

# **Unified Motion Compensation Filter Design (JCTVC-F480)**

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**Yungo Park  
Sunyoung Jeon  
Chanyul Kim  
Kwang Pyo Choi  
(Samsung)**

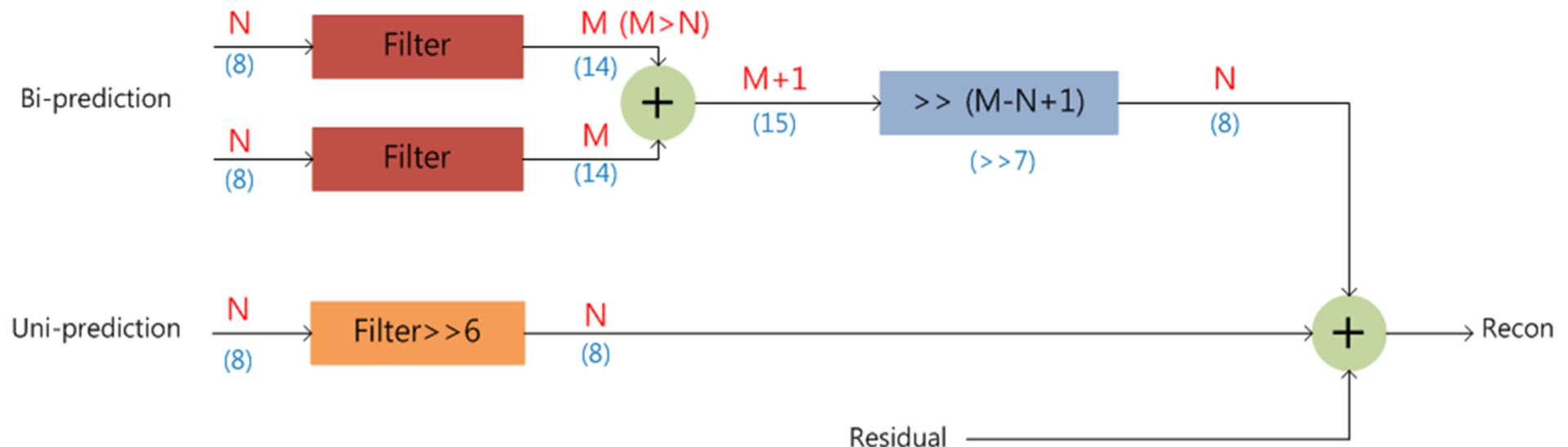
# Summary

- ❖ **Proposal for the unified MC filter design**
- ❖ **Proposal for the harmonized MC filter design with JCTVC-F537**
- ❖ **Coding efficiency impact:**
  - 0.0/0.1/0.2% on average for the unified MC filter design
  - 0.0/0.1/0.2% on average for the harmonized MC filter design with JCTVC-F537
  - No complexity increase
- ❖ **Cross-check**
  - JCTVC-F537

# Current MC prediction

## ❖ Current MC prediction in HM3.x

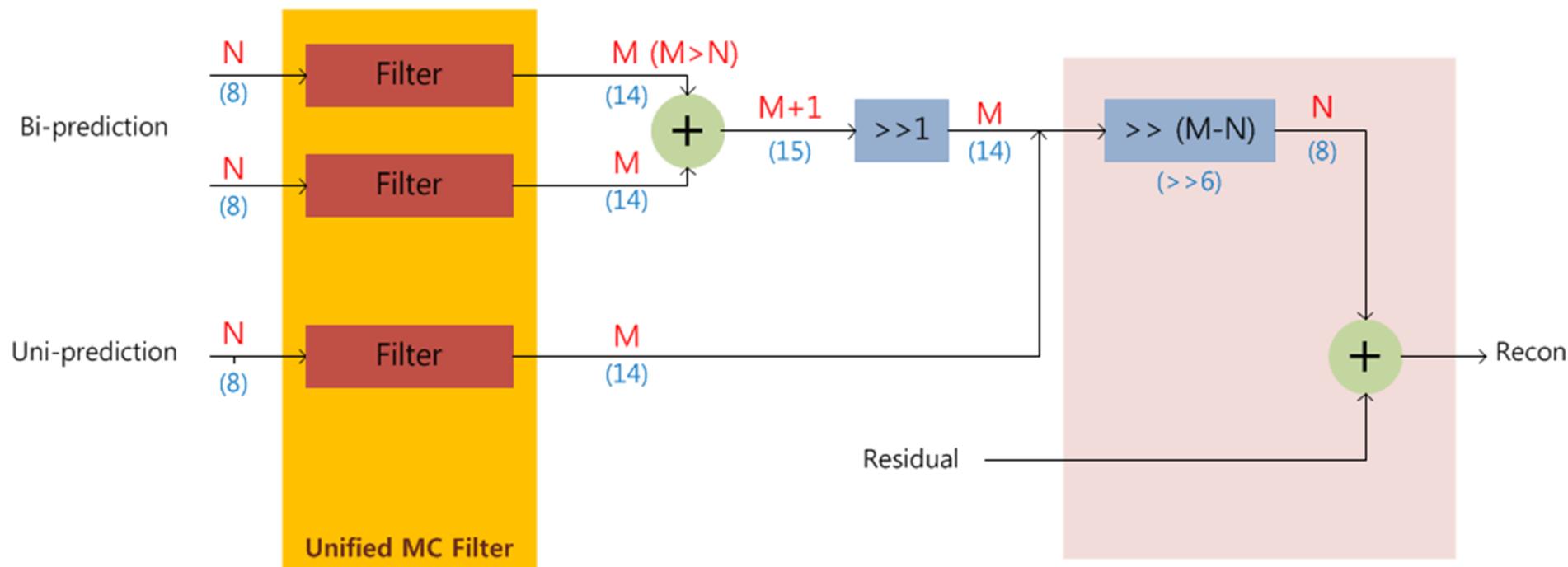
- The *Uni-prediction filter* is **separated** from the *Bi-prediction filter*
  - Bi-prediction filter does not perform rounding
  - Uni-prediction filter performs rounding to input bit depth
- The required total number of the prediction filter is equal to **25**
  - The Bi-prediction filter uses **12** ones and the Uni-prediction filter uses **13** ones, respectively



# Proposed MC prediction

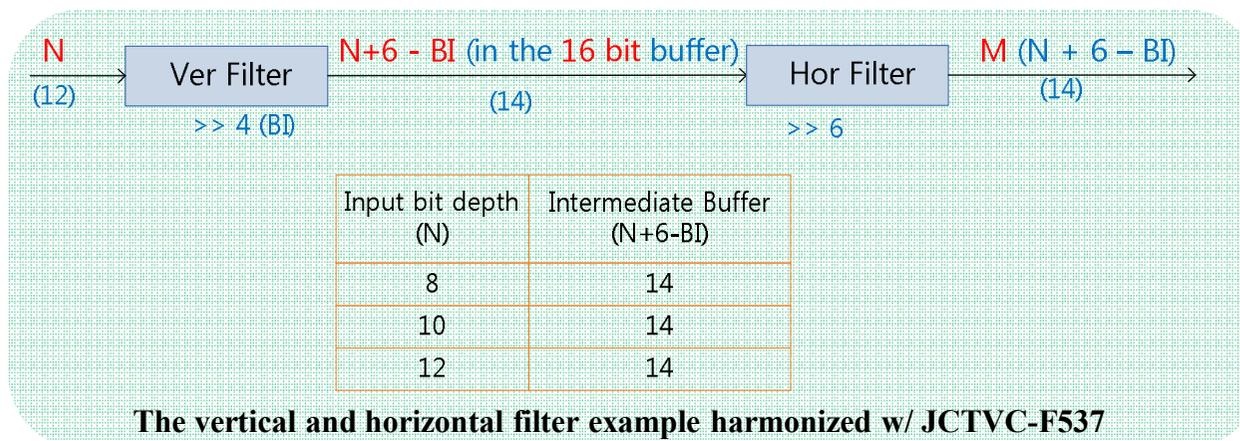
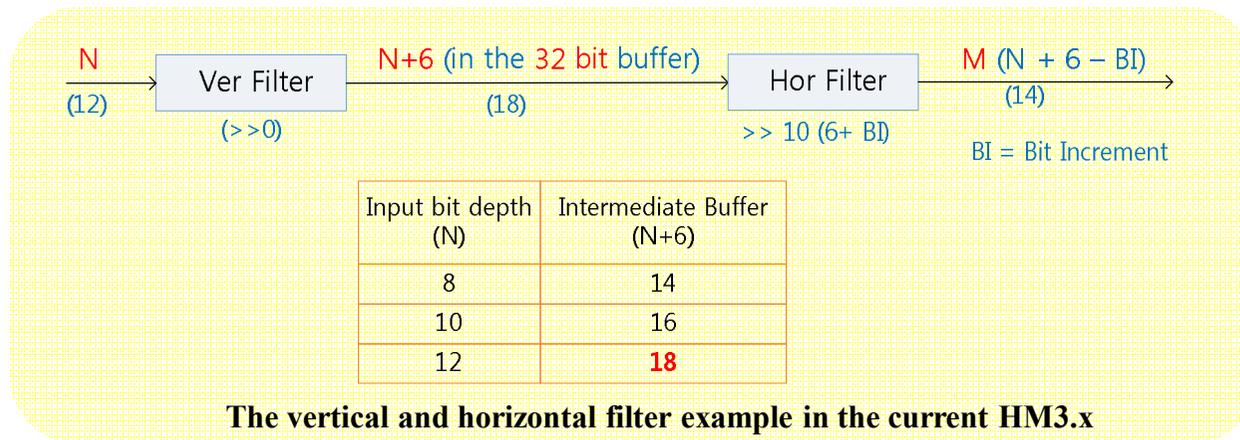
## ❖ The unified MC prediction filter is proposed

- Uni-prediction filter does not perform rounding to input bit depth like as Bi-prediction filter
  - The Uni-prediction filter uses the same filter with Bi-prediction one
- The module of rounding to input bit depth is moved to reconstruction part



# Harmonized proposal with JCTVC-F537

- ❖ **The MC related proposal was submitted in the JCTVC-F537**
  - Removing data offset adding operation of the filter for simplification
  - Ensure that all data after each of the vertical and horizontal filtering passes holds in 16-bit memory not 32-bit memory
- ❖ **We tested this improvement with unified MC filter design**



# Experimental results

## ❖ Test results for the proposed unified MC filter

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	0.0	-0.1	-0.2	0.0	0.0	0.1
Class B	0.0	0.0	0.0	0.0	0.0	0.0
Class C	0.0	0.0	0.0	0.0	0.0	0.0
Class D	0.0	0.0	-0.1	0.0	0.0	0.0
Class E						
<b>Overall</b>	<b>0.0</b>	<b>0.0</b>	<b>-0.1</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
Enc Time[%]	100%			100%		
Dec Time[%]	101%			103%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	0.0	0.2	0.3	0.0	0.1	0.2
Class C	0.0	0.0	0.1	0.0	0.2	-0.1
Class D	0.0	0.3	0.4	0.0	-0.2	0.5
Class E	0.0	0.5	1.7	0.0	0.1	0.2
<b>Overall</b>	<b>0.0</b>	<b>0.2</b>	<b>0.5</b>	<b>0.0</b>	<b>0.0</b>	<b>0.2</b>
Enc Time[%]	100%			100%		
Dec Time[%]	101%			102%		

## ❖ Test results for the harmonized MC filter w/ JCTVC-F537

	Random Access HE			Random Access LC		
	Y	U	V	Y	U	V
Class A	0.1	0.1	0.2	0.0	0.0	0.1
Class B	0.0	-0.1	0.0	0.0	0.0	0.0
Class C	0.0	0.0	-0.1	0.0	0.0	0.0
Class D	0.0	-0.2	0.0	0.0	0.0	0.0
Class E						
<b>Overall</b>	<b>0.0</b>	<b>-0.1</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
Enc Time[%]	100%			100%		
Dec Time[%]	102%			103%		

	Low delay B HE			Low delay B LC		
	Y	U	V	Y	U	V
Class A						
Class B	0.0	0.3	0.3	0.0	0.1	0.2
Class C	0.0	0.0	0.1	0.0	0.2	-0.1
Class D	0.0	0.4	0.0	0.0	-0.2	0.5
Class E	0.1	0.9	1.7	0.0	0.1	0.2
<b>Overall</b>	<b>0.0</b>	<b>0.3</b>	<b>0.4</b>	<b>0.0</b>	<b>0.0</b>	<b>0.2</b>
Enc Time[%]	100%			100%		
Dec Time[%]	101%			102%		

# Conclusions

## ❖ **Proposal for the unified MC filter design**

- The Uni-prediction filter has high accuracy with 16 bit depth as same as the bi-prediction filter
- Simplified implementation is possible w/o the loss of coding gain

## ❖ **Proposal for the harmonized MC filter design with JCTVC-F537**

- Modifying intermediate buffer size from 32 bit to 16 bit
- Advantage for the S/W optimization like as SIMD operation

## ❖ **Coding efficiency impact:**

- 0.0/0.1/0.2% on average for the unified MC filter design
- 0.0/0.1/0.2% on average for the harmonized MC filter design with JCTVC-F537
- No complexity increase