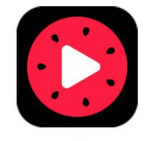


# JVET-AD0234

**Non-EE2:**

**Extensions of Residual-based Taps in ALF and CCALF**

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# Summary

## ■ Motivation

- Luma Residuals Have been Stored and Used in Luma-ALF of ECM-8.0
- Residual Usage Can be Extended to Chroma-ALF and CCALF
- Improve Chroma Performance

## ■ Proposed Solution

- Chroma Residual based Extension for Chroma-ALF
- Luma Residual based Extension for CCALF

# Chroma-ALF and CCALF in ECM-8.0

## ■ Chroma-ALF

- 9x9 Diamond Filter Shape
- Only Contain Spatial Taps
- Shown as Figure-1

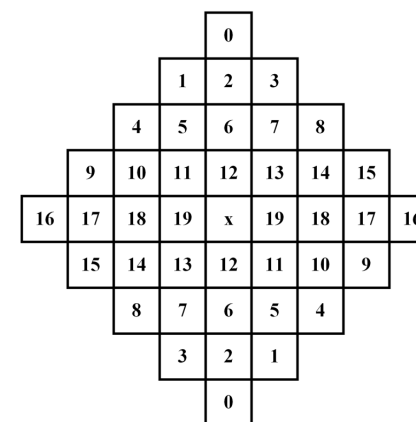


Figure-1

Diamond 9x9 Chroma Filter Shape

## ■ CCALF

- 9x9 Cross-Liked Filter Shape
- Only Contain Spatial Taps
- Shown as Figure-2

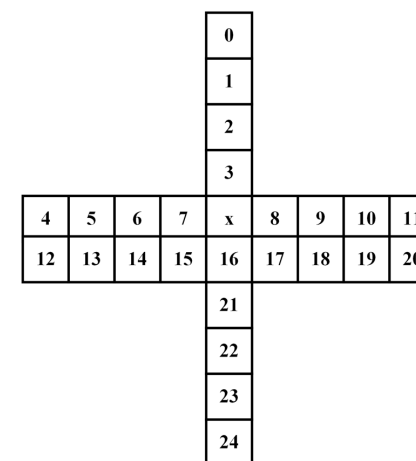


Figure-2

Cross 9x9 CCALF Filter Shape

# Proposed Methods

## ■ Chroma-ALF

- Keep Spatial Taps Unchanged
- Add 1 Residual based Tap
- Shown as Figure-3

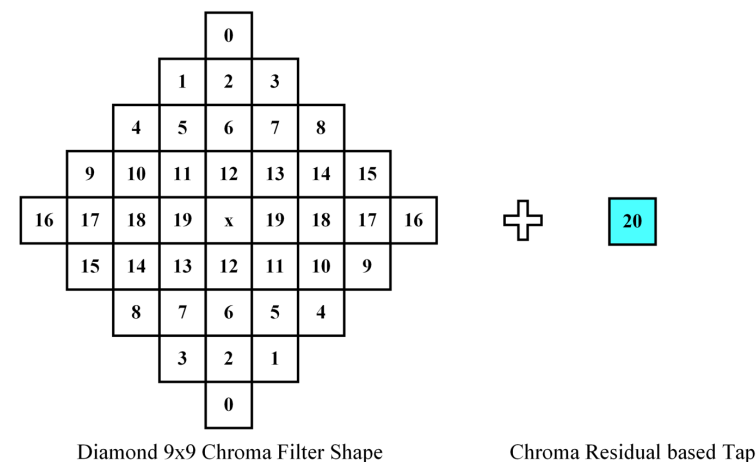


Figure-3

## ■ CCALF

- Keep Spatial Taps Unchanged
- Add 1 Residual based Tap
- Shown as Figure-4

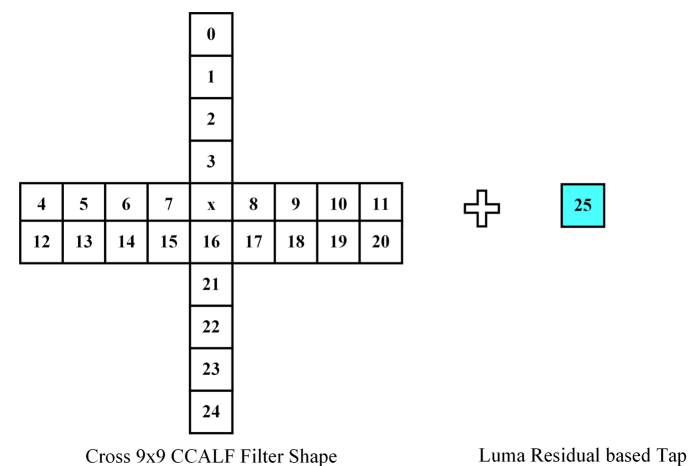


Figure-4

# Simulation Results

- Anchor is ECM-8.0
- Table shows the joint performance of the proposed methods

	AI					RA					LB				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class-A1	0.00%	-0.05%	-0.06%	101%	100%	0.02%	-0.47%	-1.19%	101%	101%					
Class-A2						0.00%	-0.49%	-0.21%	101%	99%					
Class-B	0.00%	-0.02%	-0.15%	98%	100%	0.01%	-0.42%	-0.63%	99%	98%					
Class-C	0.01%	0.00%	-0.06%	98%	100%	0.00%	-0.23%	-0.20%	99%	99%					
Class-E	0.01%	0.00%	-0.10%	100%	100%										
<b>Overall</b>						<b>0.00%</b>	<b>-0.39%</b>	<b>-0.55%</b>	<b>100%</b>	<b>99%</b>					
Class-D	0.00%	0.13%	0.10%	98%	99%	0.00%	0.19%	-0.09%	99%	97%	-0.12%	0.01%	0.09%	98%	99%
Class-F	0.00%	0.03%	0.00%	100%	97%	0.00%	-0.22%	-0.24%	97%	93%					

# Simulation Results

- Anchor is ECM-8.0
- Table shows the joint performance of the proposed methods with 3x3 in CCALF

	AI					RA					LB				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class-A1						0.01%	-0.73%	-1.19%	100%	95%					
Class-A2						0.01%	-0.87%	-1.38%	101%	98%					
Class-B						0.01%	-0.74%	-0.74%	99%	99%					
Class-C						-0.03%	-0.20%	-0.10%	98%	99%					
Class-E															
<b>Overall</b>						<b>0.00%</b>	<b>-0.62%</b>	<b>-0.78%</b>	<b>99%</b>	<b>98%</b>					
Class-D						-0.02%	0.24%	-0.02%	98%	99%					
Class-F						0.01%	-0.10%	0.07%	98%	94%					

# Conclusion

- Extensions of Residual-based Taps in ALF and CCALF are Proposed
- Simple and Straightforward Extension of the Residual Usage in ALF
- 2 Aspects are Included:
  - Chroma Residual based Extension of Chroma-ALF
  - Luma Residual based Extension of CCALF
- Promising Chroma Coding Gain Can be Achieved with Limited Coding Time Increase
- Recommended to Include into Next Round of EE2
- Thanks Qualcomm for Cross-Checking

Thanks!