

# HLS Authoring Update

Session 515

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# *HLS Authoring Specification for Apple Devices*

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<https://developer.apple.com/streaming/>

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Apple's advice for authoring HLS (HTTP Live Streaming)

# HEVC Support

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HEVC codec limits—no more than

- Main 10 Profile
- Level 5.0
- High Tier

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HEVC bit rate recommendations

- HEVC rates are still preliminary
- Remember bit rate tables are general guidelines



# Best Practices for Mixed H.264/HEVC Content

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Use transport streams for H.264 and fragmented MP4 for HEVC

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The player will switch between H.264 and HEVC

Use transport streams for H.264 and fragmented MP4 for HEVC

The same rules apply to I-frame-only variants

# New Subtitle Format

In addition to WebVTT

*TTML Profiles for Internet Media Subtitles and Captions 1.0 (IMSC1)*

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*TTML Profiles for Internet Media Subtitles and Captions 1.0 (IMSC1)*



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IMSC1 must be in fMP4

WebVTT is in text files

Subtitle formats are independent of video format

Using the CODECS attribute

- For IMSC1 content, use the value `"stpp.TTML.im1t"`
- For WebVTT content, don't include a value

# HLS Tools

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Tools for

- Segmenting and encrypting content
- Validating content
- Other tools



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- Other tools

You should use third-party tools to validate your video and audio encoding

# Tools Changes

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Ability to validate local files (not just HTTP)!

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These paths are all equivalent

```
mediastreamvalidator test/master.m3u8
```

```
mediastreamvalidator /Users/whomever/somepath/test/master.m3u8
```

```
mediastreamvalidator file:///Users/whomever/somepath/test/master.m3u8
```

# Tools Changes

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Support for HEVC

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Support for HEVC

General improvements

- More checks
- Better handling of errors
- Consistent ordering of variants and renditions

# New Options on Tools



# New Options on Tools

MediaStreamValidator

-description

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MediaStreamValidator

-description

HLSReport

--columns

*replaces* --id and --pl

# New Options on Tools

MediaStreamValidator

-description

HLSReport

--columns *replaces --id and --pl*

MediaFileSegmenter

-hdcpc-level

# Sample Report

## HLS Validation Report

Advanced Stream (fmp4)

Stream type: VOD

[https://tungsten.aaplimg.com/VOD/bipbop\\_adv\\_fmp4\\_example/master.m3u8](https://tungsten.aaplimg.com/VOD/bipbop_adv_fmp4_example/master.m3u8)

## Variant Overview

| Audio ID | #    | Max Rate | % Diff. | Avg Rate | % Diff | Resolution  | IDR Int. | Framerate | Codec | Profile | Level | Encryption | % Proc. |
|----------|------|----------|---------|----------|--------|-------------|----------|-----------|-------|---------|-------|------------|---------|
| aud1     | 1    | 541      | 0.0%    | 531      | 0.0%   | 480 x 270   | 2.000    | 30.000    | AVC   | High    | 2.1   | -          | 100%    |
|          | ↳ 2  | 902      | 0.0%    | 896      | 0.0%   | 640 x 360   | 2.000    | 30.000    | AVC   | High    | 3.0   | -          | 100%    |
|          | ↳ 3  | 1269     | 0.0%    | 1265     | 0.0%   | 768 x 432   | 2.000    | 30.000    | AVC   | High    | 3.0   | -          | 100%    |
|          | ↳ 4  | 2177     | 0.0%    | 2168     | 0.0%   | 960 x 540   | 2.000    | 60.000    | AVC   | High    | 3.2   | -          | 100%    |
|          | ↳ 5  | 3217     | 0.0%    | 3169     | 0.0%   | 1280 x 720  | 2.000    | 60.000    | AVC   | High    | 3.2   | -          | 100%    |
|          | ↳ 6  | 4944     | 0.0%    | 4671     | 0.0%   | 1920 x 1080 | 2.000    | 60.000    | AVC   | High    | 4.2   | -          | 100%    |
|          | ↳ 7  | 6313     | 0.0%    | 6170     | 0.0%   | 1920 x 1080 | 2.000    | 60.000    | AVC   | High    | 4.2   | -          | 100%    |
|          | ↳ 8  | 8001     | 0.0%    | 7968     | 0.0%   | 1920 x 1080 | 2.000    | 60.000    | AVC   | High    | 4.2   | -          | 100%    |
| aud2     | 9    | 764      | 0.0%    | 753      | 0.0%   | 480 x 270   | 2.000    | 30.000    | AVC   | High    | 2.1   | -          | 100%    |
|          | ↳ 10 | 1125     | 0.0%    | 1118     | 0.0%   | 640 x 360   | 2.000    | 30.000    | AVC   | High    | 3.0   | -          | 100%    |
|          | ↳ 11 | 1492     | 0.0%    | 1488     | 0.0%   | 768 x 432   | 2.000    | 30.000    | AVC   | High    | 3.0   | -          | 100%    |
|          | ↳ 12 | 2400     | 0.0%    | 2391     | 0.0%   | 960 x 540   | 2.000    | 60.000    | AVC   | High    | 3.2   | -          | 100%    |

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| ↳        | 10 | 1125     | 0.0%    | 1118     | 0.0%   | 640 x 360   | 2.000    | 30.000    | AVC   | High    | 3.0   | -          | 100%    |
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# Sample Report

|   |    |      |      |      |      |             |       |        |     |      |     |   |      |
|---|----|------|------|------|------|-------------|-------|--------|-----|------|-----|---|------|
| ↳ | 22 | 4974 | 0.0% | 4701 | 0.0% | 1920 x 1080 | 2.000 | 60.000 | AVC | High | 4.2 | - | 100% |
| ↳ | 23 | 6343 | 0.0% | 6200 | 0.0% | 1920 x 1080 | 2.000 | 60.000 | AVC | High | 4.2 | - | 100% |
| ↳ | 24 | 8032 | 0.0% | 7999 | 0.0% | 1920 x 1080 | 2.000 | 60.000 | AVC | High | 4.2 | - | 100% |

Average duration processed: 0:10:00

## Rendition Overview

| Group ID | #  | Max Rate | Avg Rate | Type     | Name    | InstreamID | Audio  | Channels | Sample Rate | Lang. | Encryption | % Proc. |
|----------|----|----------|----------|----------|---------|------------|--------|----------|-------------|-------|------------|---------|
| aud1     | 25 | 162      | 162      | Audio    | English | -          | AAC-LC | Stereo   | 48000       | en    | -          | 100%    |
| aud2     | 26 | 384      | 384      | Audio    | English | -          | AC-3   | 5.1      | 48000       | en    | -          | 100%    |
| aud3     | 27 | 192      | 192      | Audio    | English | -          | EC-3   | 5.1      | 48000       | en    | -          | 100%    |
| cc1      | 28 | -        | -        | CC       | English | CC1        | -      | -        | -           | en    | -          | N/A     |
| sub1     | 29 | -        | -        | Subtitle | English | -          | -      | -        | -           | en    | -          | N/A     |

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 Dev. | Codec | Profile | Level | Encryption |
|----------|----|----------|---------|----------|--------|------------|-------|------------|----------|--------------|-------|---------|-------|------------|
|          | 30 | 40       | 0.0%    | 40       | 0.0%   | 635        | 16x   | 480 x 270  | 2.000    | 0.000        | AVC   | High    | 2.1   | -          |
|          | 31 | 65       | 0.0%    | 64       | 0.0%   | 1016       | 16x   | 640 x 360  | 2.000    | 0.000        | AVC   | High    | 3.0   | -          |

# Sample Report

|   |    |      |      |      |      |             |       |        |     |      |     |   |      |
|---|----|------|------|------|------|-------------|-------|--------|-----|------|-----|---|------|
| ↳ | 22 | 4974 | 0.0% | 4701 | 0.0% | 1920 x 1080 | 2.000 | 60.000 | AVC | High | 4.2 | - | 100% |
| ↳ | 23 | 6343 | 0.0% | 6200 | 0.0% | 1920 x 1080 | 2.000 | 60.000 | AVC | High | 4.2 | - | 100% |
| ↳ | 24 | 8032 | 0.0% | 7999 | 0.0% | 1920 x 1080 | 2.000 | 60.000 | AVC | High | 4.2 | - | 100% |

Average duration processed: 0:10:00

## Rendition Overview

| Group ID | #  | Max Rate | Avg Rate | Type     | Name    | InstreamID | Audio  | Channels | Sample Rate | Lang. | Encryption | % Proc. |
|----------|----|----------|----------|----------|---------|------------|--------|----------|-------------|-------|------------|---------|
| aud1     | 25 | 162      | 162      | Audio    | English | -          | AAC-LC | Stereo   | 48000       | en    | -          | 100%    |
| aud2     | 26 | 384      | 384      | Audio    | English | -          | AC-3   | 5.1      | 48000       | en    | -          | 100%    |
| aud3     | 27 | 192      | 192      | Audio    | English | -          | EC-3   | 5.1      | 48000       | en    | -          | 100%    |
| cc1      | 28 | -        | -        | CC       | English | CC1        | -      | -        | -           | en    | -          | N/A     |
| sub1     | 29 | -        | -        | Subtitle | English | -          | -      | -        | -           | en    | -          | N/A     |

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 Dev. | Codec | Profile | Level | Encryption |
|----------|----|----------|---------|----------|--------|------------|-------|------------|----------|--------------|-------|---------|-------|------------|
|          | 30 | 40       | 0.0%    | 40       | 0.0%   | 635        | 16x   | 480 x 270  | 2.000    | 0.000        | AVC   | High    | 2.1   | -          |
|          | 31 | 65       | 0.0%    | 64       | 0.0%   | 1016       | 16x   | 640 x 360  | 2.000    | 0.000        | AVC   | High    | 3.0   | -          |



# Summary

Everything is at <https://developer.apple.com/streaming/>

- Sample streams (including a new HEVC sample)
- A link to the tools download
- Links to past videos
- Information about FairPlay Streaming
- Plus all the documents

# More Information

<https://developer.apple.com/wwdc17/515>

# Related Sessions

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[Advances in HTTP Live Streaming](#)

Grand Ballroom B

Tuesday 5:10PM

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[Error Handling Best Practices for HTTP Live Streaming](#)

Video

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