Joint Content Conformance Project (JCCP) - OSMART#2, 2023

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Effort sponsored by ATSC, CTA WAVE, DASH-IF, DVB, HbbTV

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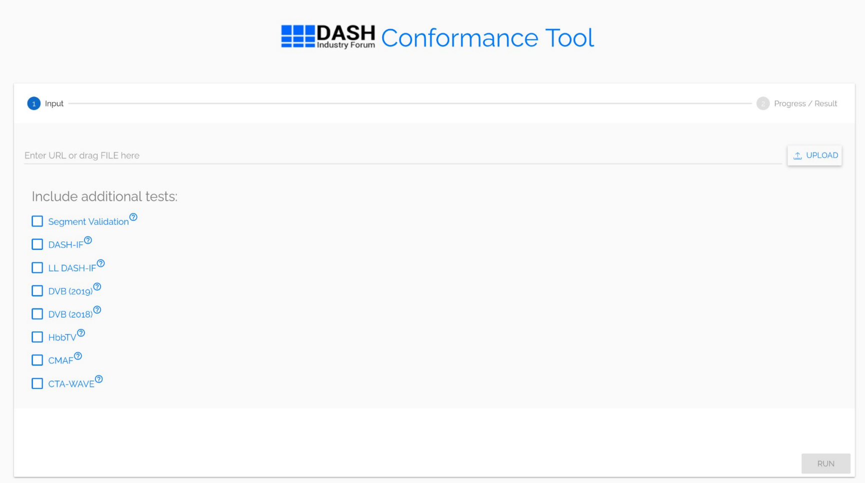
Introduction

The Conformance Validator

- **What**: Validate DASH content against different guidelines and profiles : DASH-IF, DVB, HbbTV, CMAF, CTA-WAVE
- **How**: MPD and segment validation of VoD and live streams
- **Why**: Conformance is the key for interoperability
- **Where**:
    - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance
    - https://conformance.dashif.org/



The Joint Content Conformance Project (JCCP)

- Software development program sponsored by **DASH-IF, DVB, CTA WAVE, HbbTV and ATSC** that aims at improving and refactoring the current code base of the conformance tool.
- **Why?**
  - Unstructured and hard to maintain code base
  - Bugs in the current implementation
  - Entry barrier to contribute new tests and features is very high
  - Incomplete documentation
  - Outdated technologies
  - Bad performance
- **Goals**
  - Establish CI/CD pipeline to ensure code quality and consistent deployment
  - Improve documentation for easy onboarding and usage
  - Modularize code for easier development and maintenance
  - Rationalize number of programming languages
  - Derive code coverage and identify missing test content, unused parts and bugs in the code

JCCP - The Team

Motionspell

- **Romain Bouqueau** *Point of contact & Developer*
- Area of expertise: Broadcast, Streaming, Open Source

- **Erik Zandvliet**
- *Senior Sw developer*
- *Area of expertise: Streaming, Software development*

Fraunhofer FOKUS

- **Daniel Silhavy** *Development coordinator*
- Area of expertise: Media Streaming & Player Development & Standardization

- **Alexander Futasz** *Sw developer*
- Area of expertise: Software development, web technologies

- **Louay Bassbouss** *Senior Project Manager*
- Area of expertise: Standardization: HbbTV, W3C, CTA, DASH, Media Streaming and Cross-Platform Playback)

- **Fritz Heiden** *Sw developer*
- Area of expertise: Software development, web technologies

Scope of the work

Documentation

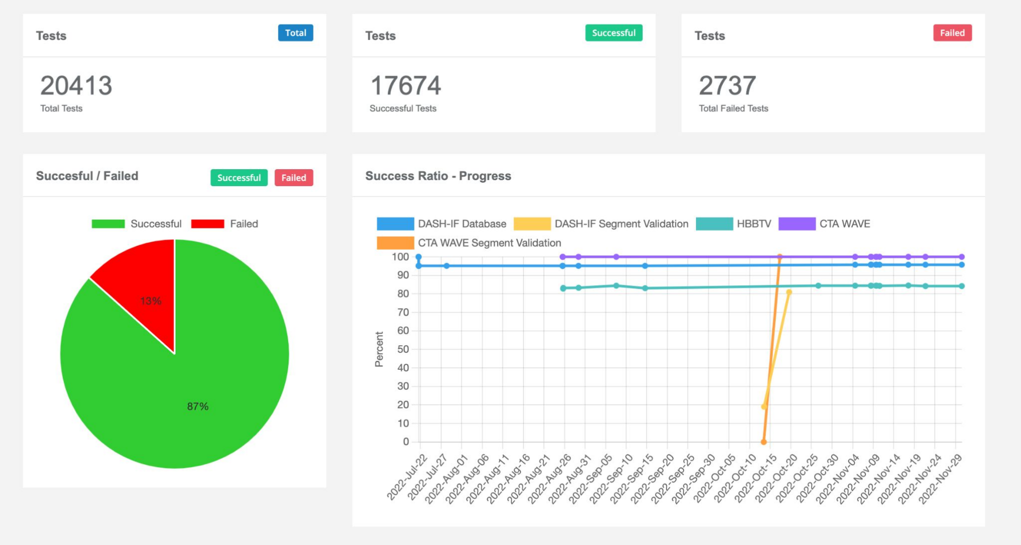
- Add **installation and setup guide** including troubleshooting section
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/wiki/Installation--guide
- Establish **development principles** including Git branching strategy, pull request handling and documentation on Github actions
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/wiki/Development-principles
- Add documentation how to use the **command line interface**
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/wiki/Command-Line-Interface
- Add documentation how to **release** a new version of the tools
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/wiki/Release-Procedure
- Collect a list of relevant **specifications**
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/wiki/Specifications
- Collect a list of relevant **testvector** URLs
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/wiki/Test-vectors
- Document the usage of the **REST interface**
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/wiki/REST-Interface%5D

CI/CD

- Automated deployment on different subdomains after Git push to development or main branch
- Automated code linting checks for each pull request
- Automated generation of code documentation (Doxygen)
- Unit testing
- Functional testing

Management & Analytics Dashboard

- Derive test results and code coverage for a whole set of testvectors
- Integrated with the CI/CD pipeline
- Used to identify
  - bugs in the code
  - missing test content
- https://conformance.dashif.org/jccp-dashboard/dist/#



Tests Total

20413

Total Tests

Tests Successful

17674

Successful Tests

Tests Failed

2737

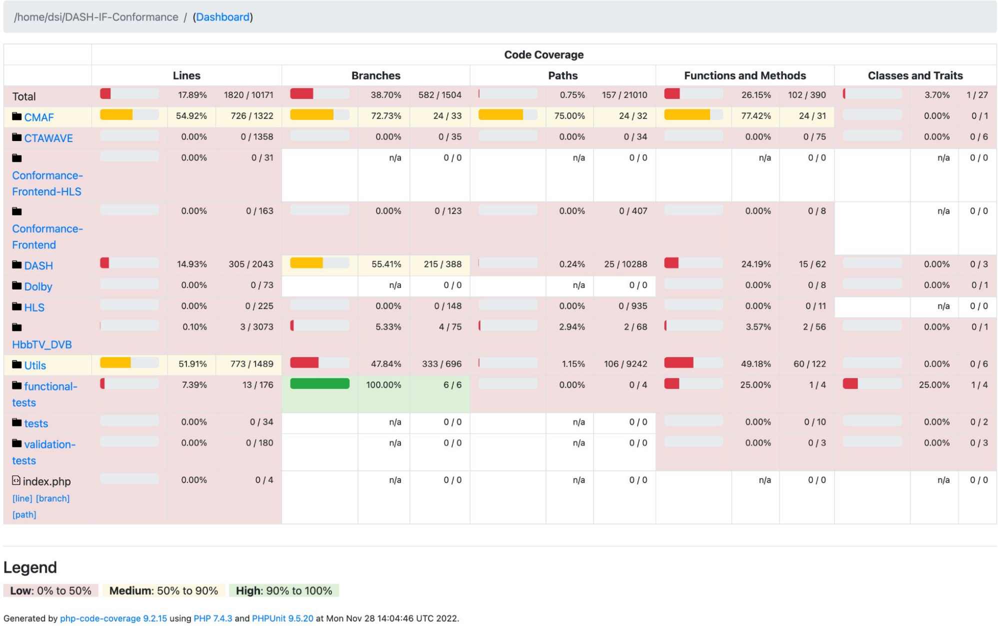
Total Failed Tests

Succesful / Failed

Success Ratio - Progress

Database validation and Code Coverage

- Use one of the provided scripts to derive the validation and code coverage for your own database or subset of an existing database
- https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/wiki/Code-Coverage



/home/dsi/DASH-IF-Conformance / (Dashboard)

	Code Coverage									
	Lines		Branches		Paths		Functions and Methods		Classes and Traits	
Total	17.89%	1820 / 10171	38.70%	582 / 1504	0.75%	157 / 21010	26.15%	102 / 390	3.70%	1 / 27
CMAF	54.92%	726 / 1322	72.73%	24 / 33	75.00%	24 / 32	77.42%	24 / 31	0.00%	0 / 1
CTAWAVE	0.00%	0 / 1358	0.00%	0 / 35	0.00%	0 / 34	0.00%	0 / 75	0.00%	0 / 6
Conformance-Frontend-HLS	0.00%	0 / 31	n/a	0 / 0	n/a	0 / 0	n/a	0 / 0	n/a	0 / 0
Conformance-Frontend	0.00%	0 / 163	0.00%	0 / 123	0.00%	0 / 407	0.00%	0 / 8	n/a	0 / 0
DASH	14.93%	305 / 2043	55.41%	215 / 388	0.24%	25 / 10288	24.19%	15 / 62	0.00%	0 / 3
Dolby	0.00%	0 / 73	n/a	0 / 0	n/a	0 / 0	0.00%	0 / 8	0.00%	0 / 1
HLS	0.00%	0 / 225	0.00%	0 / 148	0.00%	0 / 935	0.00%	0 / 11	n/a	0 / 0
HbbTV_DVB	0.10%	3 / 3073	5.33%	4 / 75	2.94%	2 / 68	3.57%	2 / 56	0.00%	0 / 1
Utils	51.91%	773 / 1489	47.84%	333 / 696	1.15%	106 / 9242	49.18%	60 / 122	0.00%	0 / 6
functional-tests	7.39%	13 / 176	100.00%	6 / 6	0.00%	0 / 4	25.00%	1 / 4	25.00%	1 / 4
tests	0.00%	0 / 34	n/a	0 / 0	n/a	0 / 0	0.00%	0 / 10	0.00%	0 / 2
validation-tests	0.00%	0 / 180	n/a	0 / 0	n/a	0 / 0	0.00%	0 / 3	0.00%	0 / 3
index.php [line] [branch] [path]	0.00%	0 / 4	n/a	0 / 0	n/a	0 / 0	n/a	0 / 0	n/a	0 / 0

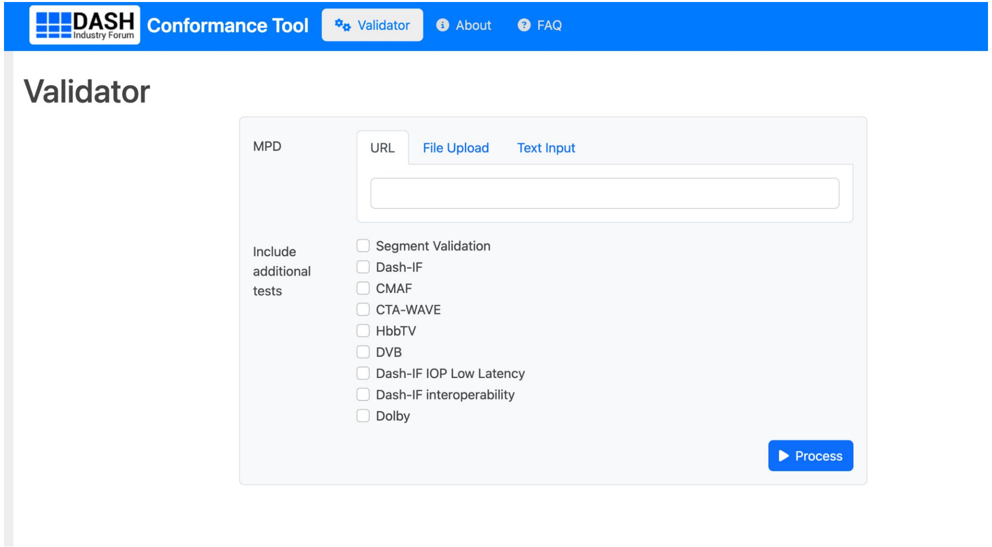
Legend

Low: 0% to 50% **Medium**: 50% to 90% **High**: 90% to 100%

Generated by php-code-coverage 9.2.15 using PHP 7.4.3 and PHPUnit 9.5.20 at Mon Nov 28 14:04:46 UTC 2022.

Conformance Frontend - New User Interface

- Replaced **unmanageable old code version** including outdated version of Angular
- Plain JavaScript implementation using the new **REST interface** instead of polling for a .php file



Validator

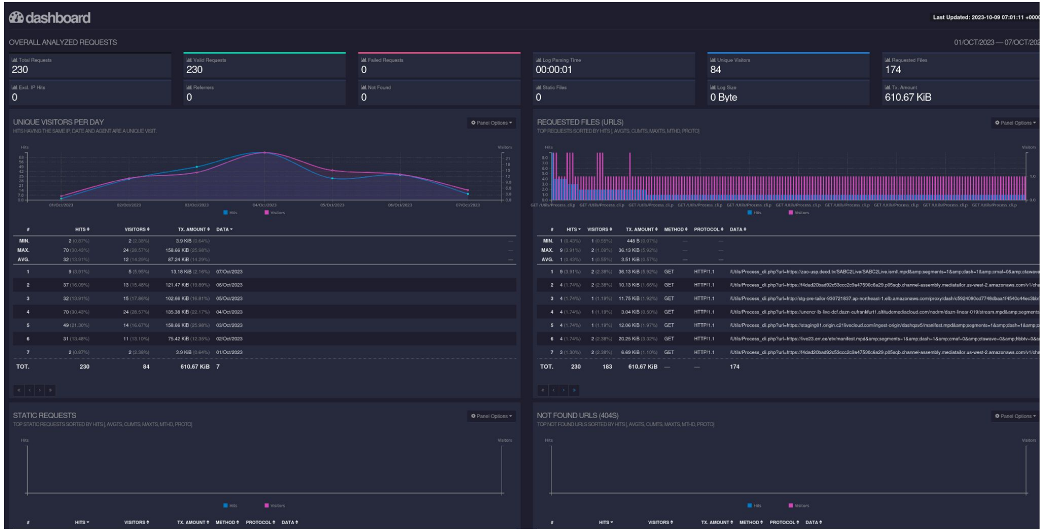
MPD

Include additional tests

- □ Segment Validation
- □ Dash-IF
- □ CMAF
- □ CTA-WAVE
- □ HbbTV
- □ DVB
- □ Dash-IF IOP Low Latency
- □ Dash-IF interoperability
- □ Dolby

Conformance Analytics

- Replaced **manual computations**
- https://conformance.dashif.org/report/static.html



dashboard

Last Updated: 2023-10-09 07:01:11 +0000

OVERALL ANALYZED REQUESTS

01/OCT/2023 — 07/OCT/202

Total Requests 230	Valid Requests 230	Failed Requests 0	Log Parsing Time 00:00:01	Unique Visitors 84	Requested Files 174
Excl. IP Hits 0	Referrers 0	Not Found 0	Static Files 0	Log Size 0 Byte	Tx. Amount 610.67 KiB

UNIQUE VISITORS PER DAY

HITS HAVING THE SAME IP, DATE AND AGENT ARE A UNIQUE VISIT.

#	HITS	VISITORS	TX. AMOUNT	DATA
MIN.	2 (0.87%)	2 (2.38%)	3.9 KiB (0.64%)	—
MAX.	70 (30.43%)	24 (28.57%)	158.66 KiB (25.98%)	—
AVG.	32 (13.91%)	12 (14.29%)	87.24 KiB (14.29%)	—
1	9 (3.91%)	5 (5.95%)	13.18 KiB (2.16%)	07/Oct/2023
2	37 (16.09%)	13 (15.48%)	121.47 KiB (19.89%)	06/Oct/2023
3	32 (13.91%)	15 (17.86%)	102.66 KiB (16.81%)	05/Oct/2023
4	70 (30.43%)	24 (28.57%)	135.38 KiB (22.17%)	04/Oct/2023
5	49 (21.30%)	14 (16.67%)	158.66 KiB (25.98%)	03/Oct/2023
6	31 (13.48%)	11 (13.10%)	75.42 KiB (12.35%)	02/Oct/2023
7	2 (0.87%)	2 (2.38%)	3.9 KiB (0.64%)	01/Oct/2023
TOT.	230	84	610.67 KiB	7

REQUESTED FILES (URLS)

TOP REQUESTS SORTED BY HITS [, AVGTS, CUMTS, MAXTS, MTHD, PROTO]

#	HITS	VISITORS	TX. AMOUNT	METHOD	PROTOCOL	DATA
MIN.	1 (0.43%)	1 (0.55%)	448 B (0.07%)	—	—	
MAX.	9 (3.91%)	2 (1.09%)	36.13 KiB (5.92%)	—	—	
AVG.	1 (0.43%)	1 (0.55%)	3.51 KiB (0.57%)	—	—	
1	9 (3.91%)	2 (2.38%)	36.13 KiB (5.92%)	GET	HTTP/1.1	/Utils/Process_cli.php?url=https://zao-usp.deod.tv/SABC2Live/SABC2Live.isml/.mpd&amp;segments=1&amp;dash=1&amp;cmaf=0&amp;ctawave
2	4 (1.74%)	2 (2.38%)	10.13 KiB (1.66%)	GET	HTTP/1.1	/Utils/Process_cli.php?url=https://f4dad20bad92c53ccc2c9a47590c6a29.p05sqb.channel-assembly.mediatailor.us-west-2.amazonaws.com/v1/cha
3	4 (1.74%)	1 (1.19%)	11.75 KiB (1.92%)	GET	HTTP/1.1	/Utils/Process_cli.php?url=http://stg-pre-tailor-930721837.ap-northeast-1.elb.amazonaws.com/proxy/dash/c5924090cd7748dbaa1f4540c44ec3bb/
4	4 (1.74%)	1 (1.19%)	3.04 KiB (0.50%)	GET	HTTP/1.1	/Utils/Process_cli.php?url=https://unencr-lb-live-dcf.dazn-eufrankfurt1.altitudemediacloud.com/nodrm/dazn-linear-019/stream.mpd&amp;segments
5	4 (1.74%)	1 (1.19%)	12.06 KiB (1.97%)	GET	HTTP/1.1	/Utils/Process_cli.php?url=https://staging01.origin.c21livecloud.com/ingest-origin/dashqav5/manifest.mpd&amp;segments=1&amp;dash=1&amp;c
6	4 (1.74%)	2 (2.38%)	20.25 KiB (3.32%)	GET	HTTP/1.1	/Utils/Process_cli.php?url=https://live23.err.ee/etv/manifest.mpd&amp;segments=1&amp;dash=1&amp;cmaf=0&amp;ctawave=0&amp;hbbtv=0&a
7	3 (1.30%)	2 (2.38%)	6.69 KiB (1.10%)	GET	HTTP/1.1	/Utils/Process_cli.php?url=https://f4dad20bad92c53ccc2c9a47590c6a29.p05sqb.channel-assembly.mediatailor.us-west-2.amazonaws.com/v1/cha
TOT.	230	183	610.67 KiB	—	—	174

STATIC REQUESTS

TOP STATIC REQUESTS SORTED BY HITS [, AVGTS, CUMTS, MAXTS, MTHD, PROTO]

#	HITS	VISITORS	TX. AMOUNT	METHOD	PROTOCOL	DATA

NOT FOUND URLS (404S)

TOP NOT FOUND URLS SORTED BY HITS [, AVGTS, CUMTS, MAXTS, MTHD, PROTO]

#	HITS	VISITORS	TX. AMOUNT	METHOD	PROTOCOL	DATA

Additional New Features

- Add a **Command Line Interface (CLI)** to run the tests directly from the command line instead of using the web interface
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/wiki/Command-Line-Interface
- Add a **REST interface** to trigger conformance tests
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/wiki/REST-Interface
- Support for running the Conformance Tools in **Docker**
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/wiki/Installation--guide

Hosted Installation

URL	Version	Branch
https://conformance.dashif.org/	latest released version, e.g. 2.2.3	main
https://staging.conformance.dashif.org/	latest development version	development

Latest updates (since June 2022)

General

- Version 2.0.0
  - Released on Nov 10, 2022
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/releases/tag/v2.0.0
- Version 2.1.0
  - Released on Nov 30, 2022
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/releases/tag/v2.1.0
- Version 2.2.0
  - Released on Mar 13, 2023
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/releases/tag/v2.2.0
- Version 2.2.1
  - Released on Apr 25 2023
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/releases/tag/v2.2.1
- Version 2.2.2
  - Released on Jun 8, 2023
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/releases/tag/v2.2.2
- Version 2.2.3
  - Released on Aug 28, 2023
  - https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/releases/tag/v2.2.3
- CCP project in maintenance mode since 2.2.0

Next steps / Open Issues

Next steps / Open Issues

- **Maintenance**: The Conformance Validator has no maintainer, new releases, important bugfixes and management of GitHub issues and documentation are performed by the JCCP team in their spare time.
- Add support for **segment validation of live streams**
- Increase the **coverage** of the validator: HEVC, VVC, HDR, Subtitles, Encryption, Other audio codecs
- **Add** and **update tests** based on the latest version of the specifications

Thank you !

Code Refactoring

- Move to a **mono repository** instead of including the required modules as Git submodules of the main repository.
- Move all the tests of the existing modules to **dedicated .php files**
- Implement a **dedicated module.php** for each of the submodules. Includes of the individual test files are done in these module files.
- Remove unused files
- Removed Python as a dependency
- Move to php 7.4, prepare migration to php 8
- Fixed various bugs

Segment Validator

- Resolve main crashes as part of the general QoE improvements
- Build regression tests
- Split parsing from checks
- Start implementing tests in PHP
- The “old” segment validator crashed frequently leading to missing validation results. Many tests are dependent on the output of the validator and were reported as “passed” if no validation output was available. These “**false positives”** are now gone.

Version 2.2.1

- Released on April 25, 2023
- https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/releases/tag/v2.2.1
- Includes important bugfixes based on user feedback, e.g.
    - CTA-WAVE: Fix wrong parsing of media profiles
    - HbbTV: Fix wrong variable names and missing references
    - General: Fix a bug when merging higher level attributes into lower level attributes leading to missing information in the Representations

Version 2.2.2

- Released on June 8, 2023
- https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/releases/tag/v2.2.1
- Again minor improvements and fixes based on user feedback (mainly HbbTV and CTA-WAVE)
  - Add support for segments with multiple moof/mdat boxes
  - Fix a division by zero that lead to tests failing
  - Fix accessing the wrong attribute for the NAL unit type

Version 2.2.3

- Released on Aug 28, 2023
- https://github.com/Dash-Industry-Forum/DASH-IF-Conformance/releases/tag/v2.2.2
- Again minor fixes based on user feedback
  - Add support for pasp/btrt boxes for HEVC
  - 8 other misc