

# **Supplemental enhancement information set SEI message**

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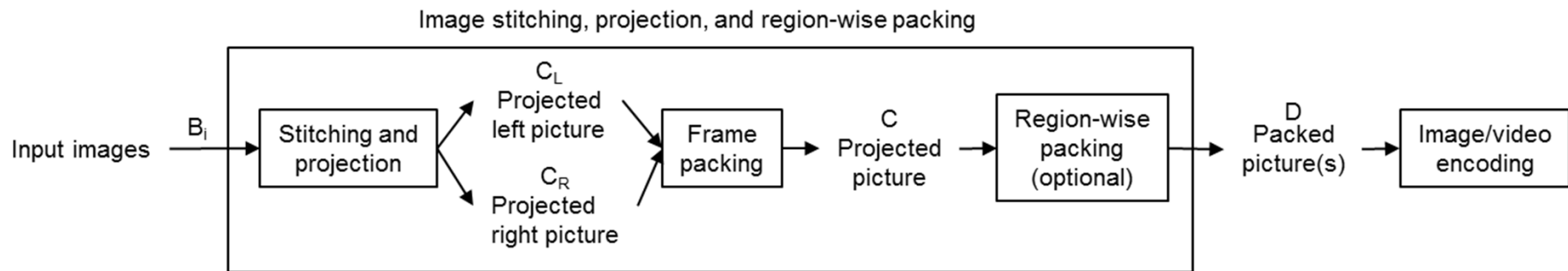
(JCTVC-AB0036)

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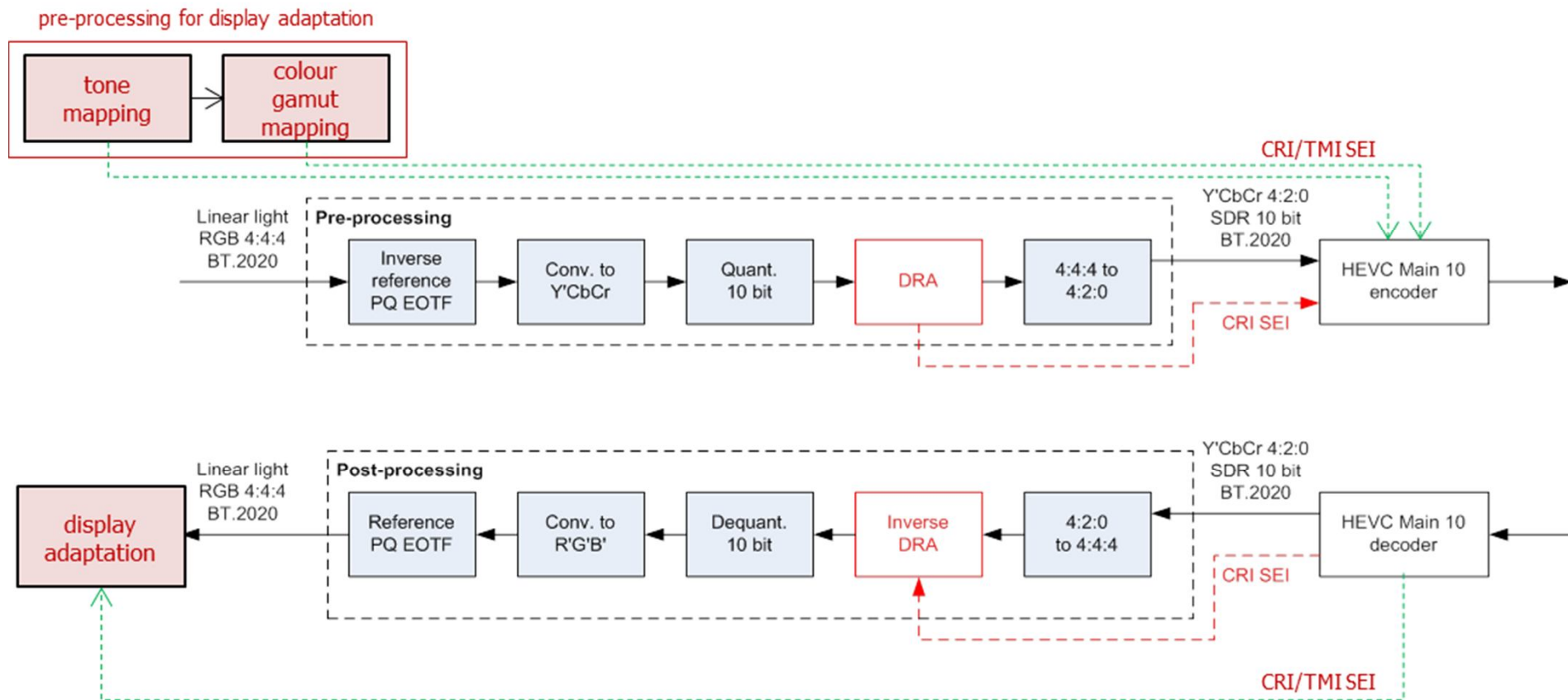
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- In Hobart, two SEI messages describing SEI messages contained in a video stream was proposed in JCTVC-AA0026.
  - In terms of system point of view, the SEI messages in a video stream were categorized into essential and non-essential supplemental information.
- In decoder point of view, the list of SEI messages in a video stream could help decoders to prepare for the intended processes when multiple SEI messages are considered for the consecutive post-processing steps.
  - e.g. omnidirectional video, HDR

- In omnidirectional video use case, the followings information are needed to produce intended output picture.
  - Omnidirectional projection indication
  - Frame packing arrangement for stereoscopic video
  - Region-wise packing discussed in OMAF



- In HDR video use case, multiple CRI or TMI could be used in different processing steps:
  - DRA
  - display adaptation



- Based on those use cases, it is proposed to provide a list of SEI messages to support decoders to perform intended processes.
  - The processing order is indicated if it affect the output picture.
  - Each SEI message is described by
    - payload type
    - SEI message identifier if exists
    - frame by frame change indication.

- Proposed syntax and semantics of supplemental enhancement information set SEI message.

supplemental_enhancement_information_set( payloadSize ) {	Descriptor
sei_set_id	u(8)
sei_set_cancel_flag	u(8)
if( ! sei_set_cancel_flag ) {	
sei_set_persistence_flag	u(1)
num_sei_msgs_minus1	u(8)
for( i = 0; i <= num_sei_msgs_minus1; i++ ) {	
sei_rec_order_constraint_flag[ i ]	u(1)
sei_msg_id_present_flag[ i ]	u(1)
sei_msg_change_flag[ i ]	u(1)
reserved_5bits	u(5)
sei_payload_type[ i ]	u(8)
if( sei_msg_id_present_flag[ i ] )	
sei_msg_id[ i ]	ue(v)
}	
}	
}	

**sei\_set\_id** contains an identifying number that may be used to identify the purpose of the one or more SEI messages that are supplemental enhanced information set SEI message. The value of **sei\_set\_id** shall be in the range of 0 to  $2^{16} - 1$ , inclusive.

**sei\_set\_cancel\_flag** equal to 1 indicates that the supplemental enhancement information set SEI message cancels the persistence of any previous supplemental enhancement information set SEI message in output order that applies to the current layer. **sei\_set\_cancel\_flag** equal to 0 indicates that supplemental enhancement information set information follows.

**sei\_set\_persistence\_flag** specifies the persistence of the supplemental enhancement information set SEI message for the current layer.

**sei\_set\_persistence\_flag** equal to 0 specifies that the supplemental enhancement information set applies to the current decoded picture only.

Let **picA** be the current picture. **sei\_set\_persistence\_flag** equal to 1 specifies that the supplemental enhancement information set SEI message persists for the current layer in output order until any of the following conditions are true:

- A new CLVS of the current layer begins.
- The bitstream ends.
- A picture **picB** in the current layer in an access unit containing a supplemental enhancement information set SEI message that is applicable to the current layer is output for which **PicOrderCnt( picB )** is greater than **PicOrderCnt( picA )**, where **PicOrderCnt( picB )** and **PicOrderCnt( picA )** are the **PicOrderCntVal** values of **picB** and **picA**, respectively, immediately after the invocation of the decoding process for the picture order count of **picB**.

**num\_sei\_msgs\_minus1** plus 1 specifies the total number of SEI messages contained in the supplemental enhancement information set SEI message with **sei\_set\_id**.

**sei\_rec\_order\_constraint\_flag**[ *i* ] equal to 1 indicates that the *i*-th SEI message contained in the supplemental enhancement information set SEI message is recommended to be used in the sequential order of SEI messages with **sei\_rec\_order\_constraint\_flag** equal to 1. When both **sei\_rec\_order\_constraint\_flag**[ *i* ] and **sei\_rec\_order\_constraint\_flag**[ *j* ] equal to 1 and *i* is smaller than *j*, it is recommended to use SEI message designated by **sei\_payload\_type**[ *i* ] with **sei\_msg\_id**[ *i* ] prior to the SEI message designated by **sei\_payload\_type**[ *j* ] with **sei\_msg\_id**[ *j* ]. **sei\_rec\_order\_constraint\_flag**[ *i* ] equal to 0 indicates that there is no recommended order of use for the *i*-th SEI message contained in the supplemental enhancement information set SEI message.

**sei\_msg\_id\_present\_flag**[ *i* ] equal to 1 indicates that identification number **sei\_msg\_id**[ *i* ] is present for the *i*-th SEI message. **sei\_msg\_id\_present\_flag**[ *i* ] equal to 0 indicates that identification number **sei\_msg\_id**[ *i* ] is not present for the *i*-th SEI message.

When the following SEI messages are present in supplemental enhancement information set SEI message, **sei\_msg\_id\_present\_flag**[ *i* ] could be set equal to 1: Buffering period SEI message, Pan-scan rectangle SEI message, Picture snapshot SEI message, Progressive refinement segment start SEI message, Progressive refinement segment end SEI message, Tone mapping information SEI message, Frame packing arrangement SEI message, Active parameter sets SEI message, Knee function information SEI message, and Colour remapping information SEI message. Otherwise, **sei\_msg\_id\_existence\_flag**[ *i* ] should equal to 0.



**sei\_msg\_change\_flag[ i ]** equal to 1 indicates that the persistence flag in the i-th SEI message equal to 1.  
**sei\_msg\_change\_flag[ i ]** equal to 0 indicates that the persistence flag in the i-th SEI message equal to 0 or the persistence flag does not exist.

**sei\_payload\_type[ i ]** specifies the payload type, PayloadType defined in D.2.1, of the i-th SEI message in the supplemental enhancement information set SEI message designated by **sei\_set\_id[ i ]**.

**sei\_msg\_id[ i ]** specifies the identification number that is used to indicate the purpose of the i-th SEI message. **sei\_msg\_id[i]** should be equal to the specific identification number in Buffering period SEI message, Pan-scan rectangle SEI message, Picture snapshot SEI message, Progressive refinement segment start SEI message, Progressive refinement segment end SEI message, Tone mapping information SEI message, Frame packing arrangement SEI message, Active parameter sets SEI message, Knee function information SEI message, or Colour remapping information SEI message.

- Supplemental enhancement information set SEI message is proposed.
  - It provides the list of SEI messages used to produce an intended output.
- In order to support decoder post-processing, it is proposed
  - to indicate the processing order of SEI messages in the list,
  - to describe the SEI message with
    - payload type
    - SEI message identifier if exists
    - frame by frame change indication.

# Thank you