

# Intel® Stress Bitstreams and Encoder (Intel® SBE) 2017 - HEVC

## Getting Started

(Version 2.3.0)

### Main, Main10 and Format Range Extension Profiles

### Package Description

This stream set is intended to validate a decoder for **HEVC Main, Main10 and some of Format Range Extension Profiles (Main 4:2:0 12, Main 4:2:2 10, Main 4:2:2 12, Main 4:4:4 10, Main 4:4:4 12, Monochrome and Monochrome 12 profiles)** compliance. It covers features of these profiles bit stream format and makes it easy to verify that the decoder's compliance to standard. The package contains:

- HEVC compressed bitstreams
  - Package includes
    - files of 500 frames at 432×240 resolution
    - files of 100 frames at 1920×1080 resolution
    - file with variable resolution from 4×4 to 128×128
    - files of 20 frames of 3840×2160 resolution (UHD streams package)
    - files of 20 frames of 7680×4320 resolution (UHD streams package)
- MD5 check sums for decoding results of each encoded file
- all\_bitstreams.md5 — file with check sums for all encoded files
- number of bytes read from reconstructed buffer while decoding evaluated by simple memory model and number of bytes read per source sample
- Table with detailed description of each bitstream: enabled coding tools and possible values.

The decoding result is assumed correct if it binary-matches to the result of the reference decoder. This can be verified with the md5-files included within the package. All the streams are HEVC compliant - this package doesn't contain any invalid streams for error-resilience testing. Also this package is not intended for decoder-performance testing since a lot of bitstream features have distributions not typical for "real-world" video: many long motion vectors pointing out of frame, areas with random noise, highly variable QP values, etc.

The stream package consists of several buckets. Some buckets validate the features presumably related to intra and inter prediction correspondingly, and other buckets contains streams covering other HEVC format features not directly related to intra or inter prediction.

There are some types of streams like *Syntax*, *Stress*, *Smaller* etc. *Syntax* streams are designed to test a certain subset of features, for example, all the intra-prediction modes or all loop-filter related parameters. *Stress* streams include all the features covered by the bucket, so they are useful for smoke testing: if a decoder passes the *Stress* stream, it is likely to pass all the *Syntax* streams from the bucket. A *Smaller* stream is similar to a *Stress* stream of *INTER* bucket, the major purpose is to test the decoder's ability to handle very small resolutions. *Syntax* streams are provided in two versions: 500 frames of 432×240 and 100 frames of 1920×1080. *Stress* streams include *Memaccess* streams that are provided for testing memory consumption of the decoder when it uses reconstructed pixel storage. *501* and *60x* streams are provided to validate Format Range Extension specific syntax.

## File name pattern

All files are named corresponding to the following pattern: (Purpose)\_HEVC\_(level)\_(resolution)\_(frame rate)\_(id)\_(bucket/name)\_(encoder\_version).hevc

- (purpose) is “Syntax”, “Stress”, “Smaller” etc;
- (level) is HEVC main profile level (See HEVC specification Appendix A)
- (resolution) is pair of frame width and height joint with “x”
- (frame rate) is number of frames per second followed by “fps”
- (id): either an index of stream in the bucket;
- (bucket/name): “INTRA”, “INTER” or “EXTRA”/ special feature name, e.g. “tiles” or “wpp”;
- (encoder\_version): version of encoder used for stream generation. Package may contain streams of different encoder versions.

For example, Syntax\_HEVC\_Main10HT50\_1920x1080\_30fps\_003\_intra\_1.0.hevc is the third stream from *INTRA* bucket.

Pair of (id) and (bucket/name) is a short description of the content of the stream.

## Video content

Each bitstream is encoded from a synthetic video sequence. Encoded sequences **may have strong visual artifacts**, mostly due to high QP values, random prediction, blocks with random residual data and randomly placed *skip* flag. Bitstreams contain frame sequences with bit depth varying from 8 to 12 both in luma and chroma independently.

## Stream Description

Stream name	Description	Resolution, number of frames
<i>INTRA</i> bucket		
001_intra	All intra prediction modes for CU size 64x64, PUs 2Nx2N and all TU sizes	432x240, 500 frames; 1920x1080, 100 frames;
002_intra	All intra prediction modes for CU size 64x64 and 32x32, all PUs and all TU sizes. Intra smoothing is enabled.	
003_intra	All intra prediction modes for CU size 64x64, 32x32 and 16x16, all PUs and all TU sizes.	
004_intra	All intra prediction modes for CU size 64x64, 32x32, 16x16 and 8x8, all PUs and all TU sizes.	
005_intra	All intra prediction modes for all CU size, all PUs and all TU sizes.	
006_intra	All intra PU modes and sizes, all TU sizes. Transform skip, transquant bypass and sign hiding are enabled.	

007_intra	All intra PU modes and sizes, all TU sizes. Enabled delta QP.	
008_intra	All intra PU modes and sizes, all TU sizes. Enabled IPCM.	
009_intra	All intra PU modes and sizes, all TU sizes. Enabled scaling list.	
010_intra	All intra PU modes and sizes, all TU sizes. Enabled deblocking.	
<i>INTER</i> bucket		
101_inter	P frames with AMVP PUs and intra CTBs. 64x64 CU sizes. No skip blocks. One reference.	432×240, 500 frames; 1920×1080, 100 frames;
102_inter	P frames with AMVP PUs and intra CTBs. All CU sizes. Several references. TMVP enabled.	
103_inter	P frames with AMVP and merge PUs and intra CTBs. All CU sizes. Several references.	
104_inter	P frames with AMVP and merge PUs and intra CTBs. All CU sizes. Several references. Enabled deblocking.	
105_inter	P frames with AMVP and merge PUs and intra CTBs. All CU sizes. Several references. Enabled scaling list.	
106_inter	P frames with all PUs and all CU sizes. Several references.	
107_inter	P frames with all PUs and all CU sizes. Several references. Enabled dependent slices. Many slices.	
108_inter	B frames with AMVP PUs and intra CTBs. 64x64 CU sizes. No skip blocks. One reference.	432×240, 500 frames; 1920×1080, 100 frames;
109_inter	B frames with AMVP PUs and intra CTBs. All CU sizes. Several references. TMVP enabled.	
110_inter	B frames with AMVP PUs and intra CTBs. All CU sizes. Several references. TMVP enabled.	
111_inter	B frames with AMVP and merge PUs and intra CTBs. All CU sizes. Several references.	
112_inter	B frames with all PUs and all CU sizes. Several references. Enabled deblocking and scaling list.	

113_inter	B frames with all PUs and all CU sizes. Several references. Enabled dependent slices. Many slices.	
114_inter	B frames with all PUs and all CU sizes. Several references. Enabled SAO.	
115_inter	B frames with all PUs and all CU sizes. Several references. Enabled dependent slices and SAO. Many slices.	
116_inter	B frames with all PUs and all CU sizes. Several references. Enabled weighted prediction.	
<i>EXTRA</i> bucket		
201_inter_tile	B frames with all PUs and all CU sizes. Several references. Enabled tiles.	432×240, 500 frames; 1920×1080, 100 frames; 3840×2160, 20 frames;
202_inter_wpp	B frames with all PUs and all CU sizes. Several references. Enabled wavefront.	
203_inter_sei	B frames with all PUs and all CU sizes. Several references. Enabled many different SEI messages.	
204_temporal	B frames with all PUs and all CU sizes. Several references. Enabled temporal layers.	
<i>STRESS</i> bucket		
301_intra	All intra PU modes and sizes, all TU sizes. Enabled dependent slices. Many slices.	432×240, 500 frames; 1920×1080, 100 frames; 3840×2160, 20 frames; 7680×4320, 20 frames
302_inter	B frames with all PUs and all CU sizes. Several references. Enabled all of the above.	
401_memaccess	Maximized number of motion vectors, no skip and merge modes, maximized split to small coding units, used AMP; maximized deblocking and SAO usage.	1920×1080, 100 frames; 3840×2160, 20 frames; 7680×4320, 20 frames
402_sliness	Maximized number of slices.	1920×1080, 100 frames; 3840×2160, 20 frames; 7680×4320, 20 frames
403_tiles	Maximized number of tile columns.	1920×1080, 100 frames; 3840×2160, 20 frames; 7680×4320, 20 frames

404_tiles	Maximized number of tile rows.	1920x1080, 100 frames; 3840x2160, 20 frames; 7680x4320, 20 frames
608_rext	Enabled all technologies of RExt profiles; extended QP range.	1920x1080, 100 frames; 3840x2160, 20 frames; 7680x4320, 20 frames
<i>MIXED</i> bucket		
smaller	Enabled everything	1300 frames of resolution from 4x4 to 128x128.
<i>REXT</i> bucket		
501_main422_10bit	High precision offsets and chroma QP offset lists are enabled	1920x1080, 100 frames; 3840x2160, 20 frames; 7680x4320, 20 frames
601_rext	Enabled cross color component prediction	1920x1080, 100 frames;
602_rext	Enabled transform skip rotation	1920x1080, 100 frames;
603_rext	Enabled transform skip context modification	1920x1080, 100 frames;
604_rext	Enabled RDPCM modes	1920x1080, 100 frames;
605_rext	Disabled intra smoothing	1920x1080, 100 frames;
606_rext	Enabled persistent Rice adaptation	1920x1080, 100 frames;
607_rext	Enabled CABAC bypass alignment	1920x1080, 100 frames;
001 - 501	These streams are provided for Monochrome and Monochrome 12	Same resolution and frames
<i>Longterm</i> bucket		
701_longterm	Enabled longterm frames generation	1920x1080, 100 frames; 3840x2160, 20 frames; 7680x4320, 20 frames

## Error resilience streams

Error resilience streams are of 432x240 resolution, each named according to specific problem it aimed at reference JCT-VC HM Decoder.

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