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.

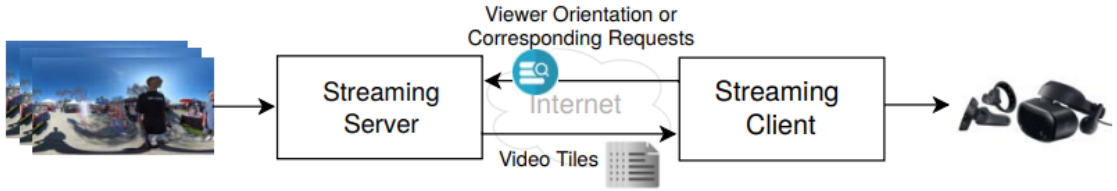
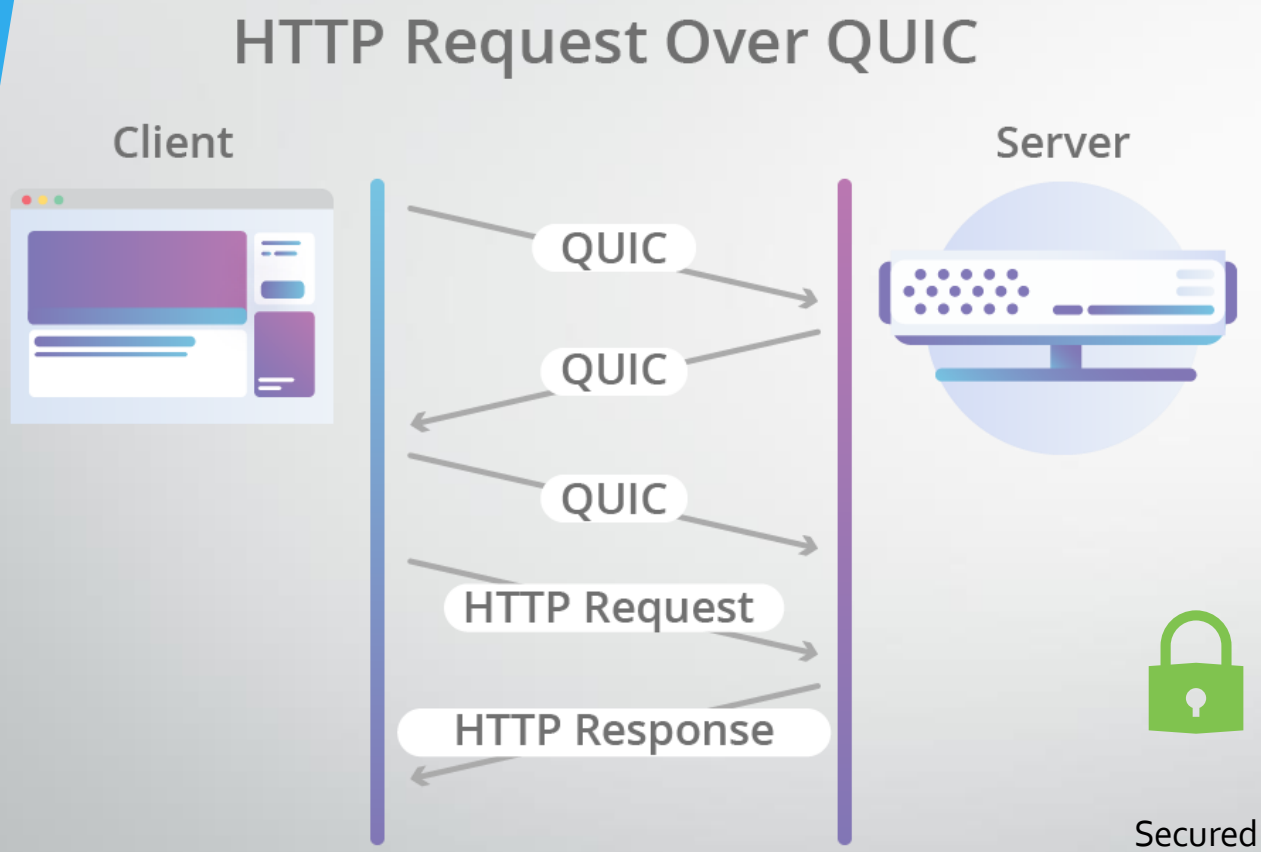


Figure 1: 360° video streaming needs high bandwidth, low latency.

Quick UDP Internet Connections (**QUIC**)



Secured communications.

Multiplexed streams with prioritized schedulers.

Low latency.

System Design

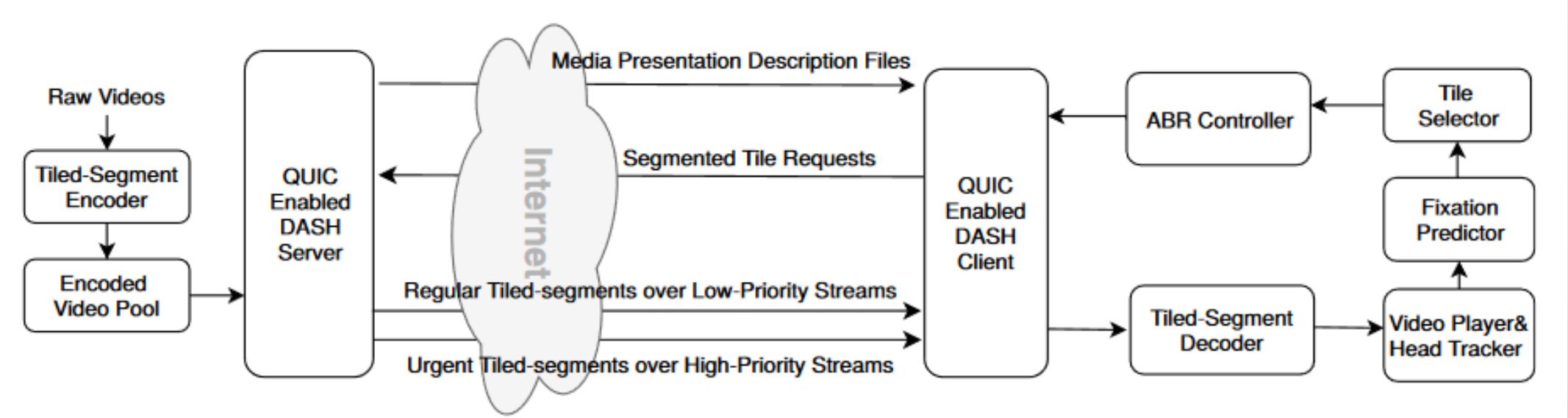


Figure 2: Architecture of the 360° video streaming using DASH over QUIC protocol.

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 (as per paper)

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

Modules implemented by the paper

Video streaming via DASH over QUIC

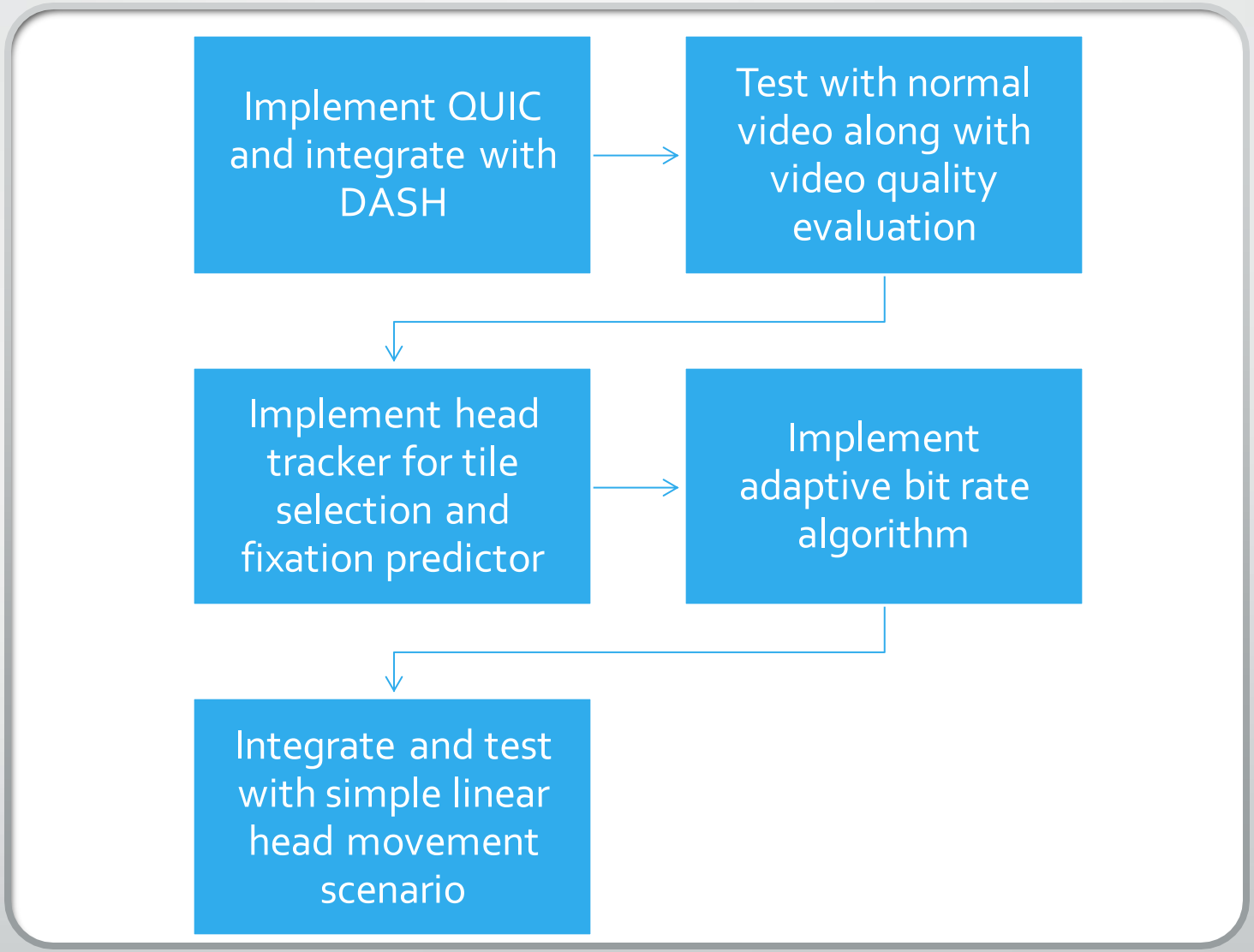
Integrating head-tracker for 360° video

- 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


Implement QUIC and integrate with DASH
Test with normal video along with video quality evaluation
Implement head tracker for tile selection and fixation predictor
Implement adaptive bit rate algorithm
Integrate and test with simple linear head movement scenario