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| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  10th Meeting: Stockholm, SE, 11–20 July 2012 | Document: JCTVC-J0261r1 |

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| *Title:* | **Signaling of VPS Activation** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Proposal | | |
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# Abstract

Video parameter set (VPS) can be used to describe essential information of “scalable layers” of a bitstream. However, to know which VPS is active, an extractor must parse slice headers, related PPS and SPS as well. This is obviously a big burden for any extractor. In this contribution, some simple mechanisms for activation signaling of video parameter set using additional messages are proposed.

# Introduction and Problem Statement

In the last meeting, video parameter set (VPS) is adopted to describe essential information of “scalable layers” of a bitstream. However, to know which VPS is active, an extractor must parse slice headers, and related PPS/SPS as well. This means that, an extractor must understand all the syntax elements in parameter sets and slice headers. This is obviously a big burden for any extractor. To solve this problem, we propose some simple mechanisms for activation signaling of video parameter set using additional message.

# Activation Signaling for Video Parameter Set (VPS)

The video parameter set could be sometimes updated. To let an extractor know which VPS is activated without having to parse slice headers and related PPS/SPSs, we propose to include a new element **vps\_id** to indicate the identifier of the video parameter set to be used for the NAL units inside the related access unit. The following proposed options are different in the locations of the vps\_id.

In the first option, **vps\_id** element is added to the access unit delimiter. The syntax of the modified access unit delimiter is shown below.

|  |  |
| --- | --- |
| access\_unit\_delimiter\_rbsp( ) { | Descriptor |
| **pic\_type** | u(3) |
| **vps\_id\_present\_flag** | u(1) |
| if( VPS\_id\_present\_flag ) |  |
| **vps\_id** | ue(v) |
| rbsp\_trailing\_bits( ) |  |
| } |  |

* **vps\_id\_present\_flag**: if equal to 0, indicates that vps\_id element is present in the access unit delimiter.
* **vps\_id**: identifies the video parameter set referred by the access unit. The value of vps\_id shall be in the range of 0 to X, inclusive.

In the second option, a new SEI message called parameter\_set\_reference() is used to specifically convey the **vps\_id** element. The syntax of the SEI message is shown below.

|  |  |
| --- | --- |
| parameter\_set\_reference( payloadSize ) { | **Descriptor** |
| **vps\_id** | ue(v) |
| } |  |

In the third option, Recovery point SEI message is extended to convey vps\_id element. The semantics of **vps\_id\_present\_flag** and **vps\_id** is the same as the above.

|  |  |
| --- | --- |
| recovery\_point( payloadSize ) { | Descriptor |
| **vps\_id\_present\_flag** | u(1) |
| if( vps\_id\_present\_flag ) |  |
| **vps\_id** | ue(v) |
| **recovery\_poc\_cnt** | ue(v) |
| **exact\_match\_flag** | u(1) |
| **broken\_link\_flag** | u(1) |
| } |  |

Note that, the above options to convey vps\_id value are only used at IDR access unit. To extract a bitstream, an extractor just has to maintain one or more VPS and detects the value of vps\_id element if at least one of these options is used in an IDR access unit.

# Revised option 2 based on meeting discussion

A new SEI message called parameter\_set\_reference() is used to specifically convey the **vps\_id** element, **sps\_id** element, and extension data. The syntax of the SEI message is shown below.

|  |  |
| --- | --- |
| parameter\_set\_reference( payloadSize ) { | **Descriptor** |
| **vps\_id** | u(4) |
| **sps\_id\_present\_flag** | u(1) |
| if(sps\_id\_present\_flag) |  |
| **sps\_id** | ue(v) |
| **psr\_extension\_flag** | u(1) |
| if(psr\_extension\_flag){ |  |
| **psr\_extension\_length** | ue(v) |
| for(i=0; i<psr\_extension\_length; i++) |  |
| **psr\_extension\_data\_byte** | u(8) |
| } |  |
| } |  |

* **vps\_id** specifies the video\_parameter\_set\_id of the active video parameter set. The value of vps\_id shall be in the range of 0 to 15, inclusive.
* **sps\_id\_present\_flag** equal to 1 indicates that the sequence\_parameter\_set\_id of the active sequence parameter set is specified. When sps\_id\_present\_flag is equal to 0, the sequence\_parameter\_set\_id of the active sequence parameter set is unspecified
* **sps\_id** specified the sequence\_parameter\_set\_id of the active sequence parameter set. The value of sps\_id shall be in the range of 0 to 31, inclusive.
* **psr\_extension\_flag** equal to 0 specifies that no parameter set reference SEI message extension syntax elements are present in the parameter set reference SEI message. psr\_extension\_flag shall be equal to 0 in bitstreams conforming to this Recommendation | International Standard. The value of 1 for psr\_extension\_flag is reserved for future use by ITU-T | ISO/IEC.
* **psr\_extension\_length** specifies the length of the psr extension data in bytes, not including the bits used for signalling psr\_extension\_length itself. The value of psr\_extension\_length shall be in the range of 0 to 256, inclusive
* **psr\_extension\_data\_byte**: may have any value. Its value does not affect decoder conformance to profiles specified in this Recommendation | International Standard.

# References

[1] T. C. Thang, J. W. Kang, H. Lee, J. S. Choi, "High-level syntax modifications to support extractor operation" JCTVC-I0252, 9th meeting: Geneva, CH, 27 April – 7 May, 2012.

# Patent rights declaration(s)

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