Meeting Future Demand for IP Video

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Turner Broadcasting System, Inc.

- Linear Television Networks (US)
  - News: CNN, HLN
  - Entertainment: TBS, TNT, TCM, truTV, CartoonNetwork, etc.
- Websites
  - News: CNN.com, Money.com, etc.
  - Sports: SI.com, NBA.com, NCAA.com, Nascar.com, PGA.com, etc.
  - Entertainment: TBS.com, TNT.com, TCM.com, TeamCoco.com, Cartoonnetwork.com, etc.
- Apps for Mobile/Tablet/Connected Devices

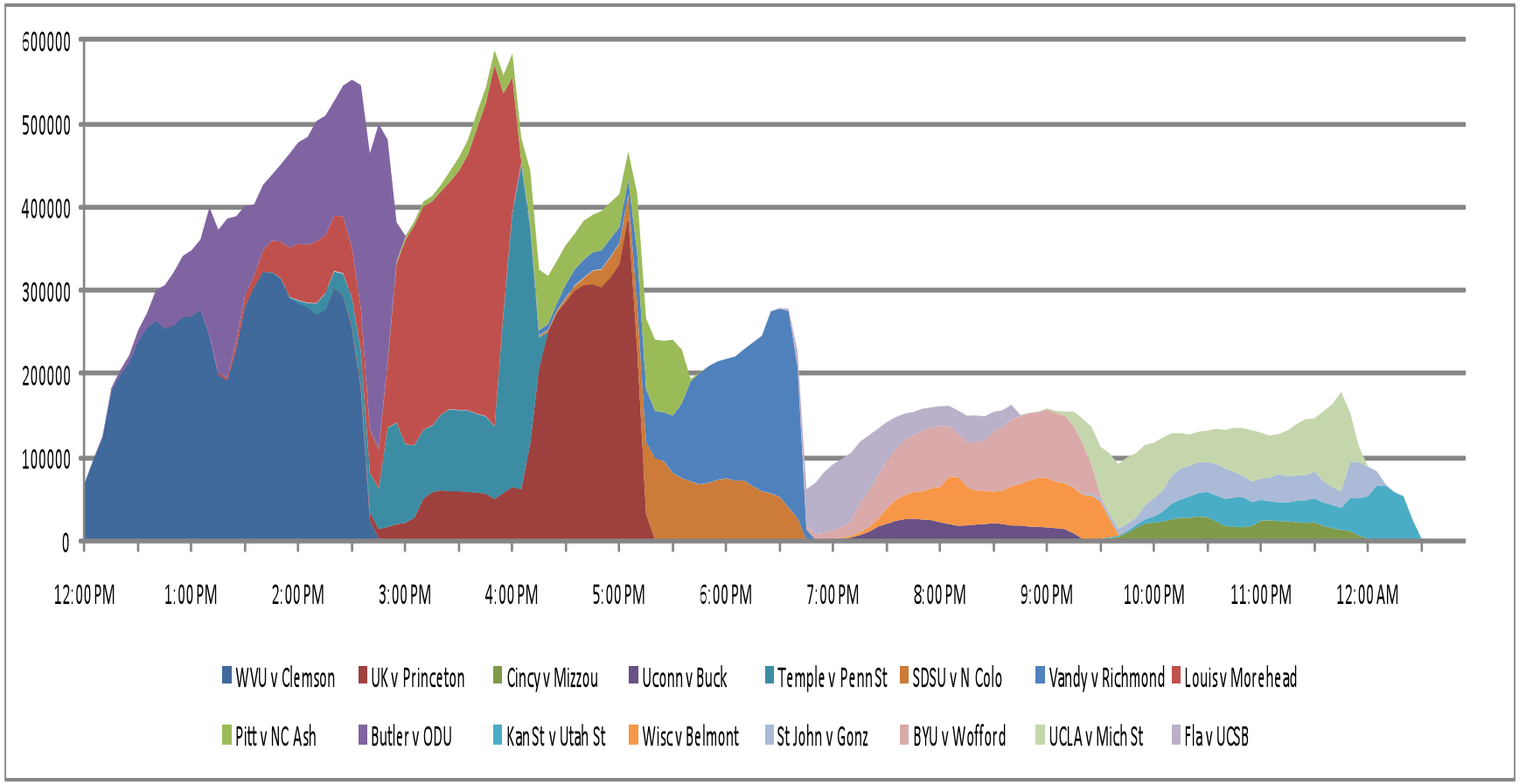
Prior Large-Scale IP Video Events

- News: Obama Inauguration
  - 1.35 million concurrent @ 500Kb
  - 7.8 million Live sessions
  - 3.78 million Hours
  - 1:34:00 viewing per average Unique User
  - Over 200 Countries

Prior Large-Scale IP Video Events

- Sports: March Madness on Demand 2011
  - All 68 Tournament games streamed live.
  - 13.7 million streaming hours (17% > 2010)
  - Adaptive HTTP @ 1.6Mb (max), 1.3Mb (avg). ~600K concurrent at peak.
  - Broadband: 1.9 million avg. daily uniques, 67.5 viewing minutes per unique.
  - Mobile: 683K avg. daily uniques, 16.6 viewing minutes per unique.
  - 30% of streams were delivered to iPhone/iPad apps.

Round of 64 Viewing – 3/17



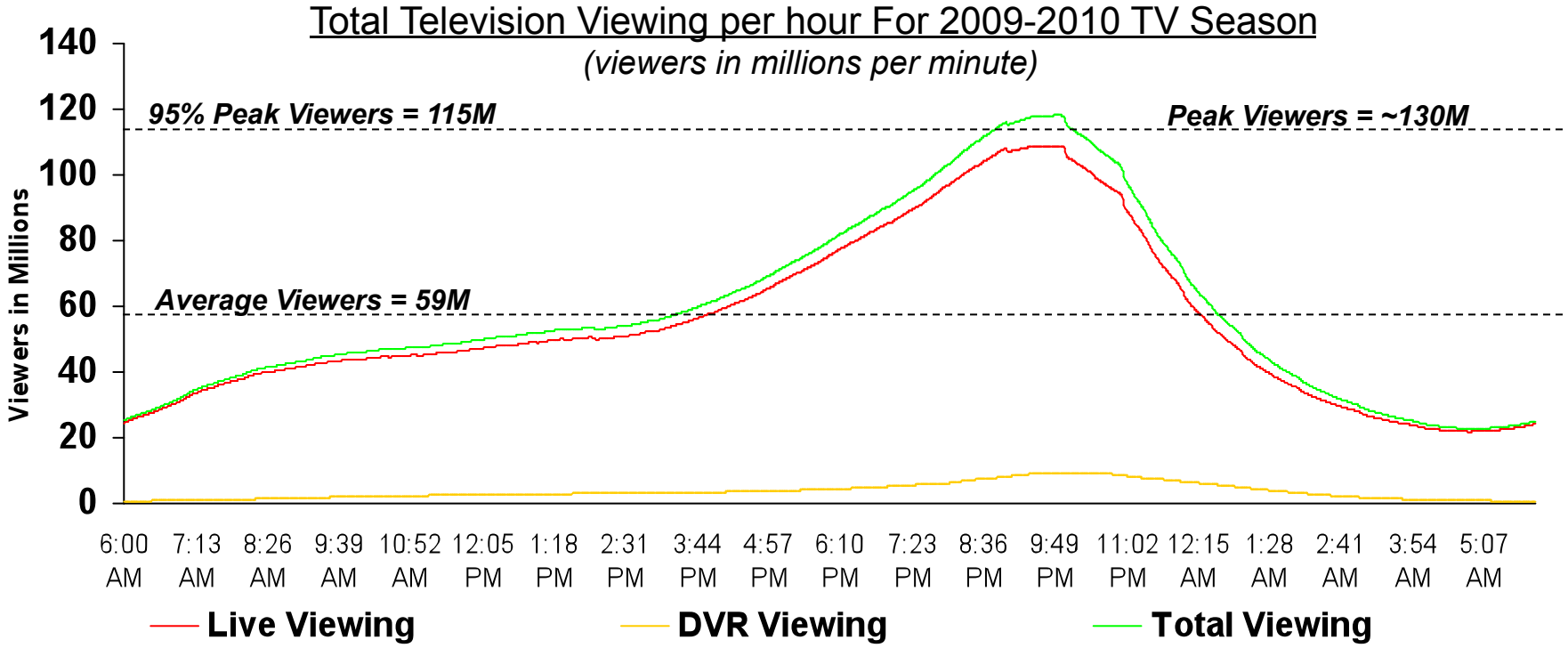
Thursday peak 780Gb, Friday ~500Gb, later rounds ~200-300Gb

Graph source: Akamai

“TV Everywhere”

- IP delivery of “long-form” Network programming to authenticated subscribers on devices of their choice.
- Available to 70 million households by start of Q3.

Concurrent TV Viewing (US)



	Total Viewing	Live Viewing	DVR
95% Peak Viewers	115M	106M	9M
Average Viewers	59M	55M	4M

What If?

- n% of TV viewing time or peak viewers shifted to IP delivery?
- Could it be provisioned as unicast?
- Could it be delivered?

Some Rough Math

- Viewers * percentage * bitrate
  - 130MM * 5% * 2Mb = 13Tbits
  - 130MM * 5% * 4Mb = 26Tbits
- Cisco 2011 VNI: 33.6 EB/mo in 2015
  - 33.6EB/mo is 104Tb/s (avg)
  - US is 1/4th of World => 26Tb (avg)

Is there a more efficient way?

- Can we reduce the network stress caused by large-scale streaming?
- Can we improve quality?
- Can we reduce infrastructure requirements for all participants?

Multicast?

- Historically problematic at Internet Scale
- SSM helps with origination issues
- AMT helps with last-mile gaps
- That leaves deployment in the middle …. CDNs and ISPs

AMT Issues

- Client Code, esp. for connected devices
- Relay Code
- Adaptive HTTP vs UDP
- AMT Relay Discovery -- Anycast?
- And?

Let’s Talk…