|  |
| --- |
| **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 146** |
| **Online, 13–22 July 2022** |
| |  |  | | --- | --- | | **Title:** | **Preliminary working draft of SEI processing order SEI message in VVC** | | **Source:** | **Convenor (Jens-Rainer Ohm)** | | **Type:** | **Project** | | **Subtype:** | **Draft** | | **Status:** | **Approved** | | **Date:** | **2022-08-05** | | **Expected Action:** | **Info** | | **Action due date:** | **N/A** | | **No. of pages** | **5** (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** | |

|  |  |
| --- | --- |
| **Joint Video Experts Team (JVET)**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29**  27th Meeting, by teleconference, 13–22 July 2022 | Document: JVET-AA2027-v1 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Title:* | **SEI processing order SEI message in VVC (Draft 1)** | | |
| *Status:* | Output document approved by JVET | | |
| *Purpose:* | Draft text | | |
| *Author(s) or Contact(s):* | Sean McCarthy Miska Hannuksela Ye-Kui Wang | Email: | sean.mccarthy@dolby.com miska.hannuksela@nokia.com yekui.wang@bytedance.com |
| *Source:* | Editors | | |

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

# Abstract

This document contains the draft text for changes to the Versatile Video Coding (VVC) standard (Rec. ITU-T H.266 | ISO/IEC 23090-3), to specify the SEI processing order SEI message.

**Changes to the specification text:**

*Replace subclause D.2.1 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 \*/ |  |
| shutter\_interval\_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 Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| scalability\_dimension\_info( payloadSize ) |  |
| else if( payloadType = = 209 ) /\* Specified in ISO/IEC 23090-13 \*/ |  |
| vdi\_sei\_envelope( payloadsize ) |  |
| else if( payloadType = = 210 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| nn\_post\_filter\_characteristics( payloadSize ) |  |
| else if( payloadType = = 211 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| nn\_post\_filter\_activation( payloadSize ) |  |
| else if( payloadType = = 212 ) /\* Specified in Rec. ITU-T H.274 | ISO/IEC 23002-7 \*/ |  |
| phase\_indication( payloadSize ) |  |
| else if( payloadType = = 213 ) |  |
| sei\_processing\_order( 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 subclause D.2.2, make the following changes:*

...

**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 message |
| SEI processing order | The CVS containing the SEI message |

...

The list VclAssociatedSeiList is set to consist of the payloadType values 3, 19, 45, 47, 129, 132, 137, 142, 144, 145, 147 to 150, inclusive, 153 to 156, inclusive, 165, 168, 177, 179, 180, 200 to 202, inclusive, and 204 to 213, inclusive.

...

*Add clause D.11 as follows:*

**D.11 SEI processing order SEI message**

D.11.1 SEI processing order SEI message syntax

|  |  |
| --- | --- |
| sei\_processing\_order( payloadSize ) { | **Descriptor** |
| for( i = 0, b = 0; b < payloadSize; i++, b += 3 ) { |  |
| **po\_sei\_payload\_type**[ i ] | u(16) |
| **po\_sei\_processing\_order**[ i ] | u(8) |
| } |  |
| } |  |

D.11.2 SEI processing order SEI message semantics

The SEI processing order SEI message carries information indicating the preferred processing order, as determined by the encoder (i.e., the content producer), for different types of SEI messages that may be present in the bitstream. When an SEI processing order SEI message is present in any access unit of a CVS, an SEI processing order SEI message shall be present in the first access unit of the CVS. The SEI processing order SEI message persists in decoding order from the current access unit until the end of the CVS. When there are multiple SEI processing order SEI messages present in a CVS, they shall have the same content.

**po\_sei\_payload\_type**[ i ] specifies the value of payloadType for the i-th SEI message for which information is provided in the SEI processing order SEI message. The values of po\_sei\_payload\_type[ m ] and po\_sei\_payload\_type[ n ] shall not be identical when m is not equal to n.

**po\_sei\_processing\_order**[ i ] indicates the preferred order of processing any SEI message with payloadType equal to po\_sei\_payload\_type[ i ]. po\_sei\_processing\_order[ m ] greater than 0 and less than po\_sei\_processing\_order[ n ] indicates any SEI message with payloadType equal to po\_sei\_payload\_type[ m ], when present, should be processed before any SEI message with payloadType equal to po\_sei\_payload\_type[ n ], when present. po\_sei\_processing\_order[ m ] greater than 0 and equal to po\_sei\_processing\_order[ n ] indicates that the preferred order of processing of SEI messages with payloadTypes equal to po\_sei\_payload\_type[ m ] and po\_sei\_payload\_type[ n ] is unknown or unspecified or determined by external means not specified in this Specification. po\_sei\_processing\_order[ i ] equal to 0 specifies that the preferred order of processing SEI messages with payloadType equal to po\_sei\_payload\_type[ i ] is unknown or unspecified or determined by external means not specified in this Specification.