



# AhG Quantization: Sub-LCU Delta QP

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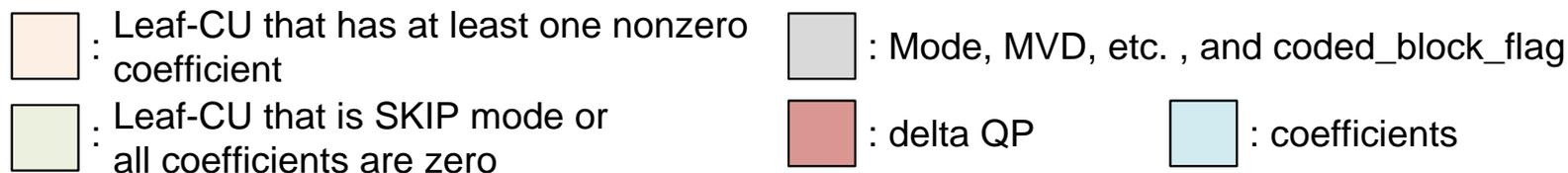
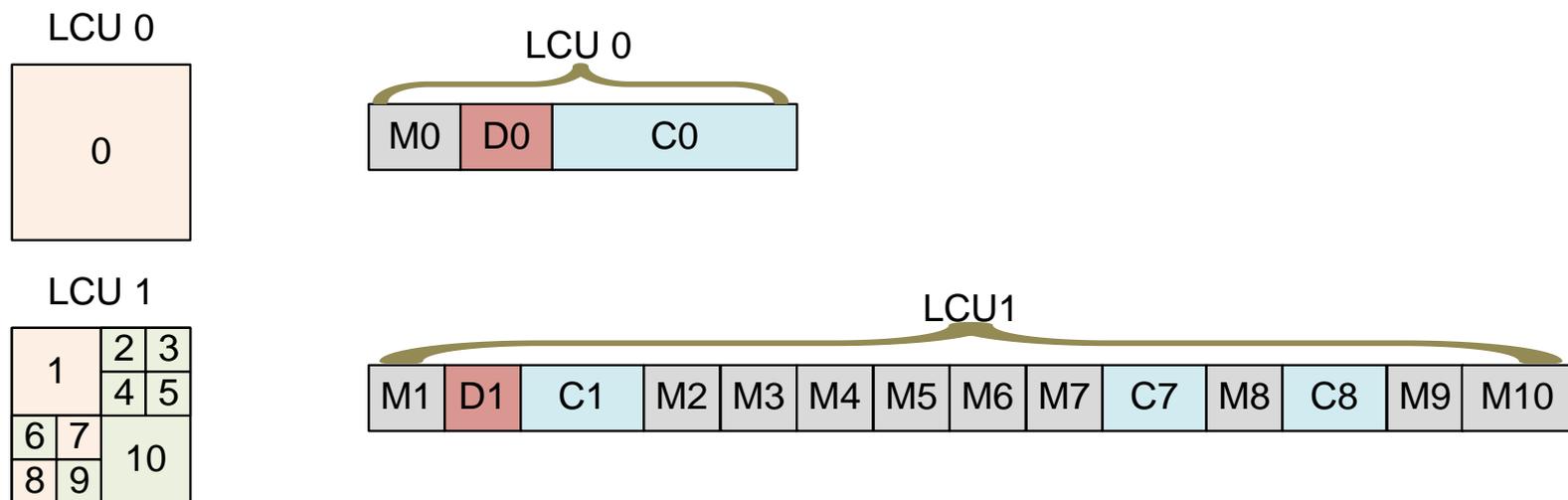


# Overall Summary

- Sub-LCU level delta quantization parameter (dQP) signaling
  - Implement sub-LCU dQP (same as TI's proposal JCTVC-D038)
    - Allow dQP signaling at blocks smaller than LCU (64x64)
  - Harmonize with the adopted Sony proposal JCTVC-D258
    - dQP is sent only when at least one nonzero coefficient exist
  
- Provide finer granularity of rate and visual quality control

# LCU-based dQP in HM2.1

- The dQP is transmitted in the first non-SKIP leaf-CU
- The granularity of dQP signaling is at LCU level



# Subjective Quality Result of LCU-based dQP

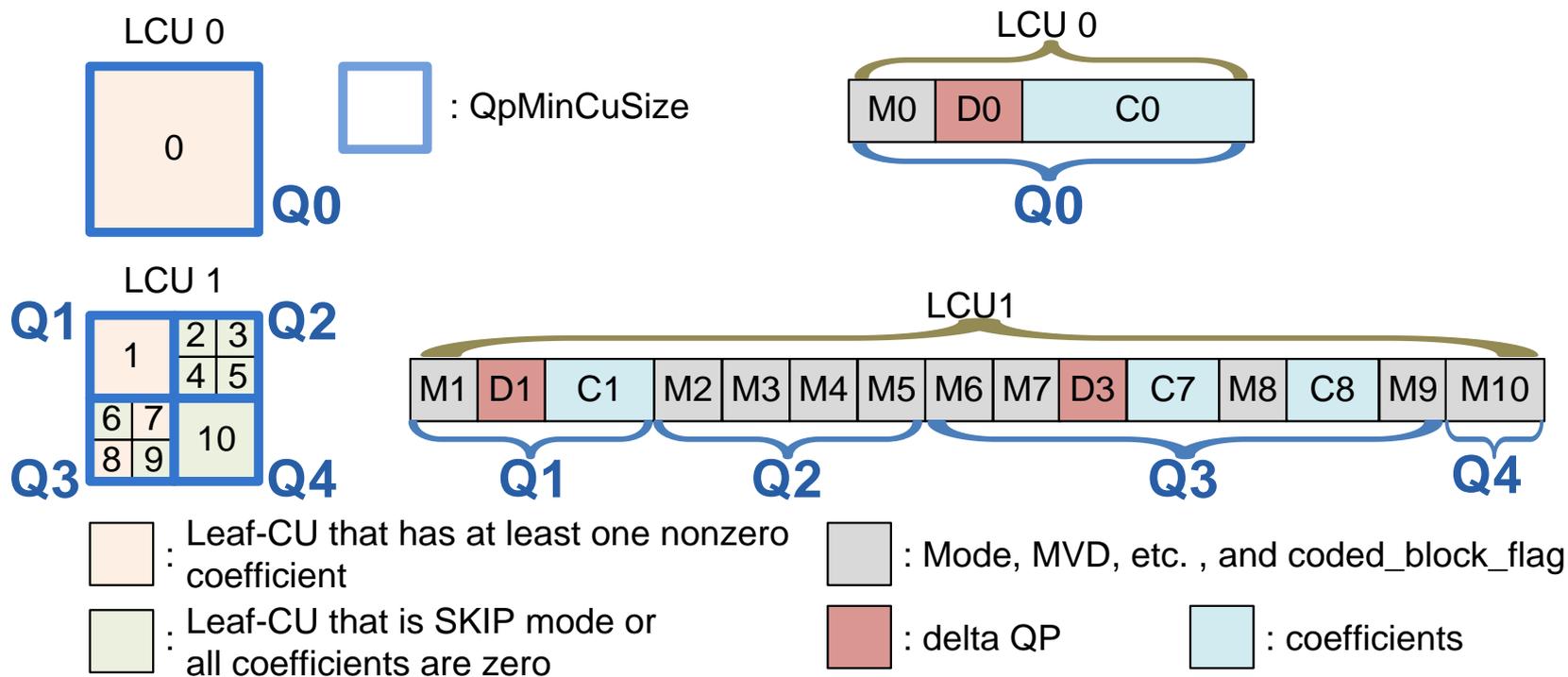
- A 64x64 LCU may cover both flat area and busy area
- LCU-based dQP makes subjective quality control difficult



RaceHorses\_832x480\_30fps,  
B-slice, Frame-7, QP 35

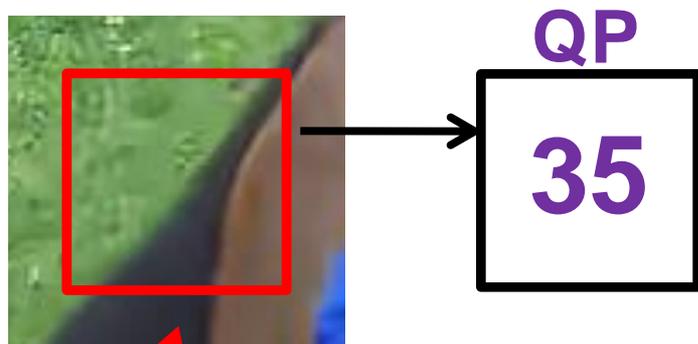
# Proposed sub-LCU-based dQP

- A  $QpMinCuSize$  is defined as the minimum CU size that can signal a dQP
  - dQP is sent only when at least one nonzero coefficient exist
- A dQP for leaf CU that is larger than or equal to the  $QpMinCuSize$
- All leaf CUs with in a  $QpMinCuSize$  share the same dQP.

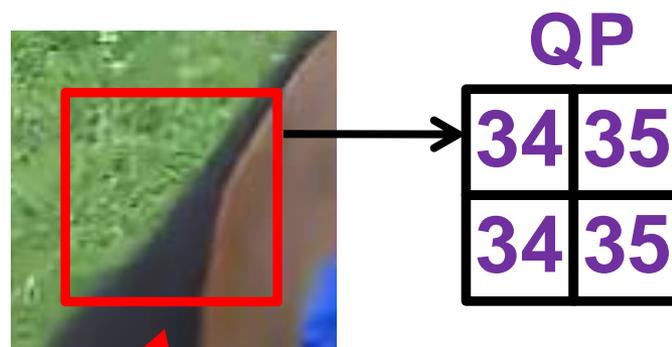


# Subjective Quality Result

LCU-based dQP



Sub-LCU-based dQP



# Simulation Results

- JCTVC-D600 anchor
- Proposed approach is implemented on HM-2.0-dev (rev. 609)
- 1/10 length, RDO with dQP tests on +1, 0, -1, no mismatch was found

**QpMinCuSize**  
= 32x32

	HE-AI Y BD-rate	LC-AI Y BD-rate	HE-RA Y BD-rate	LC-RA Y BD-rate	HE-LD Y BD-rate	LC-LD Y BD-rate
Class A	-0.9	-0.6	0.2	-0.8		
Class B	-0.9	-0.7	-0.7	-0.4	-0.4	-0.2
Class C	-0.9	-0.7	-1.2	-0.9	-0.9	-0.8
Class D	-0.7	-0.6	-1.2	-0.6	-0.8	-0.4
Class E	-1.2	-0.9			-1.0	-0.3
All	-0.9	-0.7	-0.7	-0.7	-0.8	-0.4
Enc Time[%]	248%	292%	282%	297%	286%	298%
Dec Time[%]	99%	100%	98%	97%	98%	99%

**QpMinCuSize**  
= 16x16

	HE-AI Y BD-rate	LC-AI Y BD-rate	HE-RA Y BD-rate	LC-RA Y BD-rate	HE-LD Y BD-rate	LC-LD Y BD-rate
Class A	-0.9	-0.2	0.3	0.0		
Class B	-0.8	-0.2	-0.4	0.4	-0.2	0.7
Class C	-0.9	-0.5	-1.0	-0.3	-0.6	0.1
Class D	-0.8	-0.5	-0.9	-0.1	-0.5	0.4
Class E	-0.7	0.1			-0.6	0.7
All	-0.8	-0.3	-0.5	0.0	-0.5	0.5
Enc Time[%]	249%	292%	284%	298%	286%	299%
Dec Time[%]	100%	101%	98%	97%	98%	97%

# Experiments

- We thank TI for crosschecking our proposal
  - JCTVC-E238
- BD-rates and run times are confirmed

**Thank You.**

