

# **TE 8: Evaluation of RIM parallel context processing (PCP) proposal**

**(JCTVC-C063/m18086)**

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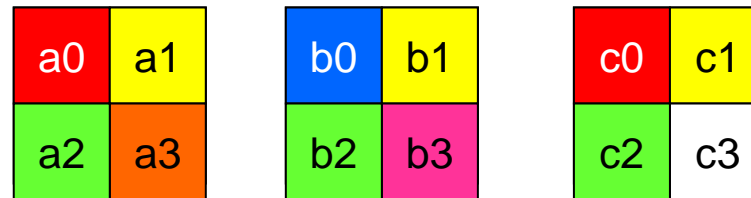
**Joint Collaborative Team on Video Coding (JCT-VC)  
of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11**

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# RIM parallel context processing (PCP)

- Proposed in JCTVC – B036 (RIM)
- Reorder sequence of flags in significance map
  - for same size transforms, group in terms of position and context, rather than blocks

e.g.



Originally: a0, a1, a2, a3, b0, b1, b2, b3, c0, c1, c2, c3  
Proposal: {a0, c0}, b0, {a1, b1, c1}, {a2, b2, c2}, a3, b3, c3

- A maximum of 4 bins are processed in parallel at a time
- Throughput estimated from  $\frac{\text{total number of bins}}{\text{number of groups } \{ \}}$
- Note: Throughput calculated only for significant map

# Cross-Verification

- TMuC-0.7 under common conditions (JCTVC-B300) except QC\_MDDT is disabled
- Simulation platform is LSF equipped with Intel(R) Xeon(R) CPU X5570@2.93GHz 64 bits Linux machines
- Coding Efficiency Results (BD-Rate) for High Efficiency Test

Intra	Random Access	Low Delay
-0.1	0.0	0.0

- RIM-PCP has a 0 to 0.1% coding **loss** compared to anchor

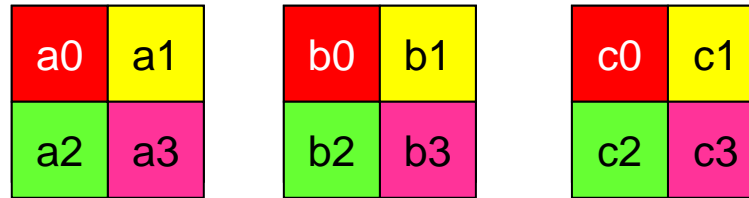
Throughput	Intra	Random Access	Low Delay
significant_coeff_flag	1.9	1.7	1.4
last_significant_coeff_flag	2.1	1.9	1.5

- RIM-PCP reports a 1.4 to 2.1 throughput improvement
- Results have been verified to mostly match those obtained from RIM

# Concerns (Serial Matching)

- Without HHI\_TRANSFORM\_CODING, contexts same for given position

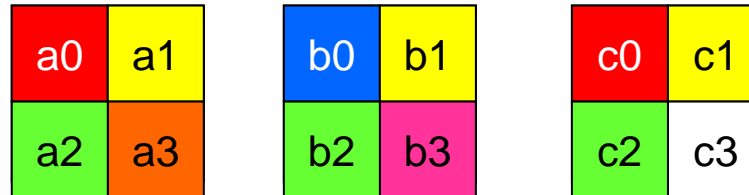
e.g.



Proposal: {a0, b0, c0}, {a1, b1, c1}, {a2, b2, c2}, {a3, b3, c3}

- With HHI\_TRANSFORM\_CODING, contexts can be different for given position

e.g.



Proposal: {a0, c0}, b0, {a1, b1, c1}, {a2, b2, c2}, a3, b3, c3

- Need to check the context index (context selection) for each block to determine if there's a match - **serial processing (not reflected in throughput measurements)**

- In worst case, up to 64 4x4 transforms

# Concerns (Serial Context Updates)

- Context update remains an issue; updates done *serially* in the software under test
- In JCTVC – B036, proposed skipping the update of up to four `significant_coeff_flag` or `last_significant_coeff_flag` that are to be processed in parallel (coding efficiency impact).
  - This was *not* implemented in the software under evaluation

# Conclusions and Recommendations

- The total loss of RIM-PCP is 0 to 0.1%. However, this is without skipping context updates.
- Serial processing required to match up contexts. Not reflected in the reported throughput benefit of 1.4 to 2.1x.
- Context updates are still being done serially, which poses a challenge for both encoding and decoding.
- Further study is recommended as part of a tool experiment.