



# VQEG 24

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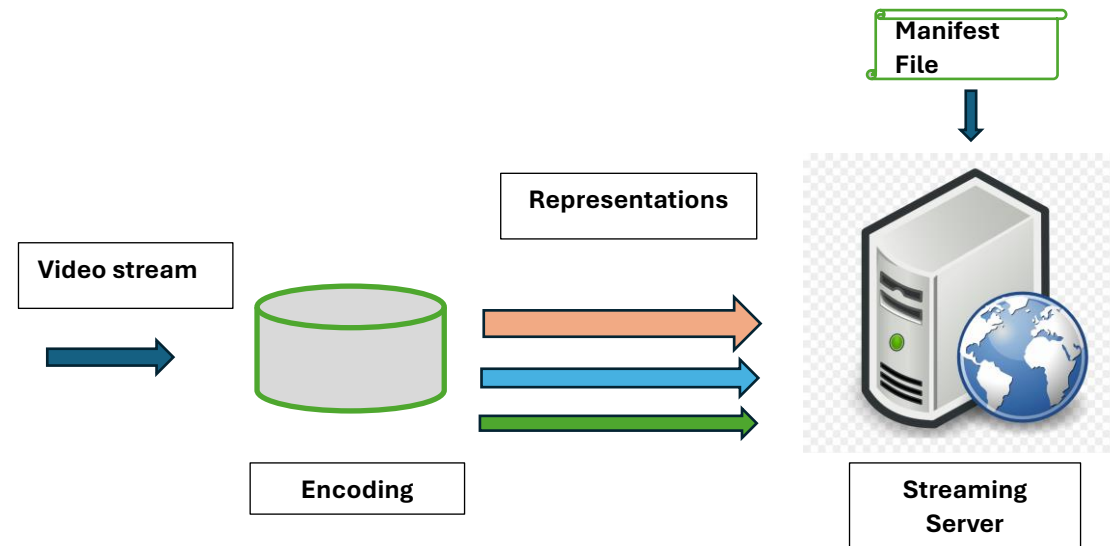
Presenter: Mr. Syed. G Uddin

QoE Based Objective Analysis of Low-Latency Algorithms in DASH.JS



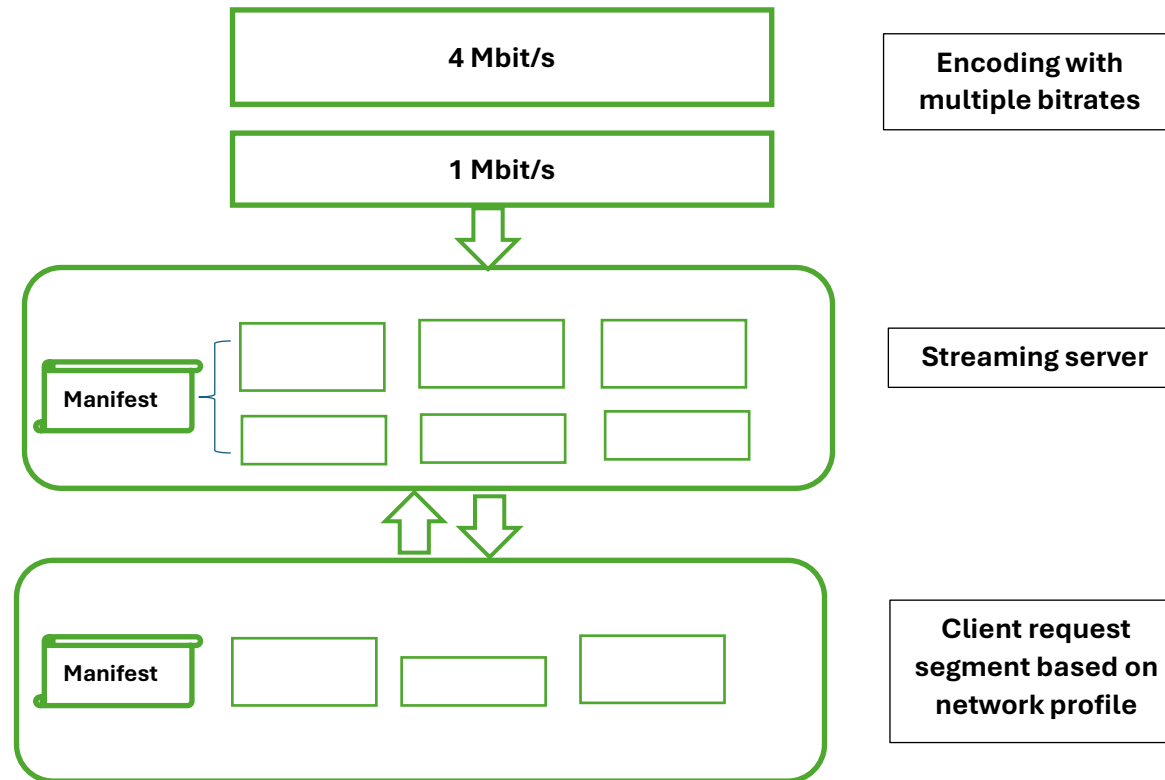
# Introduction

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## DASH FRAMEWORK

# Introduction



# Hypothesis

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*H: Stalling duration, quality switching patterns and segmentation strategies can be optimized using ABR Algorithms in order to increase the perceived quality of the DASH streamed video.*

# ABR Algorithms

## Bandwidth

- Throughput
- Dynamic

## Buffer

- BOLA

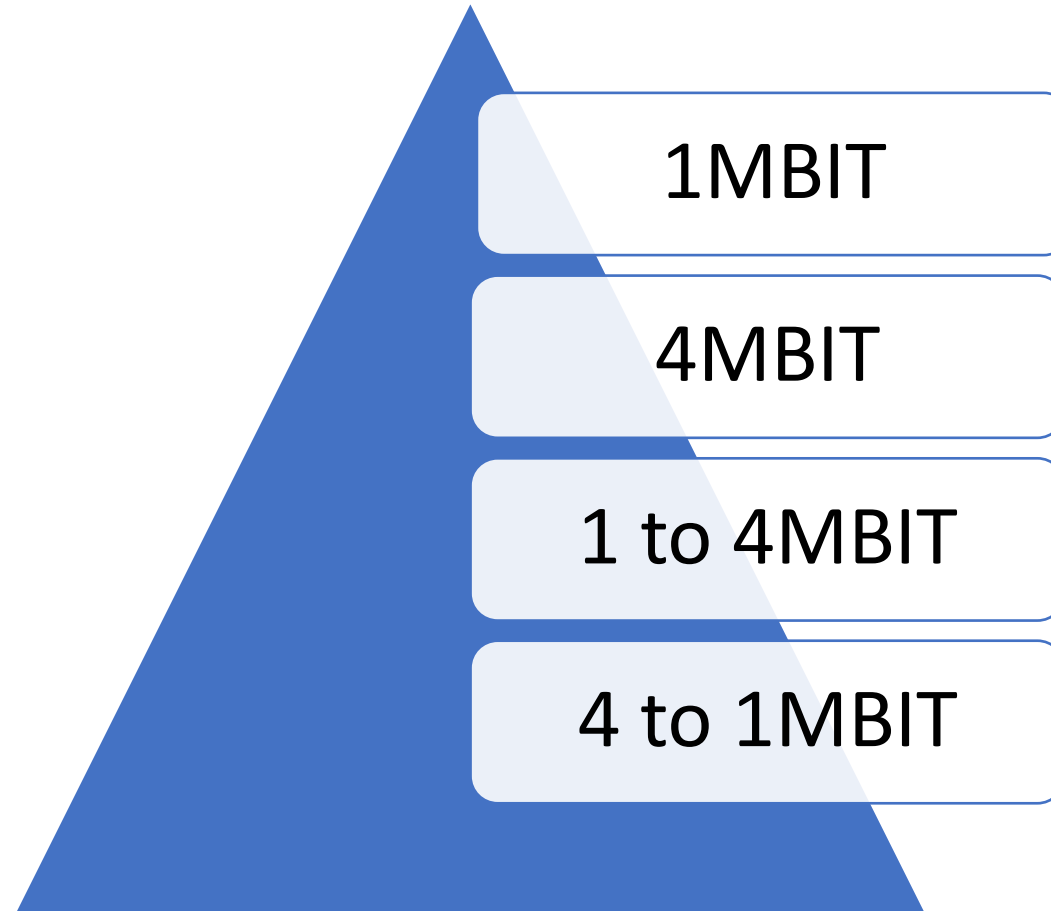
## Latency

- L2ALL
- LOL+

[1] Lyko, T., Broadbent, M., Race, N. et al. Improving quality of experience in adaptive low latency live streaming. *Multimed Tools Appl* 83, 15957–15983 (2024).

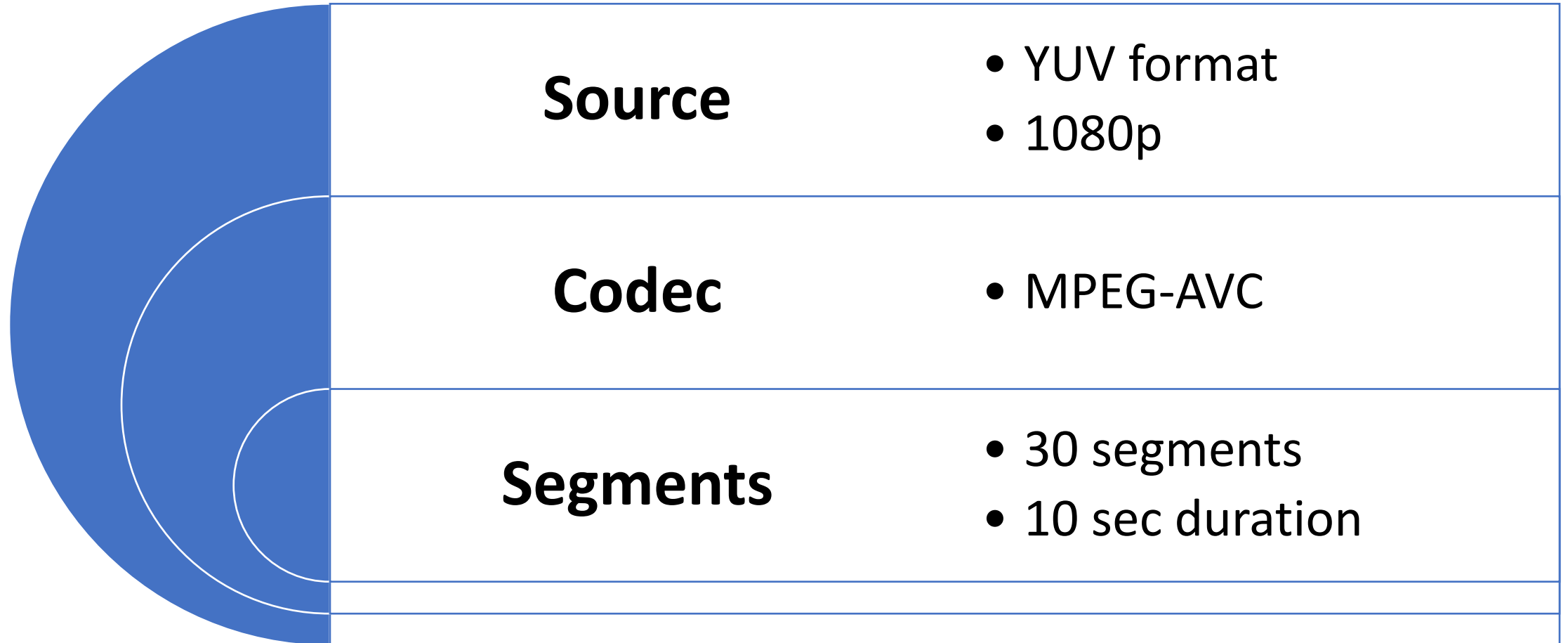
[2] Piers O'Hanlon and Adil Aslam. 2023. Latency Target based Analysis of the DASH.js Player. In *Proceedings of the 14th Conference on ACM Multimedia Systems (MMSys '23)*.

# Network Profiles



- [1] Timmerer, Christian et al. "Which Adaptation Logic? An Objective and Subjective Performance Evaluation of HTTP-based Adaptive Media Streaming Systems." ArXiv abs/1606.00341 (2016)
- [2] Z. Duanmu, A. Rehman and Z. Wang, "A Quality-of-Experience Database for Adaptive Video Streaming," in IEEE Transactions on Broadcasting, vol. 64, no. 2, pp. 474-487, June 2018

# Dataset





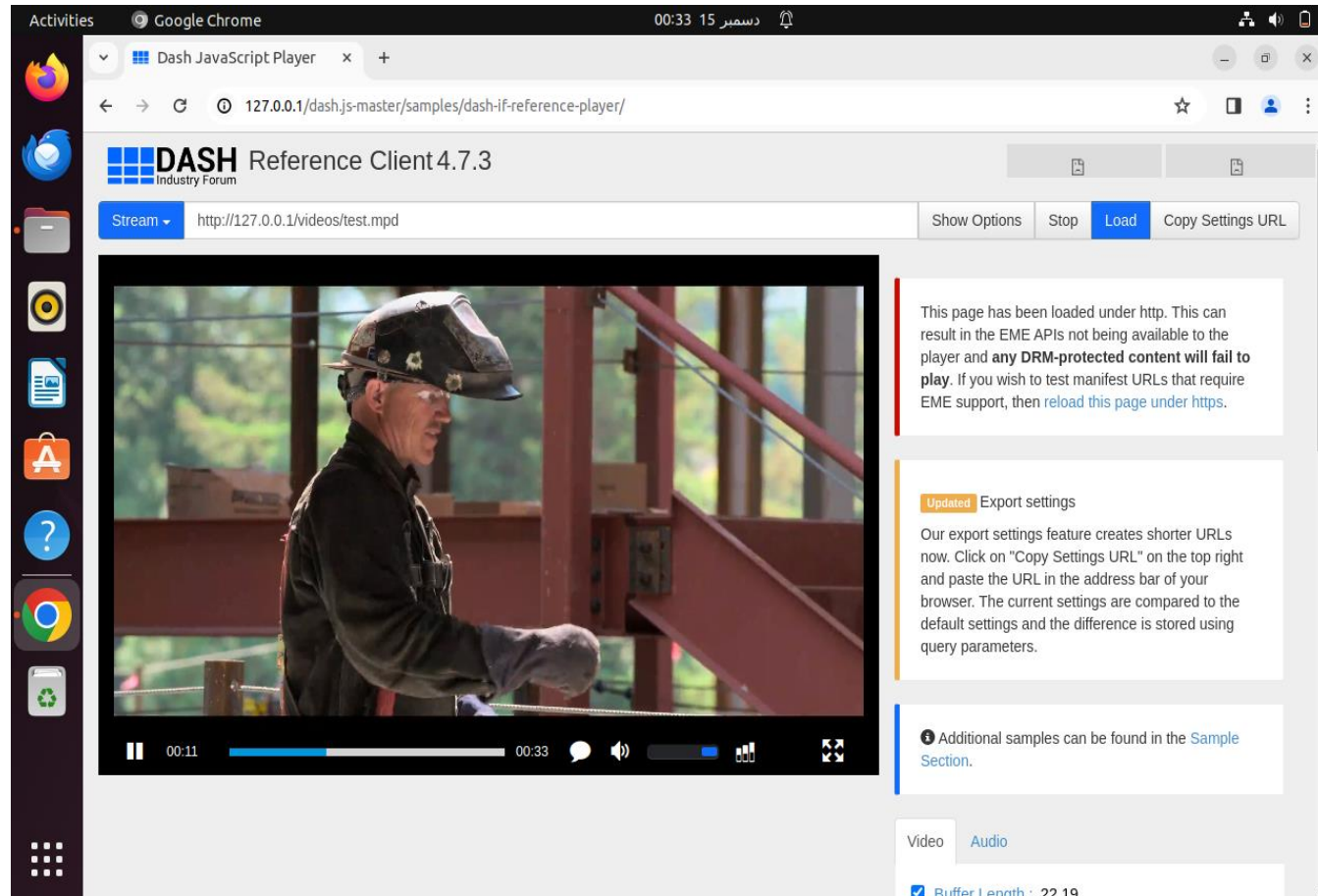
# Encoding Ladder

Index	Video resolution	Bitrate	Bitrate
1	1280x720	987061	987 kbps
2	1280x720	1174238	1.2 Mbps
3	1280x720	1431232	1.4 Mbps
4	1920x1080	2070985	2.1 Mbps
5	1920x1080	2384387	2.4 Mbps
6	1920x1080	2884382	2.9 Mbps
7	1920x1080	3245900	3.2 Mbps
8	1920x1080	3493765	3.5 Mbps
9	1920x1080	3792491	3.8 Mbps

[1] Stefan Lederer, Christopher Müller and Christian Timmerer, "Dynamic Adaptive Streaming over HTTP Dataset "

[2] B. Taraghi, M. Nguyen, H. Amirpour and C. Timmerer, "Intense: In-Depth Studies on Stall Events and Quality Switches and Their Impact on the Quality of Experience in HTTP Adaptive Streaming," in IEEE Access

# Evaluation



Activities Google Chrome 00:33 15 دسمبر

Dash JavaScript Player x +

127.0.0.1/dashjs-master/samples/dash-if-reference-player/

**DASH** Reference Client 4.7.3  
Industry Forum

Stream http://127.0.0.1/videos/test.mpd Show Options Stop Load Copy Settings URL

This page has been loaded under http. This can result in the EME APIs not being available to the player and **any DRM-protected content will fail to play**. If you wish to test manifest URLs that require EME support, then [reload this page under https](#).

**Updated** Export settings

Our export settings feature creates shorter URLs now. Click on "Copy Settings URL" on the top right and paste the URL in the address bar of your browser. The current settings are compared to the default settings and the difference is stored using query parameters.

Additional samples can be found in the [Sample Section](#).

Video Audio

Buffer Length : 22.19

- **dash.js**

- Reference client
- Playback of MPEG DASH
- Java script

<https://dashjs.org/>

# Analysis

- Bitrate of the all downloaded segments.
- Find out how many bitrate changes made
- Average bitrate change
- Average bitrate

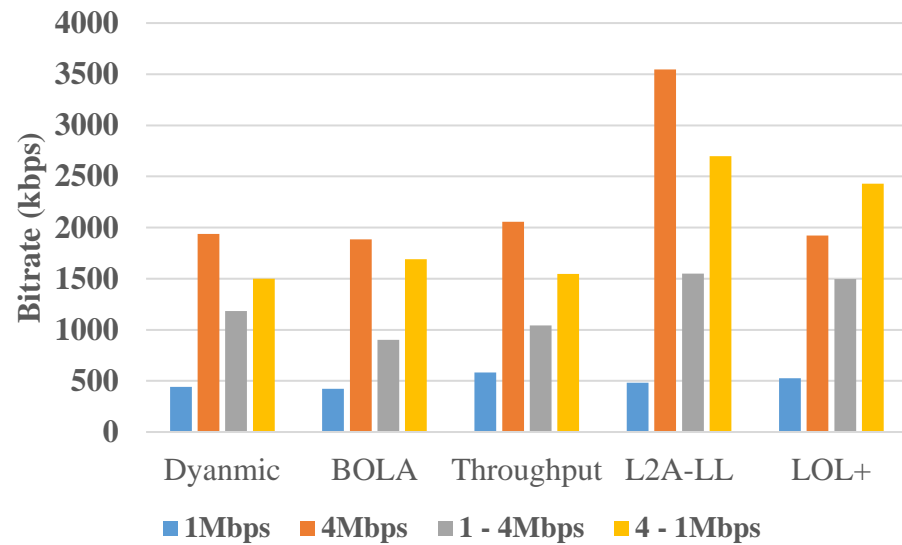
# Analysis

- For example
  - Segment 1: 100kbps
  - Segment 2: 100 kbps
  - Segment 3: 200 kbps
  - Segment 4: 500 kbps
  - Segment 5: 500 kbps
  - Segment 6: 1000 kbps
  
- We can observe 3 bitrate changes
- Average bitrate:  $(100+100+200+500+500+1000)/6$
- Small bitrate change between segment 3 and 2. Large bitrate change between 5 and 6

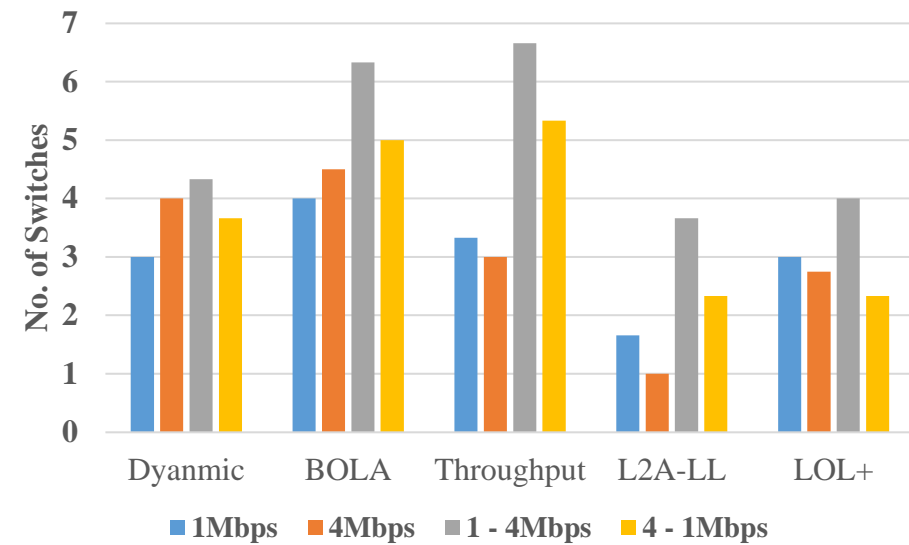
# Analysis

- Now we have all the data.
  - Bitrate of each segment
  - Number of bitrate switches
  - Number of rebuffering
  - Duration of each rebuffering

# Results

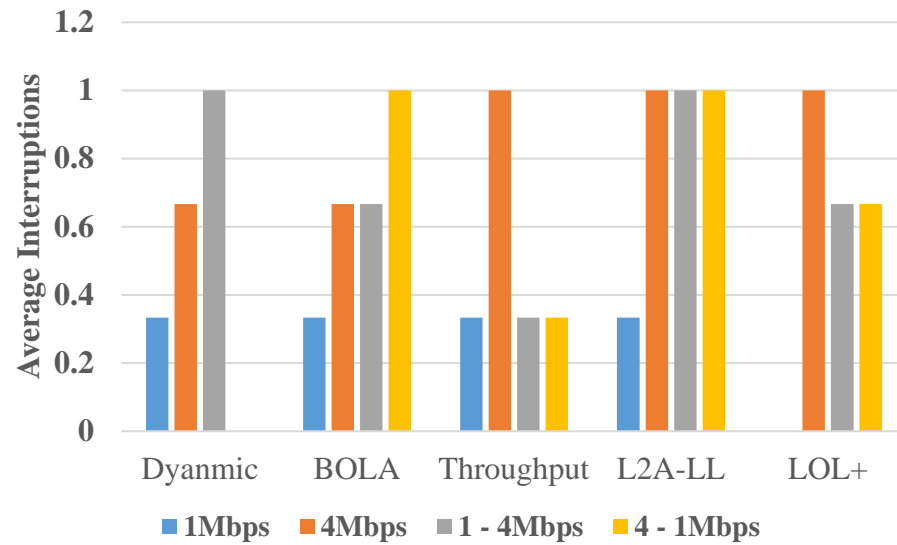


Average bitrates achieved by the algorithms

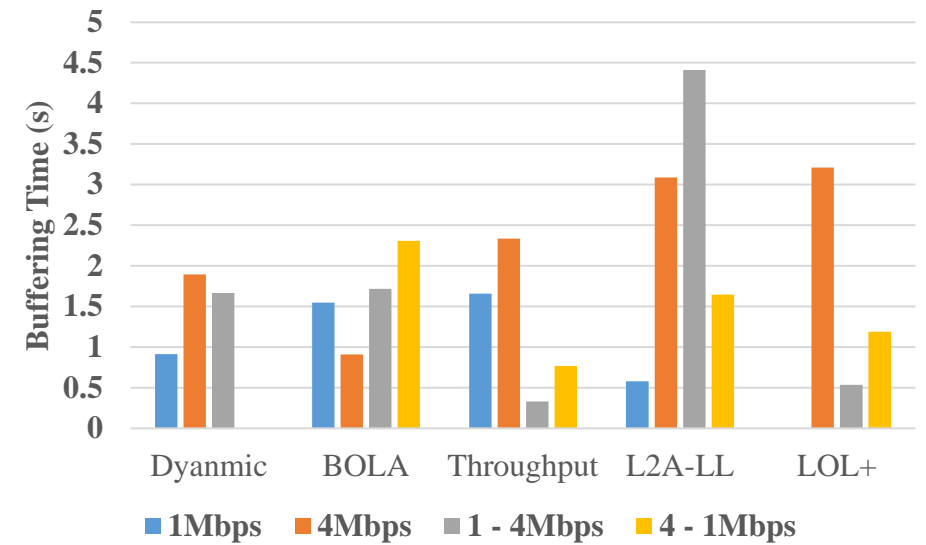


Average video rate switches experienced by the clients

# Results



Average interruptions experienced by the clients



Duration of playback interruptions

# Conclusion

- Assess the impact of ABR Algorithms on the perceived QoE in DASH
- Measure the impact of ABR algorithms on the quality switching in DASH
- Evaluate the influence of Low-Latency Algorithms on the video quality
- Build model based on QoE metrics and Network profiles

[1] Lyko, T., Broadbent, M., Race, N. et al. Improving quality of experience in adaptive low latency live streaming. *Multimed Tools Appl* 83, 15957–15983 (2024).

[2] Piers O'Hanlon and Adil Aslam. 2023. Latency Target based Analysis of the DASH.js Player. In *Proceedings of the 14th Conference on ACM Multimedia Systems (MMSys '23)*.