

AHG9: High-level syntax for signalling maximum TT size (JVET-Q0226)

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Overview

- Proposes to modify the valid value range for the allowed maximum ternary tree size `maxTtSize` signalled in the SPS and the picture header
 - Limits the minimum value of `maxTtSize` to be equal to the minimum coding block size
 - Limits the maximum value of `maxTtSize` to be equal to $\text{Min}(64, \text{CTBSizeY})$ in accordance with the VPDU size constraint
 - No modification to decoding process

Signalling MaxTtSize & MaxBtSize in VVC Draft 7

- When MaxMttDepth is greater than 0, the maximum TT size and maximum BT sizes are specified w.r.t. the minimum QT size, as follows for a luma block :
 - $\text{MaxTtSizeY} = 1 \ll (\text{MinQtLog2SizeY} + \text{log2_diff_max_tt_min_qt_luma})$
 - $\text{MaxBtSizeY} = 1 \ll (\text{MinQtLog2SizeY} + \text{log2_diff_max_bt_min_qt_luma})$
- The minimum values of MaxTtSize and MaxBtSize are both equal to the specified minimum QT size MinQtSize
- When $\text{MinCbsize} < \text{MinQtSize}$ & $\text{MaxMttDepth} > 0$, QT is not allowed and TT and BT are both enabled to support further splitting CUs with size less than or equal to MinQtSize

Proposed Modification on MaxTtSize

- Motivation

- Enabling at least one of two MTT split types (BT or TT) is sufficient for further partitioning CUs with width/height less than or equal to MinQtSize up to the minimum CB size
- For out-of-bounds CUs along picture boundaries, TT split is not allowed

- Proposed modifications:

- $\text{MaxBtSizeY} = 1 \ll (\text{MinQtLog2SizeY} + \text{log2_diff_max_bt_min_qt_luma})$
- $\text{MaxTtSizeY} = 1 \ll (\text{MinCbLog2SizeY} + \text{log2_diff_max_tt_min_cb_luma})$

- Features

- Flexibility for further allowing MaxTtSize to be less than MinQtSize
- Without adding a new HLS element, TT split can be effectively turned off alone (without turning BT off) by setting MaxTtSizeY equal to MinCbSize

VPDU Constraints on TT in VVC Draft 7

- The maximum allowed value of maxTtSize is equal to CTB size
- The VPDU constraints are enforced by testing if both CU width and height are greater than $\text{Min}(64, \text{maxTtSize})$ to determine whether TT split is allowed, with the VPDU size equal to 64
- The variable allowTtSplit is derived as follows:
 - If one or more of the following conditions are true, allowTtSplit is set equal to FALSE:
 - cbSize is less than or equal to $2 * \text{MinTtSizeY}$
 - cbWidth is greater than $\text{Min}(64, \text{maxTtSize})$
 - cbHeight is greater than $\text{Min}(64, \text{maxTtSize})$
 - mttDepth is greater than or equal to maxMttDepth
 - $x0 + \text{cbWidth}$ is greater than `pic_width_in_luma_samples`
 - $y0 + \text{cbHeight}$ is greater than `pic_height_in_luma_samples`
 - treeType is equal to DUAL_TREE_CHROMA and $(\text{cbWidth} / \text{SubWidthC}) * (\text{cbHeight} / \text{SubHeightC})$ is less than or equal to 32
 - treeType is equal to DUAL_TREE_CHROMA and $(\text{cbWidth} / \text{SubWidthC})$ is equal to 8 and ttSplit is equal to SPLIT_TT_VER
 - treeType is equal to DUAL_TREE_CHROMA and modeType is equal to MODE_TYPE_INTRA
 - $\text{cbWidth} * \text{cbHeight}$ is equal to 64 and modeType is equal to MODE_TYPE_INTER

Proposed Modifications

- Proposed to limit the maximum value of maxTtSize to be equal to $\text{Min}(64, \text{CTBSizeY})$ according to VPDU size constraint
- The variable allowTtSplit is derived as follows:
 - If one or more of the following conditions are true, allowTtSplit is set equal to FALSE:
 - cbSize is less than or equal to $2 * \text{MinTtSizeY}$
 - cbWidth is greater than ~~$\text{Min}(64, \text{maxTtSize})$~~
 - cbHeight is greater than ~~$\text{Min}(64, \text{maxTtSize})$~~
 - mttDepth is greater than or equal to maxMttDepth
 - $x0 + \text{cbWidth}$ is greater than `pic_width_in_luma_samples`
 - $y0 + \text{cbHeight}$ is greater than `pic_height_in_luma_samples`
 - treeType is equal to DUAL_TREE_CHROMA and $(\text{cbWidth} / \text{SubWidthC}) * (\text{cbHeight} / \text{SubHeightC})$ is less than or equal to 32
 - treeType is equal to DUAL_TREE_CHROMA and $(\text{cbWidth} / \text{SubWidthC})$ is equal to 8 and ttSplit is equal to SPLIT_TT_VER
 - treeType is equal to DUAL_TREE_CHROMA and modeType is equal to MODE_TYPE_INTRA
 - $\text{cbWidth} * \text{cbHeight}$ is equal to 64 and modeType is equal to MODE_TYPE_INTER
 - Otherwise, allowTtSplit is set equal to TRUE.