

Assignment-3
Checkpoint
presentation

Group 2

Efficient streaming of 360° video
using DASH over QUIC

Problem Statement

- Streaming VR video for headsets under the current network infra is suboptimal.
- We aim to follow and improve upon the paper "Streaming 360° videos to head-mounted virtual reality using DASH over QUIC transport protocol"
- We would like to experiment with:
 - Different priority schedulers in QUIC
 - Suggesting improvements to bitrate adaptive algorithms for priority based streaming
 - Come up with a better tile-prediction algorithm

Challenges

Bandwidth Challenge:

- VR systems demand high bandwidth (50–200 Mbps) and even more for videos with 6 degree of freedom.
- Tiled streaming is used to reduce bandwidth by focusing on the current viewpoint.

Tiled Streaming Drawbacks:

- Missing tiles in tiled streaming can lead to black holes or playout freezes.
- Negatively impacts user experience, potentially driving users away from VR services.

DASH Limitations

Employs HTTP over TCP for video streaming.

We only want to send the tile that falls in the viewport of head mounted device (HMD)

Naively applying DASH for 360° video streaming may result in suboptimal streaming quality.

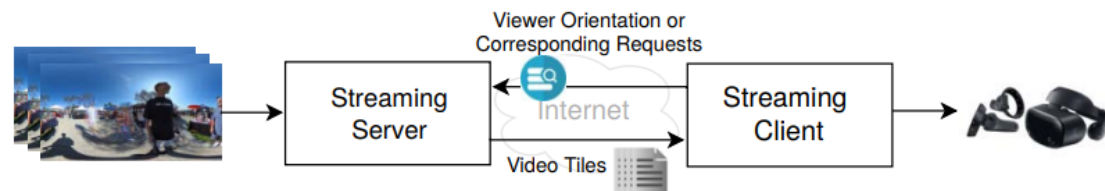
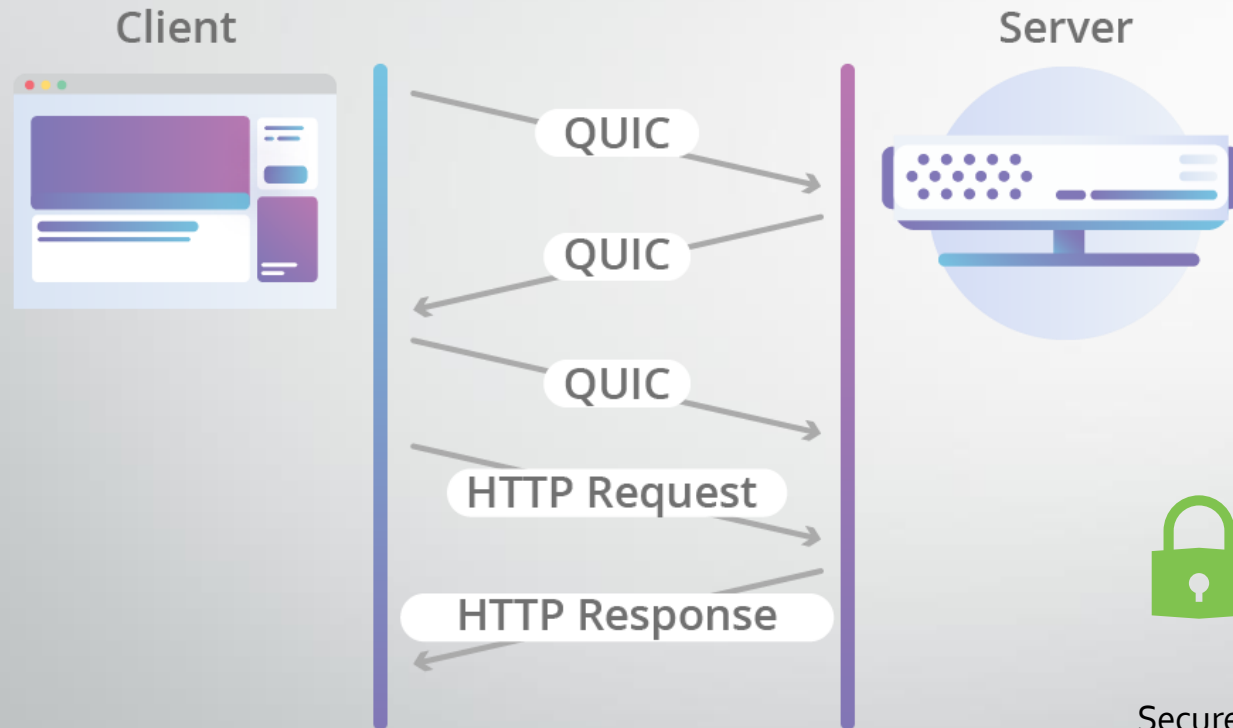


Figure 1: 360° video streaming needs high bandwidth, low latency.

Quick UDP Internet Connections (QUIC)

HTTP Request Over QUIC



Secured
communications.



Multiplexed streams
with prioritized
schedulers.



Low latency at the time
of writing.

System Design

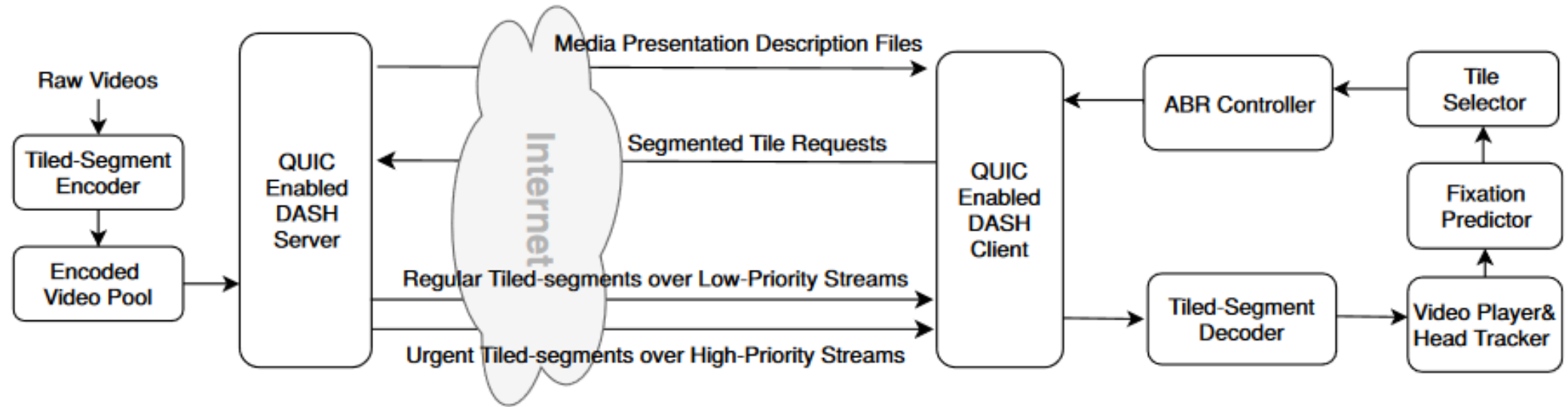


Figure 2: Architecture of the 360° video streaming using DASH over QUIC protocol.

Shou-Cheng Yen, Ching-Ling Fan, and Cheng-Hsin Hsu. 2019. Streaming 360° videos to head-mounted virtual reality using DASH over QUIC transport protocol. In Proceedings of the 24th ACM Workshop on Packet Video (PV '19).

System Optimizations



Fixation predictor that predicts the user viewports in the future.



Tile selector that maps (future) viewports to tiles for DASH requests.



ABR controller that interfaces with existing ABR algorithms to control prioritized streams.

Project deliverables



Video streaming via DASH over QUIC



Integrating head-tracker for 360° video

Fixation predictor

Tile selector



Implementing bit-rate controller and priority scheduler



Performance evaluation using CDF and perceptual video quality metrics like SSIM and P-SNR

Roadmap

