What's new in HTTP Live Streaming

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Contents

HLS Specification

The most recent specification of HTTP Live Streaming is RFC 8216. This document was published in August 2017. A more up-to-date reference is the current Internet-Draft draft-pantos-hls-rfc8216bis "HTTP Live Streaming 2nd Edition".

There is a related Internet-Draft for Content Steering, please see [Content-Steering] (https://datatracker.ietf.org/doc/html/draft-pantos-content-steering-00) for details.

The URL https://developer.apple.com/streaming/ contains links to the above documents as well as a preliminary version of the next update to the Internet-Draft.

New Video projection specifier in REQ-VIDEO-LAYOUT

REQ-VIDEO-LAYOUT now recognizes the Video projection specifier along with the existing Video channel specifier. The projection specifier defines how a two-dimensional rectangular image must be transformed to render correctly. The Video projection specifier is an enumerated string. Valid values are PROJ-RECT, PROJ-EQUI, PROJ-HEQU, PROJ-PRIM, and PROJ-AIV. These values correspond to rectilinear, equirectangular, half-equirectangular, parametric spherical, and Apple Immersive Video projections respectively.

Please see [QuickTime and ISO Base Media File Formats and Spatial and Immersive Media] (https://developer.apple.com/av-foundation/Stereo-Video-ISOBMFF-Extensions.pdf) for more information.

INSTREAM-ID for all media types

EXT-X-MEDIA now supports INSTREAM-ID for all media types. It is required for CLOSED-CAPTIONS while it is optional for all other media types. Mapping the INSTREAM-ID to the content within the segment is defined by the sample or bitstream format. The value is a string containing characters from the set [A-Z], [a-z], [0-9], and '.'. If the value does not match any alternative content, the client must behave as if no INSTREAM-ID was provided. A Playlist must indicate an EXT-X-VERSION of 13 or higher if it contains an EXT-X-MEDIA tag with an INSTREAM-ID attribute for a TYPE other than CLOSED-CAPTIONS.

Updates to the CHANNEL attribute

The second parameter of the CHANNELS attribute indicates the presence of spatial audio of some kind. Its value is a comma-separated list of Audio coding identifiers. When ambisonics are present, an Audio coding identifier can be used that consists of a decimal-integer that represents the order of ambisonics followed by the letters 'OA' (0x4F41). For example, 3OA indicates third-order ambisonics.

The third parameter of the CHANNELS attribute contains indications of special channel usage needed for informed selection and processing. The value of this parameter is a comma-separated list of Special Usage Identifiers. The following two new identifiers are now recognized:

BED-<integer>: Indicates the count of channels among the total channels that are devoted to fixed speaker positions. The value after the dash character (0x2D) indicates the count of channels. An example is 'BED-4'

DOF-<integer>: Signals a scenario in which the listener's orientation or position within the space defined by an audiovisual presentation can be changed. The value after the dash character (0x2D) indicates

numerical value associated with degrees of freedom. Valid values for this special usage identifier are "DOF-3" or "DOF-6".

New characteristic in EXT-X-MEDIA

A new characteristic "public.machine-generated" has been defined to indicate a rendition that's authored or translated programmatically.

New DATERANGE schema for preloading HLS date range resources

To allow clients to preload HLS date range resources, a new schema is now added which is identified by the new class "com.apple.hls.preload". This enables the client to preload the URI specified by the X-ASSET-URI or X-ASSET-LIST attribute of an existing or upcoming Interstitial EXT-X-DATERANGE tag. Following attributes are defined for this class.

X-URI:

The value is a quoted-string containing a URI that identifies the resource to be preloaded. This attribute is REQUIRED.

X-TARGET-ID:

The value is a quoted-string that identifies the ID of the Date Range for which the resource should be preloaded. This attribute is REQUIRED.

X-TARGET-CLASS:

The value is a quoted-string that identifies the target class, which is the CLASS of the Date Range with the specified X-TARGET-ID. This attribute is REQUIRED.

Skip button control for an Interstitial

Content producers can allow clients to skip an interstitial. The following parameters are added to the interstitial EXT-X-DATERANGE schema to control the behavior of the Skip button.

X-SKIP-CONTROL-OFFSET:

The value of the X-SKIP-CONTROL-OFFSET is a decimal-integer of seconds of an interstitial content that should be played until a skip button is displayed. If this value is 0, the skip button should be displayed immediately upon entering the interstitial.

X-SKIP-CONTROL-DURATION:

The value of the X-SKIP-CONTROL-DURATION is a decimal-integer of seconds of an interstitial content that a skip button should be displayed for. In the absence of this attribute, the skip button will be displayed for the entire duration of the interstitial.

X-SKIP-CONTROL-LABEL-ID:

The value of X-SKIP-CONTROL-LABEL-ID is a quoted-string which acts as a key that a client application uses to render a localized label for the skip button. In the absence of this attribute, a default label should be

applied by the client application. All characters in the quoted-string must be from the following set: [a-z], [A-Z], '-', and '_'.

A new "SKIP-CONTROL" JSON object is also added to X-ASSET-LIST JSON to allow client to override skip button control behavior.

Custom Media Selection

Custom media selection signals that the user interface for selecting media options may be based on the user's choices of content characteristics. These characteristics are specified in the EXT-X-MEDIA tag using the CHARACTERISTICS attribute.

While groups of Renditions are typically organized by language, they can be organized for presentation and selection in other ways. For example, a Multivariant Playlist might include audio Renditions for the Home and Away broadcasts of a sporting event, in both English and Spanish. Specifying these relationships between Renditions enables a client to present a custom selection interface to the user. The server MAY specify them by providing a Custom Media Selection Scheme. Please refer to [Custom Media Selection] (https://developer.apple.com/streaming/HLS-draft-pantos.pdf) in HTTP Live Streaming 2nd Edition for more details.

Media Formats and Tools

Apple distributes several tools for segmenting and validating HLS streams. These are available from the Apple developer downloads site. A link is available at the URL above.

The tools are updated several times per year and are provided for macOS and Red Hat Enterprise Linux 9 systems.

Signaling APMP and AIV content

Spatial videos are intended to produce a richer experience for the user. These videos can be classified into the following three categories.

• Stereo video:

These are stereoscopic and a separate view is available for the left and right eye simultaneously.

• Projection video:

Rectilinear projection is default but content creators can opt for non rectilinear projections to preserve the artistic intent. This kind of media is referred as Apple Projected Media Profile (APMP) and can be monoscopic or stereo.

• Immersive video:

Video is projected from a hemisphere using special lens and often requires a special metadata file to render correctly.

Within Multivariant playlists, spatial videos are signaled via REQ-VIDEO-LAYOUT tag and carries projection and channel specifier. For example,

#EXT-X-STREAM-INF:…. REQ-VIDEO-LAYOUT="CH-STEREO/PROJ-EQUI" ..

#EXT-X-STREAM-INF:…. REQ-VIDEO-LAYOUT="CH-MONO/PROJ-EQUI" ..

#EXT-X-STREAM-INF:…. REQ-VIDEO-LAYOUT="CH-STEREO/PROJ-PRIM" ..

MediaFileSegmenter and MediaStreamValidator now support segmenting and validating spatial videos.

Please see [HTTP Live Streaming (HLS) authoring specification for Apple devices] (https://developer.apple.com/documentation/http-live-streaming/hls-authoring-specification-for-apple-devices) for more information on authoring guidelines related to spatial videos.

Segmentation of Per Frame Rectangular Mask (PFRM, aka, Dynamic mask metadata) content

Per Frame Rectangular Mask (aka PFRM, and dynamic mask metadata) is carried via a timed metadata track in QuickTime Movie File Format. This is typically used to indicate a fixed to changing rectangular area extracted from a constant size decoded video, for example, letterboxing or complex spatial video adjustments to the displayed area. MediaFileSegmenter now supports segmenting PFRM content.

Please see [Rectangular Mask Payload Metadata within the QuickTime Movie File Format](https://developer.apple.com/av-foundation/Rectangular-Dynamic-Mask-Metadata.pdf) for more information.

Please see [Streaming Examples] (https://developer.apple.com/streaming/examples/) for sample APMP and AIV HLS stream.

Metrics and Logging

AVMetrics is now supported on the progressive download playback path. The same AVMetricEvent classes available in HLS are largely available for file playback, with the exception of events related to variant switches or playlist/segment/content key requests.

AVMetrics is also now supported on HLS offline downloads. Developers can subscribe to events via a new callback URLSession: assetDownloadTask:didReceiveMetricEvent: in AVAssetDownloadDelegate. A single event type, AVMetricDownloadSummaryEvent, is available and is published upon completion of the download.

The following new properties have been added to the events available in HLS:

- Variant switch event types carry media rendition information, indicating the currently playing media selections for video, audio, and subtitles.

- AVMetricHLSMediaSegmentRequestEvent carries segment duration.

Please refer to the [AVMetrics APIs]

(https://developer.apple.com/documentation/avfoundation/avmetrics) for more information.

Interstitials

New downloadsInterstitialAssets property on AVAssetDownloadConfiguration provides an opt-in functionality that allows AVAssetDownloadTask to identify and download interstitial assets scheduled by the server. Once downloaded, interstitials will play when the device is offline similarly to how they would in an online streaming scenario.

AVContentKeySession

New options AVContentKeyRequestShouldRandomizeDeviceIdentifierKey and AVContentKeyRequestRandomDeviceIdentifierSeedKey on AVContentKeyRequest allows customer to in crease the privacy by randomizing the FairPlay anonymized device ID for each request.

 New originatingRecipient property on AVContentKeyRequest allows application to better bookkeep key requests vs. their originator.

Please refer to [AVContentKeyRequest APIs]

(https://developer.apple.com/documentation/avfoundation/avcontentkeyrequest) for more detailed information.

Archives

What's new in HLS (2024) (https://developer.apple.com/streaming/Whats-new-HLS-2024.pdf)

What's new in HLS (2023) (https://developer.apple.com/streaming/Whats-new-HLS-2023.pdf)