DASH Industry Forum

Low Latency Streaming Challenges & Opportunities

Media Streaming Meets 5G Workshop

Standardization status: DASH

- DASH-IF “Low Latency Modes for DASH” Change Request is in community review since June 2019
- DVB-DASH October 2019 updated spec includes low latency support
- Dash.js improves low latency support since v.2.8.0 (July 2018) – stable 2s latency

Standardization status: HLS

- The 2018 LHLS community proposal is still alive and used at scale
- Apple announced Low-Latency HLS (LL-HLS) at WWDC in June 2019
- Two industry meetings have happened in August and October
- At Streaming Media West, Roger Pantos announced that the H2/Push requirement would be relaxed in the next version of the spec

Formats commonalities

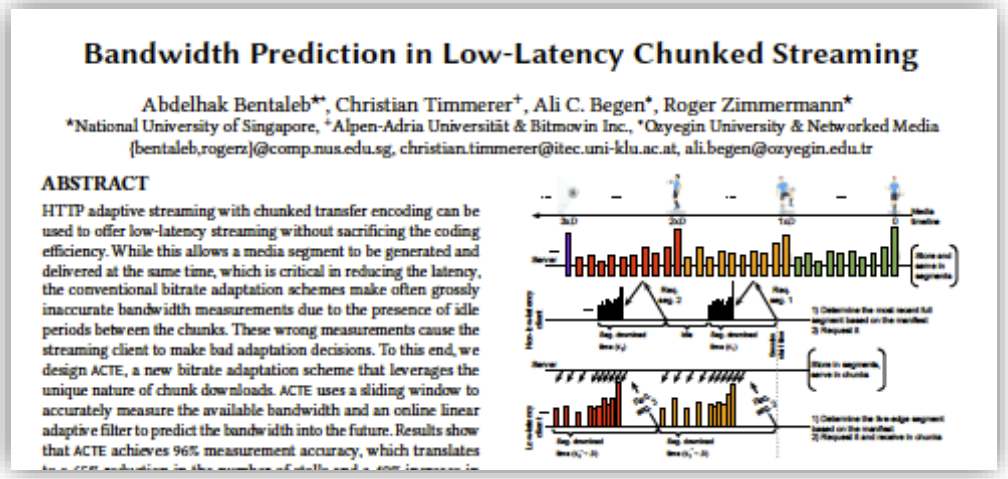
	LL-HLS	LHLS	DASH
Require content to be chunk encoded	●	●	●
Support E2E latencies from 2-10s+	●	●	●
Backwards compatible with older players	●	●	●
Cacheable by CDNs	●	●	●
Support DRM	●	●	●
Support ad insertion	●	●	●
Support multiple codec types	●	●	●
Allow ABR playback	●	●	●
HTTP delivery	●	●	●

Formats differences

	LL-HLS	LHLS	DASH
Use chunk encoded transfer	🔴	🟢	🟢
Describe internal segment structure	🟢	🔴	🔴
Require playlist refresh with each chunk	🟢	🔴	🔴
Objects always delivered at line speed	🟢	🔴	🔴
Separate servers for playlists/segments	🔴	🟢	🟢
Require HTTP2 for last mile	🟢	🔴	🔴
Require smart origin to modify playlists	🟢	🔴	🔴
Deterministic start-up	🟢	🔴	🔴

Challenges

- ABR heuristics: throughput estimation with Chunked Transfer Encoding, line-speed for LL-HLS parts is inferior to line speed for full segments
- Latency catch up and rate adjustment
- Video start time



Bandwidth Prediction in Low-Latency Chunked Streaming

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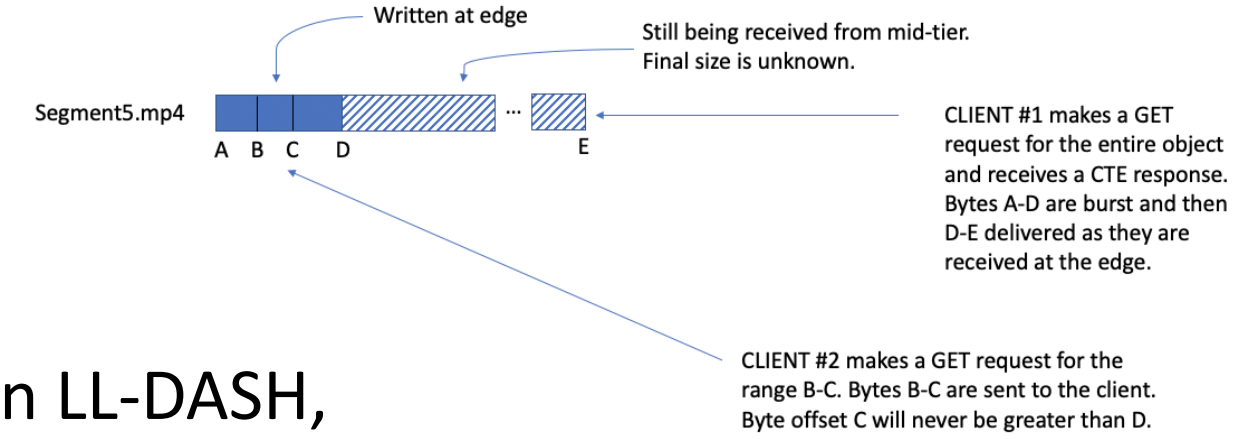
ABSTRACT

HTTP adaptive streaming with chunked transfer encoding can be used to offer low-latency streaming without sacrificing the coding efficiency. While this allows a media segment to be generated and delivered at the same time, which is critical in reducing the latency, the conventional bitrate adaptation schemes make often grossly inaccurate bandwidth measurements due to the presence of idle periods between the chunks. These wrong measurements cause the streaming client to make bad adaptation decisions. To this end, we design ACTE, a new bitrate adaptation scheme that leverages the unique nature of chunk downloads. ACTE uses a sliding window to accurately measure the available bandwidth and an online linear adaptive filter to predict the bandwidth into the future. Results show that ACTE achieves 96% measurement accuracy, which translates

Opportunities



- Common media Workflow between LL-DASH, LL-HLS and LHLS using Chunked Transfer encoding for LL-DASH and LHLS, and byte-range addressing for LL-HLS

- Leveraging 5G's 1 digit latency: can we get both the bandwidth and the latency?

- New uses cases: Extended Reality AR/VR, multi-cameras streaming, interactive video services