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| **Joint Collaborative Team on 3D Video Coding Extension**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  11th Meeting: Geneva, CH, 12–18 Feb. 2015 | Document: JCT3V-K0002 |

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| *Title:* | **JCT-3V AHG Report: 3D-HEVC Draft and MV-HEVC / 3D-HEVC Test Model editing (AHG2)** | | |
| *Status:* | AHG report input to JCT-3V | | |
| *Purpose:* | AHG report | | |
| *Author(s) or Contact(s):* | Gerhard Tech (Fraunhofer HHI)  Krzysztof Wegner (Poznan Univ. of Tech.)  Jill Boyce (Vidyo)  Ying Chen (Qualcomm Incorporated)  Miska Hannuksela (Nokia)  Teruhiko Suzuki (Sony)  Sehoon Yea (LGE)  Jens-Rainer Ohm (RWTH Aachen)  Gary Sullivan (Microsoft) | Email: | [gerhard.tech@hhi.fraunhofer.de](mailto:gerhard.tech@hhi.fraunhofer.de)  [kwegner@multimedia.edu.pl](mailto:kwegner@multimedia.edu.pl)  [jill@vidyo.com](mailto:jill@vidyo.com)  [cheny@qti.qualcomm.com](mailto:cheny@qualcomm.com)  [miska.hannuksela@nokia.com](file:///C:\Users\cheny\AppData\Local\Microsoft\Windows\Temporary%20Internet%20Files\Content.Outlook\E1R8VN2J\miska.hannuksela@nokia.com)  [teruhikos@jp.sony.com](mailto:teruhikos@jp.sony.com)  [sehoon.yea@lge.com](mailto:sehoon.yea@lge.com)  [ohm@ient.rwth-aachen.de](mailto:ohm@ient.rwth-aachen.de)  [garysull@microsoft.com](mailto:garysull@microsoft.com) |
| *Source:* | AHG | | |

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# Abstract

This document reports on the work of the JCT-3V ad hoc group on 3D-HEVC Draft and MV-HEVC / 3D-HEVC Test Model editing (AHG2) between the 10th JCT-3V meeting in Strasbourg and the 11th meeting in Geneva.

# Mandates

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| **Title and Email Reflector** | **Chairs** | **Mtg** |
| **3D-HEVC Draft and MV-HEVC / 3D-HEVC Test Model editing (AHG2)**   * Produce and finalize JCT3V-J1001 3D-HEVC Draft Text 6. * Produce and finalize JCT3V-J1003 3D-HEVC and MV-HEVC Test Model 10. * Gather and address comments for refinement of these documents. * Coordinate with the HTM software Integration AHG to address issues relating to mismatches between software and text. * Coordinate with AHG6 w.r.t. text improvements in 3D-HEVC specific HLS. | G. Tech, K. Wegner (co-chairs),  J. Boyce,  Y. Chen,  M. Hannuksela,  T. Suzuki,  S. Yea,  J.-R. Ohm,  G. Sullivan (vice chairs) | N |

# Introduction

The sixth 3D-HEVC draft, the eighth Test Model of 3D-HEVC and MV-HEVC were developed from the fifth 3D-HEVC draft, the seventh 3D-HEVC Test Model, respectively, following the decisions taken at the 10th JCT-3V meeting in Strasbourg.

Two editorial teams were formed to work on the two documents that were to be produced:

* JCT3V-J1001 3D-HEVC Draft Text 6
* G. Tech, Y. Chen
* JCT3V-J1003 Test Model 10 of 3D-HEVC and MV-HEVC
* Y. Chen, G. Tech

# Status

## 3D-HEVC Draft 6

Six versions of JCT3V-J1001 have been published by the AHG following the 9th JCT-3V meeting in Strasbourg. The last version has been submitted as study text to the MPEG secretariat.

### Incorporated changes

All, but one, adoptions of the last meeting have been incorporated. Most of the changes have been minor modifications. Existing text has been revised and improved.

Changes (41) of JCT3V-J1001 relative to JCT3V-I1001 are:

Merge candidate list (3)

* (3DN-18/[JCT3V-J0059](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2348)) A cleanup of the size derivation for 3D-HEVC merge candidate list Decision(BF): Adopt J0059 (text and software)
* (3DN-17/[JCT3V-J0042](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2331)) Simplification of depth merge candidate list Decision: Agreed to remove DDD as proposed in JCT3V-J0042 and JCT3V-J0030. This removes significant parts from the draft text and reduces implementation complexity.
* (3DN-16/[JCT3V-J0039](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2328)) Removal of redundant VSP candidates in Merge mode, Decision: Adopt J0039 method 2

DMM (2)

* (3DN-23/[JCT3V-J0035](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2324)) On Lookup Table Size Reduction for DMM1. Decision: Adopt JCT3V-J0035.
* (3DN-11/[JCT3V-J0033](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2322)) A cleanup of DMM index coding. Decision: Specify the valid range in the semantics of wedge\_full\_tab\_idx.

Single depth mode (4)

* (3DN-14/[JCT3V-J0053](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2342)) Simplification on CABAC context models for single depth mode No action on changing the syntax element single\_sample\_idx to bypass coded Decision(BF/ed.): Various issue pointed out in this contributions need to be fixed, missing context tables, misalignment between text and software w.r.t. sequence of candidates processing, specification that single\_sample\_idx is a flag is missing.
* (3DN-13/[JCT3V-J0052](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2341)) Clipping for candidate index of single depth mode)
* (3DN-12/[JCT3V-J0115](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2414)) Single Depth Intra Mode Simplification Decision: Adopt JCT3V-J0115
* (3DN-10/[JCT3V-J0060](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2349)) Single depth flag signaling, Decision: Adopt J0060 (Add VPS flag to disable SDM globally) or put it to SPS in case that the other flags are also treated that way Decision: (from discussion): Remove current slice level flag for SDM

Profiles (1)

* (3DN-08/[JCT3V-J0106](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2402)) Initial text for the specification of profiles, tiers, and levels in 3D-HEVC (version 2 with the restriction as indicated above)

HLS (5)

* (3DN-07/[JCT3V-J0107](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2403)) On 3D-HEVC HLS and its alignment with MV-HEVC HLS, Aspect 5, Camera parameters.
* (3DN-06/[JCT3V-J0107](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2403)) On 3D-HEVC HLS and its alignment with MV-HEVC HLS, Aspect 4, MvHevcCompatibilityFlag.
* (3DN-05/[JCT3V-J0107](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2403)) On 3D-HEVC HLS and its alignment with MV-HEVC HLS, Aspect 3, vps extension indication
* (3DN-04/[JCT3V-J0107](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2403)) On 3D-HEVC HLS and its alignment with MV-HEVC HLS, Aspect 2, tool parameters
* (3DN-03/[JCT3V-J0107](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2403)) On 3D-HEVC HLS and its alignment with MV-HEVC HLS, Aspect 1, layer dependencies

Various (9) (DLT, DBBP, IC ARP, Sub Motion, NBDV, depth refinement, chorma

* (3DN-09/Chroma) Disable chroma for depth.
* (3DN-26/[JCT3V-J0037](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2326)) ARP, IC and DBBP Flags Signaling for 3D-HEVC Decision: Adopt J0037 item 1 and item 4. WD text item 1 and item 4 in version 3 uploaded
* (3DN-25/[JCT3V-J0041](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2330)) Simplification of an NBDV availability check Decision: Adopt JCT3V-J0041 Note: The encoder restriction related to ARP is still necessary
* (3DN-24/[JCT3V-I0129](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2212)) AHG4: Editorial improvement for ARP specification text. Missing integration from last meeting.
* (3DN-22/[JCT3V-J0066](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2355)) Simplification and improvement of sub-PU Decision: Adopt J0066 method 1
* (3DN-21/[JCT3V-J0029](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2318)) Cleanup3: DLT table derivation Decision(Ed.): Adopt the suggested text change.
* (3DN-20/[JCT3V-J0046](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2335)) Modification of reference index for depth disparity derivation Decision: Adopt J0046
* (3DN-19/[JCT3V-J0045](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2334)) Alignment of motion derivation from other components Decision(BF): Adopt JCT3V-J0045 (except for DDD part as DDD was removed).
* (3DN-15/[JCT3V-J0050](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2339)) Simplification of chroma IC

Editorial improvements/Fixes (17)

* (3DC-48) Small bug fixes
* (3DC-46) Fix indices.
* (3DC-44) Fix SPB motion.
* (3DC-39) Fix ticket #89.
* (3DC-36) Fix ticket #80.
* (3DC-43) Fix ticket 92 ( cMax wedge\_full\_tab\_idx)
* (3DC-34) Fixes: PredFlagLX, ticket #82, Comment on ticket #88
* (3DC-27) Editorial fixes (e.g. Ticket #81, removal editor notes)
* (3DC-33) Fix sub Pb size
* (3DC-31) Fixes
* (3DC-30) Removed obsolete derivation process for the shifted disparity merge candidate.
* (3DC-29) Fixes and cleanup related to DLT
* (3DC-28) Fixed missing mergeCandIsVspFlag derivation.
* (3DE-02) Editorial fixes.
* (3DE-01) Alignment with 2nd edition.
* (3DE-42) Renamed DefaultRefViewIdxAvailableFlag and fix for depth layers
* (3DE-41) Introduced DisparityDerivationFlag.

### Open issues

* A mismatch of the software and draft text regarding the binarization of part\_mode in QTL has been reported (ticket #88). It turned out that the binarization of part\_mode as performed in the current HTM version has not been proposed in the specification text of related proposal (JCT3V-G0055).
* A list of other minor issues is listed in the bug tracking system.

## Test Model 10 of 3D-HEVC and MV-HEVC

One version of JCT3V-J1003 has been published by the editing AHG following the 10th JCT-3V meeting in Strasbourg. The last version corresponds to the text submitted to MPEG secretariat.

### Incorporated changes

All adoptions of the last meeting have been incorporated. Moreover existing text has been revised and improved and missing text from previous meeting has been added.

Changes (9) of JCT3V-J1003 relative to JCT3V-I1003 are:

* (3DN-01/[JCT3V-J0107](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2403)) On 3D-HEVC HLS and its alignment with MV-HEVC HLS.
* (3DN-02/[JCT3V-J0037](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2326)) ARP, IC and DBBP Flags Signaling for 3D-HEVC Decision: Adopt J0037 item 1 and item 4. WD text item 1 and item 4 in version 3 upload.
* (3DN-03/[JCT3V-J0041](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2330)) Simplification of an NBDV availability check Decision: Adopt JCT3V-J0041 Note: The encoder restriction related to ARP is still necessary
* (3DN-04/[JCT3V-J0042](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2331)) Simplification of depth merge candidate list Decision: Agreed to remove DDD as proposed in JCT3V-J0042 and JCT3V-J0030. This removes significant parts from the draft text and reduces implementation complexity.
* (3DN-05/[JCT3V-J0039](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2328)) Removal of redundant VSP candidates in Merge mode, Decision: Adopt J0039 method 2
* (3DN-06/[JCT3V-J0115](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2414)) Single Depth Intra Mode Simplification Decision: Adopt JCT3V-J0115
* (3DN-07/[JCT3V-J0050](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2339)) Simplification of chroma IC
* (3DN-08/[JCT3V-J0035](http://phenix.it-sudparis.eu/jct3v/doc_end_user/current_document.php?id=2324)) On Lookup Table Size Reduction for DMM1. Decision: Adopt JCT3V-J0035
* (3DN-09) Editorial improvements and bug fixes

## MV-HEVC specification defects

Some minor defects related to the 2nd edition of HEVC have been reported. Some of them are related to MV-HEVC. Details can be found in:

[JCTVC-T0002](http://phenix.int-evry.fr/jct/doc_end_user/current_document.php?id=9989): JCT-VC AHG report: HEVC test model editing and errata reporting (AHG2)

# Recommendations

The recommendations of the 3D-HEVC Draft and MV-HEVC / 3D-HEVC Test Model editing AHG are to:

* Approve the edited documents JCT3V-J1001, JCT3V-J1003 as JCT-3V outputs.
* Continue to edit documents JCT3V-J1001 and JCT3V-J1003 to ensure that all agreed elements of 3D-HEVC are fully described
* Compare the documents JCT3V-J1001 and JCT3V-J1003 with the HTM-software and resolve any discrepancies that may exist, in collaboration with the Software AHG.
* Continue to improve the overall editorial quality of the documents JCT3V-J1001, and JCT3V-J1003.
* Ensure that properly drafted candidate text is available prior to making any decision to change the specifications.
* Reviewing specification text of each adopted proposal, since 3D-HEVC is close to finalization.
* Discuss reported open issues.