[JCTVC-G419]

Inconsistency of intra LM mode between HM and WD

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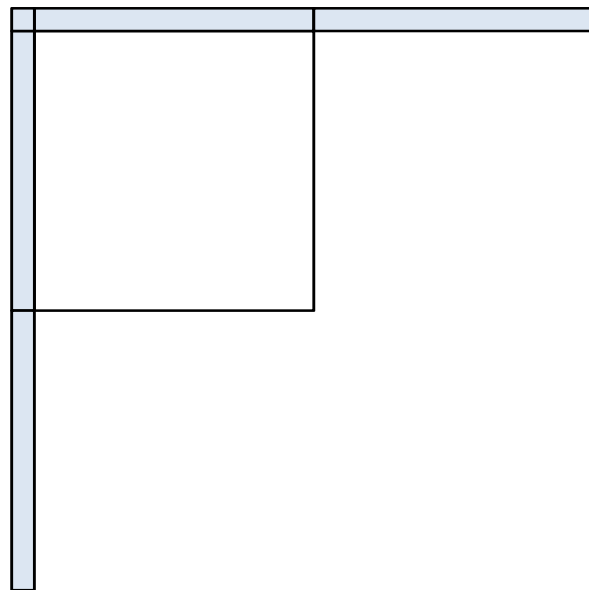# Introduction

❑ **Padding(Substitution) process & LM mode in HM4.0**
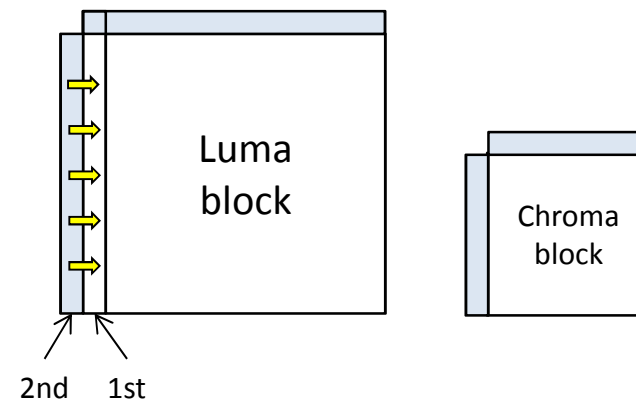
   ❖ Padding process

      ➢ Reference samples(1 line) are padded for intra prediction

   ❖ LM mode

      ➢ 1st left column is replaced by 2nd left column in the padding process

Reference sample substitution

Luma block

Chroma block

2nd   1st

LM mode

Revised WD text

❑ WD 4.0

❖ Top: $p_Y'[x, y] = ($ recSamples$_L$ [2x-1, 2y+1] + 2*recSamples$_L$ [2x, 2y+1] + recSamples$_L$ [2x+1, 2y+1] + 2) >> 2, with x=0..nS-1, y = -1

❖ Left & Inner: $p_Y'[x, y] = ($ recSamples$_L$[2x, 2y] + recSamples$_L$[2x, 2y+1]) >> 1, with x=-1 0..nS-1, y = 0..nS-1

## ❑ Revised two parts in WD

p$_L$ **recSamples$_L$**

Luma block

❖ Padding process

➢ If intra prediction mode is equal to Intra_FromLuma and p[x, y] is luma reconstructed sample, p[x-1, y] is assigned to p[x, y] with x=-1, y=0..nS*2-1.

❖ LM mode process: split into neighboring and inner samples

➢ Top: $p_Y'[x, y] = ($ p$_L$ [2x-1, 2y+1] + 2*p$_L$ [2x, 2y+1] + p$_L$ [2x+1, 2y+1] + 2) >> 2, with x=0..nS-1, y = -1

➢ Left: $p_Y'[x, y] = ($ p$_L$ [2x+1, 2y] + p$_L$ [2x+1, 2y+1]) >> 1, with x=-1, y = 0..nS-1

➢ Inner: $p_Y'[x, y] = ($ recSamples$_L$[2x, 2y] + recSamples$_L$[2x, 2y+1]) >> 1, with x=0..nS-1, y = 0..nS-1
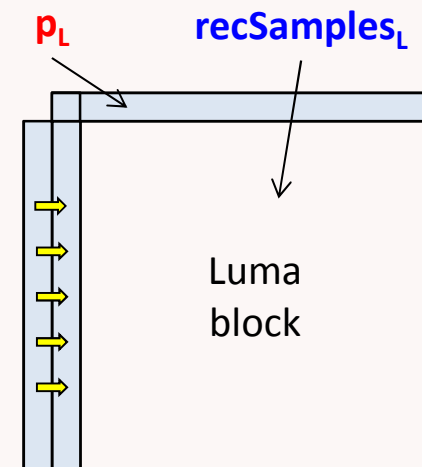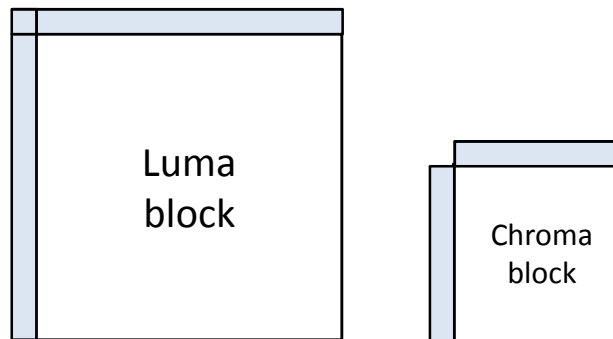
Consistency of padding process

❑ **Additional issue on consistency of padding process**

    ❖ Inconsistent design of padding process by LM mode
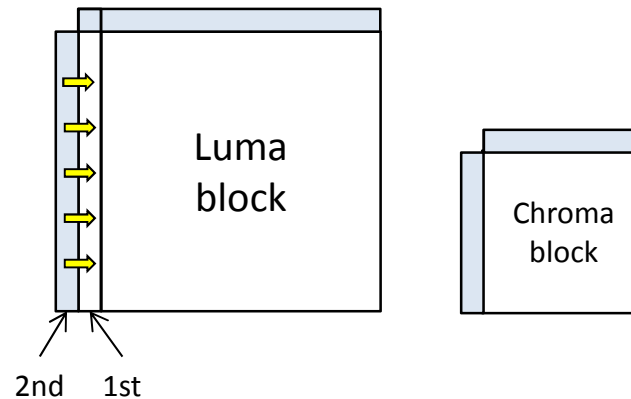
    ❖ **Proposal**: Simplified LM mode having consistency of padding process

Simulation result

❑ Simulation result

❖ Cross-checked by Samsung (JCTVC-G886) [Anchor: HM4.0rc1]

	All Intra HE (BD-rate)			All Intra LC (BD-rate)		
	Y	U	V	Y	U	V
Class A	0.1%	2.2%	1.6%	0.1%	2.2%	1.7%
Class B	0.1%	0.4%	0.2%	0.1%	0.3%	0.1%
Class C	0.2%	0.9%	1.0%	0.2%	0.5%	0.8%
Class D	0.1%	0.3%	0.3%	0.1%	0.3%	0.3%
Class E	0.0%	0.1%	0.2%	0.0%	0.1%	0.1%
Overall	**0.1%**	**0.8%**	**0.7%**	**0.1%**	**0.7%**	**0.6%**
Enc Time[%]	100%			100%		
Dec Time[%]	99%			100%		

❖ Cross-checked by Sony (JCTVC-G1037) [Anchor: HM4.0 with bugfix]

	All Intra HE (BD-rate)		
	Y	U	V
Class A	0.1%	2.3%	2.0%
Class B	0.1%	0.4%	0.2%
Class C	0.2%	0.8%	1.0%
Class D	0.1%	0.4%	0.4%
Class E	0.0%	0.2%	0.2%
Overall	**0.1%**	**0.8%**	**0.8%**
Enc Time[%]	100%		
Dec Time[%]	100%		

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Simulation result

❑ Information

❖ Coding efficiency of LM off vs. on (JCTVC-G511)

	All Intra HE (BD-rate)			All Intra LC (BD-rate)		
	Y	U	V	Y	U	V
Class A	1.2%	25.6%	15.9%	1.2%	25.5%	15.3%
Class B	0.5%	7.1%	3.8%	0.7%	7.2%	3.7%
Class C	0.9%	6.8%	7.7%	1.1%	6.5%	7.6%
Class D	0.4%	4.7%	4.7%	0.6%	4.7%	4.7%
Class E	0.1%	1.8%	2.2%	0.1%	3.1%	4.0%
Overall	**0.6%**	**9.5%**	**6.9%**	**0.7%**	**9.6%**	**7.0%**
Enc Time[%]	99%			98%		
Dec Time[%]	99%			100%		

Conclusion

❑ **Revision of WD text**

❖ Solution for inconsistency between HM and WD

❑ **Simplification of LM mode**

❖ Solution for inconsistency of padding process

❖ 0.1%(Y), 0.8%(U), 0.8%(V) loss in AI-HE

❑ **Suggest the proposal to be adopted in WD5.0**

Thank You !

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