Multicast to the Grandma (MTTG): It’s finally here!

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What is MTTG?

- Multicast made so easy and ubiquitous that your Grandma uses it!
Why Multicast?

- First, some simple facts:
  - HD Bitrate: 4-8Mbps (Netflix recommends 5Mbps)
  - 4K Bitrate: 15-35Mbps (Netflix recommends 25Mbps)
  - 8K Bitrate: 80-100Mbps
  - VR Bitrate: 500Mbps-5.2Gbps!!!
  - TV Audience of typical NFL game: ~15M
    - 15M viewers @ 25Mbps = 375Tbps!! Can Brute Force Unicast (BFU) keep up?
  - “Cord Cutting” Evolution- live, linear TV is the last frontier
    - SlingTV, HuluTV, Vue, YouTubeTV, etc
  - Live, linear TV is not dead yet!
What’s old is new: Live streaming is Trending

• **Brand Transparency and Authenticity**: due to spontaneous and un-editable nature, live streams are perceived as more authentic and drive greater emotional engagement than on-demand

• Viewers spend **8X longer with live video** than on-demand (5.1 minutes for on-demand vs. 42.8 minutes for live video content)

• **67% of live video viewers are more likely to make a purchase**

• >50% of marketing professionals said they have seen the **best ROI from live video** than any other social media platform

• Live video is outpacing the growth of other types of online video, with a **113% increase in ad growth yearly**
Conclusion: Live linear video is here to stay

• ... but, IP (unicast) is not well suited to multi-destination traffic
  • IP Multicast was created 2+ decades ago to solve this problem
    • So, what went wrong?
Steps For world domination

• Step 1: AMT Relays
• Step 2: AMT GW implementations
• Step 3: Portal for mContent
• Step 4: Off-Net Sourcing
  • Simple way for end users to add live multicast content to the MBone
• Step 5: Profit!!
Step 1: AMT Relay Deployment

- AMT Relay deployed at Thomas Jefferson HS
  - Already had 10G multicast-enabled connection to I2 (MBone)
  - Student (William Zhang) deployed the first AMT relay on the MBone as sr. project
  - Also, curated existing multicast content on I2
    - Python script that ran “show multicast route detail” on all routers at I2 Looking Glass
    - Found 119 sources and 40 mcast groups > 5pps
    - Presented his experiences at IETF 101 (London)
- Added a second relay at George Washington Univ (Andrew Gallo)
Step 2: AMT Gateway Implementation

- Goal: build a modern AMT GW implementation that’s easiest enough for Grandma to use
  - Preferably in browser
    - Doesn’t appear possible today
  - Settled for VLC- widely used video apps
    - Available for Mac/Windows/iOS/Android
    - Initial implementation by Natalie Landsberg (presented in IETF102)
    - Enhancements added by Wayne Brassem (relay resilience, etc)
    - Open source- patch submitted
- Download and watch it now!
  - [https://github.com/Juniper/amt-vlc](https://github.com/Juniper/amt-vlc)
Step 3: Multicast Content Portal

• Webpage/Portal with a list of active multicast streams
  • Take output of William’s curation script and populate “(mc)TV Guide” that can launch AMT-enabled VLC to view
  • Simple API for sources to add own content
Step 4: Off-Net Sourcing

• Sourcing from MBone is available today (On-Net)
  • ... but most sources will be on unicast-only networks (Off-Net)

• Off-Net sourcing- users on unicast-only nets can stream to some “server” on MBone, which converts stream to multicast
  • Then accessible natively to on-net receivers and via AMT to off-net receivers
How to get involved

• CONTENT, CONTENT, CONTENT
• Further dev of VLC (maybe)
• In browser implementation
• Portal- curation script to populate “TV Guide” of active streams
• Add more relays
  • Ideas for relay discovery- lessons from CDNs?
• Off-Net Sourcing
Summary

• Need for Internet Multicast is now greater than ever
  • Live linear is cool again, democratization/decentralization of content providing
• Internet Multicast is the destination, AMT is the indispensable transition step
• AMT has been around a while, but until now had missing pieces
  • All pieces now in place to have working solutions
  • You can see it working now! The proof is in the pudding
• If you are interested in any of this, find me at the bar
References

• Natalie/Wayne’s VLC with AMT GW build
  • https://github.com/Juniper/amt-vlc

• William’s Senior Project Docs
  • https://github.com/willzhang05/senior-research

• Curation Results
  • https://github.com/willzhang05/senior-research/blob/master/logs/results.txt