

JVET-AH0182

Non-EE2: On intra and inter LFNST/NSPT for low delay configuration

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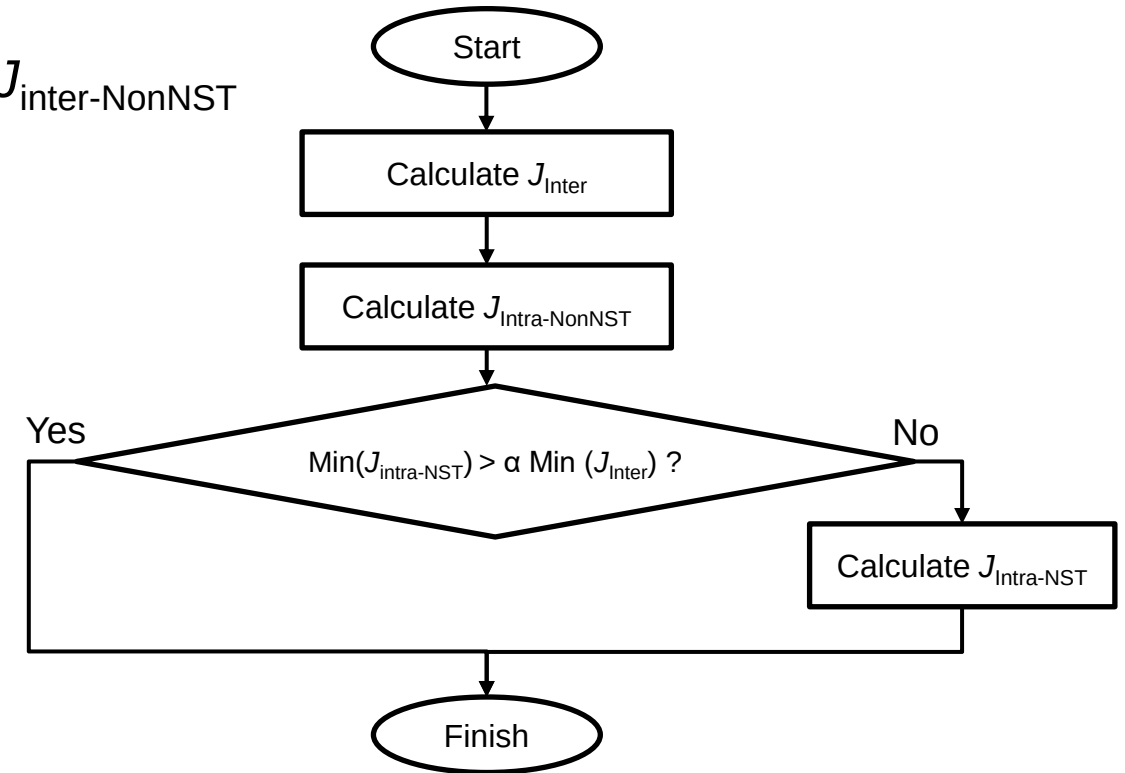
- Propose two options to enable LFNST/NSPT for LDB/LDP with balancing gain and EncT.
 - Option 1: Early termination of intra-LFNST/NSPT for P/B slices
 - Option 2: Disabling intra-LFNST/NSPT for I/P/B slices using SPS flag
- Comparison of JVET-AH0103, AH0181, and AH0182, sorted by BD-rate Y.

Method	Results over ECM-12 under LDB configuration			Approach	Intra-LFNST/NSPT		Inter- LFNST/ NSPT	Early Term. intra- LFNST/ NSPT	Early Term. intra- LFNST/ NSPT	Early Term. inter- LFNST/ NSPT
	Y	EncT	DecT		I-slice	P/B- slice	P/B-slice	I-slice	P/B-slice	P/B-slice
ECM-12	N/A	N/A	N/A	N/A	X	X	X	X	X	X
AH0182 Test 1: ECM-12 + enabling intra/inter LFNST/NSPT	-1.58%	115.1%	101.4%	Non-normative	O	O	O	X	X	X
AH0182 Test 2: Test 1 + Option 1	-1.52%	106.5%	101.6%	Non-normative	O	O	O	X	O	X
AH0181	-1.43%	104.4%	104.2%	Non-normative	O	X	O	X	X	X
AH0103 Test A	-1.15%	101.7%	101.6%	Normative	O	X	O	X	X	O
AH0182 Test 3: Test 1 + Option 2	-1.04%	104.1%	102.0%	Normative	X	X	O	X	X	X
AH0103 Test B	-0.77%	101.2%	101.6%	Normative	X	X	O	X	X	O

■ Option 1: Early termination of intra-LFNST/NSPT for P/B-slices

● Based on comparison:

- RD cost at the end of inter coding: J_{Inter}
- RD cost of intra coding without LFSNT/NSPT: $J_{\text{inter-NonNST}}$



■ Option 2: Disabling intra-LFNST/NSPT for I/P/B-slices using SPS flag

■ Test 1: ECM-12 + Enabling intra/inter-LFNST/NSPT

Class	LDB					LDP				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
A1										
A2										
B	-1.31%	-0.44%	-0.61%	116.0%	101.2%	-1.41%	-0.41%	-0.40%	127.4%	100.8%
C	-2.06%	-0.67%	-0.39%	117.3%	101.9%	-2.13%	-0.72%	-0.80%	130.1%	100.7%
E	-1.40%	0.04%	-1.97%	110.7%	101.1%	-1.67%	-0.57%	-1.49%	116.6%	102.4%
Overall	-1.58%	-0.40%	-0.88%	115.1%	101.4%	-1.71%	-0.55%	-0.80%	125.5%	101.2%
D	-1.30%	0.55%	-0.93%	114.4%	101.5%	-1.47%	-0.84%	0.01%	124.6%	101.1%
F	-1.20%	-1.16%	-1.59%	110.3%	100.9%	-1.22%	0.40%	-0.41%	115.6%	100.8%

■ Test 2: Test 1 + Early termination of intra-LFNST/NSPT for P/B slices

Class	LDB					LDP				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
A1										
A2										
B	-1.23%	-0.16%	-0.59%	106.6%	101.6%	-1.36%	-0.01%	0.17%	110.4%	101.2%
C	-1.92%	-0.26%	-0.13%	107.7%	102.1%	-2.11%	-0.65%	-0.02%	112.0%	101.3%
E	-1.45%	0.05%	-1.43%	104.8%	101.2%	-1.59%	-0.21%	-1.22%	105.8%	102.8%
Overall	-1.52%	-0.14%	-0.64%	106.5%	101.6%	-1.67%	-0.27%	-0.24%	109.8%	101.6%
D	-1.28%	0.57%	-1.70%	106.3%	102.5%	-1.50%	-1.06%	-0.07%	109.3%	101.4%
F	-1.02%	-0.60%	-1.56%	104.8%	100.9%	-1.41%	0.16%	-0.57%	106.4%	101.0%

■ Test 1: ECM-12 + Enabling intra/inter-LFNST/NSPT

Class	LDB					LDP				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
A1										
A2										
B	-1.31%	-0.44%	-0.61%	116.0%	101.2%	-1.41%	-0.41%	-0.40%	127.4%	100.8%
C	-2.06%	-0.67%	-0.39%	117.3%	101.9%	-2.13%	-0.72%	-0.80%	130.1%	100.7%
E	-1.40%	0.04%	-1.97%	110.7%	101.1%	-1.67%	-0.57%	-1.49%	116.6%	102.4%
Overall	-1.58%	-0.40%	-0.88%	115.1%	101.4%	-1.71%	-0.55%	-0.80%	125.5%	101.2%
D	-1.30%	0.55%	-0.93%	114.4%	101.5%	-1.47%	-0.84%	0.01%	124.6%	101.1%
F	-1.20%	-1.16%	-1.59%	110.3%	100.9%	-1.22%	0.40%	-0.41%	115.6%	100.8%

■ Test 3: Test 1 + Disabling intra-LFNST/NSPT for I/P/B-slices using SPS flag

Class	LDB					LDP				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
A1										
A2										
B	-1.01%	0.36%	0.31%	104.0%	102.1%	-1.08%	0.31%	1.06%	104.9%	101.6%
C	-1.13%	0.25%	0.30%	104.4%	102.3%	-1.35%	0.15%	0.37%	105.0%	102.0%
E	-0.96%	-0.16%	-0.86%	104.0%	101.4%	-1.19%	-0.58%	0.07%	104.4%	102.8%
Overall	-1.04%	0.19%	0.01%	104.1%	102.0%	-1.20%	0.03%	0.58%	104.8%	102.0%
D	-1.08%	0.85%	0.26%	103.5%	102.1%	-1.35%	-0.64%	0.80%	104.2%	102.0%
F	-0.77%	-0.11%	-0.40%	102.6%	101.0%	-0.71%	-0.28%	0.50%	102.5%	101.4%

- **Two options are proposed to apply LFNST/NSPT for LDB/LDP.**
 - **Option 1: Early termination of intra-LFNST/NSPT for P/B slices**
 - **Option 2: Disabling intra-LFNST/NSPT for I/P/B slices using SPS flag**

- **Option 1 and 2 achieve a better trade-off, but trade-off of Option 2 is worse than AH0181 Test A.**

- **It is recommended to study combination test of AH0181 Test A and Option 1, i.e., early termination of both intra/-inter LFNST/NSPT, in the next EE.**

Thanks to InterDigital for crosscheck!
(JVET-AH0331)