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| *Title:* | **AHG4 report: 3D-AVC Software Integration** | | |
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| *Source:* | AhG4 | | |

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# Abstract

This document reports on activities performed by JCT-3V AHG4 on 3D-AVC Software Integration between 7th and 8th JCT-3V meetings. Activities focused on the execution of integration plan listed in JCT3V-G0239. All planned working items have been implemented and 3D-ATM v11.0 has been validated and cross-checked in EHP PIP/IBP/IPP coding configurations, as well as preliminary results for HP PIP/IBP/IPP were produced and expect on cross-check.

Nevertheless, a recently reported bug in HLS of MVC+D prevented AhG4 to reach consensus, whether current software release (3D-ATM v11.0) should be utilized for 3D-AVC conformance bitstream production. It was suggested to utilize 3D-AVC v11.1 (to be available shortly) for generating conformance bitsteams.

# Introduction

At the 7th JCT-3V meeting, the following mandates have been specified for AHG4:

1. Coordinate development of the 3DV-ATM software and its distribution to JCT-3V members
2. Produce documentation of software usage for distribution with the software
3. Prepare and deliver 3DV-ATM v11.0 software which to address bug reports and requests for additional functionality identified in JCT3V-G0239. (expected by 14 March 2014).
4. Perform analysis and reconfirmation checks of the behaviour of technical changes adopted into the draft design, and report the results of such analysis.
5. Coordinate with 3D-AVC Draft and Test Model editing (AHG2) to identify any mismatches between software and text.
6. Start an effort for software code clean up.

# Report

With respect to the mandates 1-2, JCT-3V AhG4 coordinated development of the 3D-AVC software and distributions to the JCT-3V community. The 3D-AVC Test Model description document JCT3V-H1003 was updated to reflect changes in software and specification text.

## Mandate 3

AhG4 coordinated integration of work items categorized in the JCT3V-G0239 and given below for information.

Table 1. Suggested integration plan and timeline

|  |  |  |  |
| --- | --- | --- | --- |
| Work Item | Volunteer | Cross Checker/Helper | Days |
| **Stage I (19 days)** | | | |
| ALC, Part I (Sec. 2.3) | Samsung (Jin Young Lee) | Dmytro Rusanovskyy | 1 |
| DMVP and VSP decoupling (Sec. 2.1) | Samsung (Jin Young Lee) | Dmytro Rusanovskyy | 3 |
| High Level Syntax (Sec. 2.4) | Nokia (Miska Hannuksela) | Olgierd Stankiewicz | 3 |
| Flexible depth resolution issues (Sec. 2.5) | Nokia (Miska Hannuksela) | Olgierd Stankiewicz | 2 |
| DMV derivation, texture first coding (5,6,7,8 in F0268) | Qualcomm (Ying Chen) | Jian-Liang Lin | 5 |
| DMV derivation, depth first coding (5,6,7,8 in F0268) | MediaTek (Jian-Liang Lin) | Ying Chen | 5 |
| DMVP/VSP (3 and 4 in F0268) | LGE (Dmytro Rusanovskyy) | Jian-Liang Lin | 2 |
| **Stage II (20 days)** | | | |
| IBP (Sec. 2.2) | LGE (Dmytro Rusanovskyy) | Dong Tian | 10 |
| ALC, Part II (Sec. 2.3) | Samsung (Jin Young Lee) | Dong Tian | 10 |

Working items were categorized in two groups, marked as Stage I, which incorporated all major bugs known to AhG4, and Stage II, which targeted enabling new functionality, namely IBP inter-view prediction. A reasoning for such categorization was an attempt to utilize software resulted from Stage I for generating conformance bitstreams for most of cases. The software integration of Stage I was conducted in time. However, a late bug-report for MVC+D HLS implementation in 3D-ATM raised concerns and AhG4 was not able to reach a consensus, if this software should be used for 3D-AVC conformance bitstream production until the MVC+D bug-fix is provided.

The software resulting from Stage II work was publicly released with a significant delay, compare to the original working schedule. The delay was originally caused by limited computational resources for proponent's simulations and further increased by the complexity of timely replication of the simulation framework for large amount of non-typical (non-CTC) coding configurations, e.g. EHP IBP/IPP and HP IBP. Proponents and cross-checkers did not have ready validated setups and this lead to a delay for communication for configuration alignments.

AhG4 would like to thank Samsung, Nokia, Qualcomm and MediaTek for their efforts and ability to conduct the work according to schedule of Stage I.

AhG4 would like to thank LGE for their efforts on enabling IBP/IPP inter-view prediction functionality in 3D-ATM. And we would like thank Dong Tian from MERL and Jin Young from Samsung for their time and efforts on cross-checking and validating 3D-ATM software in multiple non-CTC coding configuration for Stage II.

AhG4 would like to thank Dolby for reporting a bug in HLS of MVC+D and we would like to thank Nokia, who volunteered to produce a bug-fix. The bug-fix is expected to be released in short time as 3D-ATMv11.1.

## Mandates 4

As per mandate 4, AhG4 conducted extensive validation and verification of 3D-ATM under different coding configuration.

Simulations included verification of 3D-ATM functionality for independency in enabling of coding tools, e.g. DVMP, VSP and ALC.

Following this, 3D-ATM was validated under different coding configuration, including IPP, IBP and IPP inter-view prediction in EHP and HP. Simulation results for IPP/IBP/PIP in EHP are available in /results folder. Results for IPP/IBP/PIP in HP configuration will be available shortly after bug-fix in HLS of MVC+D is introduced.

## Mandates 5

A number of mismatches between 3D-AVC specification text and 3D-ATM software have been listed and analyzed in JCT3V-G0239. In addition to this, several working items were communicated between AhG2 and AhG4. JCT3V AhG4 and volunteering proponents conducted an extensive actions toward aligning the specification text and software implementation. List of working items conducted during this period includes:

1. Bug-fix in HLS implementation of 3D-AVC

2 Flexible depth resolution

3. DMV derivation and BVSP in depth first and texture first coding order

4. Enabling support of IBP inter-view prediction in 3D-ATM

5. Bug-fix in support of un-paired MVD coding in 3D-AVC

# Recommendation

1. Approve report
2. Finilize efforts on providing bug-fixes for HLS in MVC+D and release 3D-ATM v11.1
3. Re-produce MVC+D conformance bitstream with 3D-ATM v11.1
4. Produce 3D-AVC conformance bitstream with 3D-ATM v11.1

# Acknowledgment

AhG4 would like to thank LGE, MediaTek, MERL, Nokia, Qualcomm and Samsung for their time and efforts on 3D-ATM software integration.

AhG4 would like to thank Dolby for reporting a bug in HLS of MVC+D and we would like to thank Nokia, who volunteered to produce a bug-fix.