# ETSI TS 103 572 V1.2.1 (2020-10)


**HDR Signalling and Carriage of Dynamic Metadata for Colour Volume Transform; Application #1**

EBU

Reference
RTS/JTC-057

Keywords
broadcasting, content, distribution, HDR, HDTV, UHDTV, video

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# Foreword

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# Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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# Introduction

SMPTE ST 2094-10 [4] HDR dynamic metadata provides and describes dynamic information about the video signal. The usage of this information can be employed by the display to adapt the delivered HDR imagery to the capability of the display device. The information conveyed in the SEI message carrying SMPTE ST 2094-10 [4] HDR dynamic metadata is adequate for purposes corresponding to the use of Society of Motion Picture and Television Engineers SMPTE ST 2094-1 [3] "Dynamic Metadata for Color Volume Transform - Core Components" and SMPTE ST 2094-10 [4] "Dynamic Metadata for Color Volume Transform - Application #1".

# 1 Scope

The present document specifies the format of the HEVC SEI message for the carriage of SMPTE ST 2094-10 [4] HDR dynamic metadata.

The present document provides the guidelines for the carriage and signalling the presence of SMPTE ST 2094-10 [4] HDR dynamic metadata (carried in SEI messages defined in the present document) for DVB systems, using private data signalling methods compatible with those defined in ETSI TS 101 154 [8], ETSI TS 103 285 [9] and ETSI EN 300 468 [6].

# 2 References

## 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] SMPTE ST 2084: "High Dynamic Range Electro-Optical Transfer Function of Mastering Reference Displays".

[2] SMPTE ST 2086: "Mastering Display Color Volume Metadata Supporting High Luminance And Wide Color Gamut Images".

[3] SMPTE ST 2094-1: "Dynamic Metadata for Color Volume Transform - Core Components".

[4] SMPTE ST 2094-10: "Dynamic Metadata for Color Volume Transform - Application #1".

[5] Recommendation ITU-T H.265 | ISO/IEC 23008-2: "Information technology -- High efficiency coding and media delivery in heterogeneous environments -- Part 2: High efficiency video coding".

[6] ETSI EN 300 468: "Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems".

[7] Void.

[8] ETSI TS 101 154: "Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcast and Broadband Applications".

[9] ETSI TS 103 285: "Digital Video Broadcasting (DVB); MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks".

[10] Void.

## 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Recommendation ITU-R BT.2246-2: "The present state of ultra-high definition television".

# 3 Definition of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the following terms apply:

**display mapping:** adapting the signal to the dynamic range and the colour gamut of the target display

**dynamic range:** ratio of the maximum light intensity to the minimum light intensity [i.1]

NOTE: In digital cameras the dynamic range is normally measured in terms of stops, which describe the total light range by power of 2.

**extended display mapping metadata:** subset of the ST2094_data() structure

**high dynamic range:** typically, a dynamic range of more than 10 stops is referred to as high dynamic range

**standard dynamic range:** typically, a dynamic range of up to 10 stops is referred to as standard dynamic range

## 3.2 Symbols

### 3.2.1 Arithmetic operators

For the purposes of the present document, the following arithmetic operators apply:

| | |
|---|---|
| + | Addition |
| - | Subtraction (as a two-argument operator) or negation (as a unary prefix operator) |
| x | Multiplication, including matrix multiplication |
| ÷ | Used to denote division in mathematical equations where no truncation or rounding is intended |
| / | Integer division with truncation of the result toward zero |

EXAMPLE: 7/4 and - 7/- 4 are truncated to 1 and - 7/4 and 7/- 4 are truncated to - 1.

### 3.2.2 Relational operators

For the purposes of the present document, the following relational operators apply:

| | |
|---|---|
| > | Greater than |
| >= | Greater than or equal to |
| < | Less than |
| <= | Less than or equal to |
| == | Equal to |
| != | Not equal to |

### 3.2.3 Assignment operators

For the purposes of the present document, the following assignment operators apply:

| | |
|---|---|
| = | Assignment operator |
| ++ | Increment, i.e. *x* is equivalent to *x* = *x* + 1; when used in an array index, evaluates to the value of the variable prior to the increment operation |
| -- | Decrement, i.e. *x*- - is equivalent to *x* = *x* - 1; when used in an array index, evaluates to the value of the variable prior to the decrement operation |
| += | Increment by amount specified, i.e. x += 4 is equivalent to x = x + 4, and x += (-4) is equivalent to x = x + (-4) |
| -= | Decrement by amount specified, i.e. x -= 4 is equivalent to x = x - 4, and x -= (-4) is equivalent to x = x - (-4) |

### 3.2.4 Mathematical functions

For the purposes of the present document, the following mathematical functions apply:

$$\text{Abs}(x) = \begin{cases} x & ; \quad x \geq 0 \\ -x & ; \quad x < 0 \end{cases}$$

$$\text{Clip3}(x, y, z) = \begin{cases} x & ; \quad z < x \\ y & ; \quad z > y \\ z & ; \quad otherwise \end{cases}$$

Floor(x) the largest integer less than or equal to x.

Round(x)=Sign(x)*Floor(Abs(x)+0,5)

$$\text{Sign}(x) = \begin{cases} 1 & ; \quad x > 0 \\ 0 & ; \quad x = 0 \\ -1 & ; \quad x < 0 \end{cases}$$

## 3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

| | |
|---|---|
| CVS | Coded Video Sequence |
| EN | European Standard |
| HDR | High Dynamic Range |
| HEVC | High Efficiency Video Coding |
| ITU-R | International Telecommunications Union - Radiocommunications standardization sector |
| ITU-T | International Telecommunications Union - Telecommunications standardization sector |
| MPEG | Moving Picture Expert Group |
| PQ | Perceptual Quantizer |

NOTE: As defined in SMPTE ST 2084 [1].

| | |
|---|---|
| SEI | Supplemental Enhancement Information |
| SI | Service Information |
| SMPTE | Society of Motion Pictures and Television Engineers |
| ST | STandard |
| UHDTV | Ultra High Definition TeleVision |

# 4 ST2094-10_data() structure definition

## 4.1 Introduction

This clause specifies the syntax and semantics of ST2094-10_data() structure.

Clause 4.1 defines the syntax of the ST2094-10_data() structure.

Clause 4.2 defines the semantics of the ST2094-10_data() structure.

NOTE: The metadata elements of the ST2094-10_data() structure are defined according to the SMPTE ST 2086 [2], SMPTE ST 2094-1 [3] and SMPTE ST 2094-10 [4].

## 4.2 ST2094-10_data() structure syntax

The parsing process of each syntax element by the descriptor u(n) is described in Recommendation ITU-T H.265 [5].

**Table 1: ST2094-data() syntax**

| ST2094-10_data () { | Descriptor |
|---|---|
| **app_identifier** | ue(v) |
| **app_version** | ue(v) |
| **metadata_refresh_flag** | u(1) |
| if( metadata_refresh_flag ) { | |
| **num_ext_blocks** | ue(v) |
| if( num_ext_blocks ) { | |
| while( !byte_aligned() ) | |
| **dm_alignment_zero_bit** | f(1) |
| for( i = 0; i < num_ext_blocks; i ++ ) { | |
| ext_dm_data_block(i) | |
| } | |
| } | |
| } | |
| while( !byte_aligned() ) | |
| **dm_alignment_zero_bit** | f(1) |
| } | |

**Table 2: ext_dm_data_block() syntax**

| ext_dm_metadata_block(i) { | Descriptor |
|---|---|
| **ext_block_length**[ i ] | ue(v) |
| **ext_block_level** [ i ] | u(8) |
| ext_dm_data_block_payload( ext_block_length[ i ], ext_block_level [ i ] ) | |
| } | |

**Table 3: ext_dm_data_block_payload() syntax**

| ext_dm_data_block_payload( ext_block_length, ext_block_level ) { | Descriptor |
|---|---|
| ext_block_len_bits = 8 * ext_block_length | |
| ext_block_use_bits = 0 | |
| if( ext_block_level == 1 ) { | |
| **min_PQ** | u(12) |
| **max_PQ** | u(12) |
| **avg_PQ** | u(12) |
| ext_block_use_bits += 36 | |
| } | |
| if( ext_block_level == 2 ) { | |
| **target_max_PQ** | u(12) |
| **trim_slope** | u(12) |
| **trim_offset** | u(12) |
| **trim_power** | u(12) |
| **trim_chroma_weight** | u(12) |
| **trim_saturation_gain** | u(12) |
| **ms_weight** | i(13) |
| ext_block_use_bits += 85 | |
| } | |
| if( ext_block_level == 3 ) { | |
| **min_PQ_offset** | u(12) |
| **max_PQ_offset** | u(12) |
| **avg_PQ_offset** | u(12) |
| ext_block_use_bits += 36 | |
| } | |
| if( ext_block_level == 4 ) { | |
| **TF_PQ_mean** | u(12) |
| **TF_PQ_stdev** | u(12) |
| ext_block_use_bits += 24 | |
| } | |
| if( ext_block_level == 5 ) { | |
| **active_area_left_offset** | u(13) |
| **active_area_right_offset** | u(13) |
| **active_area_top_offset** | u(13) |
| **active_area_bottom_offset** | u(13) |
| ext_block_use_bits += 52 | |
| } | |
| while( ext_block_use_bits++ < ext_block_len_bits ) | |
| **ext_dm_alignment_zero_bit** | f(1) |
| } | |

## 4.3 ST2094-10_data() structure semantics

**app_identifier** identifies an application and shall be set equal to 1 according to constraints of the section 5 of SMPTE ST 2094-10 [4].

**app_version** specifies the application version in the application and shall be set equal to 0 according to constraints of the section 5 of SMPTE ST 2094-10 [4].

**metadata_refresh_flag** when set equal to 1 cancels the persistence of any previous extended display mapping metadata in output order and indicates that extended display mapping metadata follows. The extended display mapping metadata persists from the coded picture to which the SEI message containing ST2094-10_data() is associated (inclusive) to the coded picture to which the next SEI message containing ST2094-10_data() and with **metadata_refresh_flag** set equal to 1 in output order is associated (exclusive) or (otherwise) to the last picture in the CVS (inclusive). When set equal to 0 this flag indicates that the extended display mapping metadata does not follow.

**num_ext_blocks** specifies the number of extended display mapping metadata blocks. The value shall be in the range of 1 to 254, inclusive.

**dm_alignment_zero_bit** shall be equal to 0.

**ext_block_length**[ i ] is used to derive the size of the i-th extended display mapping metadata block payload in bytes. The value shall be in the range of 0 to 1 023, inclusive.

**ext_block_level**[ i ] specifies the level of payload contained in the i-th extended display mapping metadata block. The value shall be in the range of 0 to 255, inclusive. The corresponding extended display mapping metadata block types are defined in Table 4. Values of ext_block_level[ i ] that are reserved shall not be present in the bitstreams conforming to this version of the present document. Blocks using reserved values shall be ignored:

- When the value of ext_block_level[ i ] is set equal to 1, the value of ext_block_length[ i ] shall be set equal to 5.
- When the value of ext_block_level[ i ] is set equal to 2, the value of ext_block_length[ i ] shall be set equal to 11.
- When the value of ext_block_level[ i ] is set equal to 3, the value of ext_block_length[ i ] shall be set equal to 5.
- When the value of ext_block_level[ i ] is set equal to 4, the value of ext_block_length[ i ] shall be set equal to 3.
- When the value of ext_block_level[ i ] is set equal to 5, the value of ext_block_length[ i ] shall be set equal to 7.

**Table 4: Definition of extended display mapping metadata block type**

| ext_block_level | extended display mapping metadata block type |
|---|---|
| 0 | Reserved |
| 1 | Level 1 Metadata - Content Range |
| 2 | Level 2 Metadata - Trim Pass |
| 3 | Level 3 Metadata - Content Range Offsets |
| 4 | Level 4 Metadata - Temporally Filtered Image Level |
| 5 | Level 5 Metadata - Active Area |
| 6…255 | Reserved |

When an extended display mapping metadata block with ext_block_level equal to 5 is present, the following constraints shall apply:

- An extended display mapping metadata block with ext_block_level equal to 5 shall be preceded by at least one extended display mapping metadata block with ext_block_level equal to 1, 2, 3 or 4.
- Between any two extended display mapping metadata blocks with ext_block_level equal to 5, there shall be at least one extended display mapping metadata block with ext_block_level equal to 1, 2, 3 or 4.
- No extended display mapping metadata block with ext_block_level equal to 1, 2, 3 or 4 shall be present after the last extended display mapping metadata block with ext_block_level equal to 5.
- The metadata of an extended display mapping metadata block with ext_block_level equal to 1, 2, 3 or 4 shall be applied to the active area specified by the first extended display mapping metadata block with ext_block_level equal to 5 following this block.
- When the active area defined by the current extended display mapping metadata block with ext_block_level equal to 5 overlaps with the active area defined by preceding extended display mapping metadata blocks with ext_block_level equal to 5, all metadata of the extended display mapping metadata blocks with ext_block_level equal to 1, 2, 3 or 4 associated with the current extended display mapping metadata block with ext_block_level equal to 5 shall be applied to the pixel values of the overlapping area.

**min_PQ** specifies the minimum luminance value of the current picture in 12-bit PQ encoding. The value shall be in the range of 0 to 4 095, inclusive. Note that the 12-bit min_PQ value with full range is calculated as follows:

$$min\_PQ = Clip3(0, 4\,095, Round(Min \times 4\,095)) \quad (1)$$

where Min is MinimumPqencodedMaxrgb as defined in clause 6.1.3 of SMPTE ST 2094-10 [4].

**max_PQ** specifies the maximum luminance value of current picture in 12-bit PQ encoding. The value shall be in the range of 0 to 4 095, inclusive. Note that the 12-bit max_PQ value with full range is calculated as follows:

$$\text{max\_PQ} = \text{Clip3}(0, 4\,095, \text{Round}(\text{Max} \times 4\,095)) \quad (2)$$

where Max is MaximumPqencodedMaxrgb as defined in clause 6.1.5 of SMPTE ST 2094-10 [4].

**avg_PQ** specifies the midpoint luminance value of current picture in 12-bit PQ encoding. The value shall be in the range of 0 to 4 095, inclusive. Note that the 12-bit avg_PQ value with full range is calculated as follows:

$$\text{avg\_PQ} = \text{Clip3}(0, 4\,095, \text{Round}(\text{Avg} \times 4\,095)) \quad (3)$$

where Avg is AveragePqencodedMaxrgb as defined in section 6.1.4 of SMPTE ST 2094-10 [4].

**target_max_PQ** specifies the maximum luminance value of a target display in 12-bit PQ encoding. The value shall be in the range of 0 to 4 095, inclusive. The target_max_PQ is the PQ encoded value of TargetedSystemDisplayMaximumLuminance as defined in clause 10.4 of SMPTE ST 2094-1 [3].

If there is more than one extended display mapping metadata block with ext_block_level equal to 2, those blocks shall have no duplicated target_max_PQ.

**trim_slope** specifies the slope metadata. The value shall be in the range of 0 to 4 095, inclusive. If trim_slope is not present, it shall be inferred to be 2 048. Note that the 12-bit slope value is calculated as follows:

$$trim\_slope = \text{Clip3}(0, 4\,095, \text{Round}((S - 0{,}5) \times 4\,096)) \quad (4)$$

where *S* is the ToneMappingGain as defined in clause 6.2.3 of SMPTE ST 2094-10 [4].

**trim_offset** specifies the offset metadata. The value shall be in the range of 0 to 4 095, inclusive. If trim_offset is not present, it shall be inferred to be 2 048. Note that the 12-bit offset value is calculated as follows:

$$trim\_offset = \text{Clip3}(0, 4\,095, \text{Round}((O + 0{,}5) \times 4\,096)) \quad (5)$$

where *O* is the ToneMappingOffset as defined in clause 6.2.2 of SMPTE ST 2094-10 [4].

**trim_power** specifies the power metadata. The value shall be in the range of 0 to 4 095, inclusive. If trim_power is not present, it shall be inferred to be 2 048. Note that the 12-bit power value is calculated as follows:

$$trim\_power = \text{Clip3}(0, 4\,095, \text{Round}((P - 0{,}5) \times 4\,096)) \quad (6)$$

where *P* is the ToneMappingGamma as defined in clause 6.2.4 of SMPTE ST 2094-10 [4].

**trim_chroma_weight** specifies the chroma weight metadata. The value shall be in the range of 0 to 4 095, inclusive. If trim_chroma_weight is not present, it shall be inferred to be 2 048. Note that the 12-bit chroma weight value is calculated as follows:

$$trim\_chroma\_weight = \text{Clip3}(0, 4\,095, \text{Round}((CW + 0{,}5) \times 4\,096)) \quad (7)$$

where *CW* is the ChromaCompensationWeight as defined in clause 6.3.1 of SMPTE ST 2094-10 [4].

**trim_saturation_gain** specifies the saturation gain metadata. The value shall be in the range of 0 to 4 095, inclusive. If trim_saturation_gain is not present, it shall be inferred to be 2 048. Note that the 12-bit saturation gain value is calculated as follows:

$$trim\_saturation\_gain = \text{Clip3}(0, 4\,095, \text{Round}((SG + 0{,}5) \times 4\,096)) \quad (8)$$

where *SG* is the SaturationGain as defined in clause 6.3.2 of SMPTE ST 2094-10 [4].

**ms_weight** this field is reserved for future specification. This 13-bit signed integer shall be 0x1fff (-1).

**min_PQ_offset** specifies a creative adjustment to **min_PQ**. The value shall be in the range of 0 to 4095, inclusive. This integer range encodes the normalised PQ value range [-1.0, 1.0] inclusive, as specified in section 6.1.6 of SMPTE ST 2094-10 [4].

If min_PQ_offset is not present, it shall be inferred to be 2048. This defualt value corresponds to the encoded normalized PQ value of 0.0 as specified in section 6.1.6 of SMPTE ST 2094-10 [4].

The 12-bit min_PQ_offset value is calculated as follows:

$$\text{min\_PQ\_offset} = \text{Clip3}(0, 4095, \text{Round}((\text{Min\_Offset} + 1) * 2048)) \quad (9)$$

where Min_Offset is MinimumPqencodedMaxrgbOffset as defined in section 6.1.6 of ST 2094-10 [4].

**max_PQ_offset** specifies a creative adjustment to **max_PQ**. The value shall be in the range of 0 to 4095, inclusive. This integer range encodes the normalised PQ value range [-1.0, 1.0] inclusive, as specified in section 6.1.8 of SMPTE ST 2094-10 [4].

If max_PQ_offset is not present, it shall be inferred to be 2048. This defualt value corresponds to the encoded normalized PQ value of 0.0 as specified in section 6.1.8 of SMPTE ST 2094-10 [4].

The 12-bit max_PQ_offset value is calculated as follows:

$$\text{max\_PQ\_offset} = \text{Clip3}(0, 4095, \text{Round}((\text{Max\_Offset} + 1) * 2048)) \quad (10)$$

where Max_Offset is MaximumPqencodedMaxrgbOffset as defined in section 6.1.8 of ST 2094-10 [4].

**avg_PQ_offset** specifies a creative adjustment to **avg_PQ**. The value shall be in the range of 0 to 4095, inclusive. This integer range encodes the normalised PQ value range [-1.0, 1.0] inclusive, as specified in section 6.1.7 of SMPTE ST 2094-10 [4].

If avg_PQ_offset is not present, it shall be inferred to be 2048. This defualt value corresponds to the encoded normalized PQ value of 0.0 as specified in section 6.1.7 of SMPTE ST 2094-10 [4].

The 12-bit avg_PQ_offset value is calculated as follows:

$$\text{avg\_PQ\_offset} = \text{Clip3}(0, 4095, \text{Round}((\text{Avg\_Offset} + 1) * 2048)) \quad (11)$$

where Avg_Offset is AveragePqencodedMaxrgbOffset as defined in section 6.1.7 of ST 2094-10 [4].

**TF_PQ_mean** specifies the temporally filtered mean of the maximum RGB value of the current frame. The value shall be in the range of 0 to 4095, inclusive. Note that the 12-bit TF_PQ_mean value for i[th] frame $\text{TF\_PQ\_mean}_i$ is calculated as follows:

$$TF\_PQ\_norm\_mean_i = TF\_PQ\_norm\_mean_{i-1} * (1 - \alpha) + \text{mean}\big(\text{PQ}(maxRGB_i)\big) * \alpha \quad (12)$$

where *maxRGB* is defined in section 4.1.1 of SMPTE ST 2094-1 [3] and in the range [0, 1], and:

$$\alpha = \min(1, \min\big(1, (SC * \left|\text{mean}\big(\text{PQ}(maxRGB_i)\big) - \text{mean}\big(\text{PQ}(maxRGB_{i-1})\big)\right| * 8 + 0.1) * 24/framerate)) \quad (13)$$

The value of *SC* is set to 1 at a scene boundary; otherwise the value of *SC* is set to 0:

$$TF\_PQ\_mean_i = Clip3(0, 4095, \text{Round}(TF\_PQ\_norm\_mean_i * 4095)) \quad (14)$$

NOTE 1: For an intitial frame where there is no i-1 frame, a default value for TF_PQ_mean of 1474 (0.36) may be used.

**TF_PQ_stdev** specifies the temporally filtered standard deviation of the maximum RGB value of the current frame. The value shall be in the range of 0 to 4095, inclusive. Note that the 12bit - value for i[th] frame $\text{TF\_PQ\_stdev}_i$ is calculated as follows:

$$TF\_PQ\_norm\_stdev_i = TF\_PQ\_norm\_stdev_{i-1} * (1 - \alpha) + \text{stdev}\big(\text{PQ}(maxRGB_i)\big) * \alpha \quad (15)$$

where *maxRGB* is defined in section 4.1.1 of SMPTE ST 2094-1 [3] and in the range [0, 1], and:

$$\alpha = \min(1, \min\big(1, (SC * \left|\text{mean}\big(\text{PQ}(maxRGB_i)\big) - \text{mean}\big(\text{PQ}(maxRGB_{i-1})\big)\right| * 8 + 0.1) * 24/framerate)) \quad (16)$$

The value of *SC* is set to 1 at a scene boundary; otherwise the value of *SC* is set to 0:

$$TF\_PQ\_stdev_i = Clip3(0, 4095, \text{Round}(TF\_PQ\_norm\_stdev_i * 4095)) \quad (17)$$

NOTE 2: For an intitial frame where there is no i-1 frame, a default value for TF_PQ_stdev of 0 may be used.

NOTE 3: The alpha value is calculated to ensure a smooth transition between scenes. The scene boundary can be determined by an appropriate mechanism, such as in the encoder.

**active_area_left_offset, active_area_right_offset, active_area_top_offset, active_area_bottom_offset** specify the selected pixels of the current picture, in terms of a rectangular region specified in picture coordinates for active area. The values shall be in the range of 0 to 8 191, inclusive. See also ProcessingWindow definitions in SMPTE ST 2094-10 [4].

**active_area_left_offset, active_area_right_offset, active_area_top_offset, active_area_bottom_offset** represent the coordinates of UpperLeftCorner and LowerRightCorner constrained in clause 7.1 of SMPTE ST 2094-10 [4] as follows:

$$\begin{aligned} \text{UpperLeftCorner} &= (\text{active\_area\_left\_offset}, \text{active\_area\_top\_offset}) \\ \text{LowerRightCorner} &= (\text{XSize} - 1 - \text{active\_area\_right\_offset}, \text{YSize} - 1 - \text{active\_area\_bottom\_offset}) \end{aligned} \quad (18)$$

where Xsize is the horizontal resolution of the current picture and Ysize is the vertical resolution of the current picture.

**ext_dm_alignment_zero_bit** shall be equal to 0.

# Annex A (informative): SMPTE ST 2094-10 HDR Dynamic Metadata in MPEG-2 TS for DVB Systems

## A.1 Introduction

This annex was removed as the carriage and signalling of SMPTE ST 2094-10 HDR dynamic metadata in DVB systems compliant MPEG-2 transport streams has now been defined in ETSI TS 101 154 [8] and ETSI EN 300 468 [6].

# History

| Document history | | |
|---|---|---|
| V1.1.1 | March 2018 | Publication |
| V1.1.2 | July 2018 | Publication |
| V1.2.1 | October 2020 | Publication |
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