Adaptive Bit Rate video delivery

Thomas Kernen

Agenda

- The Big Picture: Video Distribution over the Internet
- Why MPEG DASH?
- DASH264
- Impact on network?
- H.265/HEVC
- So what happens next?

Online video services are everywhere

BBC iPlayer

hulu

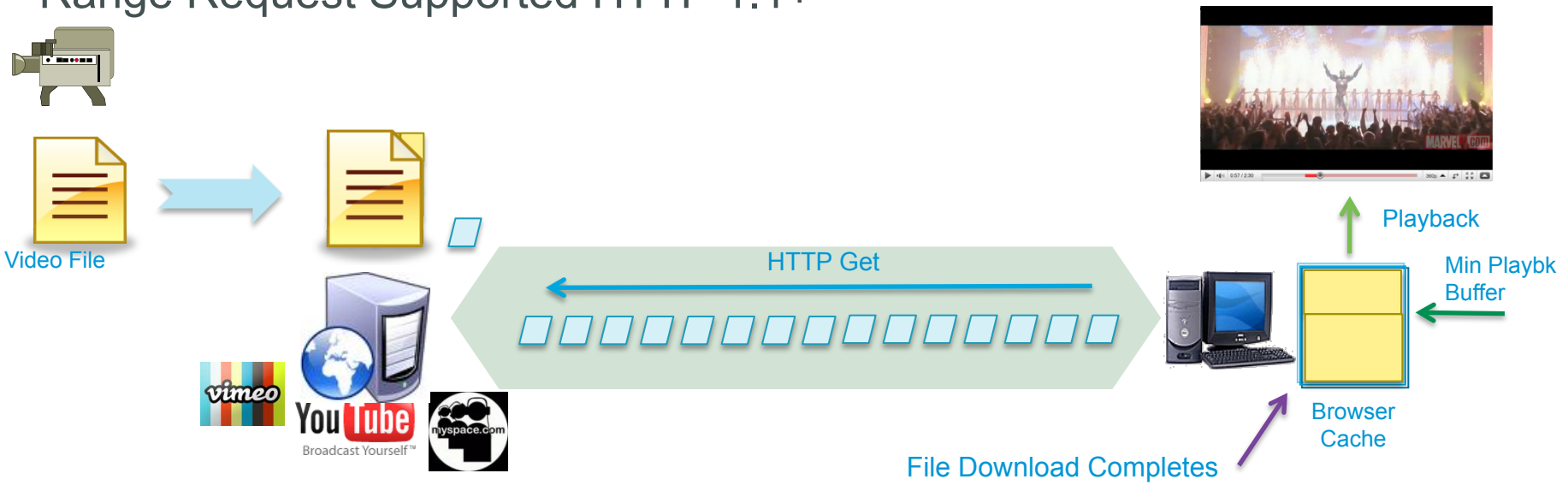
HBO GO

Sky Go

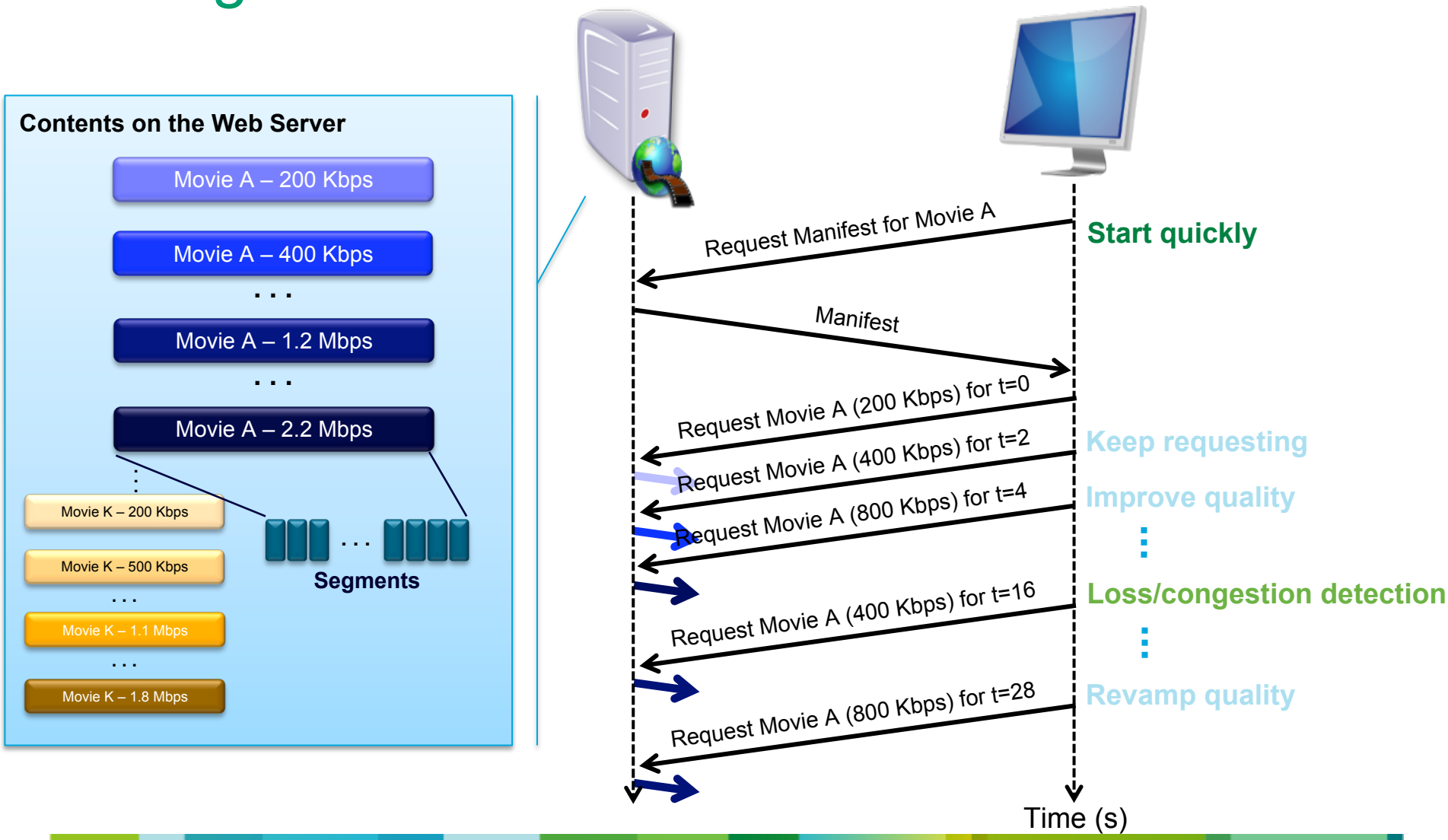
LOVEFiLM.com®

HTTP Progressive Download

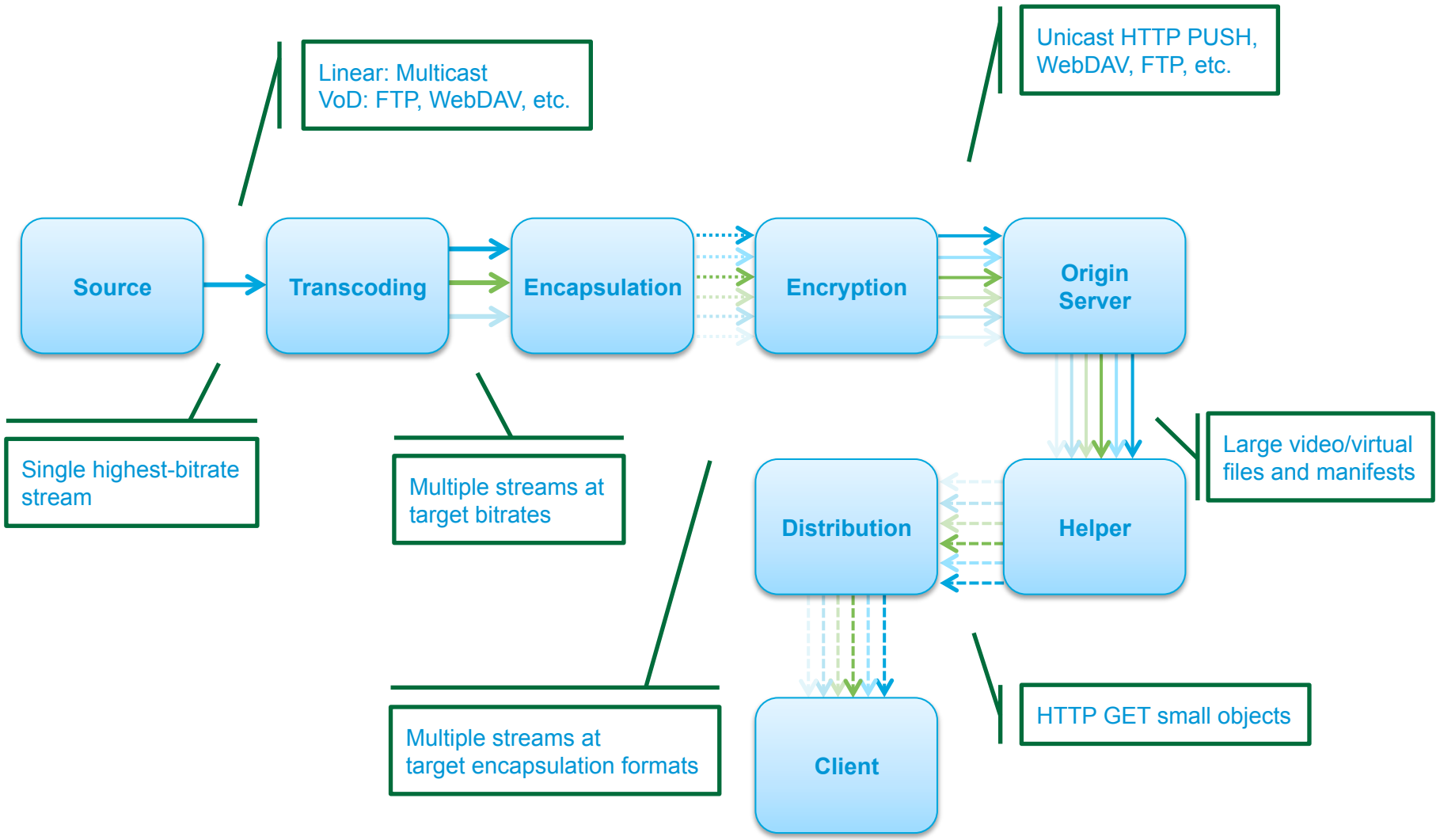
- Prevalent form of Web-based media delivery for video share sites.
- ‘Ordinary’ File Download from HTTP Web Server
- Many file formats
- ‘Progressive’ = Playback begins while download is in progress Byte Range Request Supported HTTP 1.1+



Multi-Bitrate Encoding and Representation Shifting

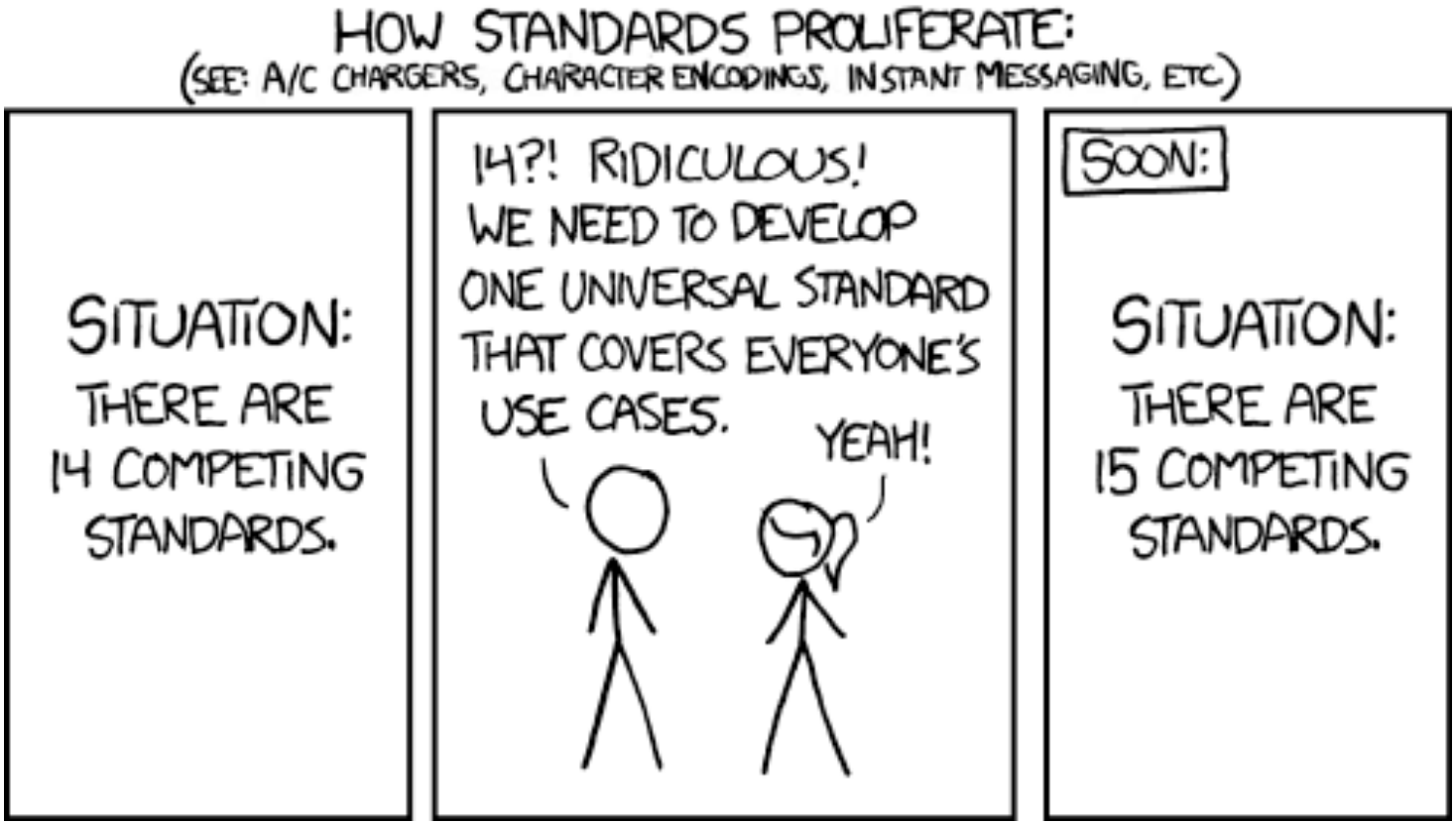


Adaptive Streaming Content Workflow
Today



Why MPEG-DASH?

Where we were



Source: http://xkcd.com/927/

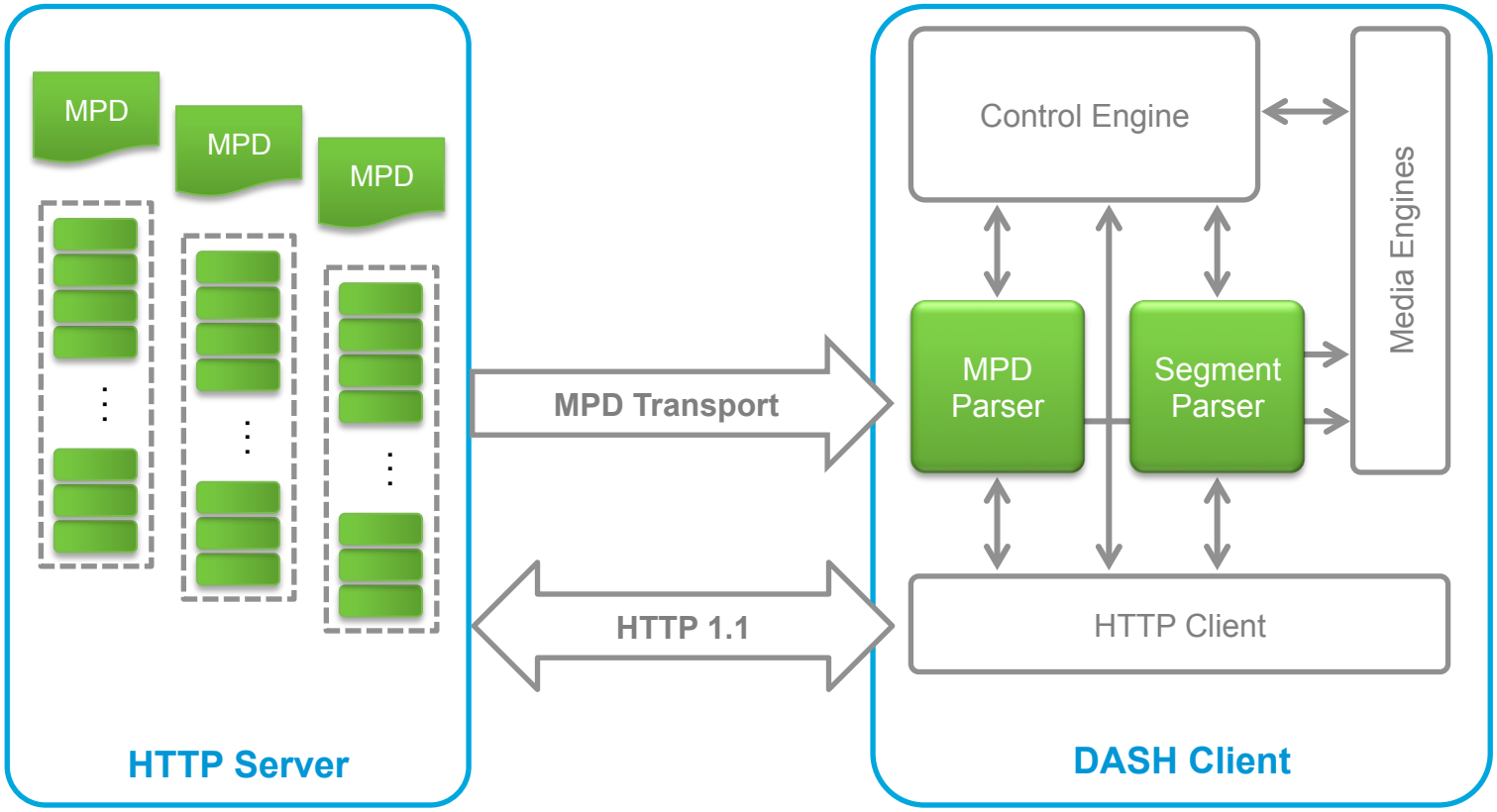
The MPEG-DASH Toolbox

DASH is an enabler

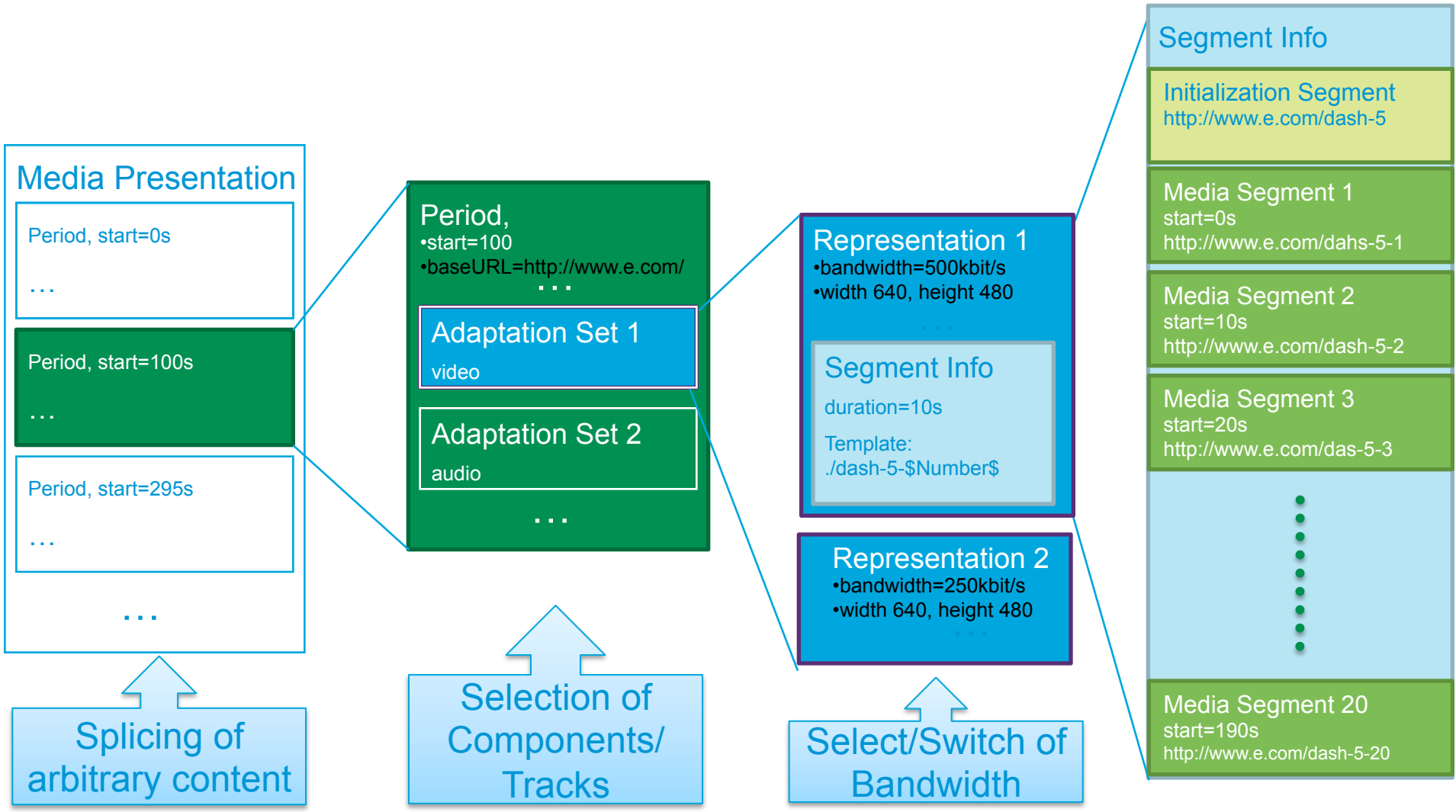
- Provides formats to enable high-quality streaming over the Internet
- System definition left to other organizations (SDOs, Companies, etc.)

- Only for HTTP delivery of streaming video/audio with adaptive features
- It standardizes the container description information to ensure interoperability between servers and clients.
- DRM is not explicitly defined but support of DRM metadata is described.
- MPEG-DASH specifies adaptive stream switching using a hierarchical definition of segments, representations, groups and periods.
- Captioning, extended data and triggers are not specified but adopted from the underlying formats
- Trick modes are a supported feature of MPEG-DASH

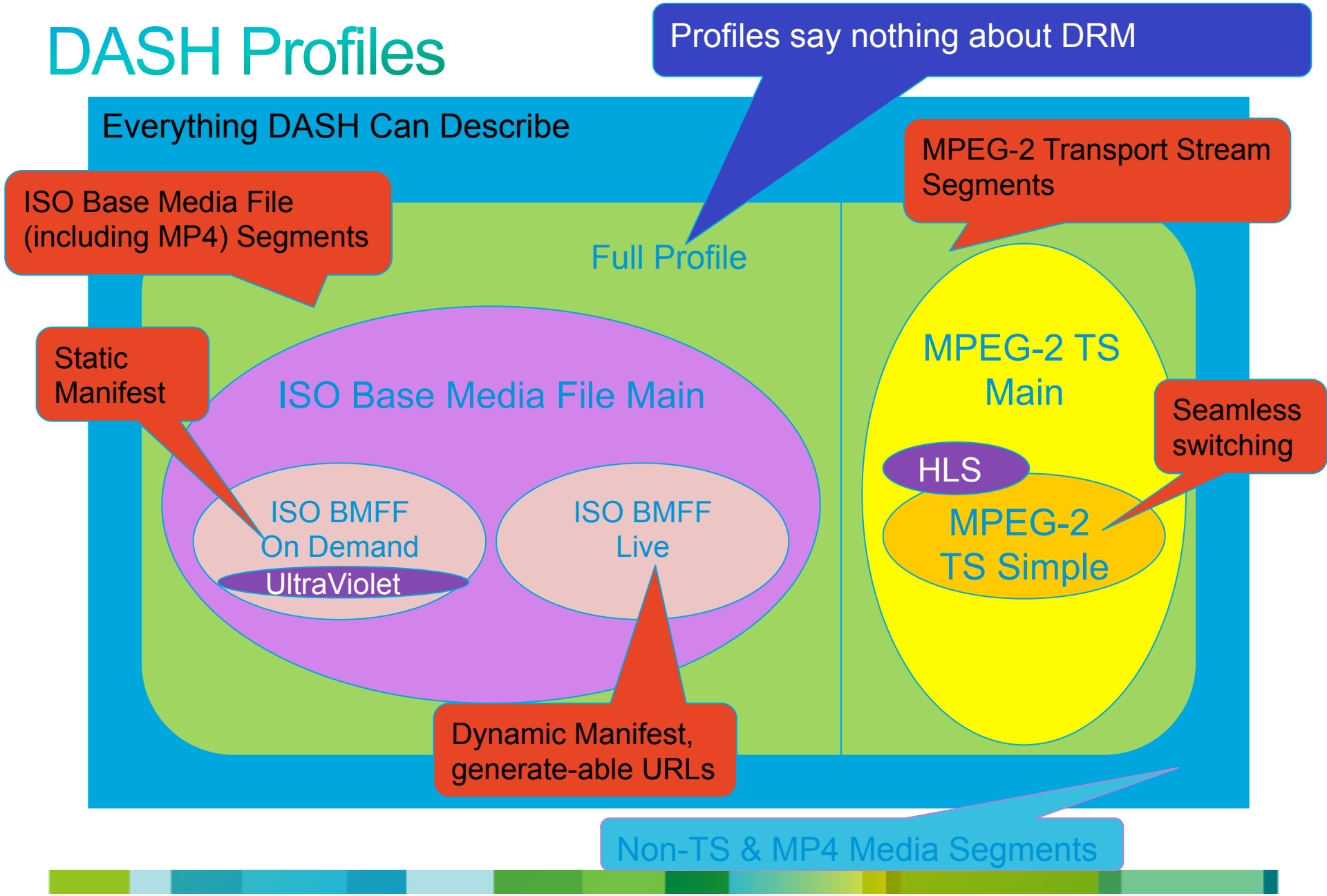
Scope of MPEG DASH Shown in Green



Media Presentation Description (MPD) Data Model



DASH Profiles



DASH264

DASH Industry Forum
http://dashif.org

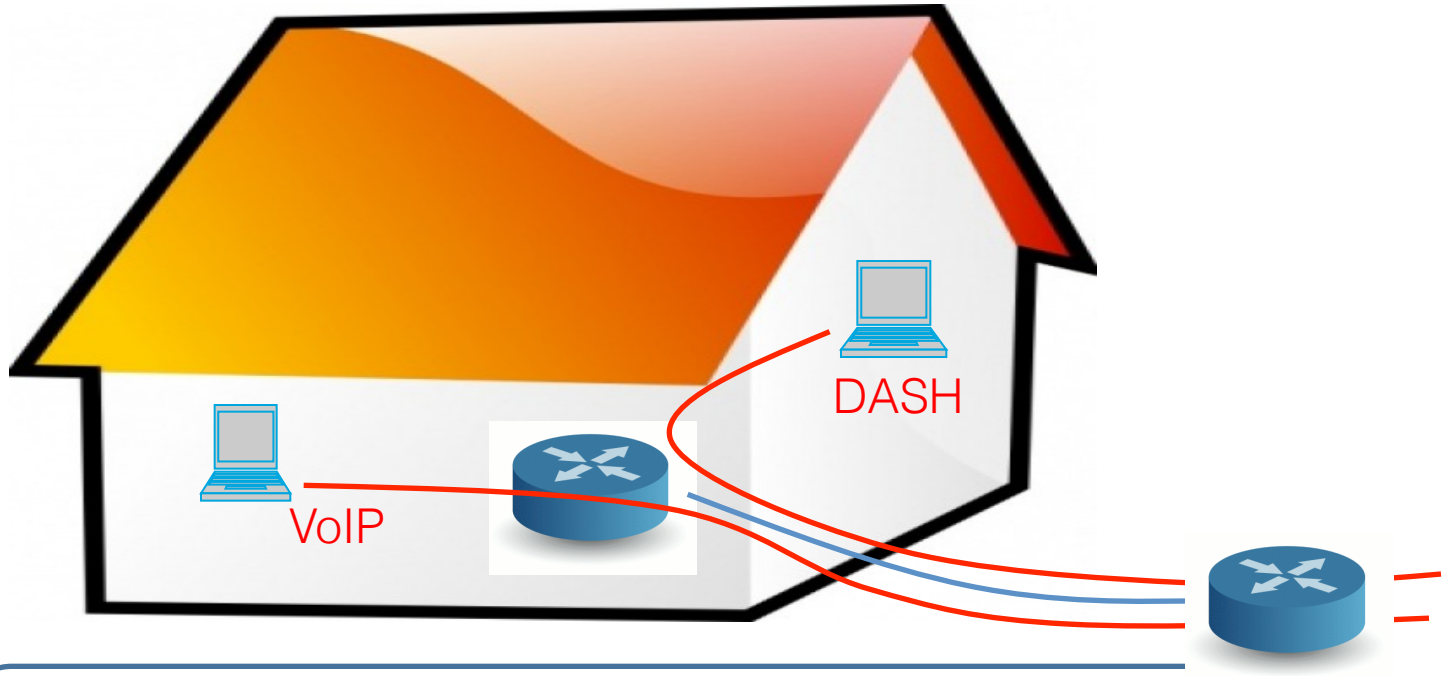
- **Objectives**
  - Promote and catalyze market adoption of MPEG DASH
  - Publish interoperability and deployment guidelines (DASH264 Base)
  - Facilitate interoperability tests
  - Collaborate with SDOs and industry consortia in aligning ongoing DASH standards development and the use of common profiles
- **DASH IF defines several interoperability points (IOP) regarding**
  - MPEG DASH specific features
  - Codecs including levels and profiles
  - Subtitles and closed captioning
  - DRM specific aspects
  - Transport-layer specific aspects
  - Metadata

DASH264 Base IOPs Overview

- **Profiles**
  - Restricted version of ISO BMFF Live and On-demand profiles
  - No playlist-based addressing
- **Encoding**
  - Video: H.264/AVC MP@3.0 for SD, H.264/AVC MP@3.1 for HD
  - Audio: HE-AAC v2
  - No muxed audio/video
  - No open-GoP switching
- **Subtitles**
  - TTML-based Timed Text (SMPTE TT, CFF TT, EBU TT)
- **DRM Baseline**
  - ISO/IEC 23001-7 Common Encryption

Impact on network?

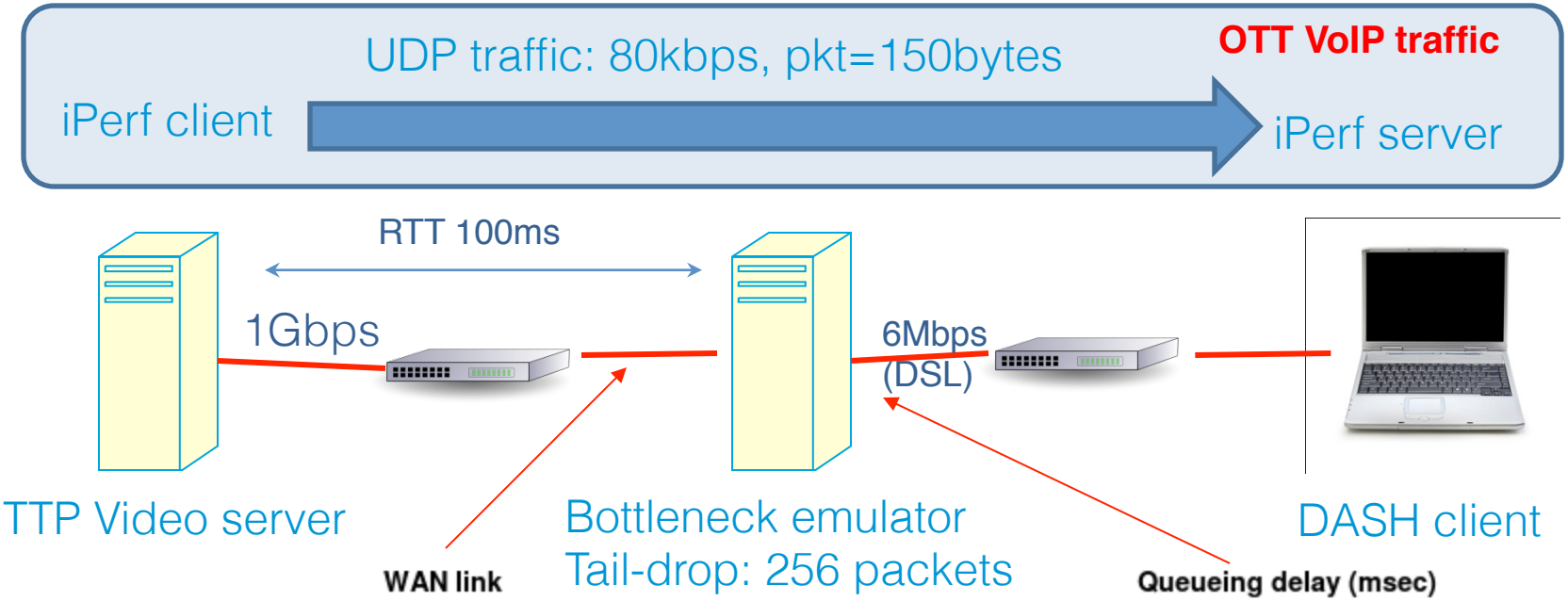
Not just worried about Video…

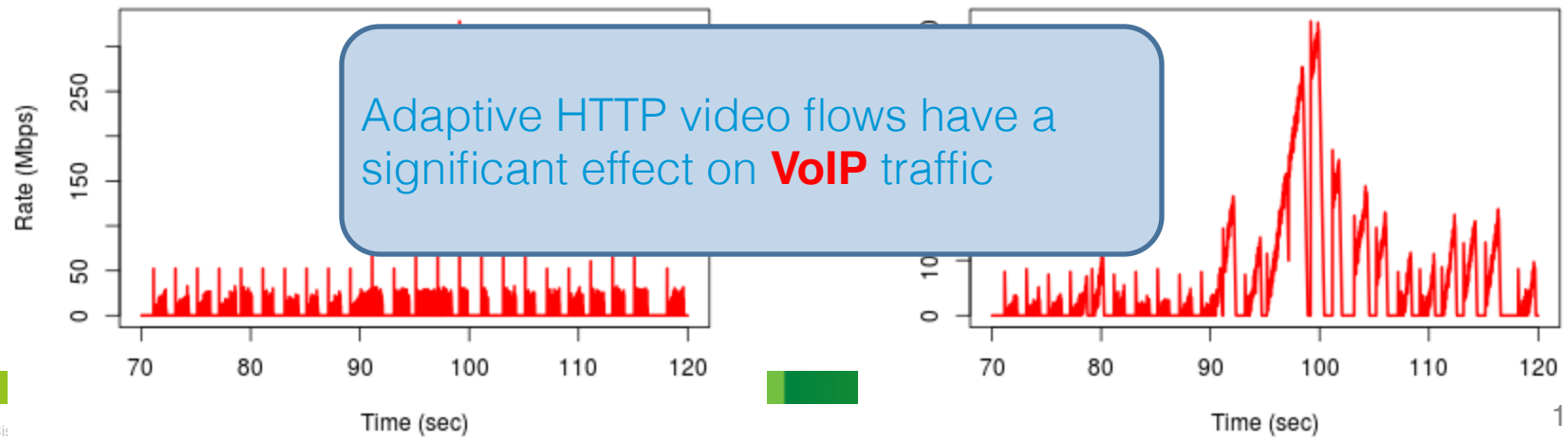


Will the quality of VoIP calls get affected by DASH flows?

Courtesy: Ahmed Mansey GATech

Studying the issue

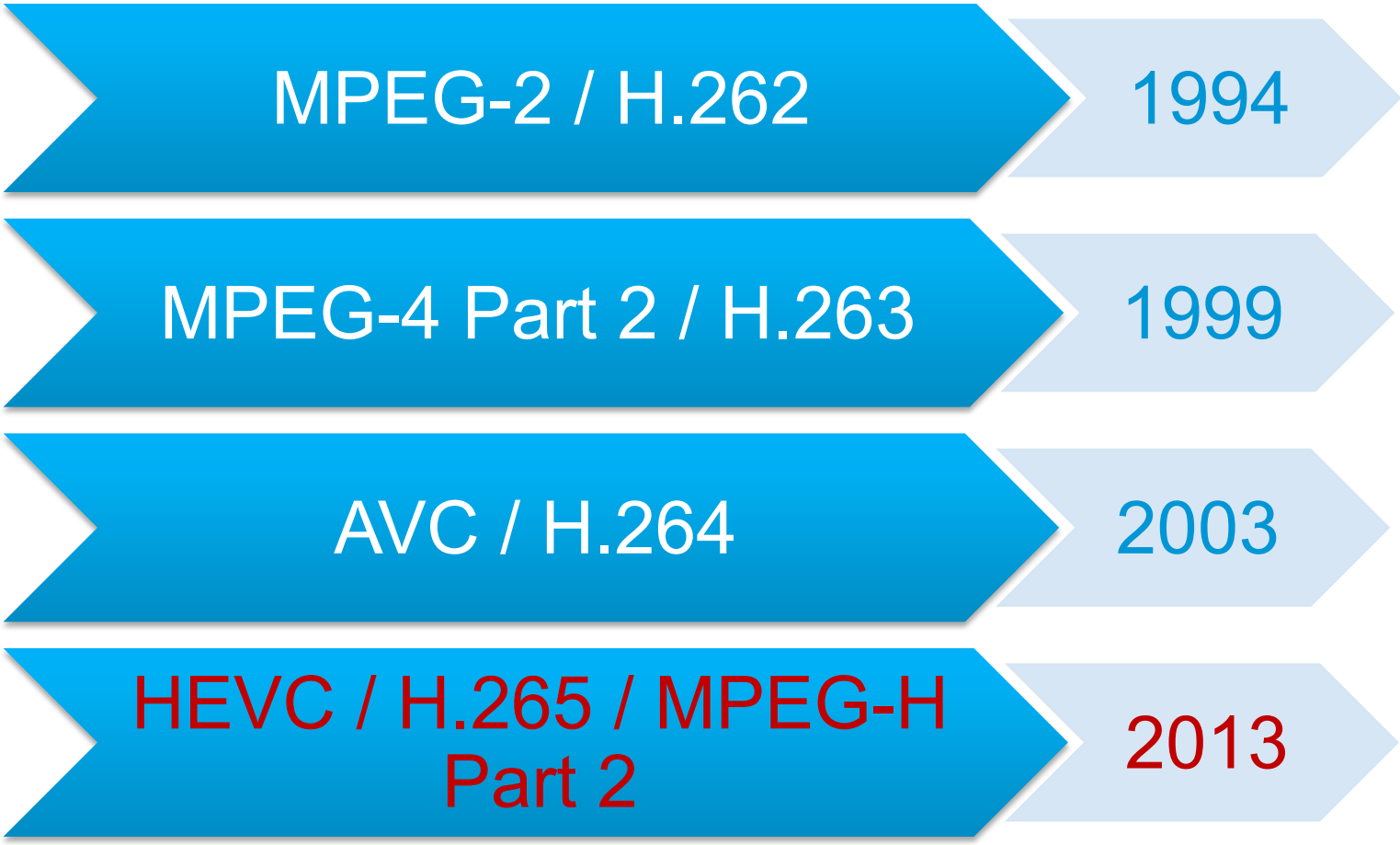




Adaptive HTTP video flows have a significant effect on **VoIP** traffic

H.265/HEVC

Codec Evolution



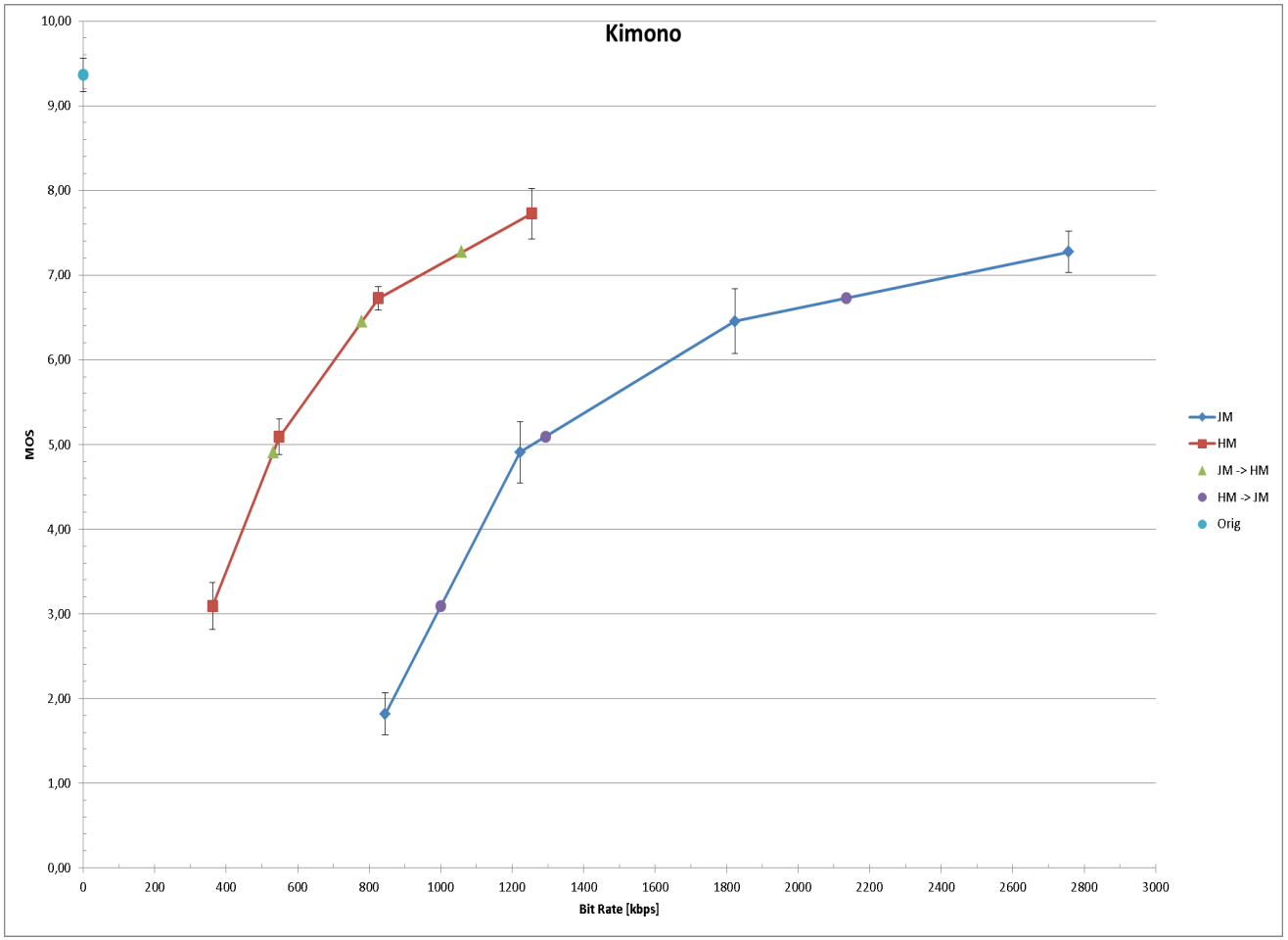
HEVC main drivers

- Bandwidth savings at all bitrates (Target is 2:1 over H.264/AVC)
  - Ex: Enables expanding IPTV service delivery footprint for DSL based infrastructure
- Higher resolutions (8K by 4K and 4K by 2K) and frame rates
- Improve performance on mobile devices with “HD” display capabilities
  - More integrated decode functions = less power/battery usage
- Launch 1080p50/60 services to compete against package media (BluRay)
  - Current services generally in 720p or 1080i
- Expected <10x more computational complexity (encode) and 2x-3x (decode)
  - 720p30 software decode on iPad3 available today (with reference SW decoders)

Overview of AVC vs. HEVC video coding

AVC	HEVC
 16 x 16 Macroblock size	 Coding Unit size 64x64 to 8x8
 Various Inter partitions down to 4x4	 Hierarchical quad-tree partitioning down to 8x8
 9 Intra modes	 Up to 35 Intra modes
 8x8 and 4x4 transform sizes	 32x32, 16x16, 8x8 and 4x4 transform sizes

Subjective Testing (February 2012)



Source: JCTVC-H1004 contribution (February 2012)

So what happens next?

We're at the Beginning…

- MPEG-2 Transport Stream spec (H.222) finished in mid-1995… Only became widespread in late 90s with Digital TV services
- iPads were only launched in April 2010 but by 2012 already had higher resolution screens that almost all TVs
- MPEG-DASH finished in mid-2012, and H.264/AVC based

  for now…

H.265/HEVC combined with MPEG-DASH will most likely reach your tablet, Connected TV or smartphones within the next 2 years.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