

CE8-related : Transform skip restriction

Jung-Ah Choi, Jin Heo, Sunmi Yoo, Jangwon Choi, Jaehyun Lim, Seung Hwan Kim

LG Electronics Inc.

Background

- Current VVC text specification allows high QP up to 63 (from 51)
- Transform skip block does not occur in the low bit-rate environment (i.e. high quantization parameter (QP))
- However, *transform_skip_flag* is always signaled when the certain transform skip condition is satisfied

transform_unit(x0, y0, tbWidth, tbHeight, treeType, subTulIndex) {	Descriptor
if(treeType == SINGLE_TREE treeType == DUAL_TREE_LUMA) {	
if((IntraSubPartitionsSplitType == ISP_NO_SPLIT && !(cu_sbt_flag && ((subTulIndex == 0 && cu_sbt_pos_flag) (subTulIndex == 1 && !cu_sbt_pos_flag)))) (IntraSubPartitionsSplitType != ISP_NO_SPLIT && (subTulIndex < NumIntraSubPartitions - 1 !InferTuCbfLuma)))	
tu_cbf_luma[x0][y0]	ae(v)
if(IntraSubPartitionsSplitType != ISP_NO_SPLIT)	
InferTuCbfLuma = InferTuCbfLuma && !tu_cbf_luma[x0][y0]	
}	
if(treeType == SINGLE_TREE treeType == DUAL_TREE_CHROMA) {	
if((IntraSubPartitionsSplitType == ISP_NO_SPLIT && !(cu_sbt_flag && ((subTulIndex == 0 && cu_sbt_pos_flag) (subTulIndex == 1 && !cu_sbt_pos_flag)))) (IntraSubPartitionsSplitType != ISP_NO_SPLIT && (subTulIndex == NumIntraSubPartitions - 1))) {	
tu_cbf_cb[x0][y0]	ae(v)
tu_cbf_cr[x0][y0]	ae(v)
}	
if(IntraSubPartitionsSplitType != ISP_NO_SPLIT && treeType == SINGLE_TREE && subTulIndex == NumIntraSubPartitions - 1)	
xC = CbPosX[x0][y0]	
yC = CbPosY[x0][y0]	
wC = CbWidth[x0][y0] / 2	
hC = CbHeight[x0][y0] / 2	
} else	
xC = x0	
yC = y0	
wC = tbWidth / SubWidthC	
hC = tbHeight / SubHeightC	
}	
if((tu_cbf_luma[x0][y0] tu_cbf_cb[x0][y0] tu_cbf_cr[x0][y0]) && treeType != DUAL_TREE_CHROMA) {	
if(cu_qp_delta_enabled_flag && !IsCuOpDeltaCoded) {	
cu_qp_delta_abs	ae(v)
if(cu_qp_delta_abs)	
cu_qp_delta_sign_flag	ae(v)
}	
if(tu_cbf_luma[x0][y0] && treeType != DUAL_TREE_CHROMA && (tbWidth <= 32) && (tbHeight <= 32) && (IntraSubPartitionsSplit[x0][y0] == ISP_NO_SPLIT) && (!cu_sbt_flag)) {	
if(transform_skip_enabled_flag && tbWidth <= MaxTsSize && tbHeight <= MaxTsSize)	
transform_skip_flag[x0][y0]	ae(v)
if((CuPredMode[x0][y0] != MODE_INTRA && sps_explicit_mts_inter_enabled_flag) (CuPredMode[x0][y0] == MODE_INTRA && sps_explicit_mts_intra_enabled_flag) && (tbWidth <= 32) && (tbHeight <= 32) && (!transform_skip_flag[x0][y0]))	
tu_mts_idx[x0][y0]	ae(v)
}	
if(tu_cbf_luma[x0][y0])	
residual_coding(x0, y0, Log2(tbWidth), Log2(tbHeight), 0)	
if(tu_cbf_cb[x0][y0])	
residual_coding(xC, yC, Log2(wC), Log2(hC), 1)	
if(tu_cbf_cr[x0][y0])	
residual_coding(xC, yC, Log2(wC), Log2(hC), 2)	
}	

Proposed Methods

- To remove unnecessary *transform_skip_flag* signaling for very low bit-rate environment
 - In case of CE8.4.4a, threshold becomes 59
 - Method I: restriction in the transform unit syntax

transform unit(x0, y0, tbWidth, tbHeight, treeType, subTuIndex) {	Descriptor
....	
if($QP_y < \text{threshold}$ && transform skip enabled flag && tbWidth <= MaxTsSize && tbHeight <= MaxTsSize)	
transform skip flag [x0][y0]	ae(v)
...	
}	

- Method II: restriction in the PPS header

pic parameter set rbsp() {	Descriptor
...	
init qp_minus26	se(v)
if($\text{init qp_minus26} < (\text{threshold}-26)$)	
transform_skip_enabled_flag	u(1)
if(transform skip enabled flag)	
log2 transform skip max size minus2	ue(v)
if($\text{init qp_minus26} < \text{threshold}-26$)	
cu_qp_delta_enabled_flag	u(1)
...	
}	

- The proposed method reduces the number of context-coded bins

Thank you