



**JCTVC-G242**

**CE6b: Intra Mode Coding with mode  
ranking and 2 or 3 MPMs**

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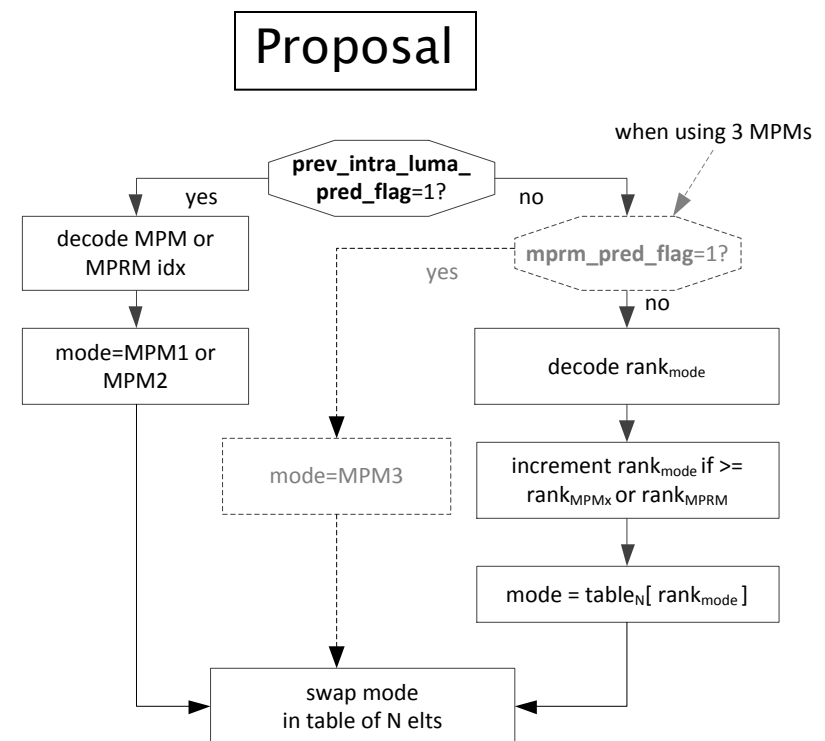
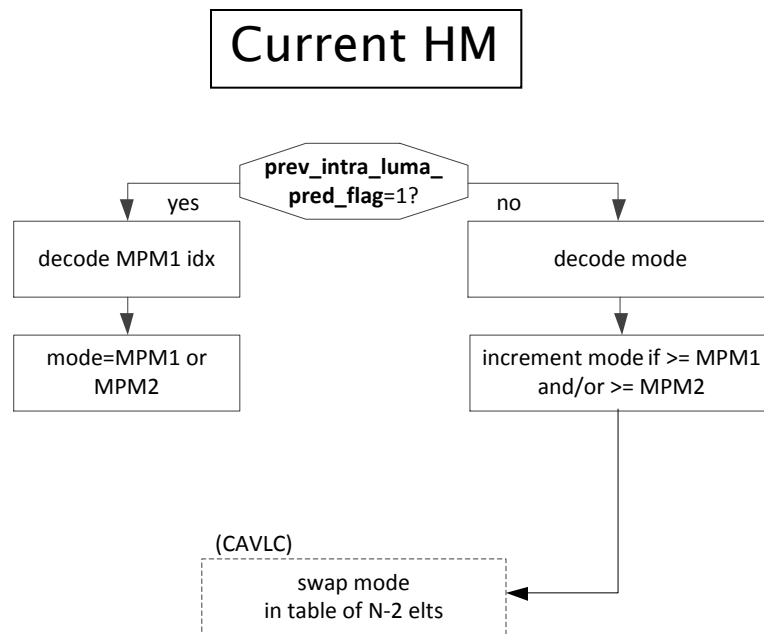
# Proposal overview

- Applies to 4x4 to 32x32 PUs
- Remaining mode coding
  - Unified use of mode ranking for CABAC and CAVLC
    - Applied to all intra modes (not to remaining mode values)
  - Unified binarization/VLC tables for CABAC/CAVLC
  - Bypass coding of all remaining modes bins in HE
- MPMs derivation – 2 cases tested
  - Use of 2 MPMs as in current HM
  - Use of 3 MPMs
- 19 modes for 4x4 PUs

# Remaining mode coding

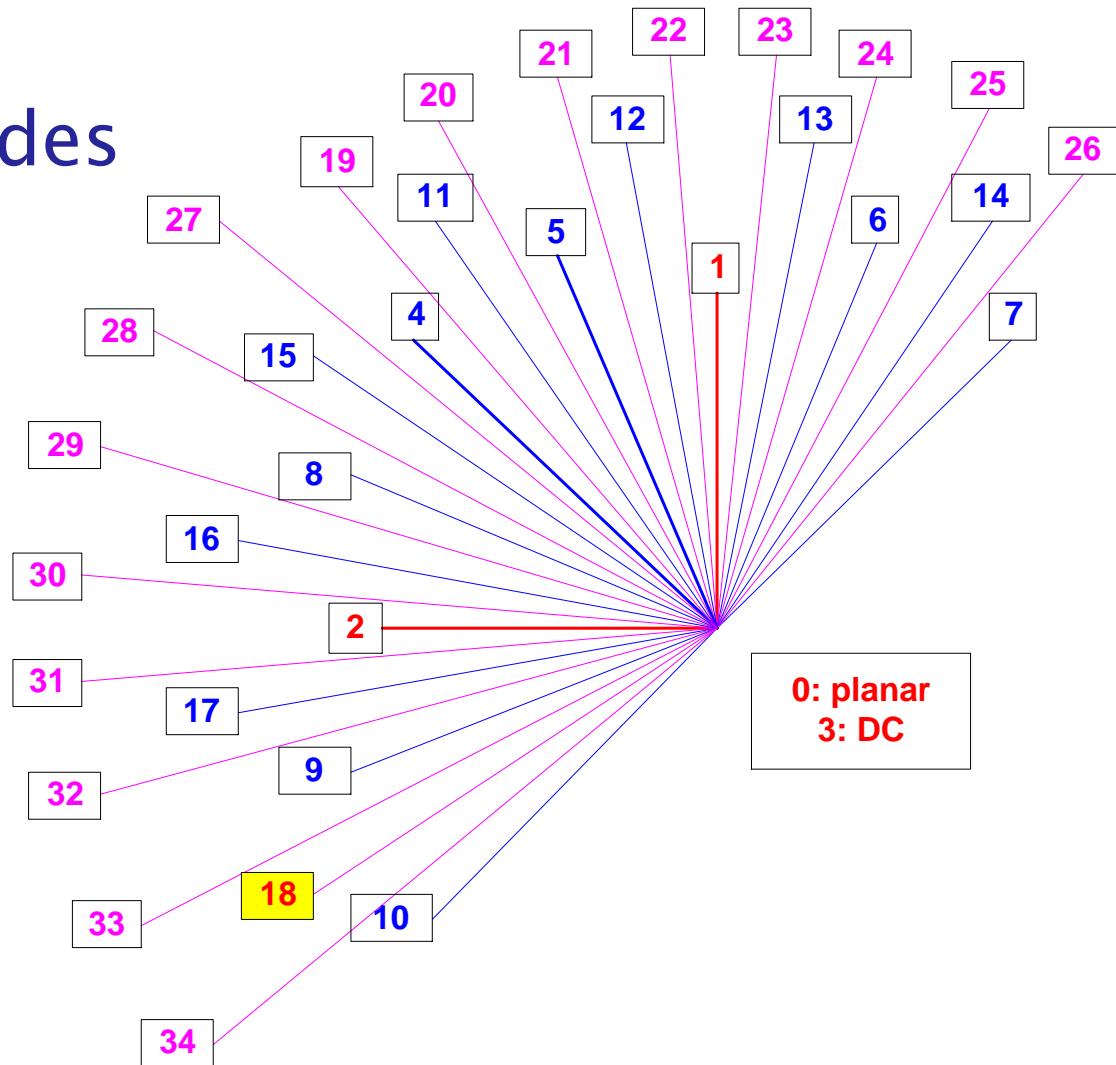
## ■ Mode ranking of all intra modes

- 2 rank tables of size 19 (4x4 PUs) and 35 (8x8 to 32x32 PUs)
- Counters used for CABAC (Renormalized once per LCU)
- Same binarization/VLC tables for CABAC/CAVLC



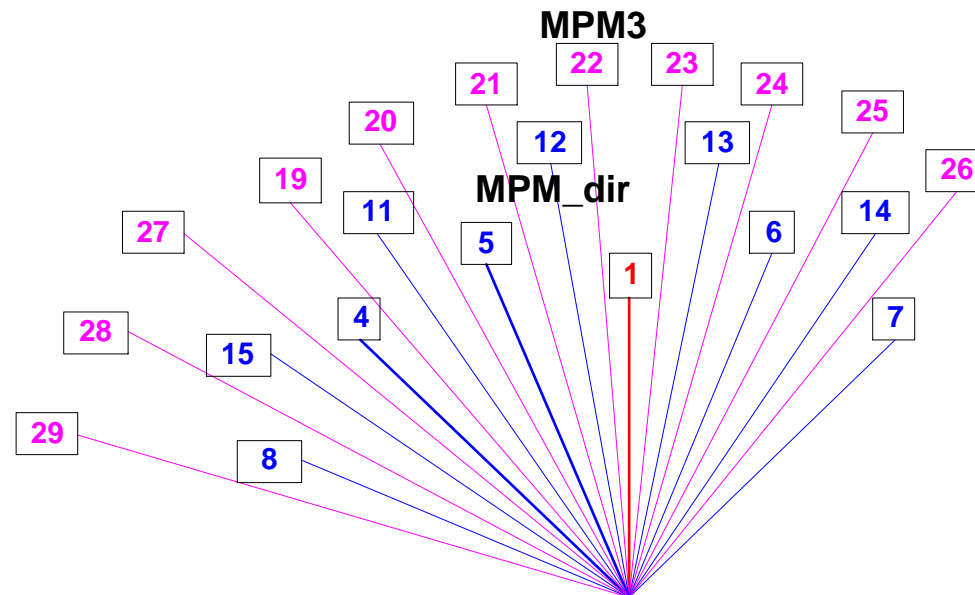
# 19 modes for 4X4 PUs

- Mode 18 added in set of 4x4 modes



# 3rd MPM derivation

- If none of MPM1 and MPM2 is Planar, MPM3 = Planar
- Else if one of MPM1 or MPM2 is DC, MPM3 = vertical mode
- Else one of the MPM1 or MPM2 mode is a directional mode denoted MPM\_dir. MPM3 is set to the mode with the nearest superior adjacent angular direction to the direction of MPM\_dir



# Results

## ■ 2 MPMs

	All Intra HE			All Intra LC		
	Y	U	V	Y	U	V
Class A	-0.31%	-0.07%	0.00%	-0.16%	-0.07%	-0.07%
Class B	-0.25%	-0.04%	-0.07%	-0.18%	-0.14%	-0.12%
Class C	-0.27%	-0.09%	-0.13%	-0.23%	-0.20%	-0.18%
Class D	-0.14%	-0.04%	-0.05%	-0.10%	-0.07%	-0.08%
Class E	-0.11%	0.00%	0.00%	-0.03%	0.01%	0.11%
<b>Overall</b>	<b>-0.22%</b>	<b>-0.05%</b>	<b>-0.05%</b>	<b>-0.15%</b>	<b>-0.10%</b>	<b>-0.08%</b>
	-0.22%	-0.05%	-0.06%	-0.15%	-0.10%	-0.09%
Enc Time[%]	101%			101%		
Dec Time[%]	100%			101%		

## ■ 3 MPMs

	All Intra HE			All Intra LC		
	Y	U	V	Y	U	V
Class A	-0.42%	-0.01%	-0.01%	-0.29%	-0.09%	-0.11%
Class B	-0.38%	-0.06%	-0.05%	-0.32%	-0.22%	-0.14%
Class C	-0.36%	-0.14%	-0.18%	-0.36%	-0.27%	-0.24%
Class D	-0.25%	-0.06%	-0.08%	-0.20%	-0.05%	-0.09%
Class E	-0.39%	0.06%	0.10%	-0.29%	0.01%	0.14%
<b>Overall</b>	<b>-0.36%</b>	<b>-0.05%</b>	<b>-0.05%</b>	<b>-0.29%</b>	<b>-0.14%</b>	<b>-0.10%</b>
	-0.36%	-0.05%	-0.06%	-0.29%	-0.14%	-0.11%
Enc Time[%]	99%			100%		
Dec Time[%]	101%			100%		

# Conclusion

## ■ Propose a modified intra mode coding

- Remaining mode coding

- Unified use of mode ranking for CABAC and CAVLC, applied to all modes
- Unified VLC and binarization tables for LC and HE configurations
- In HE, bypass coding for MPRMs and remaining modes bins

- Use of 2 or 3 MPMs

## ■ Performance

- 2 MPMs, Y BD-rate gain of 0.22% AIHE, 0.15% AILC
- 3 MPMs, Y BD-rate gain of 0.36% AIHE, 0.29% AILC
- Negligible impact on encoding/decoding run time

## ■ Both tools (mode ranking and use of a 3rd MPM) contribute complementarily to the overall gain

- 2 MPMs: more important gains for high resolution sequences
- 3 MPMs: gains more balanced