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| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11**  10th Meeting: Stockholm, Sweden, July 11-20, 2012 | Document: JCTVC-J0085  M25407 |

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| *Title:* | **AHG9: On number of tile rows limit** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Proposal | | |
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# Abstract

In HM7.0 tile column width is restricted to be larger than or equal to 384, but there is no restriction on tile row height. In the worst case there will be 340 tiles in a 1080p frame (i.e. 1920\*1088/384/16). Such a high number of tiles is unlikely required by real-world applications, but imposes a significant burden on real-time decoder design due to tile transition overheads and CABAC reset at end of each tile. It is recommended to impose restriction on tile row height as follows: a conforming bitstream shall satisfy **num\_tile\_rows\_minus1 ≤ (pic\_height\_in\_luma\_samples** + 96)/192 - 1.For a 1080p frame this additional constraint effectively reduces the worst case tile number from 340 to 30.

# References

[1] [B. Bross](mailto:benjamin.bross@hhi.fraunhofer.de), [W.-J. Han](mailto:wjhan.han@samsung.com), [J.-R. Ohm](mailto:ohm@ient.rwth-aachen.de), [G. J. Sullivan](mailto:garysull@microsoft.com), [T. Wiegand](mailto:thomas.wiegand@hhi.fraunhofer.de) “High Efficiency Video Coding (HEVC) text specification draft 7,” JCT-VC Document, JCTVC-I1003, 9th Meeting: Geneva, Switzerland, 27 April – 07 May, 2012.

# Patent rights declaration(s)

**Texas Instruments, Inc. does not have IPR relating to the technology described in this contribution and, conditioned on reciprocity.**

# CD text

Changes are marked yellow.

A.3.2 Main profile

Bitstreams conforming to the Main profile shall obey the following constraints:

* Sequence parameter sets shall have chroma\_format\_idc equal to 1 only.
* Sequence parameter sets shall have bit\_depth\_luma\_minus8 equal to 0 only.
* Sequence parameter sets shall have bit\_depth\_chroma\_minus8 equal to 0 only.
* Sequence parameter sets shall have adaptive\_loop\_filter\_enabled\_flag equal to 0 only.
* Sequence parameter sets shall have chroma\_pred\_from\_luma\_enabled\_flag equal to 0 only.
* Sequence parameter sets shall have inter\_4x4\_enabled\_flag equal to 0 only.
* Sequence parameter sets shall have asymmetric\_motion\_partitions\_enabled\_flag equal to 0 only.

[Ed. (KM): Confirm that this flag has been defined. (GJS): It is now in the SPS, but not yet connected to the decoding process.]

* Sequence parameter sets shall have nsrqt\_enabled\_flag equal to 0 only.
* Sequence parameter sets shall have seq\_parameter\_set\_id in the range of 0 to 15, inclusive.
* Log2CtbSize shall be in the range from 4 to 6, inclusive.
* SliceGranularity shall be equal to 0.
* Picture parameter sets shall have tiles\_or\_entropy\_coding\_sync\_idc in the range of 0 to 1, inclusive.
* Picture parameter sets shall have dependent\_slice\_enabled\_flag equal to 0.
* When tiles\_or\_entropy\_coding\_sync\_idc is equal to 1, num\_tile\_rows\_minus1shall be less than or equal to (pic\_height\_in\_luma\_samples + 96)/192 - 1; ColumnWidthInLumaSamples[ i ] shall be greater than or equal to 384 for any i in the range of 0 to num\_tile\_columns\_minus1, inclusive.

[Ed. (KM): Confirm that this is the best formulation]

* Picture parameter sets shall have pic\_parameter\_set\_id in the range of 0 to 63, inclusive.
* Adaptation parameter sets shall have aps\_id in the range of 0 to 63, inclusive.
* The level constraints specified for the Main profile in subclause shall be fulfilled.

Conformance of a bitstream to the Main profile is indicated by profile\_idc being equal to 1.

Decoders conforming to the Main profile at a specific level (identified by a specific value of level\_idc) shall be capable of decoding all bitstreams in which the profile\_idc is equal to 1 and level\_idc represents a level lower than or equal to the specified level. For purposes of comparison of level capabilities, a particular level shall be considered to be a lower level than some other level if the level\_idc of the particular level is less than the level\_idc of the other level.