|  |  |
| --- | --- |
| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  34th Meeting: Marrakech, MA, 12–18 Jan. 2019 | Document: JCTVC-AH0022-v3 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Title:* | **Baseband Signalling Specifications Carriage to Supplement of Usage of Video Signal Coding Types document** | | |
| *Status:* | Proposal to JCT-VC | | |
| *Purpose:* | Draft Text | | |
| *Author(s) or Contact(s):* | Yasser Syed  Atsuro Ichigaya  Chris Seeger | Tel: Email: | +1 303-246-8413 [yasser\_syed@comcast.com](mailto:yasser_syed@comcast.com)  [ichigaya.a-go@nhk.or.jp](mailto:ichigaya.a-go@nhk.or.jp)  chris.seeger@nbcuni.com |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Abstract**

This document contains a draft of an amendment for adding baseband signalling specification compatibility to the non- normative technical report’s video signal property description code points and their combinations that are widely used in production and video content workflows. This report will provide baseband signal specification compatibility and carriage of the combination of video properties.

DRAFT TECHNICAL REPORT

Draft ISO/IEC 23091-4 : 201x (E)

Draft ITU-T H Suppl. XX (201x E)

DRAFT ITU-T SUPPLEMENT

USAGE OF VIDEO SIGNAL TYPE CODE POINTS- BASEBAND Inputs

# Scope

# Normative references

* 1. **Identical Recommendations | International Standards**
  2. **Paired Recommendations | International Standards equivalent in technical content**
  3. **Additional references**
* Rec. ITU-R BT.2077-2:2017 Real-time serial digital interfaces for UHDTV Signals
* SMPTE ST 2022-6:2012 Transport of High Bit Rate Media Signals over IP Networks (HBRMT)
* SMPTE ST 2110-20:2017 Professional Media Over Managed IP Networks: Uncompressed Active Video
* Rec. ITU-R BT.656-5:2007 Interface for digital component video signals in 525-line and 625-line television systems operating at the 4:2:2 level of Recommendation ITU-R BT.601
* SMPTE ST 259M:2008 Television – SDTV1 Digital Signal/Data – Serial Digital Interface
* SMPTE ST 292-1:2018 1.5 Gb/s Signal/Data Serial Interface
* Rec. ITU-R BT.1120-9:2017 Digital interfaces for studio signals with 1920x1080 image formats
* SMPTE ST 372(-1):2017 Dual Link 1.5 Gb/s Digital Interface for 1920 x 1080 and 2048 x 1080 Picture Formats
* SMPTE ST 425-1:2017 Source Image Format and Ancillary Data Mapping for the 3 Gb/s Serial Interface
* SMPTE ST 424-3:2015 Image Format and Ancillary Data Mapping for the Dual Link 3 Gb/s Serial Interface
* SMPTE ST 425-5:2015 Image Format and Ancillary Data Mapping for the Quad Link 3 Gb/s Serial Interface
* SMPTE ST 2081-10:2018 2160-line and 1080-line Source Image and Ancillary Data Mapping for 6G-SDI
* SMPTE ST 2081-11:2016 2160-line and 1080-line Source Image and Ancillary Data Mapping for Dual-link 6G-SDI
* SMPTE ST 2081-12:2016 4320-line and 2160-line Source Image and Ancillary Data Mapping for Quad-link 6G-SDI
* SMPTE ST 2036-3:2018 Ultra High Definition Television – Mapping into Single-link and Multilink 10 Gb/s Serial Signal/Data Interface
* SMPTE ST 2082-10:2018 2160-line and 1080-line Source Image and Ancillary Data Mapping for 12G-SDI
* SMPTE ST 2082-11:2016 4320-line and 2160-line Source Image and Ancillary Data Mapping for Dual-link 12G-SDI
* SMPTE ST 2082-12: 2016 4320-line and 2160-line Source Image and Ancillary Data Mapping for Quad-link 12G-SDI
* CTA 861-G:2017 A DTV Profile for Uncompressed High Speed Digital Interfaces – AVI InfoFrame Version Errata: 09/13/2017

# Definitions

For the purposes of this document, the following definitions and the definitions in the HEVC (Rec. ITU-T H.265 | ISO/IEC 23008-2), AVC (Rec. ITU-T H.264 | ISO/IEC 14496-10), and CICP (Rec. ITU-T H.273 | ISO/IEC 23001-8) specifications apply.

|  |  |
| --- | --- |
| **3.1**  **3.2** | **baseband**  Uncompressed video signal  **dual-link**  Convey baseband video signal with two parallel interfaces  **quad-link**  Convey baseband video signal with four parallel interfaces |

# Abbreviations

For the purposes of this document, the following abbreviations apply.

# Overview

# Workflow domains

# Common video signal type combinations

## General

## Colorimetry and colour range descriptions

### General

[Ed/YS Insert after 1st paragraph)

In Table 2, the type of baseband carriage of video signals over serial digital interfaces are dependent on data rates limitations of the interface which are specified by the resolution of the video signal.

**Table 2 – Source Format Data (Resolution) Carriage over Broadband SDI Connections**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Spec | Source Format Data (Resolution) | | | | | | | |
|  | 720x480 | 720x576 | 1280x720 | 1920x1080 | 2048x1080 | 3840x2160 | 4096x2160 | 7680x4320 |
| ST 259M (SD-SDI) | √ | √ |  |  |  |  |  |  |
| BT 656M (SD-SDI) | √ | √ |  |  |  |  |  |  |
| ST 292-1 (HD-SDI) |  |  | √ | √ | √ |  |  |  |
| BT.1120-9 (12/2017) (HD-SDI) |  |  |  | √ |  |  |  |  |
| ST 372-1:2017 (Dual Link HD-SDI) |  |  |  | √ | √ |  |  |  |
| ST 425-1:2017 (3G-SDI) |  |  |  | √ | √ |  |  |  |
| BT 1120-9 (12/2017) (Dual link HD-SDI/3G-SDI) |  |  |  | √ |  |  |  |  |
| ST 425-5:2015 (Quad link 3G-SDI) |  |  |  |  |  | √ | √ |  |
| ST 2081-10:2018 (6G-SDI) |  |  |  | √ | √ | √ | √ |  |
| ST 2082-10:2018 (12G-SDI) |  |  |  |  |  | √ | √ |  |
| ST 2082-12:2016 (Quad link 12G-SDI) |  |  |  |  |  | √ | √ | √ |
| ST 2036-3:2018:2018 (Single/multi link 10G-SDI) |  |  |  |  |  | √ |  | √ |
| BT 2077-2 (U-SDI) |  |  |  |  |  | √ |  | √ |

In this table, white cells indicates “used combinations”; grey cells indicates “not used combinations”.

[Ed/YS Do we need to indicate highest frame rate support?]

### Colour properties

### Common descriptions and carriage – standard dynamic range video with narrow colour gamut

**\**

**Table 4 – Baseband Specifications Carriage of SDR NCG common colour volume descriptions**

|  | **System Identifier** | | **BT709\_YCC** | **BT709\_RGB** | **FR709\_RGB** | **BT601\_525** | **BT601\_625** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Colour properties** | Colour primaries | | BT.709 | BT.709 | BT.709 | BT.601 | BT.601 |
| Transfer characteristics | | BT.709 | BT.709 | BT.709 | BT.709 | BT.709 |
| Colour representation | | Y′CbCr | R′G′B′ | R′G′B′ | Y′CbCr | Y′CbCr |
| **Other** | Full/narrow range | | Narrow | Narrow | Full | Narrow | Narrow |
| 4:2:0 chroma sample location alignment | | Interstitial | Interstitial | Interstitial | Interstitial | Interstitial |
| **Baseband** | ITU-R Spec | SMPTE Spec |  | | | | |
| BT.656-5  SDI | ST 259M (SD-SDI) |  |  |  | √ | √ |
| BT.1120-9 (12/2017) | 292-1  1.5 Gb/s | √ | √ | √ |  |  |
| 372-1 Dual 1.5 Gb/s | √ | √ | √ |  |  |
| 425-1  3G | √ | √ | √ |  |  |
| XXX | 425-5  Quad 3G | √ | √ |  |  |  |
| BT 2077-2 (12/2017) | ST2081-10 6G | √ | √ | √ |  |  |
| ST2082-10  12G (up to UHD4K) | √ | √ | √ |  |  |
| ST2082-12  Quad 12G (up to UHD4K) | √ | √ | √ |  |  |
| ST 2036-3  (Single/Multi-link 10G SDI) | √ | √ | √ |  |  |
| ST 2110-20:2017  Uncompressed Video/IP | | √ | √ | √ |  |  |
| CTA 861.4/HDMI  Uncompressed HSDI | | √ | √ | √ | √ | √ |

In this table, white cells indicates “used combinations”; grey cells indicates “not used combinations”. White cells with checkmarks indicates “used combinations and the combination is specified in ITU-R and/or SMPTE specs”. Before 2017 many specifications do not have HDR and full range identifiers in the specifications. Note that baseband video properties may be used with camera log video properties.

### Common descriptions and carriage – standard dynamic range video with wide colour gamut

**Table 5 – Baseband Specifications Carriage of SDR WCG common colour volume descriptions**

|  | **System Identifier** | | **BT2020\_YCC\_NCL** | **BT2020\_RGB** | **FR2020\_RGB** |
| --- | --- | --- | --- | --- | --- |
| **Colour properties** | Colour primaries | | BT.2020 | BT.2020 | BT.2020 |
| Transfer characteristics | | BT.2020 | BT.2020 | BT.2020 |
| Colour representation | | Y′CbCr | R′G′B′ | R′G′B′ |
|  | Full/narrow range | | Narrow | Narrow | Full |
| 4:2:0 chroma sample location alignment | | Co-sited | Co-sited | Co-sited |
| **Baseband** | ITU-R Spec | SMPTE Spec |  | | |
| XXX | 425-5  Quad 3G | √ | √ |  |
| BT 2077-2  (12/2017) | ST2081-10 6G | √ | √ | √ |
| 2082-10  12G. (up to UHD4K) | √ | √ | √ |
| 2082-12 Quad 12G (up to UHD4K) | √ | √ | √ |
| ST 2036-3 (Single/Multi-link 10G SDI) | √ | √ | √ |
| ST 2036-4 (U-SDI) | √ | √ | √ |
| ST 2110-20:2017  Uncompressed Video/IP | | √ | √ | √ |
| CTA 861.4/HDMI  Uncompressed HSDI | | √ | √ | √ |

In this table, white cells indicates “used combinations”; grey cells indicates “not used combinations”. White cells with checkmarks indicates “used combinations and the combination is specified in ITU-R and/or SMPTE specs”. Before 2017 many specifications do not have HDR and full range identifiers in the specifications. Note that baseband video properties may be used with camera log video properties.

[ED/AI HD-SDI, Dual link HD-SDI and 3G-SDI are interface for HDTV. The video format of HDTV with 2020 is not specified in ITU-R and SMPTE both. As a result, these specs are removed.]

### Common descriptions and carriage – high dynamic range video with wide colour gamut

**Table 6 – Baseband Specifications Carriage of HDR WCG common colour volume descriptions**

|  | **System Identifier** | | **BT2100\_PQ\_YCC** | **BT2100\_HLG\_YCC** | **BT2100\_PQ\_RGB** | **BT2100\_HLG\_RGB** |
| --- | --- | --- | --- | --- | --- | --- |
| **Colour properties** | Colour primaries | | BT.2020 / BT.2100 | BT.2020 / BT.2100 | BT.2020 / BT.2100 | BT.2020 / BT.2100 |
| Transfer characteristics | | BT.2100 PQ | BT.2100 HLG | BT.2100 PQ | BT.2100 HLG |
| Colour representation | | Y′CbCr | Y′CbCr | R′G′B′ | R′G′B′ |
| **Other** | Full/narrow range | | Narrow | Narrow | Narrow | Narrow |
| 4:2:0 chroma sample location alignment | | Co-sited | Co-sited | Co-sited | Co-sited |
| **Baseband** | ITU-R Spec | SMPTE Spec |  | | | |
| BT.1120-9 (12/2017) | 292-1 (HD-SDI) | √ | √ |  |  |
| 372-1 (Dual-link HD-SDI) | √ | √ | √ | √ |
| 425-1  (3G-SDI) | √ | √ | √ | √ |
|  | 425-5  (Quad 3G) |  |  |  |  |
| BT 2077-2 (12/2017) | ST2081-10 6G | √ | √ | √ | √ |
| ST2082-10  12G (up to UHD4k) | √ | √ | √ | √ |
| ST2082-12  Quad 12G (up to UHD4K) | √ | √ | √ | √ |
| ST 2036-3:2018  (Single/Multilink 10G SDI | √ | √ | √ | √ |
| ST 2036-4 (U-SDI) | √ | √ | √ | √ |
| ST 2110-20:2017  Uncompressed Video/IP | | √ | √ | √ | √ |
| CTA 861.4/HDMI  Uncompressed HSDI | | √ | √ | √ | √ |

In this table, white cells indicates “used combinations”; grey cells indicates “not used combinations”. White cells with checkmarks indicates “used combinations and the combination is specified in ITU-R and/or SMPTE specs”. Before 2017 many specifications do not have HDR and full range identifiers in the specifications. Note that baseband video properties may be used with camera log video properties.

[Ed/AI- SD-SDI is an interface for SDTV. The video format of SDTV with HDR and 2020 is not specified in ITU-R and SMPTE both. As a result, SD-SDI is removed from the table.]

## Mastering display colour volume descriptions

### Mastering display colour volume properties

### Common descriptions and carriage – mastering display colour volume descriptions