

Device-Side Delivery Intelligence: Mesh Networks and Multi-CDN Load Balancing

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What's new from last year

- Trends in the industry
 - News/political events outpace sports for the biggest national audiences
 - Stadiums swapped for screens in living rooms
 - Stay at home order putting pressure on peering link between CDN and ISP
- Our technology
 - Advanced ISP matching
 - Large-scale deployments of multi-CDN load balancing

Device-side delivery intelligence

Why have an intelligence on the device side?

1. DYNAMIC BEHAVIOR

Vision of the OS, network, etc. allow the device to react to changing conditions.

Example: Bandwidth Drop

Player ABR already handles this well...

But what if the solution was not to lower the bitrate, but to go to another CDN? Or get data from a peer?

2. FASTER REACTION TIME

The client is able to take a decision and act immediately. It's longer if the decision happens on a server.

Example: DNS switching a multi-CDN setup

Significant DNS TTL

Why have an intelligence on the device side?

3. MORE GRANULAR DECISIONS

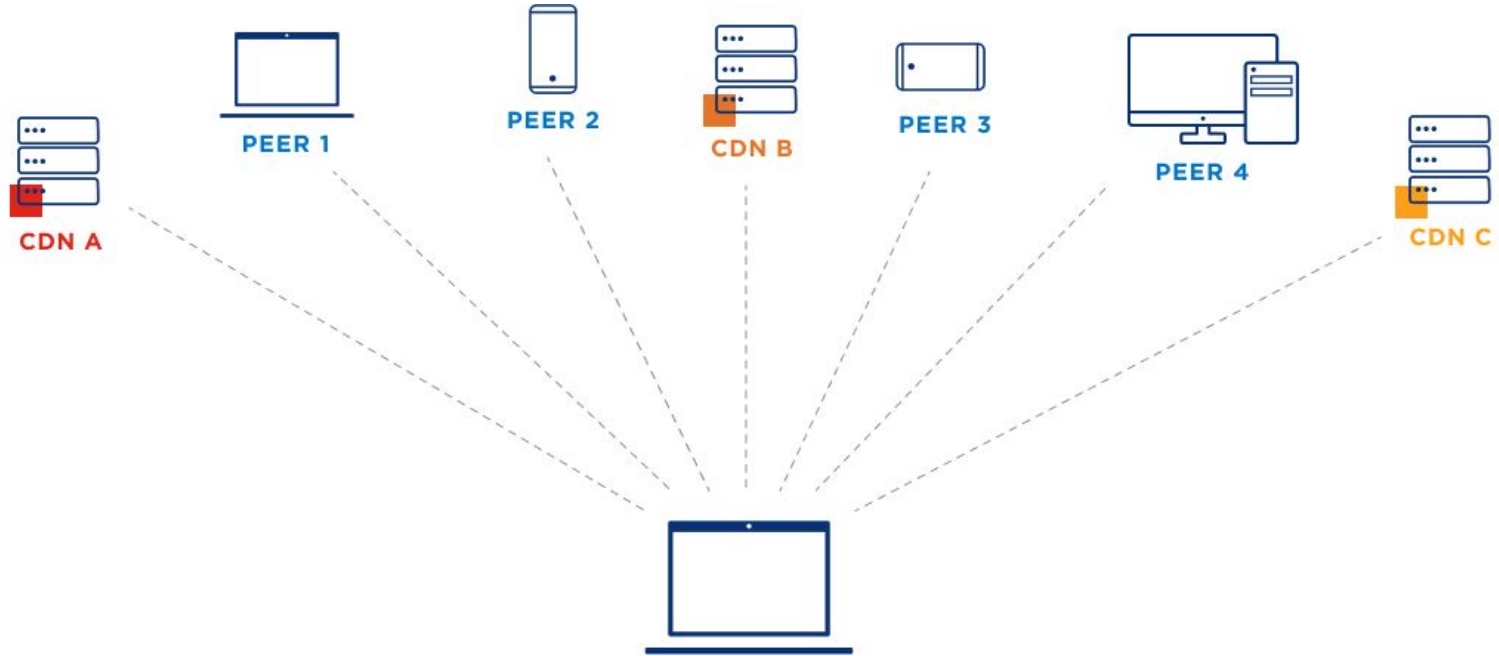
Backend aggregates hide the outliers in averages

+ the client itself has the proper data to take action

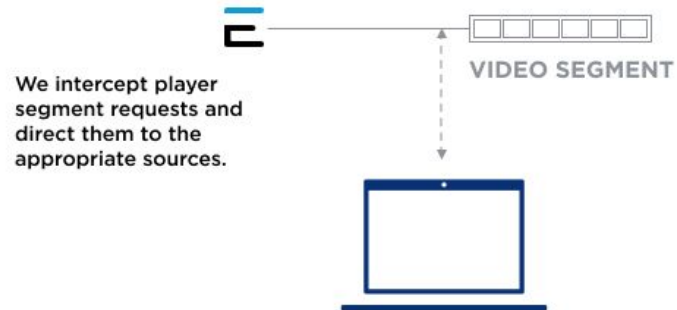
→ Per user tailored data

How it works

With our technologies, content can come from multiple sources.

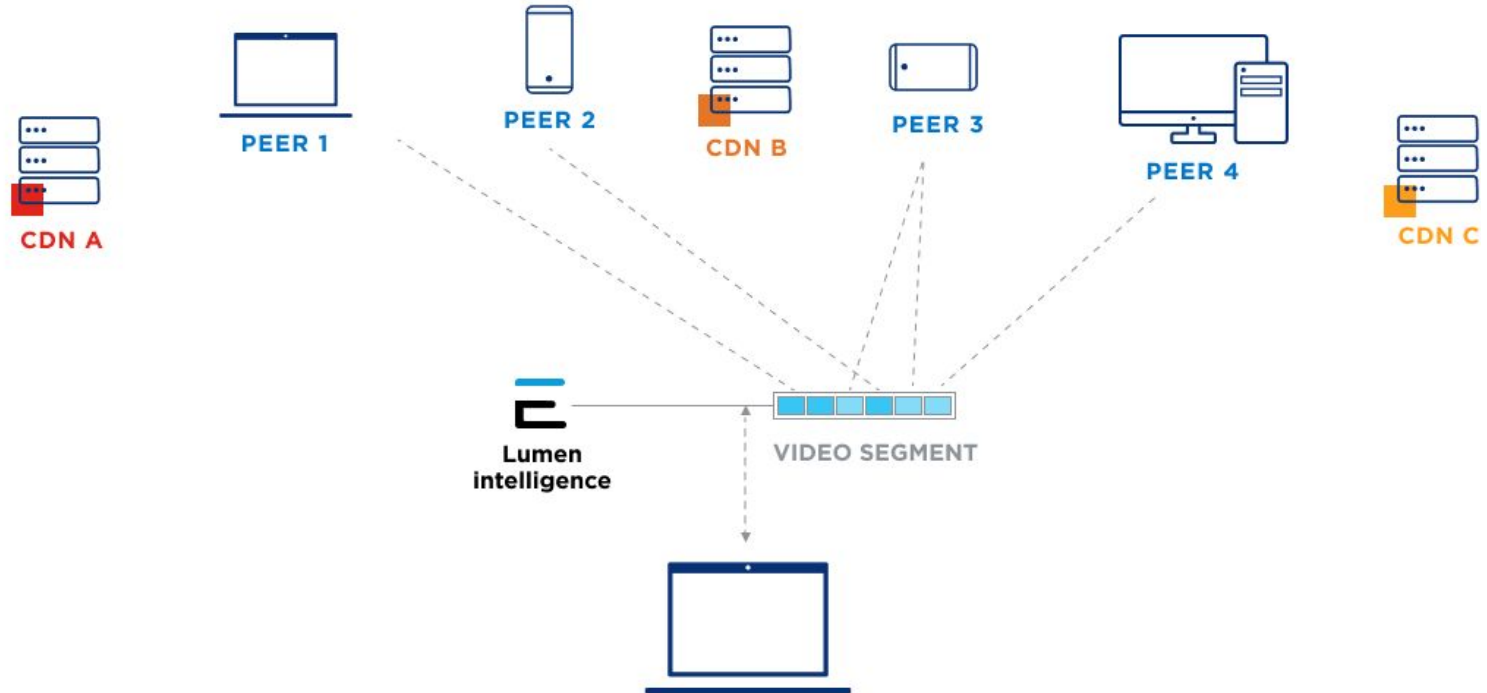


How it works



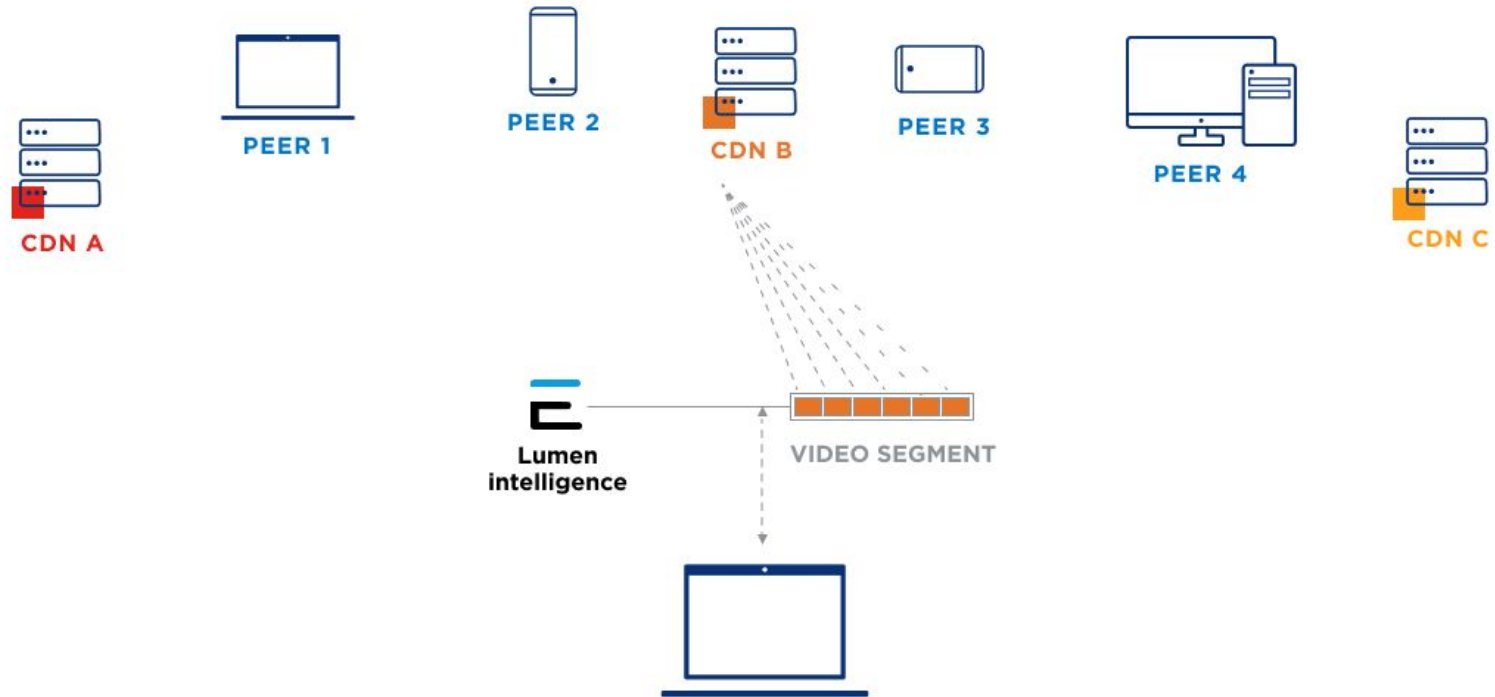
How it works

P2P multi-sourcing



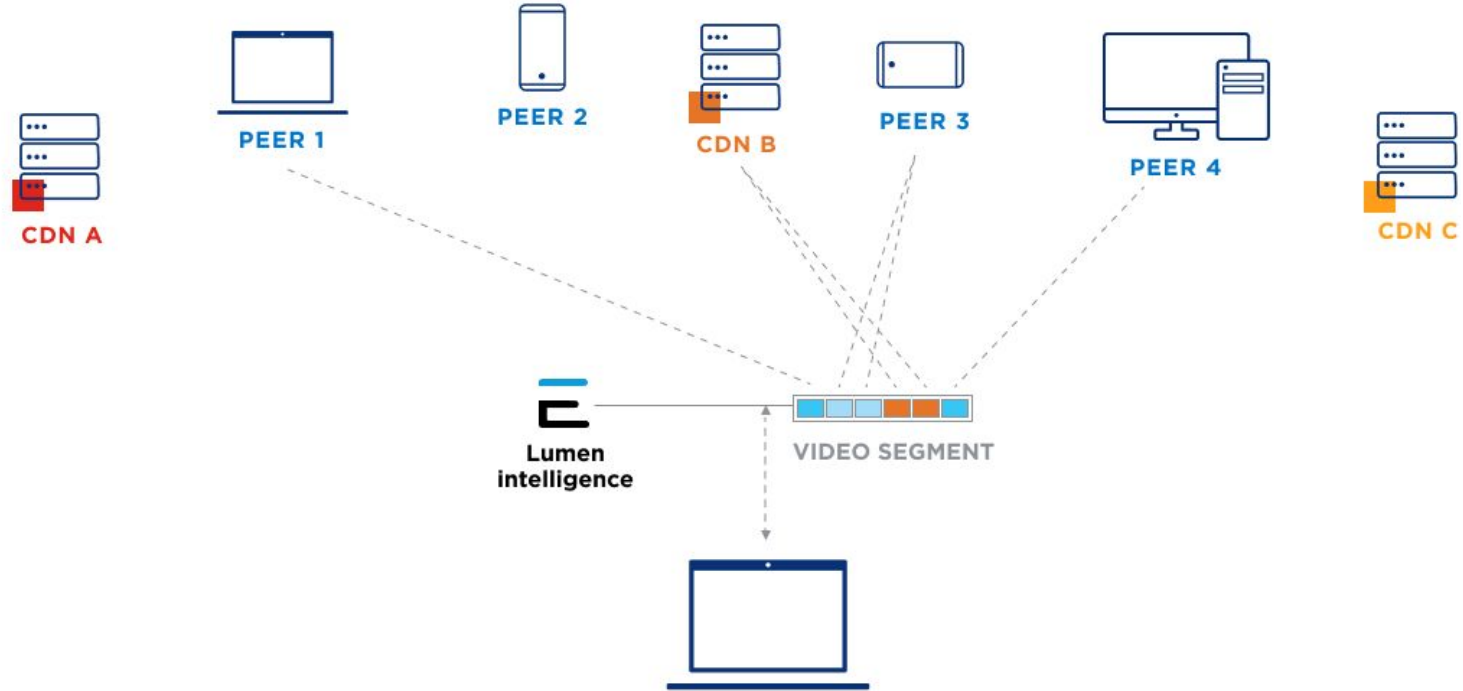
How it works

Client-side Multi-CDN



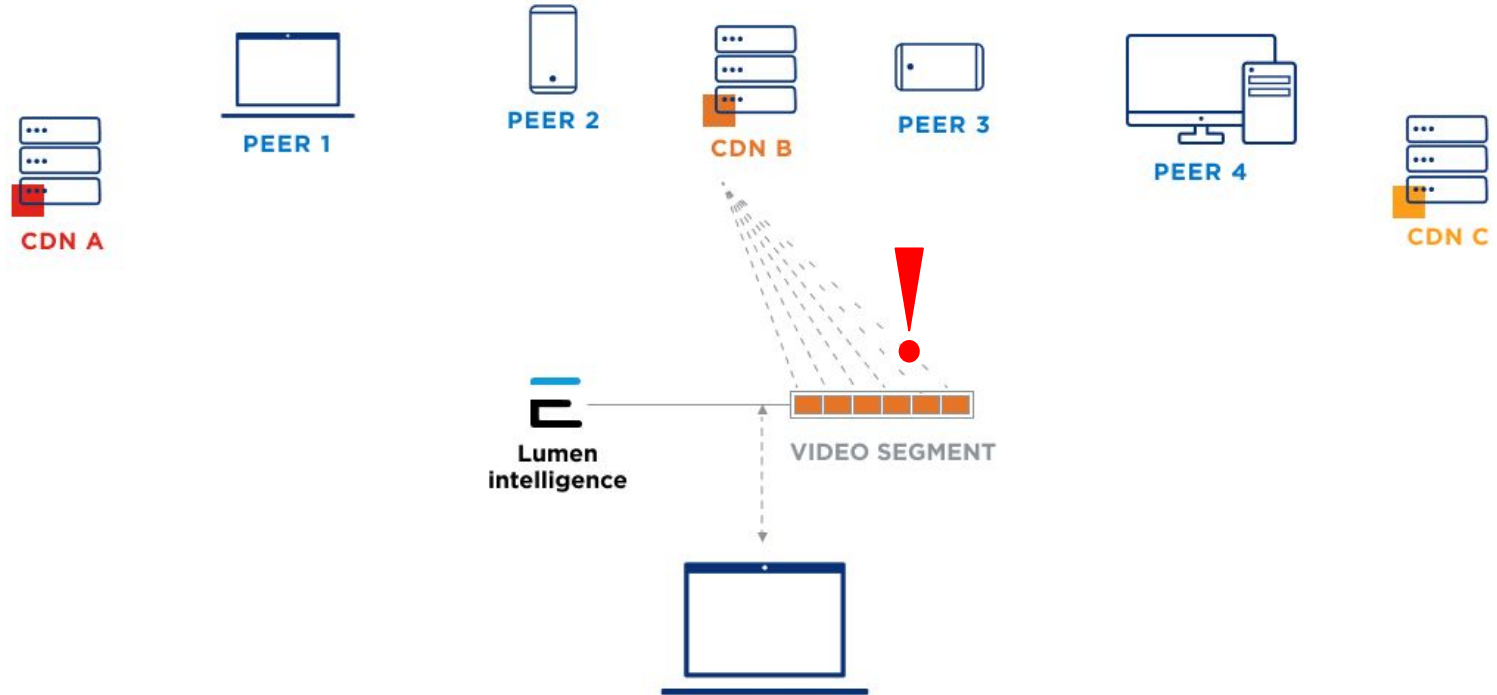
How it works

Hybrid P2P and CDN with byte-range requests



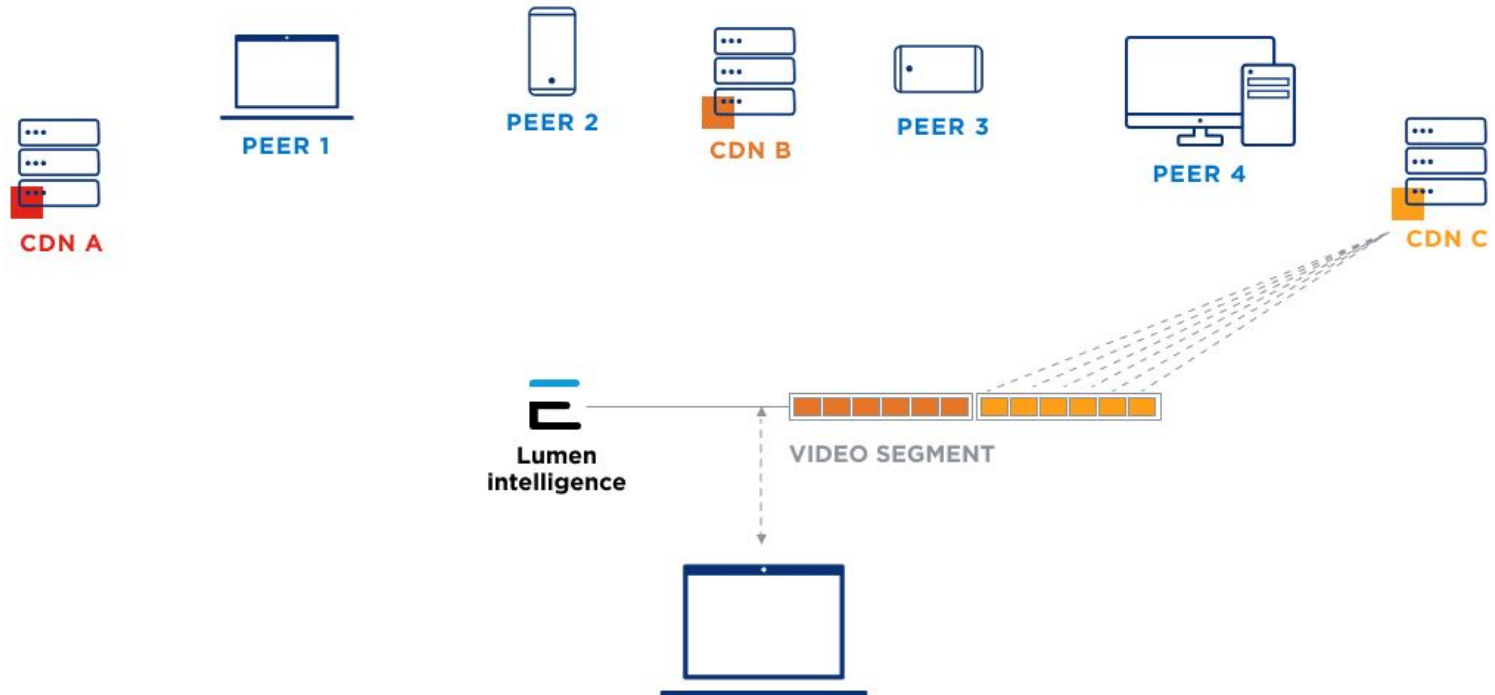
How it works

Client-side Multi-CDN



How it works

Client-side Multi-CDN

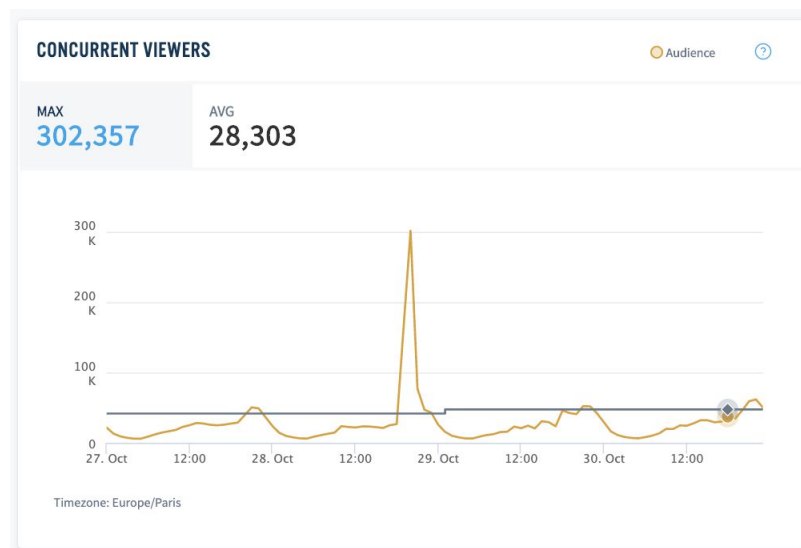
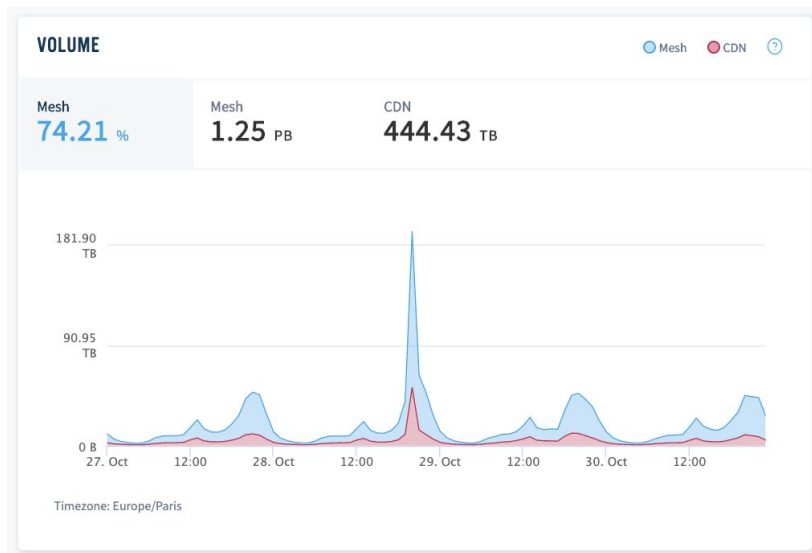


Live news use cases

Stay-at-home take center stage

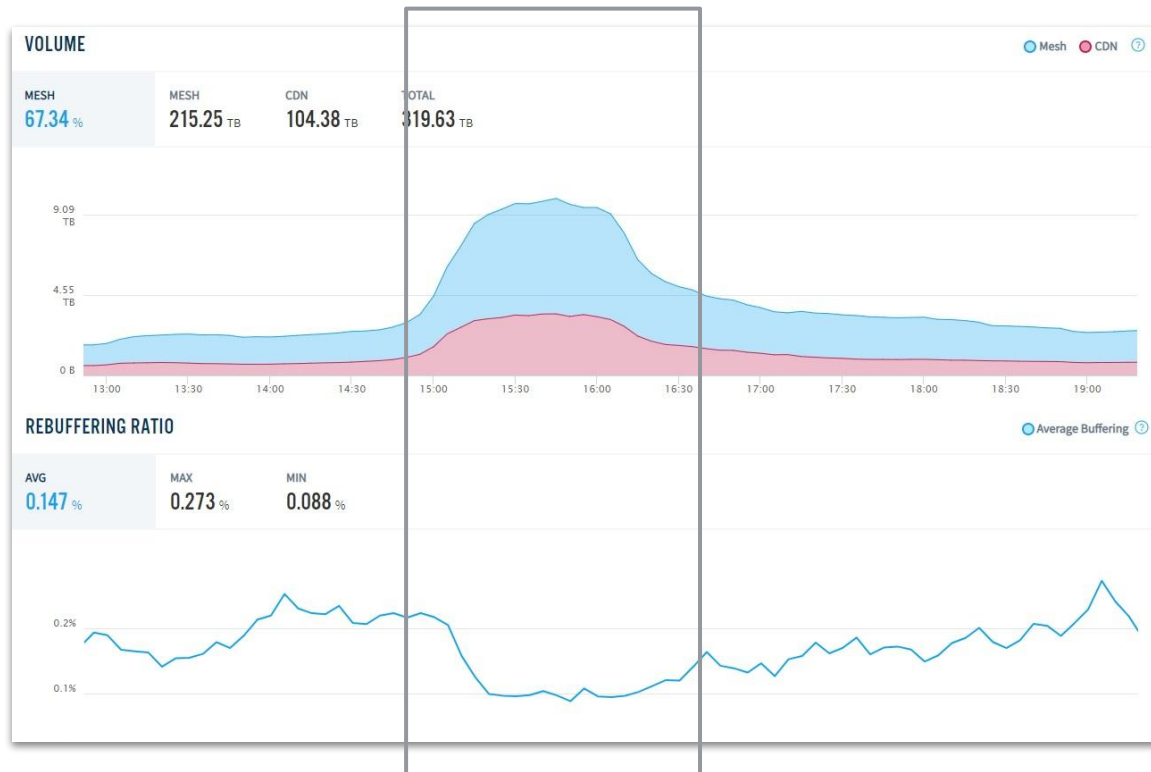
2020 stay at home orders

10x greater scale without adding new infrastructure



2020 stay at home orders

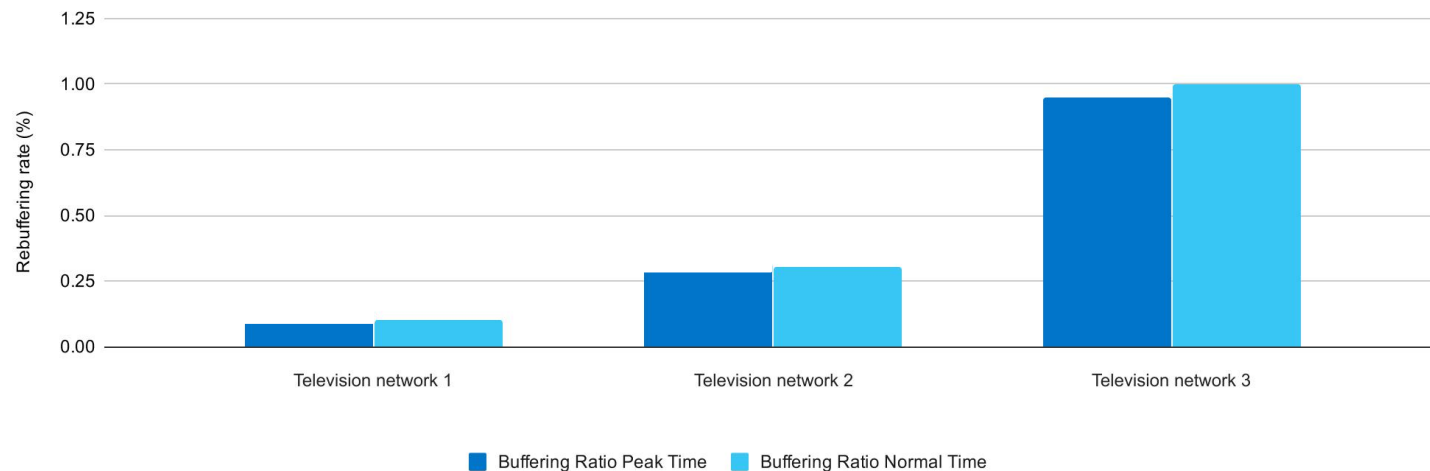
Improving performance as viewership rises



2020 stay at home orders

Consistent high performance vs. “normal” traffic levels (government speeches)

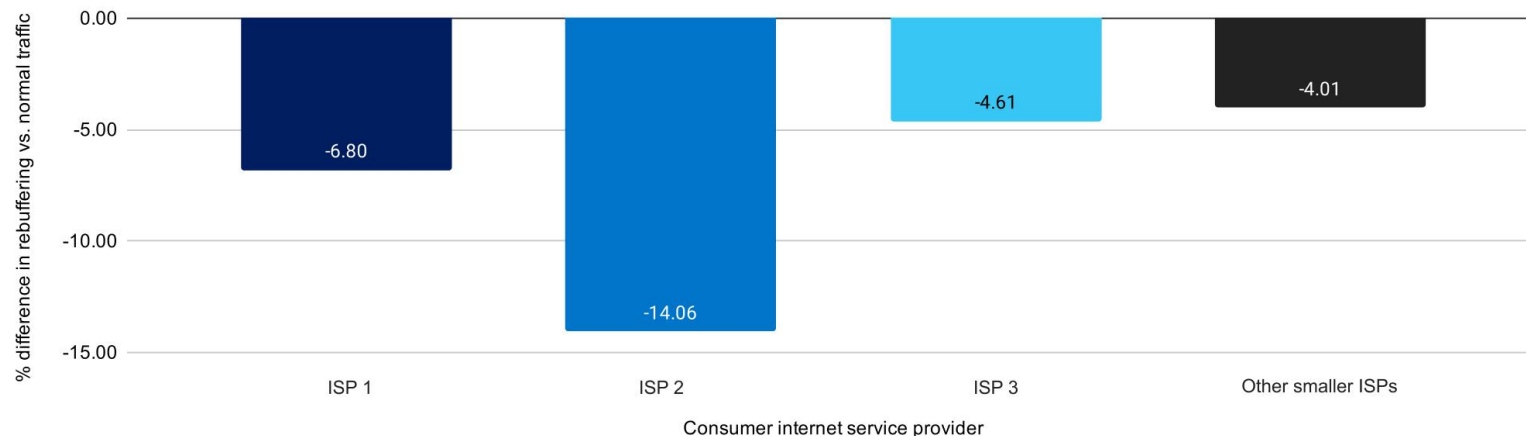
Rebuffering ratio - peak vs. normal traffic



2020 stay at home orders

Positive network effect on consumer ISPs

Percent variation in rebuffering ratio between peak vs. normal traffic time



Client-side CDN decision making

Unique client-side switching mechanism

- Decisions based on bandwidth throughput and errors
- Sensitivity to QOS changes configurable
- Fetching segments periodically from other CDNs to keep scores up to date
- Decisions made locally → no SPOF

CDN Orchestrator results

Switching decisions

CDN ORCHESTRATOR

Activity Summary
CDN Configuration
Orchestrator Properties

DATES
Custom Range

FILTERS
CDN Lists

CDNs

- CDN 1 HLS Live (P)
- CDN 3 HLS Live (B)
- CDN 1 DASH Live (P)
- CDN 1 DASH Live (B)
- CDN 1 HLS Live (B)
- CDN 2 DASH Live (P)
- CDN 2 DASH VoD
- CDN 1 HLS VoD
- CDN 1 DASH VoD
- CDN 2 HLS Live (P)
- CDN 2 DASH Live (B)
- CDN 2 HLS Live (B)
- CDN 3 HLS Live (P)
- CDN 3 DASH Live (P)
- CDN 3 DASH Live (B)
- CDN 2 HLS VoD

GRAPHS

- Traffic
- Concurrent Viewers
- Error Rate
- Avg Burst Download Speed



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Switching decisions

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08/27/2020 - 09/03/2020

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Questions?