



Mobile Video: Challenges and Opportunities

Michael Dale



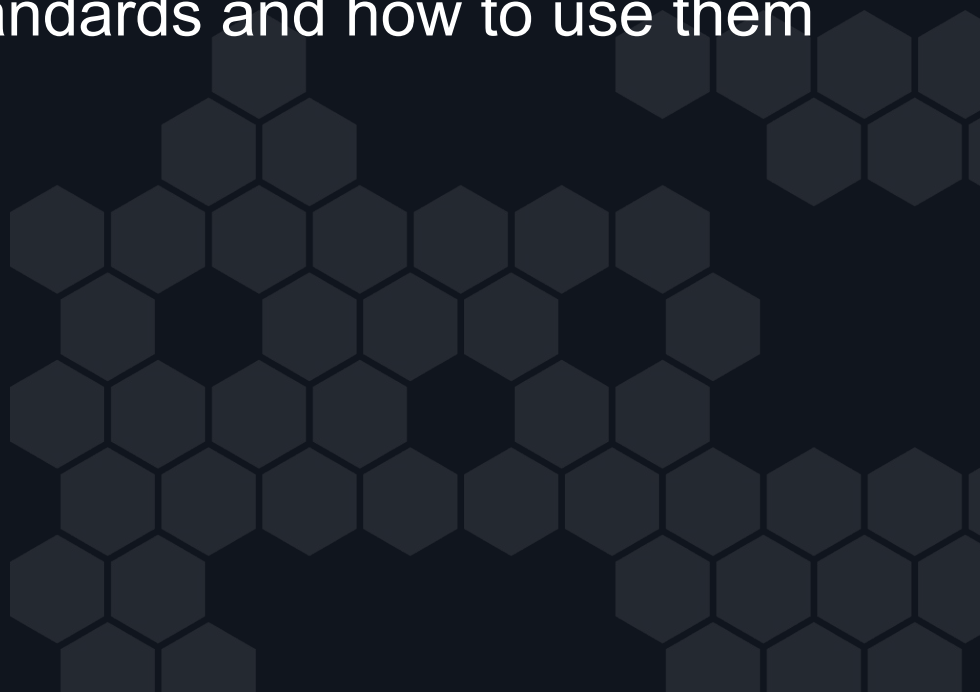
@michael_dale

Who am I?

- Long time open video advocate at Wikimedia, Mozilla etc.
- Co-organizer of FOMS ([link](#))
- Working on delivering premium video experiences across screens
- Now at Ellation / Crunchyroll

What are we talking about?

- Standards that enable a premium video experience
- A technical look at these standards and how to use them



Early web video was a painful



Many Competing standards

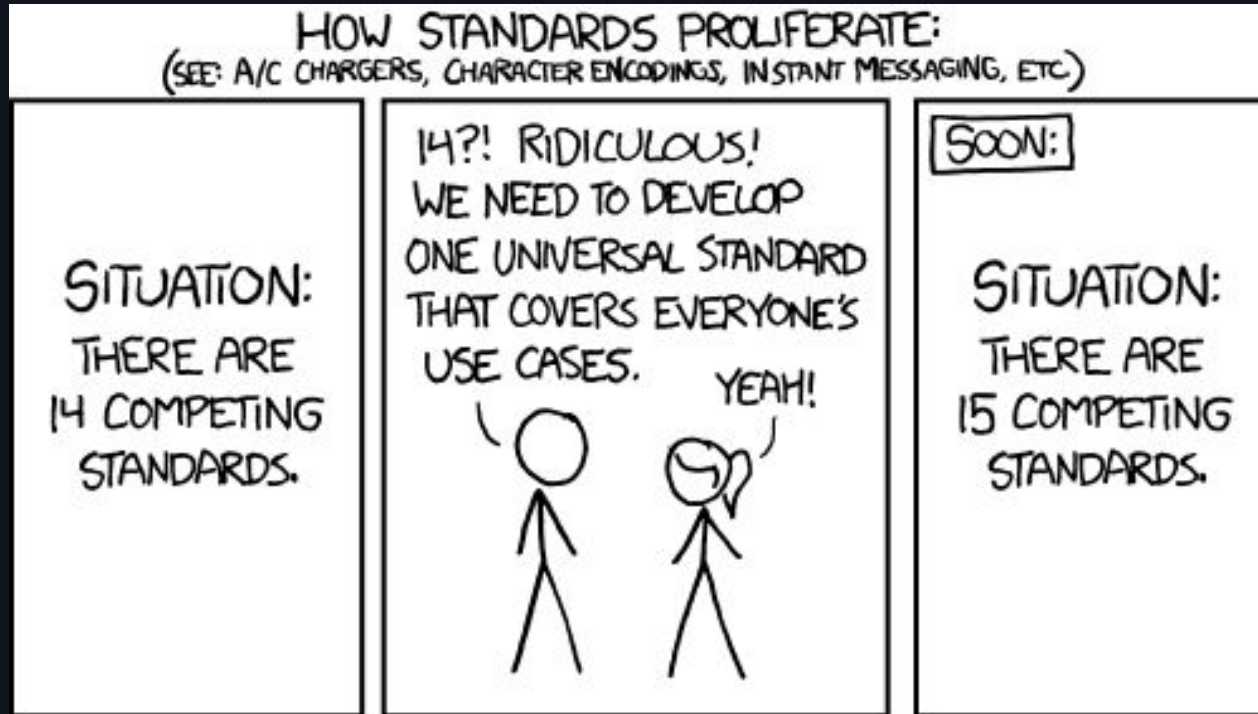
Delivery:

- Microsoft Smooth Streaming (playback with silverlight)
- Adobe HDS (playback with flash players)
- Apple HLS (apple quicktime contexts)
- Set top box proprietary IP delivery protocols

Codecs / Containers:

- Fragmented Mp4
- MPEG transport stream
- Webm / Matroska

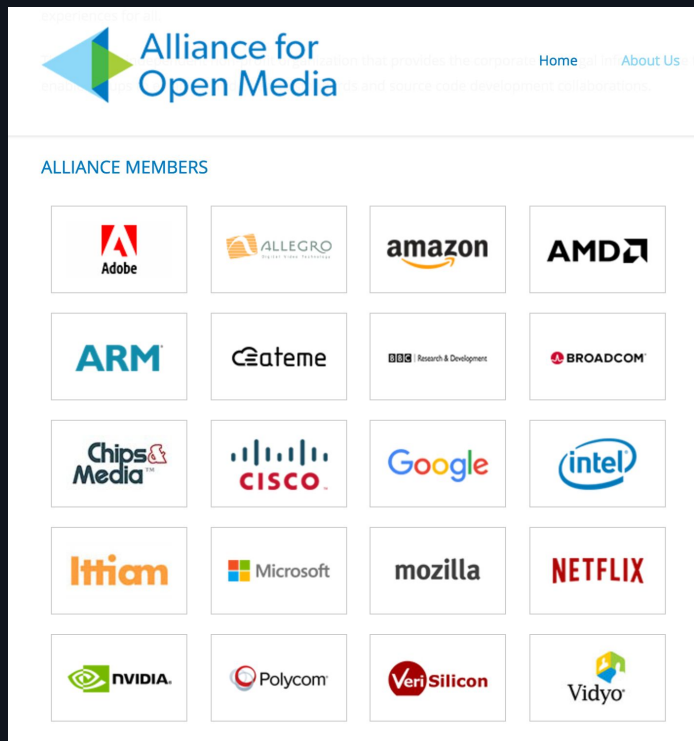
Standards without coordination:



Standards are great ... but
ultimately driven by implementation and market share



Generally recognized today as critical by all major players



The Alliance for Open Media website features a blue and green logo on the left. The main header includes the text "Alliance for Open Media" and a tagline "Alliance that provides the corporate and source code development collaborations." Navigation links for "Home" and "About Us" are present. Below the header, a section titled "ALLIANCE MEMBERS" displays a grid of 20 member logos arranged in 5 rows and 4 columns. The logos include Adobe, ALLEGRO, amazon, AMD, ARM, Cateme, Research & Development, BROADCOM, Chips Media, CISCO, Google, intel, Ittiam, Microsoft, mozilla, NETFLIX, NVIDIA, Polycom, VeriSilicon, and Vido.

Alliance for Open Media

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ALLIANCE MEMBERS

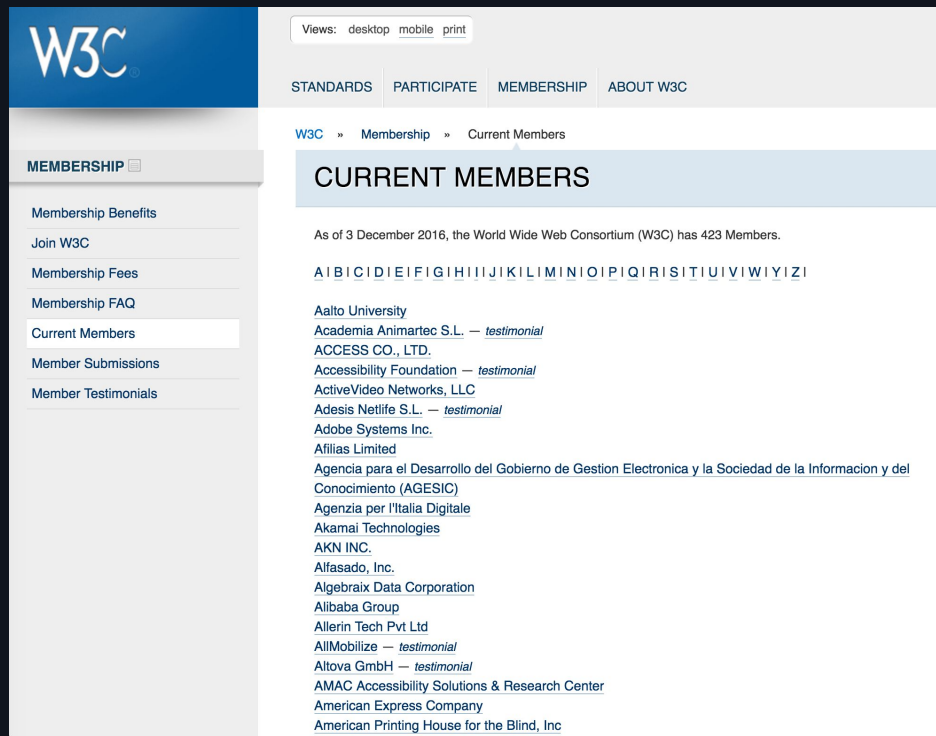
Adobe ALLEGRO amazon AMD

ARM Cateme Research & Development BROADCOM

Chips Media CISCO Google intel

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The W3C website has a blue header with the W3C logo. A navigation bar includes links for "STANDARDS", "PARTICIPATE", "MEMBERSHIP", and "ABOUT W3C". Below this, a breadcrumb trail shows "W3C » Membership » Current Members". The main content area is titled "CURRENT MEMBERS" and contains a paragraph stating that as of 3 December 2016, the World Wide Web Consortium (W3C) has 423 Members. This is followed by a long string of member acronyms: AIBICIDIEFIGIHIIJKILIMINIOPIQIRISITIUUVIWIYZI. A list of member names follows, each with a link to a testimonial page. The left sidebar contains a "MEMBERSHIP" section with links to "Membership Benefits", "Join W3C", "Membership Fees", "Membership FAQ", "Current Members", "Member Submissions", and "Member Testimonials".

W3C

Views: desktop mobile print

STANDARDS PARTICIPATE MEMBERSHIP ABOUT W3C

W3C » Membership » Current Members

CURRENT MEMBERS

As of 3 December 2016, the World Wide Web Consortium (W3C) has 423 Members.

AIBICIDIEFIGIHIIJKILIMINIOPIQIRISITIUUVIWIYZI

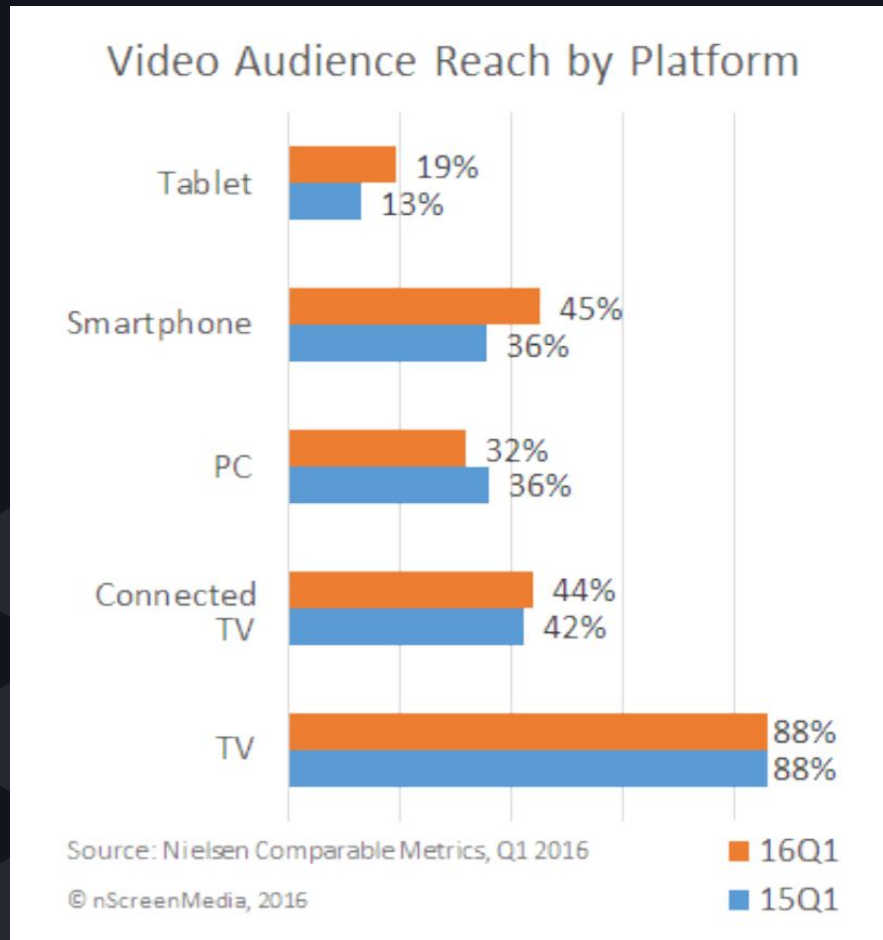
Aalto University
Academia Animartec S.L. — [testimonial](#)
ACCESS CO., LTD.
Accessibility Foundation — [testimonial](#)
ActiveVideo Networks, LLC
Adesis Netlife S.L. — [testimonial](#)
Adobe Systems Inc.
Afilias Limited
Agencia para el Desarrollo del Gobierno de Gestion Electronica y la Sociedad de la Informacion y del Conocimiento (AGESIC)
Agenzia per l'Italia Digitale
Akamai Technologies
AKN INC.
Alfasado, Inc.
Algebraix Data Corporation
Alibaba Group
Allerin Tech Pvt Ltd
AllMobilize — [testimonial](#)
Altova GmbH — [testimonial](#)
AMAC Accessibility Solutions & Research Center
American Express Company
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MEMBERSHIP

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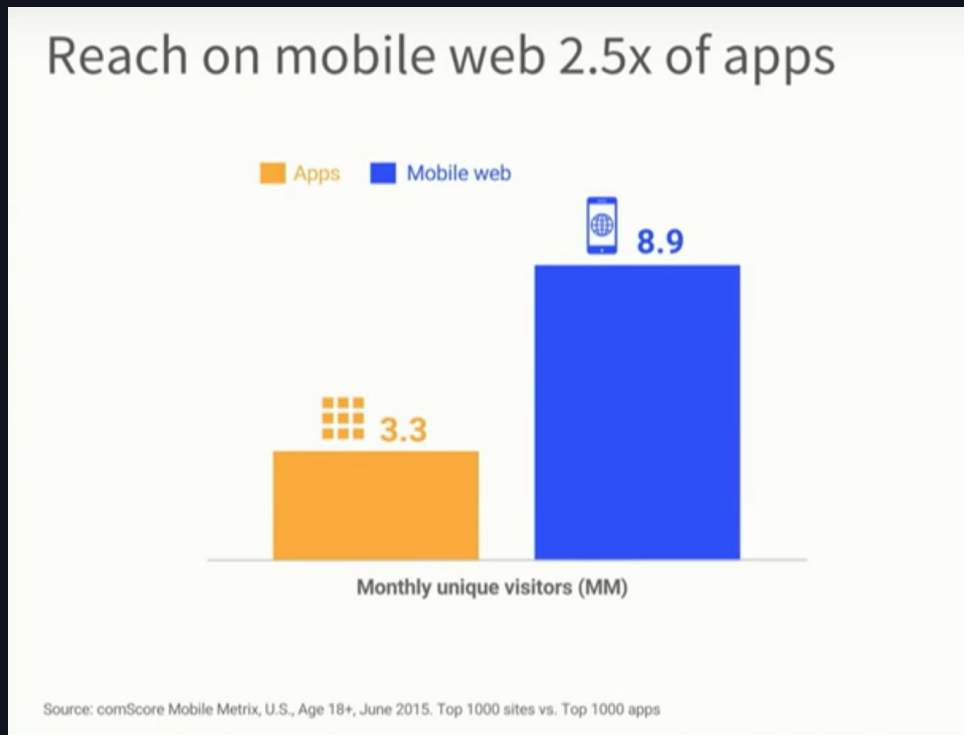
Mobile Video

- Mobile has overtaken PC video viewing this year
- Connected TVs have similar reach to smartphones and have overtaken PC for IP video.



Mobile Web is a big part of extended reach

- Mobile web within mobile has more reach but limitations around premium video features




Top 1000 sites vs top 1000 apps

What are “premium” video requirements ?

- Adaptive streaming -- reduce buffering startup time
- Protected content -- digital rights management.
- Seamless Ads insertion -- reduce monetization falloff
- Low latency live video -- interactivity requires low latency

Beyond HTML5 for Premium video experience

Standards addressing these challenges:

- Beyond <video> tag.
 - MSE - Media source extensions
 - EME - Encrypted media extensions
 - Media Capabilities API
 - HTTP2 - Delivery
- 
- A decorative pattern of dark gray hexagons is located in the bottom right corner of the slide, extending from the right edge and bottom edge towards the center.

Web standards are mobile web standards

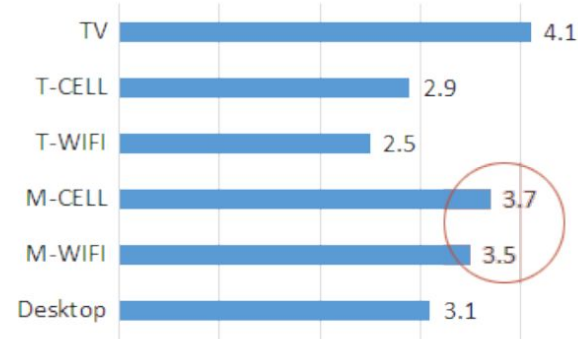
- Vertical integration of platforms consolidates browser based platform across screens
- Robust HTML5 support is everywhere.



MSE - Media source extensions

- Ease of context switching in mobile means low tolerance for long start time
- Controlling the video buffer and stream selection with MSE helps control startup time.

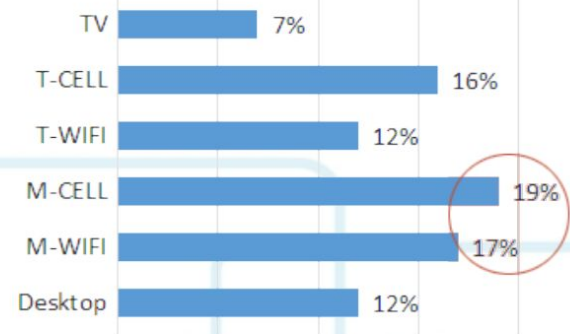
Video Startup Time (in seconds)



Source: Conviva, 2016

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Exits as a % of Attempts

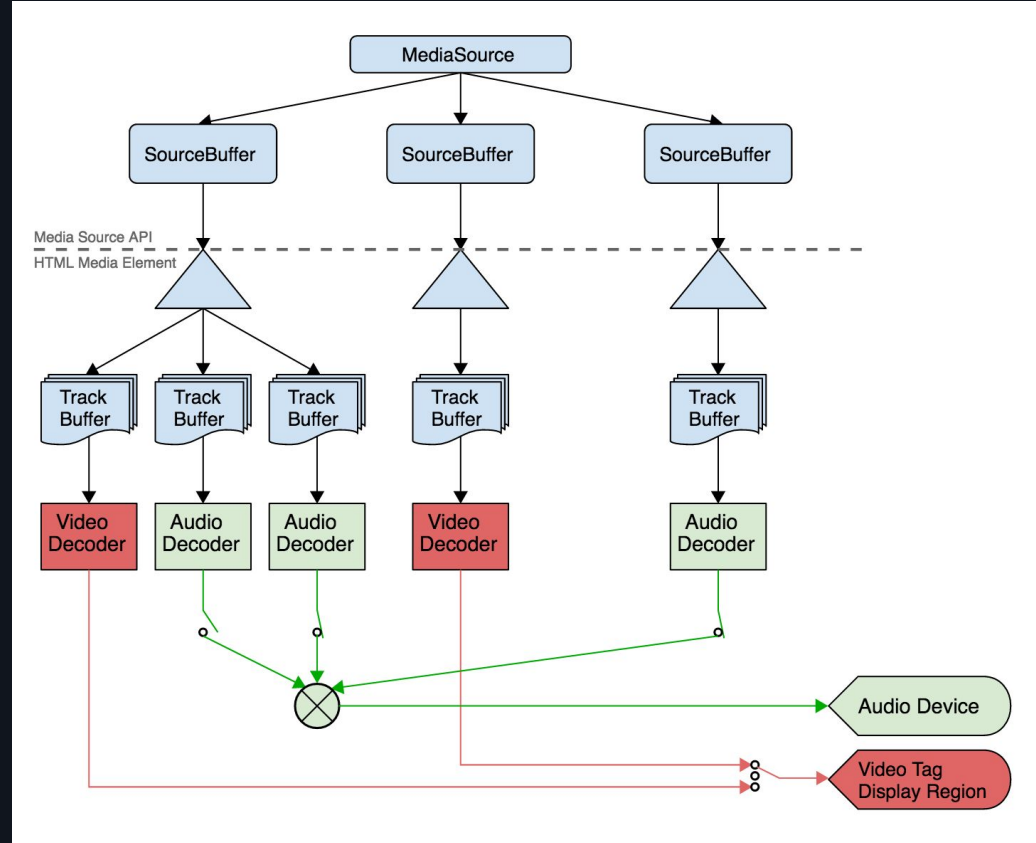


Source: Conviva, 2016

MSE - Media source extensions

How it works?

- Exposes a source buffer for adaptive streaming
- Enables lower level control over video data flow



MSE - Media source extensions

```
var video = document.getElementById('v');
var mediaSource = new MediaSource();
mediaSource.addEventListener('sourceopen', onSourceOpen.bind(this, video));
video.src = window.URL.createObjectURL(mediaSource);

function onSourceOpen(videoTag, e) {
  var mediaSource = e.target;

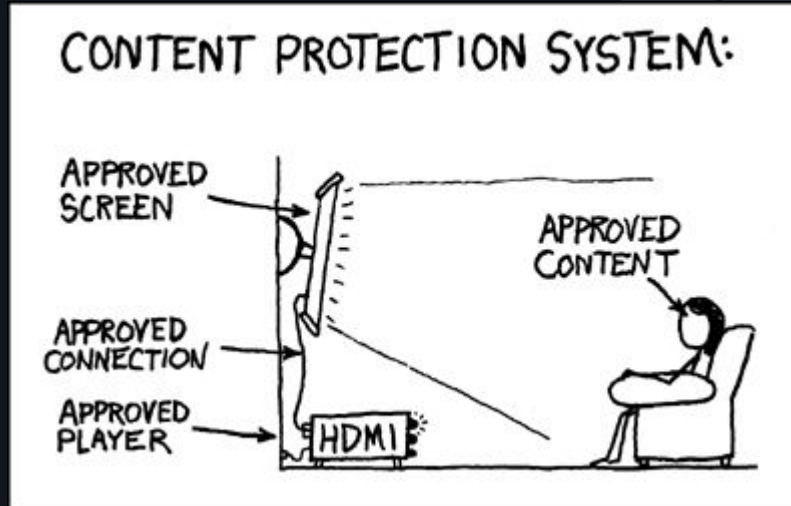
  ...

  // The segment can be retrieved via XHR request, loaded from HTML5 storage etc.
  var mediaSegment = getVideoSegment();

  // once you have video bytes you can append them:
  mediaSource.sourceBuffers[0].appendBuffer(mediaSegment);
```

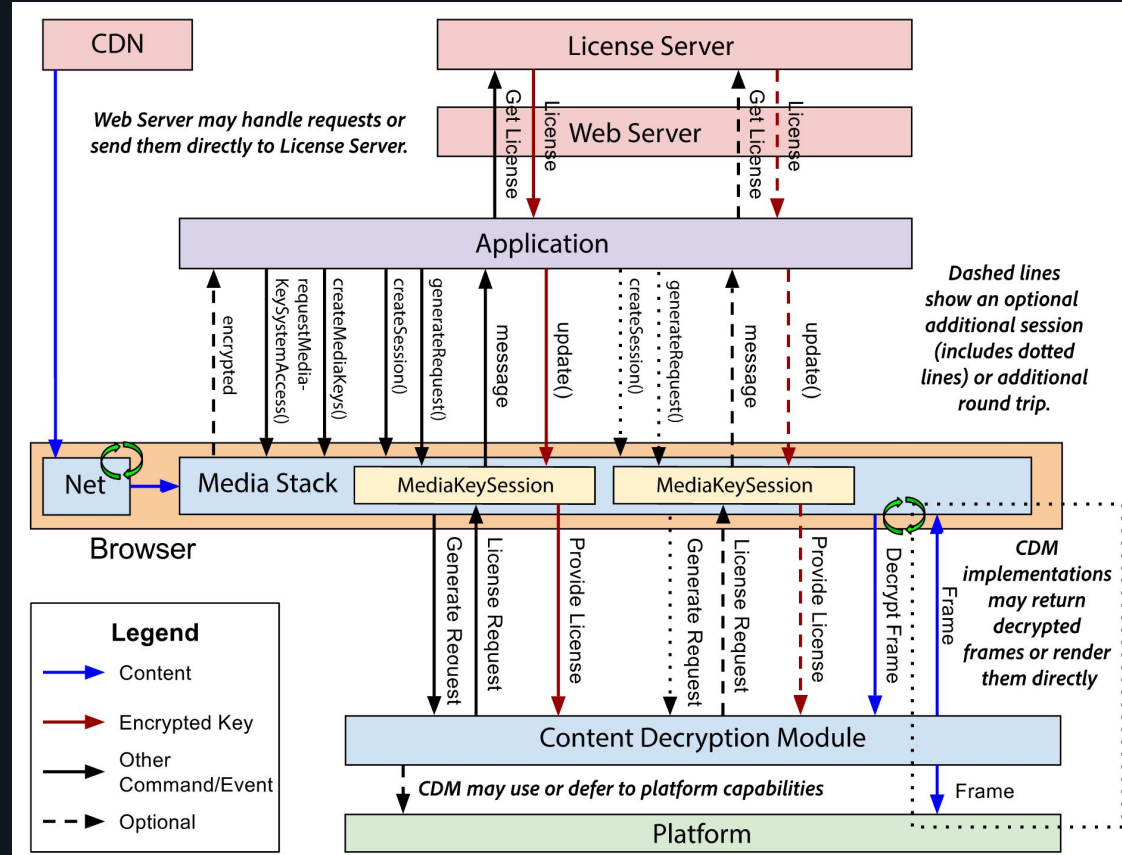

EME - Encrypted media extensions - Why ?

- Delays freshly released content from being available
- Part of content licensing requirements
- Enables “protected” content in web context



EME - Encrypted media extensions - how it works?

Standard way to interface with the CDM (content decryption module)



EME - Encrypted media extensions - example

```
var video = document.getElementById('video');
if (!video.mediaKeys) {
  navigator.requestMediaKeySystemAccess('org.w3.clearkey', [
    { initDataTypes: ['webm'],
      videoCapabilities: [{ contentType: 'video/webm; codecs="vp8"' }] }
  ]).then(
    function(keySystemAccess) {
      var promise = keySystemAccess.createMediaKeys();
      promise.then(
        function(createdMediaKeys) {
          return video.setMediaKeys(createdMediaKeys);
        }
      )
      promise.then(
        function(createdMediaKeys) {
          var te = new TextEncoder();
          var initData = te.encode( '{"kids":["LwVHf8JLtPrv2GUXFW2v_A"]}' );
          var keySession = createdMediaKeys.createSession();
          keySession.addEventListener("message", handleMessage, false);
          return keySession.generateRequest('keyids', initData);
        }
      )
    }
  );
}
```

Media Capabilities API (in proposal stage)

- Today we only have `canPlayType`

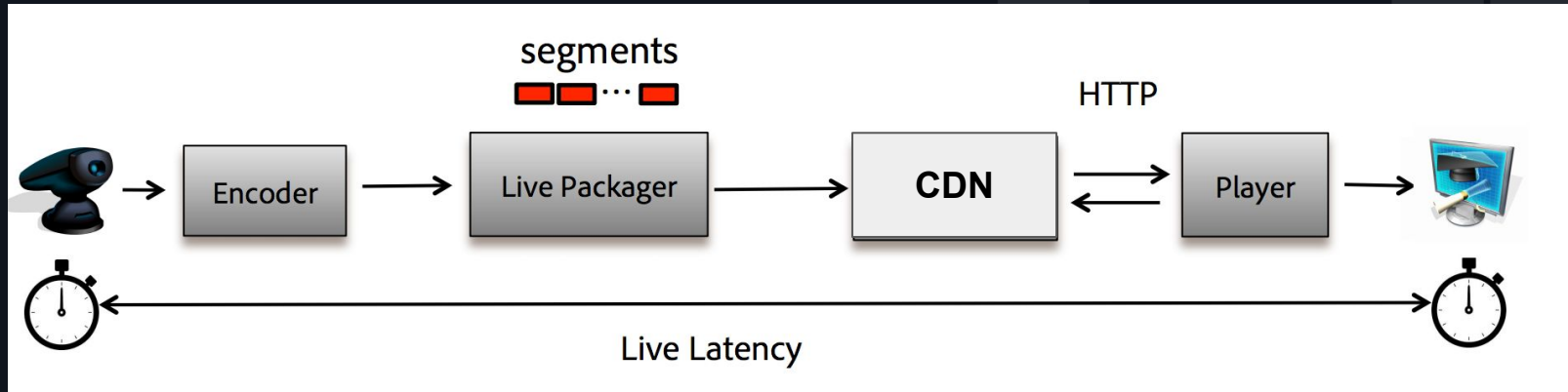
```
var obj = document.createElement('video');
```

```
console.log(obj.canPlayType('video/mp4')); // "maybe"
```

- Soon describes capabilities:
 - Will playback have high quality (smoothness)? Will it be power efficient?
 - Do output capabilities (e.g. color gamut, dynamic range, audio channels) match content?
 - Are security requirements (e.g. encryption, HDCP, etc) supported or playback-impacting?
 - Given multiple possible media formats, which is preferable?
- Still being reviewed, see [proposal here](#).

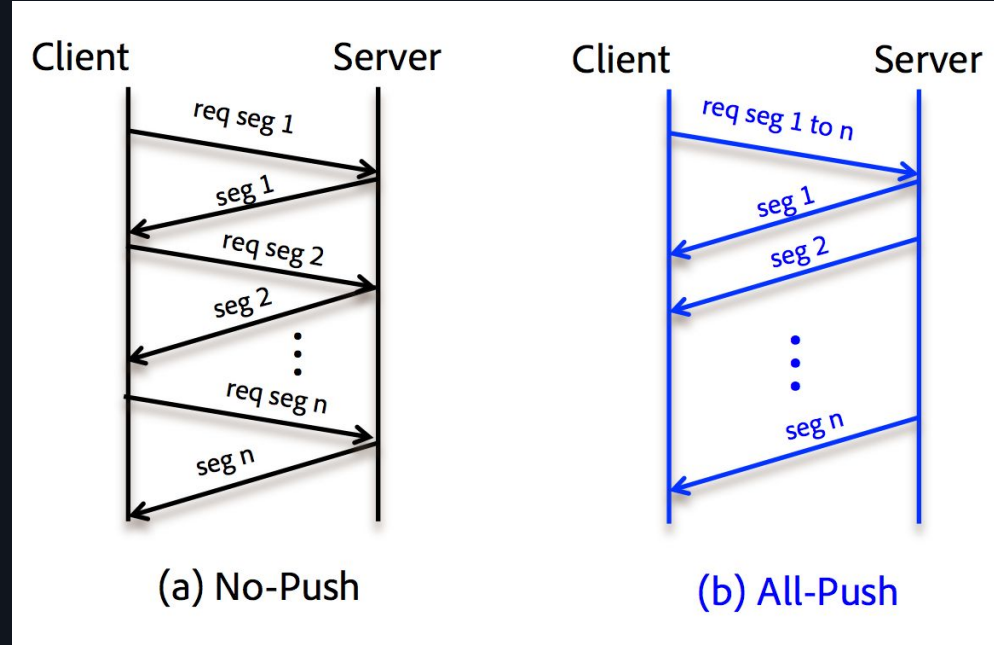
Low latency live?

- Live streaming, a huge market segment.
- Interactivity requires low latency.
- Scalable delivery requires http based delivery



HTTP2 enables lower latency live streaming

- Standard update to http,
- Supported by Chrome/Firefox/Opera/IE
- HTTP2; update to HTTP; enables continuous delivery of segments
- HTTP2 “Push” enables lower delay as there is no manifest round trip request.



HTTP2 how do you use it?

- Depends on your CDNs implementation
- Example here shows http2 push via “link” header on cloudflare[\[1\]](#)
- Video Streaming server implementations are coming to market.

```
HTTP/2.0 200
Server: nginx/1.9.15
Date: Fri, 13 May 2016 10:52:13 GMT
Content-Type: text/html
Transfer-Encoding: chunked
Connection: keep-alive
Link: </images/drucken.jpg>; rel=preload;
as=image
Link: </images/empire.jpg>; rel=preload;
as=image
```

```
<?php
function pushImage($uri) {
    header("Link: <{$uri}>; rel=preload; as=image", false);
    return <<<HTML
    
    HTML;
}

$image1 = pushImage("/images/drucken.jpg");
$image2 = pushImage("/images/empire.jpg");
?>
```



Thanks, questions ?



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