

Merge transform_tree and transform_coeff

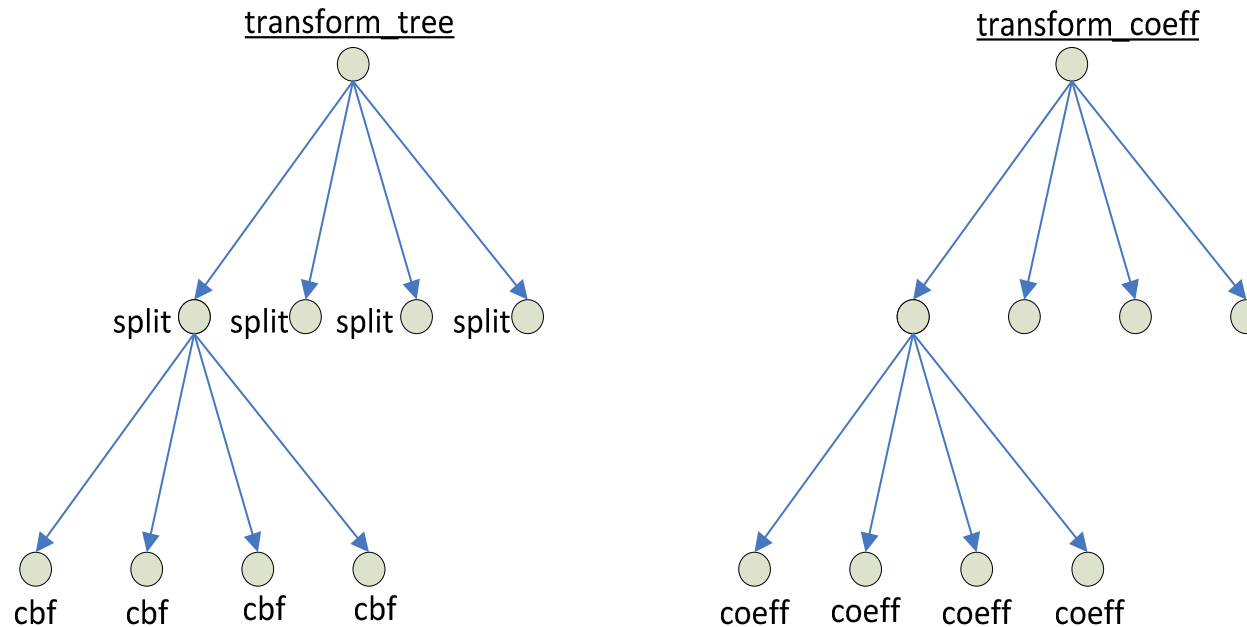
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Transform_tree and Transform_coeff

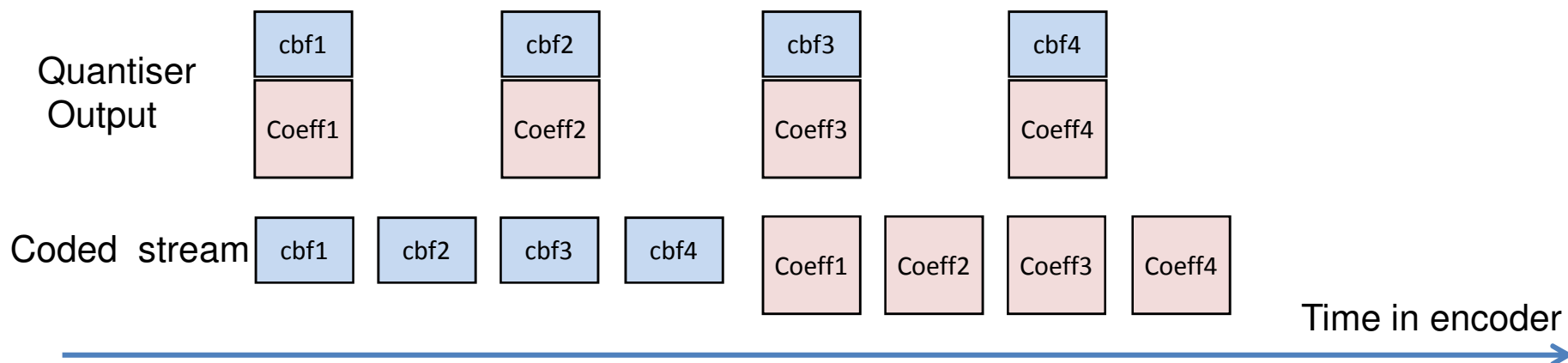
- ▶ In the current HM/WD, the transform relating syntax are separately coded in transform_tree and transform_coeff
- ▶ But their structure is equivalent !



Problem

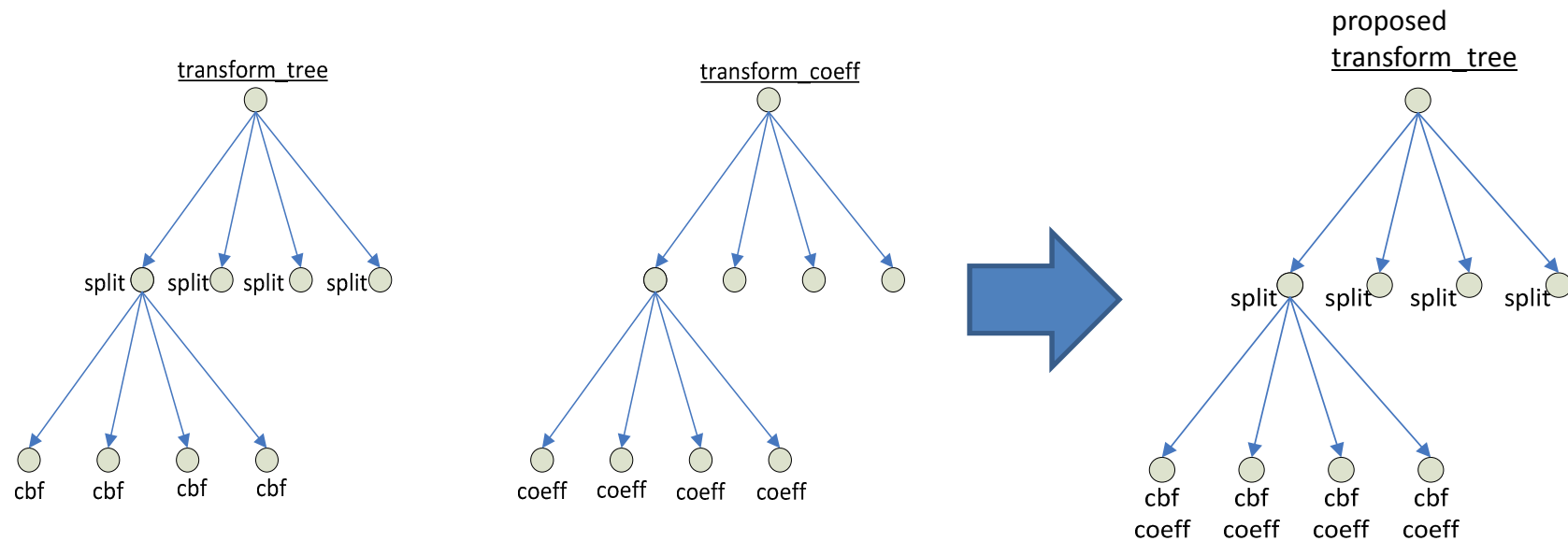
- ▶ Redundant operation by duplicated traversing
- ▶ Decoder has to hold all cbf/split_flag until 2nd tree
- ▶ Encoder has to hold all coefficient until 2nd tree
 - Cbf can be obtained after coefficient derived.
 - But all cbf are required to be coded before all coefficients.

Example: 4 TUs in CU. Note: worst case is 16 TUs in CU



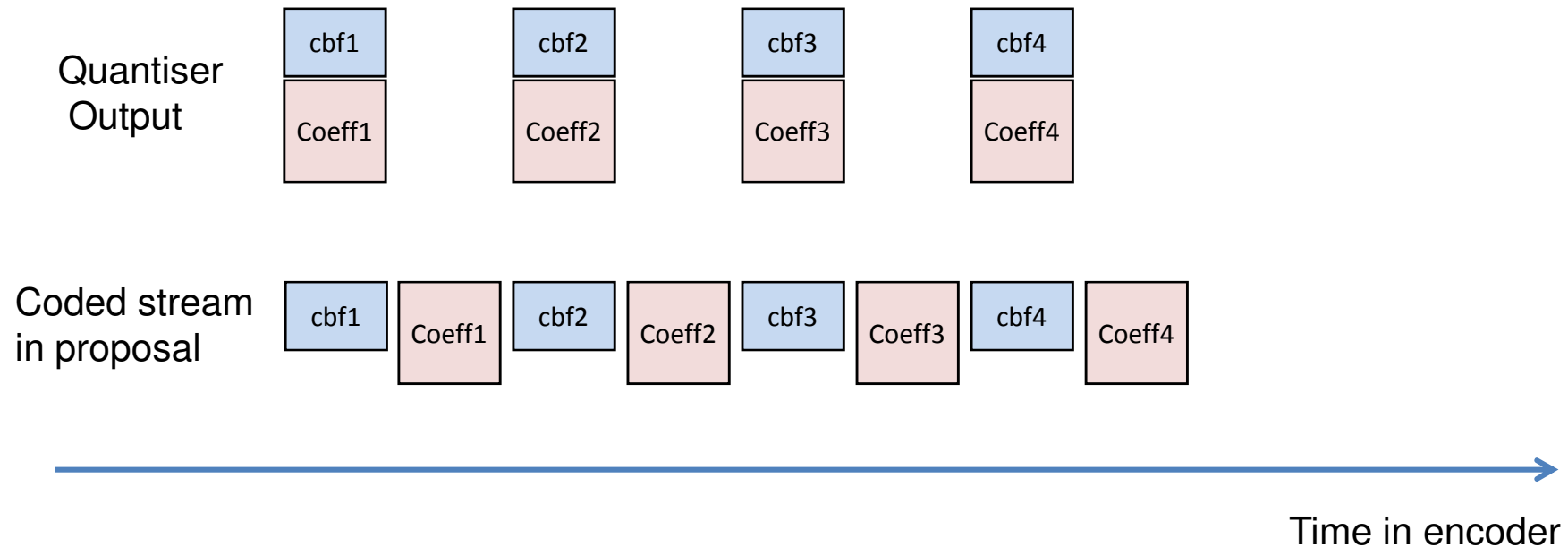
Solution

- ▶ Proposal is to merge two trees into one
 - Move transform coefficient into leaf node of transform_tree
 - No change for tree structure
 - No effect for cbf, split_transform_flag and dQP



Reduction of buffer requirement by proposal

Example: 4 TUs in CU. Note: worst case is 16 TUs in CU



Experimental Results

- ▶ No change of coding performance (in range 0.001%)
- ▶ No change of runtime (in cluster noise)

	AI-HE	AI-LC	RA-HE	RA-LC	LB-HE	LB-LC	RA-HE10
Class A	0.000 %	0.000 %	0.000 %	0.000 %			0.000 %
Class B	0.000 %	0.000 %	0.000 %	0.000 %	0.000 %	-0.001 %	0.000 %
Class C	0.000 %	0.000 %	0.000 %	0.000 %	-0.001 %	0.000 %	
Class D	0.000 %	0.001 %	0.000 %	0.000 %	0.000 %	0.000 %	
Class E	0.000 %	0.000 %			0.000 %	-0.001%	
Overall	0.000 %	0.000 %	0.000 %	0.000 %	0.000 %	0.000 %	0.000 %
	0.000 %	0.000 %	0.000 %	0.000 %	0.000 %	0.000 %	0.000 %
Class F	0.000 %	0.000 %	0.000 %	0.000 %	0.000 %	0.000 %	0.000 %
Enc Time[%]	99%	100%	100%	100%	100%	100%	100%
Dec Time[%]	100%	99%	100%	100%	100%	100%	100%

Thank to Samsung for cross check (H123)

Conclusion

- ▶ In HM/WD, the transform related syntax elements are separately coded in two trees whose structure is equivalent.
- ▶ Proposed to merge transform_tree and transform_coeff
 - No impact for result. No effect for the syntax elements.
 - Twice traversing can be reduced to once.
- ▶ Recommend the proposal be adopted in WD/HM