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JVCVC-G065
Improved Weighted Prediction

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- Weighted prediction was adopted at the July meeting
- Same process as in H.264/AVC
- Explicit weighted prediction for bi-prediction

$$WP(x, y)$$
$$= (w_0 P_0(x, y) + w_1 P_1(x, y) + (1 << w\_shift)) >> (w\_shift + 1)) + ((o_0 + o_1 + 1) >> 1$$
$$= \left\lfloor \frac{w_0 P_0(x, y) + w_1 P_1(x, y) + 2^{w\_shift}}{2^{w\_shift+1}} \right\rfloor + \left\lfloor \frac{o_0 + o_1 + 1}{2} \right\rfloor$$
$$\approx \left\lfloor \frac{w_0 P_0(x, y) + w_1 P_1(x, y) + 2^{w\_shift} + (o_0 + o_1) \cdot 2^{w\_shift} + 2^{w\_shift}}{2^{w\_shift+1}} \right\rfloor$$
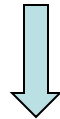
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- ## Proposed change

$$WP(x, y) = \left\lfloor \frac{w_0 P_0(x, y) + w_1 P_1(x, y) + (o_0 + o_1) \cdot 2^{w\_shift} + 2^{w\_shift}}{2^{w\_shift+1}} \right\rfloor$$

$$= (w_0 P_0(x, y) + w_1 P_1(x, y) + ((o_0 + o_1 + 1) << w\_shift)) >> (w\_shift + 1)$$

- ## WD change

$predPart_C[\,x, y\,] = (\,(\,predPartL0_C[\,x, y\,] * w_0 + predPartL1_C[\,x, y\,] * w_1 + (1 << wshift\,)\,)$
$>> (\,wshift + 1\,)\,) + (\,(\,o_0 + o_1 + 1\,) >> 1\,)$

$predPart_C[\,x, y\,] = (\,predPartL0_C[\,x, y\,] * w_0 + predPartL1_C[\,x, y\,] * w_1 + (\,(\,o_0 + o_1 + 1) << wshift\,)\,)$
$>> (\,wshift + 1\,)$

- ## No effect on higher than 8-bit video signal

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BD-Rate Performance for Black Fade Sequences

	Random Access HE 8-bit			Random Access LC		
	Y	U	V	Y	U	V
Class A	-0.1%	-0.7%	-1.5%	-0.1%	-0.8%	-1.8%
Class B	-0.3%	-1.4%	-0.5%	-0.4%	-1.6%	-1.0%
Class C	-0.2%	-0.9%	-0.4%	-0.4%	-1.2%	-0.7%
Class D	-0.3%	-1.1%	-1.4%	-0.2%	-1.9%	-2.0%
Class E						
Overall	-0.2%	-1.0%	-0.9%	-0.3%	-1.4%	-1.3%

	Low delay B HE 8-bit			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	-0.6%	-4.9%	-7.6%	-0.5%	-5.0%	-7.6%
Class C	-0.2%	-0.7%	-0.8%	-0.3%	-0.9%	-1.3%
Class D	-0.3%	-3.8%	-2.8%	-0.2%	-3.9%	-2.2%
Class E	-1.8%	-4.9%	-7.1%	-2.0%	-5.2%	-6.9%
Overall	-0.6%	-3.6%	-4.6%	-0.6%	-3.7%	-4.5%

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BD-Rate Performance for White Fade Sequences

	Random Access HE 8-bit			Random Access LC		
	Y	U	V	Y	U	V
Class A	-0.4%	-1.0%	-0.8%	-0.4%	-1.3%	-1.2%
Class B	-0.7%	-1.1%	-1.5%	-0.9%	-1.1%	-2.1%
Class C	-0.3%	-1.1%	-0.9%	-0.4%	-0.8%	-1.2%
Class D	-0.5%	-1.4%	-1.6%	-0.5%	-1.2%	-1.2%
Class E						
Overall	-0.5%	-1.2%	-1.2%	-0.6%	-1.1%	-1.5%

	Low delay B HE 8-bit			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	-0.9%	-4.5%	-8.5%	-0.9%	-5.3%	-8.5%
Class C	-0.4%	-1.0%	-1.1%	-0.3%	-0.8%	-0.8%
Class D	-0.4%	-3.6%	-3.3%	-0.3%	-3.2%	-2.1%
Class E	-2.0%	-5.8%	-6.6%	-1.7%	-5.2%	-6.8%
Overall	-0.9%	-3.7%	-5.0%	-0.8%	-3.6%	-4.6%

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- Simple modification to fixed-point precision for weighted prediction in bi-prediction

  - 2 lines of code change

- For low-delay B, 0.6-0.9% rate reduction for luma, and 3.6-5% rate reduction for chroma

- For random access, 0.2-0.6% rate reduction for luma, and 0.9-1.5% for chroma

- Suggest to adopt

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