**** **ISO/IEC JTC 1/SC 29/WG 03 N0232**

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Convenorship: KATS (Korea, Republic of)**

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**Status:** Approved

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**Email of Convenor:** young.L @ samsung . com

**Committee URL:** <https://isotc.iso.org/livelink/livelink/open/jtc1sc29wg3>

**INTERNATIONAL ORGANIZATION FOR STANDARDIZATION**

**ORGANISATION INTERNATIONALE DE NORMALISATION**

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

**ISO/IEC JTC 1/SC 29/WG 03 N** **0232**

**January 2021, Virtual**

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| **Title** | **Summary of Systems standards for video codecs after the 3rd WG03 meeting** |
| **Source** | **WG 03, MPEG Systems** |
| **Status** | **Approved** |
| **Serial Number** | **20294** |

# HEVC

## ISO/IEC 23000-19 2nd edition AMD 1 Additional CMAF HEVC media profiles

### Scope

* Adding high frame rate HEVC video CMAF media profiles (120Hz)
* Adding interlaced HEVC video CMAF media profile

### Project status

<https://sd.iso.org/projects/project/80756/overview>

| **Type** | **Version** | **Started** | **End date** | **Status** | **Result** |
| --- | --- | --- | --- | --- | --- |
| [FDIS](https://isotc.iso.org/livelink/eb3/part/view.do?id=453993) | 1 | 2021-02-04 | 2021-04-01 | CLOSED |  |
| [DIS](https://isotc.iso.org/livelink/eb3/part/view.do?id=445054) | 1 | 2020-06-30 | 2020-09-23 | CLOSED | Approved |
| [CD](https://isotc.iso.org/livelink/eb3/part/view.do?id=442305) |  | 2020-02-22 | 2020-04-18 | CLOSED | - |

### Reference output document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Title** | **In Charge** | **TBP** | **Available Date** | **S/N** |
|  | **ISO/IEC 23000-19 - Common Media Application Format** |  |  |  |  |
| **58** | **DoC on ISO/IEC 23000-19:2019 DAM 1 Additional CMAF HEVC media profiles** | **Krasimir Kolarov** | **N** | **2020-10-16** | **19761** |
| **59** | **Text of ISO/IEC 23000-19:2019 FDAM 1 Additional CMAF HEVC media profiles** | **Krasimir Kolarov** | **N** | **2020-10-16** | **19763** |

### Open issues

## ISO/IEC 23000-22 AMD 2 MIAF HEVC Advanced HDR profile and other clarifications

### Scope

* Adding HEVC Advanced HDR profile

### Project status

### <https://sd.iso.org/projects/project/81634/overview>

| **Type** | **Version** | **Started** | **End date** | **Status** | **Result** |
| --- | --- | --- | --- | --- | --- |
| [DIS](https://isotc.iso.org/livelink/eb3/part/view.do?id=451686) | 1 | 2021-01-25 | 2021-04-19 | CLOSED |  |
| [CD](https://isotc.iso.org/livelink/eb3/part/view.do?id=448544) |  | 2020-08-19 | 2020-10-12 | CLOSED | - |

### Reference output document

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| --- | --- | --- | --- | --- | --- |
| **No.** | **Title** | **In Charge** | **TBP** | **Available Date** | **S/N** |
|  | **ISO/IEC 23000-22 - Multi-Image Application Format** |  |  |  |  |
| 254 | DoC on ISO/IEC 23000-22 DAM 2 MIAF HEVC Advanced HDR profile and other clarifications | Krasimir Kolarov | N | 2021-04-30 | 20316 |
| 255 | Text of ISO/IEC 23000-22 FDAM 2 MIAF HEVC Advanced HDR profile and other clarifications | Cyril Concolato | N | 2021-05-14 | 20317 |

### Open issues

## ISO/IEC 23000-19 2nd edition AMD 3 8K HEVC, 4K HFR HEVC and Chroma Location for CMAF

### Short Description

***Motivations:***

***Objective:***

### Project status

### Reference output document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Title | In Charge | TBP | Available | S/N |
|  | ISO/IEC 23000-19 - Common Media Application Format |  |  |  |  |
| 253 | WD of ISO/IEC 23000-19:2019 AMD 3 8K HEVC, 4K HFR HEVC and Chroma Location for CMAF | Thomas Stockhammer | Y | 2021-04-30 | 20315 |

# VVC

## ISO/IEC 13818-1:2019 AMD 2 Carriage of VVC in MPEG-2 TS

### Scope

* VVC data alignment with PES packets
* VVC video descriptor and VVC HRD descriptor
* Constraints on transport of VVC bitstream
* T-STD extension for single layer VVC and layered temporal video subsets

### Project status

<https://sd.iso.org/projects/project/80754/overview>

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Type** | **Version** | **Started** | **End date** | **Status** | **Result** |
| [DIS](https://isotc.iso.org/livelink/eb3/part/view.do?id=448397) | 1 | 2020-10-06 | 2020-12-29 | CLOSED |  |
| [CD](https://isotc.iso.org/livelink/eb3/part/view.do?id=442304) |  | 2020-02-22 | 2020-04-18 | CLOSED | - |

### Reference output document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Title | In Charge | TBP | Available | S/N |
|  | ISO/IEC 13818-1 - Systems |  |  |  |  |
| 146 | DoC on ISO/IEC 13818-1:2019 DAM 2 Carriage of VVC in MPEG-2 TS | Karsten Grüneberg | N | 2021-01-15 | 19930 |
| 185 | Text of ISO/IEC FDIS 13818-1 8th edition | Karsten Grüneberg | N | 2021-04-30 | 20226 |

### Open issues

* RA needs to be reconfirmed by SMPTE according to new ISO policy for final publication of the 8th edition.

## ISO/IEC 14496-15:2019 AMD 2 Carriage of VVC and EVC in ISOBMFF

### Scope

* Definition of sample, sub-sample, sync sample, decoder configuration record and etc.
* storage format for single-layer VVC (ISO/IEC 23090-3) video streams
* storage of multiple layers in one track or each layer/sub-layer in its own track
* storage format for VVC bitstreams with more than one layer.

### Project status

<https://sd.iso.org/projects/project/80903/overview>

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Type** | **Version** | **Started** | **End date** | **Status** | **Result** |
| [DIS](https://isotc.iso.org/livelink/eb3/part/view.do?id=448361) | 1 | 2020-10-04 | 2020-12-27 | CLOSED |  |

### Reference output document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Title** | **In Charge** | **TBP** | **Available Date** | **S/N** |
|  | **ISO/IEC 14496-15 - Carriage of NAL unit structured video in the ISO Base Media File Format** |  |  |  |  |
| 214 | DoC on ISO/IEC 14496-15:2019 DAM 2 Carriage of VVC and EVC in ISOBMFF | Yago Sanchez De La Fuente | N | 2021-04-30 | 20276 |
| 234 | Text of ISO/IEC FDIS 14496-15 6th edition Carriage of NAL unit structured video in the ISO Base Media File Format | Miska Hannuksela | N | 2021-05-28 | 20296 |

### Open issues

## ISO/IEC 23000-19:2019 AMD 2 CMAF Media Profiles for MPEG-H 3D Audio, EVC, VVC and other technologies

### Scope

* Definition of CMAF VVC media track
* Definition of CMAF VVC media profile

### Project status

https://sd.iso.org/projects/project/82530/overview

| **Type** | **Version** | **Started** | **End date** | **Status** | **Result** |
| --- | --- | --- | --- | --- | --- |
| [CD](https://isotc.iso.org/livelink/eb3/part/view.do?id=454904) |  | 2021-03-01 | 2021-04-04 | CLOSED |  |

### Reference output document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Title | In Charge | TBP | Available | S/N |
|  | ISO/IEC 23000-19 - Common Media Application Format |  |  |  |  |
| 224 | Text of ISO/IEC 23000-19:2019 DAM 2 CMAF Media Profiles for MPEG-H 3D Audio, EVC, VVC and other technologies | Krasimir Kolarov | N | 2021-04-30 | 20286 |

### Open issues

## ISO/IEC 23008-12:2017 AMD 3 Support for VVC, EVC, slideshows and other improvements

### Scope

* VVC image item definition
* VVC subpicture and operating points
* VVC image sequences

### Project status

<https://sd.iso.org/projects/project/81688/overview>

| **Type** | **Version** | **Started** | **End date** | **Status** | **Result** |
| --- | --- | --- | --- | --- | --- |
| [DIS](https://isotc.iso.org/livelink/eb3/part/view.do?id=454672) | 1 | 2021-04-15 | 2021-07-08 | CREATED |  |
| [CD](https://isotc.iso.org/livelink/eb3/part/view.do?id=451050) |  | 2020-11-10 | 2021-01-04 | CLOSED | - |

### Reference output document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Title | In Charge | TBP | Available | S/N |
|  | ISO/IEC 23008-12 - Image File Format |  |  |  |  |
| 270 | Potential Improvements to support for VVC, EVC, slideshows and other improvements | Frederic MAZE | N | 2021-05-21 | 20381 |

### Open issues

# EVC

## ISO/IEC 13818-1:2019 AMD 2 Carriage of VVC in MPEG-2 TS

### Scope

* VVC data alignment with PES packets
* VVC video descriptor and VVC HRD descriptor
* Constraints on transport of VVC bitstream
* T-STD extension for single layer VVC and layered temporal video subsets

### Project status

<https://sd.iso.org/projects/project/80754/overview>

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Type** | **Version** | **Started** | **End date** | **Status** | **Result** |
| [DIS](https://isotc.iso.org/livelink/eb3/part/view.do?id=448397) | 1 | 2020-10-06 | 2020-12-29 | CLOSED |  |
| [CD](https://isotc.iso.org/livelink/eb3/part/view.do?id=442304) |  | 2020-02-22 | 2020-04-18 | CLOSED | - |

### Reference output document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Title | In Charge | TBP | Available | S/N |
|  | ISO/IEC 13818-1 - Systems |  |  |  |  |
| 146 | DoC on ISO/IEC 13818-1:2019 DAM 2 Carriage of VVC in MPEG-2 TS | Karsten Grüneberg | N | 2021-01-15 | 19930 |
| 185 | Text of ISO/IEC FDIS 13818-1 8th edition | Karsten Grüneberg | N | 2021-04-30 | 20226 |

### Open issues

* RA needs to be reconfirmed by SMPTE according to new ISO policy for final publication of the 8th edition.

## 

## ISO/IEC 14496-15:2019 AMD 2 Carriage of VVC and EVC in ISOBMFF

### Scope

* Definition of sample, sub-sample, sync sample, decoder configuration record and etc.
* storage format for single-layer VVC (ISO/IEC 23090-3) video streams
* storage of multiple layers in one track or each layer/sub-layer in its own track
* storage format for VVC bitstreams with more than one layer.

### Project status

<https://sd.iso.org/projects/project/80903/overview>

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Type** | **Version** | **Started** | **End date** | **Status** | **Result** |
| [DIS](https://isotc.iso.org/livelink/eb3/part/view.do?id=448361) | 1 | 2020-10-04 | 2020-12-27 | CLOSED |  |

### Reference output document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Title** | **In Charge** | **TBP** | **Available Date** | **S/N** |
|  | **ISO/IEC 14496-15 - Carriage of NAL unit structured video in the ISO Base Media File Format** |  |  |  |  |
| 214 | DoC on ISO/IEC 14496-15:2019 DAM 2 Carriage of VVC and EVC in ISOBMFF | Yago Sanchez De La Fuente | N | 2021-04-30 | 20276 |
| 234 | Text of ISO/IEC FDIS 14496-15 6th edition Carriage of NAL unit structured video in the ISO Base Media File Format | Miska Hannuksela | N | 2021-05-28 | 20296 |

### Open issues

## ISO/IEC 23000-19:2019 AMD 2 CMAF Media Profiles for MPEG-H 3D Audio, EVC, VVC and other technologies

### Scope

* Definition of CMAF EVC media track
* Definition of CMAF EVC media profile

### Project status

[Proposal of Amendment, ISO/IEC 23000-19:2019/Amd.2](https://isotc.iso.org/livelink/eb3/part/cib/ballotAction.do?method=doView&id=452458)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **20.00** | **1** | **New project registered in TC/SC work programme** |  |  | **2021-01-26** | **Current** |
| 20.20 |  | Working draft (WD) study initiated |  |  |  | Awaiting |
| 20.60 |  | Close of comment period |  |  |  | Awaiting |
| 20.99 |  | WD approved for registration as CD |  |  |  | Awaiting |
| 40.00 |  | DIS registered |  | 2021-09-26 |  | Awaiting |
| 60.60 |  | International Standard published |  | 2022-07-26 |  | Awaiting |

### Reference output document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Title | In Charge | TBP | Available | S/N |
|  | ISO/IEC 23000-19 - Common Media Application Format |  |  |  |  |
| 137 | Text of ISO/IEC 23000-19:2019 CDAM 2 CMAF Media Profiles for MPEG-H 3D Audio, EVC, VVC and other technologies | Krasimir Kolarov | N | 2021-01-15 | 19970 |

### Open issues

## ISO/IEC 23008-1 3rd edition AMD 2 Carriage of EVC in MMT

### Short Description

***Motivations:***

***Objective:***

This Amendment provides the carriage of the EVC stream in MMT.

### Project status

<https://sd.iso.org/projects/project/81605/overview>

| **Type** | **Version** | **Started** | **End date** | **Status** | **Result** |
| --- | --- | --- | --- | --- | --- |
| [DIS](https://isotc.iso.org/livelink/eb3/part/view.do?id=451197) | 1 | 2021-01-10 | 2021-04-04 | CREATED |  |

### Goal of this meeting

### Contributions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Session** | **Title** | **Source** | **Dispositions** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

### Summary of Discussions

### Reference output document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Title** | **In Charge** | **TBP** | **Available Date** | **S/N** |
|  | **ISO/IEC 23008-1 - MPEG Media Transport** |  |  |  |  |
| 259 | DoC on ISO/IEC 23008-1 3rd edition DAM 2 Carriage of EVC in MMT | Kyungmo Park | N | 2021-04-30 | 20321 |
| 260 | Revised text of ISO/IEC FDIS 23008-1 3rd edition MPEG Media Transport | Kyungmo Park | N | 2021-05-28 | 20322 |

## ISO/IEC 23008-12:2017 AMD 3 Support for VVC, EVC, slideshows and other improvements

### Scope

* VVC image item definition
* VVC subpicture and operating points
* VVC image sequences

### Project status

<https://sd.iso.org/projects/project/81688/overview>

| **Type** | **Version** | **Started** | **End date** | **Status** | **Result** |
| --- | --- | --- | --- | --- | --- |
| [DIS](https://isotc.iso.org/livelink/eb3/part/view.do?id=454672) | 1 | 2021-04-15 | 2021-07-08 | CREATED |  |
| [CD](https://isotc.iso.org/livelink/eb3/part/view.do?id=451050) |  | 2020-11-10 | 2021-01-04 | CLOSED | - |

### Reference output document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Title | In Charge | TBP | Available | S/N |
|  | ISO/IEC 23008-12 - Image File Format |  |  |  |  |
| 270 | Potential Improvements to support for VVC, EVC, slideshows and other improvements | Frederic MAZE | N | 2021-05-21 | 20381 |

### Open issues

# LCEVC

## ISO/IEC 13818-1:2019 AMD 4 Carriage of LCEVC and other improvements

### Scope

* a new stream type for ISO/IEC 23094-2 (LCEVC) elementary streams;
* descriptors carrying metadata for LCEVC elementary streams;
* constraints for the transport of LCEVC elementary streams;
* a new descriptor for ISO/IEC 23008-3 (kind\_media\_service\_descriptor)

### Project status

| **Type** | **Version** | **Started** | **End date** | **Status** | **Result** |
| --- | --- | --- | --- | --- | --- |
| [CD](https://isotc.iso.org/livelink/eb3/part/view.do?id=451399) |  | 2020-11-20 | 2021-01-12 | OPEN |  |

### Reference output document

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Title** | **In Charge** | **TBP** | **Available Date** | **S/N** |
|  | **ISO/IEC 13818-1 - Systems** |  |  |  |  |
| 248 | DoC on ISO/IEC 13818-1:2019 CDAM 4 Carriage of LCEVC and other improvements | Karsten Grüneberg | N | 2021-04-30 | 20310 |
| 244 | Text of ISO/IEC 13818-1:2019 DAM 4 Carriage of LCEVC and other improvements | Stefano Battista | N | 2021-05-21 | 20306 |

### Open issue?

# Other topics

## *ISO/IEC 23090-13 Video Decoding Interface for Immersive Media*

### Scope

The scope of the VDI specification covers the interface between a media application and the Video Decoding Engine (VDE) of the devices implementing video decoders such as HEVC, VVC, EVC and so on. VDI defines new functions and operations extending the existing VDE capabilities exposed by a Khronos OpenMAX interface.

### Open issues

### VDI bindings with VVC and HEVC is currently being considered. However, The VVC binding still misses metadata for combining the output of decoders into a single output video buffer so that the further processing after decoding can be applied to the sample-synchronized combined decoded sequence. It has been discussed together with JVET and agreed that the approach taken by the Green Metadata might be the solution and even using the code point assigned for the Green Metadata could be generalized for the general use of Systems SEI messages. Further contribution with detailed proposal is required to implement this.

## Advance signaling of required video decoding capability

### Scope

The key issues is to provide sufficient information on system level (manifest, MPD, CMAF Header, SDP offer/answer, HTTP capability headers) in order for a system to identify if the provided media streams can be decoded and rendered by the receiving platform before actually receive and parse the video bistreams. APIs such as isTypeSupported or the W3C media capability APIs may be used for this purpose. Currently, focus is on parameters related to codecs, profiles and levels as well as parameters documented in CICP such as color space or transfer characteristics, but recently issues around static and dynamic metadata for HDR are part of the discussion.

### Open issues

* What are relevant video parameters that need to be signaled in advance?
* How can these parameters be mapped to a proper capability on the receiver?
* If there any conformance for any of these receiver parameters?

## Systems Functionalities for Video Conformance

### Scope

For previous codecs such as AVC and HEVC, adaptive streaming system design has been limited by what is supported on hardware devices and the streaming applications needed to deal with the functionalities and limitations of hardware devices, in particular to create “seamlessness” when switching and splicing. While some of this discussion may be deferred to application and system standards, more and more devices included codecs are used for many different services. Hence, consistent decoder implementations also for systems functionalities should be a major concern for the organization that has developed the codec.

It is important that conformance streams and test cases related to adaptive streaming and systems aspects are provided to hardware and SOC decoder implementers for robust VVC/EVC hardware decoders to deal with efficient and feature‐rich streaming functionalities.

### Reference Documents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Title** | **In Charge** | **TBP** | **Available Date** | **S/N** |
|  | **Explorations** |  |  |  |  |
| 218 | Systems Functionalities for Video Conformance | Thomas Stockhammer | Y | 2021-04-30 | 20280 |

### Open issues

* Codec initialization: What is sufficient to initialize the codec?
* Codec configuration change: Once initialized, what parameters can be changed without decoder reinitialization?
* Random access, content splicing, and content switching
  + Random access: What kinds of random access can be done (without decoder reinitialization)?
  + Content splicing: What kinds of content can be spliced together (without decoder reinitialization)?
  + Content switching: What kinds of content can be seamlessly switched back and forth (without decoder reinitialization)?
* Coding efficiency: How can we maintain high coding efficiency while enabling the streaming
* functionalities?
* Suitable target latencies: How can we operate at target latencies while maintaining high coding efficiency?
* SEI message placement and handling: How does the SEI messages affect streaming functionalities? Initialization? Same SEIs across all CMAF Tracks?
* Cross‐stream switching: For example support fast join or switching, how can this be achieved?