

Title: AHG Report: Software development and HM software technical evaluation
Status: Input Document to JCT-VC
Purpose: Ad-hoc group report
Author(s): Frank Bossen | *bossen@docomoinnovations.com*
David Flynn | +1 650 496 4742
Karsten Sühring
Source: AHG chairs

Abstract

This report summarises the activities of the AhG on Software development and HM software technical evaluation that have taken place between the 8th and 9th JCT-VC meetings. Activities focused on integration of tools adopted at the 8th meeting into a common code base.

Introduction

The mandates given to the AhG are as follows

- Coordinate development of the HM software and its distribution to JCT-VC members
- Produce documentation of software usage for distribution with the software
- Prepare and deliver HM 6.0 software version and the reference configuration encodings according to JCTVC-H1100 [1] based on common conditions suitable for use in most core experiments (expected within 3 weeks after the meeting).
- Prepare and deliver HM 6.1 software (and additional “dot” version software releases as appropriate) and appropriate software branches that include additional items not integrated into the 6.0 version (expected within three weeks after the 6.0 software release).
- Perform analysis and reconfirmation checks of the behaviour of technical changes adopted into the draft design, and report the results of such analysis.
- Suggest configuration files for additional testing of tools.
- Coordinate with HEVC Draft and Test Model editing AhG to identify any mismatches between software and text.

A brief summary of activities related to each mandate is given below.

1. Development of the software was co-ordinated with the parties needing to integrate changes. A single track of development was pursued. The distribution of the software was made available through the SVN servers set up at HHI and the BBC, as announced on the JCT-VC email reflector.
2. Version 6.0 of the software was delivered approximately to schedule and reference configuration encodings were provided according to the common test conditions through an ftp site at the BBC.

<ftp://ftp.kw.bbc.co.uk/hevc/hm-6.0-anchors/>
3. Version 6.1 of the software was delivered ahead of the 9th JCT-VC meeting.
4. Text has been received to update the software manual, particularly focusing on the RPS configuration.

Table 1: HM-6.0 versus HM-5.2 for high-efficiency configurations

(a) All Intra HE-10				(b) Random Access HE-10			
	Y' BD-rate	U BD-rate	V BD-rate		Y' BD-rate	U BD-rate	V BD-rate
Class A	0.0%	4.1%	6.3%	Class A	-0.4%	3.3%	2.6%
Class B	-0.3%	3.8%	4.6%	Class B	-0.1%	0.2%	-0.6%
Class C	-0.6%	3.3%	4.4%	Class C	0.1%	0.3%	0.5%
Class D	-0.4%	3.4%	4.3%	Class D	-0.1%	0.5%	0.8%
Class E	0.4%	9.2%	9.8%	Class E			
Class F	-1.1%	3.4%	5.2%	Class F	-0.3%	-1.3%	-0.9%
All (A-E)	-0.3%	4.3%	5.5%	All (A-E)	-0.1%	1.0%	0.7%
Enc Time		90%		Enc Time		#NUM!	
Dec Time		96%		Dec Time		94%	

(c) Low delay B HE-10				(d) Low delay P HE-10			
	Y' BD-rate	U BD-rate	V BD-rate		Y' BD-rate	U BD-rate	V BD-rate
Class A				Class A			
Class B	1.0%	8.4%	9.9%	Class B	2.8%	11.7%	13.8%
Class C	0.1%	5.8%	8.1%	Class C	1.6%	8.4%	10.7%
Class D	0.3%	5.5%	7.1%	Class D	1.4%	6.5%	8.7%
Class E	1.9%	12.6%	10.8%	Class E	3.8%	21.6%	15.9%
Class F	-0.5%	8.2%	10.4%	Class F	1.4%	8.9%	15.1%
All (A-E)	0.5%	7.9%	9.2%	All (A-E)	2.1%	10.9%	12.7%
Enc Time		#NUM!		Enc Time		#NUM!	
Dec Time		108%		Dec Time		108%	

History of revisions

Multiple versions of the HM software were produced and announced on the JCT-VC email reflector. The following sections give a brief summary of the changes made for each version. A detailed history of all changes made to the software can be viewed at <http://hevc.kw.bbc.co.uk/trac/timeline>.

Released versions of the software are available on the SVN server at the following URL:

https://hevc.hhi.fraunhofer.de/svn/svn_HEVCSoftware/tags/version_number,

where `version_number` corresponds to one of the versions described below (eg., HM-6.0). Intermediate code submissions can be found on a variety of branches available at:

https://hevc.hhi.fraunhofer.de/svn/svn_HEVCSoftware/branches/branch_name,

where `branch_name` corresponds to a branch (eg., HM-6.0-dev).

Version 6.0

Version 6.0 was released on 6th March 2012. It includes all the changes adopted at the 8th JCT-VC meeting that affect the common test conditions[1]. This release was announced on the email reflector.

The changes to the common test conditions introduced at the 8th JCT-VC meeting make direct comparisons between HM-5.2 and HM-6.0 difficult. Results are presented in Table 1 for the HE10 configurations which are directly comparable. Class E results are presented using the sequences used for HM-5.2.

Version 6.1

Version 6.1 was released on 2nd April 2012. It completes the integration of the normative adoptions from the 8th JCT-VC meeting. A further HM-6.1.1 point release was produced that fixes a number of memory leaks that can cause the decoder to fail. Table 2 shows the performance of HM-6.1 relative to HM-5.1 when using the updated common test conditions of JCTVC-H1100.

Version 6.2

Version 6.2 was released on 5th May 2012. It contains the integration of the rate control feature adopted at the JCT-VC meeting and a number of bug fixes.

Table 2: HM-6.1 versus HM-5.1 (using H1100 common conditions)

(a) All Intra Main				(b) Low delay B Main			
	Y' BD-rate	U BD-rate	V BD-rate		Y' BD-rate	U BD-rate	V BD-rate
Class A	-1.1%	1.0%	1.0%	Class A			
Class B	-1.1%	1.5%	2.4%	Class B	-1.1%	7.3%	8.3%
Class C	-1.3%	1.4%	2.3%	Class C	-1.6%	6.5%	9.6%
Class D	-1.0%	0.1%	0.6%	Class D	-1.4%	1.8%	2.9%
Class E	-0.9%	2.9%	3.6%	Class E	0.2%	12.7%	15.6%
Class F	-1.8%	2.8%	4.6%	Class F	-1.5%	11.2%	16.0%
All (A-E)	-1.1%	1.3%	1.9%	All (A-E)	-1.1%	6.7%	8.7%
Enc Time		#NUM!		Enc Time		#NUM!	
Dec Time		110%		Dec Time		107%	

(c) Random Access Main				(d) Random Access HE10			
	Y' BD-rate	U BD-rate	V BD-rate		Y' BD-rate	U BD-rate	V BD-rate
Class A	-1.0%	0.5%	0.6%	Class A	-0.3%	3.6%	2.6%
Class B	-0.6%	-0.3%	-1.0%	Class B	-0.1%	0.2%	-0.6%
Class C	-0.4%	-0.5%	-0.5%	Class C	0.1%	0.3%	0.5%
Class D	-0.6%	-0.9%	-1.5%	Class D	0.1%	0.6%	0.8%
Class E				Class E			
Class F	-0.9%	-0.7%	-0.2%	Class F	-0.3%	-1.2%	-0.7%
All (A-E)	-0.7%	-0.3%	-0.6%	All (A-E)	-0.1%	1.1%	0.7%
Enc Time		#NUM!		Enc Time		#NUM!	
Dec Time		109%		Dec Time		98%	

Version 6.3

Version 6.3 was released on 7th May 2012. It is a clean up release that removes a number of no longer pertinent macros.

Other branches

In addition to the regular HM development process, one branch was created to expose tools to a wider audience:

- HM-6.1-dev-ahg15, which contains contains modifications to the reference picture buffers and list construction.

Recommendations

- Continue to develop reference software based on HM version 6.3 and improve its quality.
- Remove macros introduced in HM previous HM versions before starting integration towards HM 7.0 such as to make the software more readable
- Continue to identify bugs and discrepancies with text, and address them
- Test reference software more extensively outside of common test conditions

References

- [1] F. Bossen, "Common test conditions," document JCTVC-H1100, JCT-VC, San José CA, USA, Feb. 2012.