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| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11**  7th Meeting: Geneva, CH, 21-30 November, 2011 | Document: JCTVC-G015 |

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| *Title:* | **JCT-VC AHG report: High-level syntax (AHG 15)** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Report | | |
| *Author(s) or Contact(s):* | **Ye-Kui Wang** Qualcomm  **Jill Boyce** Vidyo  **Y. Chen** Qualcomm  **Miska M. Hannuksela** Nokia  **Kimihiko Kazui** Fujitsu  **Thomas Schierl** Fraunhofer HHI  **Rickard Sjöberg** Ericsson  **T. K. Tan** NTT DOCOMO  **Wade Wan** Broadcom | Email: | [yekuiw@qualcomm.com](mailto:yekuiw@qualcomm.com)  [jill@vidyo.com](mailto:jill@vidyo.com)  [cheny@qualcomm.com](mailto:cheny@qualcomm.com)  [miska.hannuksela@nokia.com](mailto:miska.hannuksela@nokia.com)  [kazui.kimihiko@jp.fujitsu.com](mailto:kazui.kimihiko@jp.fujitsu.com)  [thomas.schierl@hhi.fraunhofer.de](mailto:thomas.schierl@hhi.fraunhofer.de)  [rickard.sjoberg@ericsson.com](mailto:rickard.sjoberg@ericsson.com)  [ttk@pacific.net.sg](mailto:ttk@pacific.net.sg)  [wwan@broadcom.com](mailto:wwan@broadcom.com) |
| *Source:* | High-level syntax AHG | | |

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# Abstract

This report summarizes the activities of the high-level syntax ad hoc group between the 6th JCT-VC meeting held in Torino in July 2011 and the current meeting in Geneva, and lists the related input documents submitted to this meeting according to their topics.

# Mandates

1. Study NAL unit header, sequence parameter set, picture parameter set, proposed additional types of parameter sets, and slice header syntax designs
2. Study and identify needs for SEI messages and VUI
3. Study possible improvements to the reference picture list construction processes
4. Study possible simplifications and improvements to reference picture marking process (e.g., the need of the processes for generating and handling of "non-existing" pictures)
5. Study the hypothetical reference decoder behavior
6. Assist in software development and text drafting for the high-level syntax in the HEVC design

# Reflector activities

On mandate 1, there were some discussions on slice header syntax element organization, including whether to put the slice\_address syntax element first in the slice header, whether to keep the first\_slice\_in\_pic\_flag syntax element, whether the presence of the cabac\_init\_idc syntax element should depend on the value of slice\_type, which is not present in a short slice header, and whether to put all syntax elements that are only present in a full slice header in consecutive order.

On mandates 3 to 5, inclusive, extensive discussions have been happened in the context of AHG 21, which are likely to be summarized in the AHG 21 report.

There were no reflector discussions on mandates 1 and 6.

# Related contributions

The following high-level syntax related contributions have been submitted to this JCT-VC meeting, listed according to the topics. Documents that are obviously covered by other high-level syntax closely related AHGs or topics, namely the following, are not listed herein:

* AHG 4: Picture partitioning and LCU scan order
* AHG 8: Reference pictures memory compression
* AHG 14: Loss robustness
* AHG 17: Scalable coding investigation
* AHG 18: Resolution adaption
* AHG 21: Reference picture buffering and list construction
* Profile/level

The related documents are listed below, categorized according to the topics.

**Documents related to NAL unit header:**

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| JCTVC-G331 | AHG15: On NAL unit types and slice types | [Y. -K. Wang](mailto:yekuiw@qualcomm.com) , [Y. Chen (Qualcomm)](mailto:cheny@qualcomm.com) |

**Documents related to SPS (including VUI) and PPS:**

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| JCTVC-G096 | Items to be clarified in HEVC design | [M. Zhou (TI)](mailto:zhou@ti.com) , [W. Wan (Broadcom)](mailto:wwan@broadcom.com) , [T. Suzuki (Sony)](mailto:teruhikos@jp.sony.com) , [A. Tabatabai (Sony)](mailto:ali.tabatabai@am.sony.com) |
| JCTVC-G325 | AHG15: Picture size signaling | [Y. Chen](mailto:cheny@qualcomm.com) , [Y. -K. Wang](mailto:yekuiw@qualcomm.com) , [M. Karczewicz (Qualcomm)](mailto:martak@qualcomm.com) |
| JCTVC-G334 | AHG15: On sequence parameter set and picture parameter set | [Y. -K. Wang](mailto:yekuiw@qualcomm.com) , [Y. Chen](mailto:cheny@qualcomm.com) , [Y. Zheng](mailto:zhengy@qualcomm.com) , [W. -J. Chien (Qualcomm)](mailto:wchien@qualcomm.com) |
| JCTVC-G398 | High-level Syntax: Marking process for non-TMVP pictures | B. Li (USTC) , J. Xu (Microsoft) , H. Li (USTC) |
| JCTVC-G507 | Syntax Issues | [K. Sato (Sony)](mailto:Kazushi.Sato@jp.sony.com) |
| JCTVC-G546 | On high-level syntax for maximum DPB size and frame latency | [Y. Park](mailto:youngo.park@samsung.com) , [K. P. Choi](mailto:kp5.choi@samsung.com) , [C. Kim (Samsung)](mailto:dionism@samsung.com) |
| JCTVC-G779 | Proposed constraint on reordering latency (for further consideration of JCTVC-F541) | [G. J. Sullivan (Microsoft)](mailto:garysull@microsoft.com) |

**Documents related to APS:**

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| JCTVC-G122 | VLC for high level syntax (ALF and SAO parameters) | V. Sze (TI) |
| JCTVC-G220 | Non-CE8: Pure VLC for SAO and ALF | C.-Y. Tsai , C.-M. Fu , C.-Y. Chen , C.-W. Hsu , Y.-W. Huang , S. Lei (MediaTek) |
| JCTVC-G295 | Non-CE4 Subtest3 : Extension of Adaptation Parameter Sets syntax for Quantization matrix | [J. Tanaka](mailto:tanaka.junichi@jp.sony.com) , [Y. Morigami](mailto:Yoshitaka.Morigami@jp.sony.com) , [T. Suzuki (Sony)](mailto:teruhikos@jp.sony.com) |
| JCTVC-G330 | AHG15: Syntax elements in adaptation parameter set | [Y. Chen](mailto:cheny@qualcomm.com) , [Y. -K. Wang](mailto:yekuiw@qualcomm.com) , [M. Karczewicz (Qualcomm)](mailto:martak@qualcomm.com) |
| JCTVC-G332 | Multiple Adaptation Parameter Sets Referring | [M. LI](mailto:li.ming42@zte.com.cn) , [P. WU (ZTE)](mailto:ping.wu@zte.com.cn) |
| JCTVC-G570 | Byte alignment overhead reduction | [S. Esenlik](mailto:Semih.Esenlik@eu.panasonic.com) , [M. Narroschke](mailto:Matthias.Narroschke@eu.panasonic.com) , [T. Wedi (Panasonic)](mailto:Thomas.Wedi@eu.panasonic.com) |
| JCTVC-G658 | Quantization matrices in fragmented APS | [Y. Chen](mailto:cheny@qualcomm.com) , Y.-K. Wang , R. Joshi , M. Karczewicz (Qualcomm) |

**Documents related to slice header:**

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| JCTVC-G157 | Reference List Construction for Random Access Settings | [Hendry](mailto:hendry.hendry@lge.com) , [S. Park](mailto:seungwook.park@lge.com) , [B. Jeon (LG)](mailto:bm.jeon@lge.com) |
| JCTVC-G441 | Redundancy removal of explicit weighted prediction syntax | A. Tanizawa, T. Chujoh, T. Yamakage (Toshiba) |
| JCTVC-G538 | Syntax improvement and process simplification for the fine granularity slices | [Y. Park](mailto:youngo.park@samsung.com) , [S. Jeong](mailto:ss00.jeong@samsung.com) , [C. Kim (Samsung)](mailto:dionism@samsung.com) |
| JCTVC-G549 | Syntax rearrangement for list combination | [Y. Park](mailto:youngo.park@samsung.com) , [S. Jeong](mailto:ss00.jeong@samsung.com) , [C. Kim (Samsung)](mailto:dionism@samsung.com) |
| JCTVC-G566 | Syntax refinements for SAO and ALF | [S. Esenlik](mailto:Semih.Esenlik@eu.panasonic.com) , [M. Narroschke](mailto:Matthias.Narroschke@eu.panasonic.com) , [T. Wedi (Panasonic)](mailto:Thomas.Wedi@eu.panasonic.com) |
| JCTVC-G717 | Combined list construction | [Yue Yu](mailto:yyu@motorola.com) , [Krit Panusopone](mailto:krit@motorola.com) , [Xue Fang](mailto:X.Fang@motorola.com) , [Limin Wang](mailto:limin.wang@motorola.com) |

**Documents related to random access (particularly on CRA picture):**

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| JCTVC-G158 | Undiscardable Leading Picture for CRA | [Hendry](mailto:hendry.hendry@lge.com) , [S. Park](mailto:seungwook.park@lge.com) , [B. Jeon (LG)](mailto:bm.jeon@lge.com) |
| JCTVC-G159 | Random Access Detection and Notification | [Hendry](mailto:hendry.hendry@lge.com) , [S. Park](mailto:seungwook.park@lge.com) , [Y. Jeon](mailto:yongjoon.jeon@lge.com) , [B. Jeon (LG)](mailto:bm.jeon@lge.com) |
| JCTVC-G319 | AHG15: Conforming bitstreams starting with CRA pictures | [Y. Chen](mailto:cheny@qualcomm.com) , [Y. -K. Wang](mailto:yekuiw@qualcomm.com) , [M. Karczewicz (Qualcomm)](mailto:martak@qualcomm.com) |
| JCTVC-G533 | On syntax for clean random access (CRA) pictures | [Y. Park](mailto:youngo.park@samsung.com) , [H. Yang](mailto:h_c.yang@samsung.com) , [C. Kim (Samsung)](mailto:dionism@samsung.com) |
| JCTVC-G584 | Temporal layer access pictures and CRA | Jonatan Samuelsson , Rickard SjÃ¶berg (Ericsson) |

**Documents related to HRD:**

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| JCTVC-G188 | Enhancement on operation of coded picture buffer | [K. Kazui](mailto:kazui.kimihiko@jp.fujitsu.com) , S. Shimada , J. Koyama , A. Nakagawa (Fujitsu) |
| JCTVC-G583 | Reducing output delay for "bumping" process | Jonatan Samuelsson , Rickard SjÃ¶berg (Ericsson) |

**Documents related to SEI messages:**

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| JCTVC-G079 | SEI message for display orientation information | [J. Boyce](mailto:jill@vidyo.com) , [D. Hong](mailto:danny@vidyo.com) , [S. Wenger (Vidyo)](mailto:stephan@vidyo.com) |
| JCTVC-G450 | High level syntax to support interlace format | K. Sugimoto , A. Minezawa , S. Sekiguchi (Mitsubishi) |

# Recommendations

The high-level syntax ad hoc group recommends:

* To review all related input contributions
* To coordinate with other closely related AHGs and non-AHG topics on common related contributions, including
  + AHG 4: Picture partitioning and LCU scan order
  + AHG 8: Reference pictures memory compression
  + AHG 14: Loss robustness
  + AHG 17: Scalable coding investigation
  + AHG 18: Resolution adaption
  + AHG 21: Reference picture buffering and list construction
  + Profile/level