

# NSQT simplification

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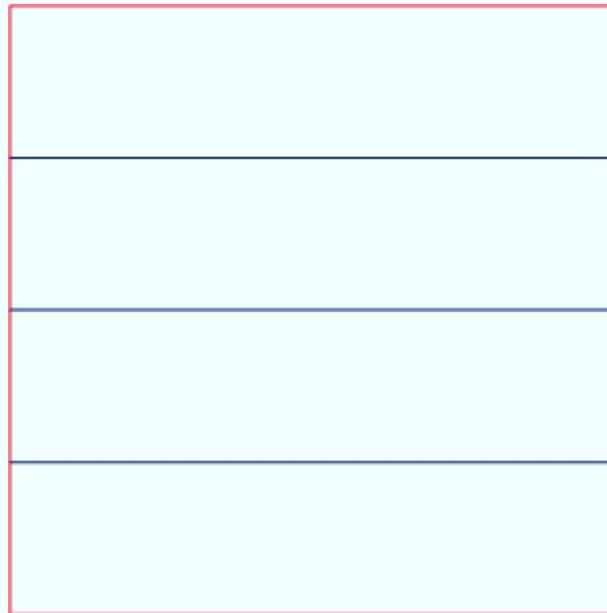
# Motivation

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- Remove non-square block to square block split process
- Simplify non-square split control logic
- Merge luma and chroma non-square transform quadtree

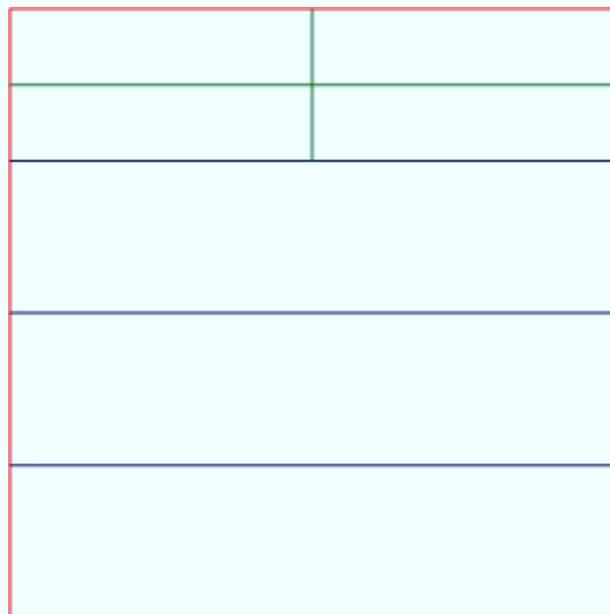
# Overview of current NSQT split process

- Square block to non-square block split (trafoDepth=0 to trafoDepth=1)



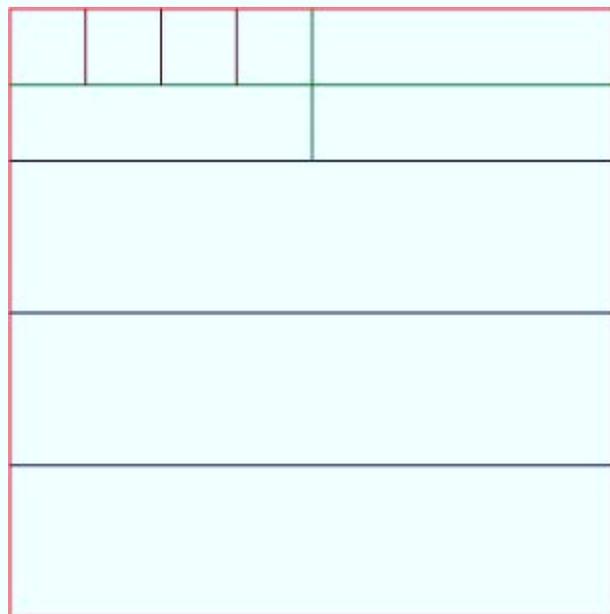
# Overview of current NSQT split process

- Non-square block to non-square block with smaller size split (trafoDepth=N to trafoDepth=N+1)



# Overview of current NSQT split process

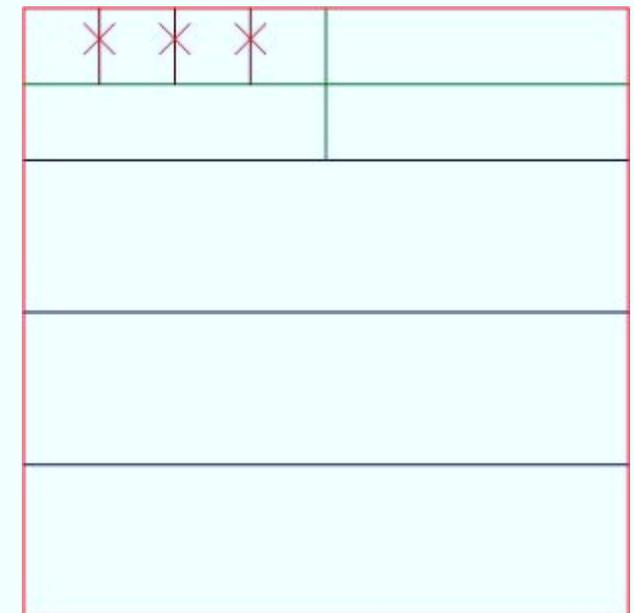
- Non-square to square split (when either edge of non-square block is equal to the minimum transform block size)



# Proposed simplified solution

- Remove non-square block to square block split
  - ◆ If either edge of non-square block is equal to the minimum transform block size, the split process is terminated

	64x64 CU		32x32 CU		16x16 CU		8x8 CU	
	Luma	Chroma	Luma	Chroma	Luma	Chroma	Luma	Chroma
trafoDepth=0	-	-	32x32	16x16	16x16	8x8	8x8	4x4
trafoDepth=1	32x32	16x16	32x8	16x4	16x4	4x4	4x4	-
trafoDepth=2	32x8	16x4	16x4	4x4	4x4	-	-	-



# Benefits

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- Simplify non-square split logic
- Unify luma and chroma non-square transform quadtree
- Both text and code are clear than before

# Test results

- Reference: HM7.0 with NSQT on
- Tested: Proposed solution

	Random Access Main			Random Access HE10				Low delay B Main			Low delay B HE10		
	Y	U	V	Y	U	V		Y	U	V	Y	U	V
Class A	-0.07%	-0.29%	-0.20%	0.00%	0.03%	0.04%	Class A						
Class B	0.02%	-0.03%	-0.17%	0.00%	-0.07%	-0.15%	Class B	-0.03%	0.30%	0.34%	-0.05%	0.28%	0.16%
Class C	0.01%	0.18%	0.17%	0.03%	0.23%	0.06%	Class C	-0.04%	0.59%	0.41%	-0.01%	0.37%	0.44%
Class D	0.06%	0.27%	0.22%	0.05%	0.39%	0.18%	Class D	0.04%	0.64%	0.65%	0.05%	0.54%	0.34%
Class E							Class E	-0.20%	-0.04%	0.16%	-0.04%	-0.82%	-0.10%
<b>Overall</b>	0.01%	0.03%	0.00%	0.02%	0.14%	0.02%	<b>Overall</b>	-0.04%	0.39%	0.40%	-0.01%	0.16%	0.23%
	0.00%	0.04%	0.00%	0.02%	0.15%	0.02%		-0.04%	0.38%	0.41%	-0.01%	0.21%	0.35%
Class F	0.13%	0.17%	0.22%	0.10%	0.22%	0.30%	Class F	-0.04%	-0.26%	-0.41%	0.08%	0.14%	1.69%
Enc Time[%]		98%			98%		Enc Time[%]		99%			99%	
Dec Time[%]		99%			99%		Dec Time[%]		100%			101%	

# Test results (continue)

- Reference: HM7.0 with NSQT off
- Tested: Proposed solution

	Random Access Main			Random Access HE10				Low delay B Main			Low delay B HE10		
	Y	U	V	Y	U	V		Y	U	V	Y	U	V
Class A	-0.3%	-1.0%	-0.9%	-0.4%	-0.5%	-0.7%	Class A						
Class B	-0.5%	-1.5%	-1.5%	-0.4%	-1.4%	-1.2%	Class B	-1.0%	-3.3%	-3.3%	-0.9%	-3.0%	-3.1%
Class C	-0.5%	-0.4%	-0.4%	-0.4%	-0.3%	-0.4%	Class C	-1.0%	-1.5%	-1.4%	-0.8%	-1.4%	-1.1%
Class D	-0.3%	-0.1%	0.0%	-0.3%	0.0%	0.0%	Class D	-0.7%	-0.8%	-0.2%	-0.7%	-1.3%	-0.8%
Class E							Class E	-1.5%	-3.0%	-2.3%	-1.3%	-3.7%	-2.8%
<b>Overall</b>	-0.4%	-0.8%	-0.7%	-0.4%	-0.6%	-0.6%	<b>Overall</b>	-1.0%	-2.2%	-1.9%	-0.9%	-2.3%	-2.0%
	-0.4%	-0.8%	-0.7%	-0.4%	-0.6%	-0.6%		-1.0%	-2.2%	-1.8%	-0.9%	-2.3%	-1.9%
Class F	-0.1%	-0.2%	0.0%	-0.3%	-0.2%	-0.1%	Class F	-1.0%	-1.5%	-1.5%	-0.9%	-1.5%	0.3%
Enc Time[%]		100%			100%		Enc Time[%]		100%			100%	
Dec Time[%]		98%			100%		Dec Time[%]		99%			100%	

# Conclusion

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- Recommend to adopt the proposed NSQT simplified solution
- Consider to add the proposed NSQT simplified solution to Main profile or the new profile



# Thank you!

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