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Information technology — Coding-independent code points —

Part 4: Usage of video signal type code points

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Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Abbreviated terms ... **3**
5 Overview ... **5**
6 Workflow domains ... **6**
7 Common video signal type combinations ... **7**
7.1 General ... 7
7.2 Colour coding characteristics ... 8
7.2.1 General ... 8
7.2.2 Colour properties ... 9
7.2.3 Common descriptions and carriage – standard dynamic range video with narrow colour gamut ... 11
7.2.4 Common descriptions and carriage – standard dynamic range video with wide colour gamut ... 12
7.2.5 Colour coding characteristics and carriage – high dynamic range video with wide colour gamut ... 13
7.2.6 Baseband carriage of colour coding characteristics descriptions ... 14
7.3 Mastering display colour volume descriptions ... 16
7.3.1 Mastering display colour volume properties ... 16
7.3.2 Common descriptions and carriage – mastering display colour volume descriptions ... 17
Annex A (informative) **Additional combinations not specified as industry standards** ... **19**
Annex B (informative) **Relevance of system identifier tags in consumer distribution specifications** ... **21**
Bibliography ... **22**

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information* in collaboration with ITU-T (as ITU-T Series H Supplement 19 (04/2021)).

This third edition cancels and replaces the second edition (ISO/IEC 23091-4:2020), which has been technically revised.

The main changes compared to the previous edition are as follows:

— clarity and terminology have been improved;

— an error in the value of the registration identifier for the MasteringDisplayMinimumLuminance parameter of SMPTE ST 2067-21 for the BT709x100n05 tag combination has been corrected.

A list of all parts in the ISO/IEC 23091 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

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Introduction

This document discusses video signal property description code points and their combinations that are widely used in production and video content workflows. Video properties and values are usually expressed in "metadata" that can exist across production and distribution workflows. Knowledge of these properties and their combinations has value as content is processed in the end-to-end production-to-distribution workflow chain.

The combinations of all possible expressible video properties as code point values can hypothetically result in hundreds or thousands of permutations; but many of those combinations are rarely or never used in practice. For example, it is highly unlikely that perceptual quantization (PQ) transfer characteristics function specified in Rec. ITU-R BT.2100 would be combined with the colour primaries specified in Rec. ITU-R BT.601. Only a small subset of the possible combinations is used in practice.

This document is written to provide information to help the producers of various content processing tools to avoid processing mistakes that can cause video quality degradation due to having incorrect assumptions made about video property combinations. There are only a few limited sets of video property combinations that are widely used in present-day video production and distribution equipment chains. This document describes these limited sets of combinations that are currently widely used and describes how the associated signal type metadata is carried to aid in the automation of content workflows across various domains of capture, production, and distribution. Lastly, this document aims to help its readers, especially toolset developers, to repurpose tools to work properly across several domains (e.g. capture, production, production distribution, and service distribution) where similar video conversion functions (e.g. chroma subsampling or colour space conversions) can be performed.

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Information technology — Coding-independent code points —

Part 4:
Usage of video signal type code points

1 Scope

This document describes common industry representation practices for the usage of video signal type code points, as these properties are conveyed across video content production and distribution carriage systems.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Rec. ITU-T H.264 | ISO/IEC 14496-10, *Information technology — Coding of audio-visual objects — Part 10: Advanced video coding*

Rec. ITU-T H.265 | ISO/IEC 23008-2, *Information technology — High efficiency coding and media delivery in heterogeneous environments — High efficiency video coding*

Rec. ITU-T H.273 | ISO/IEC 23091-2, *Information technology — Coding-independent code points — Part 2: Video*

3 Terms and definitions

For the purposes of this document, the terms and definitions in Rec. ITU-T H.265 | ISO/IEC 23008-2, Rec. ITU-T H.264 | ISO/IEC 14496-10 and Rec. ITU-T H.273 | ISO/IEC 23091-2 and the following apply.

ISO ad IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org

3.1
3G-SDI
serial digital interface with a transport capacity of 2.970 Gbit/s and 2.970/1.001 Gbit/s for transporting uncompressed digital video signals

3.2
6G-SDI
serial digital interface with a transport capacity of 5.94 Gbit/s and 5.94/1.001 Gbit/s for transporting uncompressed digital video signals

3.3
10G-SDI
serial digital interface with a transport capacity of 10.692 Gbit/s for transporting uncompressed digital video signals

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3.4
12G-SDI
serial digital interface with a transport capacity of 11.88 Gbit/s and 11.88/1.001 Gbit/s for transporting uncompressed digital video signals

3.5
colour coding characteristics
combination of colour gamut, colour primaries, dynamic range, transfer function, colour representation, video range, and chroma sample location

3.6
colour volume
space of all colours and intensities that a device or signal can reproduce or convey

3.7
creative intent
desired vision of the content creator (e.g. a director, cinematographer, videographer, editor or colourist) who adjusts and approves the appearance of rendered content in the production process

3.8
dual-link SDI
two parallel serial digital interfaces for transporting uncompressed video signals

3.9
electro-optical transfer function
EOTF
function to map a non-linear video signal to display linear light

3.10
full range
range in a fixed-point (integer) representation such that the active video range spans the full range of values that can be expressed with that bit depth

3.11
HD-SDI
serial digital interface for transporting uncompressed digital HD video signals

3.12
inverse electro-optical transfer function
inverse EOTF
function that is the inverse of an *EOTF* (3.9)

3.13
inverse opto-electrical transfer function
inverse OETF
function that is the inverse of an *OETF* (3.15)

3.14
narrow range
range in a fixed-point (integer) representation such that the active video range does not span the full range of values that can be expressed with that bit depth, although the remaining range can potentially be used for undershoot or overshoot processing artefacts and sync

Note 1 to entry: Narrow range is, in some applications, referred to by synonyms such as: “limited range”, “video range”, “legal range”, “SMPTE range” or “standard range”.

3.15
opto-electrical transfer function
OETF
function to map relative scene linear light to a non-linear video signal

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3.16
opto-optical transfer function
OOTF
function to map relative scene linear light to display linear light

3.17
quad-link SDI
four parallel serial digital interfaces for transporting uncompressed video signals

3.18
random access point access unit
RAPAU
access unit in a video bitstream containing an intra-coded picture with the property that all pictures following the intra-coded picture in output order can be correctly decoded without using any information preceding it in the bitstream

3.19
SDI
serial digital interface for transporting uncompressed video signals

3.20
SD-SDI
signal digital interface for transporting uncompressed digital SD video signals

3.21
transfer function
function among any of the following: *EOTF* (3.9), *inverse EOTF* (3.12), *OETF* (3.15), inverse *OETF* (3.13), *OOTF* (3.16), or inverse OOTF

3.22
U-SDI
multilink (up to 24 links) serial digital interface with a transport capacity of 10.692 Gbit/s per link for transporting uncompressed digital video signals

4 Abbreviated terms

2K informally used to refer to an HD resolution (1920 × 1080 for television or 2048 × 1080 for film)

4K informally used to refer a UHD resolution (3840 × 2160 for television or 4096 × 2160 for film)

8K informally used to refer to a UHD resolution (7680 × 4320 or 8192 × 4320)

AVC advanced video coding (Rec. ITU-T H.264 | ISO/IEC 14496-10)

CICP coding-independent code points (Rec. ITU-T H.273 | ISO/IEC 23091-2)

EOTF electro-optical transfer function

GBR green, blue and red component colour system in linear light domain; same as RGB, although emphasizing that the green component is handled as the primary colour component by some technical elements of the video coding technology

NOTE The colour representation does not indicate the media component order in a coded representation. For example, GBR represents the same component colour system as RGB.

G′B′R′ green, blue and red component colour system in a non-linear domain associated with a transfer function which maps the linear light domain to a more perceptually uniform domain; same as R′G′B′, although emphasizing that the green component is handled as the primary colour component by some technical elements of the video coding technology

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