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<JCTVC-J0202> Coefficient Scan for Transform Skip Mode

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Issue

❑ HM 7 Mode-Dependent Coefficient Scanning

- ❖ Scanning direction is roughly perpendicular to prediction direction
- ❖ *Make sense for transformed residue, but not for spatial residue*

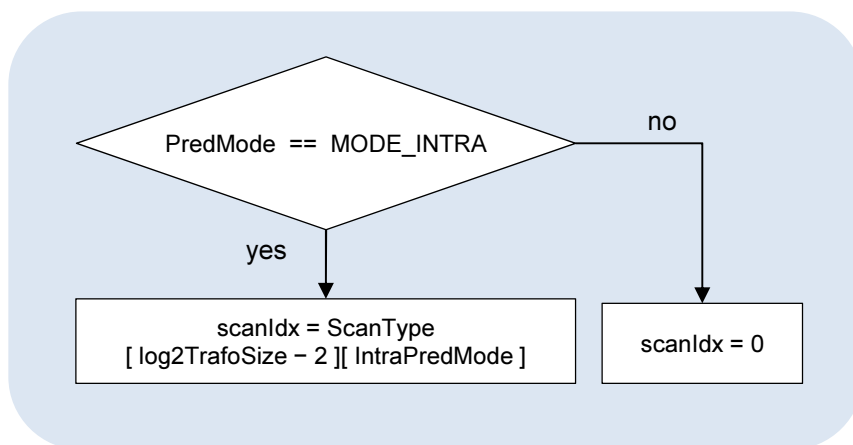
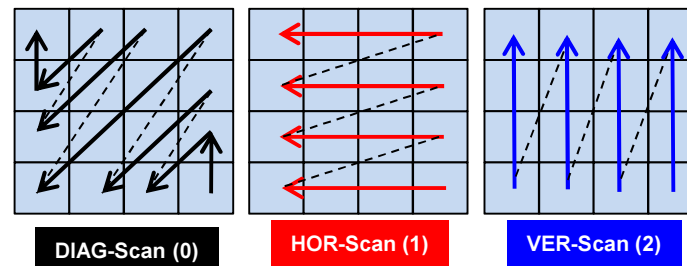
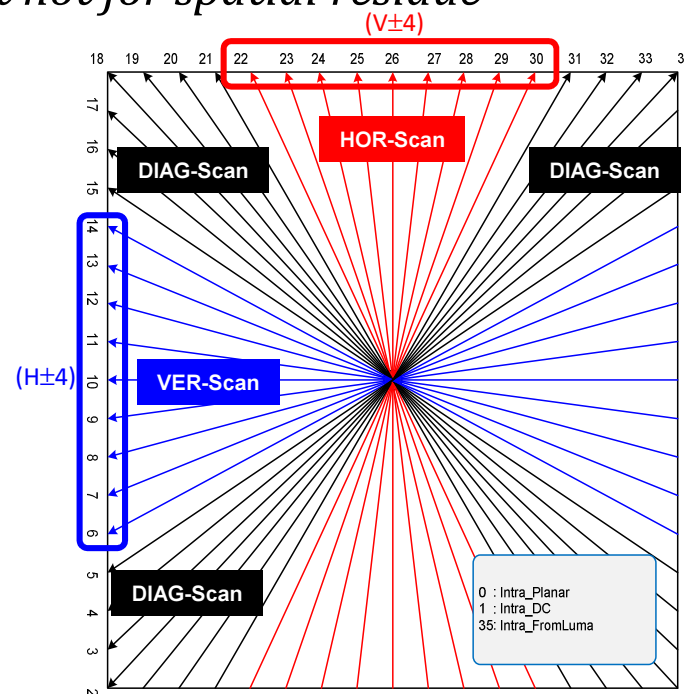


Table 7-12 – Specification of ScanType[log2TrafoSize - 2][IntraPredMode]

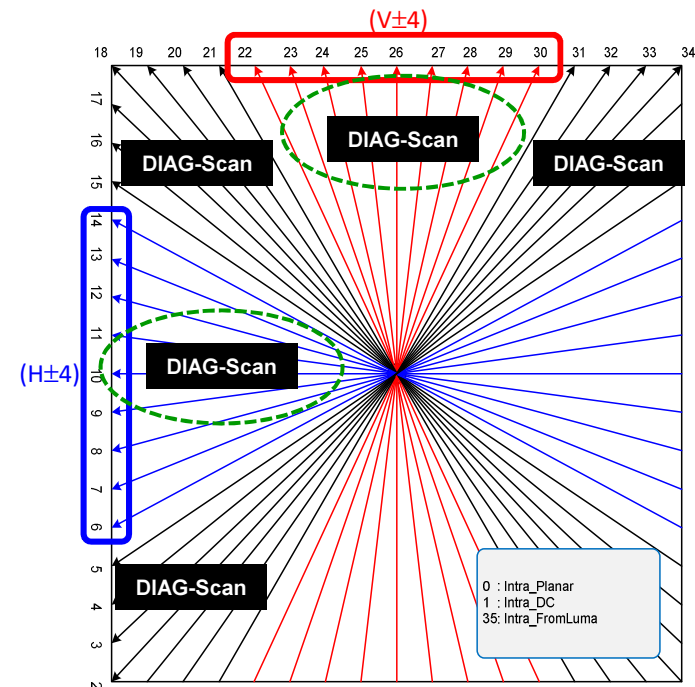
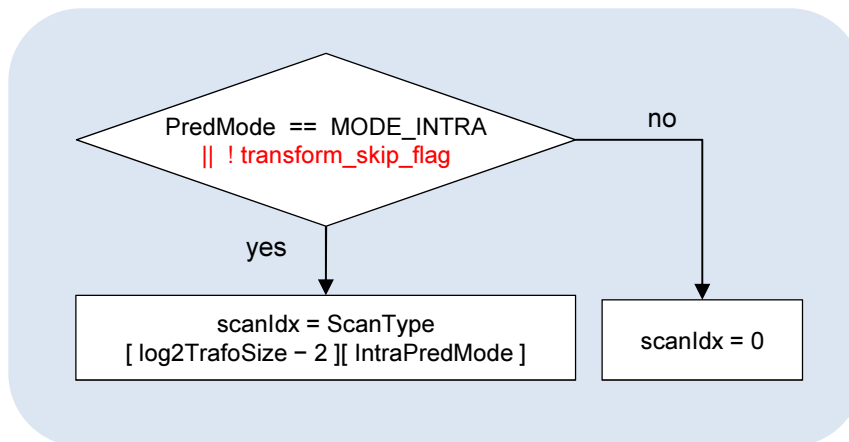
IntraPredMode	log2TrafoSize - 2			
	0	1	2	3
0	0	0	0	0
1	0	0	0	0
2 – 5	0	0	0	0
(H±4) 6 – 14	2	2	0	0
15 – 21	0	0	0	0
(V±4) 22 – 30	1	1	0	0
31 – 35	0	0	0	0



Proposal (1/2)

❑ Method 1

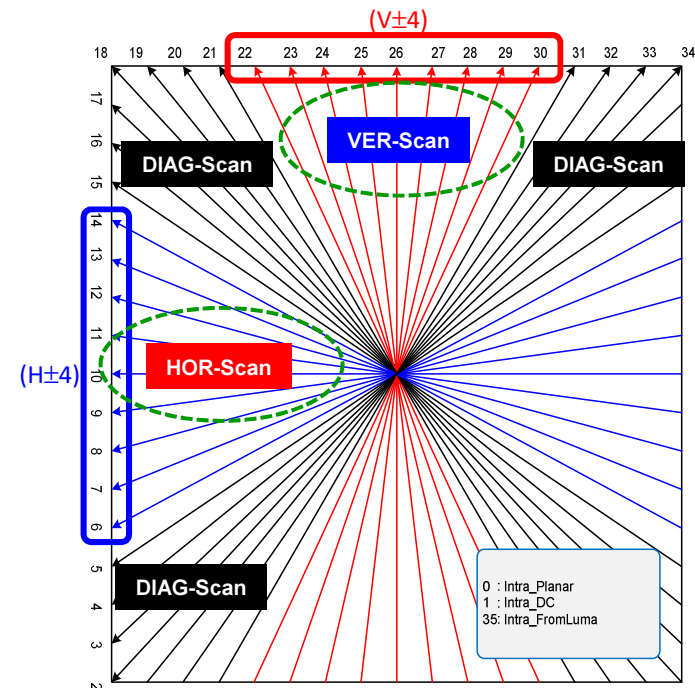
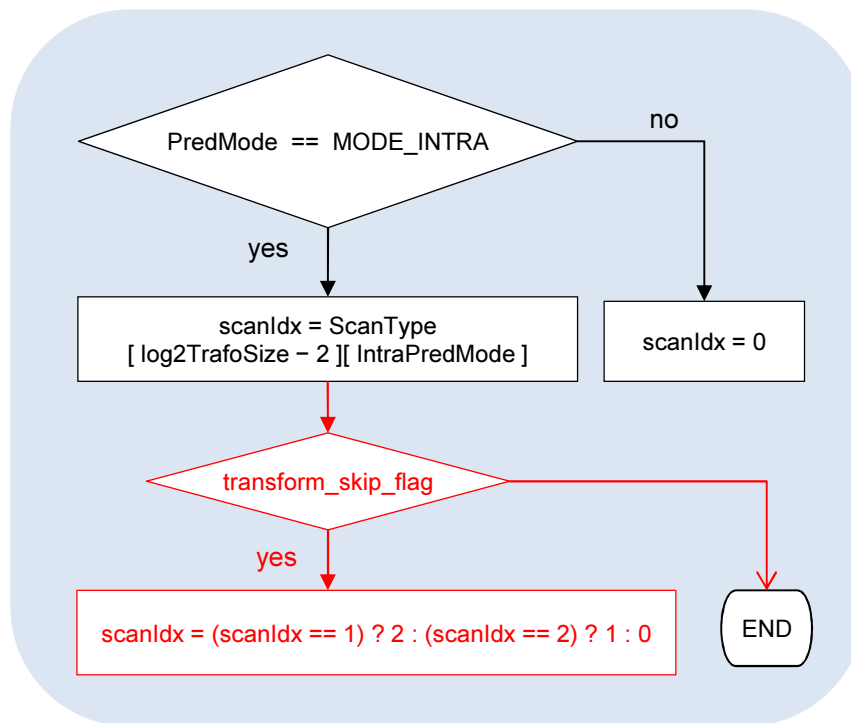
- ❖ Always use the diagonal scan (scanIdx == 0) for transform skipped residue



Proposal (2/2)

❑ Method 2

- ❖ Use the scanning direction similar to prediction direction for transform skipped residue
 - Vertical-like prediction → vertical scan
 - Horizontal-like prediction → horizontal scan



RD Results

❑ Experimental Results

❖ Results confirmed by Sharp (JCTVC-J0386)

Method 1 (DIAG)

	All Intra Main			All Intra HE10		
	Y	U	V	Y	U	V
Class A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class B	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class C	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class D	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class E	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Overall	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class F	-0.3%	-0.2%	-0.3%	-0.3%	-0.2%	-0.1%
Enc Time[%]	100%			98%		
Dec Time[%]	100%			101%		

Method 2 (VERT/HOR swap)

	All Intra Main			All Intra HE10		
	Y	U	V	Y	U	V
Class A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class B	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%
Class C	-0.1%	-0.2%	-0.1%	-0.1%	-0.1%	-0.1%
Class D	-0.1%	-0.1%	-0.2%	-0.1%	-0.1%	-0.2%
Class E	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Overall	0.0%	-0.1%	-0.1%	0.0%	-0.1%	-0.1%
	0.0%	-0.1%	-0.1%	0.0%	-0.1%	-0.1%
Class F	-0.9%	-0.9%	-1.0%	-0.9%	-0.8%	-0.8%
Enc Time[%]	101%			100%		
Dec Time[%]	100%			100%		

Conclusion

❑ scanIdx re-adjustment for transform skipped blocks

- ❖ Method 2 gives 0.9% gain in class F with just a simple index swapping
 - Needs two lines of syntax change, no change in decoding process involved.

residual_coding(x0, y0, log2TrafoWidth, log2TrafoHeight, scanIdx, cIdx) {	Descriptor
if(log2TrafoWidth == 1 log2TrafoHeight == 1) {	
log2TrafoWidth = 2	
log2TrafoHeight = 2	
}	
if(transform_skip_enabled_flag && !cu_transquant_bypass_flag && (PredMode == MODE_INTRA) && (log2TrafoWidth == 2) && (log2TrafoHeight == 2))	
transform_skip_flag [x0][y0][cIdx]	ae(v)
if(transform_skip_flag[x0][y0][cIdx])	
scanIdx = (scanIdx == 1) ? 2 : ((scanIdx == 2) ? 1 : 0)	
last_significant_coeff_x_prefix	ae(v)
last_significant_coeff_y_prefix	ae(v)
if(last_significant_coeff_x_prefix > 3)	
last_significant_coeff_x_suffix	ae(v)
if(last_significant_coeff_y_prefix > 3)	
last_significant_coeff_y_suffix	ae(v)
...	
}	

- ❖ Recommend adopting the Method 2 into the DIS version of HM.



Thank You Very Much !

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