

Quality Adaptation in P2P Video Streaming Based on Objective QoE Metrics



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Julius Rückert, Osama Abboud, Thomas Zinner

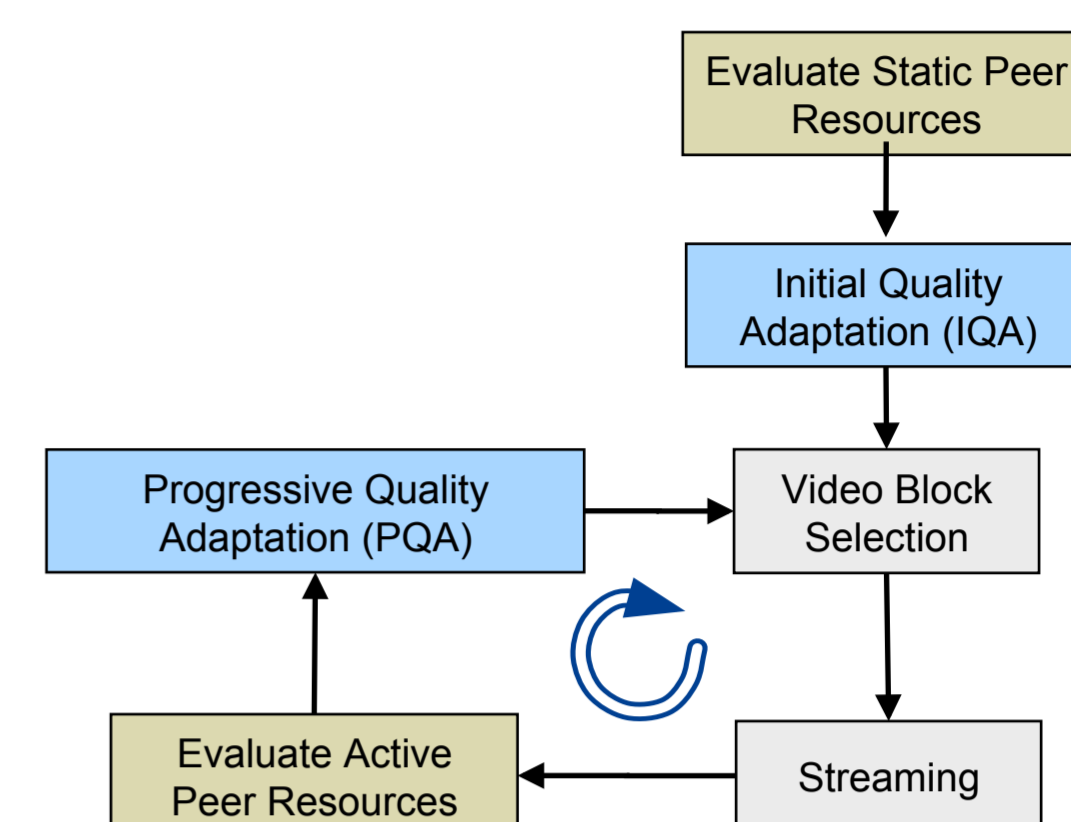
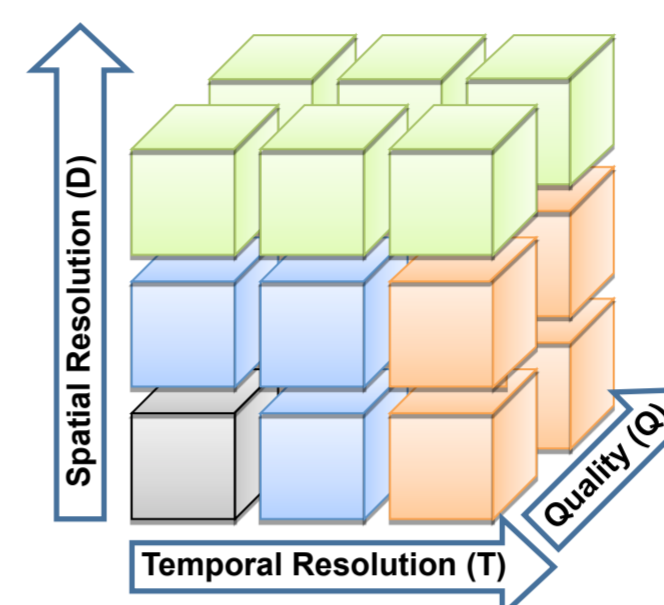
Motivation and Background

Streaming using Scalable Video Coding (SVC)

- Support heterogeneous Internet resources

So far, only QoS metrics used to select the video quality

- How to consider perceived video quality of users?
- What are the suitable QoE metrics?
- What are the effects on the system?



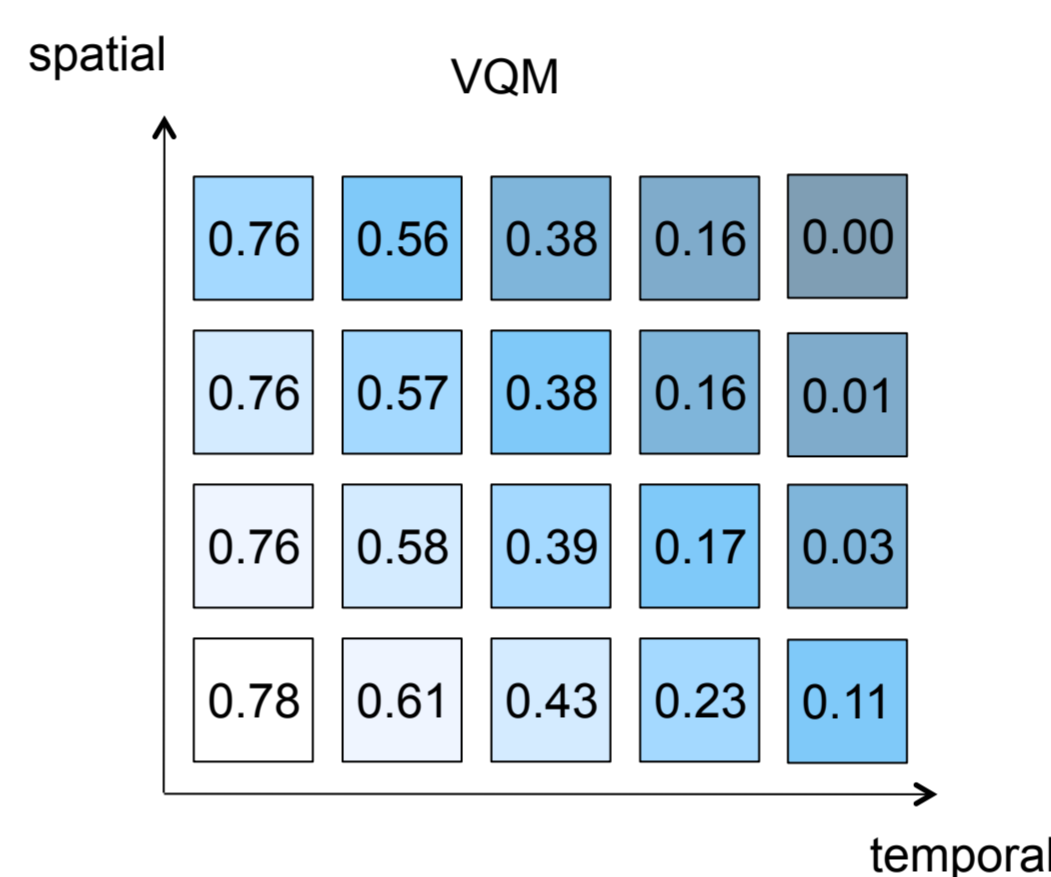
Objective QoE Metrics

We use the Video Quality Metric (VQM)

- State-of-the-art objective QoE metric
- Maps SVC layers to VQM and MOS values

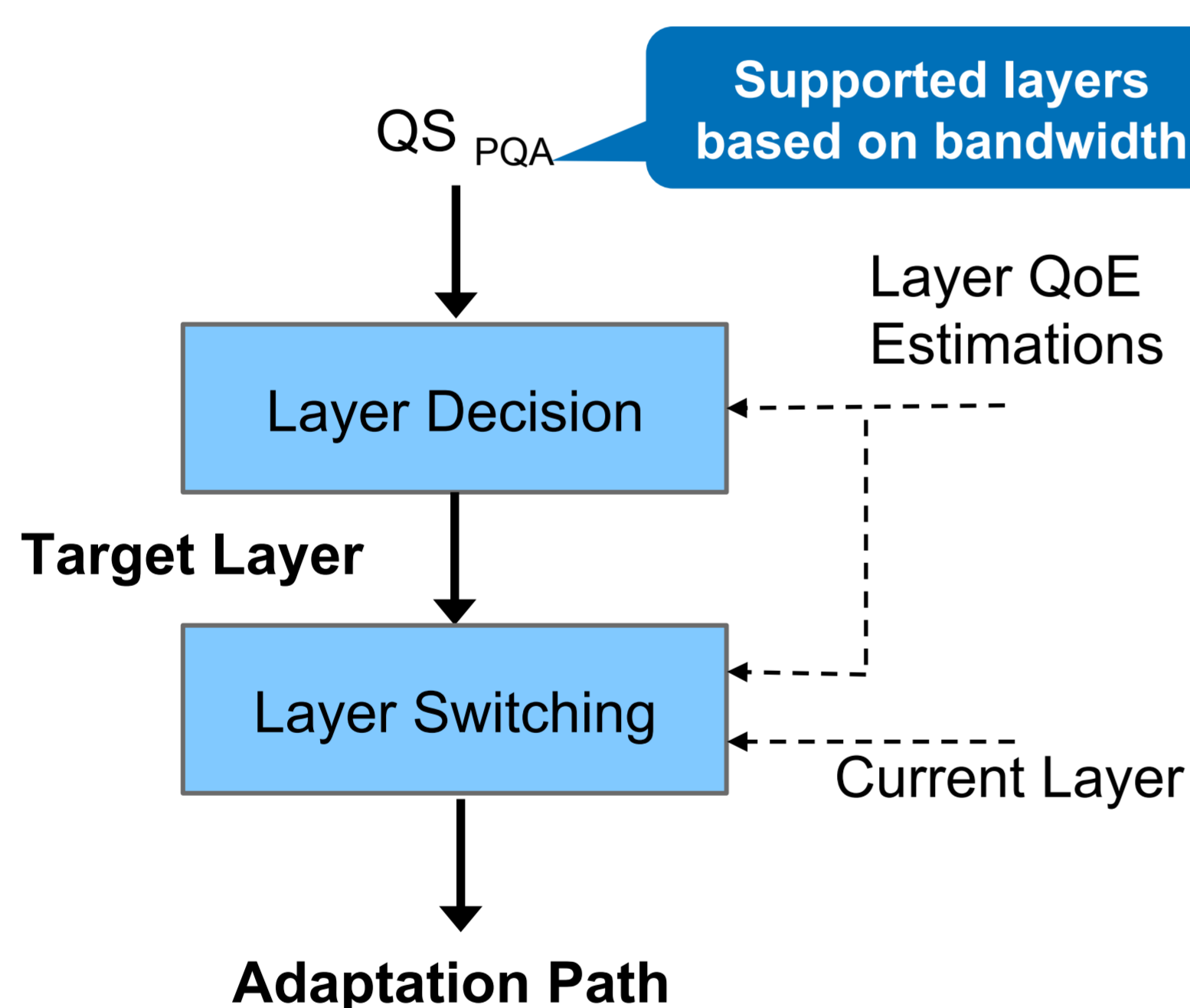
Using VQM for layer adaptation

- Enables light-weight QoE-aware adaptation
- Automation of QoE estimation at servers



VQM	MOS
< 0.2	5 (excellent)
≥ 0.2 & < 0.4	4 (good)
≥ 0.4 & < 0.6	3 (fair)
≥ 0.6 & < 0.8	2 (poor)
> 0.8	1 (bad)

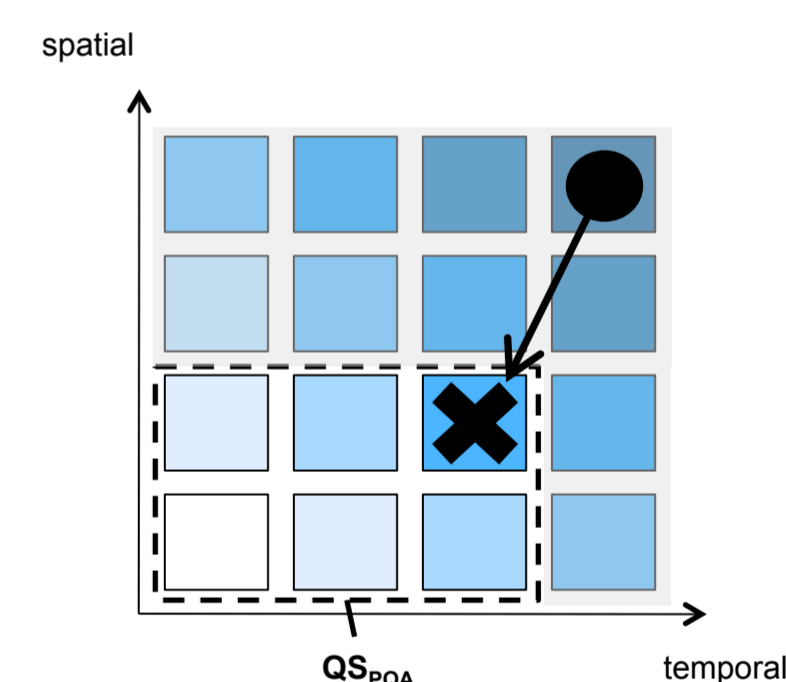
QoE-aware Quality Adaptation



Layer Decision and Switching

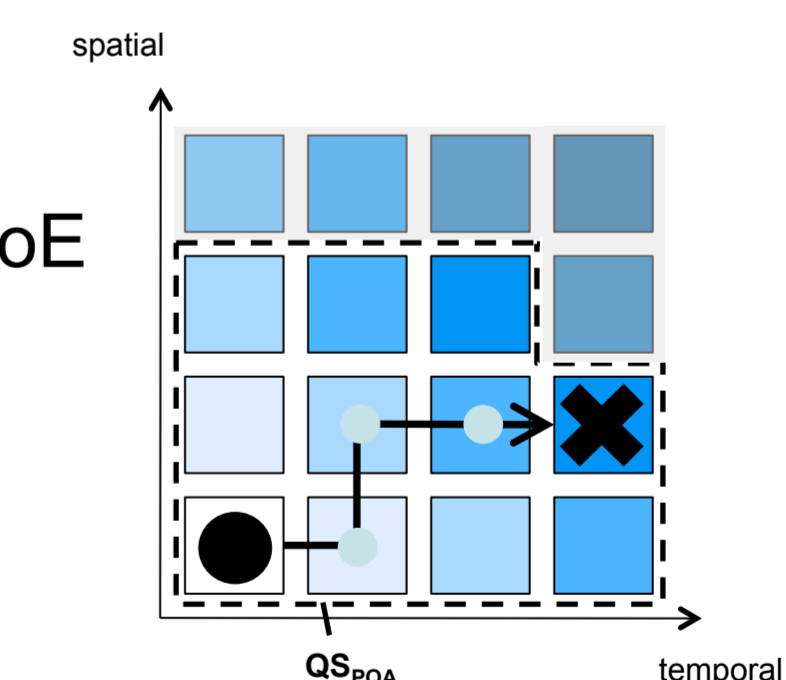
Layer decision (target layer)

- Select target layer that has highest QoE rating D_{QoE}
- Compared against decision based on Bandwidth (D_{BW}) (state-of-the-art)

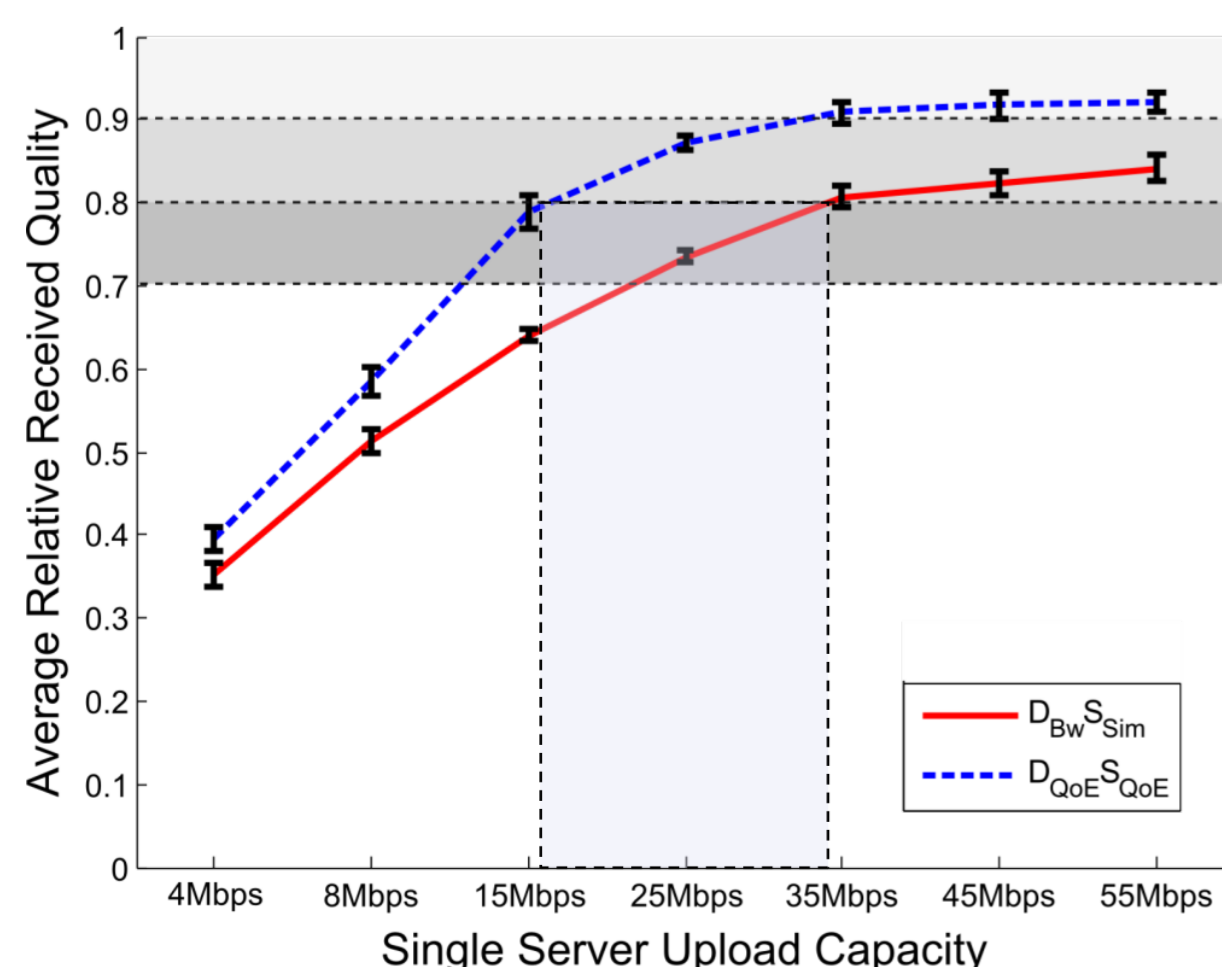


Layer switching (adaptation path)

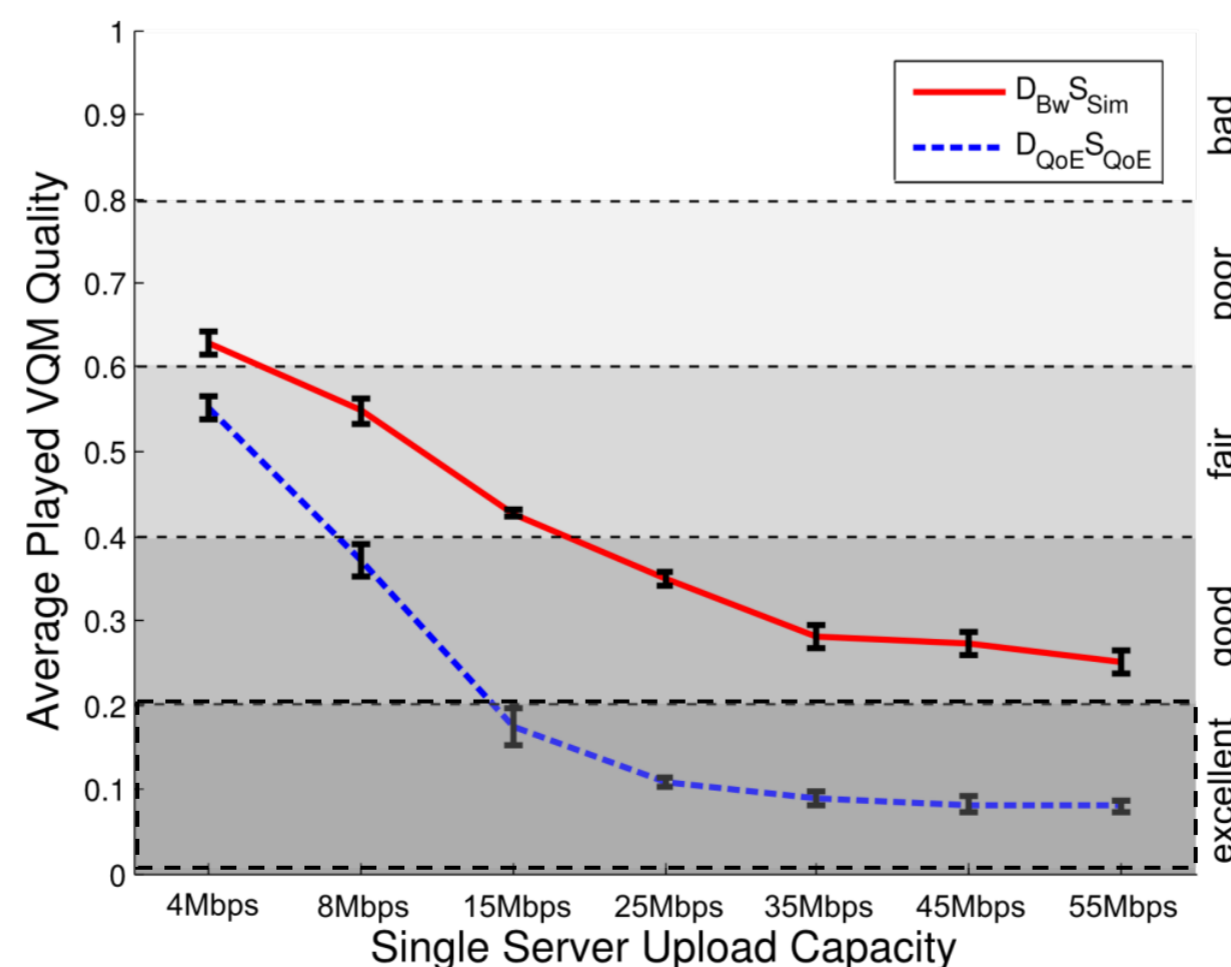
- Switch quality with minimal variation in QoE ratings (S_{QoE})
- Compared against switching based on Bandwidth (S_{BW})



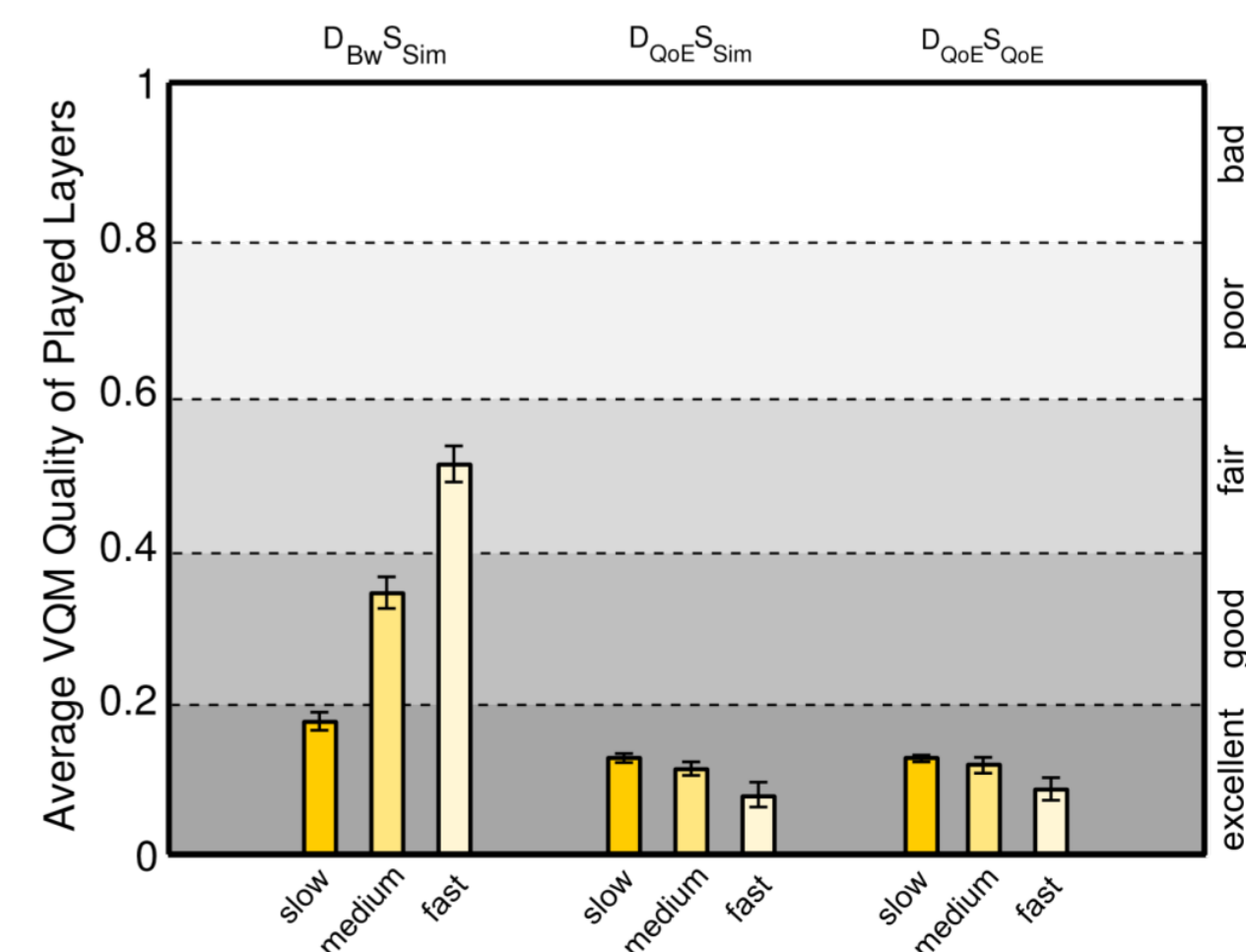
Evaluation Results



→ 60% less required server bandwidth



→ Excellent score on the MOS scale



→ Homogenous QoE performance of peers

