



# Non-TE4.4: Inter-layer Adaptive Filter on Upsampled BL with CU on/off Flags

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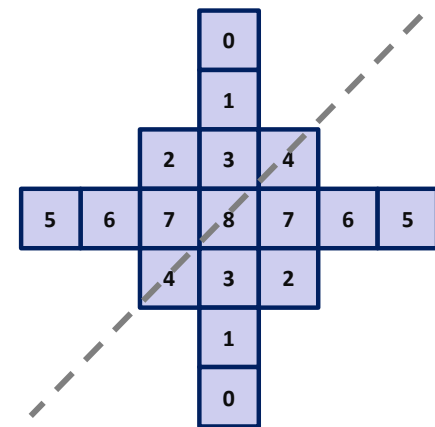
# Overall Summary

- Add CU on/off flags on top of JCTVC-L0075
  - Wiener filter is applied to upsampled BL samples for improving inter-layer intra prediction
  - Filter footprint is 7x7Cross+3x3Square
  - Filter coefficients are coded in slice header
  - One filter per color component per slice
  - CU on/off flags for Intra\_BL blocks
    - 1: Apply inter-layer adaptive filter for the current Intra\_BL block
    - 0: Disable inter-layer adaptive filter for the current Intra\_BL block
- Experimental results
  - Anchor is SMuC-0.1.1
  - 5.9% encoding time increase
  - 3.0% decoding time increase

BD-rate	AI-2x	AI-1.5x	RA-2x	RA-1.5x	RA-SNR	LD-2x	LD-1.5x	LD-SNR
Luma	-0.5%	-0.6%	-0.3%	-0.5%	-2.2%	-0.3%	-0.9%	-3.4%

# Inter-layer Adaptive Filter

- JCTVC-L0075
  - Apply Wiener filter to upsampled BL samples for improving inter-layer intra prediction
  - One filter per color component per slice
  - Filter coefficients are coded in slice header
  - Filter footprint is 7x7Cross + 3x3 Square with  $\frac{1}{2}$  symmetry
- One on/off flag for each Intra\_BL block
  - 1: Apply inter-layer adaptive filter
  - 0: Disable inter-layer adaptive filter



# BD-Rate

## ■ Anchor is SMuC-0.1.1

	AI HEVC 2x			AI HEVC 1.5x					
	Y	U	V	Y	U	V			
Class A	-0.3%	-0.9%	-1.0%						
Class B	-0.6%	-0.5%	-0.5%	-0.6%	-1.2%	-1.2%			
<b>Overall (EL+BL)</b>	-0.5%	-0.6%	-0.6%	-0.6%	-1.2%	-1.2%			
<b>Overall (EL)</b>	-1.0%	-1.4%	-1.4%	-2.2%	-4.5%	-3.9%			
Enc Time[%]	114.5%			112.1%					
Dec Time[%]	102.9%			103.7%					
Enc Mem[%]	#DIV/0!			#DIV/0!					
BL Match	Matched			Matched					
	RA HEVC 2x			RA HEVC 1.5x			RA HEVC SNR		
	Y	U	V	Y	U	V	Y	U	V
Class A	-0.1%	-0.3%	-0.2%				-4.3%	-2.5%	-1.9%
Class B	-0.3%	0.0%	0.1%	-0.5%	-0.7%	-0.3%	-1.3%	-1.1%	-0.8%
<b>Overall (EL+BL)</b>	-0.3%	0.0%	0.0%	-0.5%	-0.7%	-0.3%	-2.2%	-1.5%	-1.1%
<b>Overall (EL)</b>	-0.5%	-0.2%	-0.1%	-1.8%	-2.2%	-1.1%	-4.6%	-3.3%	-2.4%
Enc Time[%]	104.0%			103.5%			102.6%		
Dec Time[%]	100.8%			103.2%			103.8%		
Enc Mem[%]	#DIV/0!			#DIV/0!			#DIV/0!		
BL Match	Matched			Matched			Matched		
	LD-P HEVC 2x			LD-P HEVC 1.5x			LD-P HEVC SNR		
	Y	U	V	Y	U	V	Y	U	V
Class A	0.0%	-0.3%	-0.3%				-6.1%	-3.1%	-2.9%
Class B	-0.5%	-0.6%	-0.3%	-0.9%	-1.3%	-0.8%	-2.3%	-1.7%	-1.0%
<b>Overall (EL+BL)</b>	-0.3%	-0.5%	-0.3%	-0.9%	-1.3%	-0.8%	-3.4%	-2.1%	-1.6%
<b>Overall (EL)</b>	-0.6%	-1.1%	-0.6%	-2.9%	-4.0%	-2.2%	-6.3%	-4.4%	-3.5%
Enc Time[%]	104.4%			103.3%			103.2%		
Dec Time[%]	100.9%			102.5%			106.1%		
Enc Mem[%]	#DIV/0!			#DIV/0!			#DIV/0!		
BL Match	Matched			Matched			Matched		

# Conclusion

- Apply Wiener filter to upsampled BL samples for improving inter-layer intra prediction
  - Filter shape is 7x7Cross+3x3Square
  - Filter coefficients are coded in slice header
  - One filter per color component per slice
  - CU on/off flags for Intra\_BL blocks
  
- Experimental results, compared to SMuC-0.1.1
  - 0.3%-0.9% luma BD-rate gain for spatial scalability
  - 2.2%-3.4% luma BD-rate gain for SNR scalability
  - 5.9% encoding time increase
  - 3.0% decoding time increase