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JCTV-VC-C085:

Comparison of loop / post filtering
for In-loop and post-processing filtering AHG

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Summary

- **JCTVC-B095 made a comparison of coding efficiency between in-loop filtering and post filtering**
- **Coding efficiency of several filtering schemes is compared for in-loop or post filtering under the same coding conditions**
- **In-loop filtering gives 2.5% additional gain of coding efficiency for the high efficiency low delay case compared to the best performing post filtering.**

Compared methods

1. Current reference (QC_ALF) and its post-filtering version (QC_APF)

- QC_ALF uses M set of non-separable filters. The M sets of filters may be transmitted to the decoder for each frame. Whenever the ALF filtering control map indicates that a block should be filtered, for each pixel, a specific set of filters is chosen based on a measure of local characteristic of an image (sum-modified Laplacian measure). If a block is to be filtered, the filtered block is overwritten to the reference memory.

2. QALF and its post-filtering version (QAPF)

- Differences from QC_ALF are
 - At decoder, only one filter may be used
 - Only block-based control (no sum-modified Laplacian measure)
 - 2-pass Wiener-based filter design (JCTVC-C082)

3. AVC-like filtering (AALF and AAPF)

- Similar to Post-filter hint SEI message in H.264 / MPEG-4 AVC
- Implementation based on QALF/QAPF, but not using the ALF filtering control map nor redesigning filter coefficients

Experimental results

- **Conditions**

- JCTVC-B300 and JCTVC-B310_r3 (TMuC 0.7.1, identical results with 0.7)
- High Efficiency Low Delay case
- Anchor (reference): **QC_ALF off**

High Efficiency Low Delay	QC_ALF/QC_APF		QALF/QAPF		AALF/AAPF	
	QC_ALF	QC_APF	QALF	QAPF	AALF	AAPF
Class B	-5.6	-3.5	-5.0	-2.9	-2.7	-3.0
Class C	-3.9	-1.4	-3.5	-1.4	-2.0	-1.5
Class D	-2.6	0.6	-2.8	-0.5	-2.0	-1.0
Class E	-7.7	2.7	-6.8	-1.6	-0.9	-3.8
Total	-4.8	-0.8	-4.4	-1.7	-2.0	-2.3
Encoding time	101	101	101	101	101	101
Decoding time	116	128	114	126	123	132

**Best performing
In-loop filtering
(in this experiments)**

**Best performing
post-processing filtering
(in this experiments)**

Conclusion

- **Coding efficiency of several filtering schemes is compared for in-loop or post filtering**
- **In-loop filtering gives 2.5% additional gain of coding efficiency**
 - ALF filtering control map gives advantage to in-loop filtering