**3GPP TSG SA WG4 #114e *S4-210609***

**E-meeting, 18th – 29th May 2021**

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| *CR-Form-v12.0* | | | | | | | | |
| **draft CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26.116** | **CR** | **<CR#>** | **rev** | **-** | **Current version:** | **16.2.0** |  |
|  | | | | | | | | |
| *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:*** | Spatial positioning requirements the chroma samples for BT.2020 and BT.2100 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated, Tencent | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI16 | | | | |  | ***Date:*** | | | 2021-03-31 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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 can be 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | For for BT.2020 and BT.2100, the relative spatial positioning of the chroma samples is different than the default and for BT.709. Signaling this difference is only recommended in the HEVC specification and may lead to unnecessary problems shifts in the chroma presentation. | | | | | | | | |
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| ***Summary of change:*** | | Mandate the recommendation from the HEVC specification for 3GPP media profiles using BT.2020 and BT.2100 | | | | | | | | |
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| ***Consequences if not approved:*** | | Ambigous specification leading to interop problems.  Potential visual quality problems in the presentation. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.2, 4.5.3.5, 4.5.4.5, 4.5.5.5, 4.5.6.5, 4.5.7.5, 4.5.8.5, | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |
| ***56*** | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**===== CHANGE =====**

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

5GMS 5G Media Streaming

AVC Advanced Video Coding

CVS Coded Video Sequence

DASH Dynamic Adaptive Streaming over HTTP

EOTF Electro-Optical Transfer Function

FFS For Further Study

HD High Definition

HDR High Dynamic Range

HLG Hybrid Log Gamma

HRD Hypothetical Reference Decoder

HEVC High Efficiency Video Coding

MBMS Multicast Broadcast Multimedia Service

MPD Media Presentation Description

NAL Network Abstraction Layer

PPS Picture Parameter Set

OETF Opto-Electronic Transfer Function

PQ Perceptual Quantization

PSS Packet Switch Streaming

RAP Random Access Point

SDR Standard Dynamic Range

SEI Supplemental Enhancement Information

SPS Sequence Parameter Set

TV Television

UHD Ultra High Definition

VCL Video Coding Layer

VUI Video Usability Information

**===== CHANGE =====**

#### 4.5.3.5 Colour information

A Bitstream conforming to the H.265/HEVC Full HD Operation Point shall use either Recommendation ITU-R BT.709 [3] colorimetry or Recommendation ITU-R BT.2020 [4] colorimetry in non-constant luminance.

- BT.709 [3] shall be signalled by setting colour\_primaries to the value 1, transfer\_characteristics to the value 1 and matrix\_coeffs to the value 1.

- If BT.2020 [4] is used,

- it shall be signalled by setting colour\_primaries to the value 9, transfer\_characteristics to the value 14 and matrix\_coeffs to the value 9,

- the chroma\_loc\_info\_present\_flag shall be equal to 1, and

- the chroma\_sample\_loc\_type\_top\_field and chroma\_sample\_loc\_type\_bottom\_field shall both be equal to 2.

A Receiver conforming to the H.265/HEVC Full HD Operation Point shall be capable of decoding Bitstreams that use Recommendation ITU-R BT.709 [3] and ITU-R BT.2020 [4] colorimetry. Such a Receiver should support ITU-R BT.2020 [4] signalling and provide an appropriate mapping of the signal to the supported colour space of the device.

NOTE: Colour spaces are not associated to any particular spatial resolution.

**===== CHANGE =====**

#### 4.5.4.5 Colour information

A Bitstream conforming to the H.265/HEVC UHD Operation Point shall use Recommendation ITU-R BT.2020 [4] colorimetry in non-constant luminance.

- If BT.2020 [4] is used,

- it shall be signalled by setting colour\_primaries to the value 9, transfer\_characteristics to the value 14 and matrix\_coeffs to the value 9,

- the chroma\_loc\_info\_present\_flag shall be equal to 1, and

- the chroma\_sample\_loc\_type\_top\_field and chroma\_sample\_loc\_type\_bottom\_field shall both be equal to 2.

A Receiver conforming to the H.265/HEVC UHD Operation Point shall be capable of decoding Bitstreams that use ITU-R BT.2020 [4] colorimetry. Such a Receiver should support ITU-R BT.2020 [4] signalling and provide an appropriate mapping of the signal to the supported colour space of the device.

**===== CHANGE =====**

#### 4.5.5.5 Colour information and HDR transfer characteristics

A Bitstream conforming to the H.265/HEVC Full HD HDR Operation Point that uses PQ HDR shall comply with the following restrictions in the VUI:

- colour\_primaries shall be set to the value 9,

- transfer\_characteristics shall be set to the value 16,

- matrix\_coeffs shall be set to the value 9,

- the chroma\_loc\_info\_present\_flag shall be equal to 1, and

- the chroma\_sample\_loc\_type\_top\_field and chroma\_sample\_loc\_type\_bottom\_field shall both be equal to 2.

This signalling implies that BT.2020 [4] colorimetry in non-constant luminance and Perceptual Quantization (PQ) electro-optical transfer function (EOTF) as defined in Recommendation ITU-R BT.2100 [11] are in use.

**===== CHANGE =====**

#### 4.5.6.5 Colour information and HDR transfer characteristics

A Bitstream conforming to the H.265/HEVC UHD HDR Operation Point that uses PQ HDR shall comply with the following restrictions in the VUI:

- colour\_primaries shall be set to the value 9,

- transfer\_characteristics shall be set to the value 16,

- matrix\_coeffs shall be set to the value 9,

- the chroma\_loc\_info\_present\_flag shall be equal to 1, and

- the chroma\_sample\_loc\_type\_top\_field and chroma\_sample\_loc\_type\_bottom\_field shall both be equal to 2.

This signalling implies that Recommendation BT.2020 [4] colorimetry in non-constant luminance and Perceptual Quantization (PQ) electro-optical transfer function (EOTF) as defined in Recommendation ITU-R BT.2100 [11] are in use.

**===== CHANGE =====**

#### 4.5.7.5 Colour information and HDR transfer characteristics

A Bitstream conforming to the H.265/HEVC Full HD HDR HLG Operation Point shall comply with the following restrictions in the VUI:

- colour\_primaries shall be set to the value 9,

- transfer\_characteristics shall be set to either the value 18, or to the value 14. In the latter case, the Bitstream shall also contain the alternative\_transfer\_characteristics SEI message. The alternative\_transfer\_characteristics SEI message shall be inserted at each RAP, and its parameter preferred\_transfer\_characteristics shall be set to the value 18.

- matrix\_coeffs shall be set to the value 9,

- the chroma\_loc\_info\_present\_flag shall be equal to 1, and

- the chroma\_sample\_loc\_type\_top\_field and chroma\_sample\_loc\_type\_bottom\_field shall both be equal to 2.

This signalling implies that BT.2020 [4] colorimetry in non-constant luminance and Hybrid Log Gamma (HLG) opto-electronic transfer function (OETF) as defined in Recommendation ITU-R BT.2100 [11] are in use.

**===== CHANGE =====**

#### 4.5.8.5 Colour information and HDR transfer characteristics

A Bitstream conforming to the H.265/HEVC UHD HDR HLG Operation Point shall comply with the following restrictions in the VUI:

- colour\_primaries shall be set to the value 9,

- transfer\_characteristics shall be set to either the value 18, or to the value 14. In the latter case, the Bitstream shall also contain the alternative\_transfer\_characteristics SEI message. The alternative\_transfer\_characteristics SEI message shall be inserted at each RAP, and its parameter preferred\_transfer\_characteristics shall be set to the value 18.

- matrix\_coeffs shall be set to the value 9,

- the chroma\_loc\_info\_present\_flag shall be equal to 1, and

- the chroma\_sample\_loc\_type\_top\_field and chroma\_sample\_loc\_type\_bottom\_field shall both be equal to 2.

This signalling implies that Recommendation BT.2020 [4] colorimetry in non-constant luminance and Hybrid Log Gamma (HLG) opto-electronic transfer function (OETF) as defined in Recommendation ITU-R BT.2100 [11] are in use.