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| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  31st Meeting: San Diego, US, 13–20 Apr. 2018 | Document: JCTVC-AE0005-v3 |

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| *Title:* | **JCT-VC AHG report: Test sequence material (AHG5)** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | AHG Report | | |
| *Author(s) or Contact(s):* | Teruhiko Suzuki 2-10-1, Osaki, Shinagawa-ku ,  Tokyo, 141-8610  JAPAN | Tel: Email: | +81-50-3750-2740 [teruhiko.s@sony.com](mailto:teruhiko.s@sony.com) |
|  | Vittorio Baroncini | Tel: Email: | [baroncini@gmx.com](mailto:baroncini@gmx.com) |
|  | Edouard Francois | Tel: Email: | [Edouard.Francois@technicolor.com](mailto:Edouard.Francois@technicolor.com) |
|  | Pankaj Topiwala | Tel: Email: | [pankajtva@gmail.com](mailto:pankajtva@gmail.com) |
|  | Stephan Wenger | Tel: Email: | [stewe@stewe.org](mailto:stewe@stewe.org) |
| *Source:* | AHG on test sequence material | | |

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# Introduction

The mandates of this AHG are:

* Maintain the video sequence test material database for development of HEVC and its RExt, SHVC and SCC extensions.
* Identify, collect, and make available a variety of video sequence test material, especially focusing on new needs for HDR/WCG test material and corresponding SDR test material.
* Study coding performance and characteristics in relation to video test materials.
* Identify and recommend appropriate test materials and corresponding test conditions for use in development of HEVC and its extensions.
* Coordinate with the activities in AHG6 regarding HDR/WCG testing.

# Activities

## Reflector

The e-mail reflector is [jct-vc@lists.rwth-aachen.de].  To receive email, please subscribe to the e-mail reflector: <http://mailman.rwth-aachen.de/mailman/listinfo/jct-vc>. For e-mail exchange, it is recommended to put [AHG5] in the subject line for easy grouping.

## Test materials available for HEVC development

As the first step for maintaining the test sequences, the AHG makes the list of test sequences available for CTC as follows. Due to copyright restrictions, the JCT-VC database of test sequences is only available to accredited members of JCT-VC (i.e. members of ISO/IEC MPEG and ITU-T VCEG).

### HEVC v.1 CTC sequences

Test sequences are available on [ftp://hevc@ftp.tnt.uni-hannover.de/testsequences/](ftp://hevc@ftp.tnt.uni-hannover.de/orig-cfp/) (accredited members of JCT-VC may contact the JCT-VC chairs for login information).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Class** | **Sequence name** | **Width x Height** | **Frame count** | **Frame rate (Hz)** | **Bit depth** |
| A | Traffic | 2560x1600 | 150 | 30 | 8 |
| A | PeopleOnStreet | 2560x1600 | 150 | 30 | 8 |
| A | Nebuta | 2560x1600 | 300 | 60 | 10 |
| A | SteamLocomotive | 2560x1600 | 300 | 60 | 10 |
| B | Kimono | 1920x1080 | 240 | 24 | 8 |
| B | ParkScene | 1920x1080 | 240 | 24 | 8 |
| B | Cactus | 1920x1080 | 500 | 50 | 8 |
| B | BQTerrace | 1920x1080 | 600 | 6 | 8 |
| B | BasketballDrive | 1920x1080 | 500 | 50 | 8 |
| C | RaceHorses | 832x480 | 300 | 30 | 8 |
| C | BQMall | 832x480 | 600 | 60 | 8 |
| C | PartyScene | 832x480 | 500 | 50 | 8 |
| C | BasketballDrill | 832x480 | 500 | 50 | 8 |
| D | RaceHorses | 416x240 | 300 | 30 | 8 |
| D | BQSquare | 416x240 | 600 | 60 | 8 |
| D | BlowingBubbles | 416x240 | 500 | 50 | 8 |
| D | BasketballPass | 416x240 | 500 | 50 | 8 |
| E | FourPeople | 1280x720 | 600 | 60 | 8 |
| E | Johnny | 1280x720 | 600 | 60 | 8 |
| E | KristenAndSara | 1280x720 | 600 | 60 | 8 |
| F | BaskeballDrillText | 832x480 | 500 | 50 | 8 |
| F | ChinaSpeed | 1024x768 | 500 | 30 | 8 |
| F | SlideEditing | 1280x720 | 300 | 30 | 8 |
| F | SlideShow | 1280x720 | 500 | 20 | 8 |

### HEVC v.1 Verification Test sequences

The following test sequences that were used in the verification test reported in JCTVC-Q1011 have only been available from the content owners on a case-by-case basis. Information is hereby solicited regarding how to obtain them and whether or not they can be made available in our test sequence database.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Class** | **Sequence name** | **Width x Height** | **Frame count** | **Frame rate (Hz)** | **Bit depth** |
| UHD | BT709Birthday | 3840x2160 | 500 | 50 | 8 |
| UHD | Book | 3840x2160 | 500 | 50 | 8 |
| UHD | manage | 3840x2160 | 600 | 60 | 8 |
| UHD | HomelessSleeping | 3840x2160 | 600 | 60 | 8 |
| UHD | traffic | 4096x2048 | 300 | 30 | 8 |
| 1080p | JohnnyLobby | 1920x1080 | 600 | 60 | 8 |
| 1080p | Calendar | 1920x1080 | 500 | 50 | 8 |
| 1080p | SVT15 | 1920x1080 | 500 | 50 | 8 |
| 1080p | sedofCropped | 1920x1080 | 600 | 60 | 8 |
| 1080p | UnderBoat1 | 1920x1080 | 300 | 30 | 8 |
| 720p | ThreePeople | 1280x720 | 600 | 60 | 8 |
| 720p | BT709Parakeets | 1280x720 | 500 | 50 | 8 |
| 720p | QuarterBackSneak1 | 1280x720 | 300 | 30 | 8 |
| 720p | SVT01a | 1280x720 | 500 | 50 | 8 |
| 720p | SVT04a | 1280x720 | 500 | 50 | 8 |
| 480p | Cubicle | 832x480 | 300 | 30 | 8 |
| 480p | Anemone | 832x480 | 300 | 30 | 8 |
| 480p | BT709BirthdayFlash | 832x480 | 500 | 50 | 8 |
| 480p | Ducks | 832x480 | 600 | 60 | 8 |
| 480p | WheelAndCalendar | 832x480 | 500 | 50 | 8 |

### HEVC Range Extensions CTC sequences

* Test sequences are available on <ftp://hevc@ftp.tnt.uni-hannover.de/testsequences/FrExt-candidate-sequences/> (accredited members of JCT-VC may contact the JCT-VC chairs for login information).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sequence name** | **Width x Height** | **Frame count** | **Frame rate (Hz)** | **Bit depth** |
| Traffic | 2560x1600 | 150 | 30 | 12 |
| Traffic | 2560x1600 | 150 | 30 | 10 |
| Kimono | 1920x1080 | 240 | 24 | 10 |
| EBULupoCandlelight (down conv.) | 1920x1080 | 500\* | 50 | 10 |
| EBURainFruits (down conv.) | 1920x1080 | 500\* | 50 | 10 |
| EBUHorse | 1920x1080 | 500 | 50 | 10 |
| EBUGraphics | 1920x1080 | 500 | 50 | 10 |
| EBUWaterRocksClose | 1920x1080 | 500 | 50 | 10 |
| EBUKidsSoccer | 1920x1080 | 500 | 50 | 10 |
| VenueVu | 1920x1080 | 300 | 30 | 8 |
| VenueVu | 1920x1080 | 300 | 30 | 10 |
| DucksAndLegs | 1920x1080 | 300 | 30 | 10 |
| BirdsInCage | 1920x1080 | 600 | 60 | 10 |
| OldTownCross | 1920x1080 | 500 | 50 | 10 |
| CrowdRun | 1920x1080 | 500 | 50 | 10 |
| Seeking | 1920x1080 | 500 | 50 | 10 |
| ParkScene | 1920x1080 | 240 | 24 | 10 |

A number of the new sequences were kindly provided by the EBU.

Note that test sequences from the EBU (i.e. with the string ‘EBU’ included in the test sequence name) are password protected. The password can be obtained by contacting the EBU using the form located at:

<https://tech.ebu.ch/EBU_SVT_Public_Test_Sequences>

### HEVC screen content sequences

Test sequences are available on <ftp://ftp.tnt.uni-hannover.de/testsequences/FrExt-candidate-sequences/upload/screen_content/> (accredited members of JCT-VC may contact the JCT-VC chairs for login information). Some of the sequences are located in the N0294\_Gaming and TongJiYUVRevision\_02-24-2013, among other subdirectories. The last two tables shown below contain sequences used for the common conditions for screen content coding tests, as specified in JCTVC-U1015.

|  |  |  |
| --- | --- | --- |
| JCT-VC number | sequence name | frames |
| L0301 | sc\_map\_1280x720\_60\_8bit | 600 |
|  | sc\_programming\_1280x720\_60\_8bit | 600 |
|  | sc\_wordEditing\_1280x720\_60\_8bit | 600 |
|  |  |  |
| L0317 | sc\_cad\_waveform\_1920x1080\_20\_8bit\_200\_r1 | 200 |
|  | sc\_cg\_twist\_tunnel\_1280x720\_30\_8bit\_300\_r1 | 300 |
|  | sc\_pcb\_layout\_1920x1080\_20\_8bit\_200\_r1 | 200 |
|  | sc\_ppt\_doc\_xls\_1920x1080\_20\_8bit\_200\_r1 | 200 |
|  | sc\_video\_conferencing\_doc\_sharing\_1280x720\_30\_8bit\_300\_r1 | 300 |
|  | sc\_web\_browsing\_1280x720\_30\_8bit\_300\_r1 | 300 |
|  |  |  |
| M0431 | sc\_doc\_1280x720\_10\_8bit\_500 | 500 |
|  | sc\_SlideShow\_1280x720\_20\_8bit\_500 | 500 |
|  | sc\_Web\_1280x720\_10\_8bit\_500 | 500 |
|  |  |  |
| N0294 | sc\_robot\_1280x720\_30\_8bit\_300 | 300 |
|  | sc\_viking\_1280x720\_30\_8bit\_300 | 300 |
|  |  |  |
| O0222 | Basketball\_Screen\_2560x1440\_60p\_8b | 623 |
|  | BigBuck\_1920x1080\_60p\_8b | 404 |
|  | KimonoError1\_2560x1440\_60p\_8b | 1006 |
|  | KimonoError2\_2560x1440\_60p\_8b | 516 |
|  | KristenAndSaraScreen\_1920x1080\_60p\_8b | 604 |
|  | MissionControlClip1\_2560x1440\_60p\_8b | 601 |
|  | MissionControlClip2\_2560x1440\_60p\_8b | 600 |
|  | MissionControlClip3\_1920x1080\_60p\_8b | 603 |
|  |  |  |
| O0256 | sc\_console\_1920x1080\_60\_8bit | 600 |
|  | sc\_desktop\_1920x1080\_60\_8bit | 600 |
|  | sc\_flyingGraphics\_1920x1080\_60\_8bit | 600 |
|  | sc\_realtimeData\_1920x1080\_60\_8bit | 600 |
|  | sc\_socialNetworkMap\_1920x1080\_60\_8bit | 601 |
|  | sc\_videoTesting\_1920x1080\_60\_8bit | 601 |
|  |  |  |
| O0268 | sc\_cg2twist\_tunnel\_1280x720\_30\_8bit | 300 |
|  |  |  |
| JVET-C0044 | BitstreamAnalyzer\_1920x1080\_30\_8bit | 300 |
|  | ChineseDocumentEditing\_1920x1080\_30\_8bit | 300 |
|  | CircuitLayoutPresentation\_1920x1080\_30\_8bit | 300 |
|  | ClearTypeSpreadsheet\_1920x1080\_30\_8bit | 300 |
|  | EnglishDocumentEditing\_1920x1080\_30\_8bit | 300 |
|  |  |  |
| Others | sc\_VenueVu\_1920x1080\_30\_8bit1 | 300 |

1The YCbCr and RGB VenueVue sequences can be found with the Range Extensions sequences on the FTP site.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Resolution** | **Sequence name** | **Category** | **fps** | **Frames to be encoded** |
| 1920x1080 | sc\_flyingGraphics\_1920x1080\_60\_8bit\*  sc\_desktop\_1920x1080\_60\_8bit  sc\_console\_1920x1080\_60\_8bit  ChineseEditing\_1920x1080\_60\_8bit  MissionControlClip3\_1920x1080\_60p\_8b444  EBURainFruits\_1920x1080\_50\_10bit\*\*  Kimono1\_1920x1080\_24\_10bit\*\*\* | TGM  TGM  TGM  TGM  M  CC  CC | 60  60  60  60  60  50  24 | 0-299\*  0-599  0-599  0-599  0-599  0-249\*\*  0-119\*\*\* |
| 1280x720 | sc\_web\_browsing\_1280x720\_30\_8bit  sc\_map\_1280x720\_60\_8bit  sc\_programming\_1280x720\_60\_8bit  sc\_SlideShow\_1280x720\_20\_8bit  sc\_robot\_1280x720\_30\_8bit | TGM  TGM  TGM  TGM  A | 30  60  60  20  30 | 0-299  0-599  0-599  0-499  0-299 |
| 2560x1440 | Basketball\_Screen\_2560x1440\_60p\_8b444  MissionControlClip2\_2560x1440\_60p\_8444 | M  M | 60  60 | 322-621  120-419 |
| \*Note that only the first 300 frames of this sequence are used.  \*\*Note that only the first 250 frames of this 10-bit sequence are used, and InternalBitDepth is set to 8.  \*\*\*Note that only the first 120 frames of this 10-bit sequence are used, and InternalBitDepth is set to 8  TGM: Text and graphics with motion; M: mixed content; A: animation; CC: camera-captured content | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resolution | Sequence name | Category | fps | Frames to be encoded |
| 1920x1080 | sc\_flyingGraphics\_1920x1080\_60\_8bit\_420\*  sc\_desktop\_1920x1080\_60\_8bit\_420  sc\_console\_1920x1080\_60\_8bit\_420  ChineseEditing\_1920x1080\_60\_8bit\_420  MissionControlClip3\_1920x1080\_60p\_8b420 | 4:2:0 TGM  4:2:0 TGM  4:2:0 TGM  4:2:0 TGM  4:2:0 M | 60  60  60  60  60 | 0-299\*  0-599  0-599  0-599  0-599 |
| 1280x720 | sc\_web\_browsing\_1280x720\_30\_8bit\_420\_r1  sc\_map\_1280x720\_60\_8bit\_420  sc\_programming\_1280x720\_60\_8bit\_420  SlideShow\_1280x720\_20  sc\_robot\_1280x720\_30\_8bit\_420 | 4:2:0 TGM  4:2:0 TGM  4:2: 0TGM  4:2:0 TGM  4:2:0 A | 30  60  60  20  30 | 0-299  0-599  0-599  0-499  0-299 |
| 2560x1440 | Basketball\_Screen\_2560x1440\_60p\_8b420  MissionControlClip2\_2560x1440\_60p\_8420 | 4:2:0 M  4:2:0 M | 60  60 | 322-621  120-419 |
| 1024x768 | ChinaSpeed\_1024x768\_30 | 4:2:0 A | 30 | 0-499 |
| \*Note that only the first 300 frames of this sequence are used.  TGM: Text and graphics with motion; M: mixed content; A: animation; CC: camera-captured content | | | | |

### HEVC HDR sequences

HDR test sequences to be used for HDR-related experiments are listed in document “Common Test Conditions for HDR/WCG video coding experiments”, JCTVC-Z1020. Some of the sequences are available on <ftp://jvet@ftp.ient.rwth-aachen.de> in directory “/testsequences/testset\_hdr” (accredited members of JCT-VC may contact the JCT-VC chairs for login information).

Some of the sequences mentioned in JCTVC-Z1020 are only available upon request to the content owner, as described in Annex B of JCTVC-Z1020.

The following sequences are available:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Resolution** | **gamut** | **TF** | **Sequence name** | **fps** | **Frames** |
| 1920x1080 | BT.709 | Linear | FireEater2Clip4000r1\_1920x1080p\_25\_hf\_709\_ct2020\_444\_xxx.exr | 25 | 0-199 |
| 1920x1080 | BT.709 | Linear | Market3Clip4000r2\_1920x1080p\_50\_hf\_709\_ct2020\_444\_xxx.exr | 50 | 0-399 |
| 1920x1080 | BT.709 | Linear | BalloonFestival\_1920x1080p\_24\_hf\_709\_ct2020\_444\_xxx.exr | 24 | 0-239 |
| 1920x1080 | BT.709 | Linear | EBU\_04\_Hurdles\_1920x1080p\_25\_hf\_709\_ct2020\_444\_xxx.exr | 100 | 0-499 |
| 1920x1080 | BT.709 | Linear | EBU\_06\_Starting\_1920x1080p\_25\_hf\_709\_ct2020\_444\_xxx.exr | 100 | 0-499 |
| 1920x1080 | BT.709 | Linear | Sunrise\_1920x1080p\_25\_hf\_709\_ct2020\_444\_xxx.exr | 25 | 0-199 |

These sequences are provided in EXR format, Y'CbCr 10-bit 4:2:0 with BT.2100 PQ transfer function and BT.2020 color primaries, and a Y'CbCr 10-bit 4:2:0 SDR with BT.709 color primaries version is also available for each content.

### JVET test sequences

The common test condition was defined as JCTVC-AC1100. In addition to the test sequences above, the following test sequences are used. The sequences are available at <ftp://jvet@ftp.ient.rwth-aachen.de> and <ftp://jvet@ftp.hhi.fraunhofer.de>.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Class*  *Size* | *Input bit-depth* | *Frame rate* | *Encoding format* | *Test sequence filename*  *Test sequence configuration filename* | *Encoded frame count* |
| Class A1  4096x2160/ 3840x2160 | 10-bit | 60 | YCbCr 4:2:0 | Tango2\_3840x2160\_60fps\_10bit\_420.yuv  Tango.cfg | 294 |
| 10-bit | 100 | YCbCr 4:2:0 | Drums\_3840x2160\_100fps\_10bit\_420\_jvet.yuv  Drums.cfg | 300 |
| 10-bit | 30 | YCbCr 4:2:0 | Campfire\_3840x2160\_30fps\_10bit\_420\_bt709\_videoRange.yuv Campfire.cfg | 300 |
| 10-bit | 60 | YCbCr 4:2:0 | ToddlerFountain2\_3840x2160\_60fps\_10bit\_420.yuv ToddlerFountain.cfg | 300 |
| Class A2  4096x2160/ 3840x2160 | 10-bit | 60 | YCbCr 4:2:0 | CatRobot\_3840x2160\_60fps\_10bit\_420\_jvet.yuv CatRobot.cfg | 300 |
| 10-bit | 30 | YCbCr 4:2:0 | TrafficFlow\_3840x2160\_30fps\_10bit\_420\_jvet.yuv  TrafficFlow.cfg | 300 |
| 10-bit | 60 | YCbCr 4:2:0 | DaylightRoad2\_3840x2160\_60fps\_10bit\_420.yuv  DaylightRoad.cfg | 300 |
| 10-bit | 60 | YCbCr 4:2:0 | RollerCoaster2\_3840x2160\_60fps\_10bit\_420.yuv RollerCoaster.cfg | 300 |

# Recommendations

The AHG recommends

* to continue to create the list of test sequences available for HEVC development including licensing statement