

# Sub-LCU level delta QP signaling

JCTVC-E198

Masaaki Kobayashi

Masato Shima

Canon Inc.

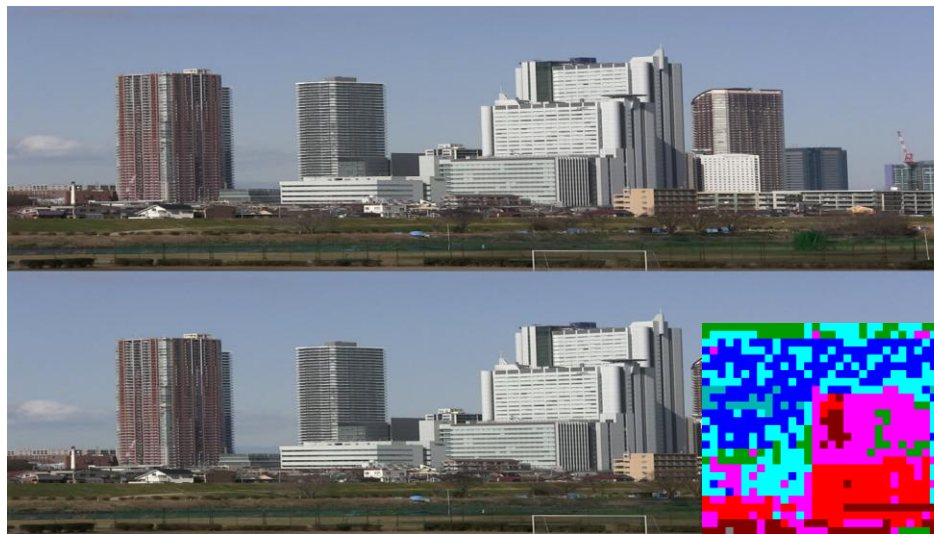
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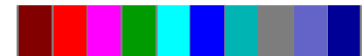
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# Introduction

AVC based product controls QP at MB(16x16) with rate control.  
However, Current HM controls QP at LCU(64x64) without rate control.

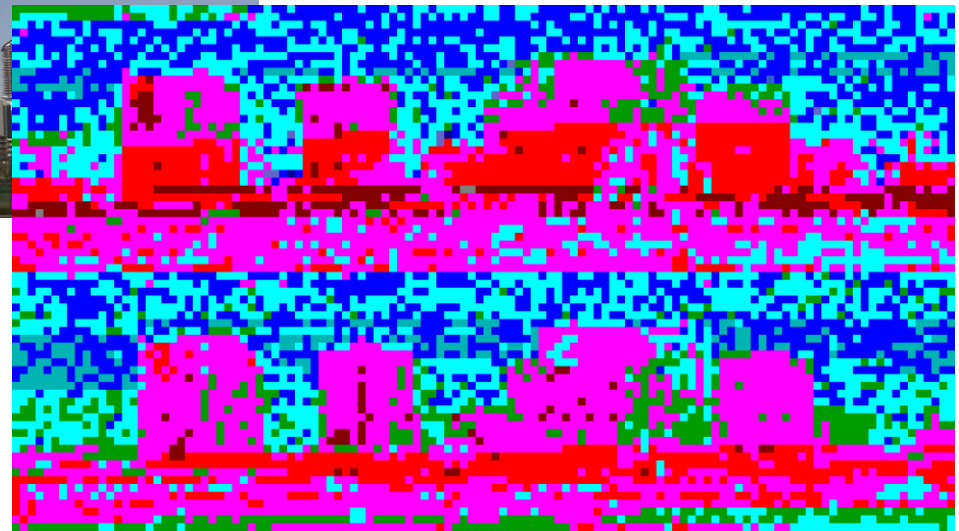


High QP



Low QP

(a)One frame of AVC video data recorded by a camcorder available in the market

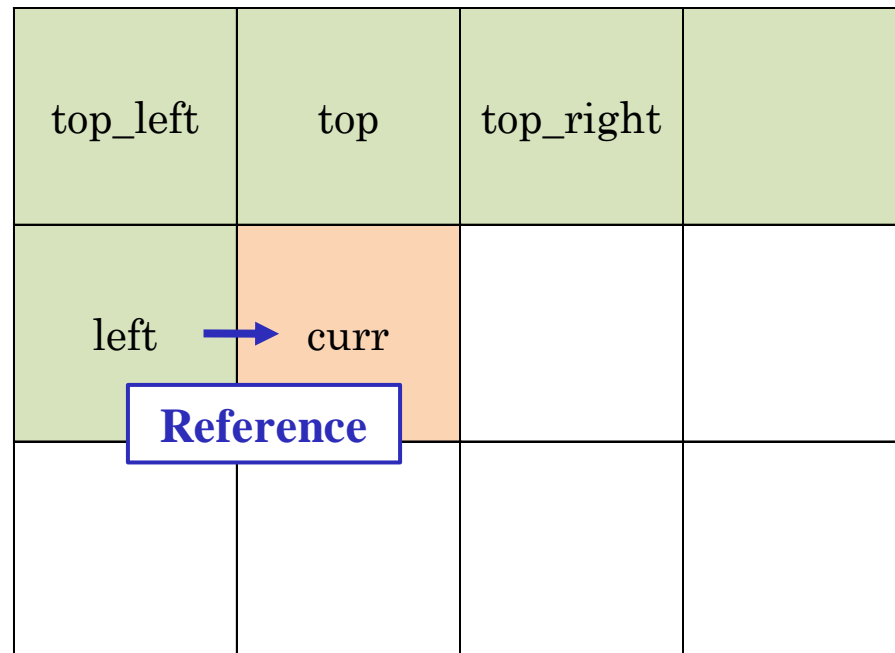


(b)QP distribution of the frame

# Method of Calculating Delta QP Already Presented

One alternative method presented in JCTVC-D038

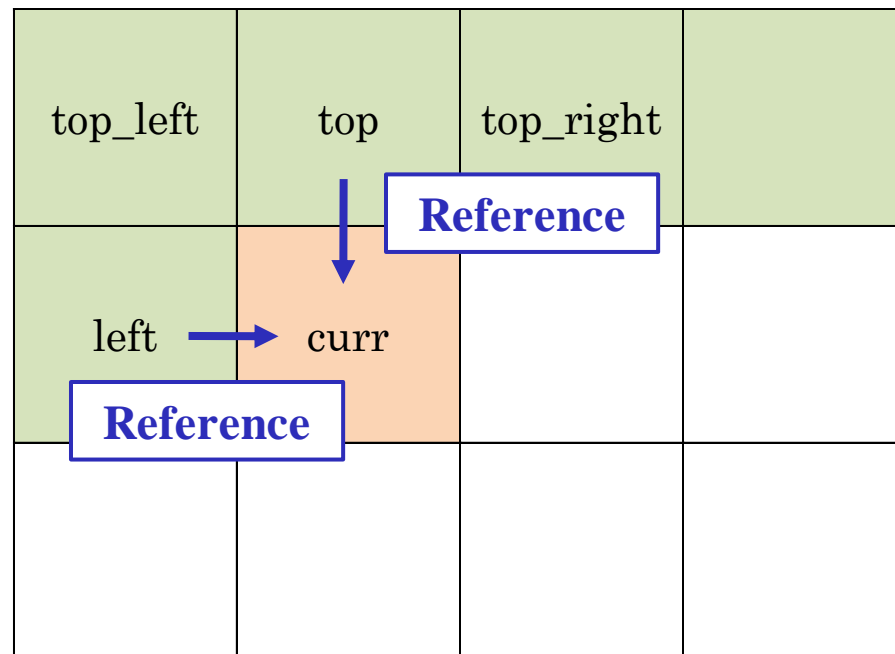
$$\text{deltaQP} = \text{currQP} - \text{leftQP}$$



However....

## Point of Discussion

It is possible to calculate deltaQP from other position of CU.  
How about predicting QP form top CU?



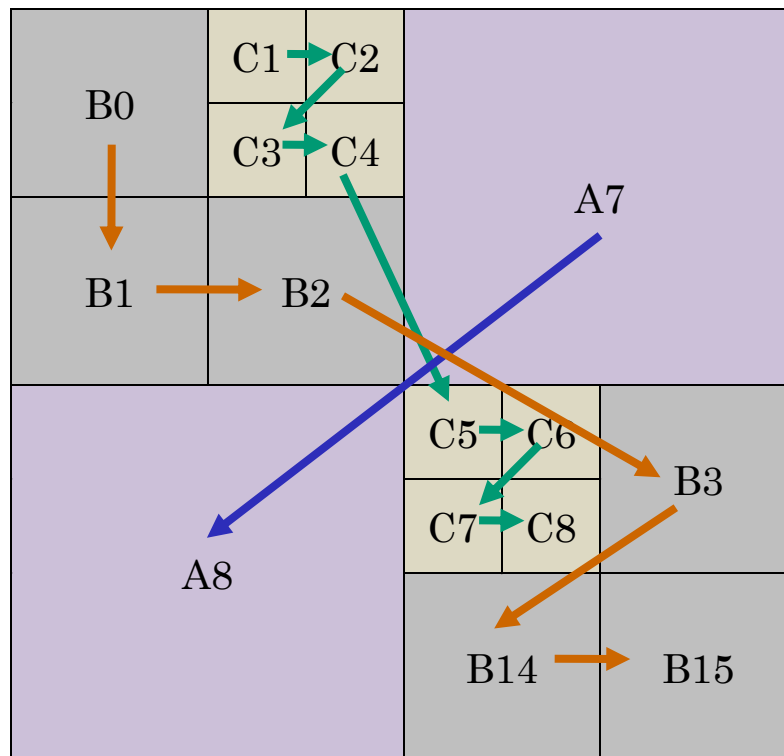
Like this, other alternative methods are conceivable.

## Alternative Methods of Calculating Delta QP(1)

$$\text{deltaQP} = \text{currQP} - \text{prevQP}$$



prevQP is QP of same size CU coded previously.



Example)

$$\text{deltaQP}(A8) = \text{QP}(A7) - \text{QP}(A8)$$

$$\text{deltaQP}(B1) = \text{QP}(B1) - \text{QP}(B0)$$

$$\text{deltaQP}(B2) = \text{QP}(B2) - \text{QP}(B1)$$

$$\text{deltaQP}(B3) = \text{QP}(B3) - \text{QP}(B2)$$

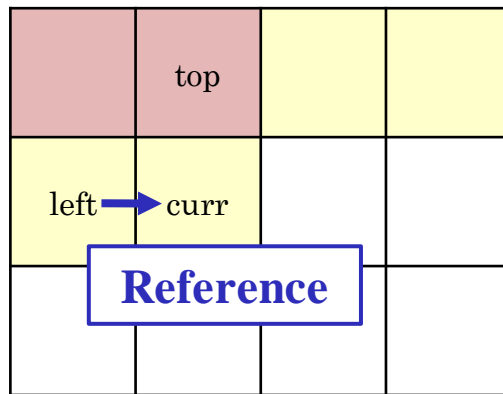
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## Alternative Methods of Calculating Delta QP(2)

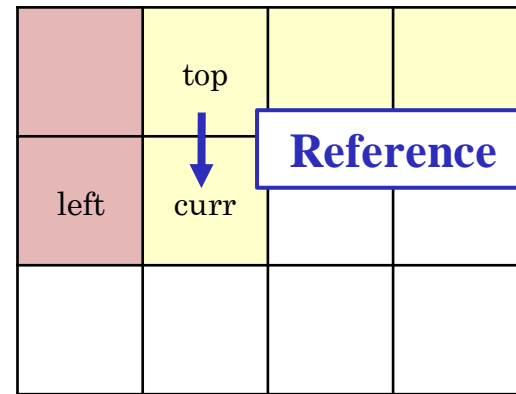
$$\text{deltaQP} = \text{currQP} - \text{predQP}$$



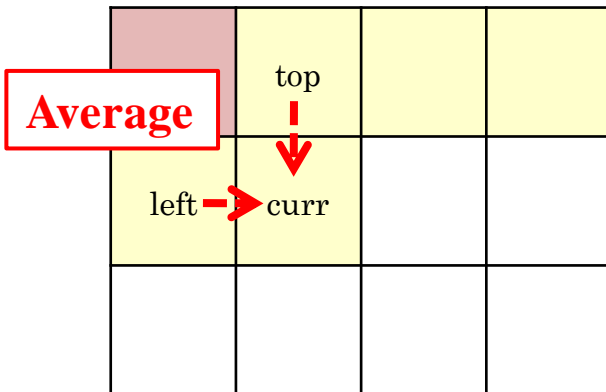
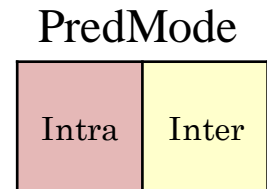
predQP is calculated from QPs of neighboring Cus.



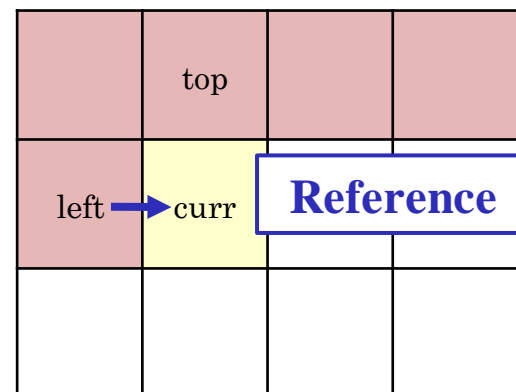
(a)



(b)



(c)



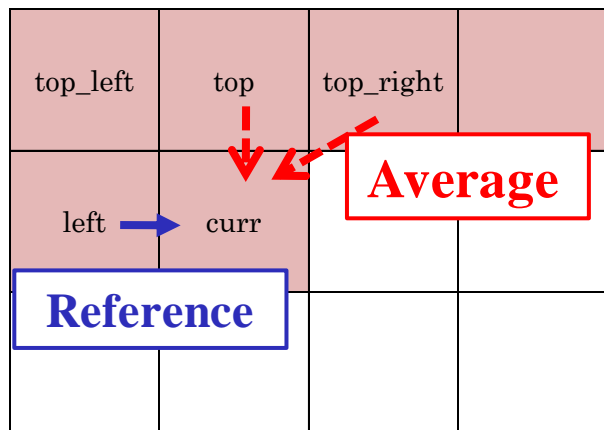
(d)

## Alternative Methods of Calculating Delta QP(3)

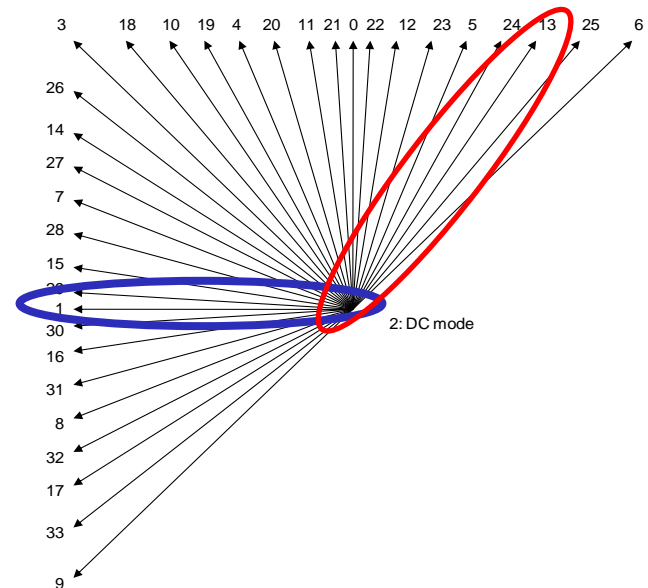
$$\text{deltaQP} = \text{currQP} - \text{predQP}$$



predQP is calculated by the direction of intra prediction.



(a) Position and Method



(b) Direction of Intra Prediction



## Conclusion

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- AVC based encoder products is controlling QP at MB(16x16)
- Current HM is controlling QP at LCU(64x64)
- Many methods to calculate deltaQP are conceivable



- HEVC should also provide sub-LCU level QP control.
- CE should be established to study methods of coding delta QP with practical rate control.