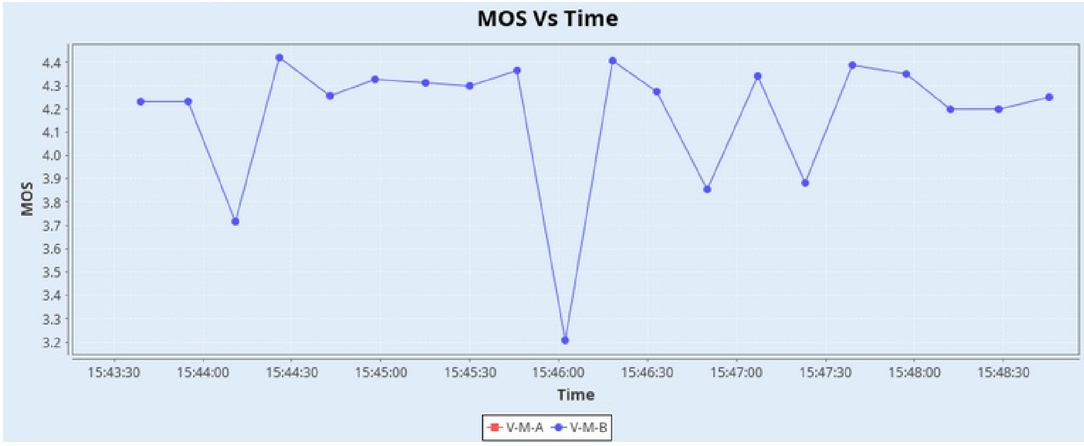
   A. Screenshot 01



B. Screenshot 02

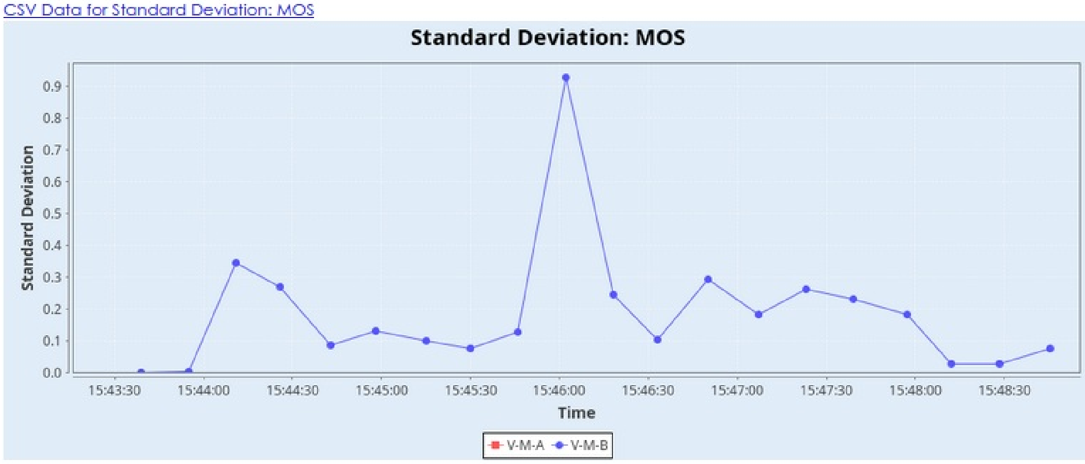
Realtime Graph below shows MOS-LQO score from recording endpoints.

CSV Data for MOS Vs Time



Realtime Graph below shows MOS Standard Deviation.

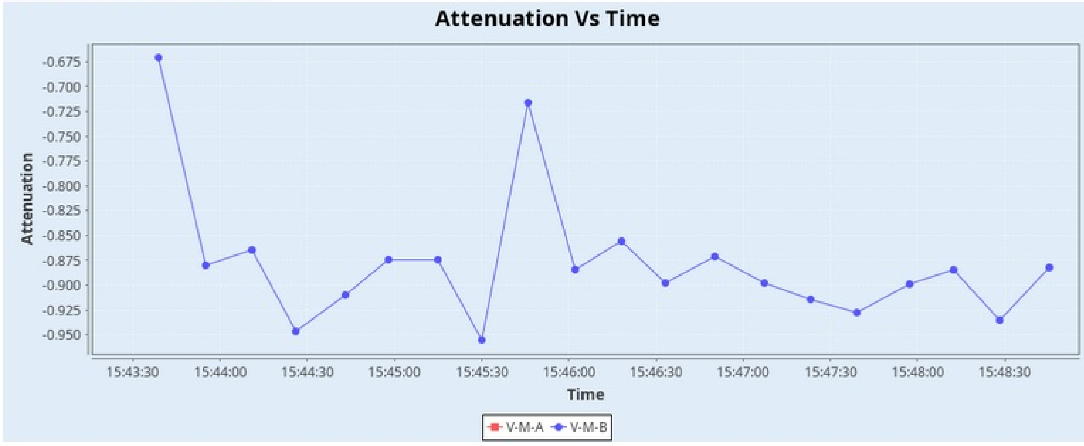
CSV Data for Standard Deviation: MOS



C. Screenshot 03

Realtime Graph below shows AQ Attenuation (AGC) from recording endpoints. Unit: dB

CSV Data for Attenuation Vs Time



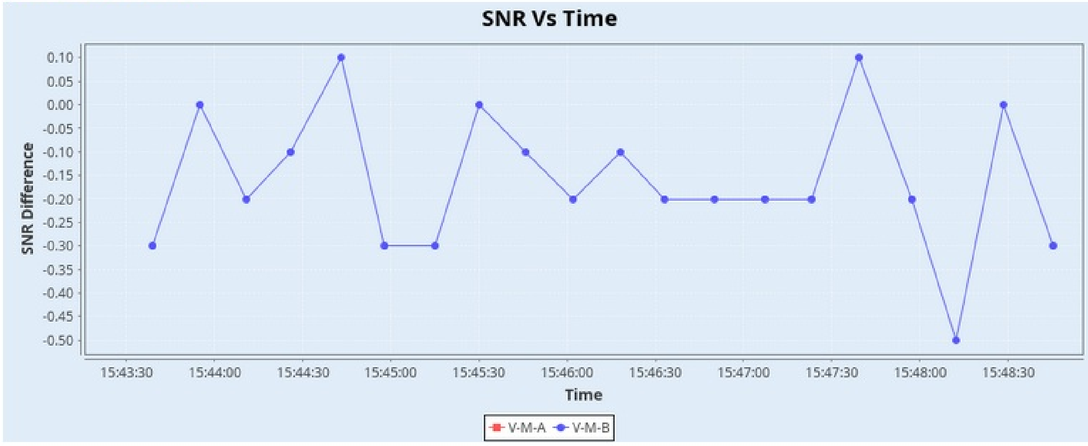
Realtime Graph below shows AQ Avg Delay from recording endpoints. Unit: ms

CSV Data for Avg. Delay Vs Time

D. Screenshot 04

Realtime Graph below shows difference between SNR Reference and SNR Degraded from recording endpoints. Unit: dB

CSV Data for SNR Vs Time



Requested Values:

Endpoint Name	V-M-A	V-M-B
Resource	1 (sk01)	1 (sk01)
Port	eth0	eth1
Device Type	VoIP	Mobile

6. Further analysis: If **Save Call Records** option is true, received audio file along with the reference audio file can be evaluated manually on POLQA server to get more advanced report. Sample Advanced Report

7. If you need assistance, you can contact us at support@candelatech.com