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| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  39th Meeting: by teleconference, 18–24 April 2020 | Document: JCTVC-AM1003-v1 |

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| *Title:* | **Draft revisions for coding-independent code points for video signal type identification (Draft 1)** | | |
| *Status:* | Output document approved by JCT-VC | | |
| *Purpose:* | Draft text | | |
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# Abstract

This document contains draft text changes to Rec. ITU-T H.273 | ISO/IEC 23091-2 as prepared by JCT-VC toward a future revision of these technically aligned twin text standards.

# Draft changes to the text specification

## Foreword

*Replace the paragraph describing the current state of the text with the following:*

The changes introduced in this edition include the addition of a code point for chroma sampling grid alignment indication for the 4:2:0 colour format, correction of the range of values specification for sample aspect ratio indication, correction of the formulae for the ICTCP colour representation for the hybrid-log-gamma (HLG) transfer function specified in Rec. ITU-T BT.2100-2, and correction of the formulae for the transfer function for the sYCC colour representation specified in IEC 61966-2-1.

## Clause 3

*Insert the following subclauses and renumber the subclauses and cross-references for alphabetical ordering.*

**3.1**

**bottom field**

assembly of the odd-numbered rows of samples of the components (3.3) of a video frame using a numbering of rows that starts with row number 0 as the top row

**3.7**

**top field**

assembly of the even-numbered rows of samples of a video frame using a numbering of rows that starts with row number 0 as the top row

## Clause 6, Table 2

*Append the following row to Table 2:*

|  |  |  |
| --- | --- | --- |
| **Chroma420SampleLocType** | Chroma sampling grid alignment for video fields or frames having the 4:2:0 colour format | 8.7 |

## Subclause 8.1, Table 3

*In Table 3, replace “*Rec. ITU-R BT.2100-1*” with “*Rec. ITU-R BT.2100-2*”.*

## Subclause 8.2 and Table 4

*In Table 4, replace “*Rec. ITU-R BT.2100-1*” with “*Rec. ITU-R BT.2100-2*” (in two places) and replace the row for the value 13 with the following:*

|  |  |  |  |
| --- | --- | --- | --- |
| 13 | – If MatrixCoefficients is equal to 0     V = *α* \* Lc( 1÷2.4 ) − ( *α* − 1 )     V = 12.92 \* Lc  – Otherwise     V = *α* \* Lc( 1÷2.4 ) − ( *α* − 1 )     V = 12.92 \* Lc     V = −*α* \* ( −Lc )( 1÷2.4 ) + ( *α* − 1 ) | for 1 > Lc >= *β*  for *β* > Lc >= 0  for Lc >= *β*  for *β* > Lc > −*β*  for −*β* >= Lc | IEC 61966-2-1 sRGB (with MatrixCoefficients equal to 0)  IEC 61966-2-1 sYCC (with MatrixCoefficients equal to 5) |

*Below Table 4, insert the following NOTE and renumber the existing NOTE 2 to NOTE 3.*

NOTE 2 For TransferCharacteristics equal to 13, the formulae given in Table 4 for interpretation with MatrixCoefficients equal to 0 were specified as applying to all values of MatrixCoefficients in a previous version of this document. Closer study later determined that IEC 61966-2-1 had specified a wider range of values for Lc in the context of sYCC usage corresponding to MatrixCoefficients equal to 5. This document was therefore revised to provide a specification of TransferCharacteristics interpretation that depends on the value of MatrixCoefficients to address this deficiency in the prior version of the document.

## Subclause 8.3 and Table 5

*In 8.3, apply paragraph indentation to reflect the logic structure of the “if … otherwise if … otherwise” logic structure.*

*Replace the final “Otherwise” case with the following:*

— Otherwise (MatrixCoefficients is equal to 14), the following applies:

— If TransferCharacteristics is not equal to 18, Formulae (73) to (75) apply:

E′Y = 0.5 \* ( E′L + E′M ) (73)

E′PB = ( 6 610 \* E′L − 13 613 \* E′M + 7 003 \* E′S ) ÷ 4 096 (74)

E′PR = ( 17 933 \* E′L − 17 390 \* E′M − 543 \* E′S ) ÷ 4 096 (75)

— Otherwise, Formulae (76) to (78) apply:

E′Y = 0.5 \* ( E′L + E′M ) (76)

E′PB = ( 3 625 \* E′L − 7 465 \* E′M + 3 840 \* E′S ) ÷ 4 096 (77)

E′PR = ( 9 500 \* E′L − 9 212 \* E′M − 288 \* E′S ) ÷ 4 096 (78)

In these cases, for purposes of the ICTCP nomenclature used in Table 5, E′Y, E′PB, and E′PR of Formulae (73), (74), and (75) or Formulae (76), (77), and (78) may be referred to as I, CT, and CP, respectively. Formulae (73), (74), and (75) were designed specifically for use with TransferCharacteristics equal to 16 (PQ), and Formulae (76), (77), and (78) were designed specifically for use with TransferCharacteristics equal to 18 (HLG).

*In Table 5, move the mention of IEC 61966-2-1 sYCC from the row for the value 1 to the row for the value 5.*

*In Table 5, replace “*Rec. ITU-R BT.2100-1*” with “*Rec. ITU-R BT.2100-2*” (in two places).*

*In Table 5, replace the row for the value 14 with the following:*

|  |  |  |
| --- | --- | --- |
| 14 | ICTCP | Rec. ITU-R BT.2100-2 ICTCP  See Formulae (73) to (75) for TransferCharacteristics value 16 (PQ)  See Formulae (76) to (78) for TransferCharacteristics value 18 (HLG) |

*At the end of the subclause, add the following NOTE:*

NOTE In a previous version of this document, the IEC 61966-2-1 sYCC representation was identified as corresponding to MatrixCoefficients equal to 1. Closer study later determined that this representation should correspond to MatrixCoefficients equal to 5 instead (which is functionally the same as the value 6). This document was therefore revised to correct the error.

## Subclause 8.6

*At the beginning of the subclause, replace the Type and Range specification with the following:*

*Type: Unsigned integer, enumeration*

*Range: 0 – 255 for SampleAspectRatio*

*Range: 0 – 65535 for SarWidth and SarHeight*

## New subclause 8.7, new Figures 9, 10 and 11, and new Table 9

*Insert a new subclause 8.7, new Figures 9, 10 and 11, and new Table 9, as follows:*

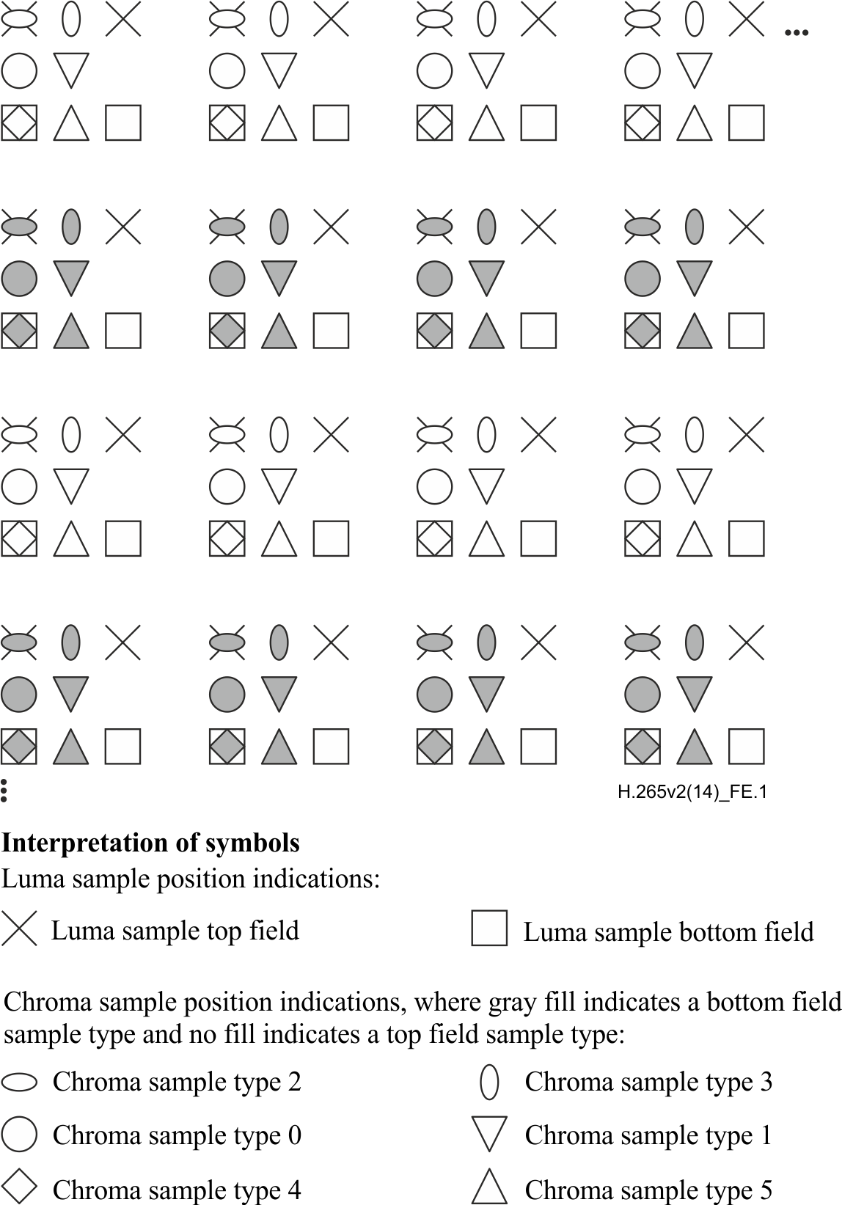
**8.7 Chroma 4:2:0 sample location type**

*Type: Unsigned integer, enumeration*

*Range: 0 – 5*

**Chroma420SampleLocType** indicates the chroma sampling grid alignment for video fields or frames using the 4:2:0 colour format (in which the two chroma arrays have half the width and half the height of the associated luma array), as shown in Figure 9.

A value of Chroma420SampleLocType may be indicated for a top field, a bottom field, or a frame. When Chroma420SampleLocType is indicated for a frame, the same value applies to both the top field and bottom field of the frame.



**Figure 9 — Location of 4:2:0 chroma samples for top and bottom fields as a function of Chroma420SampleLocType**

Figure 10 illustrates the indicated relative position of the top-left chroma sample when Chroma420SampleLocType is indicated for a frame and thus applies to both the top field and bottom field of the frame. The region represented by the top-left 4:2:0 chroma sample (depicted as a large red square with a large red dot at its centre) is shown relative to the region represented by the top-left luma sample (depicted as a small black square with a small black dot at its centre). The regions represented by neighbouring luma samples are depicted as small grey squares with small grey dots at their centres.

A picture containing screenshot, game

Description automatically generated

**Figure 10 — Location of the top-left chroma sample for a frame as a function of Chroma420SampleLocType**

The relative spatial positioning of the chroma samples, as illustrated in Figure 11, can be expressed by defining two variables HorizontalOffsetC and VerticalOffsetC as a function of Chroma420SampleLocType as given by Table 9, where HorizontalOffsetC is the horizontal (x) position of the centre of the top-left chroma sample relative to the centre of the top-left luma sample in units of luma samples and VerticalOffsetC is the vertical (y) position of the centre of the top-left chroma sample relative to the centre of the top-left luma sample in units of luma samples.

In a typical finite-impulse-response filter design, HorizontalOffsetC and VerticalOffsetC would serve as the phase offsets for the horizontal and vertical filter operations, respectively, for separable downsampling from the 4:4:4 colour format (in which the two chroma arrays have the same width and height as the associated luma array) to the 4:2:0 colour format.

A picture containing clock

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**Figure 11 — Location of the top-left chroma sample when Chroma420SampleLocType is equal to 1 and thus HorizontalOffsetC and VerticalOffsetC are both equal to 0.5**

**Table 9 — Meaning of chroma 4:2:0 sample location type indicator (Chroma420SampleLocType)**

|  |  |  |
| --- | --- | --- |
| **Chroma420SampleLocType** | **HorizontalOffsetC** | **VerticalOffsetC** |
| 0 | 0 | 0.5 |
| 1 | 0.5 | 0.5 |
| 2 | 0 | 0 |
| 3 | 0.5 | 0 |
| 4 | 0 | 1 |
| 5 | 0.5 | 1 |

## Bibliography

*In the Bibliography, replace “*Rec. ITU-R BT.2100-1*” with “*Rec. ITU-R BT.2100-2*”.*

*[ End of document ]*