|  |  |
| --- | --- |
| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  16th Meeting: San José, US, 9–17 Jan. 2014 | Document: JCTVC-P0047 |

|  |  |
| --- | --- |
| **Joint Collaborative Team on 3D Video Coding Extensions**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  7th Meeting: San José, US, 11–17 Jan. 2014 | Document: JCT3V-G0039 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Title:* | **On sub-bitstream extraction** | | |
| *Status:* | Input Document to JCT-VC and JCT-3V | | |
| *Purpose:* | Proposal | | |
| *Author(s) or Contact(s):* | Takeshi Tsukuba Tomoyuki Yamamoto Tomohiro Ikai  1-9-2 Nakase, Mihama-ku, Chiba-shi, Chiba 261-8520 JAPAN | Tel: Email: | +81-43-299-8526 [tsukuba.takeshi@sharp.co.jp](mailto:tsukuba.takeshi@sharp.co.jp) |
| *Source:* | SHARP Corporation | | |

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

# Abstract

This contribution proposes a solution to address the issue on sub-bitstream extraction process in SHVC / MV-HEVC. The issue is that VPS with nuh\_layer\_id equal to 0 is removed in sub-bitstream extraction when a target layer id list does not include nuh\_layer\_id equal to 0 and thus the extracted sub-bitstream is un-decodable. The proposal is to always include VPS with nuh\_layer\_id equal to 0 in a sub-bitstream regardless of a target layer id list. It is asserted that the proposed changes can solve the issue.

# Introduction

Current SHVC / MV-HEVC specification apply the same bit stream extraction part as HEVC version 1, where all NAL units with nuh\_layer\_id not among the values included in layerIdListTarget are removed. It raises the following problem;

1. When nuh\_layer\_id equal to 0 is not included in a target layer id list layerIdListTarget, the extracted sub-bistream is un-decodable since VPS NAL units, which are necessary for scalable bitstream decoding, are also removed.

# Proposal

Add a handling to always include VPS with nuh\_layer\_id equal to 0 in a sub-bitstream regardless of a target layer identifier list layerIdListTarget .

# Text changes

Changes are highlighted in yellow.

**F.10.X Sub-bitstream extraction process**

Inputs to this process are a bitstream, a target highest TemporalId value tIdTarget, and a target layer identifier list layerIdListTarget.

Output of this process is a sub-bitstream.

It is a requirement of bitstream conformance for the input bitstream that any output sub-bitstream of the process specified in this subclause with tIdTarget equal to any value in the range of 0 to 6, inclusive, and layerIdListTarget equal to the layer identifier list associated with a layer set specified in the active video parameter set shall be a conforming bitstream.

NOTE  – A conforming bitstream contains one or more coded slice segment NAL units with nuh\_layer\_id equal to 0 and TemporalId equal to 0.

The output sub-bitstream is derived as follows:

– When one or more of the following two conditions are true, remove all SEI NAL units that have nuh\_layer\_id equal to 0 and that contain a non-nested buffering period SEI message, a non-nested picture timing SEI message, or a non-nested decoding unit information SEI message:

– layerIdListTarget does not include all the values of nuh\_layer\_id in all NAL units in the bitstream.

– tIdTarget is less than the greatest TemporalId in all NAL units in the bitstream.

NOTE  – A "smart" bitstream extractor may include appropriate non-nested buffering picture SEI messages, non-nested picture timing SEI messages, and non-nested decoding unit information SEI messages in the extracted sub-bitstream, provided that the SEI messages applicable to the sub-bitstream were present as nested SEI messages in the original bitstream.

– Remove all NAL units with TemporalId greater than tIdTarget or nuh\_layer\_id not among the values included in layerIdListTarget except for NAL units with nal\_unit\_type being equal to VPS\_NUT.

# Conclusion

This contribution proposes a change on sub-bitstream extraction process to be applicable for SHVC / MV-HEVC, which is to add an exception handling to always include VPS with nuh\_layer\_id equal to 0 in a sub-bitstream.

It is recommended to adopt the proposal to SHVC and MV-HEVC.

# Reference

1. J. Chen, J. Boyce, Y. Ye, M. M. Hannuksela, Y.-K. Wang, “SHVC Draft 4”, JCTVC-O1008, Geneva, CH, 23 Oct. – 1 Nov. 2013.
2. G. Tech, K. Wegner, Y. Chen, M. Hannuksela, J. Boyce, “MV-HEVC Draft Text 6”, JCT3V-F1004, Geneva, CH, 23 Oct. – 1 Nov. 2013.
3. “Recommendation H.265 (04/13)”, ITU-T.

# Patent rights declaration(s)

**SHARP Corporation may have current or pending patent rights relating to the technology described in this contribution and, conditioned on reciprocity, is prepared to grant licenses under reasonable and non-discriminatory terms as necessary for implementation of the resulting ITU-T Recommendation | ISO/IEC International Standard (per box 2 of the ITU-T/ITU-R/ISO/IEC patent statement and licensing declaration form).**