MEDIATEK

JCTVC-S0098

CE8 Test B: Single Colour Intra Mode, with Supplementary Results

PoLin Lai, Shan Liu, Yi-Wen Chen,

Tzu-Der (Peter) Chuang, Yu-Chen Sun and Shawmin Lei

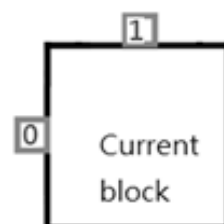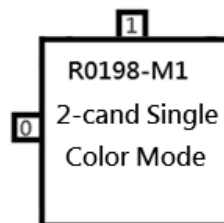19th JCTVC Meeting, Strasbourg, FR, 17-24 Oct. 2014

CE8 Test B: Single Colour Intra Mode

- Represent all samples in CU with 1 color, no residual coding
- Signalling: CU on/off, selection of the candidate
- Two candidate construction methods (JCTVC-R0198)
  - Method 1: Total 2 candidates, 2 spatial candidates, middle of line.
  - Method 2: Total 4 candidates, 2 spatial, 2 from Palette Pred.

```
coding_unit( x0, y0, log2CbSize ) {
...
  if( slice_type != I )
    cu_skip_flag[ x0 ][ y0 ]
  nCbS = ( 1 << log2CbSize )
  if( cu_skip_flag[ x0 ][ y0 ] )
    prediction_unit( x0, y0, nCbS, nCbS )
  else {
    if( slice_single_sample_mode_enable_flag )
      single_sample_flag[ x0 ][ y0 ]
    if( single_sample_flag[ x0 ][ y0 ] ) {
      single_sample_idx[ x0 ][ y0 ]
    } else {
...
}
```


R0198-M1
2-cand Single
Color Mode

Current block

Palette Pred

Candidate 2: First entry in palette pred
Candidate 3: Second entry in palette pred

CE8 Test B: Results

Method 1: 2 spatial mid-line candidates

	All Intra			Random Access			Low delay B		
	G/Y	B/U	R/V	G/Y	B/U	R/V	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-0.6%	-0.5%	-0.5%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.0%
RGB, text & graphics with motion,720p	-0.8%	-0.8%	-0.7%	-0.5%	-0.5%	-0.6%	-0.2%	-0.1%	0.1%
RGB, mixed content, 1440p	-0.3%	-0.2%	-0.3%	0.0%	0.0%	0.0%	-0.2%	-0.2%	-0.2%
RGB, mixed content, 1080p	-0.3%	-0.2%	-0.3%	0.0%	-0.1%	-0.2%	-0.4%	0.1%	0.3%
RGB, Animation, 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%
YUV, text & graphics with motion, 1080p	-0.1%	-0.1%	-0.1%	0.0%	0.1%	0.0%	0.0%	0.1%	0.1%
YUV, text & graphics with motion,720p	-0.5%	-0.6%	-0.5%	-0.3%	-0.6%	-0.5%	-0.3%	-0.1%	-0.5%
YUV, mixed content, 1440p	-0.3%	-0.3%	-0.4%	0.0%	-0.3%	-0.2%	-0.3%	-0.1%	-0.3%
YUV, mixed content, 1080p	-0.3%	-0.2%	-0.2%	-0.1%	-0.3%	-0.4%	0.0%	0.1%	0.0%
YUV, Animation, 720p	0.0%	-0.2%	-0.2%	0.0%	-0.1%	-0.1%	0.1%	-0.5%	0.1%
YUV, camera captured, 1080p	-0.1%	-0.1%	-0.2%	0.0%	0.0%	-0.2%	0.0%	-0.3%	0.0%
Enc Time[%]	102%			100%			99%		
Dec Time[%]	97%			99%			101%		

Method 2: 2 spatial candidates + Candidate from Palette Pred

	All Intra			Random Access			Low delay B		
	G/Y	B/U	R/V	G/Y	B/U	R/V	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-0.5%	-0.5%	-0.5%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.1%
RGB, text & graphics with motion,720p	-0.8%	-0.8%	-0.8%	-0.5%	-0.5%	-0.5%	-0.2%	-0.2%	-0.1%
RGB, mixed content, 1440p	-0.3%	-0.2%	-0.3%	0.0%	0.0%	-0.1%	-0.2%	-0.4%	-0.2%
RGB, mixed content, 1080p	-0.3%	-0.2%	-0.3%	0.0%	-0.2%	-0.3%	0.2%	0.0%	0.3%
RGB, Animation, 720p	0.0%	0.0%	0.0%	0.1%	0.1%	-0.1%	0.0%	0.1%	0.0%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
YUV, text & graphics with motion, 1080p	-0.2%	-0.1%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%
YUV, text & graphics with motion,720p	-0.6%	-0.6%	-0.5%	-0.3%	-0.5%	-0.4%	-0.4%	-0.2%	-0.6%
YUV, mixed content, 1440p	-0.3%	-0.3%	-0.4%	0.0%	-0.4%	-0.2%	-0.1%	-0.2%	-0.4%
YUV, mixed content, 1080p	-0.3%	-0.2%	-0.2%	-0.1%	-0.1%	-0.2%	-0.2%	0.3%	0.1%
YUV, Animation, 720p	0.0%	-0.2%	-0.2%	0.0%	-0.1%	-0.2%	0.0%	-0.4%	0.0%
YUV, camera captured, 1080p	0.0%	-0.1%	-0.1%	0.0%	-0.1%	-0.2%	0.0%	-0.4%	-0.2%
Enc Time[%]	102%			113%			111%		
Dec Time[%]	98%			123%			125%		

MEDIATEK

Thanks MERL for cross-check!

Supplementary Test: Signalling under Palette

- Move the single colour flag and index under Palette

coding_unit(x0, y0, log2CbSize) {
...
if(palette_mode_enabled_flag && ChromaArrayType == 3 &&   CuPredMode[x0][y0] == MODE_INTRA && !intra_bc_flag[x0][y0])
palette_mode_flag[x0][y0]
if(palette_mode_flag[x0][y0]){
if(slice_single_sample_mode_enable_flag)
single_sample_flag[x0][y0]
if(single_sample_flag[x0][y0]) {
single_sample_idx[x0][y0]
} else {
palette_coding(x0, y0, nCbS)
}
}
else {
...
}

Supplementary Results

Method 1, with Signal after skip above IBC, PLT

	All Intra			Random Access			Low delay B		
	G/Y	B/U	R/V	G/Y	B/U	R/V	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-0.6%	-0.5%	-0.5%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.0%
RGB, text & graphics with motion, 720p	-0.8%	-0.8%	-0.7%	-0.5%	-0.5%	-0.6%	-0.2%	-0.1%	0.1%
RGB, mixed content, 1440p	-0.3%	-0.2%	-0.3%	0.0%	0.0%	0.0%	-0.2%	-0.2%	-0.2%
RGB, mixed content, 1080p	-0.3%	-0.2%	-0.3%	0.0%	-0.1%	-0.2%	-0.4%	0.1%	0.3%
RGB, Animation, 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
RGB, camera captured, 1080p	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%
YUV, text & graphics with motion, 1080p	-0.1%	-0.1%	-0.1%	0.0%	0.1%	0.0%	0.0%	0.1%	0.1%
YUV, text & graphics with motion, 720p	-0.5%	-0.6%	-0.5%	-0.3%	-0.6%	-0.5%	-0.3%	-0.1%	-0.5%
YUV, mixed content, 1440p	-0.3%	-0.3%	-0.4%	0.0%	-0.3%	-0.2%	-0.3%	-0.1%	-0.3%
YUV, mixed content, 1080p	-0.3%	-0.2%	-0.2%	-0.1%	-0.3%	-0.4%	0.0%	0.1%	0.0%
YUV, Animation, 720p	0.0%	-0.2%	-0.2%	0.0%	-0.1%	-0.1%	0.1%	-0.5%	0.1%
YUV, camera captured, 1080p	-0.1%	-0.1%	-0.2%	0.0%	0.0%	-0.2%	0.0%	-0.3%	0.0%
Enc Time[%]		102%			100%			99%	
Dec Time[%]		97%			99%			101%	

Method 1, with Single under PLT

	All Intra			Random Access			Low delay B		
	G/Y	B/U	R/V	G/Y	B/U	R/V	G/Y	B/U	R/V
RGB, text & graphics with motion, 1080p	-0.5%	-0.5%	-0.5%	-0.2%	-0.1%	-0.1%	-0.1%	0.0%	0.1%
RGB, text & graphics with motion, 720p	-0.9%	-0.9%	-0.8%	-0.6%	-0.7%	-0.6%	-0.1%	-0.1%	0.0%
RGB, mixed content, 1440p	-0.3%	-0.3%	-0.4%	0.0%	0.0%	-0.1%	-0.2%	-0.4%	-0.4%
RGB, mixed content, 1080p	-0.3%	-0.2%	-0.3%	-0.1%	-0.2%	-0.2%	-0.1%	0.2%	0.2%
RGB, Animation, 720p	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.1%
RGB, camera captured, 1080p	-0.1%	-0.1%	-0.1%	0.1%	-0.1%	0.0%	0.0%	-0.1%	0.0%
YUV, text & graphics with motion, 1080p	-0.2%	-0.1%	-0.1%	-0.1%	0.0%	-0.1%	-0.1%	0.0%	0.1%
YUV, text & graphics with motion, 720p	-0.6%	-0.7%	-0.5%	-0.4%	-0.7%	-0.5%	-0.3%	-0.1%	-0.4%
YUV, mixed content, 1440p	-0.3%	-0.3%	-0.4%	-0.1%	-0.4%	-0.2%	-0.4%	-0.7%	-0.5%
YUV, mixed content, 1080p	-0.3%	-0.2%	-0.2%	0.0%	-0.4%	-0.3%	-0.3%	-0.7%	-0.4%
YUV, Animation, 720p	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.9%	-0.4%
YUV, camera captured, 1080p	-0.1%	-0.2%	-0.2%	0.0%	-0.1%	-0.2%	0.0%	-0.2%	-0.2%

* Performance remain similar, some gains observed.

MEDIATEK

Conclusions

Summary

- Single Colour Intra Mode:

    -- Represent CU with 1 color, **no residual coding, local candidates**

    -- Signalling: CU on/off, selection of the candidate

    -- **Largest coding gains among all CE8 proposals.**

- Singalling above or **under Palette** have similar performance

Recommendations

- Determine the signalling position, and consider adoption