



# Non-CE12

## BS Decision Tree Simplification (JCTVC-G175)



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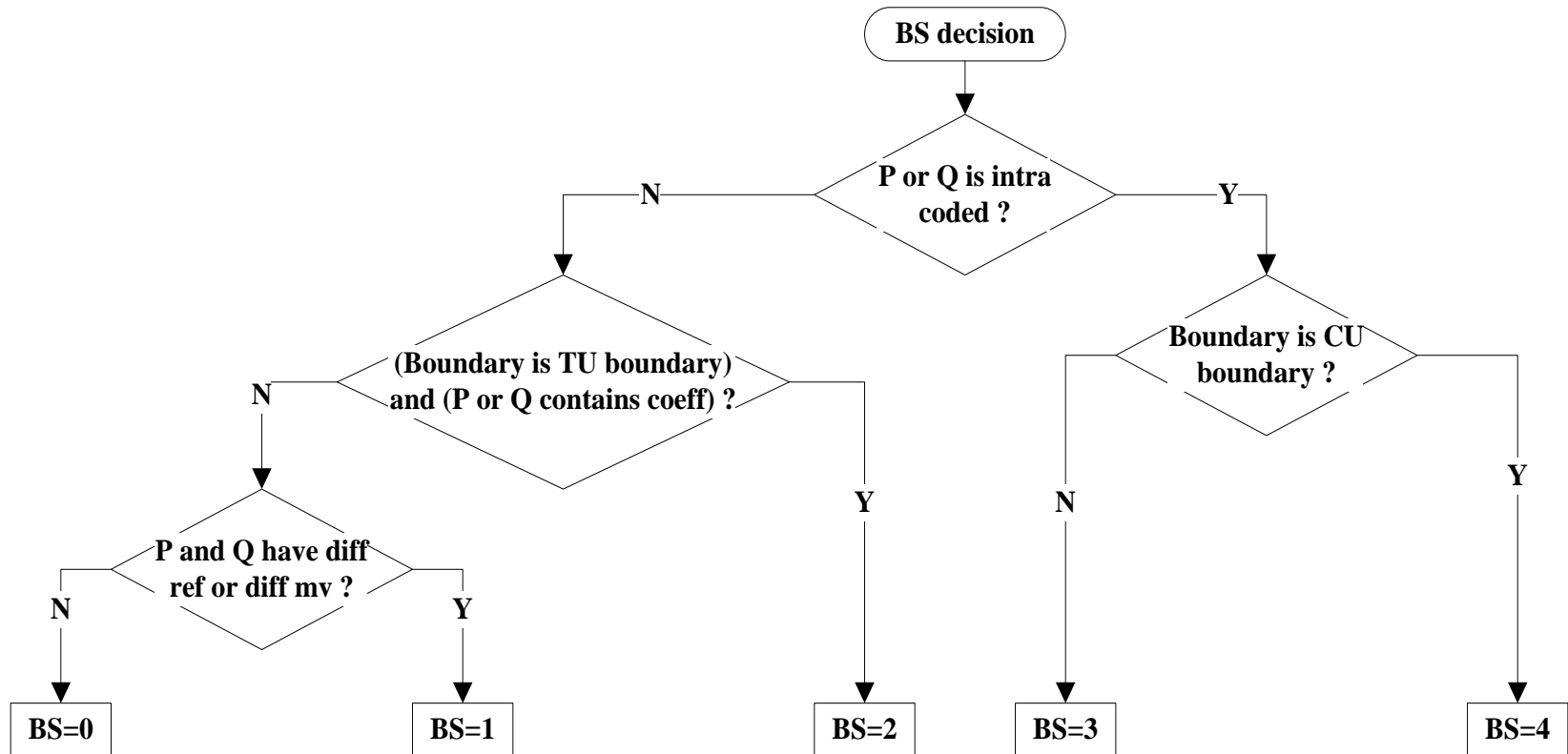
G. Auwera, M. Karczewicz

# Overall Summary

- **Simplifying BS (boundary strength) decision tree structure**
  - Some BS values are not meaningful
  - Removed redundant BS (e.g. 2 and 4)
  - Reassigned them to 0, 1 and 2 (5 values → 3 values)
- **Performance**
  - Provided the bit-exactly same results to HM4.0
  - Reduced complexity by removing useless condition check

Anchor: JCTVC-F900	AI		RA		LD	
	HE	LC	HE	LC	HE	LC
BD-Rate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Encoding time	100%	100%	100%	100%	100%	100%
Decoding time	99%	100%	100%	100%	99%	100%

- **Deblock filtering design is mostly inherited from H.264/AVC**
  - BS decision tree is the same as in AVC
    - Decision conditions
    - Boundary strength types
  - Filtering on/off and strong/weak filter decision are newly designed
  - Found some design mismatch between BS decision and others



# Problem statements

- **BS values utilized in**
  - Block filtering on/off decision
  - **tc offset assignment**
  - **However, some values are duplicate**

BS value	Usage of BS
0	Filtering off
1	Luma filtering on & tc offset = 0
2	Luma filtering on & tc offset = 0 ( <b>Same as BS=1</b> )
3	Luma filtering on & Chroma filtering on & tc offset = 2
4	Luma filtering on & Chroma filtering on & tc offset = 2 ( <b>Same as BS=3</b> )

# Proposed method

- **BS values utilized in**
  - Block filtering on/off decision
  - tc offset assignment
  - **However, some values are duplicate**
    - Remove BS=2 and 4

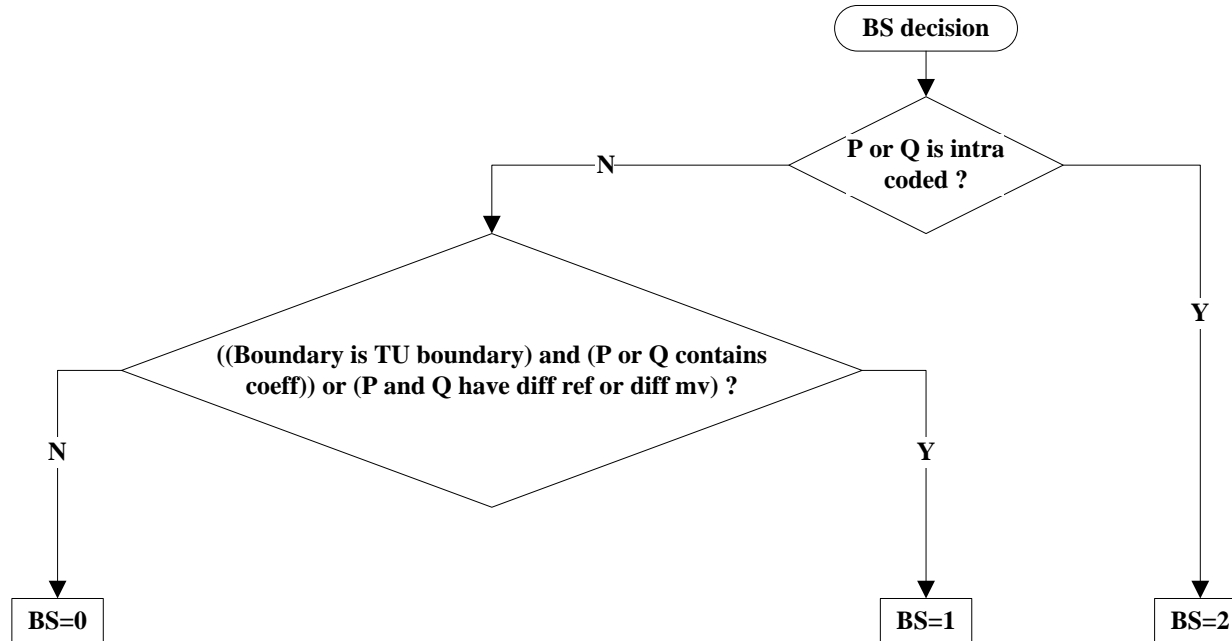
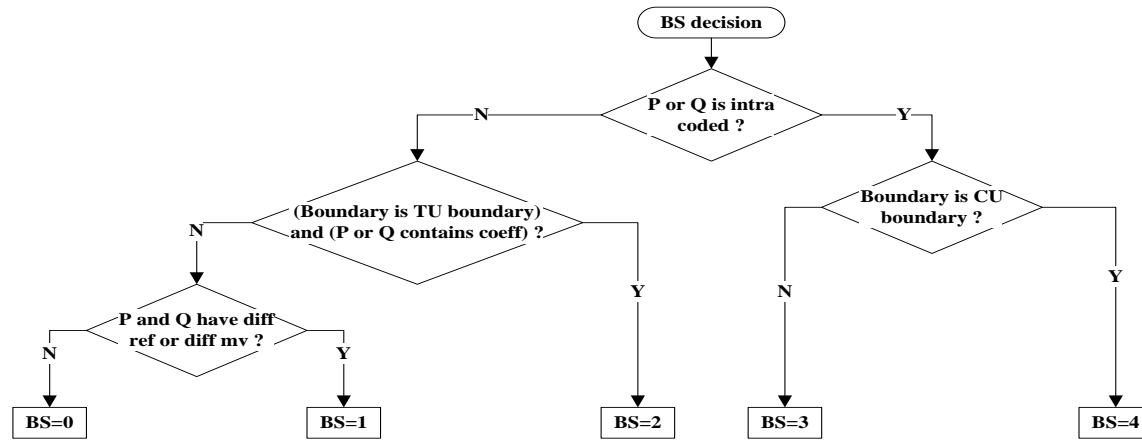
BS value	Usage of BS
0	Filtering off
1	Luma filtering on & tc offset = 0
2	<del>Luma filtering on &amp; tc offset = 0 (<b>Same as BS=1</b>)</del>
3	Luma filtering on & Chroma filtering on & tc offset = 2
4	<del>Luma filtering on &amp; Chroma filtering on &amp; tc offset = 2</del> <b>(Same as BS=3)</b>

# Proposed method

- **BS values utilized in**
  - Block filtering on/off decision
  - tc offset assignment
  - **However, some values are duplicate**
    - Remove BS=2 and 4
    - Reassign BS to 0, 1, 2

BS value	Usage of BS
0	Filtering off
1	Luma filtering on & tc offset = 0
2	Luma filtering on & Chroma filtering on & tc offset = 2

# Simplified BS Decision Tree



# Simulation Results

- Anchor: HM 4.0 with JCTVC-F900 common test conditions
- Same coding performance and visual quality with HM4.0
- We thank Panasonic (JCTVC-G959) for crosscheck

Anchor: JCTVC-F900	HE-AI			HE-RA			HE-LB		
	Y	Cb	Cr	Y	Cb	Cr	Y	Cb	Cr
BD-Rate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Encoding time	100%			100%			100%		
Decoding time	99%			100%			99%		

Anchor: JCTVC-F900	LC-AI			LC-RA			LC-LB		
	Y	Cb	Cr	Y	Cb	Cr	Y	Cb	Cr
BD-Rate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Encoding time	100%			100%			100%		
Decoding time	100%			100%			100%		



# Conclusion

- **Proposed to simplify BS decision tree**
  - Removed redundant condition check
  - Reduced number of BS values
- **Performance**
  - No change in a coding performance and visual quality as HM4.0
- **Benefit**
  - Cleaning up redundant and ambiguous process in the HM and WD