

JCTVC-G499

Improved ALF with low latency and reduced complexity

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Summary

- Apply ALF independently for each LCU
- Allows for sub-frame delay
- Significant reduction in complexity:
 - No variance classes
 - Reduction in encoding time: 33% - 6%
 - Reduction in decoding time: 9% - 6%
- Significant reduction in code size (~10 000 -> ~1000)
- BD-rate results:
 - LC configurations: between -1.6% and -4.0%
 - HE configurations: between +0.4% and -0.2%

Parsing of ALF coefficients

```
for each LCU{
    ALFbit          // AFL on/off
    if (ALFbit){
        ALFmaskBit  // Indicate mask1 or mask2
        copyFlag     // Use previous coeffs. or transmit new coeffs.
        if (copyFlag){
            copyID     // Choose between previous ALF coefficients
            copy ALF coefficients from previous ALF block
        }
        else{
            parse and decode ALF coefficients
        }
    }
}
```

Two pixel masks

Mask 1

0		1		2
	3	4	5	
6	7	8	7	6
	5	4	3	
2		1		0

Mask 2

				0				
1	2	3	4	5	4	3	2	1
				0				

Quantization of ALF coefficients

QP-dependent quantizer fidelity

- Transmit coefficients $C_0 - C_{N-2}$
- Derive coefficient C_{N-1} as

$$C_{N-1} = 1 - 2*(C_0 + C_1 + \dots + C_{N-2})$$

BD-rate results

	HE				LC			
Class	AI	RA	LB	LP	AI	RA	LB	LP
Class A	0.6	1.1			-2.4	-3.4		
Class B	0.1	0.3	0.1	-0.1	-1.6	-2.6	-2.7	-5.9
Class C	0.0	0.1	-0.1	-0.2	-1.3	-2.0	-2.8	-3.0
Class D	0.1	0.0	0.0	-0.2	-0.5	-2.2	-1.6	-1.0
Class E	0.4		-0.1	-0.5	-2.2		-1.8	-6.1
Average	0.2	0.4	0.0	-0.2	-1.6	-2.5	-2.3	-4.0

Simulation times

	HE				LC			
Class	AI	RA	LB	LP	AI	RA	LB	LP
Encoder	67%	91%	94%	90%	106%	102%	101%	101%
Decoder	91%	92%	94%	94%	114%	113%	111%	113%

Conclusion

- LCU-based ALF enabling sub-frame delay
- Significant complexity reduction and simplification
- BD-rate results
 - LC configurations: -4.0% – -1.6%
 - HE configurations: -0.2% – +0.4%
- Proposal: Adoption in HM & WD
 Both HE and LC configurations