

# Validating HTTP Live Streams

Session 510

Eryk Vershen *Media Engineer*

# Validate

To establish the soundness, or accuracy of

# HLS Validation

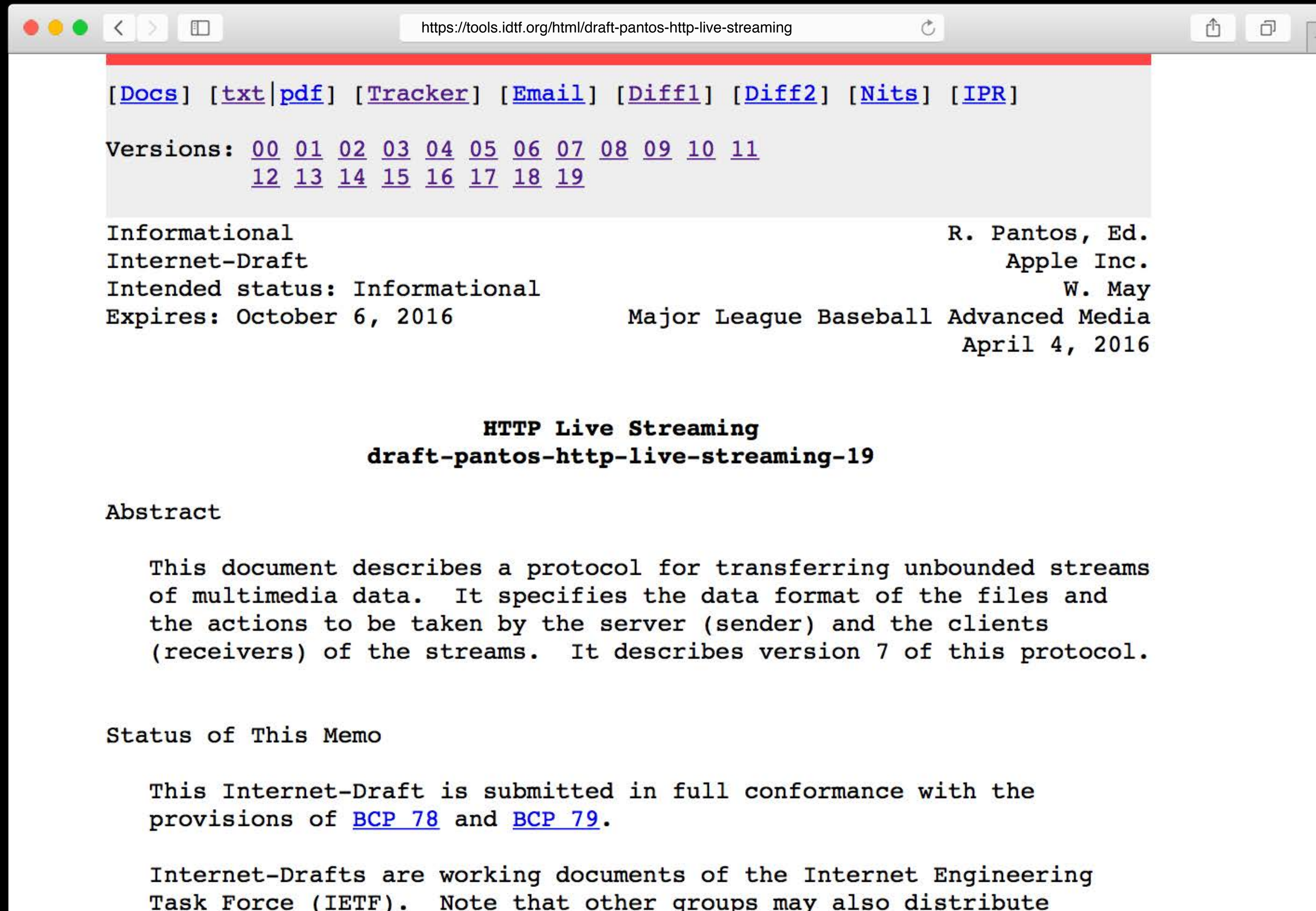
Check HLS playlists and media segments

- Files are properly formatted
- Streams obey additional requirements
- Streams adhere to best practices

Stream Plays Well

# Specifications

# HLS Specification



The screenshot shows a web browser window with the address bar containing the URL `https://tools.idtf.org/html/draft-pantos-http-live-streaming`. The page content includes navigation links, version information, author details, and the title of the draft.

[\[Docs\]](#) [\[txt|pdf\]](#) [\[Tracker\]](#) [\[Email\]](#) [\[Diff1\]](#) [\[Diff2\]](#) [\[Nits\]](#) [\[IPR\]](#)

Versions: [00](#) [01](#) [02](#) [03](#) [04](#) [05](#) [06](#) [07](#) [08](#) [09](#) [10](#) [11](#)  
[12](#) [13](#) [14](#) [15](#) [16](#) [17](#) [18](#) [19](#)

Informational R. Pantos, Ed.  
Internet-Draft Apple Inc.  
Intended status: Informational W. May  
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April 4, 2016

**HTTP Live Streaming**  
**draft-pantos-http-live-streaming-19**

Abstract

This document describes a protocol for transferring unbounded streams of multimedia data. It specifies the data format of the files and the actions to be taken by the server (sender) and the clients (receivers) of the streams. It describes version 7 of this protocol.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute

# HLS Specification

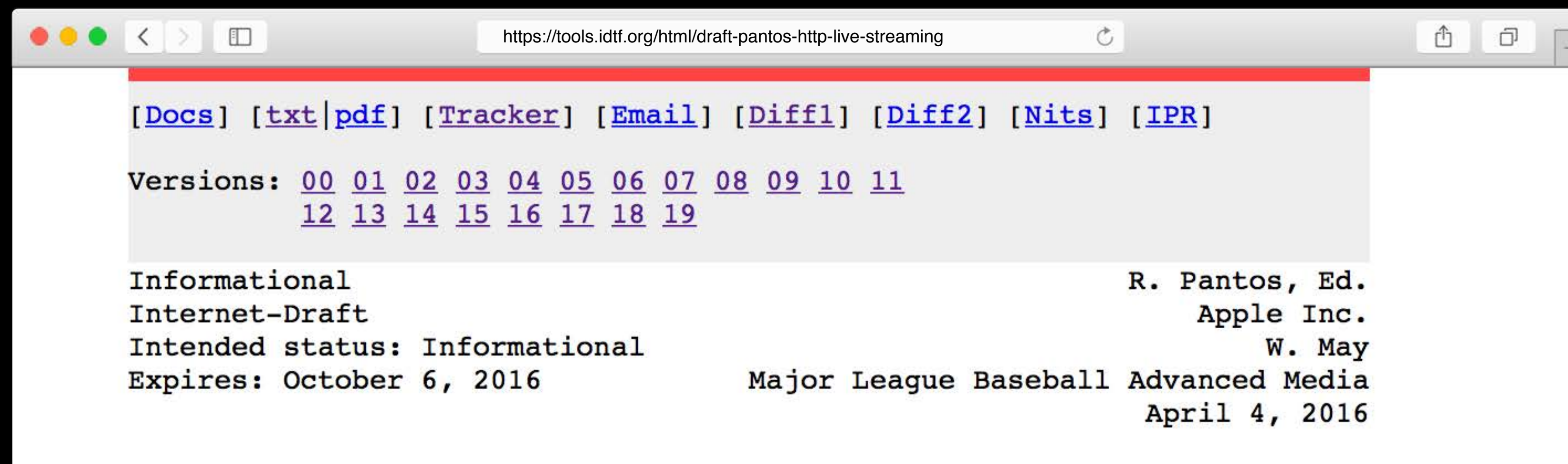
IETF Internet Draft

- <https://tools.ietf.org/html/draft-pantos-http-live-streaming>

First published—May 2009

Updated 2–3 times per year

Covers playlist structure, playlist tags, and client/server responsibilities



# HLS Authoring Specification

The screenshot shows a web browser window displaying the 'HLS Authoring Specification for Apple Devices' page from the Apple Developer Library. The browser's address bar shows 'apple.com'. The page header includes 'iOS Developer Library' and a search bar. The main content area is titled 'About HLS Authoring' and contains several paragraphs of text. A left sidebar provides navigation links for 'About HLS Authoring', 'Specification Requirements', and 'Revision History'. A 'Feedback' button is visible at the bottom right of the page.

apple.com

iOS Developer Library

Developer

HLS Authoring Specification for Apple Devices

Search iOS Developer Library

On This Page

## About HLS Authoring

This document describes the requirements for audio-video content delivery to Apple Devices.

Content should be presented via HTTP Live Streaming (HLS) playlists. Other streaming formats and self-contained video files are not discussed in this document.

For a deeper discussion of the features available in HLS, please refer to Apple's streaming resource page at <http://developer.apple.com/streaming/>, which contains pointers to the overview document, the HLS specification, technical notes, FAQs, presentations, and examples.

The current HLS specification is available at <http://tools.ietf.org/html/draft-pantos-http-live-streaming>. The latest version of that document (at the time of writing) is version 19. However, the most recent version should always be used.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

## Testing Your Streams

Apple provides several command-line tools for HTTP Live Streaming. These can be obtained from

Feedback



# HLS Authoring Specification

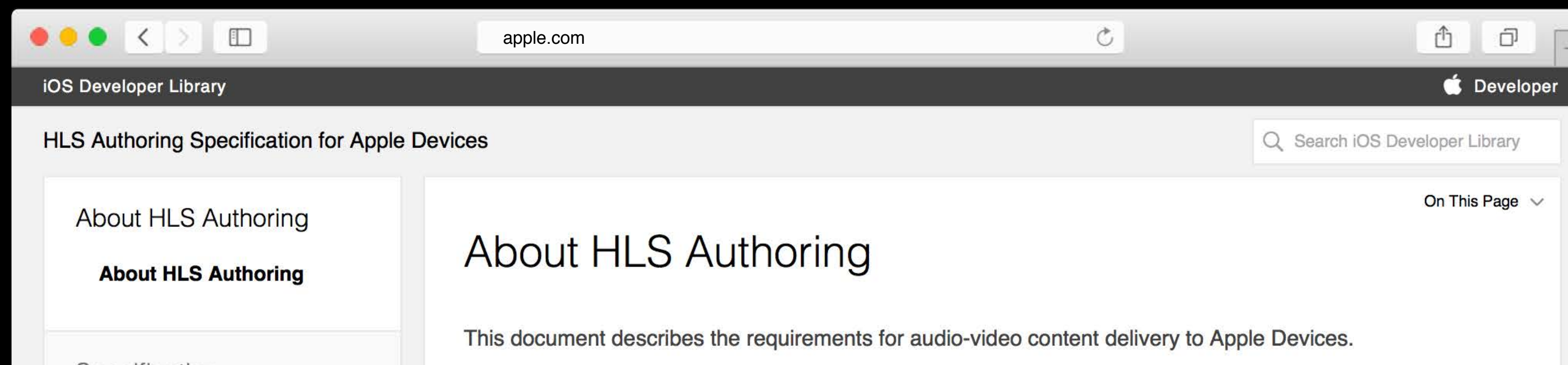
*HLS Authoring Specification for Apple Devices*

- <https://developer.apple.com/library/documentation/General/Reference/HLSAuthoringSpec/>

First published October 2015 (for tvOS)

Updated for WWDC 2016 (for iOS and OS X also)

Covers the characteristics of well-formed content



# HLS Authoring Specification

The requirements are based on

- HLS specification
- Device features
- Desired user experience
- Apple experience and analysis
- Feedback from third-parties

// HLS Authoring Specification

// Some example requirements

1.1 All video MUST be encoded using AVC/H.264.

1.5 Key frames (IDRs) SHOULD be present every two seconds.

1.16 For VOD content, the measured peak bit rate MUST be within 10% of the BANDWIDTH attribute.

6.1 I-frame playlists (EXT-X-I-FRAME-STREAM-INF) MUST be provided to support scrubbing and scanning UI.

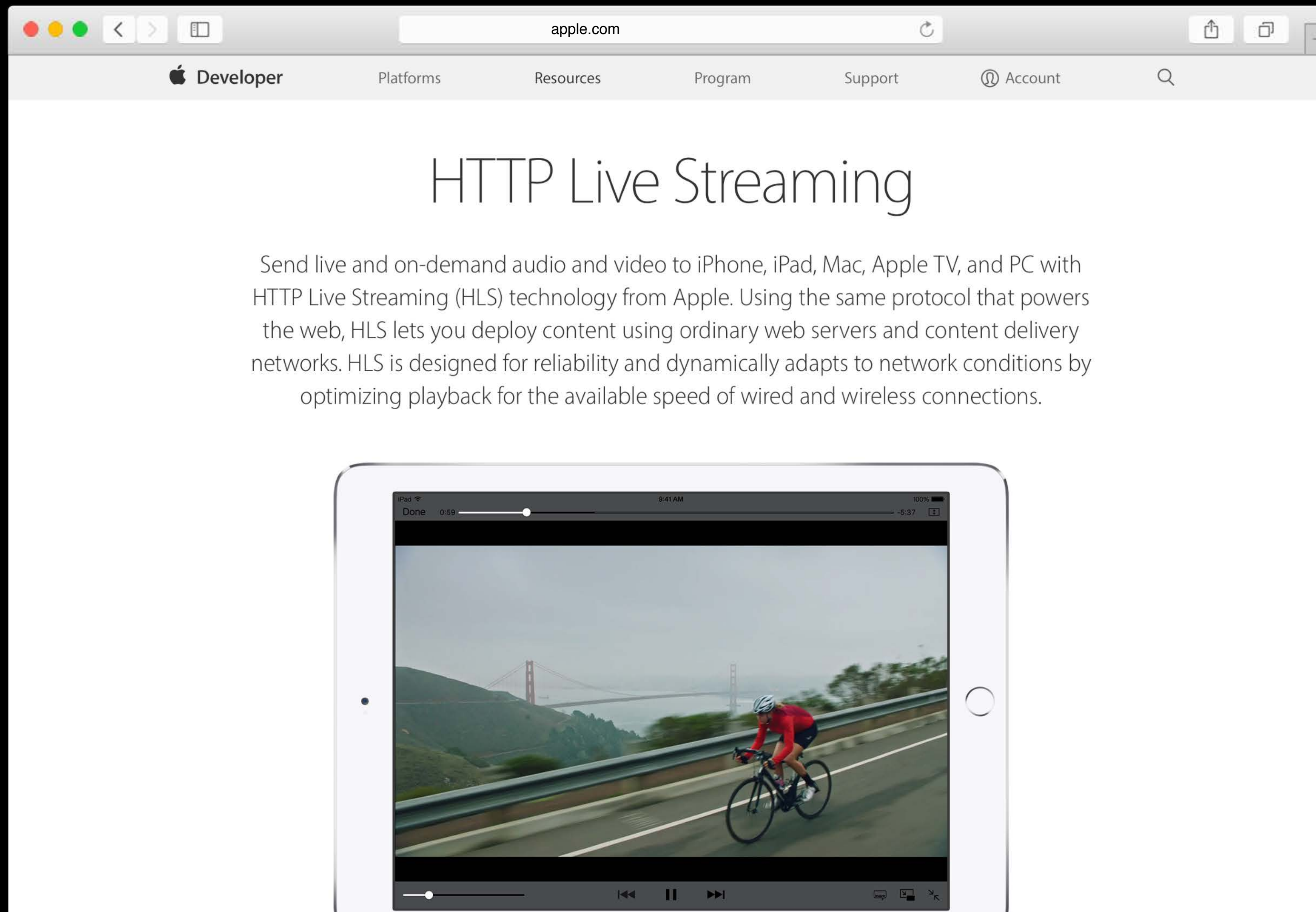
7.3 Video segments MUST start with an IDR frame.

8.15 All variants and renditions MUST have discontinuities at the same points in time.

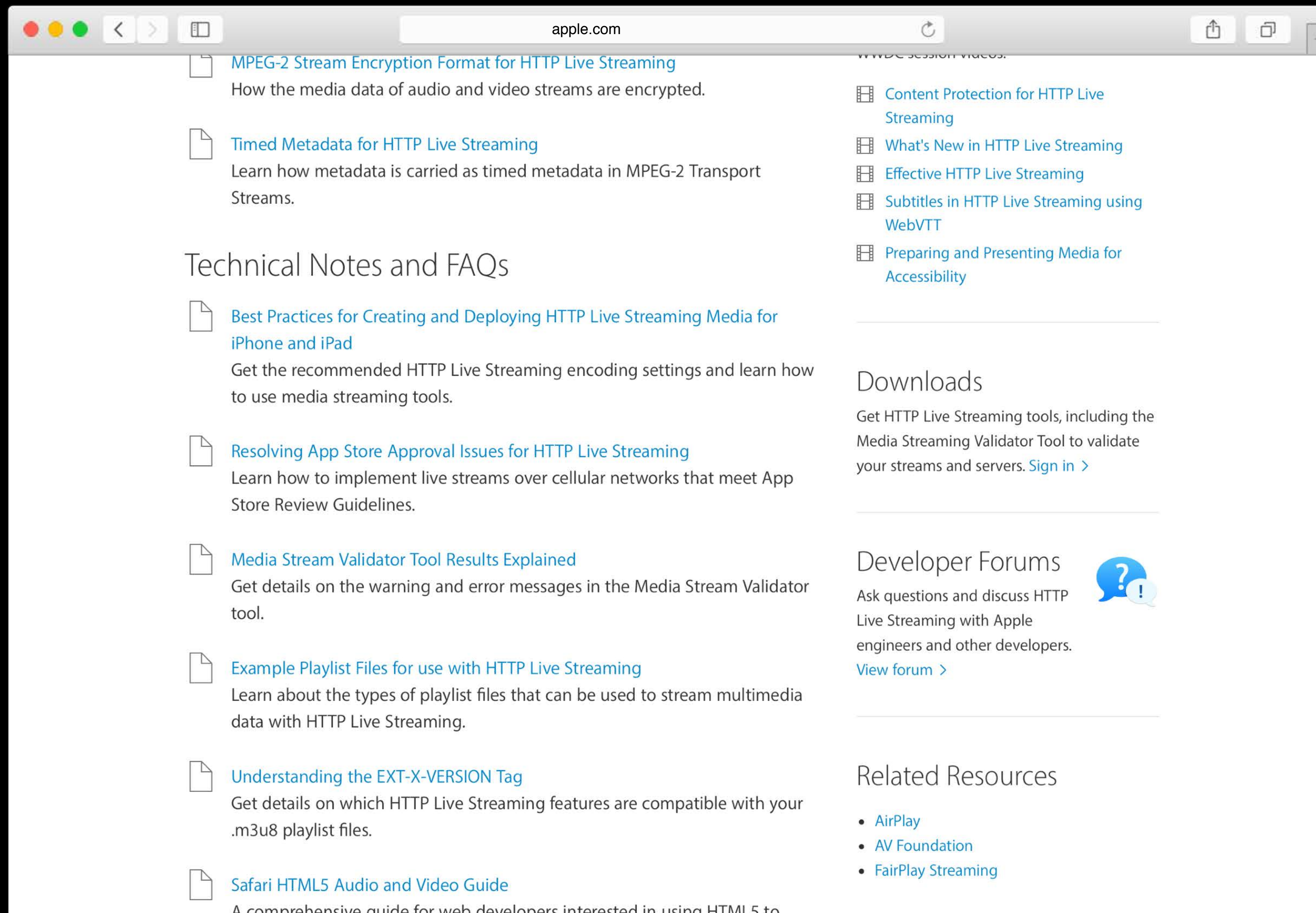
9.5 You SHOULD deliver video and audio as separate streams.

Tools

# developer.apple.com/streaming/



# developer.apple.com/streaming/



The screenshot shows a web browser window with the URL "apple.com" in the address bar. The page content is organized into several sections:

- Technical Notes and FAQs:**
  - [MPEG-2 Stream Encryption Format for HTTP Live Streaming](#): How the media data of audio and video streams are encrypted.
  - [Timed Metadata for HTTP Live Streaming](#): Learn how metadata is carried as timed metadata in MPEG-2 Transport Streams.
  - [Best Practices for Creating and Deploying HTTP Live Streaming Media for iPhone and iPad](#): Get the recommended HTTP Live Streaming encoding settings and learn how to use media streaming tools.
  - [Resolving App Store Approval Issues for HTTP Live Streaming](#): Learn how to implement live streams over cellular networks that meet App Store Review Guidelines.
  - [Media Stream Validator Tool Results Explained](#): Get details on the warning and error messages in the Media Stream Validator tool.
  - [Example Playlist Files for use with HTTP Live Streaming](#): Learn about the types of playlist files that can be used to stream multimedia data with HTTP Live Streaming.
  - [Understanding the EXT-X-VERSION Tag](#): Get details on which HTTP Live Streaming features are compatible with your .m3u8 playlist files.
  - [Safari HTML5 Audio and Video Guide](#): A comprehensive guide for web developers interested in using HTML 5 to
- Downloads:**

Get HTTP Live Streaming tools, including the Media Streaming Validator Tool to validate your streams and servers. [Sign in >](#)
- Developer Forums:**

Ask questions and discuss HTTP Live Streaming with Apple engineers and other developers. [View forum >](#)
- Related Resources:**
  - [AirPlay](#)
  - [AV Foundation](#)
  - [FairPlay Streaming](#)

# developer.apple.com/streaming/

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- Developer Forums:** Ask questions and discuss HTTP Live Streaming with Apple engineers and other developers. [View forum >](#)
- Related Resources:**
  - [AirPlay](#)
  - [AV Foundation](#)
  - [FairPlay Streaming](#)

On the right side of the page, there is a list of "WWDC session videos" including:

- [Content Protection for HTTP Live Streaming](#)
- [What's New in HTTP Live Streaming](#)
- [Effective HTTP Live Streaming](#)
- [Subtitles in HTTP Live Streaming using WebVTT](#)
- [Preparing and Presenting Media for Accessibility](#)





# HTTP Live Streaming Tools

Media Stream Validator

HLS Report

Media File Segmenter

Media Stream Segmenter

Media Subtitle Segmenter

Variant Playlist Creator

ID3 Tag Generator

# mediafilesegmenter

Command line

```
mediafilesegmenter movie_variant.mov
```

Output

Data file

```
prog_index.m3u8  
fileSequence*.ts
```

Has options related to file names, file locations, playlist structure, media format, encryption, and inserting metadata

# mediastreamvalidator

Command line

```
mediastreamvalidator http://example.com/playlist.m3u8
```

# mediastreamvalidator

Command line

```
mediastreamvalidator http://example.com/playlist.m3u8
```

Output

Trace messages

Data file

```
validation_data.json
```

# mediastreamvalidator

## Command line

```
mediastreamvalidator http://example.com/playlist.m3u8
```

## Output

Trace messages

Data file

```
validation_data.json
```

## Options

```
-O | --validation-data-path path    Location for JSON file  
-t | --timeout duration              Timeout in seconds
```

```
$ mediastreamvalidator https://tungsten.aaplimg.com/VOD/bipbop_adv_example_v2/master.m3u8
```

```
$ mediastreamvalidator https://tungsten.aaplimg.com/VOD/bipbop_adv_example_v2/master.m3u8
mediastreamvalidator: Version 1.2(160525)

[/VOD/bipbop_adv_example_v2/master.m3u8] Started root playlist download
[v2/prog_index.m3u8] Started media playlist download
[v1/iframe_index.m3u8] Started media playlist download
[v4/iframe_index.m3u8] Started media playlist download
[v5/prog_index.m3u8] Started media playlist download
[v1/prog_index.m3u8] Started media playlist download
[a3/prog_index.m3u8] Started media playlist download
[v3/iframe_index.m3u8] Started media playlist download
[v8/prog_index.m3u8] Started media playlist download
[v4/prog_index.m3u8] Started media playlist download
[a2/prog_index.m3u8] Started media playlist download
[v6/iframe_index.m3u8] Started media playlist download
[v2/iframe_index.m3u8] Started media playlist download
[v7/prog_index.m3u8] Started media playlist download
[v3/prog_index.m3u8] Started media playlist download
[a1/prog_index.m3u8] Started media playlist download
```

```
$ mediastreamvalidator https://tungsten.aaplimg.com/VOD/bipbop_adv_example_v2/master.m3u8
mediastreamvalidator: Version 1.2(160525)

[/VOD/bipbop_adv_example_v2/master.m3u8] Started root playlist download
[v2/prog_index.m3u8] Started media playlist download
[v1/iframe_index.m3u8] Started media playlist download
[v4/iframe_index.m3u8] Started media playlist download
[v5/prog_index.m3u8] Started media playlist download
[v1/prog_index.m3u8] Started media playlist download
[a3/prog_index.m3u8] Started media playlist download
[v3/iframe_index.m3u8] Started media playlist download
[v8/prog_index.m3u8] Started media playlist download
[v4/prog_index.m3u8] Started media playlist download
[a2/prog_index.m3u8] Started media playlist download
[v6/iframe_index.m3u8] Started media playlist download
[v2/iframe_index.m3u8] Started media playlist download
[v7/prog_index.m3u8] Started media playlist download
[v3/prog_index.m3u8] Started media playlist download
[a1/prog_index.m3u8] Started media playlist download
```



Average segment duration: 6.006010

Total segment bitrates (all discontinuities): average: 4604.32 kb/s, max: 4627.43 kb/s

Playlist max bitrate: 4819.532000 kb/s

Audio Group ID: aud3

Discontinuity: sequence: 0, parsed segment count: 100 of 100, duration: 600.601 sec,  
average: 4604.32 kb/s, max: 4627.43 kb/s

Track ID: 1

Video Codec: avc1

Video profile: High

Video level: 4.2

Video resolution: 1920x1080

Video average IDR interval: 2.002000, Standard deviation: 0.000000

Video frame rate: 59.940

Track ID: 2

\$

# hlsreport

Command line

```
hlsreport.py validation_data.json
```

# hlsreport

Command line

```
hlsreport.py validation_data.json
```

Output

HTML file

```
validation_data.html
```

# hlsreport

Command line

```
hlsreport.py validation_data.json
```

Output

HTML file

```
validation_data.html
```

Options

<code>-o</code>		<code>--output filename</code>	HTML output file name
<code>-i</code>		<code>--id</code>	Show dataID
<code>-V</code>		<code>--verbose</code>	Verbose output

# Submitting to an App Store

Validate your streams before you submit

In iTunes Connect, include a test stream URL in the Review Notes field

# Demo

Well, kind of a demo...

```
$ mediastreamvalidator \  
  --validation-data-path a-validation.json \  
  http://example.com/example1.m3u8
```

```
$ mediastreamvalidator \  
  --validation-data-path a-validation.json \  
  http://example.com/example1.m3u8
```

```
mediastreamvalidator: Version 1.2(160525)
```

```
[/example1.m3u8] Started root playlist download
```

```
...
```

```
$
```



```
$ mediastreamvalidator \  
  --validation-data-path a-validation.json \  
  http://example.com/example1.m3u8
```

```
mediastreamvalidator: Version 1.2(160525)
```

```
[/example1.m3u8] Started root playlist download
```

```
...
```

```
$
```

```
$ hlsreport.py a-validation.json
```

```
$ mediastreamvalidator \  
  --validation-data-path a-validation.json \  
  http://example.com/example1.m3u8
```

```
mediastreamvalidator: Version 1.2(160525)
```

```
[/example1.m3u8] Started root playlist download
```

```
...
```

```
$
```

```
$ hlsreport.py a-validation.json
```

```
$
```

```
$ mediastreamvalidator \  
  --validation-data-path a-validation.json \  
  http://example.com/example1.m3u8
```

```
mediastreamvalidator: Version 1.2(160525)
```

```
[/example1.m3u8] Started root playlist download
```

```
...
```

```
$
```

```
$ hlsreport.py a-validation.json
```

```
$
```

```
$ ls
```

```
$ mediastreamvalidator \  
  --validation-data-path a-validation.json \  
  http://example.com/example1.m3u8
```

```
mediastreamvalidator: Version 1.2(160525)
```

```
[/example1.m3u8] Started root playlist download
```

```
...
```

```
$
```

```
$ hlsreport.py a-validation.json
```

```
$
```

```
$ ls
```

```
a-validation.html
```

```
a-validation.json
```

```
$
```

# Example 1

A playlist with several common errors

# HLS Validation Report

Stream type: VOD

<http://example.com/example1.m3u8>

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	E
aud1	1	551	40.8%	539	41.2%	480 x 270	2.002	29.970	High	2.1	
↳	2	925	29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0	
↳	3	1305	24.6%	1290	24.7%	768 x 432	2.002	29.970	High	3.0	
↳	4	2267	20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2	
↳	5	3244	18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2	
↳	6	4788	17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2	
↳	7	6320	16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2	
↳	<b>8</b>	7775	16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2	

Average duration processed: 0:10:00

# HLS Validation Report

Stream type VOD

<http://example.com/example1.m3u8>

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	E
aud1	1	551	40.8%	539	41.2%	480 x 270	2.002	29.970	High	2.1	
↳	2	925	29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0	
↳	3	1305	24.6%	1290	24.7%	768 x 432	2.002	29.970	High	3.0	
↳	4	2267	20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2	
↳	5	3244	18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2	
↳	6	4788	17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2	
↳	7	6320	16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2	
↳	<span style="border: 1px solid red; border-radius: 50%; padding: 2px;">8</span>	7775	16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2	

Average duration processed: 0:10:00

# HLS Validation Report

Stream type **VOD**

VOD  
LIVE  
EVENT  
UNKNOWN  
MIXED

<http://example.com>

Note on tables: all bandwidth values are reported in kb/s, IDs for default startup variants are highlighted in dark grey, entries with a duration of 0 are excluded from the average duration calculation.

## Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	Duration
aud1	1	551	40.8%	539	41.2%	480 x 270	2.002	29.970	High	2.1	0:00:00
↳	2	925	29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0	0:00:00
↳	3	1305	24.6%	1290	24.7%	768 x 432	2.002	29.970	High	3.0	0:00:00
↳	4	2267	20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2	0:00:00
↳	5	3244	18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2	0:00:00
↳	6	4788	17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2	0:00:00
↳	7	6320	16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2	0:00:00
↳	<b>8</b>	7775	16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2	0:00:00

Average duration processed: 0:10:00



<http://example.com/example1.m3u8>

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	E
aud1	1	551	40.8%	539	41.2%	480 x 270	2.002	29.970	High	2.1	
↳	2	925	29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0	
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↳	4	2267	20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2	
↳	5	3244	18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2	
↳	6	4788	17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2	
↳	7	6320	16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2	
↳	<b>8</b>	7775	16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2	

Average duration processed: 0:10:00

## Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
----------	---	----------	----------	------	-------	----------	-------------	-------	-------	------------

are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries annotated with an asterisk (\*)

---

<b>% Diff.</b>	<b>Avg Rate</b>	<b>% Diff</b>	<b>Resolution</b>	<b>IDR Int.</b>	<b>Framerate</b>	<b>Profile</b>	<b>Level</b>	<b>Encryption</b>	<b>% Proc.</b>
40.8%	539	41.2%	480 x 270	2.002	29.970	High	2.1	NONE	100%
29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0	NONE	100%
24.6%	1290	24.7%	768 x 432	2.002	29.970	High	3.0	NONE	100%
20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2	NONE	100%
18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2	NONE	83%
17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2	NONE	57%
16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2	NONE	45%
16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2	NONE	33%

---

: 0:10:00

are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries annotated with an asterisk (\*)

<b>% Diff.</b>	<b>Avg Rate</b>	<b>% Diff</b>	<b>Resolution</b>	<b>IDR Int.</b>	<b>Framerate</b>	<b>Profile</b>	<b>Level</b>	<b>Encryption</b>	<b>% Proc.</b>
40.8%	539	41.2%	480 x 270	2.002	29.970	High	2.1	NONE	100%
29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0	NONE	100%
24.6%	1290	24.7%	768 x 432	2.002	29.970	High	3.0	NONE	100%
20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2	NONE	100%
18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2	NONE	83%
17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2	NONE	57%
16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2	NONE	45%
16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2	NONE	33%

: 0:10:00

---

<b>Avg Rate</b>	<b>Type</b>	<b>Codec</b>	<b>Channels</b>	<b>Sample Rate</b>	<b>Elem.</b>	<b>Lang.</b>	<b>Encryption</b>	<b>% Proc.</b>
-----------------	-------------	--------------	-----------------	--------------------	--------------	--------------	-------------------	----------------

<http://example.com/example1.m3u8>

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	E
aud1	1	551	40.8%	539	41.2%	480 x 270	2.002	29.970	High	2.1	
↳	2	925	29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0	
↳	3	1305	24.6%	1290	24.7%	768 x 432	2.002	29.970	High	3.0	
↳	4	2267	20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2	
↳	5	3244	18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2	
↳	6	4788	17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2	
↳	7	6320	16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2	
↳	<b>8</b>	7775	16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2	

Average duration processed: 0:10:00

## Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
----------	---	----------	----------	------	-------	----------	-------------	-------	-------	------------

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

### Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	E
aud1	1	551	40.8%	539	41.2%	480 x 270	2.002	29.970	High	2.1	
↳	2	925	29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0	
↳	3	1305	24.6%	1290	24.7%	768 x 432	2.002	29.970	High	3.0	
↳	4	2267	20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2	
↳	5	3244	18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2	
↳	6	4788	17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2	
↳	7	6320	16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2	
↳	8	7775	16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2	

Average duration processed: 0:10:00

### Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
----------	---	----------	----------	------	-------	----------	-------------	-------	-------	------------

<http://example.com/example1.m3u8>

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	E
aud1	1	551	40.8%	539	41.2%	480 x 270	2.002	29.970	High	2.1	
↳	2	925	29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0	
↳	3	1305	24.6%	1290	24.7%	768 x 432	2.002	29.970	High	3.0	
↳	4	2267	20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2	
↳	5	3244	18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2	
↳	6	4788	17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2	
↳	7	6320	16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2	
↳	8	7775	16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2	

Average duration processed: 0:10:00

## Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
----------	---	----------	----------	------	-------	----------	-------------	-------	-------	------------

<http://example.com/example1.m3u8>

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

Audio ID	#	PL Rate	Max Rate	% Diff.	PL Avg Rate	Avg Rate	% Diff	Resolution	IDR Int.	Frame
aud1	1	392	551	40.8%	382	539	41.2%	480 x 270	2.002	29.
↳	2	717	925	29.1%	707	913	29.2%	640 x 360	2.002	29.
↳	3	1047	1305	24.6%	1035	1290	24.7%	768 x 432	2.002	29.
↳	4	1884	2267	20.4%	1839	2215	20.4%	960 x 540	2.002	59.
↳	5	2733	3244	18.7%	2727	3237	18.7%	1280 x 720	2.002	59.
↳	6	4076	4788	17.5%	4056	4764	17.5%	1920 x 1080	2.002	59.
↳	7	5408	6320	16.9%	5393	6302	16.9%	1920 x 1080	2.002	59.
↳	<b>8</b>	6673	7775	16.5%	6620	7713	16.5%	1920 x 1080	2.002	59.

Average duration processed: 0:10:00

## Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
----------	---	----------	----------	------	-------	----------	-------------	-------	-------	------------

<http://example.com/example1.m3u8>

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

With --pl option

Audio ID	#	PL Rate	Max Rate	% Diff.	PL Avg Rate	Avg Rate	% Diff	Resolution	IDR Int.	Frame
aud1	1	392	551	40.8%	382	539	41.2%	480 x 270	2.002	29.
↳	2	717	925	29.1%	707	913	29.2%	640 x 360	2.002	29.
↳	3	1047	1305	24.6%	1035	1290	24.7%	768 x 432	2.002	29.
↳	4	1884	2267	20.4%	1839	2215	20.4%	960 x 540	2.002	59.
↳	5	2733	3244	18.7%	2727	3237	18.7%	1280 x 720	2.002	59.
↳	6	4076	4788	17.5%	4056	4764	17.5%	1920 x 1080	2.002	59.
↳	7	5408	6320	16.9%	5393	6302	16.9%	1920 x 1080	2.002	59.
↳	8	6673	7775	16.5%	6620	7713	16.5%	1920 x 1080	2.002	59.

Average duration processed: 0:10:00

## Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
----------	---	----------	----------	------	-------	----------	-------------	-------	-------	------------



↳	2	925	29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0
↳	3	1305	24.6%	1290	24.7%	768 x 432	2.002	29.970	High	3.0
↳	4	2267	20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2
↳	5	3244	18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2
↳	6	4788	17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2
↳	7	6320	16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2
↳	<b>8</b>	7775	16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2

Average duration processed: 0:10:00

## Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	9	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NONE

Average duration processed: 0:10:00

**Checked against *HLS Authoring Specification for Apple TV***

## Must Fix Issues

**1. The server MUST deliver playlists using gzip content-encoding**

● Master Playlist

↳	2	925	29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0
↳	3	1305	24.6%	1290	24.7%	768 x 432	2.002	29.970	High	3.0
↳	4	2267	20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2
↳	5	3244	18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2
↳	6	4788	17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2
↳	7	6320	16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2
↳	<b>8</b>	7775	16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2

Average duration processed: 0:10:00

## Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	9	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NONE

Average duration processed: 0:10:00

**Checked against *HLS Authoring Specification for Apple TV***

## Must Fix Issues

**1. The server MUST deliver playlists using gzip content-encoding**

● Master Playlist

Average duration processed: 0:10:00

## **Checked against *HLS Authoring Specification for Apple TV***

### **Must Fix Issues**

#### **1. The server MUST deliver playlists using gzip content-encoding**

- Master Playlist

#### **2. Measured average bitrate compared to master playlist declared value exceeds error tolerance**

- Master Playlist Stream Definition for All Variants

#### **3. I-frame playlists ( EXT-X-I-FRAME-STREAM-INF ) MUST be provided to support scrubbing and scanning UI**

- Master Playlist

#### **4. Measured peak bitrate compared to master playlist declared value exceeds error tolerance**

- Master Playlist Stream Definition for All Variants

### **Should Fix Issues**

#### **5. Captions, to make content accessible to the deaf or hard of hearing, SHOULD be provided with your streams**

Average duration processed: 0:10:00

## Checked against *HLS Authoring Specification for Apple TV*

### Must Fix Issues

#### 1. The server MUST deliver playlists using gzip content-encoding

- Master Playlist

#### 2. Measured average bitrate compared to master playlist declared value exceeds error tolerance

- Master Playlist Stream Definition for All Variants

#### 3. I-frame playlists ( EXT-X-I-FRAME-STREAM-INF ) MUST be provided to support scrubbing and scanning UI

- Master Playlist

#### 4. Measured peak bitrate compared to master playlist declared value exceeds error tolerance

- Master Playlist Stream Definition for All Variants

### Should Fix Issues

#### 5. Captions, to make content accessible to the deaf or hard of hearing, SHOULD be provided with your streams

## Should Fix Issues

5. Captions, to make content accessible to the deaf or hard of hearing, **SHOULD** be provided with your streams

- Master Playlist

6. Master playlists **SHOULD** be delivered using Transport Layer Security (TLS)

- Master Playlist

7. The default video variant for WiFi delivery **SHOULD** be the 2000 kb/s variant

- Variant #8

8. You **SHOULD** support stream failover by listing duplicate streams in the Master Playlist

- All Variants

## Report Information

MediaStreamValidator version: 1.2(160525)

Report generator version: 1.1(160525)

Report generation date: 05/31/16 11:03:22

JSON format version: 1

## Should Fix Issues

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## Report Information

MediaStreamValidator version: 1.2(160525)

Report generator version: 1.1(160525)

Report generation date: 05/31/16 11:03:22

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## Should Fix Issues

5. Captions, to make content accessible to the deaf or hard of hearing, **SHOULD** be provided with your streams

- Master Playlist

6. Master playlists **SHOULD** be delivered using Transport Layer Security (TLS)

- Master Playlist

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- All Variants

## Report Information

MediaStreamValidator version: 1.2(160525)

Report generator version: 1.1(160525)

Report generation date: 05/31/16 11:03:22

JSON format version: 1



Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	E
aud1	1	551	40.8%	539	41.2%	480 x 270	2.002	29.970	High	2.1	
↳	2	925	29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0	
↳	3	1305	24.6%	1290	24.7%	768 x 432	2.002	29.970	High	3.0	
↳	4	2267	20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2	
↳	5	3244	18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2	
↳	6	4788	17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2	
↳	7	6320	16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2	
↳	<b>8</b>	7775	16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2	

Average duration processed: 0:10:00

## Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	9	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NONE

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

### Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	E
aud1	1	551	40.8%	539	41.2%	480 x 270	2.002	29.970	High	2.1	
↳	2	925	29.1%	913	29.2%	640 x 360	2.002	29.970	High	3.0	
↳	3	1305	24.6%	1290	24.7%	768 x 432	2.002	29.970	High	3.0	
↳	4	2267	20.4%	2215	20.4%	960 x 540	2.002	59.940	High	3.2	
↳	5	3244	18.7%	3236	18.7%	1280 x 720	2.002	59.940	High	3.2	
↳	6	4788	17.5%	4767	17.5%	1920 x 1080	2.002	59.940	High	4.2	
↳	7	6320	16.9%	6301	16.8%	1920 x 1080	2.002	59.940	High	4.2	
↳	8	7775	16.5%	7708	16.4%	1920 x 1080	2.002	59.940	High	4.2	

Average duration processed: 0:10:00

### Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	9	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NONE

# Example 2

After fixing the previous problems

# HLS Validation Report

Stream type: VOD

<http://example.com/example2.m3u8>

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	E
aud1	1	551	0.2%	539	0.0%	480 x 270	2.002	29.970	High	2.1	
↳	2	925	0.1%	913	0.0%	640 x 360	2.002	29.970	High	3.0	
↳	3	1305	0.1%	1290	0.0%	768 x 432	2.002	29.970	High	3.0	
↳	4	2267	0.0%	2215	0.0%	960 x 540	2.002	59.940	High	3.2	
↳	5	3244	0.0%	3237	0.0%	1280 x 720	2.002	59.940	High	3.2	
↳	6	4788	0.0%	4764	0.0%	1920 x 1080	2.002	59.940	High	4.2	
↳	7	6320	0.0%	6302	0.0%	1920 x 1080	2.002	59.940	High	4.2	
↳	8	7775	0.0%	7713	0.0%	1920 x 1080	2.002	59.940	High	4.2	

Average duration processed: 0:10:00

# HLS Validation Report

Stream type: VOD

<http://example.com/example2.m3u8>

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	E
aud1	1	551	0.2%	539	0.0%	480 x 270	2.002	29.970	High	2.1	
↳	2	925	0.1%	913	0.0%	640 x 360	2.002	29.970	High	3.0	
↳	3	1305	0.1%	1290	0.0%	768 x 432	2.002	29.970	High	3.0	
↳	4	2267	0.0%	2215	0.0%	960 x 540	2.002	59.940	High	3.2	
↳	5	3244	0.0%	3237	0.0%	1280 x 720	2.002	59.940	High	3.2	
↳	6	4788	0.0%	4764	0.0%	1920 x 1080	2.002	59.940	High	4.2	
↳	7	6320	0.0%	6302	0.0%	1920 x 1080	2.002	59.940	High	4.2	
↳	8	7775	0.0%	7713	0.0%	1920 x 1080	2.002	59.940	High	4.2	

Average duration processed: 0:10:00

# HLS Validation Report

Stream type: VOD

<http://example.com/example2.m3u8>

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	E
aud1	1	551	0.2%	539	0.0%	480 x 270	2.002	29.970	High	2.1	
↳	2	925	0.1%	913	0.0%	640 x 360	2.002	29.970	High	3.0	
↳	3	1305	0.1%	1290	0.0%	768 x 432	2.002	29.970	High	3.0	
↳	4	2267	0.0%	2215	0.0%	960 x 540	2.002	59.940	High	3.2	
↳	5	3244	0.0%	3237	0.0%	1280 x 720	2.002	59.940	High	3.2	
↳	6	4788	0.0%	4764	0.0%	1920 x 1080	2.002	59.940	High	4.2	
↳	7	6320	0.0%	6302	0.0%	1920 x 1080	2.002	59.940	High	4.2	
↳	8	7775	0.0%	7713	0.0%	1920 x 1080	2.002	59.940	High	4.2	

Average duration processed: 0:10:00

kb/s, IDs for default startup variants are highlighted in dark grey, entries annotated with an asterisk ('\*') do not have a

---

<b>Rate</b>	<b>% Diff</b>	<b>Resolution</b>	<b>IDR Int.</b>	<b>Framerate</b>	<b>Profile</b>	<b>Level</b>	<b>Encryption</b>	<b>% Proc.</b>
539	0.0%	480 x 270	2.002	29.970	High	2.1	NONE	100%
913	0.0%	640 x 360	2.002	29.970	High	3.0	NONE	100%
290	0.0%	768 x 432	2.002	29.970	High	3.0	NONE	100%
215	0.0%	960 x 540	2.002	59.940	High	3.2	NONE	100%
237	0.0%	1280 x 720	2.002	59.940	High	3.2	NONE	100%
764	0.0%	1920 x 1080	2.002	59.940	High	4.2	NONE	100%
302	0.0%	1920 x 1080	2.002	59.940	High	4.2	NONE	100%
713	0.0%	1920 x 1080	2.002	59.940	High	4.2	NONE	100%

---

kb/s, IDs for default startup variants are highlighted in dark grey, entries annotated with an asterisk ('\*') do not have a

<b>Rate</b>	<b>% Diff</b>	<b>Resolution</b>	<b>IDR Int.</b>	<b>Framerate</b>	<b>Profile</b>	<b>Level</b>	<b>Encryption</b>	<b>% Proc.</b>
539	0.0%	480 x 270	2.002	29.970	High	2.1	NONE	100%
913	0.0%	640 x 360	2.002	29.970	High	3.0	NONE	100%
290	0.0%	768 x 432	2.002	29.970	High	3.0	NONE	100%
215	0.0%	960 x 540	2.002	59.940	High	3.2	NONE	100%
237	0.0%	1280 x 720	2.002	59.940	High	3.2	NONE	100%
764	0.0%	1920 x 1080	2.002	59.940	High	4.2	NONE	100%
302	0.0%	1920 x 1080	2.002	59.940	High	4.2	NONE	100%
713	0.0%	1920 x 1080	2.002	59.940	High	4.2	NONE	100%



↳	5	3244	0.0%	3237	0.0%	1280 x 720	2.002	59.940	High	3.2
↳	6	4788	0.0%	4764	0.0%	1920 x 1080	2.002	59.940	High	4.2
↳	7	6320	0.0%	6302	0.0%	1920 x 1080	2.002	59.940	High	4.2
↳	8	7775	0.0%	7713	0.0%	1920 x 1080	2.002	59.940	High	4.2

Average duration processed: 0:10:00

## Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	9	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NON
sub1	10	-	-	Subtitle	-	-	-	-	eng	NON

Average duration processed: 0:10:00

**Checked against *HLS Authoring Specification for Apple TV***

## Must Fix Issues

**1. I-frame playlists ( EXT-X-I-FRAME-STREAM-INF ) MUST be provided to support scrubbing and scanning UI**

- Master Playlist

↳	5	3244	0.0%	3237	0.0%	1280 x 720	2.002	59.940	High	3.2
↳	6	4788	0.0%	4764	0.0%	1920 x 1080	2.002	59.940	High	4.2
↳	7	6320	0.0%	6302	0.0%	1920 x 1080	2.002	59.940	High	4.2
↳	8	7775	0.0%	7713	0.0%	1920 x 1080	2.002	59.940	High	4.2

Average duration processed: 0:10:00

## Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	9	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NON
sub1	10	-	-	Subtitle	-	-	-	-	eng	NON

Average duration processed: 0:10:00

**Checked against *HLS Authoring Specification for Apple TV***

## Must Fix Issues

1. I-frame playlists ( EXT-X-I-FRAME-STREAM-INF ) MUST be provided to support scrubbing and scanning UI

- Master Playlist

3237	0.0%	1280 x 720	2.002	59.940	High	3.2	NONE	100%
4764	0.0%	1920 x 1080	2.002	59.940	High	4.2	NONE	100%
6302	0.0%	1920 x 1080	2.002	59.940	High	4.2	NONE	100%
7713	0.0%	1920 x 1080	2.002	59.940	High	4.2	NONE	100%

Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption	% Proc.
160	Audio	AAC-LC	Stereo	48000	Y	eng	NONE	100%
-	Subtitle	-	-	-	-	eng	NONE	N/A

### *ing Specification for Apple TV*

ME-STREAM-INF ) MUST be provided to support scrubbing and scanning UI

---

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	9	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NON
sub1	10	-	-	Subtitle	-	-	-	-	eng	NON

---

Average duration processed: 0:10:00

**Checked against *HLS Authoring Specification for Apple TV***

### **Must Fix Issues**

1. I-frame playlists ( EXT-X-I-FRAME-STREAM-INF ) MUST be provided to support scrubbing and scanning UI
  - Master Playlist

### **Should Fix Issues**

2. Master playlists SHOULD be delivered using Transport Layer Security (TLS)
  - Master Playlist
3. You SHOULD support stream failover by listing duplicate streams in the Master Playlist
  - All Variants

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	9	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NON
sub1	10	-	-	Subtitle	-	-	-	-	eng	NON

Average duration processed: 0:10:00

**Checked against *HLS Authoring Specification for Apple TV***

### **Must Fix Issues**

- 1. I-frame playlists ( EXT-X-I-FRAME-STREAM-INF ) MUST be provided to support scrubbing and scanning UI**
  - Master Playlist

### **Should Fix Issues**

- 2. Master playlists SHOULD be delivered using Transport Layer Security (TLS)**
  - Master Playlist
- 3. You SHOULD support stream failover by listing duplicate streams in the Master Playlist**
  - All Variants

# Example 3

Let's see what happens with I-frame playlists

# HLS Validation Report

Stream type: VOD

<http://example.com/example3.m3u8>

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level	E
aud1	1	551	0.2%	539	0.0%	480 x 270	2.002	29.970	High	2.1	
↳	2	925	0.1%	913	0.0%	640 x 360	2.002	29.970	High	3.0	
↳	3	1305	0.1%	1290	0.0%	768 x 432	2.002	29.970	High	3.0	
↳	4	2267	0.0%	2215	0.0%	960 x 540	2.002	59.940	High	3.2	
↳	5	3244	0.0%	3237	0.0%	1280 x 720	2.002	59.940	High	3.2	
↳	6	4788	0.0%	4764	0.0%	1920 x 1080	2.002	59.940	High	4.2	
↳	7	6320	0.0%	6302	0.0%	1920 x 1080	2.002	59.940	High	4.2	
↳	8	7775	0.0%	7713	0.0%	1920 x 1080	2.002	59.940	High	4.2	

Average duration processed: 0:10:00

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	9	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NON
sub1	10	-	-	Subtitle	-	-	-	-	eng	NON

Average duration processed: 0:10:00

## I-Frame Variant Overview

Video ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Scaled Avg	Mult.	Resolution	IDR Int.	IDR Std D
	11	41	0.0%	40	0.0%	638	16x	480 x 270	2.002	0.0
	12	65	-0.5%	64	0.0%	1021	16x	640 x 360	2.002	0.0
	13	81	-2.8%	80	0.0%	1282	16x	768 x 432	2.002	0.0
	14	98	-0.4%	97	0.0%	1551	16x	960 x 540	2.002	0.0
	15	133	-3.0%	129	0.0%	2059	16x	1280 x 720	2.002	0.0
	16	164	-0.9%	161	0.0%	2581	16x	1920 x 1080	2.002	0.0

Average duration processed: 0:10:00

**Checked against *HLS Authoring Specification for Apple TV***

## Should Fix Issues

1. Master playlists SHOULD be delivered using Transport Layer Security (TLS)



Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	9	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NON
sub1	10	-	-	Subtitle	-	-	-	-	eng	NON

Average duration processed: 0:10:00

## I-Frame Variant Overview

Video ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Scaled Avg	Mult.	Resolution	IDR Int.	IDR Std D
	11	41	0.0%	40	0.0%	638	16x	480 x 270	2.002	0.0
	12	65	-0.5%	64	0.0%	1021	16x	640 x 360	2.002	0.0
	13	81	-2.8%	80	0.0%	1282	16x	768 x 432	2.002	0.0
	14	98	-0.4%	97	0.0%	1551	16x	960 x 540	2.002	0.0
	15	133	-3.0%	129	0.0%	2059	16x	1280 x 720	2.002	0.0
	16	164	-0.9%	161	0.0%	2581	16x	1920 x 1080	2.002	0.0

Average duration processed: 0:10:00

**Checked against *HLS Authoring Specification for Apple TV***

## Should Fix Issues

1. Master playlists SHOULD be delivered using Transport Layer Security (TLS)

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	9	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NON
sub1	10	-	-	Subtitle	-	-	-	-	eng	NON

Average duration processed: 0:10:00

## I-Frame Variant Overview

Video ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Scaled Avg	Mult.	Resolution	IDR Int.	IDR Std D
	11	41	0.0%	40	0.0%	638	16x	480 x 270	2.002	0.0
	12	65	-0.5%	64	0.0%	1021	16x	640 x 360	2.002	0.0
	13	81	-2.8%	80	0.0%	1282	16x	768 x 432	2.002	0.0
	14	98	-0.4%	97	0.0%	1551	16x	960 x 540	2.002	0.0
	15	133	-3.0%	129	0.0%	2059	16x	1280 x 720	2.002	0.0
	16	164	-0.9%	161	0.0%	2581	16x	1920 x 1080	2.002	0.0

Average duration processed: 0:10:00

**Checked against *HLS Authoring Specification for Apple TV***

## Should Fix Issues

1. Master playlists SHOULD be delivered using Transport Layer Security (TLS)

dec	Channels	Sample Rate	Elem.	Lang.	Encryption	ID	% Proc.
-LC	Stereo	48000	Y	eng	NONE	1	100%
-	-	-	-	eng	NONE	2	N/A

F	Scaled Avg	Mult.	Resolution	IDR Int.	IDR Std Dev.	Encryption	ID	% Proc.
5	638	16x	480 x 270	2.002	0.000	NONE	16	100%
5	1021	16x	640 x 360	2.002	0.000	NONE	15	100%
5	1282	16x	768 x 432	2.002	0.000	NONE	14	100%
5	1551	16x	960 x 540	2.002	0.000	NONE	13	100%
5	2059	16x	1280 x 720	2.002	0.000	NONE	12	100%
5	2581	16x	1920 x 1080	2.002	0.000	NONE	11	100%

*for Apple TV*

ort Layer Security (TLS)

dec	Channels	Sample Rate	Elem.	Lang.	Encryption	ID	% Proc.
-LC	Stereo	48000	Y	eng	NONE	1	100%
-	-	-	-	eng	NONE	2	N/A

With --id option

	Scaled Avg	Mult.	Resolution	IDR Int.	IDR Std Dev.	Encryption	ID	% Proc.
	638	16x	480 x 270	2.002	0.000	NONE	16	100%
	1021	16x	640 x 360	2.002	0.000	NONE	15	100%
	1282	16x	768 x 432	2.002	0.000	NONE	14	100%
	1551	16x	960 x 540	2.002	0.000	NONE	13	100%
	2059	16x	1280 x 720	2.002	0.000	NONE	12	100%
	2581	16x	1920 x 1080	2.002	0.000	NONE	11	100%

*for Apple TV*

ort Layer Security (TLS)

```
{
  "independentSegments" : true,
  "playlistKind" : "master",
  "gzipEncoded" : true,
  "dataID" : 0,
  "validatorVersion" : "1.2(160525)",
  "validatorTimestamp" : "2016-05-31T10:51:08-07:00",
  "url" : "http://example.com/example3.m3u8",
  "sslHosts" : { ... },
  "sslContentDeliveredSecurely" : false,
  "variants" : [ ... ],
  "hasClosedCaptionGroups" : true,
  "dataVersion" : 1
}
```

```
{
  "independentSegments" : true,
  "playlistKind" : "master",
  "gzipEncoded" : true,
  "dataID" : 0,
  "validatorVersion" : "1.2(160525)",
  "validatorTimestamp" : "2016-05-31T10:51:08-07:00",
  "url" : "http://example.com/example3.m3u8",
  "sslHosts" : { ... },
  "sslContentDeliveredSecurely" : false,
  "variants" : [ ... ],
  "hasClosedCaptionGroups" : true,
  "dataVersion" : 1
}
```

```
"variants" : [  
  { ... },  
  ...  
  {  
    "playlistType" : "VOD",  
    "processedSegmentsCount" : 300,  
    "url" : "http://example.com/v1/iframe_index.m3u8",  
    "hasDiscSequenceTag" : false,  
    "measuredMeanBitrate" : 39838,  
    "parsedSegmentsCount" : 300,  
    "iframeOnly" : true,  
    "sslContentDeliveredSecurely" : true,  
    ...  
    "discontinuities" : [ ... ],  
    "playlistTargetDuration" : 6,  
    "dataID" : 16  
  },  
  ...  
],
```

```
"variants" : [  
  { ... },  
  ...  
  {  
    "playlistType" : "VOD",  
    "processedSegmentsCount" : 300,  
    "url" : "http://example.com/v1/iframe_index.m3u8",  
    "hasDiscSequenceTag" : false,  
    "measuredMeanBitrate" : 39838,  
    "parsedSegmentsCount" : 300,  
    "iframeOnly" : true,  
    "sslContentDeliveredSecurely" : true,  
    ...  
    "discontinuities" : [ ... ],  
    "playlistTargetDuration" : 6,  
    "dataID" : 16  
  },  
  ...  
],
```



# Example 4

Let's add some alternate audio

# HLS Validation Report

Stream type: VOD

<http://example.com/example4.m3u8>

Note on tables: all bitrates are expressed in kb/s, IDs for default startup variants are highlighted in dark grey, entries value over the entire stream.

## Variant Overview

Audio ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Resolution	IDR Int.	Framerate	Profile	Level
aud1	1	551	0.2%	539	0.0%	480 x 270	2.002	29.970	High	2.1
↳	2	925	0.1%	913	0.0%	640 x 360	2.002	29.970	High	3.0
↳	3	1305	0.1%	1290	0.0%	768 x 432	2.002	29.970	High	3.0
↳	4	2267	0.0%	2215	0.0%	960 x 540	2.002	59.940	High	3.2
↳	5	3244	0.0%	3237	0.0%	1280 x 720	2.002	59.940	High	3.2
↳	6	4788	0.0%	4764	0.0%	1920 x 1080	2.002	59.940	High	4.2
↳	7	6320	0.0%	6302	0.0%	1920 x 1080	2.002	59.940	High	4.2
↳	8	7775	0.0%	7713	0.0%	1920 x 1080	2.002	59.940	High	4.2
aud2	9	774	0.0%	763	0.0%	480 x 270	2.002	29.970	High	2.1

↳	22	4820	0.0%	4796	0.0%	1920 x 1080	2.002	59.940	High	4.2
↳	23	6351	0.0%	6334	0.0%	1920 x 1080	2.002	59.940	High	4.2
↳	24	7807	0.0%	7745	0.0%	1920 x 1080	2.002	59.940	High	4.2

Average duration processed: 0:10:00

## Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	25	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NON
aud2	26	384	384	Audio	AC-3	5.1	48000	Y	eng	NON
aud3	27	192	192	Audio	EC-3	5.1	48000	Y	eng	NON
sub1	28	-	-	Subtitle	-	-	-	-	eng	NON

Average duration processed: 0:10:00

## I-Frame Variant Overview

Video ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Scaled Avg	Mult.	Resolution	IDR Int.	IDR Std D
	29	41	0.0%	40	0.0%	638	16x	480 x 270	2.002	0.0
	30	65	0.5%	64	0.0%	1024	16x	640 x 360	2.002	0.0

↳	22	4820	0.0%	4796	0.0%	1920 x 1080	2.002	59.940	High	4.2
↳	23	6351	0.0%	6334	0.0%	1920 x 1080	2.002	59.940	High	4.2
↳	24	7807	0.0%	7745	0.0%	1920 x 1080	2.002	59.940	High	4.2

Average duration processed: 0:10:00

## Rendition Overview

Group ID	#	Max Rate	Avg Rate	Type	Codec	Channels	Sample Rate	Elem.	Lang.	Encryption
aud1	25	161	160	Audio	AAC-LC	Stereo	48000	Y	eng	NON
aud2	26	384	384	Audio	AC-3	5.1	48000	Y	eng	NON
aud3	27	192	192	Audio	EC-3	5.1	48000	Y	eng	NON
sub1	28	-	-	Subtitle	-	-	-	-	eng	NON

Average duration processed: 0:10:00

## I-Frame Variant Overview

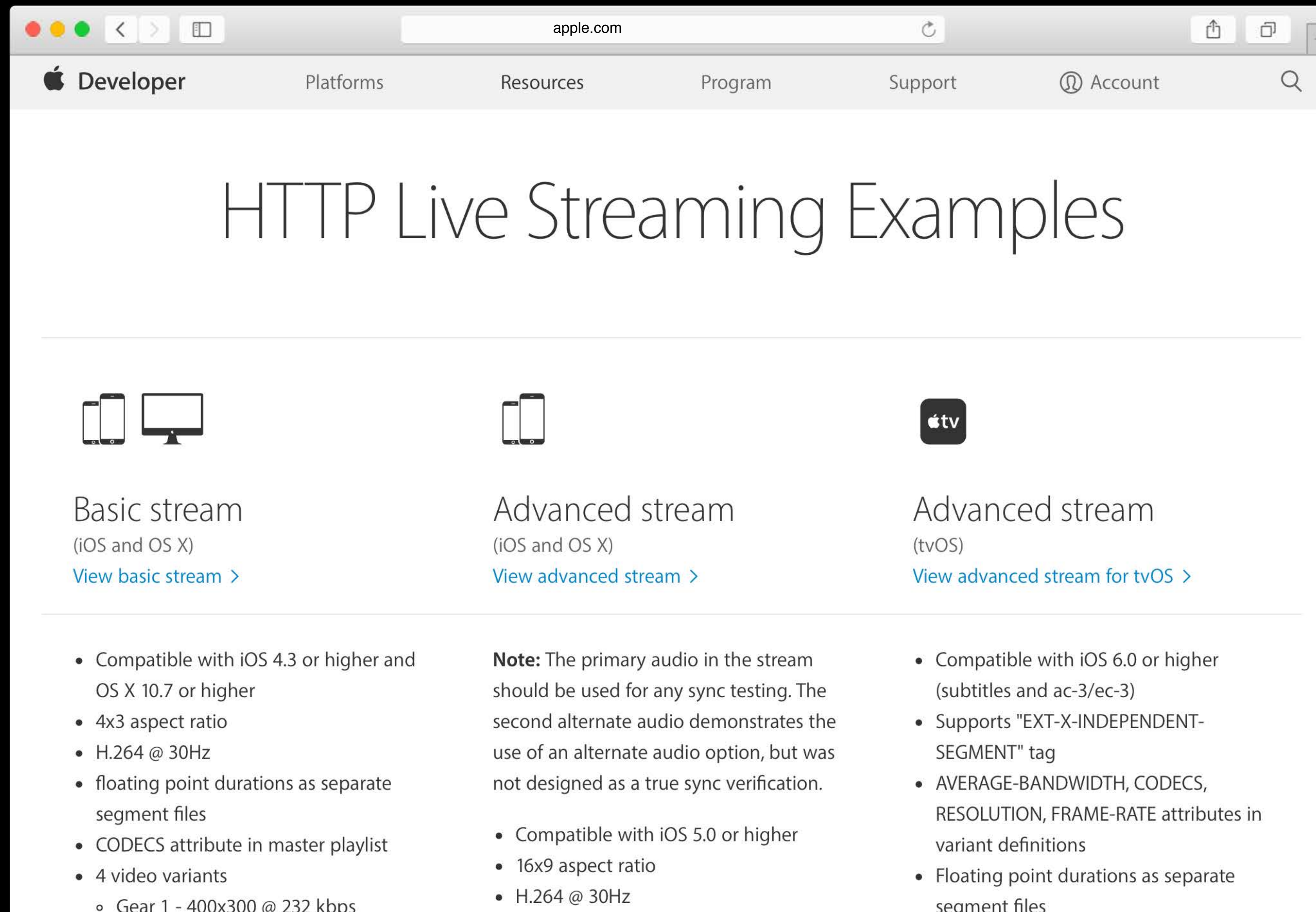
Video ID	#	Max Rate	% Diff.	Avg Rate	% Diff	Scaled Avg	Mult.	Resolution	IDR Int.	IDR Std D
	29	41	0.0%	40	0.0%	638	16x	480 x 270	2.002	0.0
	30	65	0.5%	64	0.0%	1024	16x	640 x 360	2.002	0.0

	↳	5	3244	0.0%	3237	0.0%	1280 x 720	2.002	59.940	High	3.2
	↳	6	4788	0.0%	4764	0.0%	1920 x 1080	2.002	59.940	High	4.2
	↳	7	6320	0.0%	6302	0.0%	1920 x 1080	2.002	59.940	High	4.2
	↳	8	7775	0.0%	7713	0.0%	1920 x 1080	2.002	59.940	High	4.2
aud2		9	774	0.0%	763	0.0%	480 x 270	2.002	29.970	High	2.1
	↳	10	1149	0.0%	1137	0.0%	640 x 360	2.002	29.970	High	3.0
	↳	11	1528	0.0%	1514	0.0%	768 x 432	2.002	29.970	High	3.0
	↳	12	2491	0.0%	2439	0.0%	960 x 540	2.002	59.940	High	3.2
	↳	13	3467	0.0%	3461	0.0%	1280 x 720	2.002	59.940	High	3.2
	↳	14	5012	0.0%	4988	0.0%	1920 x 1080	2.002	59.940	High	4.2
	↳	15	6543	0.0%	6526	0.0%	1920 x 1080	2.002	59.940	High	4.2
	↳	16	7999	0.0%	7937	0.0%	1920 x 1080	2.002	59.940	High	4.2
aud3		17	582	0.0%	571	0.0%	480 x 270	2.002	29.970	High	2.1
	↳	18	957	0.0%	945	0.0%	640 x 360	2.002	29.970	High	3.0
	↳	19	1336	0.0%	1322	0.0%	768 x 432	2.002	29.970	High	3.0
	↳	20	2299	0.0%	2247	0.0%	960 x 540	2.002	59.940	High	3.2
	↳	21	3275	0.0%	3269	0.0%	1280 x 720	2.002	59.940	High	3.2
	↳	22	4820	0.0%	4796	0.0%	1920 x 1080	2.002	59.940	High	4.2
	↳	23	6351	0.0%	6334	0.0%	1920 x 1080	2.002	59.940	High	4.2

	↳	5	3244	0.0%	3237	0.0%	1280 x 720	2.002	59.940	High	3.2
	↳	6	4788	0.0%	4764	0.0%	1920 x 1080	2.002	59.940	High	4.2
	↳	7	6320	0.0%	6302	0.0%	1920 x 1080	2.002	59.940	High	4.2
	↳	8	7775	0.0%	7713	0.0%	1920 x 1080	2.002	59.940	High	4.2
aud2		9	774	0.0%	763	0.0%	480 x 270	2.002	29.970	High	2.1
	↳	10	1149	0.0%	1137	0.0%	640 x 360	2.002	29.970	High	3.0
	↳	11	1528	0.0%	1514	0.0%	768 x 432	2.002	29.970	High	3.0
	↳	12	2491	0.0%	2439	0.0%	960 x 540	2.002	59.940	High	3.2
	↳	13	3467	0.0%	3461	0.0%	1280 x 720	2.002	59.940	High	3.2
	↳	14	5012	0.0%	4988	0.0%	1920 x 1080	2.002	59.940	High	4.2
	↳	15	6543	0.0%	6526	0.0%	1920 x 1080	2.002	59.940	High	4.2
	↳	16	7999	0.0%	7937	0.0%	1920 x 1080	2.002	59.940	High	4.2
aud3		17	582	0.0%	571	0.0%	480 x 270	2.002	29.970	High	2.1
	↳	18	957	0.0%	945	0.0%	640 x 360	2.002	29.970	High	3.0
	↳	19	1336	0.0%	1322	0.0%	768 x 432	2.002	29.970	High	3.0
	↳	20	2299	0.0%	2247	0.0%	960 x 540	2.002	59.940	High	3.2
	↳	21	3275	0.0%	3269	0.0%	1280 x 720	2.002	59.940	High	3.2
	↳	22	4820	0.0%	4796	0.0%	1920 x 1080	2.002	59.940	High	4.2
	↳	23	6351	0.0%	6334	0.0%	1920 x 1080	2.002	59.940	High	4.2

# Where to Find Examples

# developer.apple.com/streaming/examples/



The screenshot shows a web browser window with the URL "apple.com" in the address bar. The page title is "HTTP Live Streaming Examples". The navigation bar includes "Developer", "Platforms", "Resources", "Program", "Support", and "Account". The main content area features three columns of examples:

- Basic stream** (iOS and OS X): Includes a link to "View basic stream >".
- Advanced stream** (iOS and OS X): Includes a link to "View advanced stream >".
- Advanced stream** (tvOS): Includes a link to "View advanced stream for tvOS >".

Below the examples, there are three columns of technical details:

- Basic stream (iOS and OS X):**
  - Compatible with iOS 4.3 or higher and OS X 10.7 or higher
  - 4x3 aspect ratio
  - H.264 @ 30Hz
  - floating point durations as separate segment files
  - CODECS attribute in master playlist
  - 4 video variants
    - Gear 1 - 400x300 @ 232 kbps
- Advanced stream (iOS and OS X):**
  - Note:** The primary audio in the stream should be used for any sync testing. The second alternate audio demonstrates the use of an alternate audio option, but was not designed as a true sync verification.
  - Compatible with iOS 5.0 or higher
  - 16x9 aspect ratio
  - H.264 @ 30Hz
- Advanced stream (tvOS):**
  - Compatible with iOS 6.0 or higher (subtitles and ac-3/ec-3)
  - Supports "EXT-X-INDEPENDENT-SEGMENT" tag
  - AVERAGE-BANDWIDTH, CODECS, RESOLUTION, FRAME-RATE attributes in variant definitions
  - Floating point durations as separate segment files



# Example Streams

[https://devimages.apple.com.edgekey.net/streaming/examples/bipbop\\_4x3/bipbop\\_4x3\\_variant.m3u8](https://devimages.apple.com.edgekey.net/streaming/examples/bipbop_4x3/bipbop_4x3_variant.m3u8)

[https://devimages.apple.com.edgekey.net/streaming/examples/bipbop\\_16x9/bipbop\\_16x9\\_variant.m3u8](https://devimages.apple.com.edgekey.net/streaming/examples/bipbop_16x9/bipbop_16x9_variant.m3u8)

[https://tungsten.aaplimg.com/VOD/bipbop\\_adv\\_example\\_v2/master.m3u8](https://tungsten.aaplimg.com/VOD/bipbop_adv_example_v2/master.m3u8)

# Summary

Obey the HLS Authoring Specification

Validate your streams!

Include a test stream URL when you submit

More Information

<https://developer.apple.com/wwdc16/510>

# Related Sessions

---

What's New in HTTP Live Streaming

Mission

Wednesday 3:00PM

---

# Labs

---

HTTP Live Streaming Lab

Graphics, Games,  
and Media Lab C

Wednesday 4:00PM

---

AVFoundation / HTTP Live Streaming Lab

Graphics, Games,  
and Media Lab D

Thursday 9:00AM

---

WWDC 16 