



# Non-CE6: Last run flag for palette mode

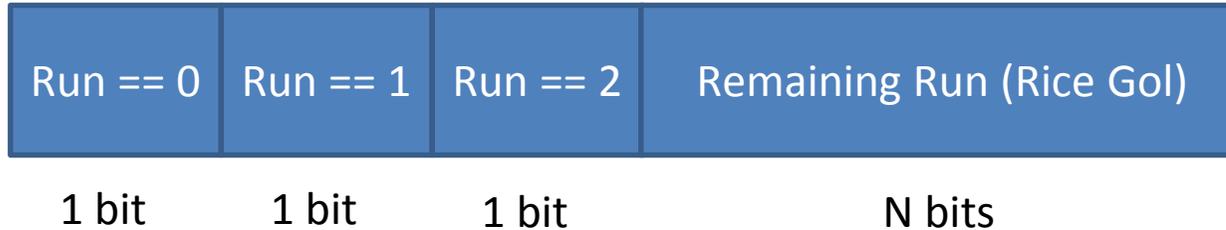
## JCTVC-S0064

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# SCM2.0 run coding

## ■ Run coding for SCM 2.0:



## ■ Adapted to short run value

# Last run flag for Palette mode

- By analyzing the run values, it seems that these values are often small or large. And when they are large they are often equal to the maximum possible value.
- Propose to add a last run flag to signal if the current run is the last run for the current CU.



# Experimental results

## ■ Anchor: SCM2.0:

### ● Average BDR AI/RA/LDB:

➤ -0.3%, -0.2 % -0.2%

	All Intra		
	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-0.4%	-0.4%	-0.5%
RGB, text & graphics with motion,720p	-0.3%	-0.4%	-0.4%
RGB, mixed content, 1440p	-0.2%	-0.2%	-0.3%
RGB, mixed content, 1080p	-0.2%	-0.2%	-0.2%
RGB, Animation, 720p	0.0%	-0.1%	-0.1%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%
YUV, text & graphics with motion, 1080p	-0.6%	-0.6%	-0.6%
YUV, text & graphics with motion,720p	-0.4%	-0.4%	-0.6%
YUV, mixed content, 1440p	-0.2%	-0.5%	-0.5%
YUV, mixed content, 1080p	-0.3%	-0.3%	-0.3%
YUV, Animation, 720p	0.0%	-0.2%	-0.2%
YUV, camera captured, 1080p	0.0%	0.0%	0.0%
Enc Time[%]	99%		
Dec Time[%]	104%		

	Random Access		
	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-0.3%	-0.2%	-0.3%
RGB, text & graphics with motion,720p	-0.2%	-0.2%	-0.3%
RGB, mixed content, 1440p	-0.1%	-0.2%	-0.1%
RGB, mixed content, 1080p	0.0%	-0.2%	-0.1%
RGB, Animation, 720p	0.0%	0.0%	0.0%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%
YUV, text & graphics with motion, 1080p	-0.3%	-0.3%	-0.3%
YUV, text & graphics with motion,720p	-0.3%	-0.4%	-0.5%
YUV, mixed content, 1440p	-0.2%	-0.3%	-0.3%
YUV, mixed content, 1080p	-0.2%	-0.6%	-0.5%
YUV, Animation, 720p	0.0%	-0.3%	-0.1%
YUV, camera captured, 1080p	0.0%	0.1%	0.0%
Enc Time[%]	99%		
Dec Time[%]	106%		

	Low delay B		
	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-0.2%	-0.2%	-0.2%
RGB, text & graphics with motion,720p	-0.4%	-0.4%	-0.3%
RGB, mixed content, 1440p	-0.1%	-0.2%	-0.3%
RGB, mixed content, 1080p	-0.3%	0.0%	0.4%
RGB, Animation, 720p	0.0%	0.1%	0.1%
RGB, camera captured, 1080p	0.0%	0.0%	0.1%
YUV, text & graphics with motion, 1080p	-0.2%	-0.3%	-0.3%
YUV, text & graphics with motion,720p	-0.3%	-0.3%	-0.6%
YUV, mixed content, 1440p	-0.2%	-0.9%	0.0%
YUV, mixed content, 1080p	0.0%	0.2%	-0.1%
YUV, Animation, 720p	0.0%	-0.2%	0.1%
YUV, camera captured, 1080p	0.0%	-0.1%	-0.1%
Enc Time[%]	99%		
Dec Time[%]	105%		

# Integration in CE6 A6 config 1

- CE6 A6 config1 integrates several modifications of the run binarization:
  - Removal of greater than 1 flag and greater than 2 flag.
  - Replacement of the Rice–Golomb code by the exponential Golomb code for the remaining run.
  - Add CABAC contexts for remaining run.
  - Limit the value of the run according to the maximum possible value. Use of truncated Golomb code.
- Truncated Golomb requires more new logic, in particular code seems complex and run coding is the only one using this new entropy coding scheme
- Its effect is actually a part of the last run flag
- ⇒ Next tests replaces the truncation part with the last run flag.

# Experimental results

- Anchor: CE6 A6 config 1:
- Test modification
  - No average difference

	All Intra		
	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	0.1%	0.1%	0.1%
RGB, text & graphics with motion,720p	0.0%	0.0%	0.0%
RGB, mixed content, 1440p	0.0%	-0.1%	0.0%
RGB, mixed content, 1080p	0.0%	0.0%	0.0%
RGB, Animation, 720p	0.0%	0.0%	0.0%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%
YUV, text & graphics with motion, 1080p	0.1%	0.1%	0.0%
YUV, text & graphics with motion,720p	0.0%	0.1%	-0.2%
YUV, mixed content, 1440p	0.0%	-0.1%	0.0%
YUV, mixed content, 1080p	0.0%	-0.1%	0.0%
YUV, Animation, 720p	0.0%	0.0%	0.0%
YUV, camera captured, 1080p	0.0%	0.0%	0.0%
Enc Time[%]	102%		

	Random Access		
	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	0.0%	0.1%	0.0%
RGB, text & graphics with motion,720p	0.0%	0.0%	0.0%
RGB, mixed content, 1440p	-0.1%	0.0%	0.0%
RGB, mixed content, 1080p	0.0%	0.2%	0.0%
RGB, Animation, 720p	0.0%	0.0%	0.0%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%
YUV, text & graphics with motion, 1080p	0.0%	0.0%	0.0%
YUV, text & graphics with motion,720p	0.0%	-0.1%	0.1%
YUV, mixed content, 1440p	0.0%	-0.1%	-0.1%
YUV, mixed content, 1080p	-0.1%	-0.2%	0.0%
YUV, Animation, 720p	0.0%	0.1%	0.0%
YUV, camera captured, 1080p	0.0%	0.1%	0.0%
Enc Time[%]	100%		

	Low delay B		
	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	0.1%	0.1%	0.1%
RGB, text & graphics with motion,720p	0.1%	-0.1%	-0.1%
RGB, mixed content, 1440p	-0.2%	-0.2%	-0.1%
RGB, mixed content, 1080p	0.1%	-0.5%	0.0%
RGB, Animation, 720p	0.0%	-0.1%	0.0%
RGB, camera captured, 1080p	0.0%	0.0%	0.1%
YUV, text & graphics with motion, 1080p	0.0%	0.1%	0.0%
YUV, text & graphics with motion,720p	-0.1%	0.0%	0.3%
YUV, mixed content, 1440p	0.1%	0.1%	0.0%
YUV, mixed content, 1080p	-0.5%	-0.4%	-0.5%
YUV, Animation, 720p	-0.1%	-0.2%	-0.5%
YUV, camera captured, 1080p	0.0%	0.1%	-0.1%
Enc Time[%]	100%		

# Conclusion

- Propose to change the palette run coding by adding a last run flag.
- Average BDR AI/RA/LDB:  $-0.3\%$ ,  $-0.2\%$   $-0.2\%$
- When using this flag in CE6 test A6 instead of truncated Golomb code, same results are obtained.