**3GPP TSG-S4 Meeting#133-e*****S4-251336***

**Online, 18th–25th July 2025**

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| *CR-Form-v12.2* |
| **PSEUDO CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  |  |
|  |  |
| ***Source to WG:*** | Apple Inc., Tencent |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | There are remaining EN’s on missing features like 3D reference info SEI which needs to be implemented. |
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| ***Summary of change:*** | Add recommendation for 3D reference info SEI. |
|  |  |
| ***Consequences if not approved:*** | Several key features will remain missing. |
|  |  |
| ***Clauses affected:*** | 6.3.6 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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

6.3.6 3GPP MV-HEVC Stereo

6.3.6.1 Introduction

The MV-HEVC Stereo Operation Point permits consistent distribution of stereoscopic content using MV-HEVC. The remainder of this clause 6.3.6 defines the Bitstream and Receiver requirements for the 3GPP-MV-HEVC-Stereo receiver.

6.3.6.2 Bitstream Requirements

A 3GPP-MV-HEVC-Stereo Bitstream shall conform to the following requirements

- the Representation Format included in the Bitstream shall conform to the 3GPP Stereoscopic format as defined in clause 4.4.3.4.

- The bitstream shall conform to the constraints specified in the **MV-HEVC-Dual-layers-UHD420-Dec** decoding capabilities as defined in clause 5.3.2.

We can do it in textual form like this.

- The bitstream shall contain a first output layer set containing the layer (nuh\_layer\_id = 0) which follows the constraints specified in the **MV-HEVC-Dual-layers-UHD420-Dec** decoding capabilities as defined in clause 5.3.2.

- The bitstream shall contain a second output layer set containing the layer (nuh\_layer\_id = 0) as output layer and a second layer as output layer which follows the constraints specified in the **MV-HEVC-Dual-layers-UHD420-Dec** decoding capabilities as defined in clause 5.3.2. This second layer corresponds to a scalability dimension of type Multiview.

Or, we can do it by syntax constraints like this.

- In the VPS,

- The value vps\_num\_layer\_sets\_minus1 shall be equal to or greater than 1.

- The value layer\_id\_included\_flag[ 1 ][ 0 ] shall be equal to 1 and there shall be a value of j with j different from 0 for which layer\_id\_included\_flag[ 1 ][ j ] is equal to 1.

- The value of scalability\_mask\_flag[ 1 ] shall be equal to 1.

- The value of ScalabilityId[ 1 ][ 1 ] shall be equal to 1.

- The value of default\_output\_layer\_idc shall be equal to 0.

End of if.

- The chroma sub-sampling shall be 4:2:0 and the value of chroma\_format\_idc shall be set to 1.

- The vps\_num\_direct\_ref\_layers[1] may be present, and if present,

- it shall be set to 1.

- the vps\_direct\_ref\_layer\_id[1][0] shall be set to 0.

NOTE: This implies, that layer-dependency is possible, but not needed. The two layers may be independent, or the second layer depend on the base layer.

- In the VUI,

 -

 - Either,

 - the values of colour\_primaries, transfer\_characteristics and matrix\_coeffs each shall be set to 1.

 - The value of chroma\_sample\_loc\_type\_top\_field shall be set to 0.

 - or

 - the values of colour\_primaries and matrix\_coeffs each shall be set to 9, and the value of transfer\_characteristics shall be set to one of the following values: 14 (for SDR with WCG), 16 (for PQ) and 18 (for HLG).

 - The value of the chroma\_sample\_loc\_type\_top\_field shall be set to 2.

The timing information may be present.

- If the timing information is present, i.e. the value of vui\_timing\_info\_present\_flag is set to 1, then the values of vui\_num\_units\_in\_tick and vui\_time\_scale shall be set according to the frame rates allowed for each operation point. The timing information present in the video Bitstream should be consistent with the timing information signalled at the system level.

- The frame rate shall not change between two RAPs. fixed\_pic\_rate\_general\_flag value, if present, shall be set to 1.

Bitstreams not required to be associated with frame packing information for all coded video sequences. It is also possible that such information, when present, may differ from one coded video sequence to another.

The Bitstream shall include the three\_dimensional\_reference\_displays\_info SEI message as specified in Recommendation ITU-T H.265 / ISO/IEC 23008-2 [h265] and at least one reference display shall be specified.

Editor’s Note: More details of the message need to be present. The included parameters allow a decoder or rendering engine to reconstruct the spatial layout of the display(s) used during content creation, which is crucial for accurate 3D rendering, especially in multi-display or immersive environments. Should be added to the representation signal.

* **num\_displays\_minus1**: Indicates how many reference displays are described (actual number is this value + 1).
	+ **Shall be at least 1** (one for each eye)
* **display\_id**: Identifier for each display.
	+ **Anything in 3GPP we want to do**
* **display\_center\_\***: 3D coordinates of the center of the display in the reference coordinate system.
	+ **X, Y, Z parameter**
* **display\_rotation\_\***: Rotation angles (or vectors) describing the orientation of the display.
	+ **X, Y, Z parameter**
* **display\_width\_\*, display\_height\_\***: Vectors defining the physical dimensions of the display surface.
	+ **X, Y, Z**
* **display\_normal\_\***: Normal vector to the display surface.
	+ **X, Y, Z**
* **display\_orientation\_flag**: Indicates whether the display orientation is defined explicitly or implicitly.

three\_dimensional\_reference\_displays\_info( )

{

  num\_displays\_minus1 = 1  // Two displays: left and right

  // Display 0: Left Eye

  display\_id = 0

  display\_center\_x = -0.032  // 32 mm to the left

  display\_center\_y = 0.0

  display\_center\_z = 0.6     // 60 cm from viewer

  display\_rotation\_x = 0.0

  display\_rotation\_y = 0.0

  display\_rotation\_z = 0.0

  display\_width\_x = 0.057

  display\_width\_y = 0.0

  display\_width\_z = 0.0

  display\_height\_x = 0.0

  display\_height\_y = 0.032

  display\_height\_z = 0.0

  display\_normal\_x = 0.0

  display\_normal\_y = 0.0

  display\_normal\_z = -1.0

  display\_orientation\_flag = 1

  // Display 1: Right Eye

  display\_id = 1

  display\_center\_x = 0.032   // 32 mm to the right

  display\_center\_y = 0.0

  display\_center\_z = 0.6

  display\_rotation\_x = 0.0

  display\_rotation\_y = 0.0

  display\_rotation\_z = 0.0

  display\_width\_x = 0.057

  display\_width\_y = 0.0

  display\_width\_z = 0.0

  display\_height\_x = 0.0

  display\_height\_y = 0.032

  display\_height\_z = 0.0

  display\_normal\_x = 0.0

  display\_normal\_y = 0.0

  display\_normal\_z = -1.0

  display\_orientation\_flag = 1

}

6.3.6.3 Receiver Requirements

Receivers conforming to this Operation Point 3GPP-MV-HEVC-Stereo shall support decoding and rendering Bitstreams with the restrictions defined in clause 6.3.6.2, including the necessary processing of three\_dimensional\_reference\_displays\_info SEI message as specified in Recommendation ITU-T H.265 / ISO/IEC 23008-2 [h265].

Editor’s Note: More details of the requirements for rendering needs to be present.

1. Examples Parse the SEI Message:
	1. The decoder extracts the SEI message from the bitstream.
	2. It reads the number of displays and their associated parameters (position, orientation, size, etc.).
2. **Reconstruct Display Geometry**:
	1. Using vectors like display\_center, display\_width, display\_height, and display\_normal, the receiver reconstructs the **3D plane** of each display.
	2. This defines the **viewing frustum** for each eye.
3. **Map Views to Displays**:
	1. The receiver maps the **left and right eye views** to the corresponding display surfaces.
	2. This ensures correct **parallax and depth perception**.
4. **Adjust for Local Display Setup**:
	1. If the actual display differs from the reference (e.g., different size or viewer distance), the receiver can **transform the scene** to preserve the intended 3D effect.
5. **Render the Scene**:
	1. The rendering engine uses the reconstructed geometry to **project the video frames** onto the virtual display planes.
	2. This is especially important in **multi-view or immersive environments** (e.g., VR, AR, CAVE systems).

Example: VR Headsets: Adjusting the stereo rendering pipeline to match the original content's intended depth.

NOTE 1: Rendering includes adherence to the parameters signalled in the bitstream to characterize the distributed Representation format.

There are no requirements on output timing conformance for H.265/HEVC decoding (Annex C of [6]). The Hypothetical Reference Decoder (HRD) parameters, if present, should be ignored by the Receiver.

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