The Road to Interdomain Multicast

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Future Plans (2014)

1. Get multicast video to play
2. Get ISPs to deliver multicast
3. *Profit!

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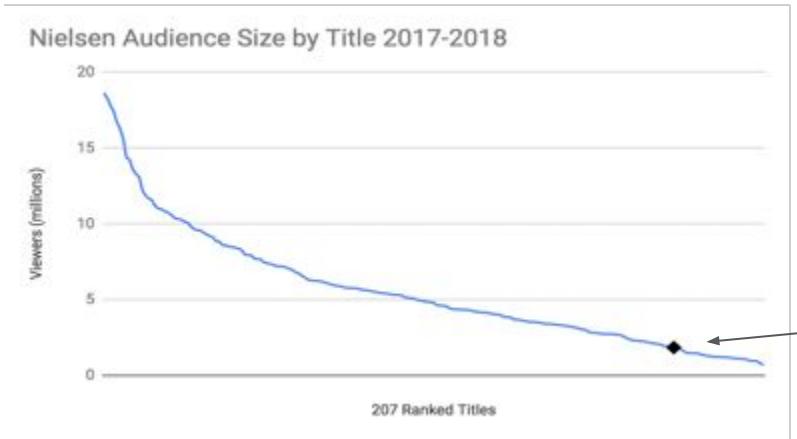
Real Motivation: looming scalability issues



Unicast Arithmetic

- 72 tbps = Akamai Traffic Record, Dec 2018*
- 40 mbps = 4k standard frame rate (35-45 mbps, 24-30fps)

$72 \times 10^{12} / 40 \times 10^{6}$

=> 1.8m simultaneous 4k viewers @record rate

Future Plans (2015)

1. Get multicast video to play
   a. FEC
      i. reliably assemble segments (unicast for repair+bootstrap)
      ii. feed them to existing player
   b. ABR -- pace segments to player based on network capacity
2. Get ISPs to deliver multicast
3. Profit!

Still working on this one...

Became walled-garden video product*
- First deployed: Q1 2019
- happy customers, ongoing deployment expansion
- (but doesn't solve scalability issues without #2)

* Akamai's Aura/LMS: https://www.akamai.com/us/en/products/network-operator/licensed-multicast-solution.jsp

Multicast Attitudes

Pros:

- Clear Value Proposition
  - scalability for many things
- Viable Transport
  - STB TV works great (deployed)
  - downloads work in lab

* STB-TV and lab: the 2 environments that own sender + network + receiver

Cons:

- Business case not clear.
  - Costs unknown
  - Savings unknown
- Tricky Interop
  - Sender + receiver. (No widely pre-deployed standards yet.)
  - Network management/provisioning
- Burned fingers
  - so many burned fingers!
    (c.f. RFC 4611 section 1.1, from "No consensus could be reached...")

Getting ISPs to Deliver Multicast (2016-present)

AMT just happened (RFC 7450), can you ingest multicast from us with it?

How to discover relay?

Anycast to a public anycast thing, spec says. Does that work? Or static IPs?

Hahahaha no.

Which fix you like better:
- draft-jholland-mboned-driad, or
- draft-jholland-idr-mcast-amt-nexthop?

Either, i guess.

K, thx. driad = RFC 8777 now, and i put up some zones.

What about rate limits? You still have useful offload if we cap your traffic?

Yes, but can you keep us below cap instead of dropping? Optional, but better. Maybe with draft-ietf-mboned-cbacc?

Mebbe. Thinking...

Addressing Multicast Attitudes

Costs (Proposed dev/maintenance work):
Ingest & Management-plane integrations:
- RFC 7450
- RFC 8777
- draft-ietf-mboned-dorms
- draft-ietf-mboned-cbacc

Savings (long-term targets):
- 20% day-to-day (of total)
- 50% peak (of total)

Repeatable by others (ask them for details on their traffic)

Time heals all wounds?

Seeking more partners
- POCs starting this year

Cons:

- Business case less clear.
  - Costs ~~unknown~~ estimatible
  - Savings ~~unknown~~ estimatible
- Interop
  - Sender, network, receiver
- Burned fingers

- **Today**: SDK (Android STB, whitelabel test app)
- **Q2**: Custom Browser Build w/API + wasm SDK
- **Next year-ish**: Browser API built-in + wasm SDK
- eventually: Standardized transport protocols

Future Plans (2020)

1. Expand multicast (anything with the same bits for many people):
    a. Popular Linear video (auto-launch multicast when it's popular enough)
    b. Popular On-demand video (auto-launch multicast when it's popular enough)
        i. e.g. ~30 offset streams for 1-hr show, clients unicast for up to 2min at startup
    c. Popular software downloads
        i. games, os updates, browser updates, etc. join any time, listen long enough.
2. Get ISPs to deliver multicast
    a. Target: ~50% peak offload, once fully deployed (~4yrs?). sufficient as win-win?
    b. Standardized, repeatable deployment that others can use also.
3. Get receivers deployed
    a. Browser API
    b. Move to standardized transport protocols
4. Profit!
    a. embiggen the pie. solving scale => more stuff can be delivered.

Immediate goals for 2020

- Browser API -- MulticastReceiver:

  "*To a first approximation, all web pages are malicious.*"
  - Initial proposal: https://discourse.wicg.io/t/proposal-multicastreceiver-api/3939
  - Secure data path authentication: draft-ietf-mboned-ambi
  - Bandwidth abuse prevention: draft-ietf-mboned-cbacc
- Trials with carriers
  - Make sure the AMT ingest architecture works for >1 carrier
  - Integrate cbacc with at least 1 bandwidth controller
  - Scale to real content with:
    - browser experimental feature on live web pages, and/or
    - content owner's app

Participation

Trials/POC this year?

- Interested carriers and content owners, please contact:
  - jholland@akamai.com: Jake Holland (presenter, draft author)
  - jataylor@akamai.com: James Taylor (business director, DISRUPT project)
- Architecture walkthrough
  - questions answered
  - AS-specific achievable offload estimates and targets (peak & typical)
  - further discussions as warranted