

**Non-CE4:  
Compatible QP prediction  
with RC and AQ**

**JCTVC-H0204**

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# 1. Overview

# Overview

- Proposed technique
  - Compatible QP prediction with RC and AQ
- Algorithm
  - Simplified predQP calculation based on CE4 Subtest1.3 (G1028)
- Cross-check
  - Proposal 1: JCTVC-H0194 by NEC
  - Proposal 2: JCTVC-H0601 by Canon
- Simulation results
  - Proposal 1: Overall BD-rate gain 0.4-0.5% (AI), 0.3% (RA and LD)
  - Proposal 2: Overall BD-rate gain 0.3% (AI and RA), 0.2-0.3% (LD)

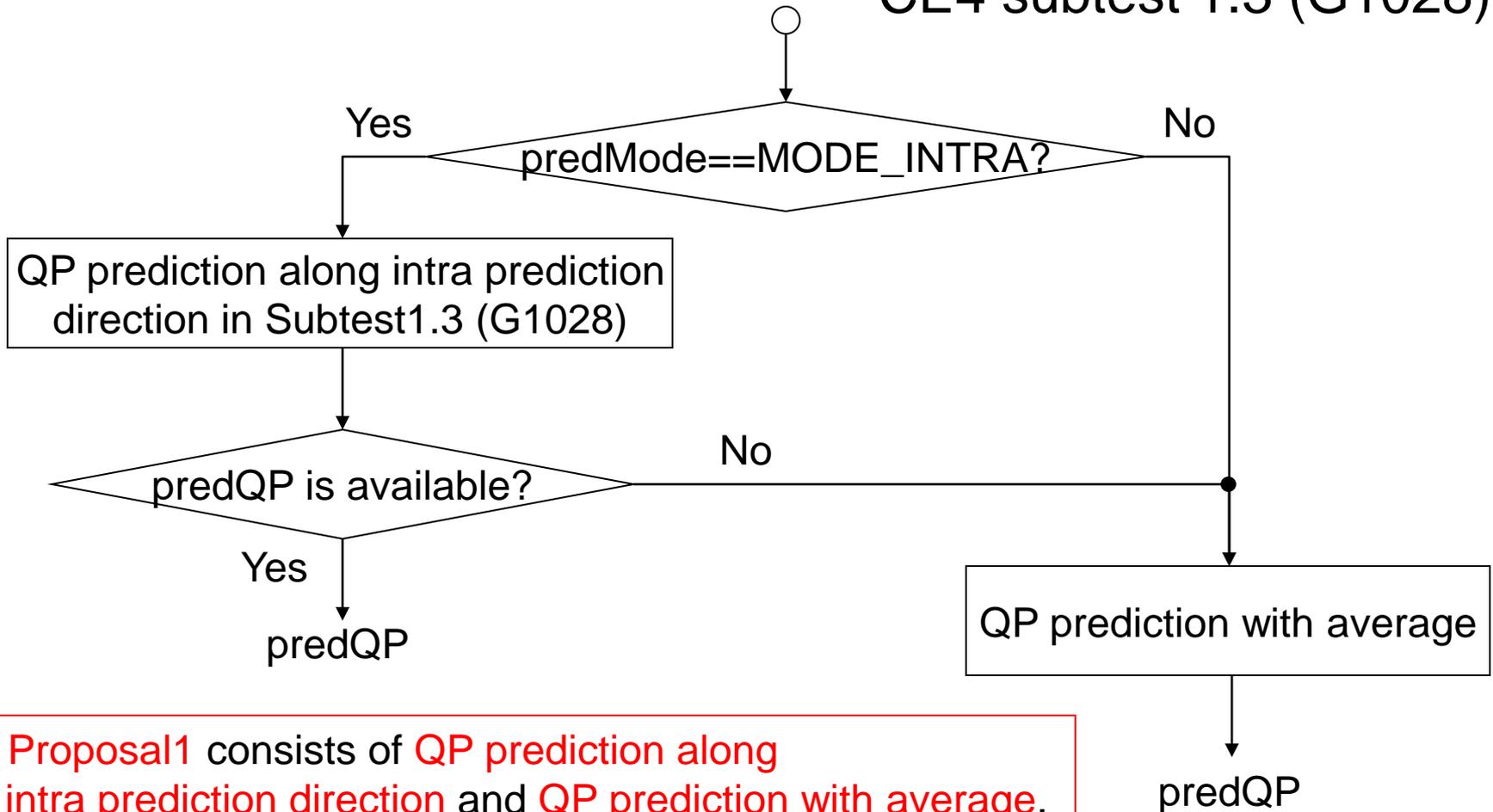


## **2. Algorithm**

# Algorithm: With/without using intra pred mode

## ■ Proposal 1

CE4 subtest 1.3 (G1028)

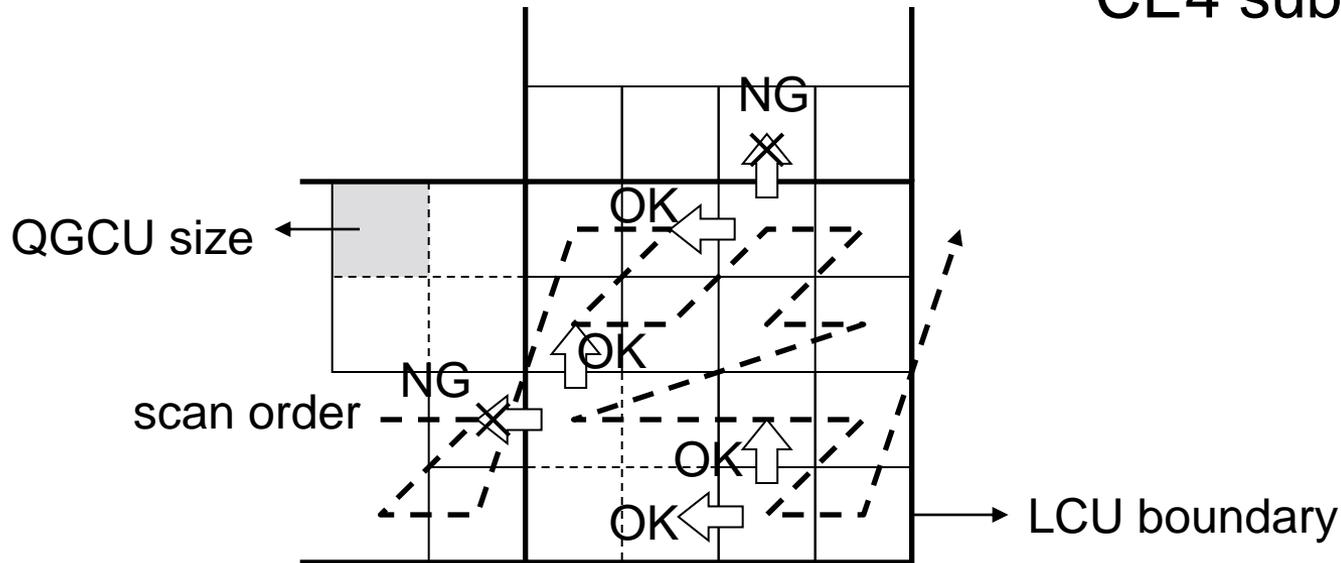


- **Proposal1** consists of **QP prediction along intra prediction direction** and **QP prediction with average**.
- **Proposal2** consists of only **QP prediction with average** regardless of predMode.

# Algorithm: LCU restriction

- Restrict QP prediction along LCU boundary

CE4 subtest 1.3 (G1028)

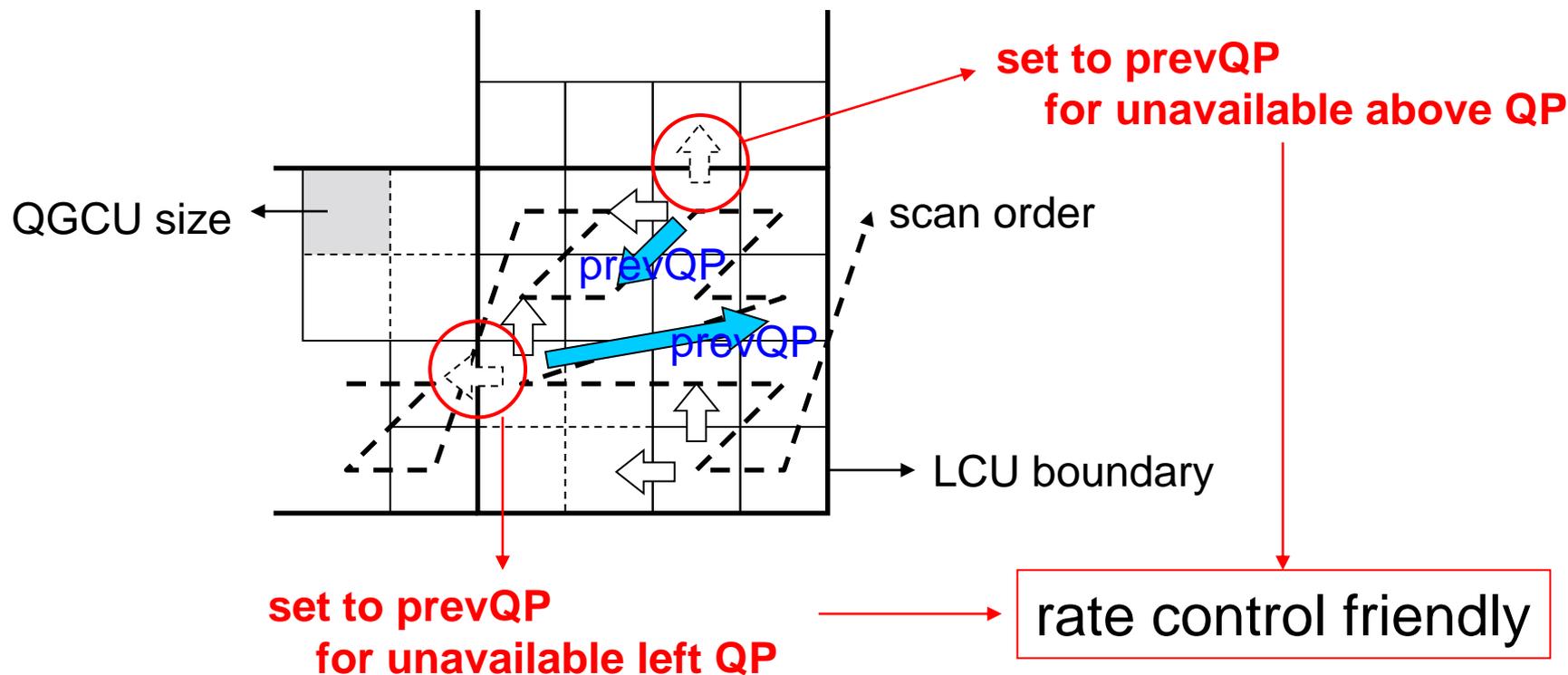


Neighbouring QPs are unavailable beyond LCU boundary.

# Algorithm: QP replacement before average operation

- QP prediction with prevQP

Proposal



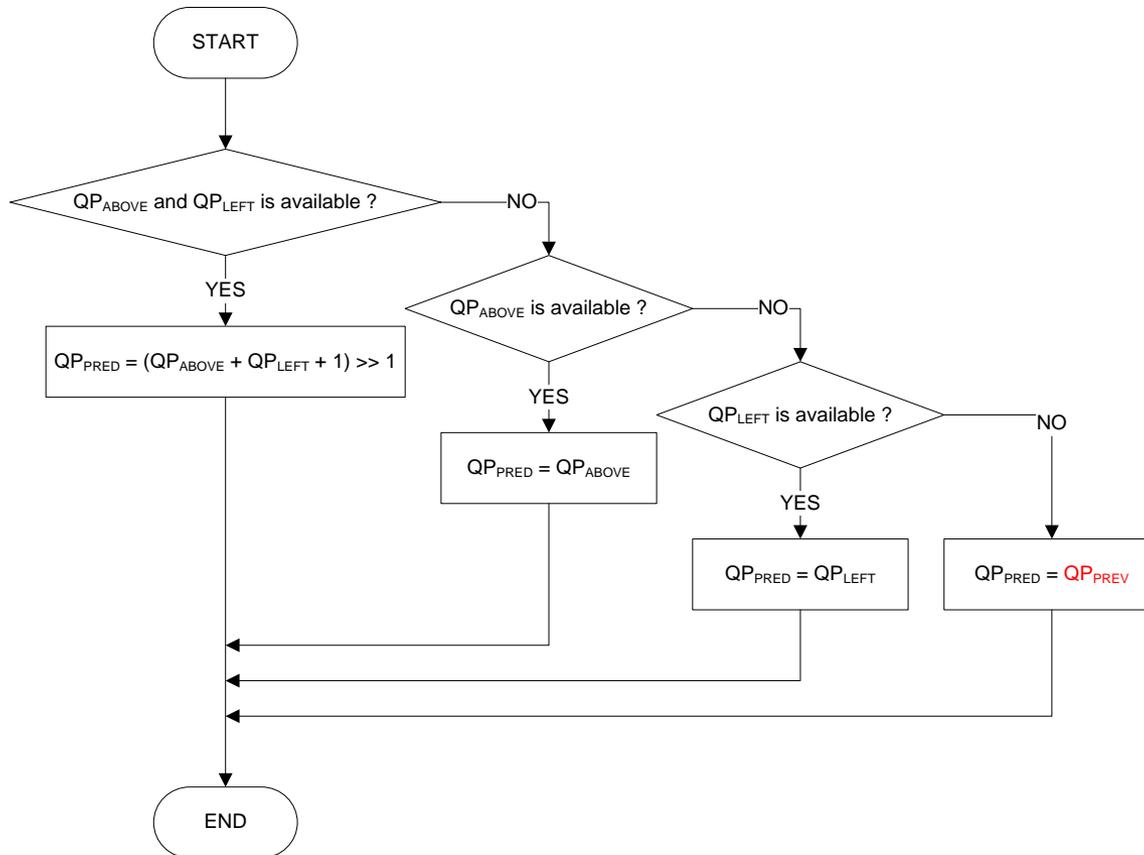
PredQP is calculated by average of **left** and **above** QP.



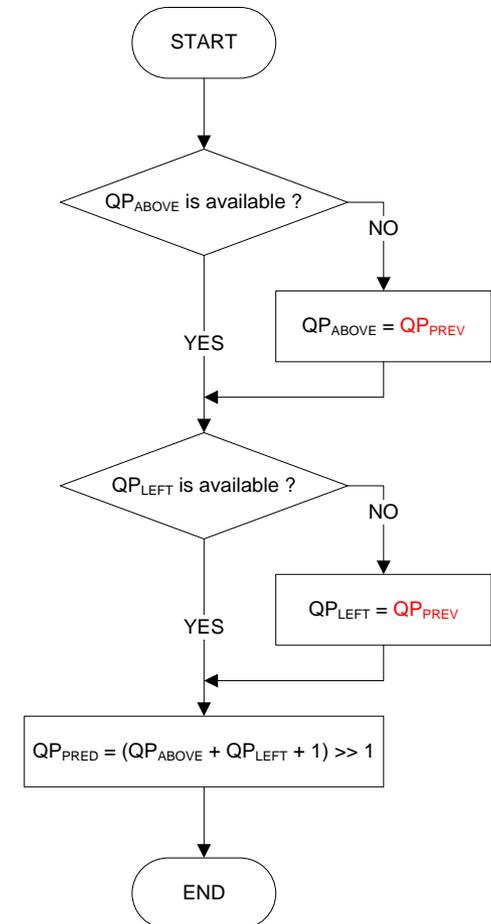
set to **prevQP** if left/above QP are **unavailable**

## Algorithm: Difference of Average operation

## CE4 subtest 1.3(G1028)



## Proposal



# 3

## 3. Experiments

# Simulation Results (Proposal 1, D3)

	All Intra HE				All Intra LC			
	Y	U	V	dQP incr.	Y	U	V	dQP incr.
Class A (8bit)	-0.4%	-0.4%	-0.4%	-8.2%	-0.3%	-0.3%	-0.3%	-8.4%
Class B	-0.4%	-0.4%	-0.4%	-10.4%	-0.3%	-0.3%	-0.3%	-10.7%
Class C	-0.5%	-0.5%	-0.5%	-12.0%	-0.5%	-0.5%	-0.4%	-12.4%
Class D	-0.5%	-0.5%	-0.4%	-12.1%	-0.4%	-0.4%	-0.4%	-12.2%
Class E	-0.7%	-0.8%	-0.7%	-12.0%	-0.7%	-0.7%	-0.7%	-13.9%
<b>Overall</b>	-0.5%	-0.5%	-0.5%	-11.2%	-0.4%	-0.4%	-0.4%	-11.7%
	-0.5%	-0.5%	-0.5%		-0.4%	-0.4%	-0.4%	
Class F	-0.3%	-0.3%	-0.3%	-7.9%	-0.2%	-0.2%	-0.3%	-8.8%
Enc Time[%]	101%				101%			
Dec Time[%]	100%				100%			

	Random Access HE				Random Access LC				Random Access HE-10			
	Y	U	V	dQP incr.	Y	U	V	dQP incr.	Y	U	V	dQP incr.
Class A (8bit)	-0.3%	-0.3%	-0.3%	-5.3%	-0.4%	-0.2%	-0.3%	-5.3%	-0.2%	-0.3%	-0.3%	-4.3%
Class B	-0.3%	-0.2%	-0.3%	-6.2%	-0.3%	-0.1%	-0.1%	-6.0%	-0.3%	-0.4%	-0.3%	-6.2%
Class C	-0.4%	-0.3%	-0.3%	-8.1%	-0.4%	-0.3%	-0.3%	-7.9%				
Class D	-0.3%	-0.3%	-0.3%	-7.6%	-0.3%	-0.5%	-0.3%	-7.7%				
Class E												
<b>Overall</b>	-0.3%	-0.3%	-0.3%	-7.0%	-0.3%	-0.3%	-0.2%	-6.9%	-0.2%	-0.3%	-0.3%	-5.3%
	-0.3%	-0.3%	-0.3%		-0.3%	-0.3%	-0.2%		-0.2%	-0.3%	-0.3%	
Class F	-0.1%	-0.3%	-0.2%	-5.9%	-0.3%	-0.2%	-0.1%	-6.3%				
Enc Time[%]	100%				100%				100%			
Dec Time[%]	101%				101%				101%			

	Low delay B HE				Low delay B LC			
	Y	U	V	dQP incr.	Y	U	V	dQP incr.
Class A								
Class B	-0.2%	-0.2%	0.3%	-4.3%	-0.2%	-0.1%	0.0%	-3.8%
Class C	-0.3%	-0.6%	-0.4%	-6.2%	-0.4%	-0.5%	-0.1%	-6.0%
Class D	-0.3%	-0.3%	0.0%	-5.9%	-0.4%	-0.6%	-0.6%	-6.1%
Class E	-0.2%	-0.6%	-0.1%	-3.6%	-0.3%	-1.0%	-0.3%	-4.4%
<b>Overall</b>	-0.3%	-0.4%	0.0%	-5.1%	-0.3%	-0.5%	-0.2%	-5.0%
	-0.3%	-0.4%	-0.1%		-0.3%	-0.5%	-0.3%	
Class F	-0.2%	-0.4%	-0.2%	-3.6%	-0.2%	-0.7%	-0.1%	-3.8%
Enc Time[%]	100%				100%			
Dec Time[%]	101%				101%			

# Simulation Results (Proposal 2, D3)

	All Intra HE				All Intra LC			
	Y	U	V	dQP incr.	Y	U	V	dQP incr.
Class A (8bit)	-0.2%	-0.2%	-0.2%	-4.2%	-0.1%	-0.1%	-0.1%	-3.9%
Class B	-0.3%	-0.3%	-0.3%	-6.7%	-0.2%	-0.2%	-0.2%	-6.7%
Class C	-0.4%	-0.3%	-0.4%	-8.9%	-0.3%	-0.3%	-0.3%	-9.1%
Class D	-0.4%	-0.4%	-0.3%	-9.6%	-0.3%	-0.3%	-0.3%	-9.7%
Class E	-0.3%	-0.3%	-0.3%	-6.0%	-0.3%	-0.3%	-0.4%	-6.7%
<b>Overall</b>	-0.3%	-0.3%	-0.3%	-7.5%	-0.3%	-0.3%	-0.3%	-7.6%
	-0.3%	-0.3%	-0.3%		-0.3%	-0.3%	-0.3%	
Class F	-0.1%	-0.1%	-0.1%	-4.3%	-0.1%	-0.2%	-0.1%	-4.0%
Enc Time[%]	100%				100%			
Dec Time[%]	100%				100%			

	Random Access HE				Random Access LC				Random Access HE-10			
	Y	U	V	dQP incr.	Y	U	V	dQP incr.	Y	U	V	dQP incr.
Class A (8bit)	-0.2%	-0.1%	-0.1%	-3.8%	-0.4%	-0.2%	-0.3%	-3.7%	-0.1%	-0.1%	-0.5%	-3.2%
Class B	-0.2%	-0.2%	-0.2%	-4.9%	-0.3%	0.0%	0.0%	-4.6%	-0.2%	-0.3%	-0.1%	-4.9%
Class C	-0.3%	-0.1%	-0.3%	-6.8%	-0.3%	-0.4%	-0.2%	-6.8%				
Class D	-0.3%	-0.4%	-0.3%	-7.0%	-0.3%	-0.5%	-0.4%	-6.9%				
Class E												
<b>Overall</b>	-0.3%	-0.2%	-0.2%	-5.8%	-0.3%	-0.3%	-0.2%	-5.7%	-0.2%	-0.2%	-0.3%	-4.2%
	-0.3%	-0.2%	-0.2%		-0.3%	-0.3%	-0.2%		-0.2%	-0.2%	-0.3%	
Class F	-0.1%	-0.1%	-0.1%	-3.6%	-0.2%	-0.2%	-0.2%	-3.5%				
Enc Time[%]	100%				100%				100%			
Dec Time[%]	100%				101%				101%			

	Low delay B HE				Low delay B LC			
	Y	U	V	dQP incr.	Y	U	V	dQP incr.
Class A								
Class B	-0.2%	-0.2%	-0.2%	-4.0%	-0.3%	-0.3%	-0.4%	-3.5%
Class C	-0.3%	-0.3%	-0.1%	-5.9%	-0.3%	-0.2%	-0.1%	-5.5%
Class D	-0.3%	-0.5%	-0.2%	-6.0%	-0.3%	-0.4%	0.0%	-5.8%
Class E	-0.1%	-0.4%	-0.6%	-3.3%	-0.2%	-1.4%	0.1%	-4.0%
<b>Overall</b>	-0.2%	-0.4%	-0.2%	-4.8%	-0.3%	-0.5%	-0.1%	-4.7%
	-0.2%	-0.4%	-0.3%		-0.3%	-0.5%	0.0%	
Class F	-0.1%	-0.2%	-0.1%	-2.5%	-0.1%	1.0%	0.1%	-2.4%
Enc Time[%]	100%				100%			
Dec Time[%]	100%				99%			

# 4. Conclusion

# Conclusion

- In the QP derivation with average operation
  - This proposal is simpler because conditional judgements are less.
  - This proposal is more friendly for rate control because more preceding QP is used in QP calculation.

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