**3GPP TSG-SA4 Meeting #131S4-250034**

**Geneva, Switzerland, 17th Feb 2025 - 21st Feb 2025**

**Source: Qualcomm Incorporated, Tencent**

**Title: Pseudo-CR on [VOPS] 3GPP Video Codecs as Web Codecs**

**Spec: 3GPP TS26.265v0.5.0 (assuming agreed 031, 032 and 033)**

**Agenda item: 9.5**

**Document for: Decision**

**1. Introduction**

During SA#103 the new work item on “Video Operating Points - Harmonization and Stereo MV-HEVC” was approved in SP-240060. The objectives of this work are to:

1. *Harmonize and include as needed all the SA4 video operating points, such as Video profiles Operation Points, Video Operation Points, video encode and decode capabilities etc., which are currently scattered in various SA4 specifications (e.g. TS 26.116, TS 26.118, TS 26.119, TS 26.143, and TS 26.511), into a new specification that will be home to all such video operating points and upgrade HEVC-based levels based on industry practices.*
2. Define the MV-HEVC capability in this new specification.
3. Then add and harmonize stereoscopic MV-HEVC (potentially with auxiliary information, e.g. alpha channels) encode/decode operating points, capabilities, streaming (e.g. CMAF, DASH) and transport aspects for:
	1. 5G-media streaming profiles, codecs, and formats (TS 26.511)
	2. Media capabilities for AR devices (TS 26.119)
	3. Video messaging media profiles (TS 26.143)
4. Perform the above work in coordination with related SDOs and industrial fora such as MPEG, DASH-IF, CTA-WAVE, and IETF, and by referencing the related specifications, e.g. the Common Media Application Format (CMAF) and the ISO base media file format (ISOBMFF), among others.

During SA4#130, document S4-241896 was agreed with the following proposal:

To follow-up on the agreed proposal, the following aspects are proposed from SA4#130

For the different operation points, the following information is collected

1. To support registration of relevant 3GPP video codecs (including AVC, HEVC, MV-HEVC) together with MPEG as web codecs including
	1. Definition of codecs strings
	2. Definition of video chunks
	3. Definition of video decoder config
	4. Definition of extensions of the video encoder config
	5. Definition of extensions of the video decoder config

It is proposed to use the table as a starting point to be added to Annex B. A pCR will be provided for an upcoming meeting.

|  |  |  |  |
| --- | --- | --- | --- |
| Operating Point | Codecs String | Video Chunk | Video Decoder Config |
| 3GPP-AVC-HDTV-CMAF | 'avc1.640029' or 'avc3.640029' | CMAF Fragment or CMAF Random Access chunk for AVC | CMAF Header for AVC |
| 3GPP-HEVC-HDTV-CMAF | 'hvc1.2.4.L123.B0' or 'hev1.2.4.L123.B0' | CMAF Fragment or CMAF Random Access chunk for HEVC | CMAF Header for HEVC |
| 3GPP-HEVC-HD-HDR-CMAF | 'hvc1.2.4.L123.B0' or 'hev1.2.4.L123.B0' | CMAF Fragment or CMAF Random Access chunk for HEVC | CMAF Header for HEVC |
| 3GPP-HEVC-UHD-HDR-CMAF | 'hvc1.2.4.L153.B0' or 'hev1.2.4.L153.B0' | CMAF Fragment or CMAF Random Access chunk for HEVC | CMAF Header for HEVC |
| 3GPP-HEVC-3DTV-CMAF | tbd | Tbd | Tbd |
| 3GPP-MVHEVC-3DTV-CMAF | Tbd | tbd | tbd |

Encoder configuration and extended decoder configuration is for further study.

1. Consider to document codecs with MSE principles and support testing of codecs.

Alignment with CTA WAVE playback capabilities for CMAF Test content and playback.

It is proposed to rely on CTA WAVE to develop CMAF Test Vectors for the VOPS profile, and to identify whether existing test material is available that conforms to the operation points. A follow-up analysis will be done in an upcoming meeting. Also for playback, this should be coordinate with CTA WAVE.

1. In VOPS, an informative Annex is created.

Add the above informationto Annex.

It is proposed to address this in a pCR in an upcoming meeting.

1. However, as pull requests to the registry are needed, it is proposed to create a registry as part of 3GPP/ETSI githubs.

No actions proposed, as needs to be coordinated with MPEG/JVET.

It is proposed that MPEG experts address this issue at an upcoming MPEG meeting.

1. The registration process of codecs should be initiated officially by 3GPP through an LS at appropriate time.

This can happen at a later time.

This document follows-up on the above proposal. Some remaining content from S4-241479 is kept as reference.

**2. Reason for Change**

This document addresses the proposals from SA4#130.

**3. Conclusions**

Once agreed, we could send an LS to MPEG/JVET.

**4. Proposal**

It is proposed to agree the following changes to 3GPP TS26.265v0.5.0 (assuming agreed 031, 032 and 033).

\* \* \* First Change \* \* \* \*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[bt709] Recommendation ITU-R BT.709-6 (06/2015): "Parameter values for the HDTV standards for production and international programme exchange"

[bt2100] Recommendation ITU-R BT.2100-2 (07/2018): "Image parameter values for high dynamic range television for use in production and international programme exchange"

[h264] Recommendation ITU-T H.264 (08/2021): "Advanced video coding for generic audiovisual services".

[h265] Recommendation ITU-T H.265 (09/2023): "High efficiency video coding".

[h273] Recommendation ITU-T H.273 (09/2023): "Coding-independent code points for video signal type identification".

[h274] Recommendation ITU-T H.274 (09/2023): "Versatile supplemental enhancement information messages for coded video bitstreams".

[CMAF] ISO/IEC 23000-19: "Information Technology Multimedia Application Format (MPEG-A) – Part 19: Common Media Application Format (CMAF) for segmented media".

[CENC] ISO/IEC 23001-7: "MPEG systems technologies - Part 7: Common encryption in ISO base media file format files".

[DPC] CTA-5003-B: "Web Application Video Ecosystem (WAVE): Device Playback Capabilities Specification", available at https://shop.cta.tech/products/web-application-video-ecosystem-device-playback-capabilities-cta-5003-b .

[6381] IETF RFC 6381: The 'Codecs' and 'Profiles' Parameters for "Bucket" Media Types.

[MSE] 3GPP TR 26.857, "5G Media Service Enablers"

[3dtv] A. Quested and B. Zegel, "3D-TV production standards - first report of the ITU-R Rapporteurs", EBU Technical Review, 2011 Q2, <https://tech.ebu.ch/publications/trev_2011-Q2_3dtv_quested>

[W3CCodecs] W3C Working Draft, "WebCodecs", https://www.w3.org/TR/webcodecs/

\* \* \* Next Change \* \* \* \*

### 4.6.2 Video Decoder API Parameters

Based on CTA-5003 [DPC], Table 4.6.2-1 provide relevant parameters that need to be attached to the content, in order to establish media playback properly, and serve as an API. The parameters are used for the following purposes:

- to identify the capability of the device in order to check of the signal can be played back

- to initialize the decoding and playback platform to allocate the resources for decoding and rendering

Table 4.6.2-1 Video Decoder API Parameters

|  |  |  |
| --- | --- | --- |
| Parameter | Restrictions | Status |
| width | specifies the width of a video player, in pixels | required |
| height | specifies the width of a video player, in pixels. | required |
| media type | specifies the media type of the component, in this case video | required |
| format | specifies the format of the media, for example mp4 | required |
| profiles | specifies the profile of the format, for example 'cmfc' | optional |
| codecs | specifies through a well-defined string the codec used for the signal  | required |
| Video format parameters | specifies additional video format parameters as defined in Table 4.4.2.1 to describe the signal and to initialize the encoder. | optional |

\* \* \* Next Change \* \* \* \*

Annex <B> (informative):
Mapping of Reference Architecture to Implementations

# B.1 Introduction

This annex provides some background on how to map the reference architectures defined in clause 4 into concrete implementations. The mapping of the capabilities, the configuration of the encoders and decoders through APIs as well as some workflow aspects are provided.

The Annex is not considered to prescribe any implementation but is expected to support implementors to integrate the capabilities and operating points defined in this specification into their workflows.

The Annex also serves as an analysis on what functionalities are available in existing implementations and where there are potential gaps that may be addressed by the owners of the implementation to fully support all features.

# B.2 WebCodecs API

## B.2.1 Introduction

The WebCodecs API [W3CCodecs] specifies a powerful web Application Programming Interface (API) that provides developers with low-level access to the individual samples of media, including frames of a video stream. It is useful for web applications that require full control over the way media is processed, such as video or audio editors, and video conferencing applications. The WebCodecs API uses an asynchronous processing model. Each instance of an encoder or decoder maintains an internal, independent processing queue.

The WebCodecs API provides several video related interfaces:

- VideoDecoder: Decodes EncodedVideoChunk objects.

- VideoEncoder: Encodes VideoFrame objects.

- EncodedVideoChunk: Represents codec-specific encoded video bytes.

- VideoFrame: Represents a frame of unencoded video data.

- VideoColorSpace: Represents the color space of a video frame.

In order to map a codec to the WebCodecs API, a codec registration procedure for new codecs is defined by W3C in <https://www.w3.org/TR/webcodecs-codec-registry/>.

The registration requirements request the following details:

- A codec string and a specification that provides the details of the codecs string

- The codec string has certain requirements

- Each registration is expected to include

- Recognized codec strings

- EncodedVideoChunk internal data

- VideoDecoderConfig description bytes

- Expectations for EncodedVideoChunk

- Registration may include description of extensions to VideoEncoderConfig dictionaries

- Candidate entries are expected to be announced by filing an issue in the WebCodecs GitHub issue tracker (<https://github.com/w3c/webcodecs/issues/>) so they can be discussed and evaluated for compliance before being added to the registry.

## B.2.2 Mapping of Operation Points to Decoder API

Table B.2.2-1 provides a mapping of operation points to Web Codecs decoder API.

Table B.2.2-1 Mapping of Operation Points to Decoder API

|  |  |  |  |
| --- | --- | --- | --- |
| Operating Point | Codecs String | Video Chunk | Video Decoder Config |
| 3GPP-AVC-HD | 'avc1.640029' or 'avc3.640029' | Tbd, see clause 7.2.3 | Tbd, see clause 7.2.3 |
| 3GPP-HEVC-HD | 'hvc1.2.4.L123.B0' or 'hev1.2.4.L123.B0' | Tbd, see clause 7.2.3 | Tbd, see clause 7.2.3 |
| 3GPP-HEVC-HD-HDR | 'hvc1.2.4.L123.B0' or 'hev1.2.4.L123.B0' | Tbd, see clause 7.2.3 | Tbd, see clause 7.2.3 |
| 3GPP-HEVC-UHD-HDR | 'hvc1.2.4.L153.B0' or 'hev1.2.4.L153.B0' | Tbd, see clause 7.2.3 | Tbd, see clause 7.2.3 |
| 3GPP-HEVC-3DTV | tbd | Tbd, see clause 7.2.3 | Tbd, see clause 7.2.3 |
| 3GPP-MVHEVC-3DTV | tbd | Tbd, see clause 7.2.3 | Tbd, see clause 7.2.3 |

## B.2.3 Mapping of Operation Points to Encoder API

tbc

\* \* \* End of Changes \* \* \* \*