

Case Study: YouTube and HTML5 Video

Highlights

YouTube switched to HTML5 as its primary video platform in January 2015. The platform uses MPEG-DASH, with both H.264 and VP9 video available to support the entire spectrum of devices, including Smart TVs, connected devices, mobile devices, and desktop browsers. In the first year, over [25 billion hours](#) of MPEG-DASH VP9 video were delivered to users, with significant improvements in watch times and user experience.

Technology



Media Source Extensions

YouTube uses HTML5 Media Source Extensions (MSE) to control how data is delivered to the browser. MSE allows YouTube to offer smooth playback, adapting to changes in a viewer's bandwidth by streaming different bit rates. This technique is called adaptive bitrate streaming and is enabled in YouTube by the MPEG-DASH multi-bitrate media format.

VP9

HTML5 video supports next-generation video compression, with over two billion devices supporting the VP9 video codec. VP9 can [reduce video bit rates by as much as 50%](#) compared with other known codecs. This in turn can help reduce transmission costs, and improve video quality. User experience is also improved by VP9, allowing video playback to start 15–80% faster and enabling more users in bandwidth-constrained environments to watch higher quality video.



- Switched to HTML5 video delivery in January 2015
- Offers H.264 and VP9 video via MPEG-DASH to consumers
- Supports over 2 billion VP9-enabled smart TVs, connected & mobile devices and browsers
- Delivered over 25 billion hours of MPEG-DASH VP9 in first year

Net result:

Significant improvements in watch times and user experience



Key Results



Improved User Experience

By **cutting bit rates by up to 50%**, VP9 allowed YouTube to significantly improve its global user experience. Globally, YouTube viewers who used VP9 experienced an increase in resolution and faster, smoother video playback. Re-buffering was cut by half in emerging markets, and in some countries over 50% of viewers were able to access 360p and greater resolutions for the first time. These changes increased viewer engagement, particularly in low-bandwidth markets.



New Viewer Experiences

At the highest end, VP9 makes new experiences such as 1440p and 2160p (4K), higher frame rates, and spherical video possible. For viewers on 3G networks, improved compression allowed viewers to access SD quality.



Lower Distribution Costs

With lower bit rates YouTube is saving millions of dollars every year on video distribution costs.



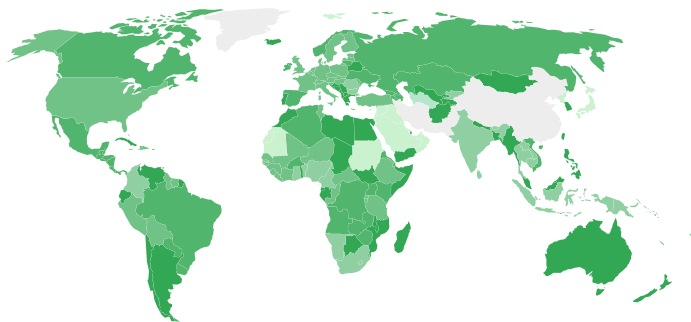
Less Buffering

With HTML5 adaptive bitrate streaming and VP9, **buffering was reduced by more than 50% globally and as much as 80% on heavily congested networks.**



More Devices

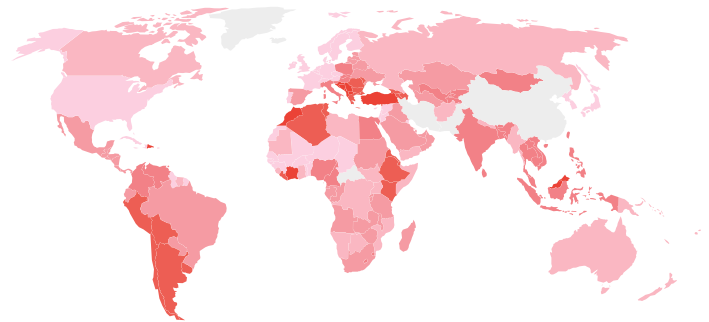
HTML5 technology allowed **YouTube to offer live streaming playback on devices such as the Chromecast, Xbox One, PS4, and Smart TV devices.**



Faster

YouTube VP9 time to load.

Dark green areas indicate a faster load time. Note that while low-bandwidth countries were the most affected, almost every country saw an improvement.



More

YouTube VP9 watch times.

Dark red areas indicate longer watch times. Note that low-bandwidth countries were most affected, but virtually every country saw an improvement.