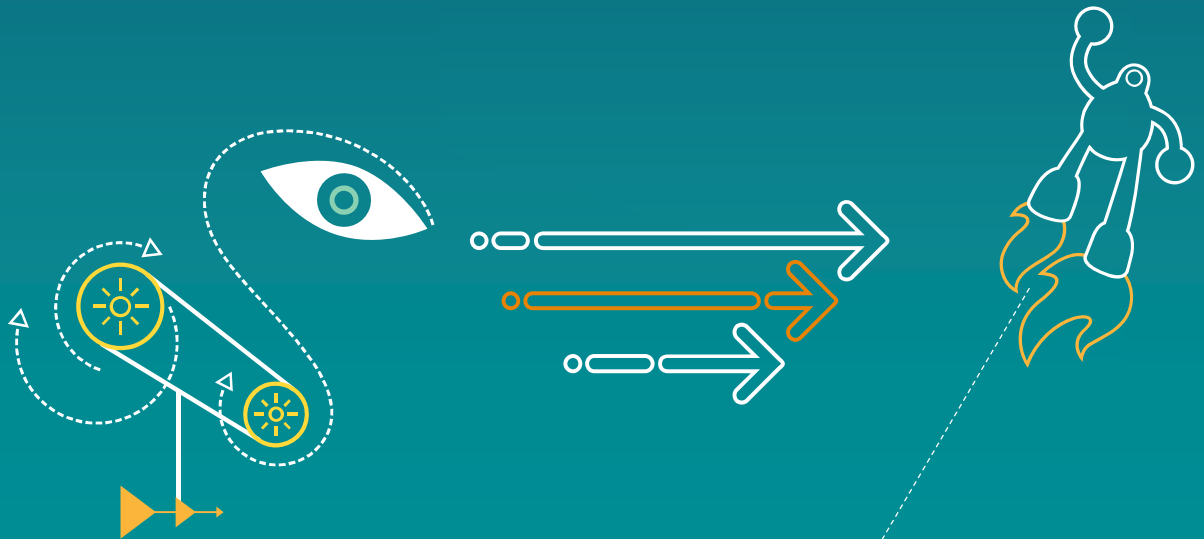V. Seregin, R. Joshi, and M. Karczewicz

# JCTVC-V0042
# SPS and PPS palette predictor initialization

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# Current palette predictor initialization

- Palette predictor initializer:
  - If pps_palette_predictor_initializer_present_flag is equal to 1, palette predictor is initialized from PPS,
  - Otherwise if sps_palette_predictor_initializer_present_flag is equal to 1, palette predictor is initialized from SPS
  - Otherwise, palette predictor is not initialized.

- Problems:
  1. Palette predictor initializer cannot be disabled on picture basis when SPS initializer is enabled
  2. Less efficient signalling due to repeated entries signalled in PPS and SPS

# Proposal 1. Allow zero size PPS initializer

- To solve the first problem, it is proposed to allow signalling zero size for PPS initializer.

- In this case, even SPS initializer is enabled, it is possible to disable PPS based initialization by signalling zero length

| | |
|---|---|
| **pps_palette_predictor_initializer_present_flag** | u(1) |
| if( pps_palette_predictor_initializer_present_flag ) { | |
| **pps_num_palette_predictor_initializer** | |
| if( pps_num_palette_predictor_initializer > 0 ) { | |
| **monochrome_palette_flag** | u(1) |
| **luma_bit_depth_entry_minus8** | ue(v) |
| if( !monochrome_palette_flag ) | |
| **chroma_bit_depth_entry_minus8** | ue(v) |
| ~~**pps_**~~**num_palette_predictor_initializer_minus1** | ue(v) |
| numComps = monochrome_palette_flag ? 1 : 3 | |
| for( comp = 0; comp < numComps; comp++ ) | |
| for( i = 0; i < pps_num_palette_predictor_initializer ~~minus1~~; i++ ) | |
| **pps_palette_predictor_initializers**[ comp ][ i ] | u(v) |
| } | |
| } | |

# Proposal 2. Combine PPS and SPS initializers

- To solve the second problem, it is proposed to combine PPS and SPS signalled entries to form one palette predictor initializer

  - SPS entries may represent sequence based characteristics
  - PPS entries can be unique per pictures
  -  No need to repeat entries
  - 76% reduction in signalling of PPS entries across all test configurations

# Test results

| | | Lossy | | | | | | Lossless | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 4:4:4 FF | | 4:4:4 4CTU | | 4:2:0 | | 4:4:4 | | 4:2:0 | |
| | | Y BD rate | PPS entr. | Y BD rate | PPS entr. | Y BD rate | PPS entr. | Y BD rate | PPS entr. | Y BD rate | PPS entr. |
| AI | RGB, text & graphics with motion, 1080p & 720p | 0.1% | 56.9% | 0.1% | 56.8% | | | 0.0% | 56.9% | | |
| | RGB, mixed content, 1440p & 1080p | 0.0% | 55.6% | 0.0% | 54.9% | | | 0.0% | 55.4% | | |
| | RGB, Animation, 720p | 0.0% | 53.5% | 0.0% | 53.1% | | | 0.0% | 100.0% | | |
| | RGB, camera captured, 1080p | 0.0% | 86.6% | 0.0% | 87.5% | | | 0.0% | 0.0% | | |
| | YUV, text & graphics with motion, 1080p & 720p | 0.0% | 60.6% | 0.1% | 60.5% | 0.0% | 65.2% | 0.0% | 56.5% | 0.0% | 48.5% |
| | YUV, mixed content, 1440p & 1080p | 0.0% | 58.9% | 0.1% | 58.3% | -0.1% | 68.8% | 0.0% | 55.7% | 0.0% | 62.5% |
| | YUV, Animation, 720p | 0.0% | 59.3% | 0.0% | 60.4% | 0.0% | 50.1% | 0.0% | 38.9% | 0.0% | 52.9% |
| | YUV, camera captured, 1080p | 0.0% | 62.3% | 0.0% | 54.4% | | | 0.0% | 100.0% | | |
| RA | RGB, text & graphics with motion, 1080p & 720p | -0.2% | 79.9% | -0.1% | 79.7% | | | 0.0% | 74.5% | | |
| | RGB, mixed content, 1440p & 1080p | 0.0% | 99.2% | 0.0% | 99.4% | | | 0.0% | 99.5% | | |
| | RGB, Animation, 720p | -0.1% | 99.7% | -0.2% | 100.0% | | | 0.0% | 0.0% | | |
| | RGB, camera captured, 1080p | 0.0% | 100.0% | 0.0% | 100.0% | | | 0.0% | 0.0% | | |
| | YUV, text & graphics with motion, 1080p & 720p | -0.4% | 83.5% | -0.2% | 82.9% | 0.0% | 87.6% | 0.0% | 74.3% | 0.0% | 68.2% |
| | YUV, mixed content, 1440p & 1080p | -0.2% | 99.7% | -0.2% | 99.3% | 0.0% | 99.4% | 0.0% | 98.9% | 0.0% | 100.0% |
| | YUV, Animation, 720p | -0.2% | 99.9% | -0.2% | 100.0% | 0.0% | 84.1% | 0.0% | 94.3% | 0.0% | 95.3% |
| | YUV, camera captured, 1080p | 0.0% | 100.0% | 0.0% | 100.0% | | | 0.0% | 0.0% | | |
| LB | RGB, text & graphics with motion, 1080p & 720p | 0.0% | 85.9% | 0.0% | 86.0% | | | 0.0% | 82% | | |
| | RGB, mixed content, 1440p & 1080p | -0.3% | 98.1% | 0.0% | 98.1% | | | 0.0% | 100% | | |
| | RGB, Animation, 720p | -0.1% | 97.0% | -0.2% | 96.2% | | | 0.0% | 0% | | |
| | RGB, camera captured, 1080p | 0.0% | 100.0% | 0.0% | 100.0% | | | 0.0% | 0% | | |
| | YUV, text & graphics with motion, 1080p & 720p | 0.0% | 87.9% | 0.0% | 88.2% | 0.0% | 94.4% | 0.0% | 84% | 0.0% | 98% |
| | YUV, mixed content, 1440p & 1080p | 0.1% | 98.7% | 0.0% | 98.6% | 0.0% | 99.4% | 0.0% | 99% | 0.0% | 100% |
| | YUV, Animation, 720p | 0.0% | 97.6% | -0.1% | 96.6% | 0.0% | 86.9% | 0.0% | 100% | 0.0% | 99% |
| | YUV, camera captured, 1080p | 0.0% | 100.0% | 0.0% | 100.0% | | | 0.0% | 0% | | |