

The logo for VQEG, consisting of the letters 'VQEG' in a white, stylized font with a blue glow effect, set against a black rectangular background.

VQEG

Live Video QoE Project

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Outline

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- Scope
- Content categories
- Live video impairments
- Model specifications
- Decisions reached
- Open Questions

Introduction

- Goal: Defining objective methods for measuring Quality of Experience (QoE) of an audience of a live media streaming session
- Observation: Several factors involved e.g., network, media processing, broadcast and playback devices
- Method: Creating “scalable” machine learning models that correlate to human perception of quality

Scope

● Broadcast Applications

- “one-to-many” applications, a single “streamer” acts as the source of media content and could have a large audience
- streamer and the audience could interact in near real time through out-of-band applications such as text chat, quizzes and polls
- Both TCP and UDP based protocols could be used for media transport
- Examples include Facebook Live, Twitch, Youtube Live

● Conversational Applications

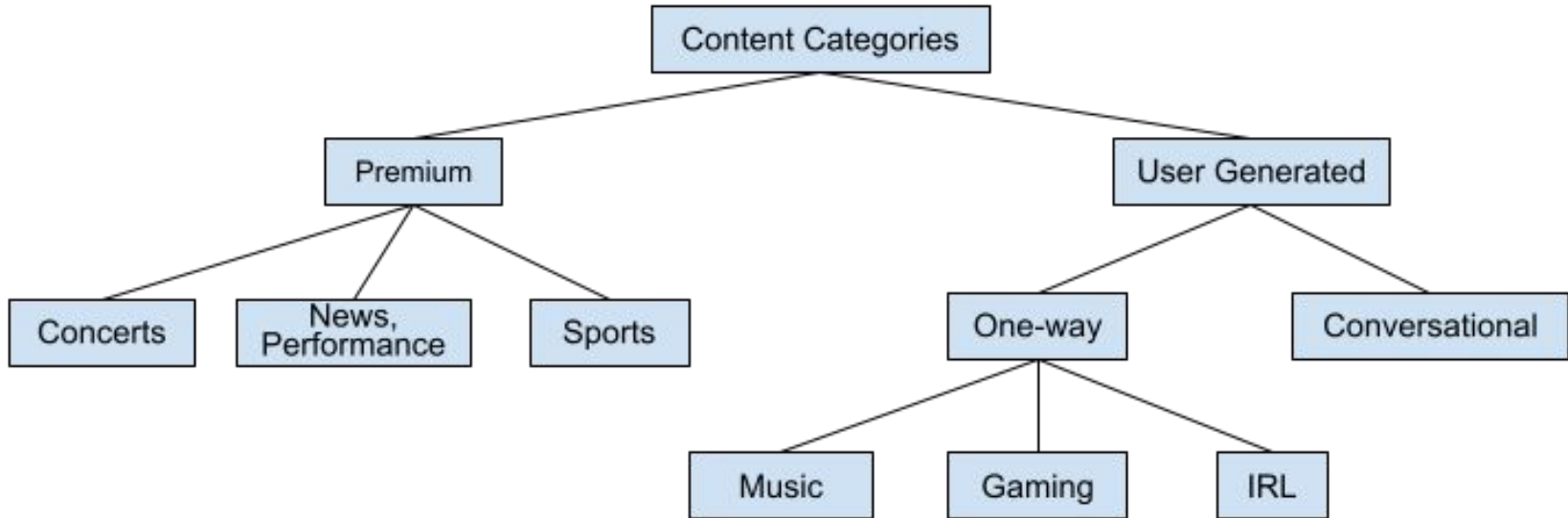
- involve a group of people
- Real-time interactive
- UDP based protocols are used for media transport
- Examples include AWS Chime, Google Meet, Microsoft Teams, and Zoom

Scope

- Real-time Interactivity

- Covers both broadcast and conversational applications
- Demands complex subjective testing where user is subject to real-time service response
- Not in immediate scope
 - Already under considerations by other projects, e.g., ITU-T BBQCG

Content Categories



Live QoE impairments - Audio

#	Distortion	Parameters
1	Uncompressed, high quality speech	Codecs: AAC, MP3, Opus Bitrates: 24, 32 kbps per channel, 64, 128 kbps Sample rates: upto 44.1/48 KHz
2	Uncompressed, high quality music	
3	Compressed speech	
4	Compressed music	
5	Speech with background noise (e.g., animal sounds, wind, police sirens)	
6	Audio packets subject to packet loss - broken audio (no concealment), metallic audio (perhaps because of concealment)	
7	Audio played back faster than natural speed	
8	Audio with echo	
9	Audio with reverberations	
10	Audio clipping	
11	Audio Pops	

Live QoE impairments - Video

#	Distortion	Parameters
1	Compressed video	Video codecs: H.264, H.265, VP9
2	Video packets subject to packet loss (black blocks in decoded video)	Video bitrate: 300 Kbps - 10 Mbps
3	Video frame freezes (concealment, with and without media skipping)	Video resolution: 1080p
4	Random frame drop (caused by jitter)	Display resolution: 1080p Display Type: TV/PC-Monitor/Mobile/Tablet Video frame rate: 15-60 fps

Live QoE impairments – Audio-Visual

#	Distortion
1	Synchronization between audio and video
2	Concurrent audio video freeze
3	Freeze or black screen in video while audio is present

Model Specifications

#	Situation	Corresponding Model Type/Mode	Comment
1.	Access to rendered audio and video frames along with the time of their rendering	Signal-based or hybrid NR (is this characterization accurate?)	Service provider or client use-case
2.	Access to audio and video packets along with their arrival timing, with the ability to decode only audio packets.	Bitstream-based NR (audio: mode 3, video: mode 1)	3rd party network or client use-case
3.	Access to audio and video packets along with their arrival timing, with the ability to decode both audio and video packets.	Bitstream-based NR (audio/video: mode 3)	3rd party network or client use-case
4.	Access to audio and video packets and their arrival timing with the ability to read headers only information	Bitstream-based NR (audio/video: mode 1)	3rd party network use case

Decisions reached

- Time scale
 - 20-30 sec, for audio-video sync issues upto 60 sec
 - Long term integration of quality is not part of the scope
- Subjective test methodology
 - 5 point ACR scale with Hidden Reference
- Video resolution/framerate
 - 1080p, upto 60 fps
- Generation of test conditions
 - at most one impairment in a single multimedia clip
 - simulated distortions
 - Network traces + playback capture from real-world applications

Open Questions

- How to acquire premium content?
 - Can we use the VoD premium content with Live impairments?
- Are there network traces already available which can be used?
- What can be re-used from other SDOs/projects?

References

- [AudioVisual HD Quality Project](#)
- [“Live QoE” Project Proposal](#)