

AHG7: Sample-based angular intra prediction for HEVC lossless coding

JCTVC-K0199

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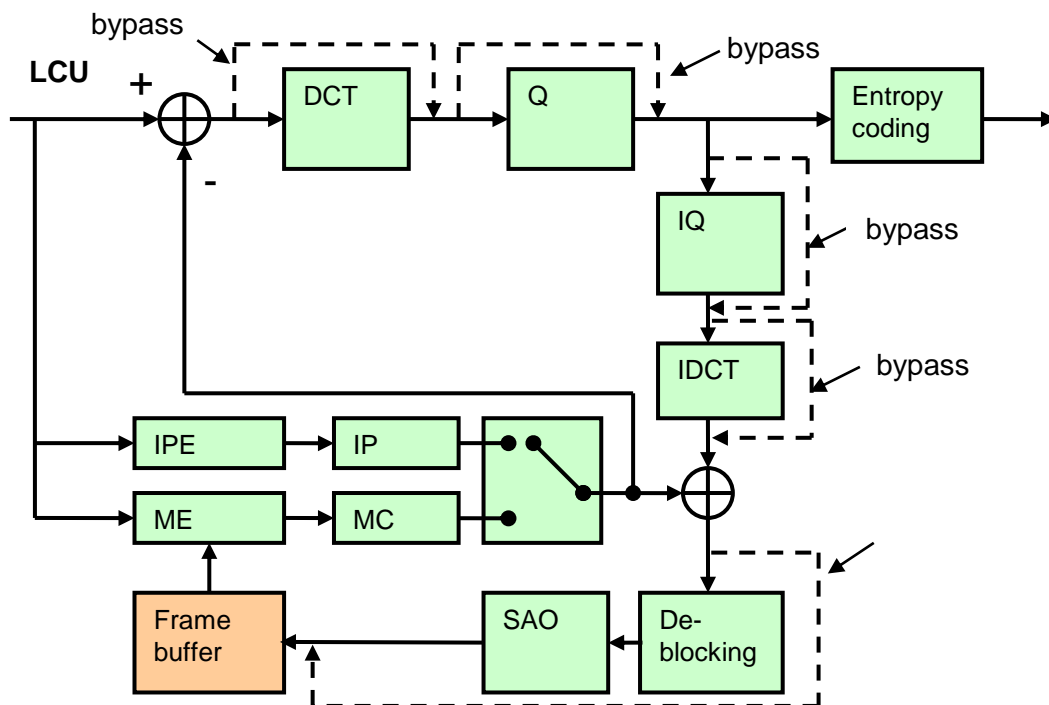
(Texas Instruments Inc., USA)

What is SAP?

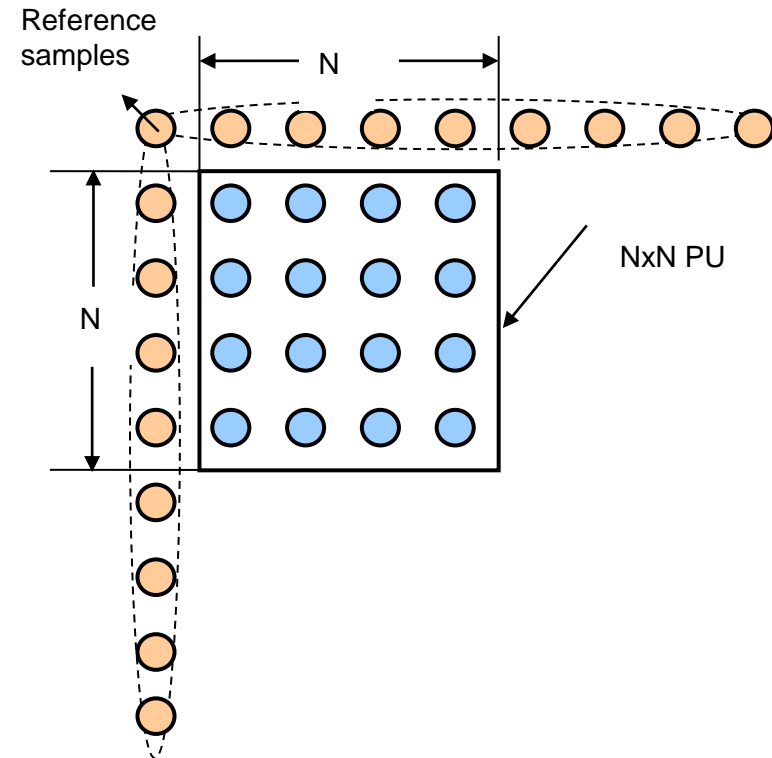
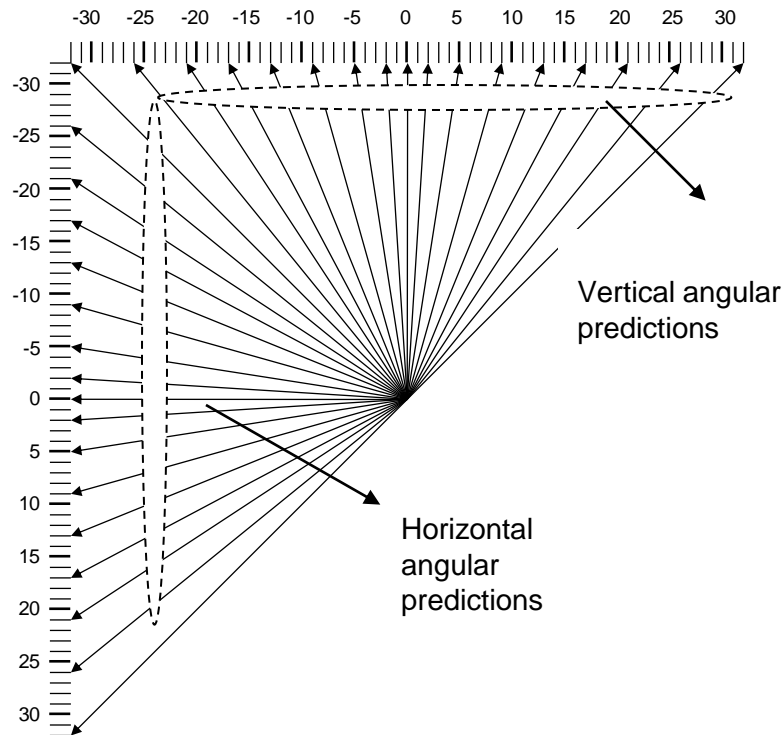
1. SAP = sample-based angular intra prediction for lossless coding
 - **Proposed SAP is exactly the same tool as proposed in JCTVC-G093 , JCTVC-H083 and in JCTVC-I0117**
 - SAP is integrated into HM8.0 and **can be switched on/off at CU level**
2. Compared to HM8.0 block-based angular intra prediction
 - No changes in syntax and semantics
 - Same definition and signaling of prediction angles
 - Same processing for reference samples from neighboring PUs
 - All the samples inside a PU share the same prediction angle
 - Same linear interpolation method for generating prediction samples
 - **However, in SAP the reference samples for a sample to be predicted are from its adjacent neighbors and prediction has to follow pre-defined orders**

Diagram of HM8.0 lossless coding mode

HM8.0 lossless mode: bypass transform and quantization, and disable de-blocking filter, SAO

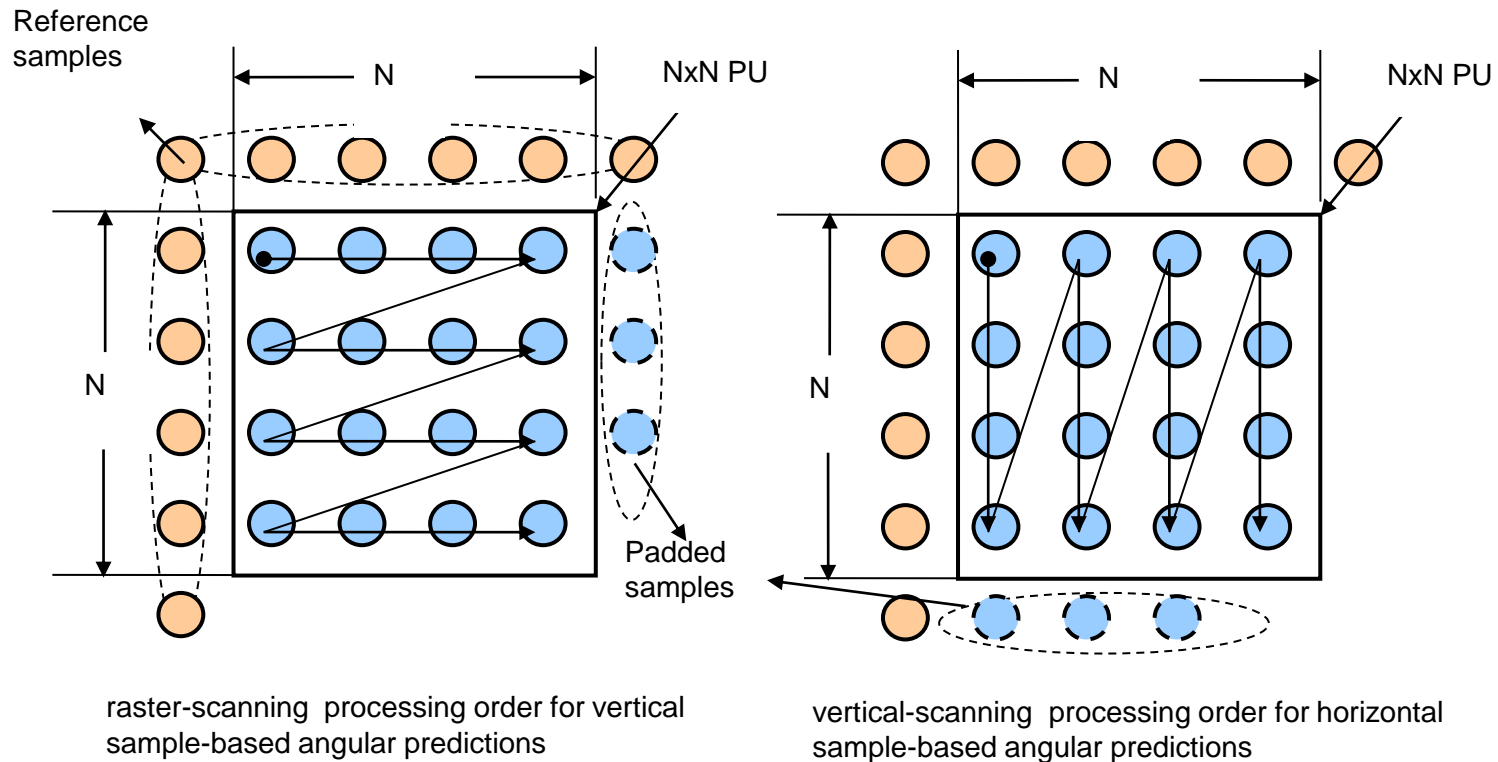


HM8.0 block-based angular intra prediction



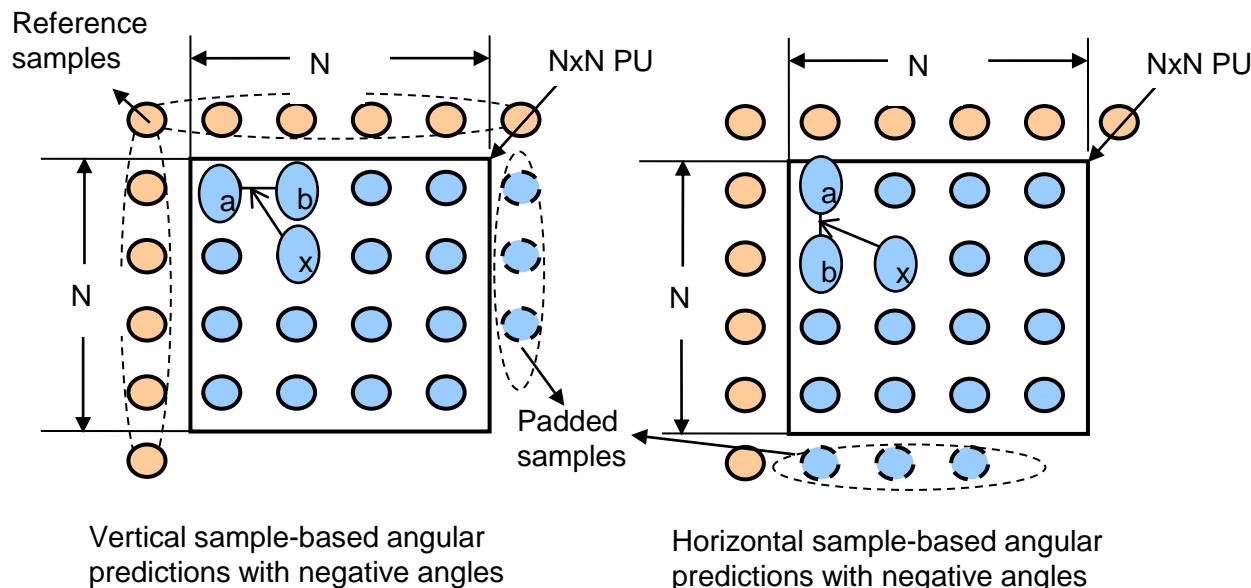
In lossless mode, not only the reference samples from neighboring PUs, but also the neighboring samples inside the current PU are available for prediction

Processing order of SAP

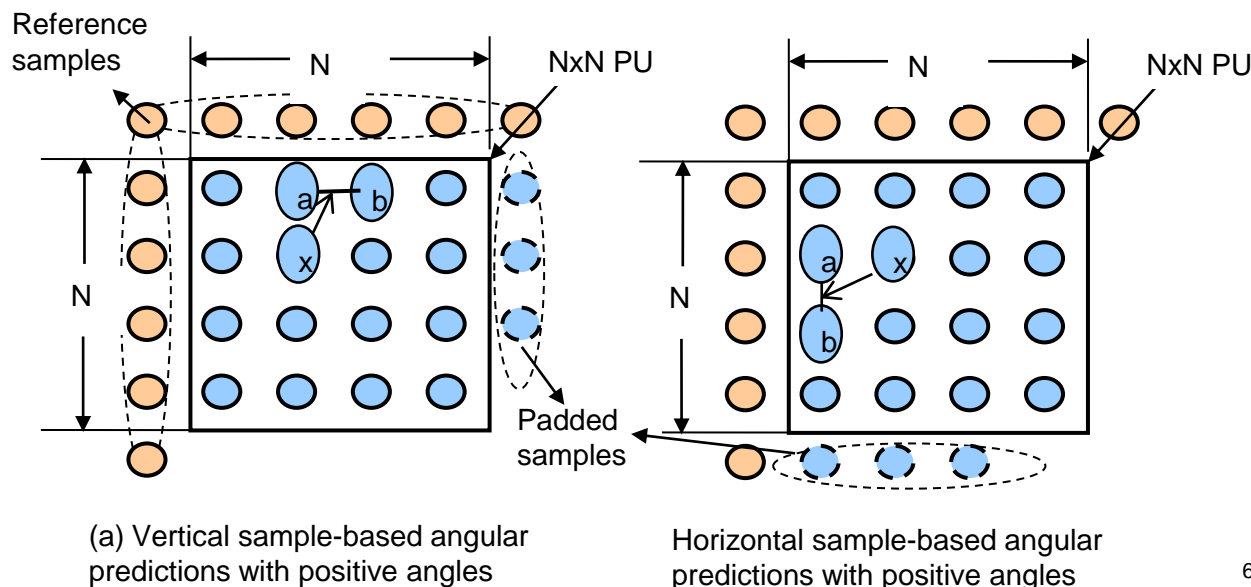


Reference sample selections in SAP

1. For each sample to be predicted (x), two direct neighboring samples (a, b) are selected based on prediction angle



2. After the reference samples are determined, the same bilinear interpolation is used for generating prediction sample



Experimental Results

- In proposed algorithm the block-based angular prediction is replaced with SAP in CUs of lossless mode (relative to HM8.0 lossless mode)

	AI-Main (%)	RA-Main (%)	LB-Main (%)	LP-Main (%)	AI-HE10 (%)	RA -HE10 (%)	LB-HE10 (%)	LP-HE10 (%)
Overall (w/o class F)	-7.7	-1.8	-1.5	-1.9	-11.9	-2.9	-2.3	-2.5
Class F only	-12.1	-6.9	-5.5	-5.5	-20.7	-12.8	-9.6	-9.6

(SEQUENCE_LEVEL_LOSSLESS off)

Additional experimental Results

- In proposed algorithm the block-based angular prediction is replaced with SAP in CUs of lossless mode (relative to HM8.0 lossless mode)

	AI-Main (%)	RA-Main (%)	LB-Main (%)	LP-Main (%)	AI-HE10 (%)	RA -HE10 (%)	LB-HE10 (%)	LP-HE10 (%)
Overall (w/o class F)	-7.0	-1.8	-1.5	-1.8	-6.9	-2.1	-2.2	-2.3
Class F only	-11.6	-6.8	-5.4	-5.5	-13.8	-9.0	-7.7	-7.7

(SEQUENCE_LEVEL_LOSSLESS on)

Conclusions

1. The proposed SAP significantly improves the HEVC lossless coding efficiency
2. Recommend to adopt the proposed method into HEVC version 2 spec

Many thanks to NEC for cross-check (JCTVC-K0179)