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| **INTERNATIONAL ORGANIZATION FOR STANDARDIZATION ORGANISATION INTERNATIONALE DE NORMALISATION ISO/IEC JTC 1/SC 29/WG 5 MPEG JOINT VIDEO CODING TEAM WITH ITU-T SG 16** |
| **ISO/IEC JTC 1 / SC 29 / WG 5 N 108** |
| **Online, 12–21 January 2022** |
| |  |  | | --- | --- | | **Title:** | **Working draft of ISO/IEC 23090-3:200x (2nd edition) Amd.1 New level and systems-related supplemental enhancement information** | | **Source:** | **Convenor (Jens-Rainer Ohm)** | | **Type:** | **Project** | | **Subtype:** | **Draft** | | **Status:** | **Approved** | | **Date:** | **2022-04-12** | | **Expected Action:** | **Info** | | **Action due date:** | **N/A** | | **No. of pages** | **10** (without this cover page) | | **Email of convenor:** | **ohm @ ient . rwth-aachen . de** | | **Committee URL:** | **https://sd.iso.org/documents/ui/#!/browse/iso/iso-iec-jtc-1/iso-iec-jtc-1-sc-29/iso-iec-jtc-1-sc-29-wg-5** | |

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| *Title:* | **New level and systems-related supplemental enhancement information for VVC (Draft 1)** | | |
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| *Source:* | Editors | | |

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# Abstract

This document contains a draft amendment for changes to the Versatile Video Coding (VVC) standard (ITU‑T H.266 | ISO/IEC 23090-3). This amendment includes the support of an additional level of capability for the profiles that have previously been defined, thus expanding the range of application requirements addressed by the standard. This amendment also includes the support of two systems-related supplemental enhancement information (SEI) messages, for signalling of “green metadata” as to be specified in ISO/IEC 23001-11 and of an alternative video decoding interface for immersive media as to be specified in ISO/IEC 23090-13.

Draft 1 incorporated items:

* Addition of "hooks" for the green metadata and video decoding interface (VDI envelope) SEI messages (JVET-Y0041)
* Addition of new levels that enable higher resolution applications up to 16384x8640 at 120fps (JVET-Y0072)

**Changes to the specification text:**

*Replace 2.3 with the following:*

**2.3 Additional references**

– Rec. ITU-T T.35 (in force), *Procedure for the allocation of ITU-T defined codes for non standard facilities*

– ISO/IEC 23001-11, Information Technology — MPEG Systems technologies — Part 11: Energy-efficient media consumption (green metadata)

– ISO/IEC 23090-13, Information technology — Coded representation of immersive media — Part 13: Video decoding interface for immersive media

*Replace the text in section A.3.1 with the following:*

**A.3.1 Main 10 and Main 10 Still Picture profiles**

Bitstreams conforming to the Main 10 or Main 10 Still Picture profile shall obey the following constraints:

* Referenced SPSs shall have ptl\_multilayer\_enabled\_flag equal to 0.
* In a bitstream conforming to the Main 10 Still Picture profile, the bitstream shall contain only one picture.
* Referenced SPSs shall have sps\_chroma\_format\_idc equal to 0 or 1.
* Referenced SPSs shall have sps\_bitdepth\_minus8 in the range of 0 to 2, inclusive.
* Referenced SPSs shall have sps\_palette\_enabled\_flag equal to 0.
* ~~In a bitstream conforming to the Main 10 profile, general\_level\_idc and sublayer\_level\_idc[ i ] for all values of i in the referenced VPS (when available) and in the referenced SPSs shall not be equal to 255 (which indicates level 15.5).~~
* The tier and level constraints specified for the Main 10 or Main 10 Still Picture profile in clause A.4, as applicable, shall be fulfilled.

Conformance of a bitstream to the Main 10 profile is indicated by general\_profile\_idc being equal to 1.

Conformance of a bitstream to the Main 10 Still Picture profile is indicated by general\_profile\_idc being equal to 65.

NOTE – When the conformance of a bitstream to the Main 10 Still Picture profile is indicated by general\_profile\_idc being equal to 65, and the indicated level is not level 15.5, the conditions for indication of the conformance of the bitstream to the Main 10 profile are also fulfilled.

Decoders conforming to the Main 10 profile at a specific level of a specific tier shall be capable of decoding all bitstreams for which all of the following conditions apply:

* The bitstream is indicated to conform to the Main 10 or Main 10 Still Picture profile.
* The bitstream is indicated to conform to a tier that is lower than or equal to the specified tier.
* The bitstream is indicated to conform to a level that is not level 15.5 and is lower than or equal to the specified level.

Decoders conforming to the Main 10 Still Picture profile at a specific level of a specific tier shall be capable of decoding all bitstreams for which all of the following conditions apply:

* The bitstream is indicated to conform to the Main 10 Still Picture profile.
* The bitstream is indicated to conform to a tier that is lower than or equal to the specified tier.
* The bitstream is indicated to conform to a level that is not level 15.5 and is lower than or equal to the specified level.

Decoders conforming to the Main 10 Still Picture profile at a specific level of a specific tier shall also be capable of decoding of the first picture of a bitstream when both of the following conditions apply:

* That bitstream is indicated to conform to the Main 10 profile, to conform to a tier that is lower than or equal to the specified tier, and to conform to a level that is not level 15.5 and is lower than or equal to the specified level.
* That picture is an IRAP picture or is a GDR picture with ph\_recovery\_poc\_cnt equal to 0, is in an output layer, and has ph\_pic\_output\_flag equal to 1.

*Replace the text in section A.3.2 with the following:*

**A.3.2 Main 10 4:4:4 and Main 10 4:4:4 Still Picture profiles**

Bitstreams conforming to the Main 10 4:4:4 or Main 10 4:4:4 Still Picture profile shall obey the following constraints:

* Referenced SPSs shall have ptl\_multilayer\_enabled\_flag equal to 0.
* In a bitstream conforming to the Main 10 4:4:4 Still Picture profile, the bitstream shall contain only one picture.
* Referenced SPSs shall have sps\_chroma\_format\_idc in the range of 0 to 3, inclusive.
* Referenced SPSs shall have sps\_bitdepth\_minus8 in the range of 0 to 2, inclusive.
* ~~In a bitstream conforming to the Main 10 4:4:4 profile, general\_level\_idc and sublayer\_level\_idc[ i ] for all values of i in the referenced VPS (when available) and in the referenced SPSs shall not be equal to 255 (which indicates level 15.5).~~
* The tier and level constraints specified for the Main 10 4:4:4 or Main 10 4:4:4 Still Picture profile in clause A.4, as applicable, shall be fulfilled.

Conformance of a bitstream to the Main 10 4:4:4 profile is indicated by general\_profile\_idc being equal to 33.

Conformance of a bitstream to the Main 10 4:4:4 Still Picture profile is indicated by general\_profile\_idc being equal to 97.

NOTE – When the conformance of a bitstream to the Main 10 4:4:4 Still Picture profile is indicated by general\_profile\_idc being equal to 97, and the indicated level is not level 15.5, the conditions for indication of the conformance of the bitstream to the Main 10 4:4:4 profile are also fulfilled.

Decoders conforming to the Main 10 4:4:4 profile at a specific level of a specific tier shall be capable of decoding all bitstreams for which all of the following conditions apply:

* The bitstream is indicated to conform to the Main 10 4:4:4, Main 10, Main 10 4:4:4 Still Picture, or Main 10 Still Picture profile.
* The bitstream is indicated to conform to a tier that is lower than or equal to the specified tier.
* The bitstream is indicated to conform to a level that is not level 15.5 and is lower than or equal to the specified level.

Decoders conforming to the Main 10 4:4:4 Still Picture profile at a specific level of a specific tier shall be capable of decoding all bitstreams for which all of the following conditions apply:

* The bitstream is indicated to conform to the Main 10 4:4:4 Still Picture or Main 10 Still Picture profile.
* The bitstream is indicated to conform to a tier that is lower than or equal to the specified tier.
* The bitstream is indicated to conform to a level that is not level 15.5 and is lower than or equal to the specified level.

Decoders conforming to the Main 10 4:4:4 Still Picture profile at a specific level of a specific tier shall also be capable of decoding of the first picture of a bitstream when both of the following conditions apply:

* That bitstream is indicated to conform to the Main 10 or Main 10 4:4:4 profile, to conform to a tier that is lower than or equal to the specified tier, to conform to a level that is not level 15.5 and is lower than or equal to the specified level.
* That picture is an IRAP picture or is a GDR picture with ph\_recovery\_poc\_cnt equal to 0, is in an output layer, and has ph\_pic\_output\_flag equal to 1.

*Replace the text in section A.3.3 with the following:*

**A.3.3 Multilayer Main 10 profile**

Bitstreams conforming to the Multilayer Main 10 shall obey the following constraints:

* Referenced SPSs shall have sps\_chroma\_format\_idc equal to 0 or 1.
* Referenced SPSs shall have sps\_bitdepth\_minus8 in the range of 0 to 2, inclusive.
* Referenced SPSs shall have sps\_palette\_enabled\_flag equal to 0.
* ~~In a bitstream conforming to the Multilayer Main 10 profile, general\_level\_idc and sublayer\_level\_idc[ i ] for all values of i in the referenced VPS (when available) and in the referenced SPSs shall not be equal to 255 (which indicates level 15.5).~~
* The tier and level constraints specified for the Multilayer Main 10 profile in clause A.4, as applicable, shall be fulfilled.

Conformance of a bitstream to the Multilayer Main 10 profile is indicated by general\_profile\_idc being equal to 17.

Decoders conforming to the Multilayer Main 10 profile at a specific level of a specific tier shall be capable of decoding all bitstreams for which all of the following conditions apply:

* The bitstream is indicated to conform to the Multilayer Main 10, Main 10, or Main 10 Still Picture profile.
* The bitstream is indicated to conform to a tier that is lower than or equal to the specified tier.
* The bitstream is indicated to conform to a level that is not level 15.5 and is lower than or equal to the specified level.

*Replace the text in section A.3.4 with the following:*

**A.3.4 Multilayer Main 10 4:4:4 profile**

Bitstreams conforming to the Multilayer Main 10 4:4:4 profile shall obey the following constraints:

* Referenced SPSs shall have sps\_chroma\_format\_idc in the range of 0 to 3, inclusive.
* Referenced SPSs shall have sps\_bitdepth\_minus8 in the range of 0 to 2, inclusive.
* ~~In a bitstream conforming to the Multilayer Main 10 4:4:4 profile, general\_level\_idc and sublayer\_level\_idc[ i ] for all values of i in the referenced VPS (when available) and in the referenced SPSs shall not be equal to 255 (which indicates level 15.5).~~
* The tier and level constraints specified for the Multilayer Main 10 4:4:4 profile in clause A.4, as applicable, shall be fulfilled.

Conformance of a bitstream to the Multilayer Main 10 4:4:4 profile is indicated by general\_profile\_idc being equal to 49.

Decoders conforming to the Multilayer Main 10 4:4:4 profile at a specific level of a specific tier shall be capable of decoding all bitstreams for which all of the following conditions apply:

* The bitstream is indicated to conform to the Multilayer Main 10 4:4:4, Multilayer Main 10, Main 10 4:4:4, Main 10, Main 10 4:4:4 Still Picture, or Main 10 Still Picture profile.
* The bitstream is indicated to conform to a tier that is lower than or equal to the specified tier.
* The bitstream is indicated to conform to a level that is not level 15.5 and is lower than or equal to the specified level.

*Replace the text in section A.3.5 with the following:*

**A.3.5 Format range extensions profiles**

The following profiles, collectively referred to as the operation range extensions profiles, are specified in this clause:

* The Main 12, Main 12 4:4:4 and Main 16 4:4:4 profiles
* The Main 12 Intra, Main 12 4:4:4 Intra and Main 16 4:4:4 Intra profiles
* The Main 12 Still Picture, Main 12 4:4:4 Still Picture and Main 16 4:4:4 Still Picture profiles

Bitstreams conforming to the operation range extensions profiles shall obey the following constraints:

* Referenced SPSs shall have ptl\_multilayer\_enabled\_flag equal to 0.
* In bitstreams conforming to the Main 12 Still Picture, Main 12 4:4:4 Still Picture or Main 16 4:4:4 Still Picture profile, the bitstream shall contain only one picture.
* ~~In bitstreams conforming to the Main 12, Main 12 4:4:4, Main 16 4:4:4, Main 12 Intra, Main 12 4:4:4 Intra, or Main 16 4:4:4 Intra profile, general\_level\_idc in the referenced SPSs shall not be equal to 255 (which indicates level 15.5).~~
* The allowed values for syntax elements as specified in Table A.1 shall be fulfilled.
* The tier and level constraints specified for the Main 12, Main 12 4:4:4, Main 16 4:4:4, Main 12 Intra, Main 12 4:4:4 Intra or Main 16 4:4:4 Intra profile in clause A.4, as applicable, shall be fulfilled.
* In bitstreams conforming to the Main 12 Intra, Main 12 4:4:4 Intra or Main 16 4:4:4 Intra profile, all pictures shall be GDR pictures with ph\_recovery\_poc\_cnt equal to 0 or IRAP pictures.

**Table A.1 – Allowed values for syntax elements in the operation range extensions profiles**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Profile for which constraint is specified** | **sps\_chroma\_format\_idc** | **sps\_bitdepth\_minus8** | **sps\_palette\_enabled\_flag** | **sps\_extended\_precision\_flag sps\_ts\_residual\_coding\_rice\_present\_in\_sh\_flag, sps\_rrc\_rice\_extension\_flag, sps\_persistent\_rice\_adaptation\_enabled\_flag sps\_reverse\_last\_sig\_coeff\_enabled\_flag** |
| Main 12 | 0..1 | 0..4 | 0 | 0 |
| Main 12 4:4:4 | 0..3 | 0..4 | 0..1 | 0..1 |
| Main 16 4:4:4 | 0..3 | 0..8 | 0..1 | 0..1 |
| Main 12 Intra | 0..1 | 0..4 | 0 | 0 |
| Main 12 4:4:4 Intra | 0..3 | 0..4 | 0..1 | 0..1 |
| Main 16 4:4:4 Intra | 0..3 | 0..8 | 0..1 | 0..1 |
| Main 12 Still Picture | 0..1 | 0..4 | 0 | 0 |
| Main 12 4:4:4 Still Picture | 0..3 | 0..4 | 0..1 | 0..1 |
| Main 16 4:4:4 Still Picture | 0..3 | 0..8 | 0..1 | 0..1 |

Note: Level 15.5 is defined to provide a suitable label for bitstreams that exceed the limits of all other levels that were defined at the time of writing the bitstream; therefore there are no formal limits for this level, and it is therefore not possible, and an error, for an implementation to claim conformance to this level. Implementations will need to scan other aspects of the bitstream to determine whether it can be handled.

Conformance of a bitstream to the Main 12 profile is indicated by general\_profile\_idc being equal to 2.

Conformance of a bitstream to the Main 12 Intra profile is indicated by general\_profile\_idc being equal to 10.

Conformance of a bitstream to the Main 12 Still Picture profile is indicated by general\_profile\_idc being equal to 66.

Conformance of a bitstream to the Main 12 4:4:4 profile is indicated by general\_profile\_idc being equal to 34.

Conformance of a bitstream to the Main 12 4:4:4 Intra profile is indicated by general\_profile\_idc being equal to 42.

Conformance of a bitstream to the Main 12 4:4:4 Still Picture profile is indicated by general\_profile\_idc being equal to 98.

Conformance of a bitstream to the Main 16 4:4:4 profile is indicated by general\_profile\_idc being equal to 35.

Conformance of a bitstream to the Main 16 4:4:4 Intra profile is indicated by general\_profile\_idc being equal to 43.

Conformance of a bitstream to the Main 16 4:4:4 Still Picture profile is indicated by general\_profile\_idc being equal to 99.

Decoders conforming to an operation range extensions profile at a specific level (identified by a specific value of general\_level\_idc) of a specific tier (identified by a specific value of general\_tier\_flag) shall be capable of decoding all bitstreams and sub-layer representations for which all of the following conditions apply:

* Any of the following conditions apply:
  + The decoder conforms to the Main 12 profile, and the bitstream is indicated to conform to the Main 10, Main 10 Still Picture, Main 12, Main 12 Intra, or Main 12 Still Picture profile.
  + The decoder conforms to the Main 12 4:4:4 profile, and the bitstream is indicated to conform to the Main 10, Main 10 Still Picture, Main 10 4:4:4, Main 10 4:4:4 Still Picture, Main 12, Main 12 Intra, Main 12 Still Picture, Main 12 4:4:4, Main 12 4:4:4 Intra, or Main 12 4:4:4 Still Picture profile.
  + The decoder conforms to the Main 16 4:4:4 profile, and the bitstream is indicated to conform to Main 10, Main 10 Still Picture, Main 10 4:4:4, Main 10 4:4:4 Still Picture, or any of the operation range extensions profile.
  + The decoder conforms to the Main 12 Intra profile, and either 1) the bitstream is indicated to conform to the Main 10 Still Picture, Main 12 Intra, or Main 12 Still Picture profile, or 2) the gci\_all\_rap\_pictures\_constraint\_flag is equal to 1 and the bitstream is indicated to conform to the Main 10 or Main 12 profile.
  + The decoder conforms to the Main 12 4:4:4 Intra profile, and either 1) the bitstream is indicated to conform to the Main 10 Still Picture, Main 10 4:4:4 Still Picture, Main 12 Intra, Main 12 4:4:4 Intra, Main 12 Still Picture, or Main 12 4:4:4 Still Picture profile, or 2) the gci\_all\_rap\_pictures\_constraint\_flag is equal to 1 and the bitstream is indicated to conform to the Main 10, Main 10 4:4:4, Main 12, or Main 12 4:4:4 profile.
  + The decoder conforms to the Main 16 4:4:4 Intra profile, and either 1) the bitstream is indicated to conform to the Main 10 Still Picture, Main 10 4:4:4 Still Picture, Main 12 Intra, Main 12 4:4:4 Intra, Main 16 4:4:4 Intra, Main 12 Still Picture, Main 12 4:4:4 Still Picture, or Main 16 4:4:4 Still Picture profile, or 2) the gci\_all\_rap\_pictures\_constraint\_flag is equal to 1 and the bitstream is indicated to conform to the Main 10, Main 10 4:4:4, Main 12, Main 12 4:4:4, or Main 16 4:4:4 profile.
  + The decoder conforms to the Main 12 Still Picture profile, and the bitstream is indicated to conform to the Main 10 Still Picture or Main 12 Still Picture profile.
  + The decoder conforms to the Main 12 4:4:4 Still Picture profile, and the bitstream is indicated to conform to the Main 10 Still Picture, Main 10 4:4:4 Still Picture, Main 12 Still Picture or Main 12 4:4:4 Still Picture profile.
  + The decoder conforms to the Main 16 4:4:4 Still Picture profile, and the bitstream is indicated to conform to the Main 10 Still Picture, Main 10 4:4:4 Still Picture, Main 12 Still Picture, Main 12 4:4:4 Still Picture, or Main 16 4:4:4 Still Picture profile.
* The bitstream is indicated to conform to a tier that is lower than or equal to the specified tier.
* The bitstream is indicated to conform to a level that is not level 15.5 and is lower than or equal to the specified level.

Decoders conforming to the Main 12 Still Picture profile at a specific level of a specific tier shall also be capable of decoding of the first picture of a bitstream when both of the following conditions apply:

* That bitstream is indicated to conform to the Main 10, Main 12, or Main 12 Intra profile, to conform to a tier that is lower than or equal to the specified tier, and to conform to a level that is not level 15.5 and is lower than or equal to the specified level.
* That picture is a GDR picture with ph\_recovery\_poc\_cnt equal to 0 or an IRAP picture, is in an output layer, and has ph\_pic\_output\_flag equal to 1.

Decoders conforming to the Main 12 4:4:4 Still Picture profile at a specific level of a specific tier shall also be capable of decoding of the first picture of a bitstream when both of the following conditions apply:

* That bitstream is indicated to conform to the Main 10, Main 10 4:4:4, Main 12, Main 12 Intra, Main 12 4:4:4, or Main 12 4:4:4 Intra profile, to conform to a tier that is lower than or equal to the specified tier, and to conform to a level that is not level 15.5 and is lower than or equal to the specified level.
* That picture is a GDR picture with ph\_recovery\_poc\_cnt equal to 0 or an IRAP picture, is in an output layer, and has ph\_pic\_output\_flag equal to 1.

Decoders conforming to the Main 16 4:4:4 Still Picture profile at a specific level of a specific tier shall also be capable of decoding of the first picture of a bitstream when both of the following conditions apply:

* That bitstream is indicated to conform to the Main 10, Main 10 4:4:4, Main 12, Main 12 Intra, Main 12 4:4:4, Main 12 4:4:4 Intra, Main 16 4:4:4, or Main 16 4:4:4 Intra profile, to conform to a tier that is lower than or equal to the specified tier, and to conform to a level that is not level 15.5 and is lower than or equal to the specified level.
* That picture is a GDR picture with ph\_recovery\_poc\_cnt equal to 0 or an IRAP picture, is in an output layer, and has ph\_pic\_output\_flag equal to 1.

*Replace D2.1 with the following:*

**D.2.1 General SEI payload syntax**

|  |  |
| --- | --- |
| sei\_payload( payloadType, payloadSize ) { | **Descriptor** |
| SeiExtensionBitsPresentFlag = 0 |  |
| if( nal\_unit\_type = = PREFIX\_SEI\_NUT ) |  |
| if( payloadType = = 0 ) |  |
| buffering\_period( payloadSize ) |  |
| else if( payloadType = = 1 ) |  |
| pic\_timing( payloadSize ) |  |
| else if( payloadType = = 3 ) |  |
| filler\_payload( payloadSize ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| else if( payloadType = = 4 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| user\_data\_registered\_itu\_t\_t35( payloadSize ) |  |
| else if( payloadType = = 5 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| user\_data\_unregistered( payloadSize ) |  |
| else if( payloadType = = 19 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| film\_grain\_characteristics( payloadSize ) |  |
| else if( payloadType = = 45 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| frame\_packing\_arrangement( payloadSize ) |  |
| else if( payloadType = = 47 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| display\_orientation( payloadSize ) |  |
| else if( payloadType = = 56 ) /\* Specified in ISO/IEC 23001-11 \*/ |  |
| green\_metadata( payloadsize ) |  |
| else if( payloadType = = 129 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| parameter\_sets\_inclusion\_indication( payloadSize ) |  |
| else if( payloadType = = 130 ) |  |
| decoding\_unit\_info( payloadSize ) |  |
| else if( payloadType = = 133 ) |  |
| scalable\_nesting( payloadSize ) |  |
| else if( payloadType = = 137 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| mastering\_display\_colour\_volume( payloadSize ) |  |
| else if( payloadType = = 142 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| colour\_transform\_info( payloadSize ) |  |
| else if( payloadType = = 144 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| content\_light\_level\_info( payloadSize ) |  |
| else if( payloadType = = 145 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| dependent\_rap\_indication( payloadSize ) |  |
| else if( payloadType = = 147 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| alternative\_transfer\_characteristics( payloadSize ) |  |
| else if( payloadType = = 148 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| ambient\_viewing\_environment( payloadSize ) |  |
| else if( payloadType = = 149 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| content\_colour\_volume( payloadSize ) |  |
| else if( payloadType = = 150 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| equirectangular\_projection( payloadSize ) |  |
| else if( payloadType = = 153 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| generalized\_cubemap\_projection( payloadSize ) |  |
| else if( payloadType = = 154 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| sphere\_rotation( payloadSize ) |  |
| else if( payloadType = = 155 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| regionwise\_packing( payloadSize ) |  |
| else if( payloadType = = 156 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| omni\_viewport( payloadSize ) |  |
| else if( payloadType = = 165 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| alpha\_channel\_info( payloadSize ) |  |
| else if( payloadType = = 168 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| frame\_field\_info( payloadSize ) |  |
| else if( payloadType = = 177 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| depth\_representation\_info( payloadSize ) |  |
| else if( payloadType = = 179 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| multiview\_acquisition\_info( payloadSize ) |  |
| else if( payloadType = = 180 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| multiview\_view\_position( payloadSize ) |  |
| else if( payloadType = = 200 ) |  |
| sei\_manifest( payloadSize ) |  |
| else if( payloadType = = 201 ) |  |
| sei\_prefix\_indication( payloadSize ) |  |
| else if( payloadType = = 202 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| annotated\_regions( payloadSize ) |  |
| else if( payloadType = = 203 ) |  |
| subpic\_level\_info( payloadSize ) |  |
| else if( payloadType = = 204 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| sample\_aspect\_ratio\_info( payloadSize ) |  |
| else if( payloadType = = 205 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| scalability\_dimension\_info( payloadSize ) |  |
| else if( payloadType = = 206 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| extended\_drap\_indication( payloadSize ) |  |
| else if( payloadType = = 207 ) |  |
| constrained\_rasl\_encoding\_indication( payloadSize ) |  |
| else if( payloadType = = 208 ) /\* Specified in ISO/IEC 23090-13 \*/ |  |
| vdi\_sei\_envelope( payloadsize ) |  |
| else /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| reserved\_message( payloadSize ) |  |
| else /\* nal\_unit\_type = = SUFFIX\_SEI\_NUT \*/ |  |
| if( payloadType = = 3 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| filler\_payload( payloadSize ) |  |
| else if( payloadType = = 132 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| decoded\_picture\_hash( payloadSize ) |  |
| else if( payloadType = = 133 ) |  |
| scalable\_nesting( payloadSize ) |  |
| else /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| reserved\_message( payloadSize ) |  |
| if( SeiExtensionBitsPresentFlag | | more\_data\_in\_payload( ) ) { |  |
| if( payload\_extension\_present( ) ) |  |
| **sei\_reserved\_payload\_extension\_data** | u(v) |
| **sei\_payload\_bit\_equal\_to\_one** /\* equal to 1 \*/ | f(1) |
| while( !byte\_aligned( ) ) |  |
| **sei\_payload\_bit\_equal\_to\_zero** /\* equal to 0 \*/ | f(1) |
| } |  |
| } |  |

*In clause D2.2, replace Table D.1 – Persistence scope of SEI messages (informative), with the following:*

**Table D.1 – Persistence scope of SEI messages (informative)**

|  |  |
| --- | --- |
| **SEI message** | **Persistence scope** |
| Buffering period | The remainder of the bitstream |
| Picture timing | The AU containing the SEI message |
| DU information | The AU containing the SEI message |
| Scalable nesting | Depending on the scalable-nested SEI messages. Each scalable-nested SEI message has the same persistence scope as if the SEI message was not scalable-nested |
| SEI manifest | The CVS containing the SEI message |
| SEI prefix indication | The CVS containing the SEI message |
| Subpicture level information | The CVS containing the SLI SEI message and up to but not including the next CVS, in decoding order, that contains an SLI SEI message with different content |
| Constrained RASL encoding indication | The CVS containing the SEI messag |
| Green metadata | Specified by the syntax of the SEI message in ISO/IEC 23090-13 |
| VDI envelope | The CVS containing the SEI message |

*Rename clause D.11 Use of ITU-T H.274 | ISO/IEC 23002-7 VUI parameters*

*as clause D.13 Use of ITU-T H.274 | ISO/IEC 23002-7 VUI parameters*

*Rename clause D.12 Use of ITU-T H.274 | ISO/IEC 23002-7 SEI messages*

*as clause D.14 Use of ITU-T H.274 | ISO/IEC 23002-7 SEI messages*

*Add clause D.11 as follows:*

**D.11 Green metadata SEI message**

**D.11.1 Green metadata SEI message syntax**

The syntax for green metadata SEI message is specified in ISO/IEC 23001-11 (Green metadata). Green metadata facilitates reduced power consumption in decoders, encoders, displays and in media selection.

**D.11.2 Green metadata SEI message semantics**

The semantics for green metadata SEI message is specified in ISO/IEC 23001-11 (Green metadata). Green metadata facilitates reduced power consumption in decoders, encoders, displays and in media selection.

*Add clause D.12 as follows:*

**D.12 VDI envelope SEI message**

**D.12.1 VDI envelope SEI message syntax**

The syntax for video decoding interface (VDI) envelope SEI message is specified in ISO/IEC 23090-13 (multi-decoder video interface for immersive media). Multi-decoder video interface for immersive media specifies the control, input, and output interfaces of a video decoding engine as well as the operations that can be performed by this video decoding engine: input formatting for elementary streams, time locking of decoded sequences and metadata streams, output formatting of decoded sequences and metadata streams, and the API for the application to control these operations.

**D.12.1 VDI envelope SEI message semantics**

The semantics for video decoding interface (VDI) envelope SEI message is specified in ISO/IEC 23090-13 (multi-decoder video interface for immersive media). Multi-decoder video interface for immersive media specifies the control, input, and output interfaces of a video decoding engine as well as the operations that can be performed by this video decoding engine: input formatting for elementary streams, time locking of decoded sequences and metadata streams, output formatting of decoded sequences and metadata streams, and the API for the application to control these operations.