

# JCTVC-L0068

## CU Depth Restriction in Enhancement Layer for SHVC

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# Introduction

- There is a high similarity between the CU depth of EL and BL.
  - In case of spatial scalability, a probability that depth of CU in EL be the one of {BL depth-1, BL depth, BL depth+1} is 81.3%.
  - In case of SNR scalability, a probability that depth of CU in EL be the one of {BL depth, BL depth+1, BL depth+2} is 89.63%.
- This contribution proposes an algorithm that restricts CU depth in EL according to the CU depth of the collocated CU in the BL.



# Proposed CU depth restriction algorithm

- For EL, target-depth  $D_T$  is defined as follows:

$$D_T = D_{BL} - \text{Round}(R-1) + 1 \quad \dots(1)$$

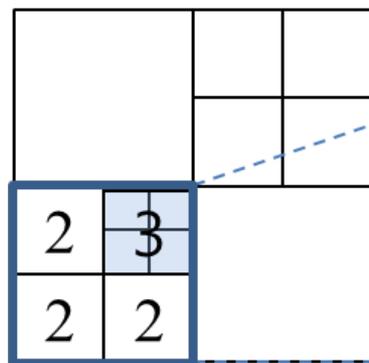
where  $D_{BL}$  is the depth of the collocated CU in BL and  $R$  is ratio between the spatial resolutions of BL and EL.

- For 2x and 1.5x spatial scalability,  $D_T$  is equal to  $D_{BL}$ .
  - For SNR scalability,  $D_T$  is equal to  $D_{BL} - 1$ .
- Candidates of CU depth in EL are restricted to  $\{D_T-1, D_T, D_T+1\}$

# Proposed CU depth restriction algorithm

- Ex) 2x and 1.5x spatial scalability cases:
  - $D_T = 2$  for “A” CUs,  $D_T = 3$  for “B” CU
  - Candidates of “A” CUs = {1, 2, 3} and candidates of “B” CU = {2, 3, 4}
- Ex) SNR scalability case:
  - $D_T = 3$  for “A” CUs,  $D_T = 4$  for “B” CU
  - Candidates of “A” CUs = {2, 3, 4} and candidates of “B” CU = {3, 4, 5}

Collocated CU in BL



CU in EL

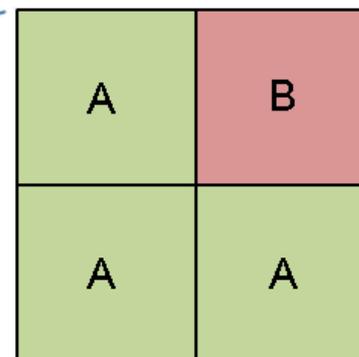


Figure 1. A CU in EL and the collocated CU in BL in SHVC

# Performance

- 2x and 1.5x spatial scalability

	RA HEVC 2x			LD-P HEVC 2x		
	Y	U	V	Y	U	V
Class A	0.5%	0.7%	0.6%	0.5%	1.1%	1.0%
Class B	0.5%	0.6%	0.6%	0.7%	0.7%	0.6%
<b>Overall</b>	<b>0.5%</b>	<b>0.6%</b>	<b>0.6%</b>	<b>0.7%</b>	<b>0.8%</b>	<b>0.7%</b>
Enc Time (EL/BL)	<b>77.1%</b>			<b>76.3%</b>		

	RA HEVC 1.5x			LD-P HEVC 1.5x		
	Y	U	V	Y	U	V
Class A						
Class B	0.6%	0.6%	0.5%	0.7%	0.7%	0.7%
<b>Overall</b>	<b>0.6%</b>	<b>0.6%</b>	<b>0.5%</b>	<b>0.7%</b>	<b>0.7%</b>	<b>0.7%</b>
Enc Time (EL/BL)	<b>73.1%</b>			<b>73.5%</b>		

# Performance

- SNR scalability

	RA HEVC SNR			LD-P HEVC SNR		
	Y	U	V	Y	U	V
Class A	0.9%	1.9%	1.9%	1.0%	2.1%	2.2%
Class B	0.9%	1.8%	1.4%	1.0%	1.8%	1.5%
<b>Overall</b>	<b>0.9%</b>	<b>1.8%</b>	<b>1.6%</b>	<b>1.0%</b>	<b>1.9%</b>	<b>1.7%</b>
Enc Time (EL/BL)	<b>78.9%</b>			<b>81.6%</b>		

# Conclusion

- There is a high correlation between the CU depth of EL and BL.
- This contribution proposes CU depth restriction algorithm in EL using the correlation.
- With the proposed algorithm, overall BD-rate increases by 0.73% and encoding time decreases by 23.25%.

