MPEG-DASH vs. Apple HLS vs. Microsoft Smooth Streaming vs. Adobe HDS

All existing adaptive HTTP streaming technologies, such as the proprietary Adobe HTTP Dynamic Streaming (HDS), Apple HTTP Live Streaming (HLS), Microsoft Smooth Streaming (MSS), and the only international standardized solution MPEG Dynamic Adaptive Streaming over HTTP (MPEG-DASH) follow nearly the same principle

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HTML5 Player

Stream Adaptive Video in any Browser on any Device

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The basic idea is to generate multiple versions of the same content (e.g., different bitrates or spatial resolutions) and chop these versions into segments (e.g., two seconds).The segments are provided on a web server and can be downloaded through HTTP standard compliant GET requests. Typically, the relationship between the different versions is described by a manifest, which is provided to the client prior to the streaming session. The manifest represents the different qualities of the media content and the individual segments of each quality with HTTP Uniform Resource Locators (URLs). This structure provides the binding of the segments to the bitrate (resolution, etc.) among others (e.g., start time, duration of segments). As a consequence each client will first request the manifest that contains the temporal and structural information for the media content and based on that information it will request the individual segments that fit best for its requirements.

The adaptation to the bitrate or spatial resolution is done on the client side for each segment, e.g., the client can switch to a higher bitrate – if bandwidth permits – on a per segment basis, or to a lower bitrate – if bandwidth

Get Started

Adaptive Streaming Feature Comparison

The following table shows a feature comparison of the proprietary adaptive streaming technologies Adobe HTTP Dynamic Streaming (HDS), Apple HTTP Live Streaming (HLS), Microsoft Smooth Streaming (MSS), and the MPEG Dynamic Adaptive Streaming over HTTP (MPEG-DASH) standard. Please note that this comparison is based on the standard's capabilities, and not reflecting the specific implementation from a certain vendor.

Feature	Adobe HDS	Apple HLS	Microsoft Smooth	MPEG–DASH
Deployment on Ordinary HTTP Servers		tick_green_sm2		tick_green_sm2
Official International Standard (e.g., ISO/IEC MPEG)				tick_green_sm2

Flexible Content Protection with Common Encryption (DRM)	tick_green_sm2	tick_green_sm2	tick_green_sm2	tick_green_sm2
Closed Captions / Subtitles	tick_green_sm2	tick_green_sm2	tick_green_sm2	tick_green_sm2
Efficent Ad Insertion				tick_green_sm2
Fast Channel Switching	tick_green_sm2		tick_green_sm2	tick_green_sm2
Protocol Support's multiple CDNs in parallel				tick_green_sm2
HTML5 Support				tick_green_sm2
Support in HbbTV (version 1.5)				tick_green_sm2
HEVC Ready (UHD/4K)				tick_green_sm2
Agnostic to Video Codecs				tick_green_sm2
Agnostic to Audio Codecs				tick_green_sm2
ISO Base Media File Format Segments	tick_green_sm2		tick_green_sm2	tick_green_sm2
MPEG-2 TS Segments		tick_green_sm2		tick_green_sm2
Segment Format Extensions beyond MPEG				tick_green_sm2
Support for multiplexed (Audio + Video) Content	tick_green_sm2	tick_green_sm2		tick_green_sm2
Support for non-multiplexed (separate Audio, Video) Content		tick_green_sm2	tick_green_sm2	tick_green_sm2
Definition of Quality Metrics				tick_green_sm2

Client Failover				tick_green_sm2
Remove and add Quality Levels during Streaming				tick_green_sm2
Multiple Video Views				tick_green_sm2
Efficient Trick Modes				tick_green_sm2

Deployment on Standard HTTP Servers

MPEG-DASH and also Apple HLS can be used with ordinary HTTP-Servers such as Apache, Nginx, IIS, etc. Adobe as well as Microsoft are using server side mechanisms that need additional logic on the server.

Official International Standard

MPEG-DASH is an international standard, ratified in 2012 and currently adopted by YouTube, Netflix, etc. Several members of different companies such as Microsoft, Adobe, Apple, Samsung, Akamai, Cisco, Dolby, Ericsson, Harmonic, Qualcomm, Netflix, Intel, bitmovin, InterDigital, etc. have contributed to the standardization. The Apple HLS IETF Internet-Draft *) is driven by one company that is able to change its direction from one day to another. Furthermore, Apple has made no efforts since May 2009 to move the HLS IETF Internet Draft to an international IETF standard.

Multiple Audio Channels

Switching between multiple audio channels is especially important for multi language content. MPEG-DASH supports this feature as well as Apple HLS and Microsoft Smooth Streaming.

Flexible Content Protection with Common Encryption

MPEG Common Encyrption (CENC) allows content encrypted once to be compatible with multiple DRM systems. This is possible, as nearly every DRM system supports AES as content encryption method and only the license key exchange between the client and the server is different.

Closed Captions / Subtitles

All formats support closed captions or subtitles. Usually they are referenced in the manifest and stored as individual file, e.g., in WebVTT format.

Efficient Ad Insertion

Ad insertion is possible in all formats through chunk substitution. This means that individual chunks of the original video will simply be replaced by chunks that contain advertisements. MPEG-DASH enables through Periods a standardized interface that enables ad insertion in an efficient way. Which means that still ordinary HTTP servers can be used and no additional, proprietary logic is required to redirect requests for specific chunks to chunks that contain the advertisement.

Fast Channel Switching

Fast channel switching is a feature that is directly related to the chunk size. As smaller chunks allow faster channel change times than bigger chunks. Apple HLS typically uses 10 second chunks and is optimized for that chunk size. Adobe, Microsoft as well as MPEG-DASH are designed to work with 2 and 4 seconds chunks that allow faster channel change. Additionally the overhead of the MP4 format used in MPEG-DASH and Microsoft has significantly lower overhead than the MPEG-2 Transport Stream (MP2TS) format used in Apple HLS. The tradeoff between large and small chunk sizes is that, small chunks sizes enable fast channel switching, reducing startup latency for some systems (some players start the playback only if they have received the first chunk fully), and allow a more flexible adaptation behavior. On the other side small chunk sizes reduce coding efficiency as Group of Pictures (GOP) need to be smaller and therefore the codec can probably not fully take benefit of more temporal redundancies when larger GOPs are also

Support multiple CDNs in parallel

Using multiple CDNs is possible with all formats. But only MPEG-DASH offers through BaseURLs on MPD level a signaling mechanism for the client that multiple CDNs are in use. The client application is therefore able to select the CDN that fits best, i.e., the CDN that gives the best performance in the network of the individual client. Moreover, all formats that can not be deployed on ordinary HTTP servers such as Adobe HDS and Microsoft Smooth Streaming are more costly because the require specialized CDN features.

HTML5 Support

MPEG-DASH can utilize the HTML5 Media Source Extensions (MSE) to enable native playback in browsers.

Support in HbbTV (version 1.5 and 2.0)

MPEG-DASH is the official streaming format used in the HbbTV 1.5 and 2.0 specification.

Agnostic to Video Codecs

MPEG-DASH is agnostic to video codecs and can be used with several video codecs such as, H.264/AVC, H.265/HEVC, MPEG-2 Video, VP8, VP9, etc.

Agnostic to Audio Codecs

MPEG-DASH is agnostic to audio codecs and can be used with several audio codecs such as, MP3, AAC, etc.

ISO Base Media File Format Segments

MPEG-2 TS Segments

MPEG-DASH and Apple HLS can use MPEG-2 TS format segments that have a significant higher overhead than ISO Base Media File Format based segments. MPEG-2 TS consists of packets with 188 bytes in size, where each packet has headers with a varying size of 4 to 12 bytes. Therefore, they overhead caused by these headers increases proportionally with the segment size, which means that relative overhead does not tend to zero with increasing bitrates. Moreover, each MPEG-2 TS stream consists of several other data beside audio and video, such as Program Association Tables that introduce additional overhead. Additionally, audio and video streams are encapsulated in Packetized Elementary Streams (PES) which introduces an extra overhead per audio sample or video frame.

HEVC Ready (UHD/4K)

MPEG-DASH is agnostic to video codecs and could be used with HEVC and 4K content encoded with H.265/HEVC or H.264/AVC.

Segment Format Extensions beyond MPEG

MPEG-DASH supports also container formats beyond MPEG such as WebM.

Support for multiplexed (Audio + Video) Content

Adobe HDS, Apple HLS v6 and MPEG-DASH can be used with multiplexed audio video content, which means that audio and video elementary streams are packaged in one and the same segment.

Support for non-multiplexed (separate Audio, Video) Content

Apple HLS v8, MSS and MPEG-DASH can be used with separate audio video content.

Definition of Quality Metrics

MPEG-DASH defines quality metrics in the standard that enable the client to send specific reports about usage behavior, stalls, playback start, stop, etc. to a defined server.

Client Logging & Reporting

Client Failover

MPEG-DASH enables through BaseURLs that are also used to signal different CDNs client failover mechanisms, as one client can possible choose several different locations to download a segment. A similar approach is available with Apple HLS using failover URLs, but the MPEG-DASH specification enables in that case more flexibility and more sophisticated use cases.

Remove and add Quality Levels during Streaming

MPEG-DASH enables through Periods the dynamic insertion and deletion of quality representations during the streaming, with seamless handover at the client side.

Multiple Video Views

MPEG-DASH enables through AdaptationSets multiple views in one and the same MPD and the client can seamlessly choose between this view angles during the streaming. For example a Formula 1 use case that has three camera perspectives would have three AdaptationSets that contain the Representations of the specific view angle. The client could then switch between these AdaptationSets which will present a different perspective for the user. Inside of an AdaptationSet (perspective) the client can adapt based on the Representations that are available in the AdaptationSet to the bandwidth conditions or the user context (device).

Efficient Trick Modes

MPEG-DASH enables trough AdaptationSets efficient trick modes as one can add specific Representations that contain only I Frames to pretend fast forward and backward.

While from a feature perspective MPEG-DASH offers nearly everything it is still a very young standard and not many encoders or players have implemented all of this features. But soon or later there will be broad support available. If you want to **test MPEG-DASH** you can use the Bitmovin encoding service. We offer a free plan with 2.5GB encoding output per month. That's great for testing MPEG-DASH and generating some content to play around.

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Sign up to our Newsletter and stay up to date with the latest in MPEG-DASH and adaptive streaming.

MPEG-CENC ClearKey DRM Encryption with Bitmovin

August 12, 2016

The Bitmovin Cloud Encoding Service now supports MPEG-CENC ClearKey offering you a free alternative to proprietary DRM services. At Bitmovin we are constantly improving our services and adding features requested by our customers. This time we're proud to present the support of MPEG-CENC ClearKey encryption. Since we already support all of the most important DRM systems [...]

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