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**ISO/IEC JTC 1/SC 29/WG 03 MPEG SYSTEMS**

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| **Title** | **Technology under consideration on ISO/IEC 14496-32 Reference Software and Conformance for File Format** |
| **Source** | **WG 03, MPEG Systems** |
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New handling of FileFormat conformance suite

During MPEG#137 a new way of handling the conformance files was adopted as proposed in [6]. All the conformance files are uploaded to MPEG File Server and published on a HTTP server with the publicly [accessible URL](https://conformance.mpeg.expert/ISOBMFF/). A [public GitHub repository](https://github.com/MPEGGroup/FileFormatConformance) was created where all the work around the file format conformance will happen from now on. New files are contributed to the conformance suite while following the new [contribution guidelines](https://github.com/MPEGGroup/FileFormatConformance/blob/main/CONTRIBUTING.md). The new GitHub repository is still work in progress and will be gradually updated to enable new features to improve the work with conformance files.

All the files which are presented in this document can be downloaded from:

<https://conformance.mpeg.expert/ISOBMFF/under_consideration/>

Compressed boxes conformance

A set of new conformance test vectors for ISOBMFF Compressed Boxes were provided by Telecom Paris during MPEG#134 meeting [1]. The conformance files were created using latest GPAC version available at <http://gpac.io>, with source code available at <https://github.com/gpac/gpac>. All sequences show a 2 seconds long video counter at 25fps. Note that due to the sequence being very short, the ‘sidx’ and ‘ssix’ boxes are being forced to their compressed versions, although their original sizes are smaller than their compressed sizes.

All 7 conformance files with compressed boxes are located in “./isobmff\_conformance/comp” directory.

comp\_moov\_isoc.mp4:

The file contains a compressed moov and ‘isoC’ brand.

comp\_moov\_otyp.mp4:

The file contains a compressed moov, a ‘ftyp’ with major brand ‘comp’ and a ‘otyp’ wrapping the original ‘ftyp’ with various brand info.

comp\_moof\_nobrand.mp4:

The file contains an empty ‘moov’, no changes in brand info and compressed ‘moof’. A player not understanding compressed boxes could see this file as an init segment (empty ‘moov’ only).

comp\_moof\_otyp.mp4:

The file contains ‘ftyp’=comp, ‘otyp’, an uncompressed empty ‘moov’ and compressed ‘moof’.

comp\_moof\_sidx\_otyp.mp4:

The file contains ‘ftyp’=comp, ‘otyp’, an uncompressed empty ‘moov’ and compressed ‘moof’ and ‘sidx’.

comp\_moof\_sidx\_ssix\_otyp.mp4:

The file contains ‘ftyp’=comp, ‘otyp’, an uncompressed empty ‘moov’ and compressed ‘moof’, ‘sidx’ and ‘ssix’.

comp\_all\_otyp.mp4:

The file contains ‘ftyp’=comp, ‘otyp’ and compressed empty ‘moov’, ‘moof’, ‘sidx’ and ‘ssix’.

Common encryption conformance

A set of new conformance test vectors for Common Encryption (CENC) were provided by Telecom Paris during MPEG#134 meeting [1]. The conformance files include common encryption technologies such as: CENC, CBC1, CENS, CBCS, sample group description for keys, Item encryption and Multi-Key per sample. The CENC conformance files were created using latest GPAC version available at <http://gpac.io>, with code source available at <https://github.com/gpac/gpac>.

All CENC conformance files are located in “./isobmff\_conformance/cenc” directory. Whereby

all DRM configuration files are located in the “./isobmff\_conformance/drm\_cfg” folder, each file containing the KID and key value for each key used. Each protected ISOBMF file also contains a PSSH box using GPAC test system ID, which contains the key values in the PSSH for simple decryption without KMS.

All video sequences show a 2s video counter at 25fps, 1280x720, 420 8 bit HEVC 3x3 motion constrained tile-set. All audio sequences play a 2s audio bip/bop at 44100Hz, mono, AAC. All image sequences show a single HEVC picture of size 1280x720, 420 8 bit, 3x3 tiled.

Basic CENC Conformance

The added sequences are covering most of 23001-7. The only feature not present in these proposed sequences is the presence of non-protected samples in a protected track, as this is under revision in 23001-7:2016 CDAM 2.

The files “**\*\_frag1s.mp4**“ test ‘seig’ sample to group mapping in movie fragments.

Item Encryption and Multi-Key Conformance

The proposed files are “**image\_\***” and “**video\_cenc\_mkey\_\***”. Both CENC-128 and CBCS with constant IV are tested.

Files “**\*\_cenc\_mkey\_subs\*”** and “**\*\_cbcs\_mkey\_const\_iv\_subs\***” only perform partial encryption of the tiles in the source frames.

When playing the content with GPAC, keys can be disabled using the option drop\_keys.

For example:

gpac -play video\_cbcs\_mkey\_const\_iv\_subs.mp4 –drop\_keys=1

This will decrypt the VCL NALUs associated with key 2 but will not decrypt NALUs associated with key 1.

VVC conformance

A set of new conformance test vectors for carriage of VVC in ISOBMFF were contributed by Nokia during MPEG#134 meeting [2] and updated during MPEG#135 [3], MPEG#136 [4] and MPEG#137 [5]. All the VVC encoded bitstreams which were used for packaging are conforming to v12.0 and/or v13.0 of the VTM reference software. The packaging was done using the software from Nokia located at: <https://github.com/nokiatech/heif/tree/VVC_MP4>

All VVC conformance files are located in “./isobmff\_conformance/VVC” directory and also at the MPEG FS server at:

https://mpegfs.int-evry.fr/mpegcontent/ under

/MPEG-04/Part15-VVC\_File\_Format/ConformanceTestVectors/Nokia/

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| --- | --- | --- | --- | --- |
| **ID** | **Filename** | **Source** | **Encoded/Input VVC bitstream** | **VVC FF features and related clauses of [1]** |
| 1 | vvc\_basic\_track.mp4 | BasketballPass/BlowingBubbles | HRD\_A\_Fujitsu\_3.bit \* | Single layer coded bitstream in VVC track with sample entry 'vvc1' (11.3.1) |
| 2 | vvc\_subpicture\_tracks.mp4 | Balboa 360 sequence | Balboa sequence 4 subpictures with QP 28 and 4 subpictures with QP 32 768x768\_60Hz\_8b\_420 | Single layer coded bitstream with subpictures. One VVC base track with sample entry 'vvc1' (11.3.1),  four subpictures coded with two different QPs in 8 VVC subpicture tracks with sample entry 'vvs1' (11.3.2), VVC merge base track has 'subp' track reference to VVC subpicture tracks (11.1.5) (11.3.1) (11.6.4), VVC subpicture tracks are grouped by 'alte' track grouping (11.1.5)(11.6.4), subpicture order sample grouping 'spor' with num\_subpic\_ref\_idx equal to 0 (same order) (11.4.16), Subpicture layout map entry 'sulm' (11.4.17) |
| 3 | vvc\_subpicture\_tracks\_spor\_ordered.mp4 | Balboa 360 sequence | Balboa sequence 4 subpictures with QP 32 768x768\_60Hz\_8b\_420 | Single layer coded bitstream with subpictures. One VVC base track with sample entry 'vvc1' (11.3.1),  four subpictures coded in 4 VVC subpicture tracks with sample entry 'vvs1' (11.3.2), VVC merge base track has 'subp' track reference to VVC subpicture tracks (11.1.5) (11.3.1) (11.6.4), subpicture order sample grouping 'spor' with num\_subpic\_ref\_idx greater than 0 (different order) (11.4.16), |
| 4 | vvc\_substitute\_subpicture\_single\_sample\_track.mp4 |  | Balboa sequence 4 subpictures with QP 28 768x768\_60Hz\_8b\_420 | Single layer coded bitstream with subpictures. One VVC base track with sample entry 'vvc1' (11.3.1),  four subpictures coded in 4 VVC subpicture tracks with sample entry 'vvs1' (11.3.2), 4 substitute subpicture track with sample entry 'vvs1' (only one sample in the track) (11.3.2) (In VvcNALUConfigBox flags&1=1), VVC merge base track has 'subp' track reference to VVC subpicture tracks (11.1.5) (11.3.1) (11.6.4), subpicture order sample grouping 'spor' with num\_subpic\_ref\_idx equal to 0 (same order) (11.4.16), |
| 5 | vvc\_substitute\_subpictures\_all\_frames.mp4 |  | Balboa sequence 4 subpictures with QP 28 768x768\_60Hz\_8b\_420 | Single layer coded bitstream with subpictures. One VVC base track with sample entry 'vvc1' (11.3.1),  four subpictures coded in 4 VVC subpicture tracks with sample entry 'vvs1' (11.3.2), 4 substitute subpicture track with sample entry 'vvs1' (time aligned samples) (11.3.2) (In VvcNALUConfigBox flags&1=1), VVC base track has 'subp' track reference to VVC subpicture tracks (11.1.5) (11.3.1) (11.6.4), subpicture order sample grouping 'spor' with num\_subpic\_ref\_idx equal to 0 (same order) (11.4.16), |
| 6 | vvc\_mixed\_nal\_subpicture\_tracks.mp4 |  | MNUT\_B\_Nokia\_3.bit \* | Single layer coded bitstream with subpictures having mixed NAL unit type. One VVC base track with sample entry 'vvc1' (11.3.1),  four subpictures coded in 4 VVC subpicture tracks with sample entry 'vvs1' (11.3.2), VVC merge base track has 'subp' track reference to VVC subpicture tracks (11.1.5) (11.3.1) (11.6.4), VVC merge base track has 'mixn' track reference to VVC subpicture tracks (11.4.18) (11.3.1)  subpicture order sample grouping 'spor' with num\_subpic\_ref\_idx equal to 0 (same order) (11.4.16), mixed NAL unit type pictures sample group 'minp' (11.4.18) same NAL unit type track grouping 'snut' (11.3.1) (11.4.18)(11.6.5) |
| \* VVC bitstreams submitted to JVET conformance testing | | | | |

References

1. Jean Le Feuvre, "Input on ISOBMFF conformance", Telecom ParisTech, MPEG#134 [m56755](https://dms.mpeg.expert/doc_end_user/current_document.php?id=78658)
2. Kashyap Kammachi-Sreedhar, Miska M. Hannuksela, Emre B. Aksu (Nokia), Lasse Heikkilä (Vincit), "VVC in 14496-15 conformance test vectors", Nokia, MPEG#134 [m56817](https://dms.mpeg.expert/doc_end_user/current_document.php?id=78720)
3. Kashyap Kammachi-Sreedhar, Miska M. Hannuksela, Emre B. Aksu (Nokia), Lasse Heikkilä (Vincit), "VVC in 14496-15 conformance test vectors update”, Nokia, MPEG#135 [m57436](https://dms.mpeg.expert/doc_end_user/current_document.php?id=79628)
4. Kashyap Kammachi-Sreedhar, Miska M. Hannuksela, Emre B. Aksu (Nokia), Lasse Heikkilä (Kodan), “VVC in 14496-15 conformance test vectors update”, [m58142](https://dms.mpeg.expert/doc_end_user/current_document.php?id=80602)
5. Kashyap Kammachi-Sreedhar, Miska M. Hannuksela, Emre B. Aksu (Nokia), Lasse Heikkilä (Kodan), “VVC in 14496-15 conformance test vectors update”, m58915
6. Dimitri Podborski, “On File Format conformance”, [m58518](https://dms.mpeg.expert/doc_end_user/current_document.php?id=81248)