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| *Title:* | **Picture size signaling** | | |
| *Status:* | Input Document to JCT-VC | | |
| *Purpose:* | Proposal | | |
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# Abstract

The current HEVC WD signals the decoded picture size, for both width and height, in luma samples. In this document, it is proposed that to signal the coded picture size is in units of LCUs, and in addition to signal the offset between the coded picture size and the decoded picture size, in units of SCUs. Furthermore, this document raises a discussion on the value range of picture sizes.

# Introduction

In HEVC, the picture size, which is the size of the decoded picture, is signaled in units of luma samples. In AVC, the decoded picture size is signaled in units of macroblocks.

The LCU concept in HEVC is the counterpart of macroblock in AVC. Tiles and wavefronts are all based on a group of complete LCUs in a specific rectangle region of a picture. So conceptually, it can be considered that a coded picture always contain complete LCUs.

However, since the size of LCU can be large, e.g., 64x64, it may be possible that even a picture has a width which is an integer number of LCU plus 1, the remaining portion of the pictures (63-pixel width, if the LCU size is 64x64) has to be kept as part of a decoded picture. Therefore, if a decoded picture is always aligned with LCUs, the required DPB size can be significantly but unnecessarily increased in some cases.

# Proposal

It is proposed that a decoded picture has to be SCU aligned, i.e., consists of an integer number of SCUs. A coded picture always contains an integer number of LCUs, and at the right or bottom picture boundary, the LCUs may only be partially inside a decoded picture. This way, there may be SCUs that are in the right or bottom picture boundary LCUs and are outside the boundary of a decoded picture.

## Sequence parameter set RBSP syntax

|  |  |
| --- | --- |
| seq\_parameter\_set\_rbsp( ) { | Descriptor |
| **profile\_idc** | u(8) |
| **reserved\_zero\_8bits** /\* equal to 0 \***/** | u(8) |
| **level\_idc** | u(8) |
| **seq\_parameter\_set\_id** | ue(v) |
| **max\_temporal\_layers\_minus1** | u(3) |
| **~~pic\_width\_in\_luma\_samples~~** | ~~u(16)~~ |
| **~~pic\_height\_in\_luma\_samples~~** | ~~u(16)~~ |
| **pic\_width\_in\_lcus\_minus1** | ue(v) |
| **pic\_height\_in\_lcus\_minus1** | ue(v) |
| **dec\_pic\_width\_offset\_in\_scus** | ue(v) |
| **dec\_pic\_height\_offset\_in\_scus** | ue(v) |
| **...** |  |
| rbsp\_trailing\_bits( ) |  |
| } |  |

## Sequence parameter set RBSP semantics

**pic\_width\_in\_lcus\_minus1** plus 1 specifies the width of each coded picture in units of largest coding units. The value of pic\_width\_in\_lcus\_minus1 shall be in the range of 0 to 212– 1, inclusive.

**pic\_height\_in\_lcus\_minus1** plus 1 specifies the height of each coded picture in units of largest coding units.

**dec\_pic\_width\_offset\_in\_scus** specifies, together with pic\_width\_in\_lcus\_minus1, the width of each decoded picture. The value of dec\_pic\_width\_offset\_in\_scus is in the range of 0 to ( 1 << ( Log2MaxCUSize – Log2MinCUSize ) ) – 1, inclusive.

**dec\_pic\_height\_offset\_in\_scus** specifies, together with pic\_height\_in\_lcus\_minus1, the height of each decoded picture. The value of dec\_pic\_height\_offset\_in\_scus is in the range of 0 to ( 1<< ( Log2MaxCUSize – Log2MinCUSize ) ) – 1, inclusive.

The width of each decoded picture, in luma samples, is derived as

PicWidthInLumaSamples = ( ( pic\_width\_in\_lcus\_minus1 + 1 ) << Log2MaxCUSize ) –   
 (dec\_pic\_width\_offset\_in\_scus << Log2MinCUSize ) (7-x)

The height of each decoded picture, in luma samples, is derived as

PicHeightInLumaSamples = ( ( pic\_height\_in\_lcus\_minus1 + 1 ) << Log2MaxCUSize ) –   
 ( dec\_pic\_height\_offset\_in\_scus << Log2MinCUSize ) (7-x+1)

The left and top boundaries of a coded picture and the corresponding decoded picture are always aligned, respectively.

# Discussions

In AVC, the value ranges for the picture size syntax elements pic\_width\_in\_mbs\_minus1 and pic\_height\_in\_map\_units\_minus1 are not specified in the semantics. In HEVC WD4d4, the value ranges for the picture size syntax elements pic\_width\_in\_luma\_samples and pic\_height\_in\_luma\_samples are specified, both as 0 to 216-1, inclusive. In the above proposal, the value ranges of pic\_width\_in\_lcus\_minus1 and pic\_height\_in\_lcus\_minus1 are both specfieid as 0 to 212– 1, inclusive, which is the same as the one in the HEVC WD4d4 if the LCU size is 16x16. We suggest discussing the need of the value ranges for the picture size syntax elements in the semantics, and if yes, what would be the best values.

# Patent rights declaration(s)

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