



Dolby Digital Plus online delivery content creation

System Testing Help

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Confidential information

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Contents

1	Information for interactive test procedures.....	4
1.1	Using this test procedure.....	4
1.2	Test materials.....	4
1.3	Accessing the test materials.....	6
1.4	Standards and Dolby documents.....	7
1.5	Channel abbreviations.....	8
1.6	Contacting Dolby	9
2	Test overview.....	10
2.1	Testing a content creation product.....	10
2.2	Product features and testing.....	10
2.2.1	Online delivery formats.....	10
2.2.2	Input stream formats.....	11
2.2.3	Video encoding formats.....	11
2.2.4	Maximum audio channel configuration.....	11
2.2.5	Multiple video and audio tracks.....	12
2.2.6	Associated audio programs.....	12
2.2.7	Dolby Atmos.....	12
2.3	Test signals.....	12
2.3.1	Test vectors.....	12
3	The interactive test procedure.....	14
3.1	Testing with the interactive procedure.....	14
4	Testing tools.....	16
4.1	MP4Validator.....	16
4.1.1	Command-line options.....	16
4.1.2	Examples of verification process.....	18
4.1.3	Error messages reported by MP4Validator.....	20
4.2	HLSValidator.....	22
4.2.1	Command-line options.....	23
4.2.2	Examples of verification process.....	24
4.2.3	Error messages reported by HLSValidator.....	26
4.3	MP4drop.....	29
4.3.1	Command-line options.....	29
4.3.2	Test bitstream parameters.....	30
4.3.3	Example of verifying Dolby Digital Plus specific boxes.....	31
4.4	MPEG-DASH MPD validator.....	32
4.4.1	Verifying an MPEG-DASH MPD file conformance.....	32
	Glossary.....	34

1 Information for interactive test procedures

This documentation provides complementary information for the interactive test procedures used to verify that a product can properly multiplex Dolby Digital Plus into online delivery formats, including MPEG-DASH and HTTP Live Streaming.

- [Using this test procedure](#)
- [Test materials](#)
- [Accessing the test materials](#)
- [Standards and Dolby documents](#)
- [Channel abbreviations](#)
- [Contacting Dolby](#)

1.1 Using this test procedure

To perform tests on a content creation product, follow the detailed instructions generated from the Dolby System Interactive Test Procedure in conjunction with using this documentation.

This documentation and the Dolby System Interactive Test Procedure are major parts of the Dolby Digital Plus Online Delivery Kit, which contains all materials (such as test signals, testing tools, web-based interactive test instructions, and so on) necessary for evaluating a content creation product.

The Dolby Digital Plus Online Delivery Kit is available from the Dolby Interoperability Support Center (DISC) at <https://disc.dolbycustomer.com>. DISC is an online service that enables you to access various Dolby online delivery kits and stream A/V test signals containing Dolby audio technology to playback products. It is designed to help you deploy Dolby audio technologies end to end across your over-the-top (OTT) workflows.

To perform content creation tests, you must access the Dolby Digital Plus Online Delivery Kit on DISC to download test signals and to generate test instructions applicable for your product by using the Dolby System Interactive Test Procedure.

Alternatively, you can download the entire kit to your local disk from the Dolby Deliverables on Demand server.

1.2 Test materials

The system test materials included in the kit are listed in this section.

The system test materials include:

- *Dolby Digital Plus for Online Delivery Playback System Development Manual.*
- *Dolby Digital Plus for Online Delivery Playback System Testing Help.*
- *Dolby Digital Plus for Online Delivery Content Creation System Development Manual.*
- *Dolby Digital Plus for Online Delivery Content Creation System Testing Help.*
- A browser-based interactive test procedure: This script selects the appropriate test instructions for your product and exports the test results data. Two versions are supplied in the kit, one for content creation products and the other for playback products.
- Test signals for Dolby Digital Plus Online Delivery Kit. For each online delivery format, files for conducting tests and for reference are provided by test case:

- Manifest files or playlist files
- Multiplexed files of multiple encodings
- Test applications: A set of GUI-based applications with Dolby Digital Plus bitstream playback capability that are designed for these platforms:
 - Samsung 2013 Smart TV platform and later
 - LG 2013 Smart TV platform and later
 - Smart TV Alliance platform
 - HbbTV v1.5 and v2.0 platforms
 - Xbox 360
 - HTML5-supported web browsers
 - Android TV
 - Roku 4
 - Apple TV with tvOS 10
 - Google Chromecast
- Testing tools: A set of command-line based tools for validating the conformance of multiplexed streams to certain specifications.

The organization of the test materials in the kit is listed here:

- <parent directory>
 - Documentation
 - Playback
 - SDM
 - Interactive_test_procedure_help
 - Interactive_test_procedure
 - Content creation
 - SDM
 - Interactive_test_procedure_help
 - Interactive_test_procedure
 - Documentation.html
 - Interactive_test_procedure.html
- Bootstrap
- Test_Signals
 - elementary_streams
 - muxed_streams
 - DASH
 - HLS
 - MP4
 - MPEG2TS
 - Test_Signals.html

- Test_Apps
 - Samsung_app
 - LG_app
 - SmartAlliance_app
 - HbbTV_app
 - HbbTV2_app
 - HTML5_app
 - AndroidTV_app
 - Xbox360_app
 - Roku
 - AppleTV
 - Chromecast_app
 - Test_Apps.html
- Test_Tools
 - hlsvalidator.zip
 - mpvaidator.zip
 - mp4drop.zip
 - Test_Tools.html
- Start_Here.html
- ReleaseNotes.txt



Note: If the product to be tested contains other Dolby technologies, be sure that those technologies are also fully tested. For details on requirements and testing for other Dolby technologies, refer to the documentation specific to such technologies.

1.3 Accessing the test materials

All materials dedicated for online delivery system test can be found on DISC website at <https://disc.dolbycustomer.com>.

About this task

The test materials package is also available for download from the Dolby Deliverables on Demand server. You can choose either way to access the test materials.

Procedure

1. Log in to the DISC website at <https://disc.dolbycustomer.com>.
 - For new customers to request access to the DISC website, select **REQUEST ACCESS** in the login page and complete the registration.
 - Registration request will be processed within two working days. You will receive an email notification allowing you access directly to the DISC website.

After successfully logging into the DISC website, you can browse all Dolby online delivery development kits, download test files for local testing, or stream test signals from the DISC website to your playback product directly.

2. Navigate to **Online delivery kit** > to download the test signals and testing tools.

1.4 Standards and Dolby documents

Standards and Dolby documents provide additional information to assist you in designing your product.

Standards

- ETSI TS 102 366 v1.4.1 (2017), *Digital Audio Compression (AC-3, Enhanced AC-3) Standard*, Annex E (normative), available from <http://www.etsi.org>. This document describes the Dolby Digital Plus (E-AC-3) bitstream syntax.
- ISO/IEC 14496-12:2012, *Information Technology—Coding of Audio-Visual Objects, Part 12: ISO Base Media File Format*, available from <http://www.iso.org>. This documentation is Part 12 of the MPEG-4 specification and describes storage of content in a media file.
- ISO/IEC 14496-14:2003, *Information Technology—Coding of Audio-Visual Objects, Part 14: MP4 File Format*, available from <http://www.iso.org>. This documentation is Part 14 of the MPEG-4 specification. It is based on Part 12 and describes the MPEG-4 container file format.
- *Portable Encoding of Audio-Video Objects: The Protected Interoperable File Format (PIFF)*, available from <http://go.microsoft.com>.
- *IIS Smooth Streaming Live Server Manifest Format*, available from <http://msdn.microsoft.com>.
- *IIS Smooth Streaming Client Manifest Format*, available from <http://msdn.microsoft.com>.
- ISO/IEC 23009-1:2014, *Information Technology—Dynamic Adaptive Streaming over HTTP (DASH)—Part 1: Media Presentation Description and Segment Formats*, available from <http://www.iso.org>.
- ETSI TS 102 796 v1.4.1, *Hybrid Broadcast Broadband TV*, available from <http://www.etsi.org>.
- *HTTP Live Streaming—draft-pantos-http-live-streaming-23*, available from <https://datatracker.ietf.org>. (Search for "pantos".)
- ISO/IEC 13818-1:2013, *Information Technology—Generic Coding of Moving Pictures and Associated Audio Information: Systems*, available from <http://www.iso.org>.
- *Digital Entertainment Content Ecosystem (DECE), Common File Format (CFF) and Media Formats Specification v1.0.7*.
- ETSI TS 102 822-3-1 v1.4.1 (2007-11), *Broadcast and Online Services: Search, Select, and Rightful Use of Content on Personal Storage Systems ("TV-Anytime"), Part 3: Metadata—Subpart 1: Metadata Schemas*, available from <http://www.etsi.org>.
- RFC 6381, *The 'Codecs' and 'Profiles' Parameters for "Bucket" Media Types*, August 2011, available from <http://tools.ietf.org/html>.
- ISO 639-2:1998, *Codes for the Representation of Names of Languages, Part 2: Alpha-3 Code*, as maintained by the ISO 639/Joint Advisory Committee, available from <http://www.iso.org>.
- ISO/IEC 8859-1:1998, *Information Technology—8-Bit Single-Byte Coded Graphic Character Sets, Part 1: Latin Alphabet no. 1*, available from <http://www.iso.org>.

1.5 Channel abbreviations

This table lists the channel notations used in this document.

Table 1:

Abbreviation	Channel
L	Left
R	Right
C	Center
Lc	Left Center
Rc	Right Center
LFE	Low-Frequency Effects
Lfh	Left Front Height
Rfh	Right Front Height
S	Mono Surround
Cs	Center Surround
Ls	Left Surround
Rs	Right Surround
Lscr	Left Screen
Rscr	Right Screen
Lsd	Left Surround Direct
Rsd	Right Surround Direct
Lb	Left Back
Rb	Right Back
Cb	Center Back
Lb *	Left Back
Rb	Right Back
Lvh	Left Vertical Height
Cvh	Center Vertical Height
Rvh	Right Vertical Height
Lrs	Left Rear Surround
Rrs	Right Rear Surround
Lrs	Left Rear Surround
Rrs	Right Rear Surround
Lw	Left Wide
Rw	Right Wide
Tbl	Top Back Left
Tbr	Top Back Right
Tfl	Top Front Left
Tfr	Top Front Right
TI	Top Left

Table 1: (continued)

Abbreviation	Channel
Tr	Top Right
Ts	Top Surround
Ltm	Left Top Middle
Rtm	Right Top Middle
Lts	Left Top Surround
Rts	Right Top Surround
SW	Subwoofer speaker output

* Lb and Rb correspond to the Lrs and Rrs channels as defined by SMPTE.

1.6 Contacting Dolby

Support services are available to address any questions and to provide advice about integrating Dolby technology into your product.

For product design or testing, contact prolicensing support@dolby.com. By utilizing Dolby expertise, especially during the design process, many problems that might require design revisions before a product is approved can be prevented.

Dolby is also available to review product plans, including preliminary design information, markings, displays, and control and menu layouts, with the goal of preventing problems early in the product development cycle.

If you have comments or feedback about this information set, send us an email at documentation@dolby.com.

2 Test overview

General information relevant to the content creation system test is provided to assist you in managing the tests within the interactive test framework.

- [Testing a content creation product](#)
- [Product features and testing](#)
- [Test signals](#)

2.1 Testing a content creation product

This topic provides an overview of how to test a content creation product by using the Dolby Digital Plus Online Delivery Kit.

About this task

Refer to the relevant section for detailed instructions.

Procedure

1. Access the Dolby Digital Plus Online Delivery Kit on DISC.
2. Download all test streams supplied in the Dolby Digital Plus Online Delivery Kit to your local disk.
3. Complete the Dolby System Interactive Test Procedure questionnaire on DISC.
This generates a test-case list with detailed test instruction for each test case.
4. Generate test signals for each test case by using the product under test.
5. Analyze the resulting test signals using the specified method and tools provided in the Dolby System Interactive Test Procedure.
6. Submit the test results to Dolby for approval.

2.2 Product features and testing

Many feature-set variations are possible in a product that includes Dolby Digital Plus technology. Test the features that your product supports.

The Dolby System Interactive Test Procedure uses the form of a questionnaire to request information about which features are supported by a product, and then uses this information to provide test instructions for all applicable test cases. Unless otherwise stated in the individual test instructions, running each test case for each supported feature is generally recommended.

Factors influencing product features are described in this section.

2.2.1 Online delivery formats

A product may support encoding and multiplexing of media content into one or more online delivery formats and profiles.

Online delivery formats include:

- MPEG Dynamic Adaptive Streaming over HTTP format (DASH)

- MPEG-DASH Live profile
- MPEG-DASH On Demand profile
- Hybrid Broadcast Broadband TV (HbbTV)
- Apple HTTP Live Streaming format

2.2.2 Input stream formats

Input media content can be supplied in one or more formats for encoding, multiplexing, or transcoding.

Input stream formats include:

- Elementary stream
- MPEG-2 transport stream
- MP4 files

2.2.3 Video encoding formats

A product may support one or more video encoding formats and profiles.

The table lists all video profiles included in the Dolby Digital Plus Online Delivery Kit.

Table 2: Video encoding formats and profiles

Encoding	Video profiles	Resolutions	Bit rate	Frame rates
H.264	Main profile at level 3.1	640 × 360p	1.5 Mbps	25 and 29.97 fps
	Main profile at level 4.0	1280 × 720p	3 Mbps	25 and 29.97 fps
	Main profile at level 4.1	1920 × 1080	5 Mbps	25 and 29.97 fps
H.265	Main 10 profile at level 4.0	1280 × 720p	1.5 Mbps	25 and 29.97 fps
	Main 10 profile at level 4.1	1920 × 1080	3 Mbps	25 and 29.97 fps
	Main 10 profile at level 5.1	3840 × 2106	10 Mbps	25 and 29.97 fps

It is possible to create a Licensed Product that does not support all of these video coding formats. For example, an HbbTV product targeted specifically at the European market could support 25 fps only.

Unless otherwise stated in the individual test instructions, run each test case for each supported video encoding format.

2.2.4 Maximum audio channel configuration

A product with a Dolby Digital Plus encoder may support audio channel configurations up to a certain maximum output channel configuration.

The maximum output channel configuration can be up to:

- Two channels
- 5.1 channels
- 7.1 channels

2.2.5 Multiple video and audio tracks

A product may support multiplexing of multiple audio and video tracks of different encodings into one online stream in order to provide advanced service.

A multiplexed online stream may contain one or more of these items:

- Multiple video tracks encoded at different bit rates
- Multiple audio tracks encoded at different bit rates
- Multiple audio tracks containing different languages
- Multiple audio tracks encoded with different codecs (for example, AAC)

2.2.6 Associated audio programs

A product may support multiplexing of main and associated audio programs into one online stream.

Associated audio can be used for many purposes. The most common use of associated audio is to provide additional content (for example, to provide the audio description [AD] service as a receiver mix).

2.2.7 Dolby Atmos

A product may support multiplexing Dolby Digital Plus with Dolby Atmos content into online delivery formats.

Some Dolby Digital Plus test streams contain Dolby Atmos content in them. These test streams can be used to verify that a content creation product can properly multiplex Dolby Atmos streams into online delivery formats, and as a result, the multiplexed streams are able to correctly signal the presence of Dolby Atmos content.

2.3 Test signals

Generally, test signals are created by multiplexing one or more audio elementary streams and one or more H.264 (or H.265) video elementary streams.

Streams in various formats are supplied in the Dolby Digital Plus Online Delivery Kit. They are meant to be used as input streams to be multiplexed or transcoded into online delivery formats. Multiplexing combinations for a specific test case are detailed in the test instructions generated by the *Dolby Digital Plus Online Delivery System Interactive Test Procedure*.

2.3.1 Test vectors

A test vector is a set of test signals that are involved in running a test case.

For the MPEG-DASH test cases, a test vector is composed of the test files as listed in the table.

MPEG-DASH profiles	Files in a test vector
MPEG-DASH Live	One Media Presentation Description (MPD) manifest file (.mpd file) A sequence of .mp4 files for each video stream A sequence of .mp4 files for each audio stream
MPEG-DASH On Demand	One MPD manifest file (.mpd file) One .mp4 file for each video stream One .mp4 file for each audio stream

For the MPEG-DASH HbbTV test cases, a test vector is composed of these test files:

- An MPD manifest file (.mpd file)
- For each audio stream:
 - A common initialization segment file (.mp4)
 - A sequence of media segment files (.mp4)
- For each video stream:
 - A common initialization segment file (.mp4)
 - A sequence of media segment files (.mp4)

For the HTTP Live Streaming test cases, a test vector is composed of these test files:

- Playlist files (.m3u8 files)
- A sequence of media segment files (.ts files)
- A sequence of ID3 format files (.ec3 or .aac files)

Each manifest (or playlist) file uses relative paths to the media files. The relative file locations between the media files and the manifest file must be kept while a test vector being copied or moved. This enables the manifest file to locate the media files for playback after you move the test vectors from one directory to another directory, including to a server location, to simulate a server/client media streaming process.

3 The interactive test procedure

This development kit includes a browser-based interactive test procedure to assist you through the testing process for the Implementation.



3.1 Testing with the interactive procedure

Follow these instructions to generate and complete the interactive test procedure.

Prerequisites

- Before you start, make sure you are familiar with product variations.
- You must obtain a DISC account.
- The interactive test procedure does not support Internet Explorer. We recommend using recent versions of Mozilla Firefox.
- JavaScript support must be enabled in your browser.

Procedure

1. Log in to the DISC website at <https://disc.dolbycustomer.com>.
2. Navigate to the **Online delivery kit > > Interactive Test Procedure > Interactive Test Procedure for Content Creation**.
If this is the first time you run the interactive test procedure, an empty product configuration questionnaire appears. If you have run the procedure before, you may need to clear the settings by clicking **Settings** , and then **New session**.
3. Fill in the product configuration questionnaire.
To obtain the list of relevant test cases for your system, you must answer some questions regarding system capabilities. The questionnaire may have multiple pages. In a completed questionnaire, every required question must have a  sign.
As you fill in the questionnaire, certain questions and answers automatically become inactive, because they are incompatible with the feature you are selecting.
If you wish to send a question or comment to the Dolby team, you can use the **Add a comment** function.
4. Click **Next** when you have completed each page, then click **Done** when you have completed the entire questionnaire.
A test-case list is generated and appears in a new page with the required and recommended tests for your system. You must complete all required tests listed for your system capabilities.
5. Optional: Sort, filter, and save the test-case list for better orientation and for future reference:
 - You can show or hide columns using the check boxes on the side panel (for example, **Approach** or **Standard**). By default, the list shows **Test case**, **Purpose**, **Online Delivery Format**, **Video Profile**, **Requirement**, and **Status**.
 - You can sort the list by clicking the column headers.

- You can apply filtering criteria on a relevant column in the list using the filtering check boxes on the side panel.
- You can save or load a session under **Settings > Session management**. The settings you filled in for your system are saved in a .json log file.

6. For each test case:

- a) Click the test case in the list, and read the test-case description and procedure.
- b) Generate test signals by multiplexing the streams listed in the **Test Signal** section by using the content creation product under test.
- c) Follow the step-by-step instructions on the page to complete the tests.
- d) Compare the test results with the expected results shown on the page, and select **Pass** or **Fail**.
- e) To go to the next test case in the list, click **Next**.
If you want to see the entire list again and check the tests' status, click **Up one level** or **Tests Overview**.

A **Test suite progress** of 100 percent indicates that you have completed all of the required tests.

7. Save the printable versions of the questionnaire and test cases under **Settings > Print versions**.

Click **All** to generate an .html file that contains the completed questionnaire and the test-case list together with test results.

4 Testing tools

Testing tools for verifying a content creation product are supplied in the Dolby Digital Plus Online Delivery Kit. Use these tools as specified in the Dolby System Interactive Test Procedure.


- [MP4Validator](#)
- [HLSValidator](#)
- [MP4drop](#)
- [MPEG-DASH MPD validator](#)

4.1 MP4Validator

The MP4Validator tool checks container and manifest files to verify that a content creation product can properly multiplex Dolby Digital Plus bitstreams (with or without Dolby Atmos content) into online delivery format, such as MPEG-DASH.


MP4Validator checks Dolby Digital Plus related information only and ignores all other information:

- For MPEG-DASH, MP4Validator validates the conformance of fragmented MP4 files and MPD files to Dolby Digital Plus and MPEG-DASH.
- For local MP4 files, MP4Validator validates the conformance of MP4 files to ISO/IEC 14496-12:2012, *Information technology—Coding of audio-visual objects, part 12: ISO base media file format*.

 **Note:** MP4Validator does not verify the general constraints defined in ISO/IEC 23009-1, *Information technology—Dynamic Adaptive Streaming over HTTP (DASH)—part 1: Media Presentation Description and segment formats*.

MP4Validator supports these features:

- Verification of MPEG-DASH streams with Live, On Demand, or HbbTV profile, hosted on a local disk or remote HTTP server
- Verification of MP4 files hosted on a local disk

 **Note:** Python version 2.7 must be installed to support downloading of test streams from remote servers. (If Python v2.7 is not installed, the streaming will not proceed.)

This tool is supplied in Microsoft Windows 32-bit/64-bit binary form, Linux 32-bit/64-bit binary form, and Mac OS X binary form.

4.1.1 Command-line options

Command-line options are entered after the command (`mp4validator`) to specify various startup options for MP4Validator. Some options are mandatory. Options are separated by spaces.

--input

This mandatory option and argument identify the source test file (including location). You can use the absolute or relative path to the test file.

The syntax is:

- For test signals on local disk:

```
mp4validator --input <filename>
```


Here, <filename> is the MPEG-DASH MPD file (for example, mpd_file_name_for_dash.mpd) or the MP4 file (for example, mp4_file_name.mp4).

- For test signals on remote servers, specify the complete path with the server URL:

```
mp4validator --input <URL>
```

Here, <URL> is the complete path to the MPD file for MPEG-DASH test files (for example, http[s]://...mpd_file_name_for_dash.mpd).

--output-folder

This option is not required. It specifies a temporary workspace for resulting test files. During the verification process, MP4Validator reserves manifest files, dumps segment files, and outputs elementary streams. All these files will be placed in the temporary workspace. It supports absolute and relative path.

The syntax is:

- For test signals on local disk:


```
mp4validator --input <filename> --output-folder <path>
```

Here, <filename> is the MPEG-DASH MPD file (for example, mpd_file_name_for_dash.mpd), and <path> is the path name to a folder on your local disk for gathering of output files.

- For test signals on remote servers, specify the complete path with server URL:

```
mp4validator --input <URL> --output-folder <path>
```

Here, <URL> is the complete path to the MPD file for MPEG-DASH test files (for example, http[s]://...mpd_file_name_for_dash.mpd), and <path> is the path to a folder on your local disk for gathering of output files.

 **Note:** If the --output option is not specified, the temporary workspace is the current directory by default.

--verbose

This option is not required. It is used to display more detailed debug information.

The syntax is:

```
mp4validator --input <filename or URL> --verbose
```

--help

This option is not required. It is used to display help information in the command-line window.

The syntax is:

```
mp4validator --help
```

--version

This option is not required. It is used to display the version information of the tool in the command-line window.

The syntax is:

```
mp4validator --version
```

4.1.2 Examples of verification process

Examples are provided to demonstrate the conformance verification process for Dolby Digital Plus in MP4 and MPEG-DASH format.

Verifying MPEG-DASH test streams on a local disk

This example describes how to verify that Dolby Digital Plus bitstreams are correctly multiplexed into the MPEG-DASH format. The multiplexed MPEG-DASH streams for testing are stored on a local disk.

Procedure

1. Locate the test streams, and then copy them to the same directory that contains MP4Validator.

Input test signals	Description
<ul style="list-style-type: none"> ChID_voices_51_256_ddp.mpd ChID_voices_51_256_ddp_A.mp4 ChID_voices_51_256_ddp_V.mp4 	MPEG-DASH On Demand streams multiplexed from one pair of video and audio streams

2. Run this command:

```
mp4validator --input ChID_voices_51_256_ddp.mpd --output-folder tmp >logfile.txt
```

3. The verification process generates the files listed in the table.

Output files	Descriptions
tmp\AS0_5177248.h264	H.264 file output from MP4Validator, named using the convention AS<AdaptionSetIndex_bitrate>.h264
tmp\AS1_256000.ec3	Dolby Digital Plus file output from MP4Validator, named using the convention AS<AdaptionSetIndex_bitrate>.ec3
tmp\0_1_index.m4s tmp\1_2_index.m4s tmp\0_1_segment_XX.m4s tmp\1_2_segment_XX.m4s	Temporary segmented MP4 files that simulate the behavior of an HTTP server, named AdaptionSetIndex_RepresentationIndex_segment_SegmentIndex.m4s
logfile.txt	Log file

4. Verify the logfile to ensure that no errors are reported by the tool.

Verifying MPEG-DASH test streams on a remote HTTP server

This example describes how to verify that Dolby Digital Plus bitstreams are correctly multiplexed into the MPEG-DASH format. The multiplexed MPEG-DASH streams for testing are stored on a remote HTTP server.

Procedure

1. Record the URL where the .mpd file in the table is located.

Input test signals	Description
<ul style="list-style-type: none"> ChID_voices_51_256_ddp.mpd ChID_voices_51_256_ddp_A.mp4 ChID_voices_51_256_ddp_V.mp4 	MPEG-DASH On Demand streams multiplexed from one pair of video and audio streams

2. Run this command:

```
mp4validator --input http://192.168.0.1/Dolby_Digital_Plus_Content_Creation_Kit_v1.1/
Test_Signals/muxed_streams/DASH/OnDemand/HPL40_25fps/channel_id/51/
ChID_voices_51_256_ddp.mpd --output-folder tmp >logfile.txt
```

3. The verification process generates the files listed in the table.

Output files	Descriptions
tmp\AS0_5177248.h264	H.264 file output from MP4Validator, named using the convention AS<AdaptionSetIndex_bitrate>.h264
tmp\AS1_256000.ec3	Dolby Digital Plus file output from MP4Validator, named using the convention AS<AdaptionSetIndex_bitrate>.ec3
tmp\0_1_index.m4s tmp\1_2_index.m4s tmp\0_1_segment_XX.m4s tmp\1_2_segment_XX.m4s	Temporary segmented MP4 files that are downloaded from the HTTP server, named AdaptionSetIndex_RepresentationIndex_segment_SegmentIndex.m4s
tmp\local.mpd	Associated MPEG-DASH MPD file
tmp\tmp.py	Temporary Python script used by MP4Validator to automatically download the segmented MP4 files from the HTTP server
logfile.txt	Log file

4. Verify the logfile to ensure that no errors are reported by the tool.

Verifying MP4 test streams on a local disk

This example describes how to verify that Dolby Digital Plus bitstreams are correctly multiplexed into the MP4 format. The multiplexed MP4 files for testing are stored on a local disk.

Procedure

1. Locate the test stream, and then copy them to the same directory that contains MP4Validator.

Input test signals	Description
ChID_voices_51_256_ddp.mp4	MP4 files multiplexed from one pair of video and audio streams

2. Run this command:

```
mp4validator --input ChID_voices_51_256_ddp.mp4 --output-folder tmp > logfile.txt
```

3. The verification process generates the files listed in the table.

Output files	Descriptions
tmp\out_2.h264	H.264 file output from MP4Validator, named using the convention out<_TrackNumber>.h264
tmp\out_1.ec3	Dolby Digital Plus file output from MP4Validator, named out<_TrackNumber>.ec3
logfile.txt	Log file

4. Verify the logfile to ensure that no errors are reported by the tool.

4.1.3 Error messages reported by MP4Validator

MP4Validator reports error messages that indicate possible errors during the multiplexing process.

An error message consists of a message that describes the error and a class that identifies the portion of the test file that generated the error. Error messages can be logged in the logfile.txt file.

This table lists the error classes that can be reported by MP4Validator.

Error class	Description
EC3SampleEntry	EC3SampleEntry contains invalid values. EC3SampleEntry is the designated box for identification of Dolby Digital Plus in ISO base media file format files.
Dolby Digital Plus bitstream	The Dolby Digital Plus bitstream is invalid.
EC3SampleEntry box vs Dolby Digital Plus bitstream	The EC3SampleEntry box contains values that do not match the content of the Dolby Digital Plus bitstream.
Dolby Atmos	Errors related to Dolby Atmos content.

This table lists the error message that can be reported by MP4Validator.

Error messages	Error class	Description
ERROR: The ChannelCount value in the EC3SampleEntry box is not set to 2.	EC3SampleEntry	The value must be set to 2 as defined in ETSI TS 102 366v1.3.1. The value of ChannelCount is not used to indicate the actual number of channels.
ERROR: The SampleSize value in the EC3SampleEntry box is not set to 16.	EC3SampleEntry	The value of SampleSize in the EC3SampleEntry box must be set to 16 as defined in ETSI TS 102 366 v1.3.1.
ERROR: The SampleRate value in the EC3SampleEntry box is not set to 48000.	EC3SampleEntry	The value of SampleRate in the EC3SampleEntry box must be set to 48,000. Dolby Digital Plus supports only a sample rate of 48,000 Hz when multiplexed into MP4 or MPEG-DASH format.
ERROR: Wrong Codec type.	EC3SampleEntry	EC3SpecificBox is set incorrectly within MPEG-DASH or MP4 files. The value of FourCC of EC3SpecificBox must be set to dec3 for Dolby Digital Plus bitstreams.
ERROR: The size of EC3SpecificBox is invalid.	EC3SampleEntry	The EC3SpecificBox has an invalid size. For detailed information, refer to the Dolby Digital Plus and MPEG-DASH specification.


Error messages	Error class	Description
ERROR: Mismatch in data-rate value between the Dolby Digital Plus elementary stream and the MP4 sample description.	EC3SampleEntry box vs Dolby Digital Plus bitstream	The bit rate calculated from the Dolby Digital Plus audio track must match the bit-rate value in the EC3SpecificBox.
ERROR: Mismatch in the number of independent substreams between the Dolby Digital Plus elementary stream and the MP4 sample description.	EC3SampleEntry box vs Dolby Digital Plus bitstream	The number of independent substreams in the Dolby Digital Plus audio track must match the value of num_ind_sub in the EC3SpecificBox.
ERROR: Mismatch in the number of dependent substream between the Dolby Digital Plus elementary stream and the MP4 sample description.	EC3SampleEntry box vs Dolby Digital Plus stream	The number of dependent substreams in the Dolby Digital Plus audio track must match the value of num_dep_sub in the EC3SpecificBox.
ERROR: Mismatch in bsid value between the Dolby Digital Plus elementary stream and the MP4 sample description.	EC3SampleEntry box vs Dolby Digital Plus bitstream	The bsid value in the Dolby Digital Plus bitstream must match the bsid value in the EC3SpecificBox.
ERROR: Mismatch in bsmod value between the Dolby Digital Plus elementary stream and the MP4 sample description.	EC3SampleEntry box vs Dolby Digital Plus bitstream	The bsmod value in the Dolby Digital Plus bitstream must match the bsmod value in the EC3SpecificBox.
ERROR: Mismatch in fscod value between the Dolby Digital Plus elementary stream and the MP4 sample description.	EC3SampleEntry box vs Dolby Digital Plus bitstream	The fscod value in the Dolby Digital Plus bitstream must match the fscod value in the EC3SpecificBox.
ERROR: Mismatch in acmod value between the Dolby Digital Plus elementary stream and the MP4 sample description.	EC3SampleEntry box vs Dolby Digital Plus bitstream	The acmod value in the Dolby Digital Plus bitstream must match the acmod value in the EC3SpecificBox.
ERROR: Mismatch in lfeon value between the Dolby Digital Plus elementary stream and the MP4 sample description.	EC3SampleEntry box vs Dolby Digital Plus bitstream	The lfeon value in the Dolby Digital Plus bitstream must match the lfeon value in the EC3SpecificBox.
ERROR: Mismatch in chan_loc value between the Dolby Digital Plus elementary stream and the MP4 sample description.	EC3SampleEntry box vs Dolby Digital Plus bitstream	The chan_loc value in the Dolby Digital Plus bitstream must match the chan_loc value in the EC3SpecificBox.

Error messages	Error class	Description
ERROR: The MP4 sample description identifies Dolby Atmos content, but the num_of_dep_frm and num_of_pgms are not correctly set in the Dolby Digital Plus elementary stream.	Dolby Atmos	The num_of_dep_frm and num_of_pgms fields are not correctly set for a Dolby Digital Plus bitstream that contains Dolby Atmos content.
ERROR: The MP4 sample description identifies Dolby Atmos content, but bse_addbsil value is invalid.	Dolby Atmos	The bse_addbsil field must be set to 1 in a Dolby Digital Plus bitstream with Dolby Atmos content.
ERROR: Mismatch in flag_ec3_extension_type_a setting between the Dolby Digital Plus elementary stream and the MP4 sample description.	Dolby Atmos	The value of flag_ec3_extension_type_a in the EC3SpecificBox does not match its equivalent in the Dolby Digital Plus elementary stream.
ERROR: Mismatch in complexity_index_type_a setting between the Dolby Digital Plus elementary stream and the MP4 sample description.	Dolby Atmos	The value of complexity_index_type_a in the EC3SpecificBox does not match its equivalent in the Dolby Digital Plus elementary stream.
ERROR: Mismatch in Dolby Atmos-specific flag settings between the Dolby Digital Plus elementary stream and the MP4 sample description.	Dolby Atmos	The EC3SpecificBox signals Dolby Atmos content, but the Dolby Digital Plus bitstream does not contain Dolby Atmos content.
ERROR: Cannot parse the Dolby Digital Plus elementary stream.	Dolby Digital Plus streams	The Dolby Digital Plus elementary stream is not structured in compliance with ETSI TS 102 366 v1.3.1.

4.2 HLSValidator

The HLSValidator tool verifies that a content creation product can properly generate media segment files and playlist files that conform to the requirements for Dolby Digital Plus and HTTP Live Streaming. (See the *Dolby Digital Plus for online delivery content creation system development manual*.)

HLSValidator checks Dolby Digital Plus related information only and ignores all other information.

 **Note:** HLSValidator does not verify the general constraints defined in *HTTP Live Streaming—draft-pantos-http-live-streaming-20*.

HLSValidator supports these features:

- Verification of HTTP Live Streaming streams by using media segment files or playlist files hosted on a local disk
- Demultiplexing audio and video elementary streams from HTTP Live Streaming streams hosted on a local disk

- Outputting text log that includes additional information for debugging and verification


This tool is supplied in Microsoft Windows 32-bit/64-bit binary form, Linux 32-bit/64-bit binary form, and Mac OS X binary form.

4.2.1 Command-line options

Command-line options are entered after the command (`hlsvalidator`) to specify various start-up options for `HLSValidator`. Some options are mandatory. Options are separated by spaces.

-i

The `-i` option is mandatory. It identifies the source test file (including location) that can be either the playlist file or a range of segment indices. You can use the absolute or relative path to the test file.

 **Note:** The `-i` and `-o` options must be used in conjunction. An error message appears in case either one of these options is absent in a command line.

- For verification of an HTTP Live Streaming stream on local disk by using the playlist file, use this syntax:

```
hlsvalidator -i <playlist_file> -o <path>
```

Here, `<playlist_file>` is the HTTP Live Streaming master playlist file (for example, `playlist_filename_for_hls.m3u8`; `<path>` is the path name to a folder on your local disk for gathering of output files).

- For verification of an HTTP Live Streaming stream by using the media segment files on local disk, use this syntax:

```
hlsvalidator -i <segment_index> -o <path>
```

Here, `<segment_index>` is a general representation of all of the segment file names. Usually, a sequence of `.ts` segment files would be generated during the multiplexing process, with each `.ts` segment including a sequential number as part of the segment file name. In the command, the sequential number part must be written in the form of `%0[n]d`, where `n` represents the number of digits comprising the sequential number. An exceptional case is when a sequential number consist of only one digit, where `%d` must be used in the command.

For example, if your product generates segments with a file name of `seg_xxx`, where `xxx` is the sequential number part consisting of three digits, you must use `seg_%03d` to replace `<segment_index>` in the command. For another example, if your segment file name is `movie_x`, where `x` is 1-digit sequential number, then you must use `movie_%d`, not `movie_%01d`.

-o

The `-o` option is mandatory. It specifies a temporary workspace for resulting test files. During the verification process, `HLSValidator` reserves manifest files, dumps segment files, and outputs elementary streams. All of these files will be placed in the temporary workspace. You can use the absolute or relative path to the test file.

The syntax is:

```
hlsvalidator -i <input file> -o <path>
```

-s

This option is not required. It enables HLSValidator to start the verification process from a specified segment file.

The syntax is:

```
hlsvalidator -i <segment_index> -o <path> -s <index>
```

Here, <index> is the index value of a specific segment file. For example, you have a sequence of segments from movie_00 to movie_50. If you want to check segments since movie_10, and output the resulting files to a folder named tmp, enter this command:

```
hlsvalidator -i movie_%02d -o tmp -s 10
```

-v

This option is not required. It is used to display the version information of the tool in the command-line window.

The syntax is:

```
hlsvalidator -v
```

-h

This option is not required. It is used to display help information in the command-line window.

The syntax is:

```
hlsvalidator -h
```

4.2.2 Examples of verification process

Examples are provided to demonstrate the conformance verification process for Dolby Digital Plus in HTTP Live Streaming format.

To start the verification process, either the playlist file or media segment files of an HTTP Live Streaming stream can be chosen as the verification entry point.

Launching the verification with the playlist file

This example describes how to start the verifying process by using the playlist file of an HTTP Live Streaming test stream, to verify that Dolby Digital Plus bitstreams are correctly multiplexed into the HTTP Live Streaming format.

About this task

The multiplexed HTTP Live Streaming test stream for testing is stored on a local disk.

Procedure

1. Locate the test streams, and then copy them to the same directory that contains HLSValidator.

Input test signals	Description
<ul style="list-style-type: none"> ChID_voices_1280x720p_25fps_h264_multi_lang.m3u8 ChID_voices_eng_6ch_256kbps_ddp_sub.m3u8 ChID_voices_fra_6ch_256kbps_ddp_sub.m3u8 Living-Room_1280x720p_25fps_h264_sub.m3u8 	HTTP Live Streaming stream multiplexed from one video track and two audio tracks, with one audio track labeled as the English track and the other as the French track.
<ul style="list-style-type: none"> Living-Room_1280x720p_25fps_h264_sub_xxxx.ts 	The sequence of .ts files are MPEG-2 transport stream segments.
<ul style="list-style-type: none"> ChID_voices_eng_6ch_256kbps_ddp_sub_xxxx.ec3 ChID_voices_fra_6ch_256kbps_ddp_sub_xxx.ec3 	The two sequences of .ec3 files are audio-only elementary stream segments, with one for the English track and one for the French track.

2. Run this command:

```
hlsvalidator -i ChID_voices_1280x720p_25fps_h264_multi_lang.m3u8 -o tmp >logfile.txt
```

3. The verification process generates the files listed in the table.

Output files	Descriptions
tmp\Living-Room-51_720p_25fps_h264_sub.h264	H.264 file output from HLSValidator, demultiplexed from Living-Room_1280x720p_25fps_h264_sub_xxxx.ts
tmp\ChID_voices_eng_6ch_256kbps_ddp_sub.ec3	Dolby Digital Plus file output from HLSValidator, demultiplexed from ChID_voices_eng_6ch_256kbps_ddp_sub_xxxx.ec3
tmp\ChID_voices_fra_6ch_256kbps_ddp_sub.ec3	Dolby Digital Plus file output from HLSValidator, demultiplexed from ChID_voices_fra_6ch_256kbps_ddp_sub_xxx.ec3
logfile.txt	Log file

4. Verify the logfile.txt to ensure that no errors are reported by the tool.

Launching the verification with a specified segment file

This example describes how to start the verifying process by using a specified media segment file of an HTTP Live Streaming test stream, to verify that Dolby Digital Plus bitstreams are correctly multiplexed into the HTTP Live Streaming format.

About this task

The multiplexed HTTP Live Streaming test stream for testing is stored on a local disk.

Procedure

1. Locate the test streams, and then copy them to the same directory that contains HLSValidator.

Input test signals	Description
<ul style="list-style-type: none"> ChID_voices_1280x720p_25fps_h264_multi_lang.m3u8 ChID_voices_eng_6ch_256kbps_ddp_sub.m3u8 ChID_voices_fra_6ch_256kbps_ddp_sub.m3u8 Living-Room_1280x720p_25fps_h264_sub.m3u8 	HTTP Live Streaming stream multiplexed from one video track and two audio tracks, with one audio track labeled as the English track and the other as the French track.
<ul style="list-style-type: none"> Living-Room_1280x720p_25fps_h264_sub_xxxx.ts 	The sequence of .ts files are MPEG-2 transport stream segments.
<ul style="list-style-type: none"> ChID_voices_eng_6ch_256kbps_ddp_sub_xxxx.ec3 ChID_voices_fra_6ch_256kbps_ddp_sub_xxxx.ec3 	The two sequences of .ec3 files are audio-only elementary stream segments, with one for the English track and one for the French track.

2. Run this command:

```
hlsvalidator.exe -i Living-Room_1280x720p_25fps_h264_sub_%04d.ts -s 1 -o tmp
>logfile.txt
```

This command indicates that the verification process starts with segment 0001 of the .ts sequence. To start with the segment 0000, remove the option `-s 1` from the command.

3. The verification process generates the files listed in the table.

Output files	Descriptions
tmp\Living-Room_1280x720p_25fps_h264_sub.ec3	Dolby Digital Plus file output from HLSValidator, demultiplexed from Living-Room_1280x720p_25fps_h264_sub_xxxx.ec3
logfile.txt	Log file

4. Verify the logfile to ensure that no errors are reported by the tool.

4.2.3 Error messages reported by HLSValidator

HLSValidator reports error messages that indicate possible errors during the multiplexing process.

An error message consists of a message that describes the error and a class that identifies the portion of the test file that generated the error. Error messages can be logged in the logfile.txt file.

This table lists the error classes that can be reported by HLSValidator.

Error class	Description
Usage errors	Incorrect use of tool
Run-time errors	Likely system resource error (error unrelated to either usage of the tool or to segment compliance)
Compliance errors	Noncompliance of transport stream under test with specifications as described in the document <i>Dolby Digital Plus for HTTP Live Streaming</i>

This table lists the error message that can be reported by HLSValidator.

Error message	Error class	Error description
ERROR: Invalid input file format.	Usage error	The input file format is not supported. The tool only supports .m3u8, .m3u, or .ts as the input file formats.
ERROR: Opening destination file failed.	Usage error	<p>The tool was unable to create the destination file. Possible reasons are:</p> <ul style="list-style-type: none"> • The destination file is already present and not writable. • The parent folder is not present or not writable. <p>Possible reasons for the file or directory not being writable are:</p> <ul style="list-style-type: none"> • The file has the wrong permissions set. • The file destination would be on a partition or network drive mounted as read only. <p>On Windows, the reason may also be that the destination file is already opened with another program and therefore locked by the operating system.</p>
ERROR: Opening segment file failed.	Usage error	The segment file was not found because it is not present at the specified location in the file system.
ERROR: Command line parsing error.	Usage error	Unknown command-line options, an incorrect combination of command-line options, or invalid parameters; for proper usage, refer to the examples provided in this document or to the usage help printed by the tool.
ERROR: You must specify -i and -o.	Usage error	Options -i and -o are mandatory.
ERROR: Found [...] Dolby Digital Plus access units with invalid sync word.	Compliance error	There were Dolby Digital Plus access units (beginning at the start of an audio PES packet) that did not start with a known sync word.
ERROR: Found [...] Dolby Digital Plus access units starting with the wrong endianness (LE) sync word.	Compliance error	One or more Dolby Digital Plus access units (beginning at the start of an audio PES packet) started with the little-endian byte-order sync word 0x77 0x0B, indicating a little-endian elementary transport stream. This endianness should not be used.
ERROR: Segment's smallest Dolby Digital Plus audio PTS must be >= segment's smallest video PTS (audio: [...]; video: [...]).	Compliance error	The first PTS of the audio track in the current segment is smaller than the first PTS of the video track in that segment. This is in violation of the specifications as described in the <i>Dolby Digital Plus for online delivery content creation system development manual</i> .

Error message	Error class	Error description
ERROR: Segment's smallest audio PTS differs more than 2,879 ticks from smallest video PTS (audio [...], video [...], difference is [...]).	Compliance error	In the analyzed segment, the first audio PTS differs by more than 2,879 ticks from the video PTS. This is in violation of the specifications as described in <i>Dolby Digital Plus and HTTP Live Streaming</i> .
ERROR: Wrong endianness sync word or unknown sync word at beginning of Dolby Digital Plus access units found.	Compliance error	One or more Dolby Digital Plus access units (beginning at the start of an audio PES packet) did not start with the expected sync word of 0x0B 0xFF. This message comprises a summary of errors for one sequence of segments. It is followed by statistics on the number of noncompliant sync words for all of the segments of that sequence.
ERROR: Lost sync, or did not find sync frame where expected. Garbage in stream? ERROR: Lost sync.	Compliance error	No transport stream sync bytes were found; this probably means that there is garbage data in the transport stream; therefore, the transport stream either has not been multiplexed properly or the file has been damaged.
ERROR: Unexpected end of file (EOF).	Compliance error	The transport stream ended unexpectedly. This can occur due to improper multiplexing, or truncation of the file while writing or copying to disc.
ERROR: Dolby Digital Plus stream must set stream_id = 0xbd in PES header.	Compliance error	For each PES packet that contains Dolby Digital Plus audio data, the stream_id field in the PES packet header must be configured as 0xbd.
ERROR: Dolby Digital Plus info tool returns error when parsing the payload data.	Compliance error	The Dolby Digital Plus parser tool can not complete the parser process, because there are errors in Dolby Digital Plus audio data.
ERROR: A PES package does not contain at least one Dolby Digital Plus access unit.	Compliance error	There is no access unit in one PES packet.
ERROR: Dolby Digital Plus descriptor is not identical to Dolby Digital Plus audio data information.	Compliance error	Fields in the .ec3 descriptor must be identical with information in Dolby Digital Plus audio data.

Error message	Error class	Error description
ERROR: File read error.	Run-time error	After successfully opening one of the transport stream segments, there was an error reading the data from that file. Potential causes are either loss of connectivity to the network drive containing the segments or the local drive becoming inaccessible. (For example, the drive has been physically disconnected or is experiencing file access errors due to physical disc failure.)
Memory allocation error.	Run-time error	There was an error allocating memory (RAM). This usually means that the computer is running too many memory consuming processes. Free some RAM by quitting processes not required for testing or for proper system operation.

4.3 MP4drop

The MP4drop tool outputs an ISO base media file format file (such as MP4 and MPEG-DASH files) to human-readable XML format.

In particular, it is capable of parsing Dolby Digital Plus specific boxes (ac-4, dac4) contained in the container file and outputting readable information in XML format. By examining the output XML file manually, you can verify that a content creation product can properly multiplex Dolby Digital Plus bitstreams into MP4 files or ISO base media file format based online delivery formats.

This tool is supplied in Microsoft Windows 32-bit/64-bit binary form, Linux 32-bit/64-bit binary form, and Mac OS X binary form.

4.3.1 Command-line options

Command-line options are entered after the command (**mp4drop**) to specify various startup options for MP4drop. Some options are mandatory. Options are separated by spaces.

-m

This option is mandatory. It is used to specify the syntax format in the output file.

The syntax is:

```
MP4drop <filename1> -m <0 or 1> > <filename2>.xml
```

where <filename1> is the file to be tested (for example, file_under_test.mp4); <filename2> is the name for the output XML file that contains the readable box information.

- Use 0 to output information in an XML- and C-combined syntax.
- Use 1 to output information in the XML-only syntax.

-h

This option is not required. It is used to display help information in the command-line window.

The syntax is:

```
mp4drop -h
```

-v

This option is not required. It is used to display the version information of the tool in the command-line window.

The syntax is:

```
mp4drop -v
```

4.3.2 Test bitstream parameters

Dolby Digital Plus bitstreams supplied in the Dolby Digital Plus Online Delivery Kit contain parameter values as shown in the table.

Signal	fscod	bsid	bsmod	acmod	lfeon	flag_ec3_extension_type_a_in_adbsi	complexity_index_type_a_in_adbsi	Channel configuration in MPD	Bit rate (bits per second)
Music_2ch_128k_ddp.ec3	0	0x0010	0	0x0002	0x0000	NA	NA	A000	128000
ChID_voices_2ch_128kbps_ddp.ec3	0	0x0010	0	0x0002	0x0000	NA	NA	A000	128000
ChID_voices_6ch_256kbps_ddp.ec3	0	0x0010	0	0x0007	0x0001	NA	NA	F801	256000
ChID_voices_8ch_768kbps_ddp.ec3	0	0x0010	0	0x0015	0x0001	NA	NA	FA01	768000
Living-Room-Atmos_6ch_640kbps_ddp_joc.ec3	0	0x0010	0	0x0007	0x0001	1	16	F801	640000
ChID_voices_fra_6ch_256kbps_ddp.ec3	0	0x0010	0	0x0007	0x0001	NA	NA	F801	256000
Silent_6ch_256kbps_ddp.ec3	0	0x0010	0	0x0007	0x0001	NA	NA	F801	256000
Silent-Atmos_6ch_384kbps_ddp_joc.ec3	0	0x0010	0	0x0007	0x0001	1	12	F801	384000
Silent-Atmos_6ch_640kbps_ddp_joc.ec3	0	0x0010	0	0x0007	0x0001	1	16	F801	640000
CM_ChID_voices_6ch_256kbps_ddp.ec3	0	0x0010	0	0x0007	0x0001	NA	NA	F801	256000
VI_ChID_voices_1ch_128kbps_ddp.ec3	0	0x0010	2	0x0001	0x0000	NA	NA	4000	128000
AVSync_2ch_128kbps_25fps_ddp.ec3	0	0x0010	0	0x0002	0x0000	NA	NA	A000	128000
AVSync_2ch_128kbps_29.97fps_ddp.ec3	0	0x0010	0	0x0002	0x0000	NA	NA	A000	128000

4.3.3 Example of verifying Dolby Digital Plus specific boxes

This example shows how to use MP4drop to dump human-readable box information from an MP4 file and then verify that the boxes specific to Dolby Digital Plus are set correctly for each of the Dolby Digital Plus tracks in the MP4 file.

About this task

This test verifies the contents of the /moov/trak[x]/mdia/minf/stbl/stsd/ac-4 box in a test stream, where [x] is the track ID of the Dolby Digital Plus track. For test cases that contain multiple Dolby Digital Plus tracks (multiple .mp4 files, correspondingly), you must run MP4drop on each file that contains Dolby Digital Plus data.

Procedure

1. Locate the test stream ChID_voices_20_32_ac4_A.mp4, and then copy it to the same directory that contains MP4drop.
2. Run this command:

```
mp4drop ChID_voices_20_32_ac4_A.mp4 -m 0 > test.xml
```



Note: For test cases containing multiple Dolby Digital Plus tracks, run MP4drop on each of them and examine the results.

The command generates this information in the test.xml file:

```
<ftyp size="36">
<moov size="551">
  <mvhd size="100">
  <trak size="379">
    <tkhd size="84">
    <mdia size="279">
      <mdhd size="24">
      <hdlr size="38">
      <minf size="193">
        <smhd size="8">
        <dinf size="28">
        <stbl size="133">
          <stsd size="57">
            unsigned int(8) version = 0;
            unsigned int(24) flags = 0;
            unsigned int(32) entry_count = 1;
            <ec-3 size="41">
              unsigned int(8) reserved = 0;
              unsigned int(8) reserved = 0;
              unsigned int(8) reserved = 0;
              unsigned int(8) reserved = 0;
              unsigned int(8) reserved = 0;
              unsigned int(8) reserved = 0;
              unsigned int(16) data_reference_index = 1;
              unsigned int(32) reserved = 0;
              unsigned int(32) reserved = 0;
              unsigned int(16) channelcount = 2;
              unsigned int(16) samplesize = 16;
              unsigned int(16) pre_defined = 0;
              unsigned int(16) reserved = 0;
```


```
unsigned int(32) samplerate = 48000 << 16;
<dec3 size="5">
    unsigned int(13) data_rate = 128;
    unsigned int(3) num_ind_sub = 0;
    unsigned int(2) fscod = 0;
    unsigned int(5) bsid = 16;
    unsigned int(5) bsmod = 0;
    unsigned int(3) acmod = 2;
    unsigned int(1) lfeon = 0;
    unsigned int(3) reserved = 0;
    unsigned int(4) num_dep_sub = 0;
    unsigned int(1) reserved = 0;
</dec3>
</ec-3>
```

3. Examine the generated XML file in an XML editor, and verify that the ac-4 and dac4 box information written to the XML file contains the values specified in the expected results.

4.4 MPEG-DASH MPD validator

MPEG-DASH MPD validator is a conformance tool recommended by DASH IF for verification of MPEG-DASH MPD file conformance to ISO/IEC 23009-1:2012.

This is an online tool, available from <http://www-itec.uni-klu.ac.at/dash> under the **Tools** menu.

 **Note:** This tool does not check Dolby Digital Plus related information. To verify Dolby Digital Plus specific content in a MPD file, use the MP4Validator tool supplied in the Dolby Digital Plus Online Delivery Kit.

4.4.1 Verifying an MPEG-DASH MPD file conformance

This section describes how to verify the conformance of an MPEG-DASH MPD file with the online MPD validator.

About this task

Procedure

1. Go the MPD validator page.
The tool page can be found at <http://www-itec.uni-klu.ac.at/dash> under the **Tools** menu.
2. Use the web-based tool to check the MPD file:
 - If the MPD passes the validation process, the tool returns **Your DASH-MPD is VALID**.
 - Otherwise, the tool returns **Your DASH-MPD is NOT VALID** with error messages.


 **Note:** When an AudioChannelConfiguration element is included in the Representation element to describe the channel layout of a Dolby Digital Plus track, this errors message appears due to the Dolby specific URI. Ignore this error message.

Figure 1: A known issue with an MPD file

Line:Col[59:113]:cvc-complex-type.2.4.a: Invalid content was found starting with element
'AudioChannelConfiguration'. One
'{"urn:mpeg:dash:schema:mpd:2011":Representation}' is expected.

MPD validation not successful – DASH is not valid!



3. Repeat the step for each MPD file.

Glossary

A/V

Audio/video.

AAC

Advanced Audio Coding. A perceptual audio coding system that is described by ISO/IEC 14496-3.

access unit

All of the frames required by a Dolby Digital Plus decoder to produce 1,536 samples of decoded audio for each channel present in the bitstream (including all substreams). The first frame of an access unit has a substream type of 0 and a substream ID value of 0. If the access unit consists of frames that contain one, two, or three blocks of audio, the first frame of the access unit has the convsync parameter set to 1.

AIT

Application Information Table. A part of the digital video broadcast specification that defines information that a broadcast receiver requires to be able to run applications available from the program manager. This can include class files, data files, and activation state, among others.

ARC

Audio Return Channel. A feature of HDMI that enables audio to be sent through the HDMI cable from the sink to the source.

AVC

Advanced Video Coding. See [H.264](#).

bed object

An object with positional metadata that does not change over time and is described by a predefined speaker position.

block

A portion of a frame.

BSI

Bitstream information. Information included in an encoded audio bitstream that describes the audio (metadata) or provides instructions to a decoder (or other device in the audio reproduction chain) on how to process the audio. Dolby Digital Plus and Dolby Digital BSI are detailed in ETSI TS 102 366 and ATSC A/52.

CFF

Common File Format. A file format that is part of the UltraViolet digital rights management system. This format is based on the ISO base file format, and ensures that a consistent set of codecs, media formats, subtitling, and other kinds of data are used across the whole UltraViolet ecosystem. The Common File Format uses the .uvu file extension.

CRC

Cyclic redundancy check.

DASH

Dynamic Adaptive Streaming over HTTP. An adaptive bit-rate streaming protocol that enables high-quality streaming of media content over the Internet delivered from HTTP.

DECE

Digital Entertainment Content Ecosystem.

DISC

Dolby Interoperability Support Center.

DRM

Digital rights management. A group of technologies that are used by hardware manufacturers, publishers, copyright holders, and individuals with the intent to control the use of digital content and devices after sale.

dynamic object

An object with positional metadata that may vary over time and is described by three coordinates (x, y, z).

elementary stream

A bitstream that is the output of an audio or video encoder and contains only one type of data, such as audio or video.

E-AC-3

Enhanced AC-3.

Dolby Digital Plus, also known as Enhanced AC-3 or E-AC-3, is a digital audio compression coding system for transport and storage of multichannel digital audio specified in Annex E of ATSC A/52 and Annex E of ETSI TS 102 366.

The file extension for a Dolby Digital Plus file is .ec3.

frame

In audio, a series of PCM samples or encoded audio data representing the same time interval for all channels in the configuration. Metadata pertaining to the frame can be carried within the frame or separately, depending on context.

frame set

Six consecutive blocks of Dolby Digital Plus audio data from a single substream. A frame set always represents 1,536 samples of audio data from a single substream.

GUID

Globally unique identifier. A unique reference number used as an identifier in software.

HLS

HTTP Live Streaming. An adaptive streaming protocol for delivery of media content developed by Apple.

ISO

International Organization for Standardization.

master playlist

A playlist where all of the URI lines in the playlist point to media playlists. A playlist that contains URIs that point to alternative content for a presentation, such as alternative language versions of the content.

media assets

A collection of files that contains a multimedia presentation formatted for adaptive streaming. Generally, a media asset consists of multiplexed and fragmented media and one or more files that describe how to play back the media (for example, playlist or manifest files).

media presentation

A collection of files that contains media content prepared for adaptive streaming. The presentation includes media files that contain the content and files that describe how to access and play the content.

MP4 sample

A single ISO base media file track sample, as defined in section 3.1.10 of *ISO/IEC 14496-12*.

MPD

Media Presentation Description. A manifest used in MPEG Dynamic Adaptive Streaming over HTTP (MPEG-DASH) to describe the available streaming content, its various alternatives, URL addresses, and other characteristics, as well as segments that contain the actual multimedia bitstreams in the form of chunks, in single or multiple files.

MPEG

Moving Picture Experts Group. An ISO/IEC working group that develops video and audio encoding standards. Also the name of a family of digital video and audio coding standards.

MPEG-4

An MPEG standard (ISO/IEC 14496) for a group of audio and video coding formats and related technologies.

object

An audio signal plus associated object audio metadata.

PAT

Program Association Table. Program Association Table of an MPEG-2 transport stream.

PCR

Program clock reference. A periodically transmitted value of 42 bits that provides a sample of the system time clock in the encoder and which is used to properly demultiplex packets and to ensure that audio and video are synchronized.

PES

Packetized elementary stream. An elementary stream that is split into small chunks (packets) for transmitting and combining multiple streams within a transport stream. Each PES is identified by a unique packet identifier (PID).

PID

Packet identifier. A unique code that identifies a packetized elementary stream (PES) within a transport stream. The PID is contained in the transport stream packet header and is listed in the service information (SI) for a transport stream.

playlist

An extended .m3u8 file that contains one or more uniform resource identifiers (URIs). A URI can point to another playlist or to a media file.

PMT

Program Map Table. A table within an MPEG-2 transport stream that defines the set of elementary streams associated with a specific program.

presentation

References to AC-4 substreams to be decoded and presented simultaneously.

presentation configuration

Set of metadata to describe how a presentation must be decoded.

PTS

Presentation time stamp. The presentation time stamp is contained in the packetized elementary stream (PES) packet header that indicates when an access unit should be decoded and presented for output. The PTS is used in combination with other time stamp parameters to synchronize audio and video.

substream

A decodable unit that represents a specific channel configuration (mono, stereo, or 5.1) and contains audio data and corresponding metadata.

substream ID

A metadata field in a Dolby Digital Plus bitstream for numbering a substream. The substream ID, in combination with the substream type, identifies a substream within a Dolby Digital Plus stream, as defined in Annex E of ETSI TS 102 366.

substream type

A metadata field in a Dolby Digital Plus bitstream that describes a substream. There are different types of substreams that make up a Dolby Digital Plus bitstream. As defined in Annex E of ETSI TS 102 366, independent substreams (type 0) may be decoded independently of any other substreams that might exist in the bitstream. Dependent substreams (type 1) must be decoded in conjunction with the independent substream with which it is associated.

time slice

A collection of Dolby Digital Plus frames that represents the audio data from the same point in time across multiple substreams. A time slice may represent one, two, three, or six blocks of audio data, depending on the number of blocks used per frame.

transport stream

As defined in ISO/IEC 13818-1, a packetized bitstream that is used to transmit audio and video information. A transport stream is made up of multiplexed program elementary streams.

transport stream segment

A single .ts file that is part of an HTTP Live Streaming (HLS) transport stream.

URI

Uniform Resource Identifier. A group of characters identifying a resource on a network (typically, the Internet).

variant playlist

A playlist that contains Uniform Resource Identifiers (URIs) that point to alternative content for a presentation, such as alternative language versions of the content. A variant playlist lists URIs for each variant presentation so that a playback client can switch between playback of the streams dynamically based on parameters such as language, bit rate, and channel configuration.