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Media Clients and Servers Cooperating with Common Media Client/Server Data

ACM/IRTF ANRW – July 28th, 2021

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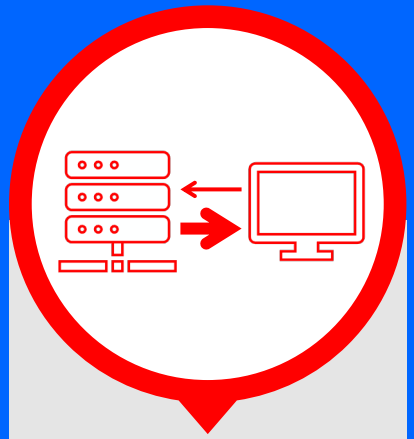
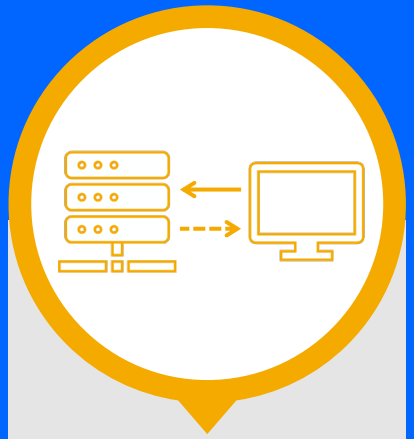
Delivering media over HTTP beyond download-and-play



Progressive Download

Playing while still downloading

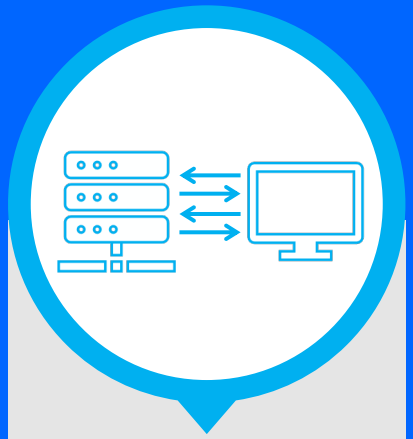
No throttling



Pseudo Streaming

+ Seeking

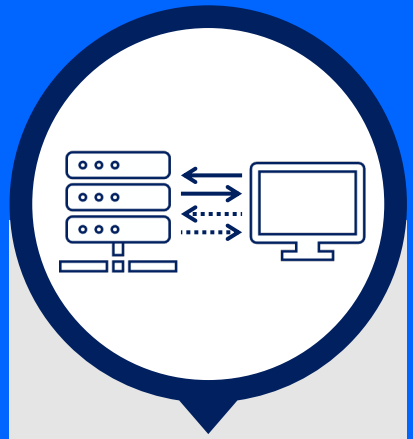
+ Throttling based on encoding bitrate



Chunked Streaming

+ Live and linear streaming

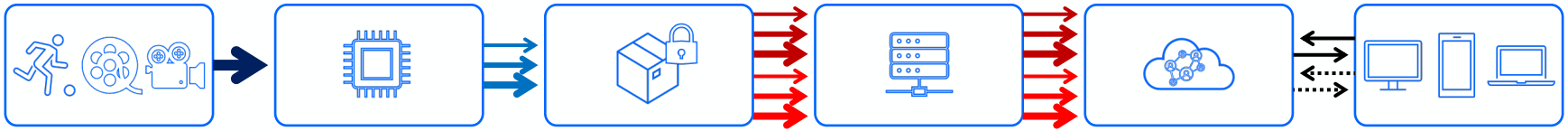
+ Ad insertion



Adaptive Streaming

+ Adapting to network and client status

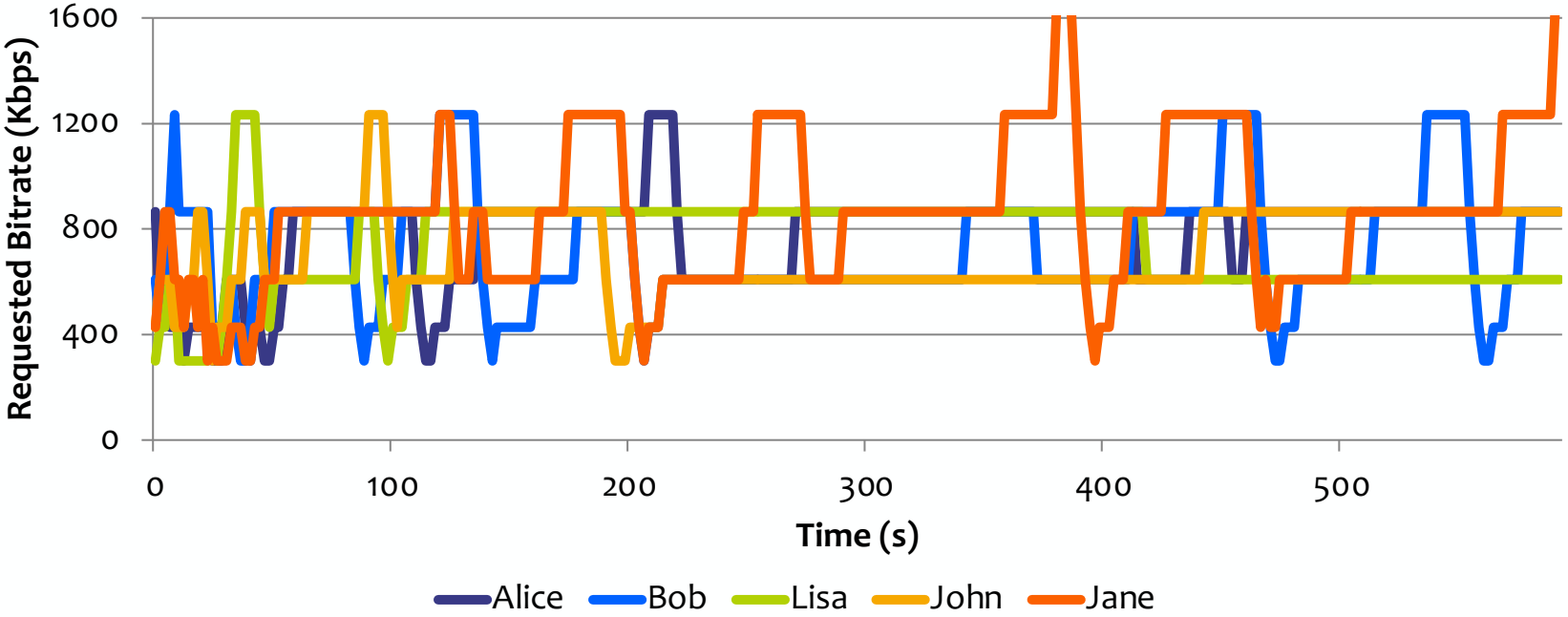
End-to-end workflow for HTTP adaptive streaming



- Why HTTP
  - Features well-understood naming/addressing and authentication/authorization infrastructure
  - Provides easy traversal for all kinds of middleboxes (e.g., NATs, firewalls)
  - Enables cloud access, leverages the existing (cheap) HTTP caching infrastructure
- Imitation of streaming via short downloads (request/response pairs)
  - Minimizes (download) waste
  - Enables monitoring/tracking consumption
- Improved viewer experience
  - Reduces startup delay (upon zapping or seeking), frame skips and stalls
  - Provides adaptation capability based on network conditions and client status

$hit happens when streaming clients compete

10 (identical) clients sharing a 10 Mbps link



Bitrate ladder: 300, 427, 608, 866, 1233, 1636, and 2436 Kbps

Reading: What happens when HTTP adaptive streaming players compete for bandwidth? – ACM NOSSDAV 2012

Servers and clients cooperate

With each other and/or the network

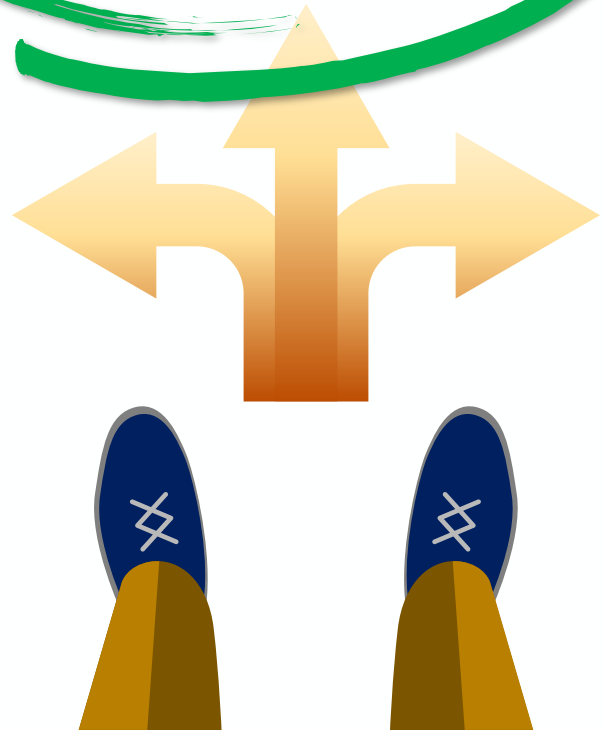
😉: *Using hints helps the clients and servers take more appropriate actions*

Server stay in control

Assume dumb clients

Apply appropriate QoS in the network

😏: *Streaming video in uncontrolled fashion will never replace traditional video*

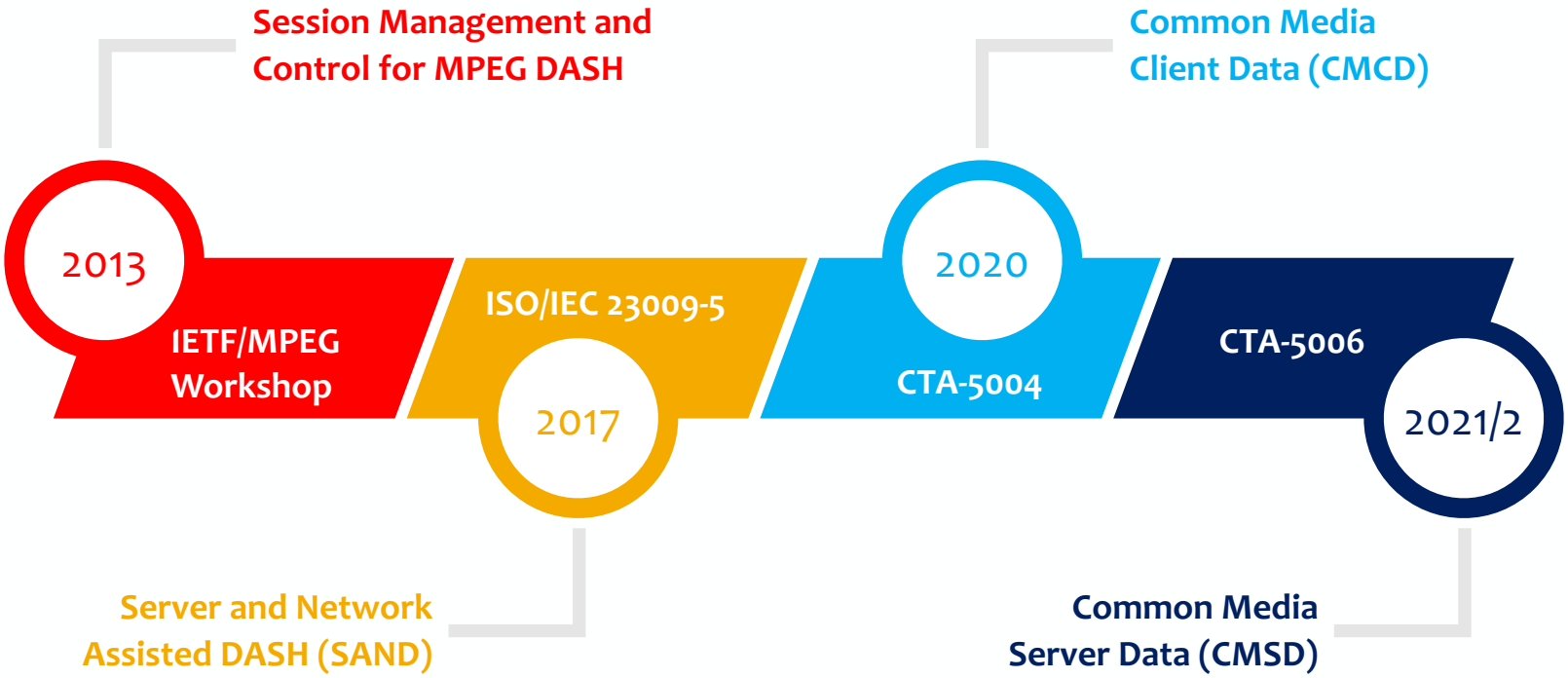


Clients stay in control

Assume dumb servers and network

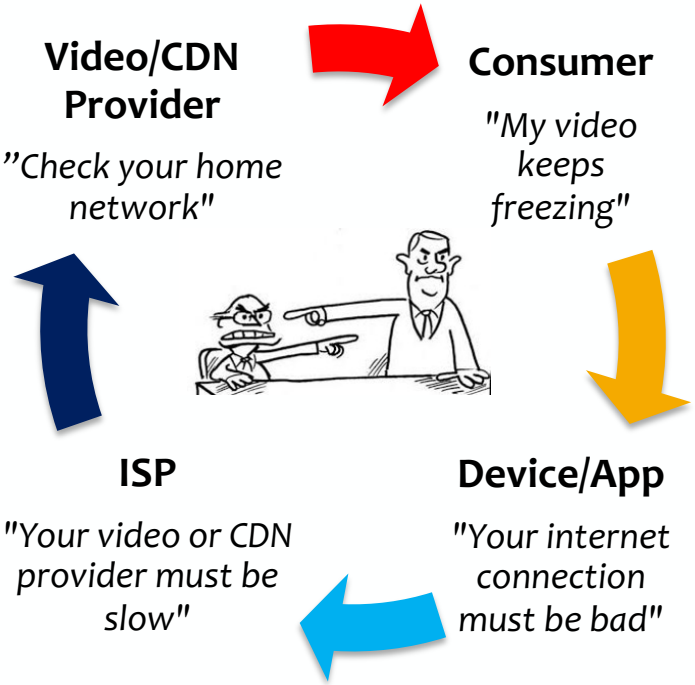
Be selfish

🤔: *Throw more bandwidth at the problem*


Session Management and Control for MPEG DASH
Common Media Client Data (CMCD)
2013
IETF/MPEG Workshop
ISO/IEC 23009-5
2017
2020
CTA-5004
CTA-5006
2021/2
Server and Network Assisted DASH (SAND)
Common Media Server Data (CMSD)

Whose fault is it when my video sucks?

Fault isolation requires analytics data from various points along the delivery pipeline



Despite the common belief, CDNs

- are clueless about what they deliver
- cannot tie the individual GETs to playback sessions
- cannot generate dashboard metrics for
  - delivery performance
  - player software issues
  - viewer experience
- cannot prioritize delivery for urgent requests

Reading: Standards-based streaming analytics and its visualization – ACM MMSys 2021

CTA-5004: Common Media Client Data (Published in Sept. 2020)

How could a client relay info about

- content ID and session ID
- current segment's type/duration/format
- delivery deadline
- next segment (or byte range) to be requested
- current buffer length, latency, startup delay and playback rate
- stall stats

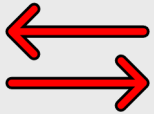
Reading: Common media client data (CMCD): initial findings – ACM NOSSDAV 2021

CTA-5006: Common Media Server Data (Work started in May 2021)

How could a server relay info about

- server-side bandwidth estimates
- hints for the startup bitrate
- min/max limits for the playback bitrate
- redirection suggestions
- caching indications
- breadcrumb data
- server/network load signals

Key takeaways and things to ponder



Info exchange is useful when it is relevant, actionable and up-to-date

Running code is available to for testing and trialing

dash.js fastly THEOplayer Akamai

What information is relevant and actionable is the main question

Running code is available to let others perform further testing

WAVE
WEB APPLICATION VIDEO ECOSYSTEM

Further reading and links

- A survey on bitrate adaptation schemes for streaming media over HTTP
  - IEEE Communications Surveys & Tutorials, 21(1):562–585, 2019 (DOI: 10.1109/COMST.2018.2862938)
  - https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8424813
- MPEG/IETF Workshop on session management and control for MPEG DASH
  - https://mpeg.chiariglione.org/about/events/workshop-session-management-and-control-mpeg-dash
- cta-wave/common-media-client-data
  - https://github.com/cta-wave/common-media-client-data
- cta-wave/common-media-server-data
  - https:// github.com/cta-wave/common-media-server-data
- dash.js CMCD reporting
  - http://reference.dashif.org/dash.js/latest/samples/advanced/cmcd.html
- Video monitoring dashboards with near real-time edge logs and CMCD KPIs
  - https://tinyurl.com/akamai-cmcd-dashboard

Thanks for listening and hope to see you at MMSys'21

Sept. 28-Oct. 1, 2021 – Istanbul, Turkey

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* Including the postponed celebrations for the 30th and 25th anniversary of NOSSDAV and PV, respectively

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