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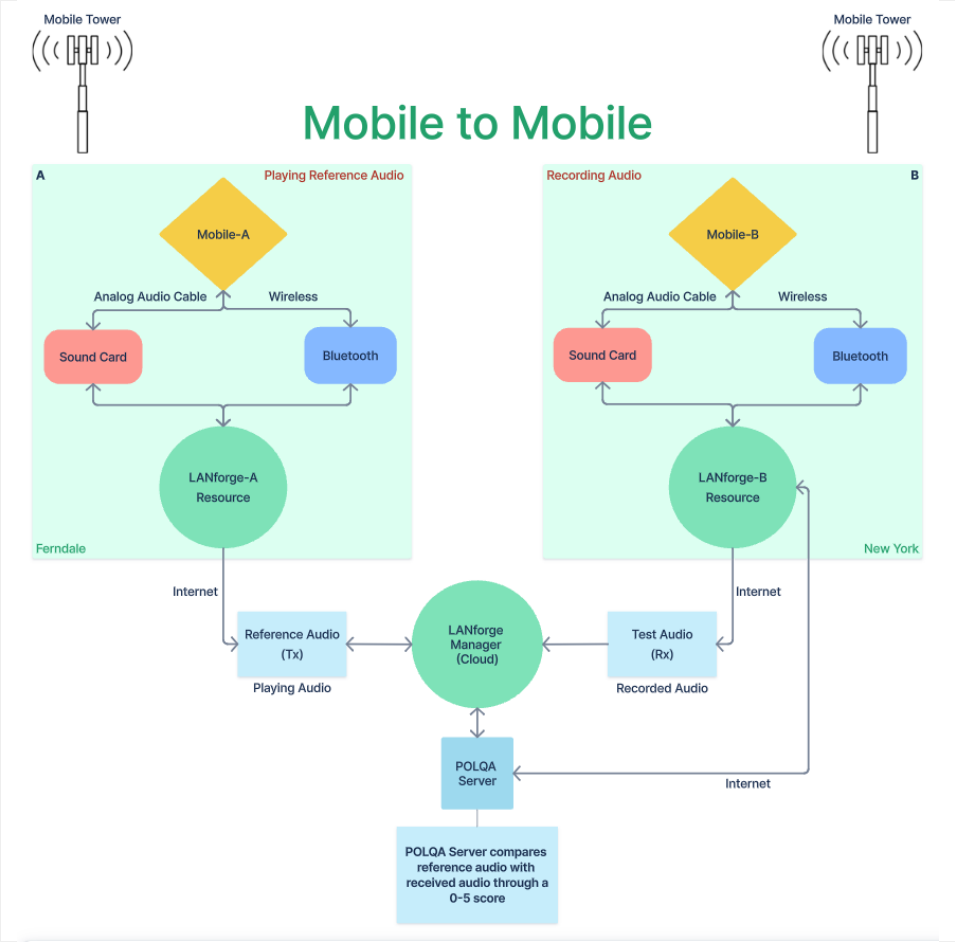
Audio Quality Testing:
Mobile to mobile calls using POLQA (Advanced Setup)

Goal: Evaluate the voice/speech audio quality made between mobile to mobile calls through POLQA scoring server where both the endpoints are located at different locations.

Consider an example:
LANforge-A (LF resource system, Ferndale location) makes a single long call using Mobile-A towards Mobile-B device which is connected to LANforge-B (LF resource system, New York location). Both of the LANforge resources are connected together to the LANforge manager cloud instance. LANforge-A plays a reference audio file over Mobile-A phone call for multiple times using Bluetooth or audio cable. The call is being recorded by LANforge-B from Mobile-B for multiple times using Bluetooth or audio cable. After the call completes, both the reference audio file and recorded audio file are evaluated by LANforge manager (Cloud) using the POLQA server which is installed on LANforge-B system. The POLQA server scores the recording based on audio quality loss during the call. Multiple location resources can be further clustered from LANforge manager for mesh testing (optional).



1. Requirements:
   A. LANforge systems (version 5.4.8). One cloud manager and minimum two resources.
   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. Mobile device (Android or IOS) having Bluetooth and active SIM/eSIM card. *(Customer provided)*

H. Mobile network like VoLTE, VoNR, etc. *(Customer provided)*

I. Internet access. *(Customer provided)*

2. Configuration:

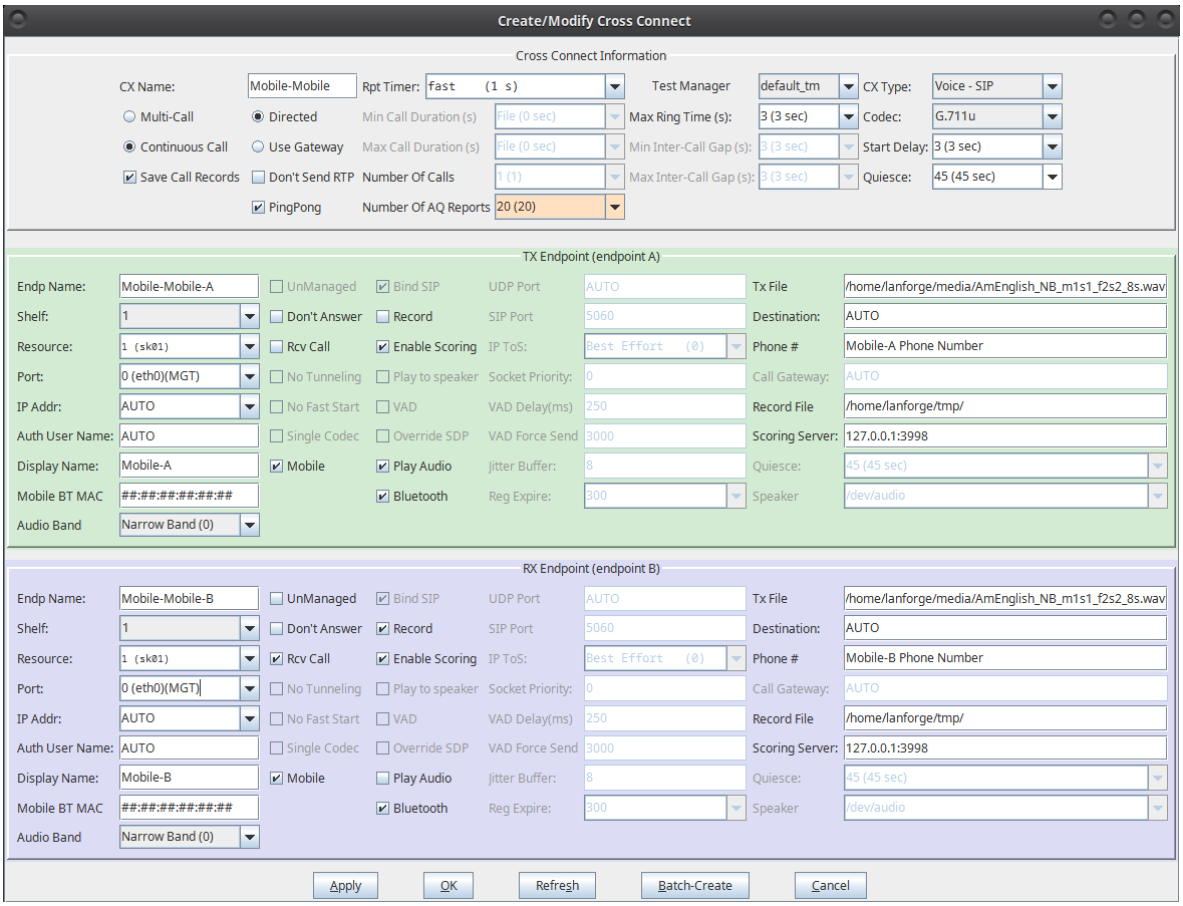
A. Clustering between one LANforge manager (Cloud) towards two or multiple LANforge resources should be done till here.

B. LANforge and POLQA licenses are installed.

C. AQ configuration: Follow `/home/lanforge/audio-bluetooth/README.txt` on all LANforge resources.

D. Then reboot all the systems.

E. On the LANforge manager (cloud), open the **GUI**.
Under **VoIP/RTP** tab, select **Create**.



A. Cross Connect details to be filled are:

I. **Cross Connect Information:**

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

ii. Select **Continuous Call** checkbox.

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

iv. Select **Directed** checkbox as mobile devices here does not require Gateway.

v. Select **PingPong** checkbox for alternate play and record event count on each endpoint.

vi. **Number Of AQ Reports:** *20*
(Means, 20 pingpong events on each endpoint)

vii. Rest can remain defaults

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

i. **Resource:** *LANforge-A resource Hostname*
(Ferndale location system in this example)

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

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

iv. **Display Name:** *Mobile-A Name*

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

vi. Deselect **Rcv Call** checkbox.

vii. Select **Mobile** checkbox.

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

ix. **Audio Band:** *Narrow Band*
(Optional: Super Wide Band also supported)

x. Select **Play Audio** checkbox.

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-A number*

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

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

III. **RX Endpoint B:** Fill the RX Endpoint B with Mobile-B details.

i. **Resource:** *LANforge-B resource Hostname*
(New York location system in this example)

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

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

iv. **Display Name:** *Mobile-B Name*

v. **Mobile BT MAC:** *Mobile-B 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*
(Optional: Super Wide Band also supported)

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*

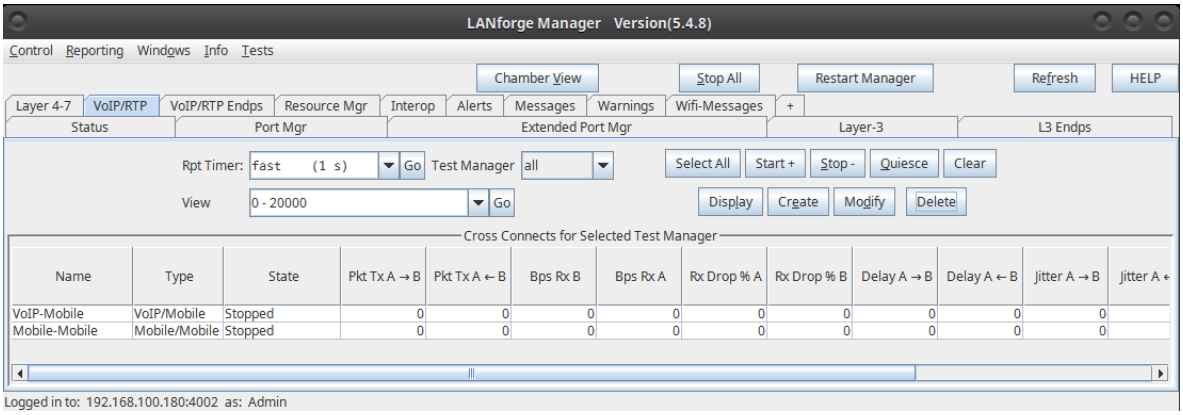
xiv. **Phone:** *Mobile-B number*

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/`

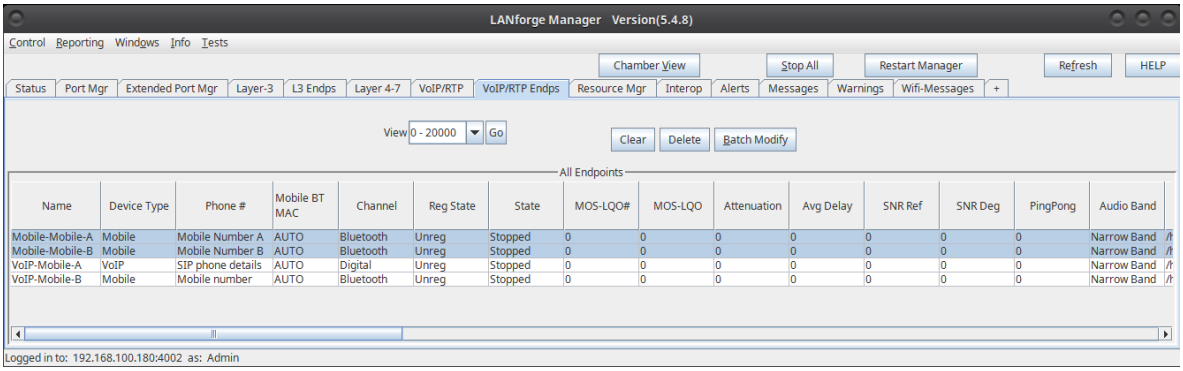
E. `git pull`

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

G. This command can be integrated for further automation.

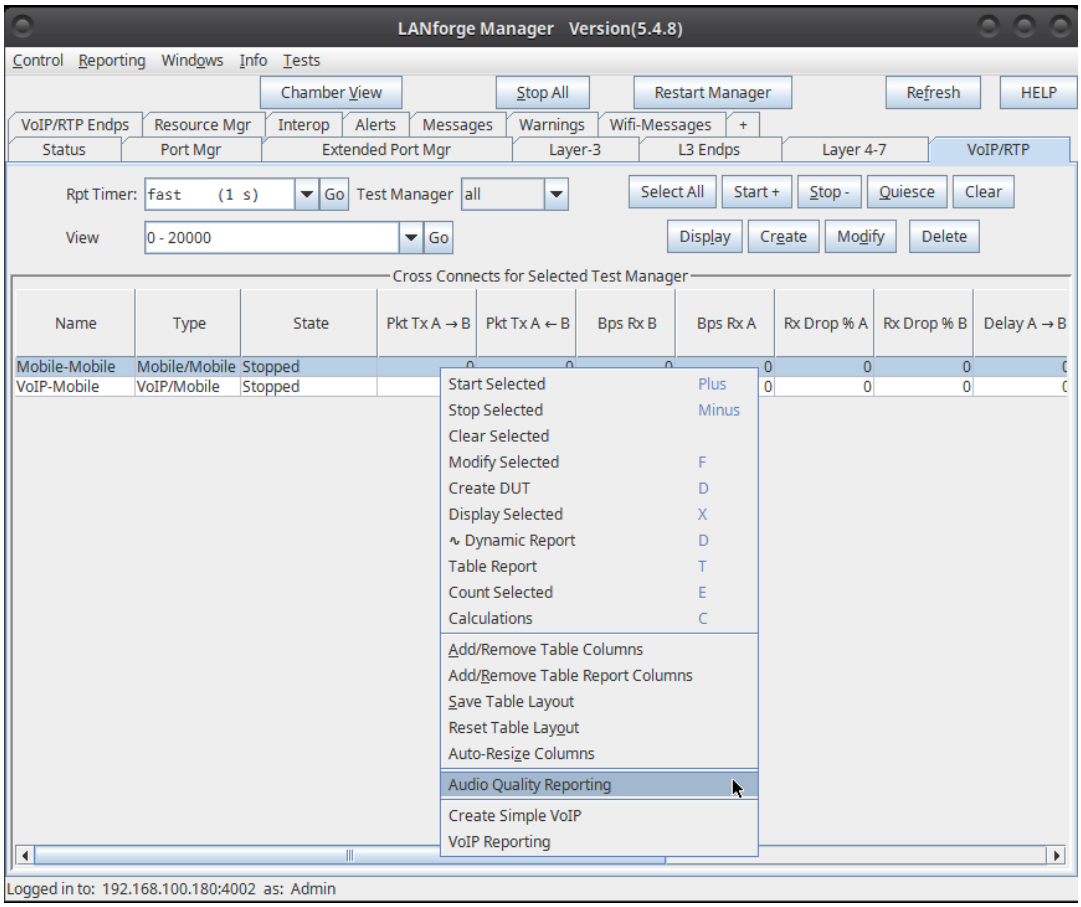
4. AQ Test Results:

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

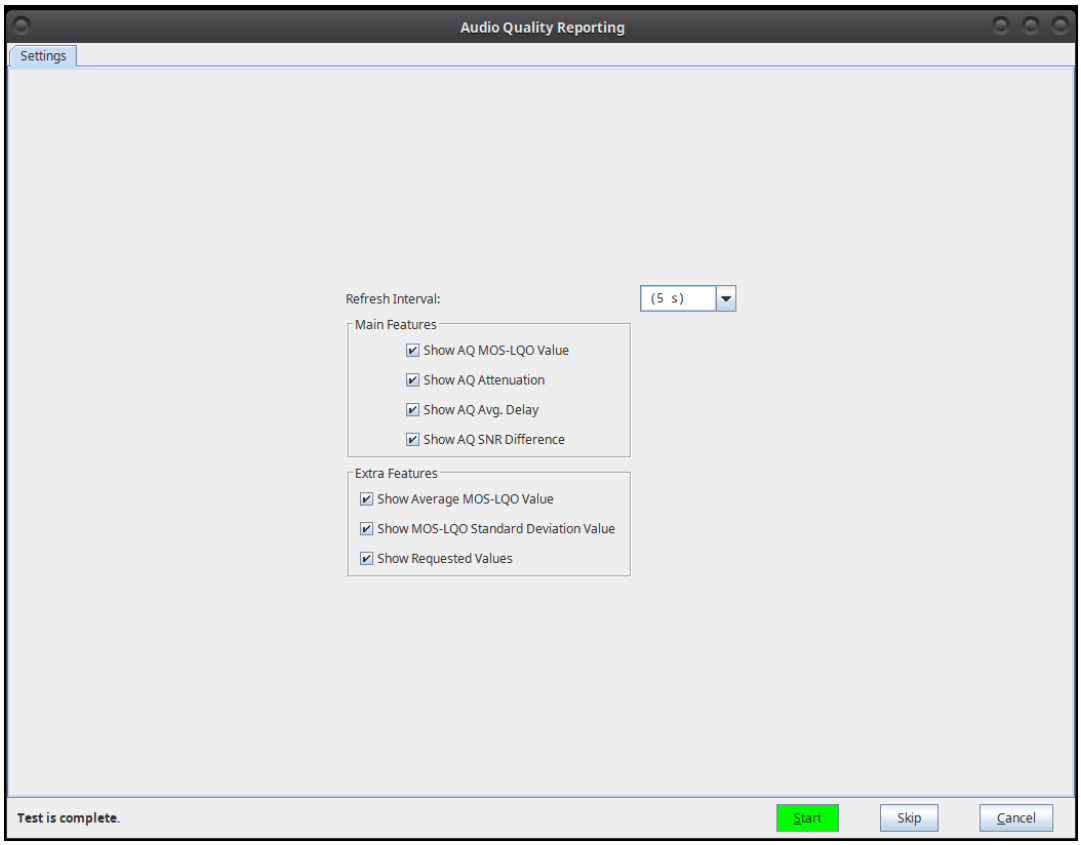


B. Option 02: Using live graphical reporting.

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

Report for: Audio Quality

Wed Jul 24 16:05:08 PDT 2024

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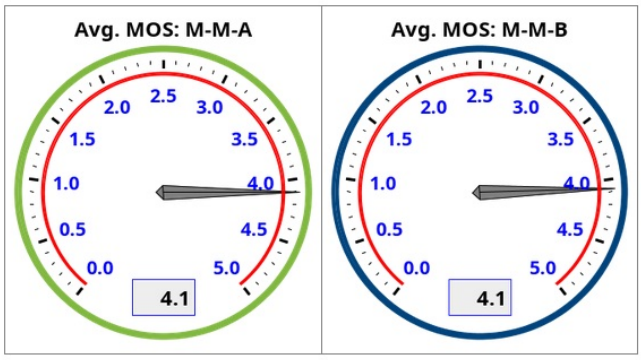
PDF Report

Objective

The LANforge Audio Quality Report (AQR) displays the actual test attributes from POLQA/PESQ server such as MOS (Score), Attenuation (Automatic Gain Control), Average Delay, and SNR (Signal To Noise ratio). AQ test can be performed between VoIP-VoIP, VoIP-Mobile, and Mobile-Mobile.

Realtime Graph below shows Current Avg MOS Score.



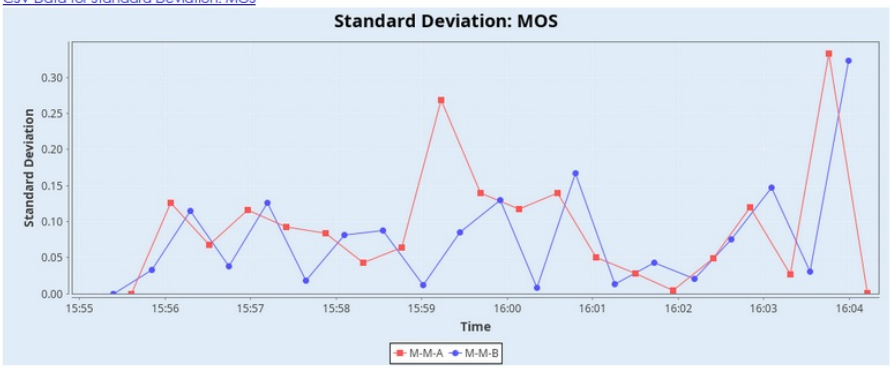
B. Screenshot 02

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

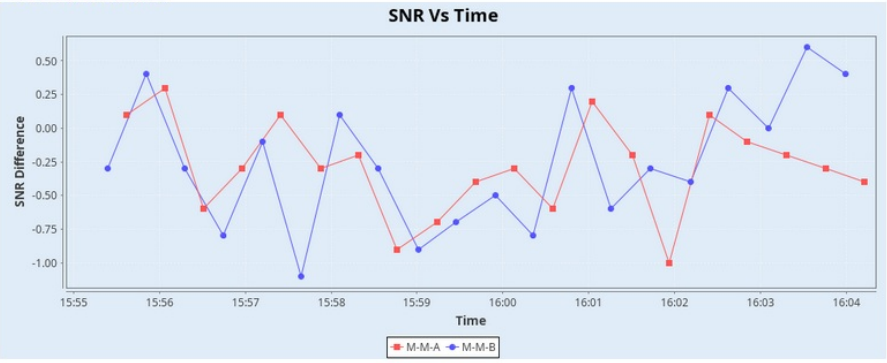
Realtime Graph below shows AQ Avg Delay from recording endpoints. Unit: ms

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	M-M-A	M-M-B
Resource	1 (sk01)	1 (sk01)
Port	eth0	eth1
Device Type	Mobile	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