

CE7.3.2: Extension of quantization parameter value range (JVET-K0251)

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Overall Summary

- Propose to extend the quantization parameter value range to the maximum value equal to 57 from 51
- Achieves average BD rate reductions of 0.67%, 2.24%, and 1.88% for luma, cb, and cr components, respectively, for the RA configuration setting under the VTM-1.0 CTCs using QPs 32, 37, 42, and 47.

Problems

- Using the hierarchical GOP structure, the QP value for quantization of transform coefficients in a temporal layer is derived from a base-layer QP plus a QP offset value corresponding to the temporal layer index
- When using a relatively large base QP value over a low bitrate range, the derived QP value for the higher temporal layers may exceed the maximum QP value 51
- Such scenario is observed from the anchor results of some CfP test points in the RA setting

Proposed Method

- The QP value range is further extended to the maximum value equal to 57 from 51.
- The control parameters corresponding to QP values larger than 51 for de-block filtering are extrapolated from the original parameter values

Simulation Results

- Tested under VTM-1.0 CTCs & BMS-1.0 CTCs but using QPs 32, 37, 42 & 47

	Random Access Main 10									
	Over VTM-1.0					Over BMS-1.0				
	Y	U	V	EncT	DecT	Y	U	V	EncT	DecT
Class A1	-0.50%	-2.21%	-1.76%	94%	98%	-0.54%	-2.06%	-1.69%	94%	94%
Class A2	-0.62%	-2.19%	-1.83%	95%	99%	-0.64%	-2.09%	-1.71%	96%	92%
Class B	-0.77%	-2.63%	-2.18%	95%	101%	-0.79%	-2.54%	-2.05%	95%	92%
Class C	-0.73%	-1.81%	-1.63%	94%	99%	-0.74%	-1.65%	-1.54%	95%	99%
Class E										
Overall	-0.67%	-2.24%	-1.88%	94%	99%	-0.70%	-2.11%	-1.77%	95%	95%
Class D	-0.30%	-1.46%	-1.16%	96%	99%	-0.26%	-1.21%	-1.02%	97%	99%
Class F (optional)	-0.53%	-1.05%	-1.08%	95%	99%	-0.47%	-1.06%	-0.92%	96%	99%

Conclusions

- This contribution proposes to extend the QP value range to the maximum value equal to 57 from 51.
- Experimental results show the proposed modification can improve compression efficiency for coding video sequences in the RA setting using a hierarchical GOP structure.



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Simulation Results

- Tested under VTM-1.0 CTCs but using QPs 42, 44, 46, & 48 for the test and using QPs 42, 45, 48, & 51 for the anchor

Random Access Main 10					
Over VTM-1.0					
	Y	U	V	EncT	DecT
Class A1	-2.75%	-4.15%	-5.08%	79%	81%
Class A2	-2.66%	-4.51%	-4.03%	84%	83%
Class B	-3.73%	-5.27%	-4.35%	84%	86%
Class C	-3.80%	-3.97%	-2.83%	79%	97%
Class E					
Overall	-3.34%	-4.55%	-4.03%	82%	87%
Class D	-1.73%	-1.66%	-1.25%	81%	95%
Class F (optional)	-2.48%	-1.12%	-0.35%	85%	101%