

JVET-L0120

CE4-related: Low pipeline latency LIC

K. Abe, T. Toma, J. Li

Panasonic Corporation

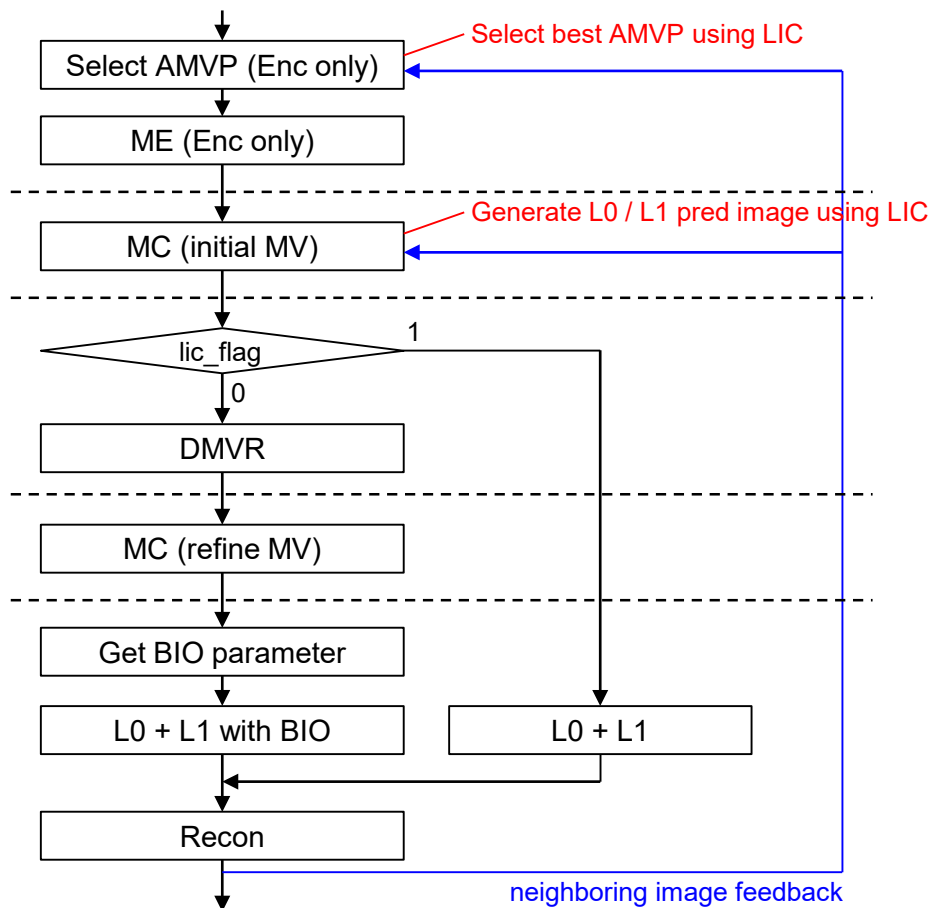
- LIC provides interesting gains, but it causes pipeline latency problem.

Gain : 0.76% for RA, 0.95% for LDB (BMS2.0.1)

Problem : Long feed backloop for neighboring recon image

➡ We propose to introduce LIC without pipeline latency problem.

LIC implementation in JEM



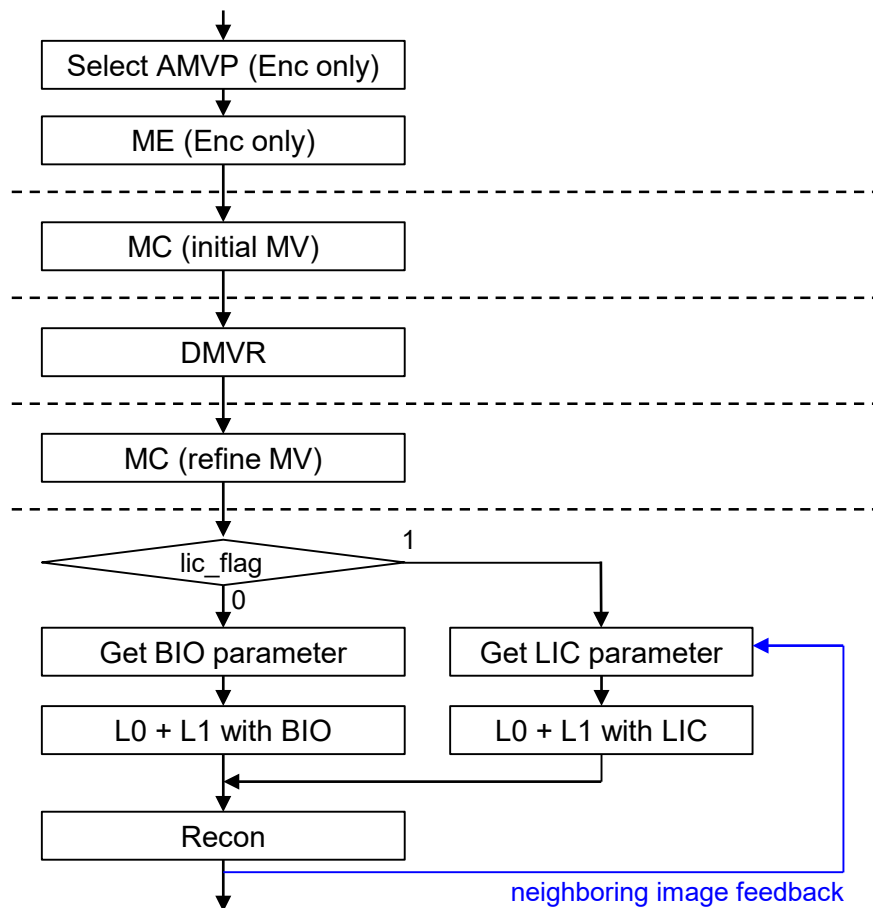
Algorithm

- Cost calculation of AMVP selection uses LIC modification.
- L0 / L1 pred images are generated using LIC in MC process preceding DMVR.

Problem

- Very long feedback loop.
- LIC can't be used with DMVR.

Proposed LIC implementation



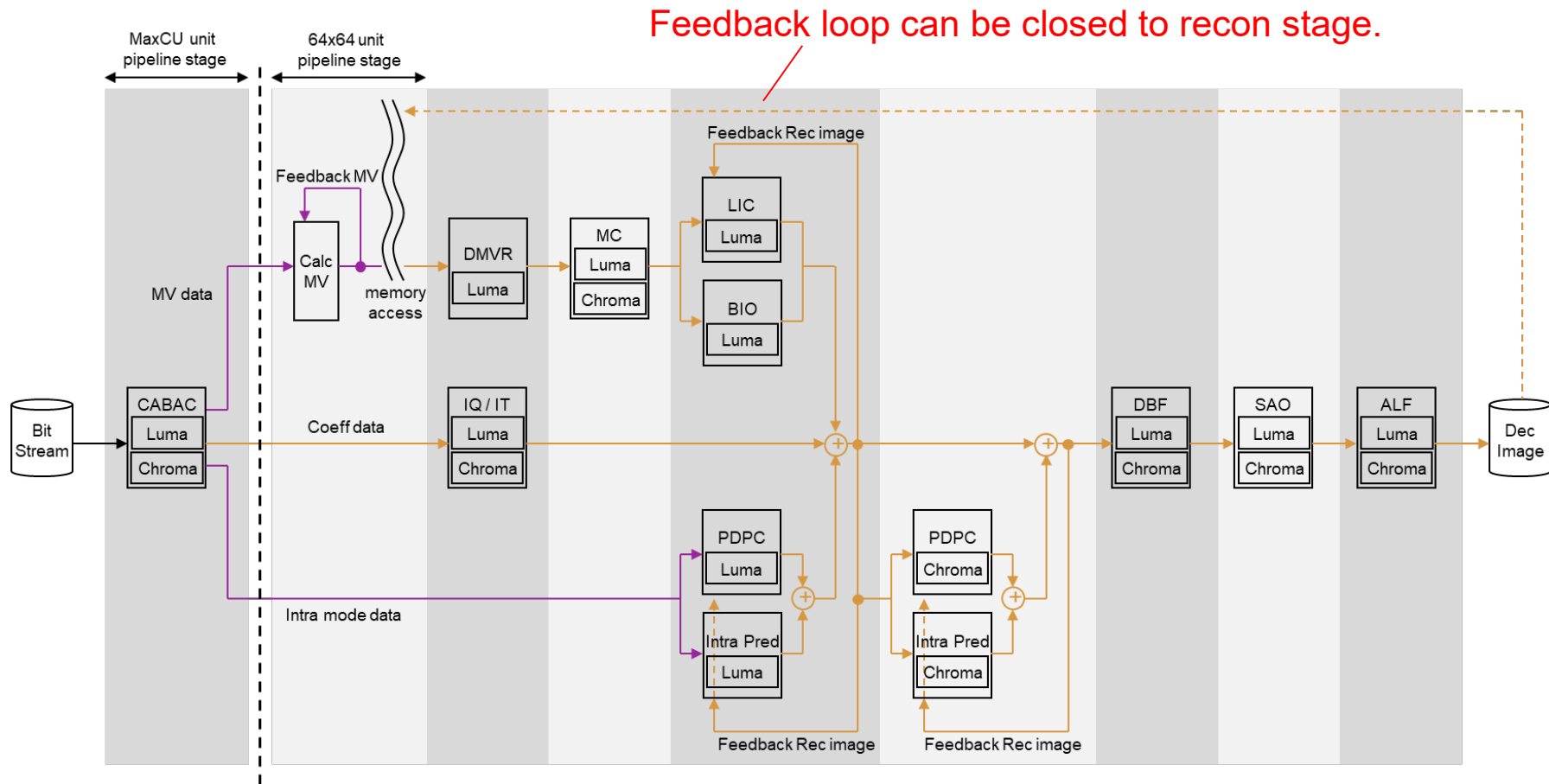
■ Algorithm

- Remove all encoder and decoder LIC processes other than recon stage.
- Apply LIC process after DMVR refined MC.

■ Benefit

- Feedback loop can be closed to recon stage.
- LIC can be used with DMVR.

Example of decoder pipeline structure



Proposed method

The proposed method is based on the existing LIC with the following modifications:

1. Remove all encoder and decoder LIC processes other than recon stage.
2. Apply LIC process after DMVR refined MC.
3. Set bS=1 for LIC boundary in DBF (same proposal as JVET-J0020).

Conditions	bS
At least one of the blocks uses Intra prediction	2
At least one of the blocks has non-zero coded residual coefficient	1
Absolute difference between corresponding spatial motion vector components of the two blocks are ≥ 1 in units of integer pixels	1
Motion-compensated prediction for the two blocks refers to different reference pictures or the number of motion vectors is different for the two blocks	1
At least one of the blocks uses LIC	1
Otherwise	0

Simulation results

Anchor : BMS2.0.1(BMS configuration)

Test : Proposed LIC

	Random Access Main 10				
	Y	U	V	EncT	DecT
Class A1	-1.04%	-0.13%	-0.64%	147%	98%
Class A2	-0.52%	-0.03%	-0.33%	143%	99%
Class B	-0.89%	-0.33%	-0.16%	137%	98%
Class C	-0.53%	-0.51%	-0.26%	133%	99%
Class E					
Overall	-0.75%	-0.28%	-0.31%	139%	99%
Class D	0.00%	0.31%	-0.05%	132%	99%
Class F	-1.39%	-0.92%	-0.89%	128%	100%

Low delay B Main10				
Y	U	V	EncT	DecT
-1.17%	-0.80%	-0.59%	160%	98%
-0.82%	-0.68%	-0.53%	158%	100%
-0.58%	-0.69%	-0.27%	191%	99%
-0.90%	-0.73%	-0.49%	167%	99%
-0.13%	-0.55%	-0.37%	164%	100%
-3.74%	-2.84%	-3.38%	165%	99%

Interesting gain with small decoder complexity

Simulation results

Anchor : BMS2.0.1(BMS configuration)

Test : Conventional LIC (in JEM)

	Random Access Main 10				
	Y	U	V	EncT	DecT
Class A1	-1.07%	-0.09%	-0.49%	150%	98%
Class A2	-0.52%	-0.11%	-0.27%	146%	99%
Class B	-0.92%	-0.25%	-0.04%	139%	98%
Class C	-0.51%	-0.49%	-0.33%	134%	99%
Class E					
Overall	-0.76%	-0.25%	-0.25%	141%	98%
Class D	-0.05%	0.16%	-0.13%	133%	98%
Class F	-1.47%	-0.87%	-0.89%	129%	99%

Low delay B Main10				
Y	U	V	EncT	DecT
-1.20%	-0.87%	-0.84%	162%	98%
-0.85%	-0.65%	-0.68%	160%	105%
-0.67%	-0.51%	0.08%	192%	99%
-0.95%	-0.70%	-0.55%	168%	100%
-0.21%	-0.58%	-0.28%	166%	100%
-3.79%	-2.95%	-3.28%	167%	99%

The difference between proposal and conventional is negligible.

Simulation results

Anchor : BMS2.0.1(BMS configuration)

Test : Proposed LIC + FastPicLevelLIC

	Random Access Main 10				
	Y	U	V	EncT	DecT
Class A1	-1.03%	-0.22%	-0.65%	140%	99%
Class A2	-0.42%	-0.11%	-0.35%	121%	100%
Class B	-0.84%	-0.41%	-0.25%	123%	98%
Class C	-0.51%	-0.53%	-0.27%	126%	99%
Class E					
Overall	-0.70%	-0.34%	-0.36%	127%	99%
Class D	-0.04%	0.22%	-0.12%	123%	99%
Class F	-1.22%	-0.78%	-0.75%	118%	100%

Low delay B Main10				
Y	U	V	EncT	DecT
-1.03%	-0.76%	-0.61%	139%	99%
-0.73%	-0.60%	-0.66%	150%	101%
-0.15%	-0.15%	-0.01%	105%	99%
-0.71%	-0.56%	-0.48%	133%	100%
-0.17%	-0.80%	-0.03%	143%	101%
-3.22%	-2.42%	-2.58%	142%	101%

It can reduce encoding time with small loss.
We think there is more capability to reduce encoding time.

Conclusions

- The proposed LIC is based on the existing LIC with the following modifications:
 - Remove all encoder and decoder LIC processes other than recon stage.
 - Apply LIC process after DMVR refined MC.
 - Set bS=1 for LIC boundary in DBF.
- It can solve the pipeline latency issue.
- 0.75%, 0.90% gain for RA, LDB for BMS.

➡ It is proposed to adopt into test model.

Thank Huawei for cross-checking of the proposal test.