



Simplification for Intra Transform Skip Mode

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Overall Summary

- A limitation is proposed to speed up the transform skip mode
 - For a 4x4 intra luma or chroma TU, intra transform skip mode can be selected only when the size of CU is 8x8 in luma and the partition mode is Intra_NxN.
 - This limitation can be implemented normatively or non-normatively.
 - However, the non-normative method sends unnecessary transform skip flags to the decoder.
- Experimental results
 - Based on HM7.0 and common test conditions: All-Intra HE10
 - Both the normative and non-normative method can achieve about **9% encoder complexity reduction** with almost the **same coding efficiency**.

Transform Skip Mode in HM7.0

- For an Intra 4x4 luma TU, a transform skip flag will be signaled in the following three cases

	Luma CU	PU	TU
Case 1	16x16	2Nx2N	4x4
Case 2	8x8	2Nx2N	4x4
Case 3	8x8	NxN	4x4

- For an Intra 4x4 chroma TU, there is an extra case, besides the above 3 cases.

	Luma CU	PU	TU
Case 4	32x32	2Nx2N	4x4

Proposed Simplification

- Limit the 4x4 intra transform skip to Case 3
 - It is observed that most of the gain is from case 3.
- Implementation can be normative or non-normative
 - Normative method: The transform skip mode can only be used in Case 3.
 - No transform skip flag is sent for other 3 cases.
 - Non-normative method: The transform skip flag is set to 0 for Case 1, 2, or 4.
 - Unnecessary transform skip flags are sent to the decoder.

Simulation Results

- All-Intra HE10 in the Common Test Conditions
 - Anchor : HM7.0
- Thank TI for crosschecking
 - JCTVC-J0393

Table 1. Results of the normative method

	All Intra HE10		
	Y	U	V
Class A	-0.01%	-0.02%	-0.01%
Class B	-0.02%	0.02%	0.02%
Class C	0.00%	-0.02%	0.00%
Class D	-0.01%	-0.01%	-0.01%
Class E	-0.02%	-0.04%	0.01%
Overall	-0.01%	-0.01%	0.01%
	-0.01%	-0.01%	0.02%
Class F	0.14%	-0.15%	0.15%
Enc Time[%]	91%		
Dec Time[%]	99%		

Table 2. Results of the non-normative method

	All Intra HE10		
	Y	U	V
Class A	0.00%	0.01%	0.07%
Class B	0.00%	0.07%	0.08%
Class C	0.03%	0.06%	0.09%
Class D	0.01%	0.06%	0.09%
Class E	0.01%	0.01%	0.08%
Overall	0.01%	0.04%	0.08%
	0.01%	0.05%	0.09%
Class F	0.19%	0.10%	0.36%
Enc Time[%]	91%		
Dec Time[%]	99%		

Conclusions

- A limitation is proposed to speed up the transform skip mode on the encoder side.
- Both normative and non-normative method can achieve about 9% encoder complexity reduction for All-Intra HE10 test conditions.
- Without transmitting the unnecessary transform skip flags, the BD-rate of the normative method is a little better than that of the non-normative method.
- Thus, the normative method is recommended.

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Thank you

