|  |  |
| --- | --- |
| **Joint Collaborative Team on Video Coding (JCT-VC)**  **of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11**  11th Meeting: Shanghai, China,10 -19 October, 2012 | Document: JCTVC-K0202  M26529 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Title:* | **AHG9: on number of tiles constraint** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Proposal | | |
| *Author(s) or Contact(s):* | Minhua Zhou Texas Instruments Inc., USA | Tel: Email: | +1-214-480-3816 [zhou@ti.com](mailto:zhou@ti.com) |
| *Source:* | Texas Instruments Inc; | | |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Abstract

In the current Main Profile level specification, the worst tile rate (number of tiles per second) for a level can be increased by a factor of 4.5 compared to the intended limit, when the picture size decreases and frame-rate increases under a same level of constraints. This is the consequence of the fact, that in Table A-1 of JCTVC-J1003 the max number of tiles per picture (i.e. MaxTileCols and MaxTileRows) is derived by using tile size of 384 x 192, while the minimum tile size is define as 256 x 64. For example, for level 5.0 with MaxTileCols = 10 and MaxTileRows = 11, the tile rate is 3300 slices/sec for 4K x2K@30, 13200 tiles/sec for 1080p@120, and 13500 tiles/sec for 720p@240 (limited by the minimum tile size of 256 by 64). To avoid unnecessary burden on real-time decoder implementation, it is proposed to add additional constraints in section A.4.2 of the spec to make either the tile rate constant for a level, or the number of tiles per luma sample constant for a level.

# CD text

in section A.4.2 (Variant 1, constant [instantaneous](http://www.google.com/search?hl=en&safe=active&biw=1011&bih=562&sa=X&ei=qQtpUI_ZHeri2AWWt4HwBg&ved=0CBoQvwUoAQ&q=instantaneous&spell=1) tile rate for a level)

This variant requires that [instantaneous](http://www.google.com/search?hl=en&safe=active&biw=1011&bih=562&sa=X&ei=qQtpUI_ZHeri2AWWt4HwBg&ved=0CBoQvwUoAQ&q=instantaneous&spell=1) slice rate (number of slices per second) be less than or equal to MaxTileCols\*MaxTileRows \*MaxLumaSR/MaxLumaPS.

**Text changes:**

Add

1. In bitstreams conforming to the Main profile, the removal time of access unit 0 shall satisfy the constraint that the number of tiles in picture 0 is less than or equal to Min(MaxTileCols\*MaxTileRows\*MaxLumaSR/MaxLumaPS\*( tr( 0 ) − tr,n( 0 )) + MaxTileCols\*MaxTileRows\* PicSizeInSamplesY /MaxLumaPS, MaxTileCols\*MaxTileRows ), for the value of PicSizeInSamplesY of picture 0, where MaxTileCols, MaxTileRows, MaxLumaSR and MaxLumaPS are the values specified in that apply to picture 0.
2. In bitstreams conforming to the Main profile, the difference between consecutive removal time of access units n and n -1 (with n > 0) shall satisfy the constraint that the number of tiles in picture n is less than or equal to Min(MaxTileCols\*MaxTileRows\*MaxLumaSR/MaxLumaPS\*( tr( n ) − tr( n − 1 )),  MaxTileCols\*MaxTileRows ) , where MaxTileCols, MaxTileRows, MaxLumaSR and MaxLumaPS are the values specified in that apply to picture n.

in section A.4.2 (Variant 2, constant max tiles per luma sample for a level)

add

1. In bitstreams conforming to the Main profile, the number of tiles in picture n (n≥0) shall be less than or equal to MaxTileCols\*MaxTileRows*\**PicSizeInSamplesY*/MaxLumaPS* for the value of PicSizeInSamplesY of picture n, where MaxTileCols, MaxTileRows and MaxLumaPS are the values specified in .

# References

[1] F. Bossen, “Common test conditions and software reference configurations,” JCT-VC Document, JCTVC-J1100, Stockholm, Sweden, July 2012.

[2] [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) Test Model 8 (HM 8) Encoder Description” JCT-VC Document, JCTVC-J1003, Stockholm, Sweden, July 2012.

# Patent rights declaration(s)

**Texas Instruments, Inc. may have IPR relating to the technology described in this contribution and, conditioned on reciprocity, is prepared to grant licenses under reasonable and non-discriminatory terms as necessary for implementation of the resulting ITU-T Recommendation |ISO/IEC International Standard (per box 2 of the ITU-T/ITU-R/ISO/IEC patent statement and licensing declaration form).**