

DASH2M: Exploring HTTP/2 for Internet Streaming to Mobile Devices

Project: CSR: Small: Toward Energy-efficient Internet Mobile Streaming (CNS-1524462)

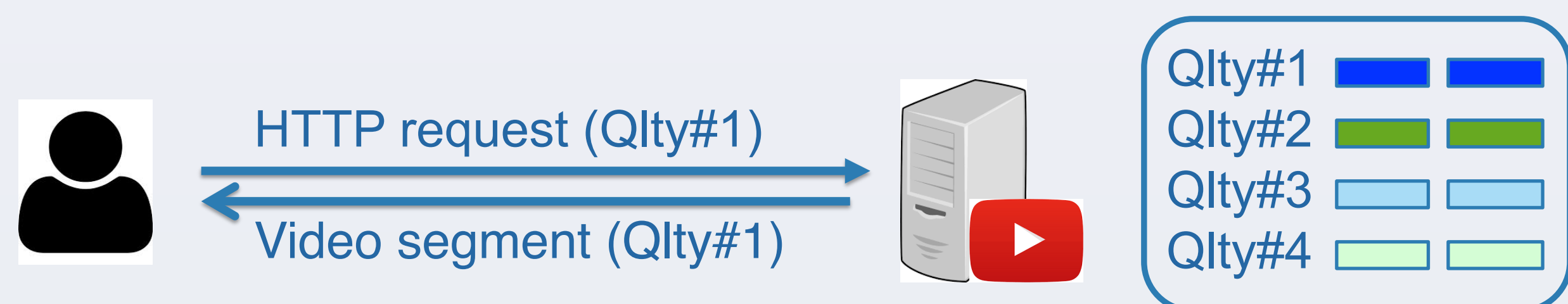
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Motivations

- The streaming services have become one of the most important applications on mobile devices



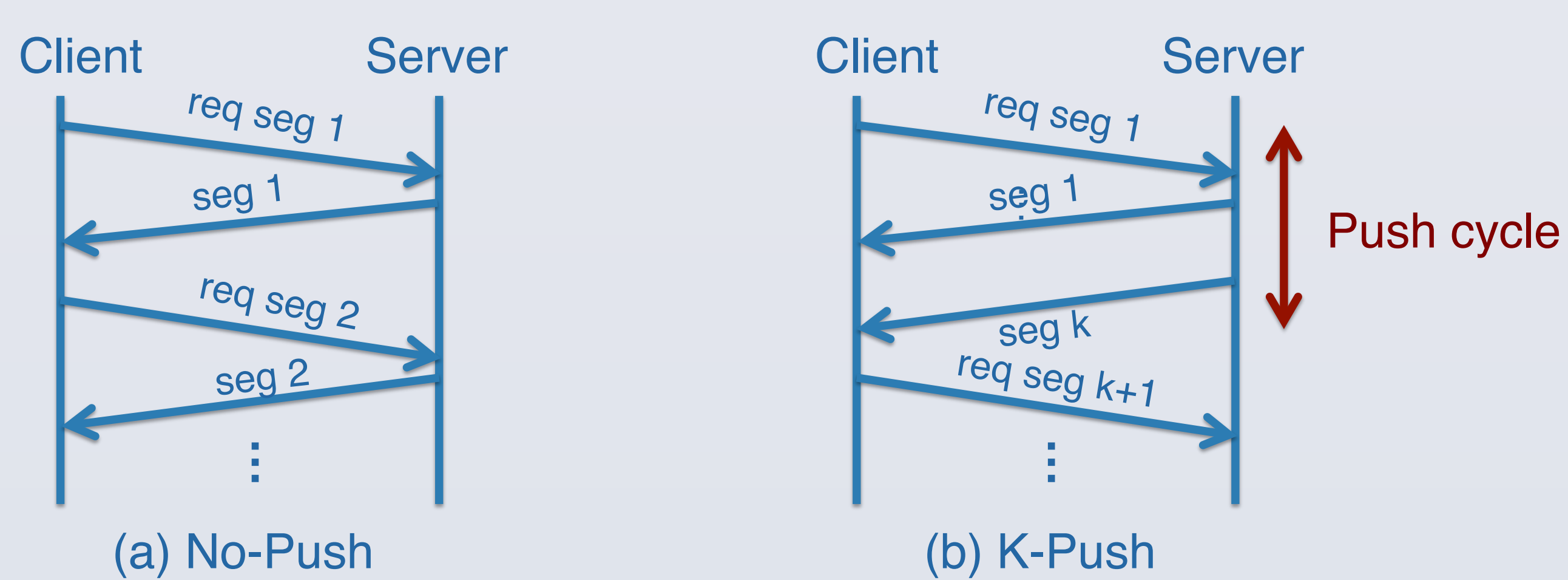
- Consumer Internet video traffic will be **80%** of all consumer Internet traffic in 2019, up from **64%** in 2014
- HTTP Streaming** is the most prevalent streaming method over Internet with the capability of **adapting to varying network bandwidth**



- HTTP/2** is the new HTTP protocol, featuring **server-initiated push**, **stream termination** and other advanced techniques
- Can the streaming service be improved in the protocol evolution?

K-push Analysis

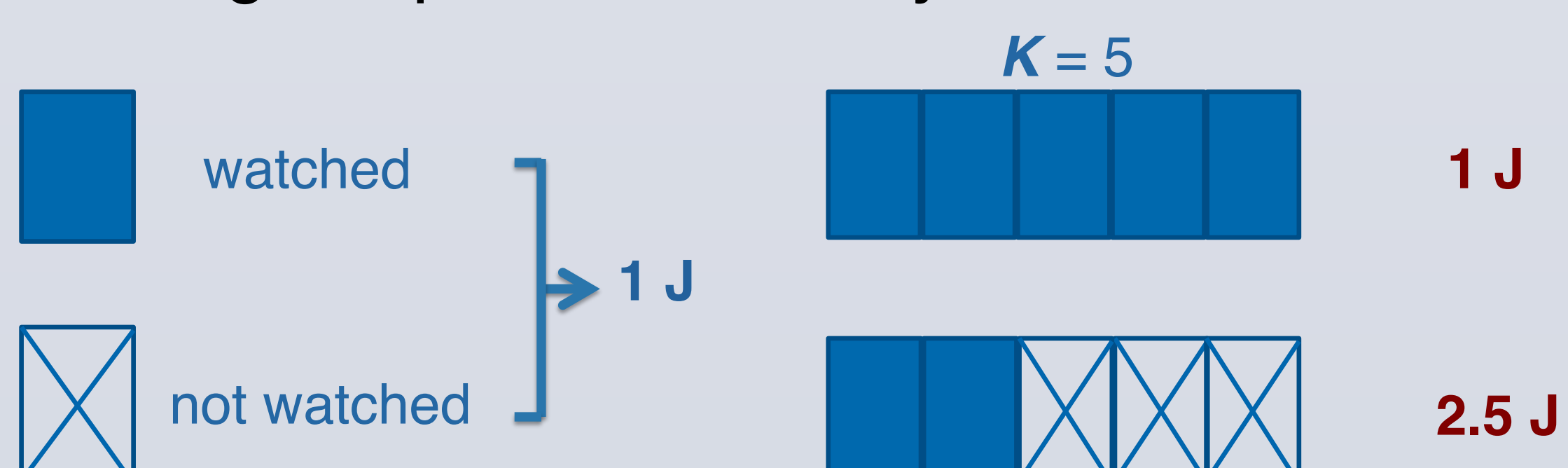
- K-push** is an effective means to improve HTTP streaming performance in terms of **streaming throughput** and **power efficiency**



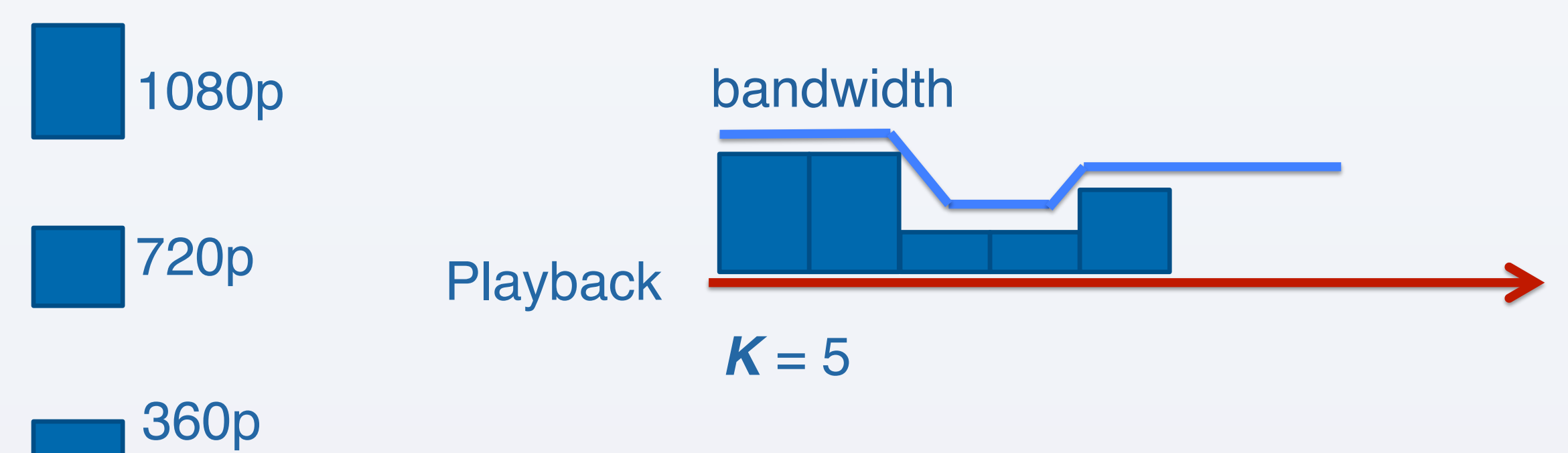
- K-push** also **degrades the network adaptability** and **over-downloads unnecessary content**

System Design

- DASH2M** directs how to operate for the push cycles in a video streaming session
- DASH2M** balances the push number to minimize the **expectation of watching energy per segment**, maximizing the power efficiency



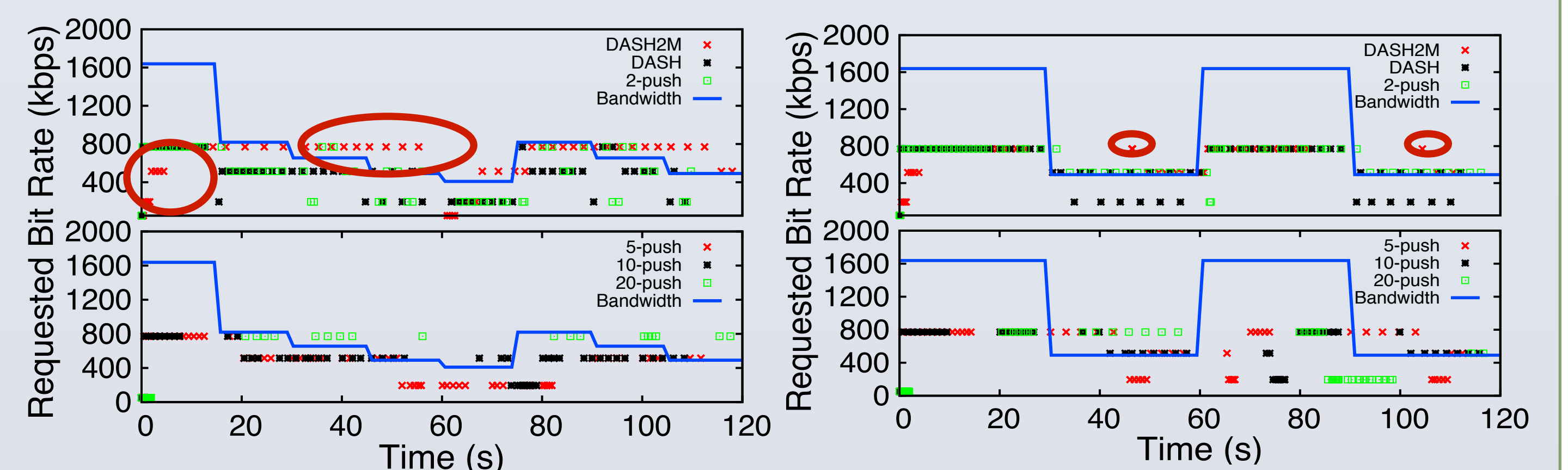
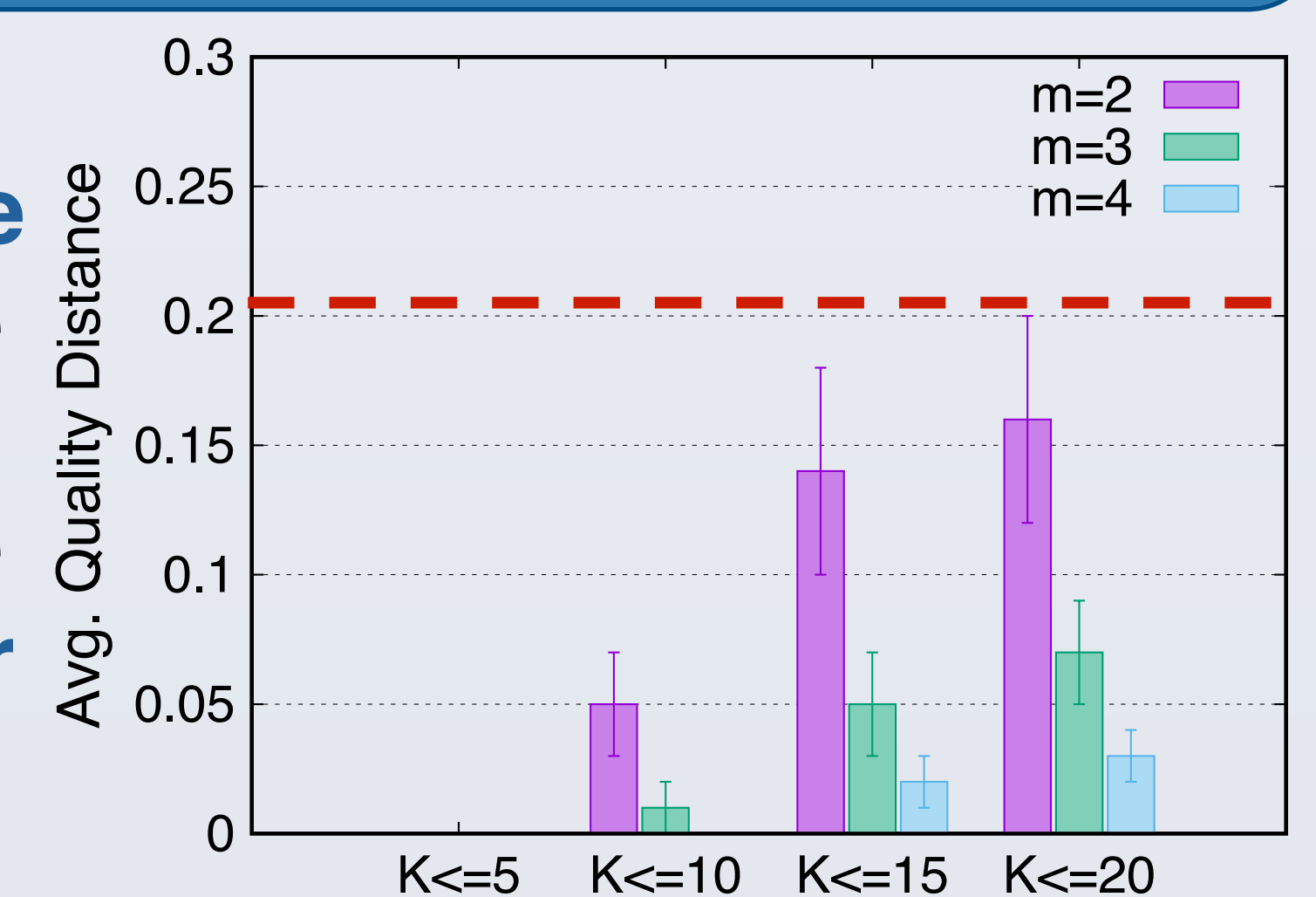
- DASH2M** models the bitrate selection inside a push cycle as an **integer linear programming problem** to maximize the **cumulative bitrate**



- DASH2M** solves the integer linear programming problem while following the constraints of **continuous playback**, **smooth playback** and **maximum buffer size**
- DASH2M** predicts the future bandwidth from **local measurements** weighted by the time distance and **optional server support**
- DASH2M** adopts **stream termination** proposed in HTTP/2 to terminate all upcoming transmissions of pushed segments while bandwidth prediction has significantly deviated from the actual values

Evaluation

- DASH2M** uses the **average quality distance** to reflect the performance of the integer linear programming solver while varying the **push number** and the **quality duration**
- DASH2M** achieves the highest **average video qualities**, which are **572 kbps** and **647 kbps**, whether the bandwidth prediction is accurate or not



- DASH2M** always approaches the most **power efficient** solution no matter how abundant the bandwidth resource is

