



CREATING THE LIVING NETWORK™

JVET-P0413

CE4-related: Clipping for PROF

Wei Chen, Yuwen He
October 2019



Introduction

- 16-bit overflow in PROF
 - In VTM-6.0, there is no clipping operation applied for PROF refinement offset. Therefore, after adding the refinement offset, the refined prediction signal of each list may exceed the 16-bit range and become 17-bit.

Proposal

- Add clipping to PROF refinement offset
 - The clipping range is $\max(14, BD+2)$ -bit-signed-integer. E.g., for $BD \leq 12$, the clipping range is $[-8192, 8191]$.
 - The benefits are multi-fold:
 - Reduce about 250 lines of code in VTM6.0
 - PROF supports WP transparently
 - Simplify Hardware design
 - Improved software SIMD implementation
 - Two tests:
 - Test 1: Clipping based on VTM 6.0.
 - Test 2: Clipping based on CE4.2.1, where delta MV precision is changed from 1/64-pel to 1/32-pel and delta MV range is clipped from $[-64, 63]$ to $[-32, 31]$.

Simulations

Test 1: based on VTM 6.0

	Random Access Main 10				
	Over VTM-6.0				
	Y	U	V	EncT	DecT
Class A1	0.00%	0.00%	0.00%	100%	99%
Class A2	0.00%	0.00%	0.00%	100%	98%
Class B	0.00%	0.00%	0.00%	100%	99%
Class C	0.00%	0.00%	0.00%	100%	98%
Class E	-	-	-	-	-
Overall	0.00%	0.00%	0.00%	100%	98%
Class D	0.00%	0.00%	0.00%	99%	98%
Class F	0.01%	0.01%	0.01%	100%	99%
	Low delay B Main10				
	Over VTM-6.0				
	Y	U	V	EncT	DecT
Class A1	-	-	-	-	-
Class A2	-	-	-	-	-
Class B	0.00%	-0.01%	-0.01%	100%	101%
Class C	0.00%	0.00%	0.00%	100%	96%
Class E	0.00%	0.00%	0.00%	100%	98%
Overall	0.00%	0.00%	0.00%	100%	99%
Class D	0.00%	0.00%	0.00%	100%	98%
Class F	0.07%	0.20%	0.00%	100%	98%

Test 2: based on CE4.2.1

	Random Access Main 10				
	Over CE-4.2.1				
	Y	U	V	EncT	DecT
Class A1	0.00%	0.00%	0.01%	100%	100%
Class A2	0.00%	0.00%	0.00%	100%	101%
Class B	0.00%	0.00%	0.00%	100%	100%
Class C	0.00%	0.00%	0.00%	100%	100%
Class E	-	-	-	-	-
Overall	0.00%	0.00%	0.00%	100%	100%
Class D	0.00%	0.00%	0.00%	100%	100%
Class F	0.00%	0.00%	0.01%	100%	101%
	Low delay B Main10				
	Over CE-4.2.1				
	Y	U	V	EncT	DecT
Class A1	-	-	-	-	-
Class A2	-	-	-	-	-
Class B	0.00%	0.00%	0.00%	100%	102%
Class C	0.00%	0.00%	0.00%	100%	100%
Class E	0.00%	0.00%	0.00%	100%	101%
Overall	0.00%	0.00%	0.00%	100%	101%
Class D	0.00%	0.00%	0.00%	100%	99%
Class F	-0.01%	0.14%	0.13%	100%	99%

Summary

- Propose to add clipping to PROF refinement offset.
 - Avoid 16-bit overflow, and many other benefits (e.g., reduce VTM code, improve efficiency, compatible with WP and BCW).
- Two tests
 - Test 1: clipping based on VTM6.0
 - RA: (0.00%, 0.00%, 0.00%), LDB: (0.00%, 0.00%, 0.00%)
 - Test 2: clipping based on CE4.2.1
 - RA: (0.00%, 0.00%, 0.00%), LDB: (0.00%, 0.00%, 0.00%)
- This simplification does not lead to performance loss.

Thank Panasonic for cross-checking !
(JVET-P0697)