

Unification of intra reference sample generation

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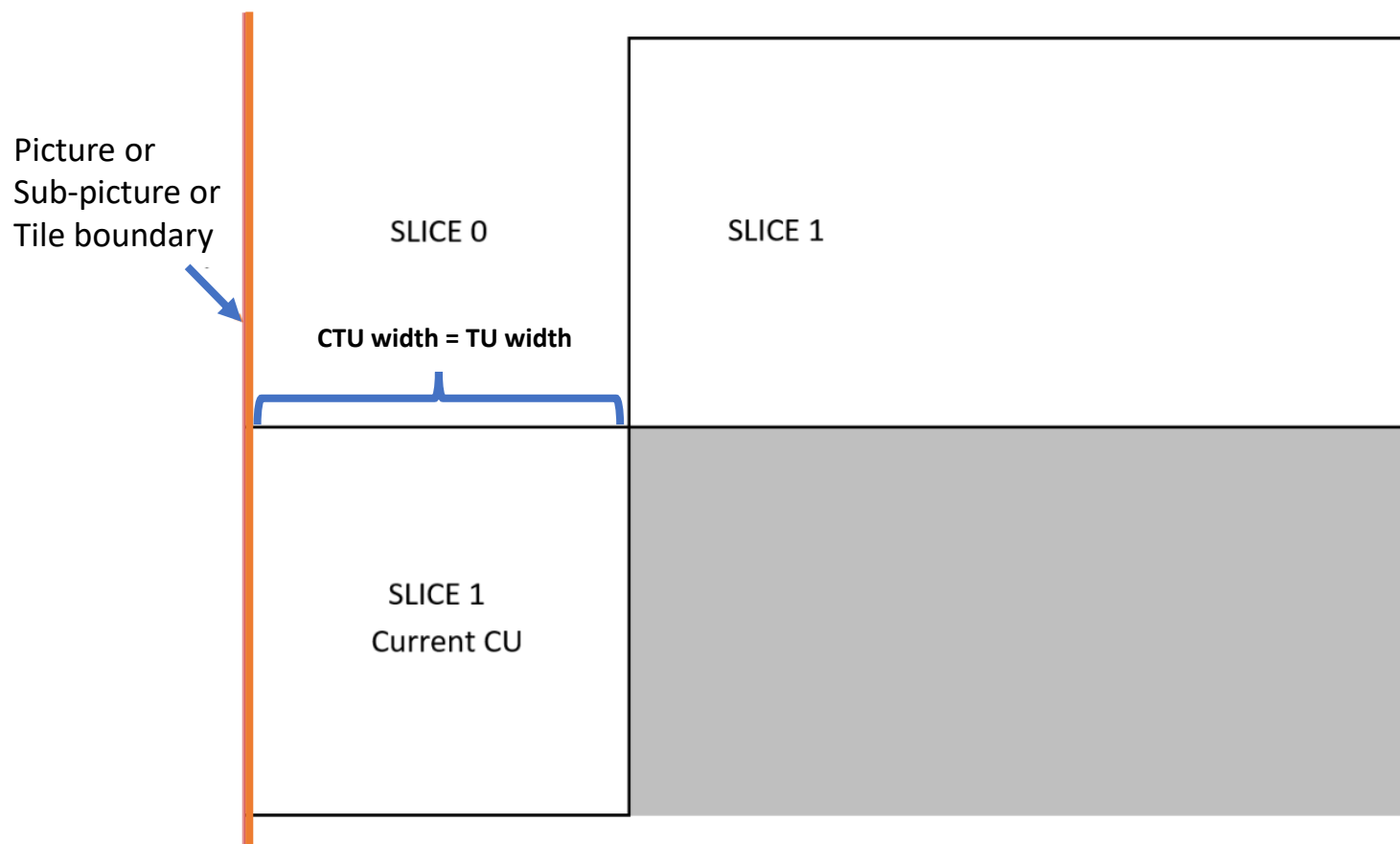
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Introduction

- Misalignment on the number of reference samples for MIP
 - VVC draft7
 - Above - TU width
 - Left - TU height
 - VTM7 software
 - Above - TU width x 2
 - Left - TU height x 2
- Due to the misalignment, the reconstruction from the draft and the reconstruction from the software can be different in non-CTC cases.
- We introduce the cases and propose methods to fix the misalignment.

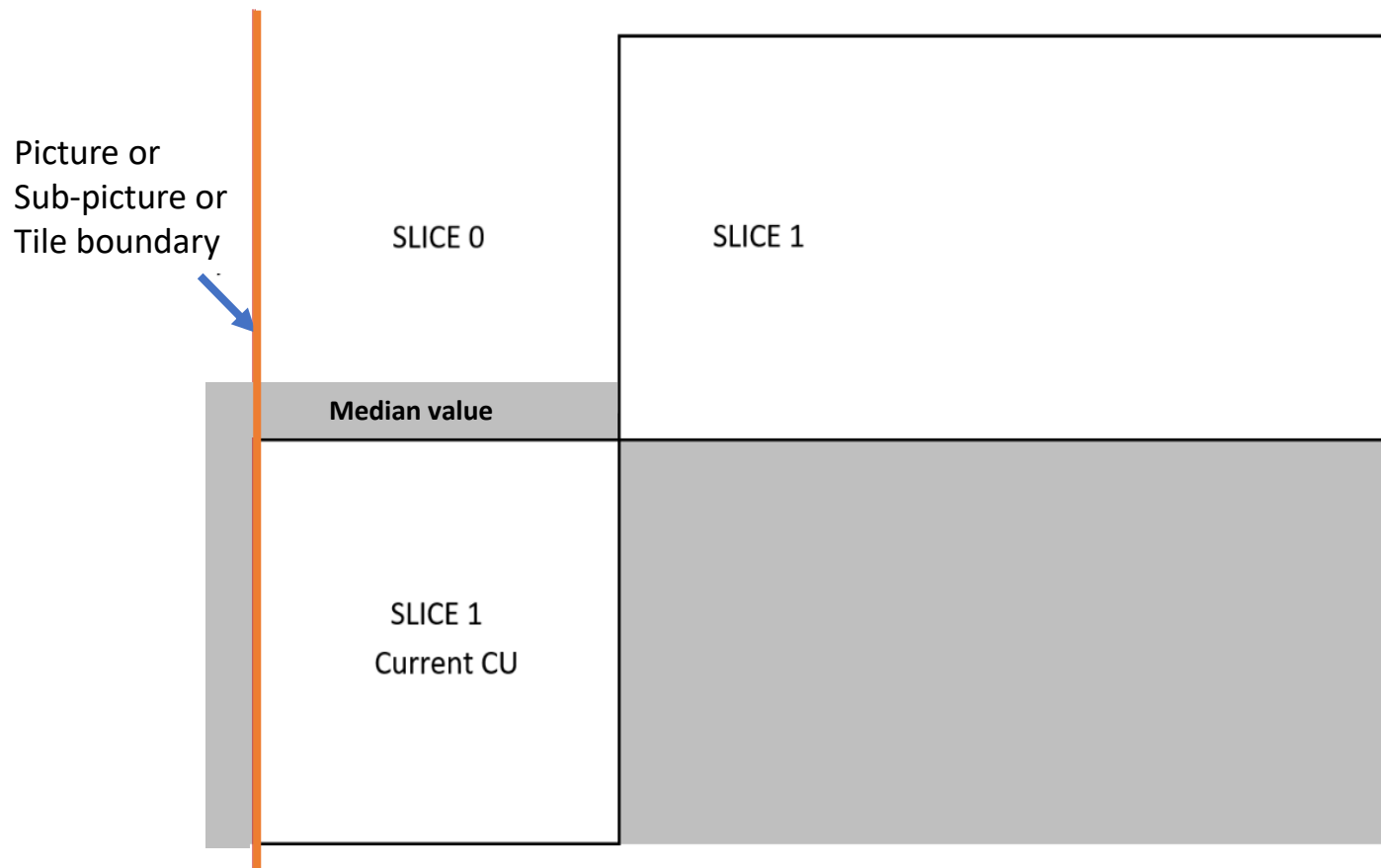
Problem Statement

- An example of the case where the mismatch would occur
 - Multiple slices
 - CTU width = transform width
 - ex) CTU = 64x64, tuWidth = 64



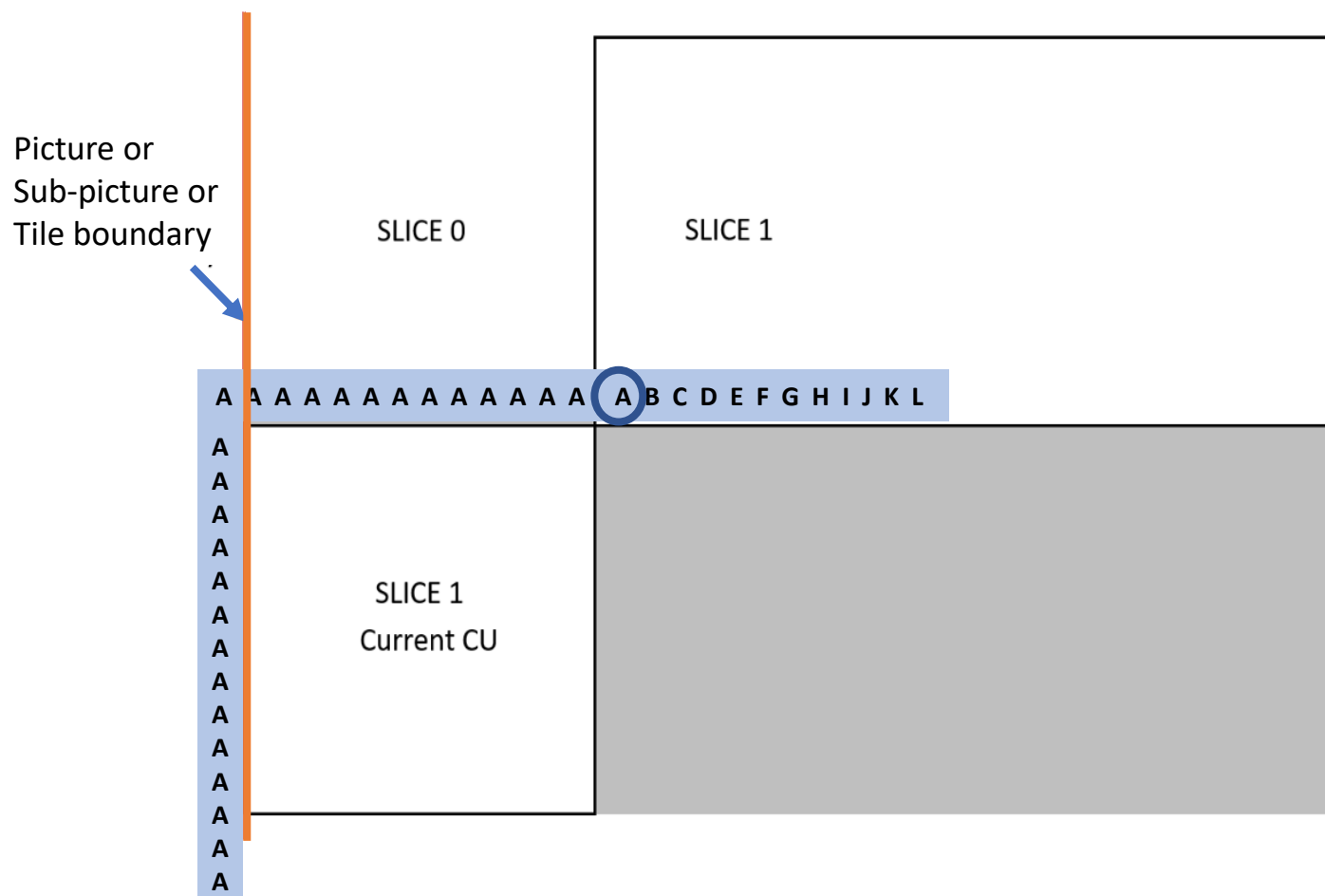
Problem Statement

- The result when the reference sample generation of **VVC draft 7** is applied



Problem Statement

- The result when the reference sample generation of **VTM7** is applied



Proposed Methods

- Method #1 - Align the text to the software (i. e. Unify with the general intra prediction)

Intra mode	Ref. sample width	Ref. sample height
MIP & General intra mode	TU width x 2	TU height x 2
ISP	CU width + TU width	CU height + TU height

- The generated reference samples can be shared in RDO process.
- Method #2 - Align the software to the text

Intra mode	Ref. sample width	Ref. sample height
MIP	TU width	TU height
General intra mode	TU width x 2	TU height x 2
ISP	CU width + TU width	CU height + TU height

- The generated reference samples cannot be shared in RDO process.
- **It is method #1 is adopted to solve the mismatch problem.**

Proposed text changes

8.4.5.2.1 Matrix-based intra sample prediction

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The variables refW and refH are derived as follows:

$$\text{refW} = \text{nTbW} * 2$$

$$\text{refH} = \text{nTbH} * 2$$

For the generation of the reference samples $\text{refT}[x]$ with $x = 0..\text{refW} - 1$ and $\text{refL}[y]$ with $y = 0..\text{refH} - 1$, the following applies:

- The reference sample availability marking process as specified in clause 8.4.5.2.7 is invoked with the sample location (x_{TbCmp} , y_{TbCmp}), reference line index equal to 0, the reference sample width refW , the reference sample height refH , colour component index equal to 0 as inputs, and the reference samples $\text{refUnfilt}[x][y]$ with $x = -1$, $y = -1..\text{refH} - 1$ and $x = 0..\text{refW} - 1$, $y = -1$ as output.
- When at least one sample $\text{refUnfilt}[x][y]$ with $x = -1$, $y = -1..\text{refH} - 1$ and $x = 0..\text{refW} - 1$, $y = -1$ is marked as "not available for intra prediction", the reference sample substitution process as specified in clause 8.4.5.2.8 is invoked with reference line index 0, the reference sample width refW , the reference sample height refH , the reference samples $\text{refUnfilt}[x][y]$ with $x = -1$, $y = -1..\text{refH} - 1$ and $x = 0..\text{refW} - 1$, $y = -1$, and colour component index 0 as inputs, and the modified reference samples $\text{refUnfilt}[x][y]$ with $x = -1$, $y = -1..\text{nTbH} - 1$ and $x = 0..\text{nTbW} - 1$, $y = -1$ as output.

Conclusion

- MIP has a misalignment between text and software on the number of reference samples to be generated.
- Due to the misalignment, the reconstruction from the draft and the reconstruction from the software would be different in non-CTC.
- To solve the problem, it is suggested to align the reference sample generation of the MIP to that of the general intra mode.
 - i.e. Align the draft to the software.
- **It is suggested to adopt into the next version of VVC draft.**