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| *Title:* | **Draft verification test plan for HEVC screen content coding extensions** | | |
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| *Author(s) or Contact(s):* | Haoping Yu  Vittorio Baroncini  Robert Cohen  Krishna Rapaka  Jizheng Xu | Email: | <haoping.yu@huawei.com>  baroncini@gmx.com  <cohen@merl.com>  krapaka@apple.com  [jzxu@microsoft.com](mailto:jzxu@microsoft.com) |
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# Abstract

This contribution provides a draft test plan for verification of the coding performance of HEVC screen content coding extensions. It describes a set of test conditions under consideration and presents a preliminary work plan for test preparation.

# Test conditions description

## General description

The coding performance of HEVC screen content extensions, HEVC, and AVC will be compared by encoding selected sequences at selected bit-rates using software representing the typical applications of these video coding standards.

## Test material

Table 1 below lists all the candidate sequences for the verification tests[[1]](#footnote-1). These sequences are classified into four categories, namely ‘text and graphics with motion (TGM)’, ‘mixed content (M)’, ‘animation (A)’, and ‘camera-captured content (CC)’ category. Both 4:4:4 and 4:2:0 sampling formats will be considered1. For the 4:4:4 color sampling format, both RGB and YUV colour space will be considered1

**Table 1 - Test Sequences**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Resolution** | **Sequence name** | **Category** | **fps** | **Frames to be encoded** |
| 1920x1080 | CircuitLayoutPresentation  ClearTypeSpreadsheet  BitstreamAnalyzer  EnglishDocumentEditing  ChineseDocumentEditing  BigBuckBunnyStudio  KristenAndSaraScreen  sc\_realtimeData  sc\_videoTesting  sc\_socialNetworkMap  sc\_cad\_waveform  sc\_pcb\_layout  sc\_ppt\_doc\_xls | TGM  TGM  TGM  TGM  TGM  M  M  TGM  TGM  TGM  TGM  TGM  TGM | 30  30  30  30  30  60  60  60  60  60  20  20  20 | 0-299  0-299  0-299  0-299  0-299  0-599  0-599  ???  ???  ???  0-199  0-199  0-199 |
| 1280x720 | sc\_viking  sc\_wordEditing  sc\_video\_conferencing\_doc\_sharing  sc\_cg\_twist\_tunnel  sc\_cg2twist\_tunnel | A  TGM  TGM  TGM  TGM | 30  60  30  30  30 | 0-299  0-599  0-299  0-299  0-299 |
| 2560x1440 | KimonoError1  KimonoError2  MissionControlClip1 | M  M  M | 60  60  60 | ???  ???  ??? |
| TGM: Text and graphics with motion; M: mixed content; A: animation; CC: camera-captured content | | | | |

## Encoder software

The bitstreams will be generated by using the following software:

* SCM-8.1: latest version SCM available at https://hevc.hhi.fraunhofer.de/svn/svn\_HEVCSoftware/tags/HM-16.12+SCM-8.1)
* HM-16.12: latest version of HM available at https://hevc.hhi.fraunhofer.de/svn/svn\_HEVCSoftware/tags/HM-16.12
* JM-19.0: http://iphome.hhi.de/suehring/tml/download/

## Coding modes, configurations, and bit-rates

Both lossy and mathematically lossless coding modes will be tested. For the lossy mode, three encoding configurations will be tested, which are All Intra (AI), Random Access (RA), and Low-delay (LB).

For the random access configuration, the period for intra random access frames for each test sequence is specified in HM and SCM, as follows:

* IntraPeriod: Specifies the intra refresh period in the random access configuration. The intra refresh period is dependent on the frame rate of the test sequence. A value 16 shall be used for test sequences with a frame rate equal to 20fps, 32 for 24fps and 30fps, 48 for 50fps, and 64 for 60fps.

The same intra refresh structures can also be specified in JM-19.0.

A list of the encoder configuration files used in the tests is shown in Table 2.

**Table 2 – Configuration files for JM, HM, and SCM**

|  |  |  |  |
| --- | --- | --- | --- |
| Coding mode | JM configuration file | HM configuration file | SCM configuration file |
| 4:4:4 lossless |  |  |  |
| 4:2:0 lossless |  |  |  |
| 4:4:4 AI |  |  |  |
| 4:4:4 RA |  |  |  |
| 4:4:4 LB |  |  |  |
| 4:2:0 AI |  |  |  |
| 4:2:0 RA |  |  |  |
| 4:2:0 LB |  |  |  |

The generation of the HEVC bitstreams will be done considering four QPs, e.g. QP=22, 27, 32, 37.

The AVC encoding will be done at the same bit rates resulting from HEVC SCC bitstreams.

# Test results evaluation

The test results from each coding mode in Table 2 will be collected into an Excel file similar to the result-reporting templates in JCTVC-U1015. The relative coding performance will be reported in BD-rates.

A formal subjective evaluation will be done only on the Lossy coding conditions.

The Lossless coding conditions will be evaluated objectively (compression ratio).

The test method will be the DCR (Degradation Category Rating) as specified in Recommendation ITU-T P.910 [X].

The DCR test method is commonly adopted when the material to be evaluated shows a range of visual quality that well distributes across all quality scales.

This method will be used under the schema of evaluation of the impairment between the images to test and an un-impaired reference.

An 11 grades impairment rating scale will be adopted, ranging from "0" (lowest quality) to "10" (highest quality). The test will be coordinated and supervised by the Test Chair person and will be run in Roma at the GBTech Laboratories[[2]](#footnote-2).

The video material used for these tests will consist of video clips of around 10 seconds duration.

The structure of the Basic Test Cell (BTC) of DCR method is made of the following steps (see *Figure 1*):

* a mid grey screen showing the letter “A” in the middle (1 second);
* the SRC video clip (original not coded);
* a mid grey screen showing the letter “B” in the middle (1 second);
* the coded video clip to evaluate;
* a mid grey screen showing the message “Vote\_N”, where N is a progressive number indicating the BTC to vote.

*Figure 1 - DCR BTC*



B

A

The score will be collected on paper scoring sheets.

The viewers will be young university students carefully screened for visual acuity and colour blindness, and will be carefully trained on both the test protocol and the kind of impairments they will have to detect.

A detailed explanation of the test experiment will be done to each viewer before the beginning of the testing activities. A short practice (training) session will be also run to allow the subjects to understand better he rules and to get practice with scoring process.

The training session will include a representative set of whole quality range of the video test material to allow a better detection of any possible impairment and a proper ranking of the test cases.

A stabilization phase will also be applied at the beginning of each SCC test sessions, to make more effective the evaluation process.

The number of test sessions, and therefore the overall test duration, will depend on the total number of test cases, resulting from the selection of the coding conditions, test sequences and bit rates that will be defined at the Chengdu MPEG meeting.

# Schedule [To be discussed]

The following preliminary time-line is proposed for the test:

* Test plan finalization: Oct, 2016
* HEVC bitstream generation: xxxx, 2016
* QP or bit-rate establishment for AVC bitsreams: xxxx, 2016/2017
* AVC bitsream generation: xxxx, 2016/2017

# References

1. JCTVC-U1015, “Common test conditions for screen content coding,” Warsaw, PL, 19–26 June 2015.

1. The final selection and decision will be made during the Chengdu meeting. [↑](#footnote-ref-1)
2. The final list of Test Laboratories will be defined during the Chengdu meeting, considering other eventual candidates. [↑](#footnote-ref-2)