



# CREATING THE LIVING NETWORK™

JVET-D0092

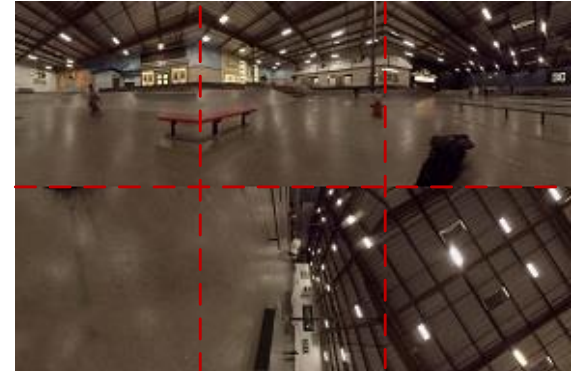
AHG8: Reference samples derivation using  
geometry padding for intra coding

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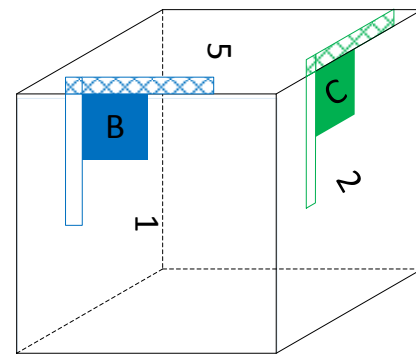
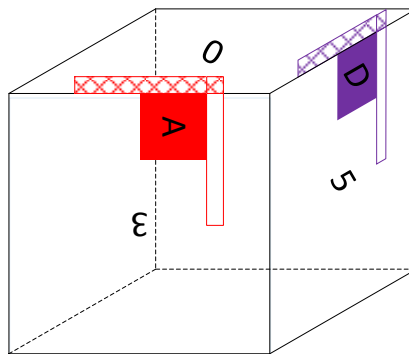
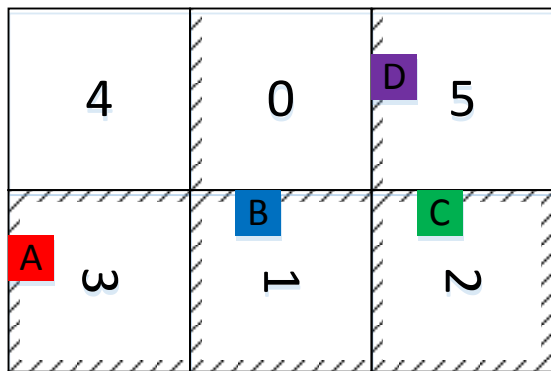
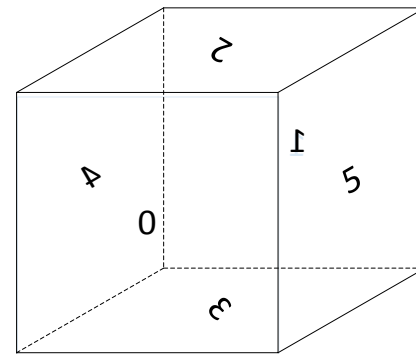
# Introduction

- For geometries composed of multiple faces, there is a discontinuity across faces as they are defined in different projection planes
- In the frame packed picture, the discontinuity across neighboring faces may be increased depending on face arrangement
- Therefore, for intra coding, reference samples located outside of current face need to be handled appropriately considering face arrangement in the frame packed picture
- Geometry padding is proposed in JVET-D0095 for motion compensation padding, and could be applied to properly derive reference samples located outside of current face



# Proposed reference samples derivation method

- Applied to blocks located at face boundary
- Geometry padding is used for deriving reference samples located outside of current face
- Only previously coded samples are used



# Simulation

- Test sequences: 8 4K ERP sequences + 8 8K ERP sequences
- Software: JEM3.0 + PCT360
- Configuration: All Intra
- Coding projection format: CMP 3x2
- Metrics: SPSNR, L-SPSNR, AW-SPSNR, and PSNR

Test	Source	Coding format	Max CTU size	Metrics calculation
Test-1	4K ERP	75% CMP 3x2	64	Converted back to 4K ERP to calculate the metrics in 4K ERP domain
Test-2	8K ERP	4K CMP 3x2	128	Converted back to 8K ERP to calculate the metrics in 8K ERP domain

# Simulation results – 4K ERP

	SPSNR			AW-SPSNR			L-SPSNR			PSNR		
	Y	U	V	Y	U	V	Y	U	V	Y	U	V
Shark	-0.30%	-0.23%	-0.32%	-0.33%	-0.25%	-0.32%	-0.30%	-0.24%	-0.35%	-0.37%	-0.30%	-0.36%
Bicyclist	-0.20%	-0.31%	-0.41%	-0.22%	-0.29%	-0.42%	-0.19%	-0.31%	-0.41%	-0.19%	-0.15%	-0.48%
Glacier	-0.24%	-0.23%	-0.52%	-0.23%	-0.20%	-0.53%	-0.24%	-0.27%	-0.55%	-0.16%	-0.26%	-0.17%
Paramotor	-0.21%	-0.04%	-0.37%	-0.21%	-0.01%	-0.39%	-0.19%	-0.10%	-0.37%	-0.17%	-0.08%	-0.34%
Skate	-0.52%	-0.38%	-0.58%	-0.52%	-0.37%	-0.58%	-0.53%	-0.45%	-0.46%	-0.50%	-0.38%	-0.73%
Basejump	-0.33%	0.24%	-0.11%	-0.29%	0.27%	-0.09%	-0.35%	0.05%	-0.13%	-0.22%	0.19%	-0.14%
Building	-0.47%	-0.48%	-0.49%	-0.41%	-0.50%	-0.42%	-0.46%	-0.46%	-0.43%	-0.34%	-0.56%	-0.72%
Sheriff	-0.14%	-0.02%	-0.03%	-0.12%	-0.04%	0.02%	-0.15%	-0.13%	0.12%	-0.13%	0.11%	-0.11%
<b>Overall</b>	<b>-0.30%</b>	<b>-0.18%</b>	<b>-0.35%</b>	<b>-0.29%</b>	<b>-0.17%</b>	<b>-0.34%</b>	<b>-0.30%</b>	<b>-0.24%</b>	<b>-0.32%</b>	<b>-0.26%</b>	<b>-0.18%</b>	<b>-0.38%</b>

# Simulation results – 8K ERP

	SPSNR			AW-SPSNR			L-SPSNR			PSNR		
	Y	U	V	Y	U	V	Y	U	V	Y	U	V
Basketball	-0.07%	-0.37%	-0.76%	-0.11%	-0.36%	-0.71%	-0.10%	-0.38%	-0.67%	-0.10%	-0.68%	0.28%
Charilift	-0.28%	-0.27%	-0.36%	-0.27%	-0.26%	-0.35%	-0.29%	-0.31%	-0.46%	-0.29%	-0.12%	-0.22%
Sb_in_lot	-0.20%	-0.11%	-0.11%	-0.24%	-0.10%	-0.10%	-0.21%	-0.06%	-0.19%	-0.23%	-0.22%	-0.08%
Jam	-0.41%	-0.09%	-0.20%	-0.35%	-0.08%	-0.20%	-0.40%	-0.16%	-0.18%	-0.36%	-0.02%	-0.26%
Train	-0.36%	-0.59%	-0.46%	-0.37%	-0.62%	-0.46%	-0.37%	-0.58%	-0.47%	-0.37%	-0.65%	-0.58%
Sb_trick	-0.21%	-0.29%	-0.24%	-0.22%	-0.30%	-0.24%	-0.21%	-0.29%	-0.24%	-0.22%	-0.31%	-0.16%
Dancing	-0.32%	-0.45%	-0.17%	-0.29%	-0.46%	-0.15%	-0.34%	-0.42%	-0.20%	-0.28%	-0.59%	-0.05%
Driving	-0.32%	-0.09%	-0.96%	-0.30%	-0.07%	-0.94%	-0.32%	-0.18%	-0.58%	0.05%	0.01%	-1.22%
<b>Overall</b>	<b>-0.27%</b>	<b>-0.28%</b>	<b>-0.41%</b>	<b>-0.27%</b>	<b>-0.28%</b>	<b>-0.39%</b>	<b>-0.28%</b>	<b>-0.30%</b>	<b>-0.37%</b>	<b>-0.22%</b>	<b>-0.32%</b>	<b>-0.29%</b>

# Conclusion

- Geometry padding is proposed for deriving reference samples located outside of current face
- Coding gains: 0.3% AI BD-rate savings for CMP 3x2 based on SPSNR
- Suggest to establish focused group to explore 360 video coding tools

THANK YOU!

