Experiments on HTTP Adaptive Streaming over interconnected Content Delivery Networks

draft-famaey-cdni-has-experiments-01

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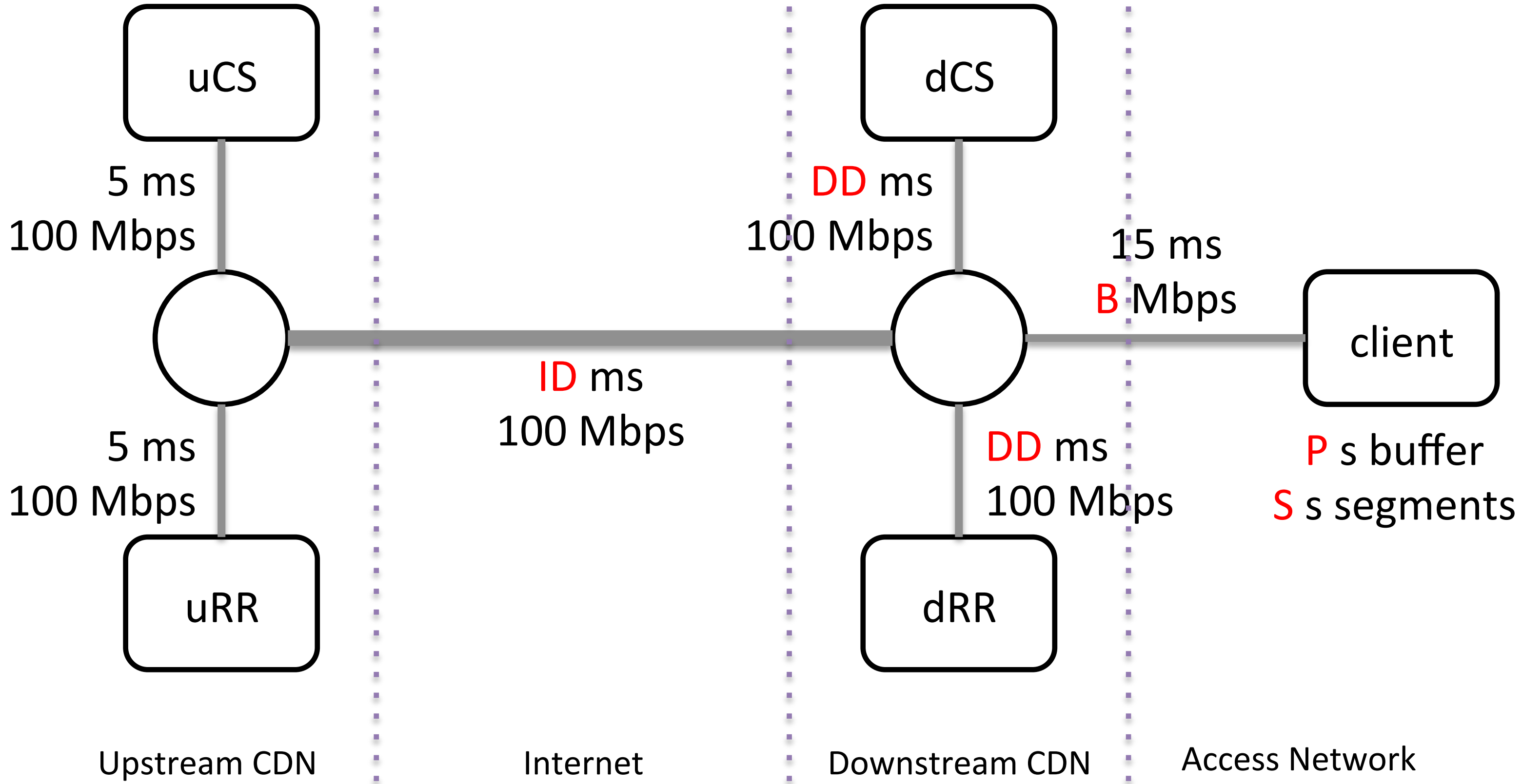
(Presented by Ray van Brandenburg)

Goal

- Evaluate the delivery of HTTP Adaptive Streaming (HAS) services over federated CDNs
- Draft-brandenburg-cdni-has proposes several alternative HAS request routing schemes with different levels of indirection
- Our experiments aim to investigate the effects of such indirection on the quality and performance of HAS services

NS-3 Simulations

Using Smooth Streaming client algorithms



Parameters:
- ID = Internet delay
- DD = Downstream delay
- B = Client bandwidth
- P = Client buffer size
- S = Segment duration

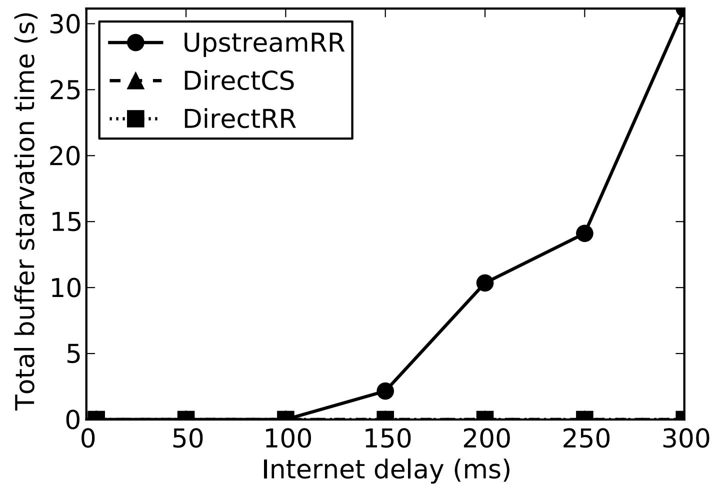
HAS Video:
- LD: 500 kbps
- SD: 1 Mbps
- HD: 2 Mbps

Evaluated request routing policies

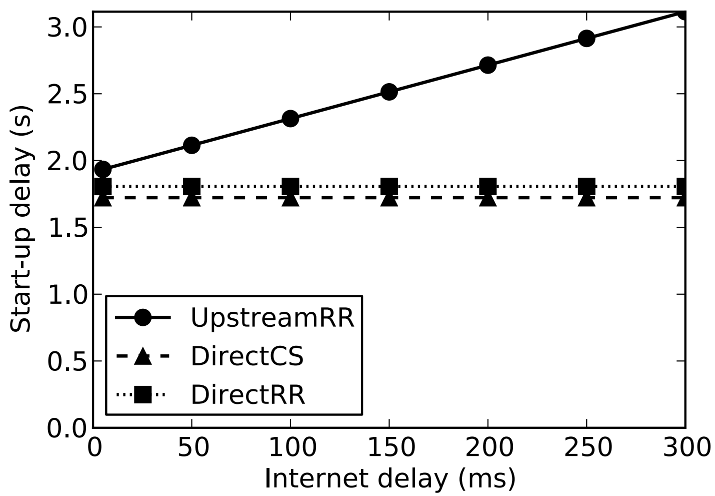
- UpstreamRR
  - Content at upstream CDN: uRR -> uCS
  - Content at downstream CDN: uRR -> dRR -> dCS
- DirectRR
  - Content at upstream CDN: uRR -> uCS
  - Content at downstream CDN: dRR -> dCS
- DirectCS
  - Content at upstream CDN: uCS
  - Content at downstream CDN: dCS

Buffer starvation and start-up delay in congested networks

- Under congestion, high-latency redirects cause significant buffer starvation



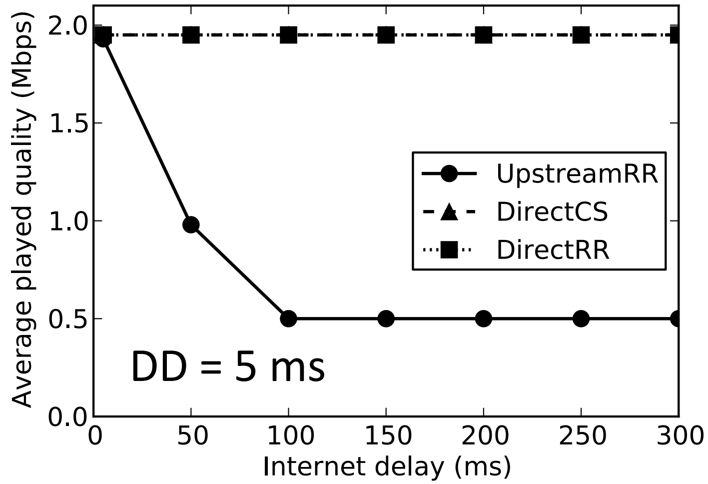
- The start-up delay of streaming sessions increases linearly with the total redirection latency

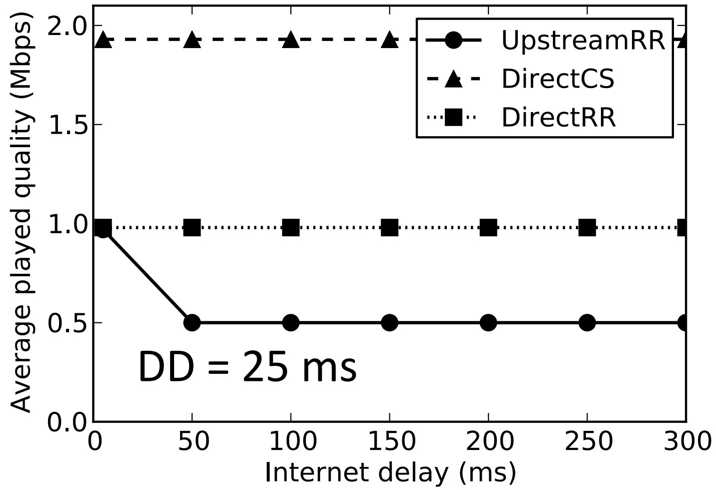


DD = 5 ms, B = 1 Mbps, P = 24 s, S = 2 s

Video quality in uncongested network

- In uncongested scenarios redirects to the upstream CDN can cause significant reductions in quality
- If latency to the downstream CDN is non-negligible, even redirects via downstream request routers can cause significant quality drops

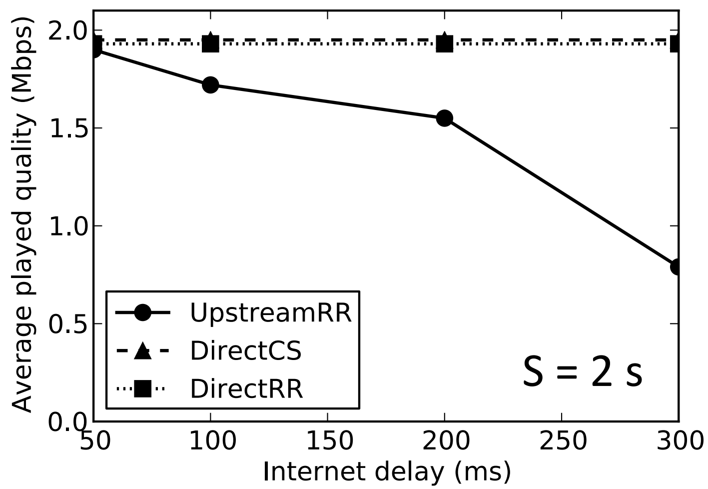


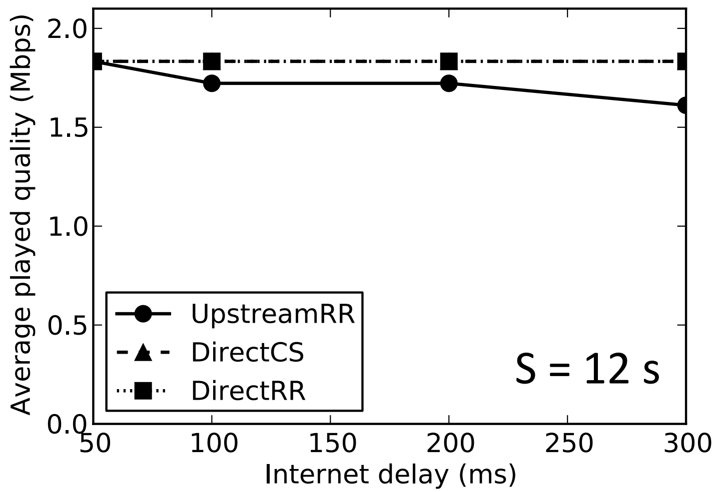


B = 10 Mbps, P = 6 s, S = 2 s

Effect of segment duration

- Increasing the segment duration significantly reduces the negative effects of high-latency redirects
- However, it increases start-up delay and time lag in live sessions





DD = 5 ms, B = 5 Mbps, P = 36 s

Conclusion

Requesting HAS segments through the upstream request router clearly impacts HAS performance

- In congested scenarios
  - Significant increase in buffer starvation at high upstream latencies
  - Start delay increases even at lower upstream latencies
- In uncongested scenarios
  - Video quality reductions at high upstream latencies
  - Start delay increases even at lower upstream latencies
- Increasing segment duration
  - Reduces impact of redirects on video quality
  - But, increases start-up delay and time lag in live sessions

Questions and remarks:
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