

JCTVC-G1028

Non-CE4: Rate control friendly spatial QP prediction

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Overview

In CE4 Subtest 1.3: Spatial QP Prediction for QP coding, G067 (test 1.3.c) showed the best performance: 0.5% BDR, 10% dQP bits

Problems

1. Friendliness to rate control
2. Complexity

Solution

Two conceptual modifications introduced into G067

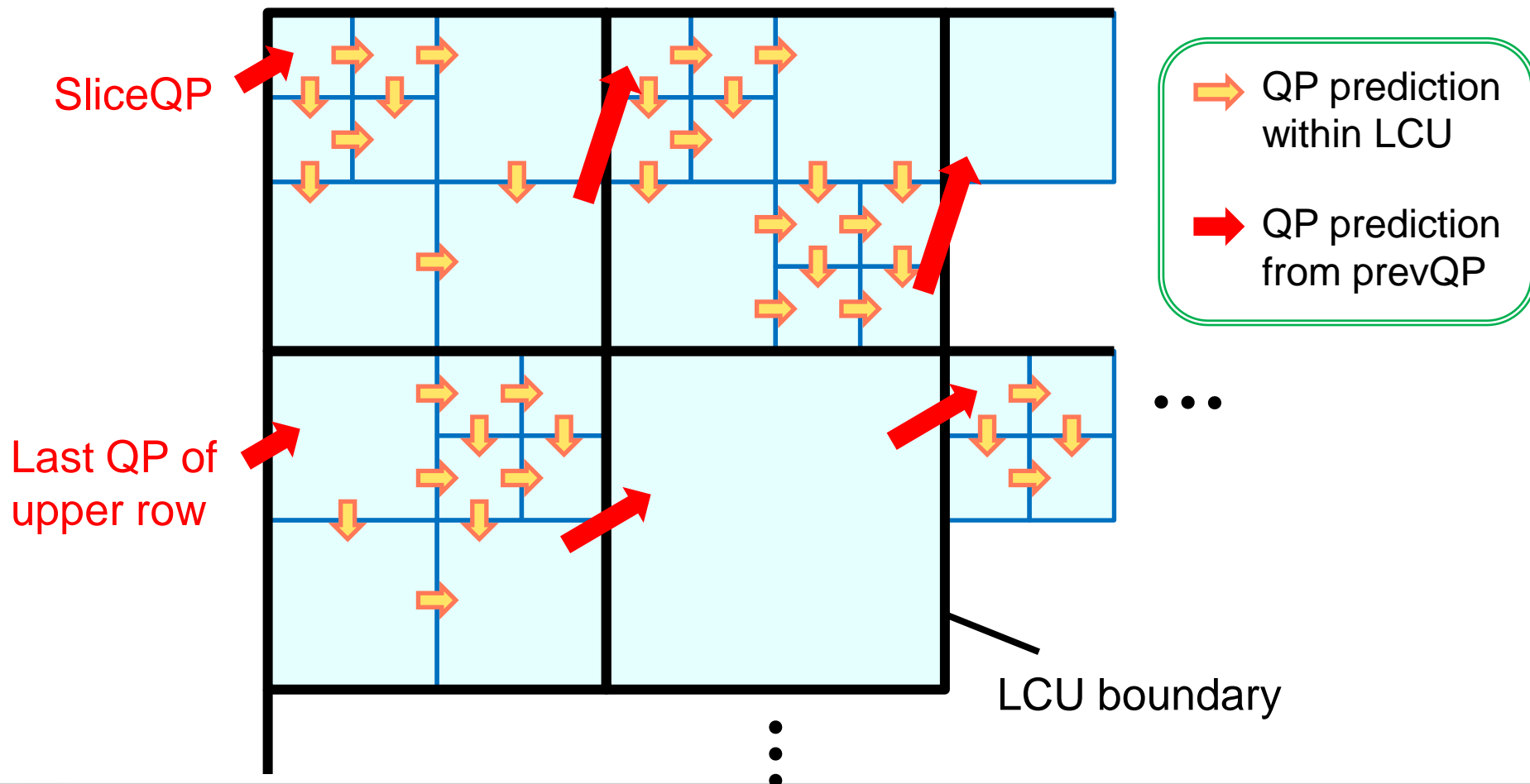
1. Prohibits QP reference across LCU boundary -> solves the problem 1.
2. Removes prediction mode dependent QP prediction -> alleviates the problem 2.

A harmonization of contributions on QP coding during 2 meeting cycles

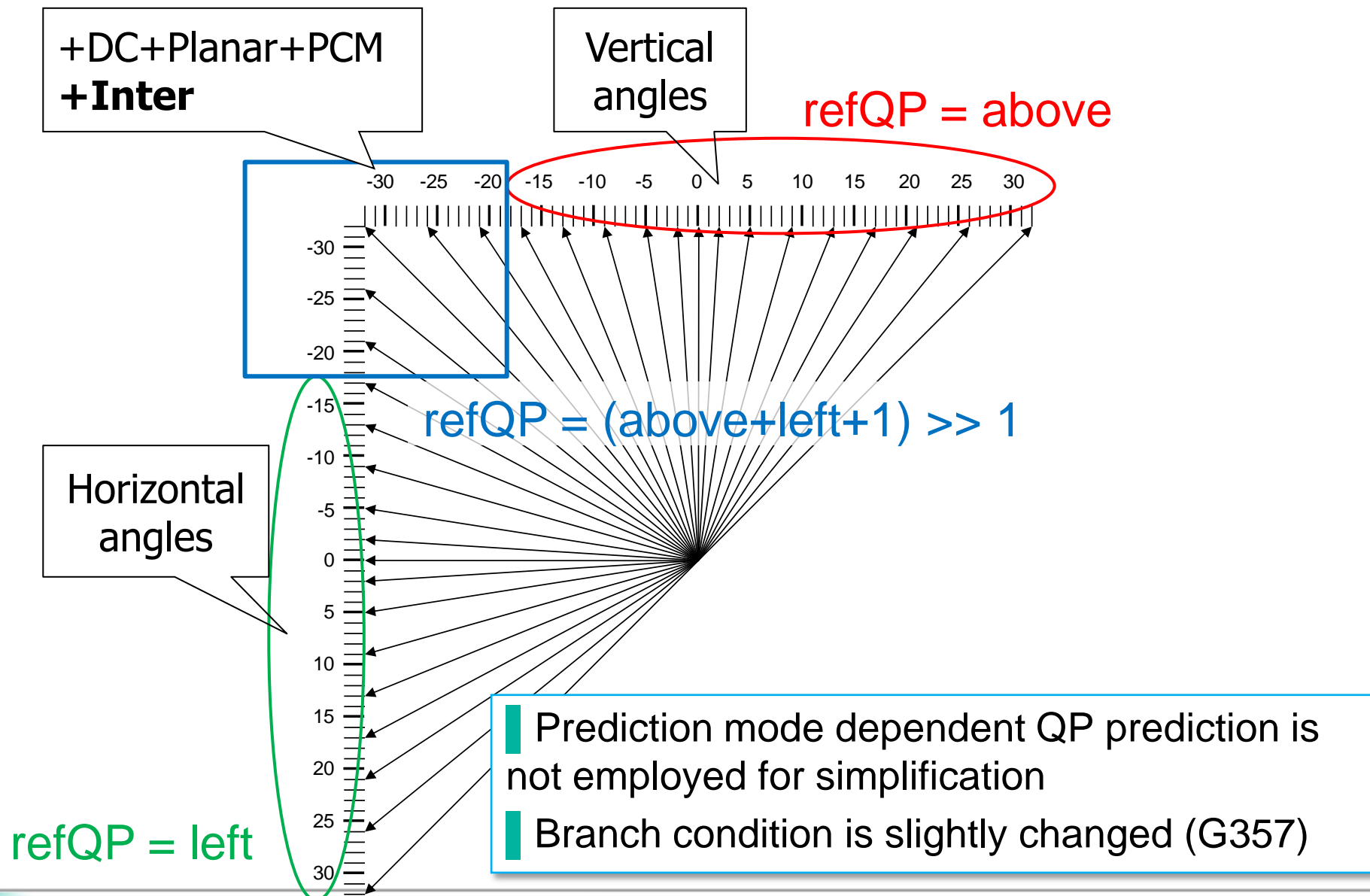
- No new techniques are introduced here

Prohibition of QP prediction across LCU boundary

- The concept is originally employed in E391/F332 (test 2.3.c of the former CE4)
- At the top left CU within each LCU, previous QP is used as the predicted QP
- LCU-level adaptability to QP change for the rate control purpose is guaranteed



QP prediction based on intra prediction



Experimental results (against HM4)

	All Intra HE				All Intra LC			
	Y	U	V	dQP incr.	Y	U	V	dQP incr.
Class A	-0.1%	-0.1%	-0.1%	-2.7%	-0.1%	-0.1%	-0.1%	-2.2%
Class B	-0.2%	-0.2%	-0.2%	-4.8%	-0.2%	-0.2%	-0.2%	-5.0%
Class C	-0.3%	-0.4%	-0.3%	-8.0%	-0.4%	-0.4%	-0.4%	-8.8%
Class D	-0.3%	-0.3%	-0.3%	-7.8%	-0.4%	-0.4%	-0.4%	-8.9%
Class E	-0.4%	-0.4%	-0.4%	-7.8%	-0.4%	-0.4%	-0.4%	-8.1%
Overall	-0.3%	-0.3%	-0.3%	-6.1%	-0.3%	-0.3%	-0.3%	-6.4%

	Random Access HE				Random Access LC			
	Y	U	V	dQP incr.	Y	U	V	dQP incr.
Class A	-0.1%	0.2%	0.1%	-2.1%	-0.1%	-0.1%	-0.1%	-1.7%
Class B	-0.2%	-0.1%	0.0%	-4.2%	-0.2%	-0.2%	-0.2%	-4.0%
Class C	-0.3%	-0.3%	-0.5%	-6.6%	-0.4%	-0.4%	-0.4%	-7.4%
Class D	-0.2%	-0.2%	-0.2%	-6.3%	-0.4%	-0.4%	-0.3%	-6.8%
Class E								
Overall	-0.2%	-0.1%	-0.1%	-4.8%	-0.3%	-0.2%	-0.2%	-4.9%

	Low delay B HE				Low delay B LC			
	Y	U	V	dQP incr.	Y	U	V	dQP incr.
Class A								
Class B	-0.2%	-0.1%	-0.1%	-3.8%	-0.2%	-0.2%	-0.4%	-3.5%
Class C	-0.3%	-0.3%	-0.1%	-5.7%	-0.4%	-0.4%	-0.3%	-6.5%
Class D	-0.3%	-0.8%	0.0%	-5.7%	-0.3%	-0.3%	-0.4%	-6.2%
Class E	-0.3%	0.0%	-0.2%	-4.7%	-0.3%	-0.5%	-0.5%	-4.9%
Overall	-0.3%	-0.3%	-0.1%	-4.9%	-0.3%	-0.3%	-0.4%	-5.2%

Conclusion

- A rate control friendly spatial QP prediction method was proposed
 - As a harmonization of contributions on QP coding during 2 meeting cycles
- Two conceptual modifications into JCTVC-G067 (CE4 1.3.c)
 - Prohibits QP reference across LCU boundary
 - > LCU-level adaptability to QP change for the rate control purpose is guaranteed
 - Removes prediction mode dependent QP prediction
 - > Complexity is reduced
- About 0.3% gain is achieved compared with HM4 QP prediction
- More gain (around 0.5%) is expected to be achieved, compared with AVC-style QP prediction employing previous QP only
- It is recommended that the proposed method is adopted to HM5/WD5

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