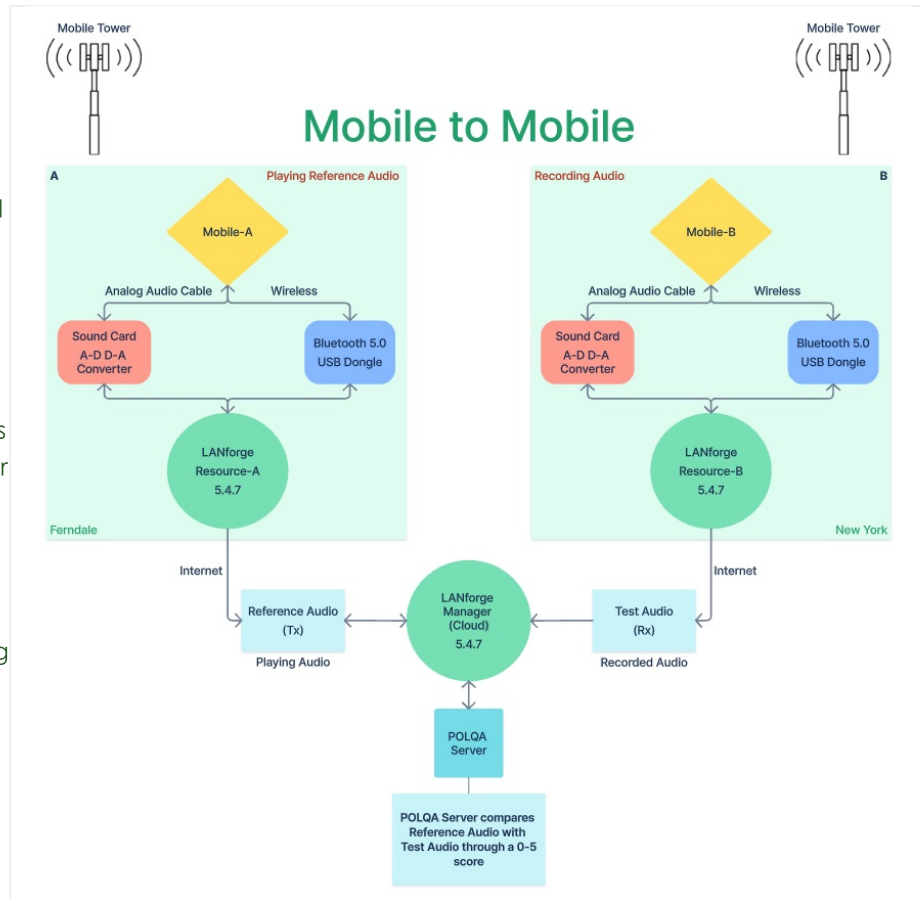


Mobile-Mobile Audio Quality Testing using POLQA/PESQ

Goal: Evaluate the voice call quality made between two Mobile phones through POLQA scoring server. PESQ can also be used in place of POLQA here.

Consider an example: LANforge-A (resource) makes a Mobile phone call towards another Mobile device connected to LANforge-B (resource). Both the LANforge resources are connected together via LANforge manager (cloud). LANforge resource-A plays a reference audio file over the call through analog audio cable or bluetooth. The incoming call is being recorded by LANforge resource-B through analog audio cable or bluetooth. After the call completes, both the reference audio file and recorded audio file are evaluated by LANforge manager (cloud) through the POLQA server. The POLQA server scores the recording, based on audio quality loss during the call.



1. Requirements:

- A. LANforge systems (version 5.4.7). One manager and atleast one resource.
- B. LANforge licenses
- C. POLQA license and server
- D. POLQA standard reference audio files
- E. Mobile Phones having Bluetooth connection and active SIM cards.
- F. Bluetooth USB dongles
- G. Analog audio cables
- H. USB sound cards
- I. Internet access
- J. Mobile network

2. Configuration:

- A. Connection between one or more LANforge resource systems towards one LANforge manager (Cloud)

should be done till here.

- B. LANforge licenses and POLQA licenses are installed.
- C. Installation steps: Follow /home/lanforge/audio-bluetooth/README.txt on all LANforge resources.
- D. After installation, please **reboot** all the LANforge systems.
- E. On the LANforge manager (cloud), open the **GUI**.
In the VoIP/RTP tab, select **Create**.

The screenshot shows the 'Create/Modify Cross Connect' window. It is divided into three main sections: 'Cross Connect Information', 'TX Endpoint (endpoint A)', and 'RX Endpoint (endpoint B)'.
- **Cross Connect Information:** CX Name: M-M, Rpt. Timer: Fast (1 s), Test Manager: default_tm, CX Type: Voice - SIP, Multi-Call selected, Directed selected, Min Call Duration: File, Max Ring Time: 20, Codec: G.711u, Max Call Duration: File, Min Inter-Call Gap: 15, Start Delay: 15, Don't Send RTP selected, Number Of Calls: 10, Max Inter-Call Gap: 15, Quiesce: 45 (45 sec).
- **TX Endpoint (endpoint A):** Endp Name: M-M-A, UnManaged, Bind SIP, UDP Port: AUTO, Tx File: /home/lanforge/media/AmEnglish_NB_m1s1_f2s2_8s.wav, Shelf: 1, Don't Answer, Record, SIP Port: 5060, Destination: AUTO, Resource: 1 (sk01), Rcv Call, Enable Scoring, IP ToS: Best Effort (0), Phone #: Caller Phone Number, Port: 0 (eth0)(MGT), No Tunneling, Play to speaker, Socket Priority: 0, Call Gateway: anonymous@0, IP Addr: AUTO, No Fast Start, VAD, VAD Delay(ms): 250, Record File: /dev/null, Auth User Name: user 1, Single Codec, Override SDP, VAD Force Send: 3000, Scoring Server: 127.0.0.1:3998, Display Name: Caller Phone Details, Mobile checked, Play Audio checked, Jitter Buffer: 8, Quiesce: 45 (45 sec), Bluetooth, Reg Expire: 300, Speaker: /dev/audio.
- **RX Endpoint (endpoint B):** Endp Name: M-M-B, UnManaged, Bind SIP, UDP Port: AUTO, Tx File: /home/lanforge/media/AmEnglish_NB_m1s1_f2s2_8s.wav, Shelf: 1, Don't Answer, Record checked, SIP Port: 5060, Destination: AUTO, Resource: 3 (sk03), Rcv Call checked, Enable Scoring checked, IP ToS: Best Effort (0), Phone #: Receiver Phone Number, Port: 0 (eth0)(MGT), No Tunneling, Play to speaker, Socket Priority: 0, Call Gateway: anonymous@0, IP Addr: AUTO, No Fast Start, VAD, VAD Delay(ms): 250, Record File: /home/lanforge/tmp/, Auth User Name: user 2, Single Codec, Override SDP, VAD Force Send: 3000, Scoring Server: 127.0.0.1:3993, Display Name: Receiver Phone Details, Mobile checked, Play Audio checked, Jitter Buffer: 8, Quiesce: 45 (45 sec), Bluetooth, Reg Expire: 300, Speaker: /dev/audio.
Buttons at the bottom: Apply, OK, Refresh, Batch-Create, Cancel.

A. Cross Connect details to be filled are:

- I. **TX Endpoint A:** Mobile-A performs an outbound call towards Mobile-B. During this call, Mobile-A plays an audio Tx File over the call which is triggered from LANforge resource-A via analog cable or bluetooth connection.
 - i. **Phone:** Phone Number A
 - ii. **Auth User Name:** Mob User A
 - iii. **Resource:** LANforge resource-A (hostname sk01 from Ferndale location in this example)
 - iv. **Port:** Management Port with Internet access (eth0 in this example)
 - v. **Display Name:** Mobile A mac_address
 - vi. **Tx file:** reference audio file to be played on call
 - vii. Checkboxes:
 - i. **Mobile:** True
 - ii. **Rcv Call:** False (become a caller)
 - iii. **Bluetooth:** True (Play audio through Bluetooth channel optional)
Bluetooth: False (Play audio through analog audio cable)
 - iv. **Record:** False
 - v. **Enable Scoring:** False
 - vi. **Play Audio** True
- II. **RX Endpoint B:** Mobile-B connected to LANforge resource-B receives an inbound call from Mobile-A. LANforge resource-B starts recording the active incoming audio call from Mobile-B via Bluetooth channel or analog audio cable option at the specified Record File location. The recorded file is then evaluated by POLQA server against the original Tx File.

- i. **Phone:** Phone Number B
- ii. **Auth User Name:** Mob User B
- iii. **Resource:** LANforge resource-B (hostname sk03 from New York location in this example)
- iv. **Port:** Management Port with Internet access (eth0 in this example)
- v. **Display Name:** Mobile B mac_address
- vi. **Tx file:** same audio file as TX Endpoint-A Tx File
- vii. Checkboxes:
 - i. **Mobile: True**
 - ii. **Rcv Call: True** (become a receiver)
 - iii. **Bluetooth: True** (Record call through Bluetooth channel optional)
Bluetooth: False (Record call through analog audio cable)
 - iv. **Record: True**
 - v. **Enable Scoring: True** (Enable POLQA scoring)
- viii. **Record File:** Recording folder path
- ix. **Scoring Server:** POLQA Server Address

B. Select **Apply**, **OK**, and **START** the test.

C.

The screenshot shows the LANforge Manager Version 5.4.7 interface. The 'VoIP/RTP Endps' tab is selected. The main display area shows a table titled 'Cross Connects for Selected Test Manager' with the following data:

Name	Type	State	Pkt Tx A → B	Pkt Tx A ← B	Bps Rx B	Bps Rx A	Rx Drop % A	Rx Drop % B	Delay A → B	Delay A ← B	Jitt
M-M	SIP/G.711u	In progress	0	0	0	0	0	0	0	0	0

The interface also shows a 'Rpt Timer' set to 'fast (1 s)' and a 'View' range of '0 - 20000'. The status bar at the bottom indicates 'Logged in to: localhost:4002 as: Admin'.

- F. Go To **VoIP/RTP Endps** tab to get the **POLQA Scores**.
(MOS-LQO, Attenuation AGC, Avg. Delay, SNR Reference, SNR Degraded).

LANforge Manager Version(5.4.7)

Control Reporting Windows Info Tests

Chamber View Stop All Restart Manager Refresh HELP

Serial Spans PPP-Links vAP Stations DUT Profiles Traffic-Profiles Event Log Alerts Messages Warnings +

Attenuators RF-Generator File-IO Generic Test Mgr Connection Group Collision-Domains Resource Mgr

Status Port Mgr Extended Port Mgr Layer-3 L3 Endps Layer 4-7 Armageddon WanLinks VoIP/RTP VoIP/RTP Endps

View 0 - 20000 Go Clear Delete Batch Modify

All Endpoints

Name	State	Reg State	MOS-LQO#	MOS-LQO	Attenuati...	Avg Delay	SNR Ref	SNR Deg	Scoring B...	Tx Pkts	Rx Pkts	Tx Bytes	Rx Bytes
M-M-A	On Hook	Unreg	0	0	0	0	0	0	0	0	0	0	0
M-M-B	On Hook	Unreg	0	3.19	-5.371	1290.461	39.0	40.1	0	0	0	0	0

Logged in to: localhost:4002 as: Admin

3. Sample [POLQA Score Report](#) from POLQA server.

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

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