

# AHG13: Removal of Intra Subblock Partitioning (ISP) (JVET-P0417)

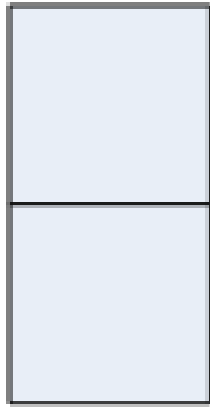
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# Intra Subblock Partitioning

- Intra Tool: Divides Luma CU into 2 or 4 smaller partitions.
  - Examples:



4x8



8x4



8x8 and larger

- All standard Intra Prediction Modes are used in each partition
- PU is no longer the same as CU

# ISP: Design Complexity

- 14 New Transform Sizes Created (56% Increase)
  - Also, 7 New PU sizes – 1 or 2 Pixels Tall

|    | 1 | 2 | 4 | 8 | 16 | 32 | 64 |
|----|---|---|---|---|----|----|----|
| 1  |   |   |   |   | Y  | Y  | Y  |
| 2  |   |   |   | Y | Y  | Y  | Y  |
| 4  |   |   | Y | Y | Y  | Y  | Y  |
| 8  |   | Y | Y | Y | Y  | Y  | Y  |
| 16 | Y | Y | Y | Y | Y  | Y  | Y  |
| 32 | Y | Y | Y | Y | Y  | Y  | Y  |
| 64 | Y | Y | Y | Y | Y  | Y  | Y  |

- 140+ lines of Spec Text
- 2 Unique Syntax Elements, 5 CABAC contexts

## AHG13 – Worst Performers (without Screen Content)

| Tool                               | Abbr | VTM6  |
|------------------------------------|------|-------|
| Sample adaptive offset             | SAO  | 0.13% |
| Multi-reference line prediction    | MRLP | 0.18% |
| Intra sub-partitioning             | ISP  | 0.20% |
| Combined intra/inter prediction    | CIIP | 0.24% |
| Symmetric motion vector difference | SMVD | 0.27% |

## Gain is Smaller for Higher Resolutions (AHG13 Results)

|                    | Random Access Main 10 |        |       |             |             |
|--------------------|-----------------------|--------|-------|-------------|-------------|
|                    | Over VTM6.0           |        |       |             |             |
|                    | Y                     | U      | V     | <u>EncT</u> | <u>DecT</u> |
| Class A1           | 0.13%                 | 0.14%  | 0.10% | 97%         | 100%        |
| Class A2           | 0.17%                 | 0.13%  | 0.04% | 98%         | 100%        |
| Class B            | 0.20%                 | 0.35%  | 0.28% | 97%         | 100%        |
| Class C            | 0.26%                 | 0.31%  | 0.27% | 97%         | 100%        |
| Class E            |                       |        |       |             |             |
| <b>Overall</b>     | 0.20%                 | 0.25%  | 0.19% | 97%         | 100%        |
| Class D            | 0.22%                 | -0.31% | 0.25% | 97%         | 100%        |
| Class F (optional) | 0.36%                 | 0.10%  | 0.41% | 97%         | 99%         |

# Conclusions

- ISP Gain does not justify Complexity
  - Gain has dropped 25% since adoption
  - Smallest gain of all AHG13 standard tools
- VVC has 8+ other Intra Coding Tools
  - 65 Angular Modes
  - Wide-Angle Intra Prediction
  - Position-Dependent Intra Prediction Combination (PDPC)
  - Cross-Component Linear Model (CCLM)
  - Matrix-based Intra Prediction (MIP)
  - Combined Intra/Inter Prediction (CIIP)
  - Intra Block Copy (IBC)
  - Luma Mapping Chroma Scaling (LMCS)



# Thank You

## AHG13: AI Results

|                    | All Intra Main10 |        |        |             |             |
|--------------------|------------------|--------|--------|-------------|-------------|
|                    | Over VTM6.0      |        |        |             |             |
|                    | Y                | U      | V      | <u>EncT</u> | <u>DecT</u> |
| Class A1           | 0.08%            | -0.06% | -0.16% | 87%         | 98%         |
| Class A2           | 0.27%            | 0.21%  | 0.24%  | 87%         | 98%         |
| Class B            | 0.40%            | 0.36%  | 0.30%  | 85%         | 97%         |
| Class C            | 0.55%            | 0.32%  | 0.53%  | 84%         | 97%         |
| Class E            | 0.72%            | 0.58%  | 0.62%  | 85%         | 97%         |
| <b>Overall</b>     | 0.41%            | 0.29%  | 0.32%  | 86%         | 97%         |
| Class D            | 0.48%            | 0.45%  | 0.52%  | 84%         | 96%         |
| Class F (optional) | 0.54%            | 0.25%  | 0.16%  | 92%         | 97%         |



## AHG13: Low Delay B Results

|                    | Low delay B Main10 |       |       |             |             |
|--------------------|--------------------|-------|-------|-------------|-------------|
|                    | Over VTM6.0        |       |       |             |             |
|                    | Y                  | U     | V     | <u>EncT</u> | <u>DecT</u> |
| Class A1           |                    |       |       |             |             |
| Class A2           |                    |       |       |             |             |
| Class B            | 0.10%              | 0.43% | 0.05% | 98%         | 100%        |
| Class C            | 0.05%              | 0.24% | 0.24% | 98%         | 100%        |
| Class E            | 0.16%              | 0.53% | 0.52% | 100%        | 101%        |
| <b>Overall</b>     | 0.10%              | 0.39% | 0.23% | 98%         | 100%        |
| Class D            | 0.07%              | 0.06% | 0.49% | 98%         | 99%         |
| Class F (optional) | 0.28%              | 0.29% | 0.77% | 99%         | 99%         |