

Unification of intra reference sample generation

Dae-Yeon Kim (Chips&Media)

Sung-Chang Lim (ETRI)

Jinho Lee (ETRI)

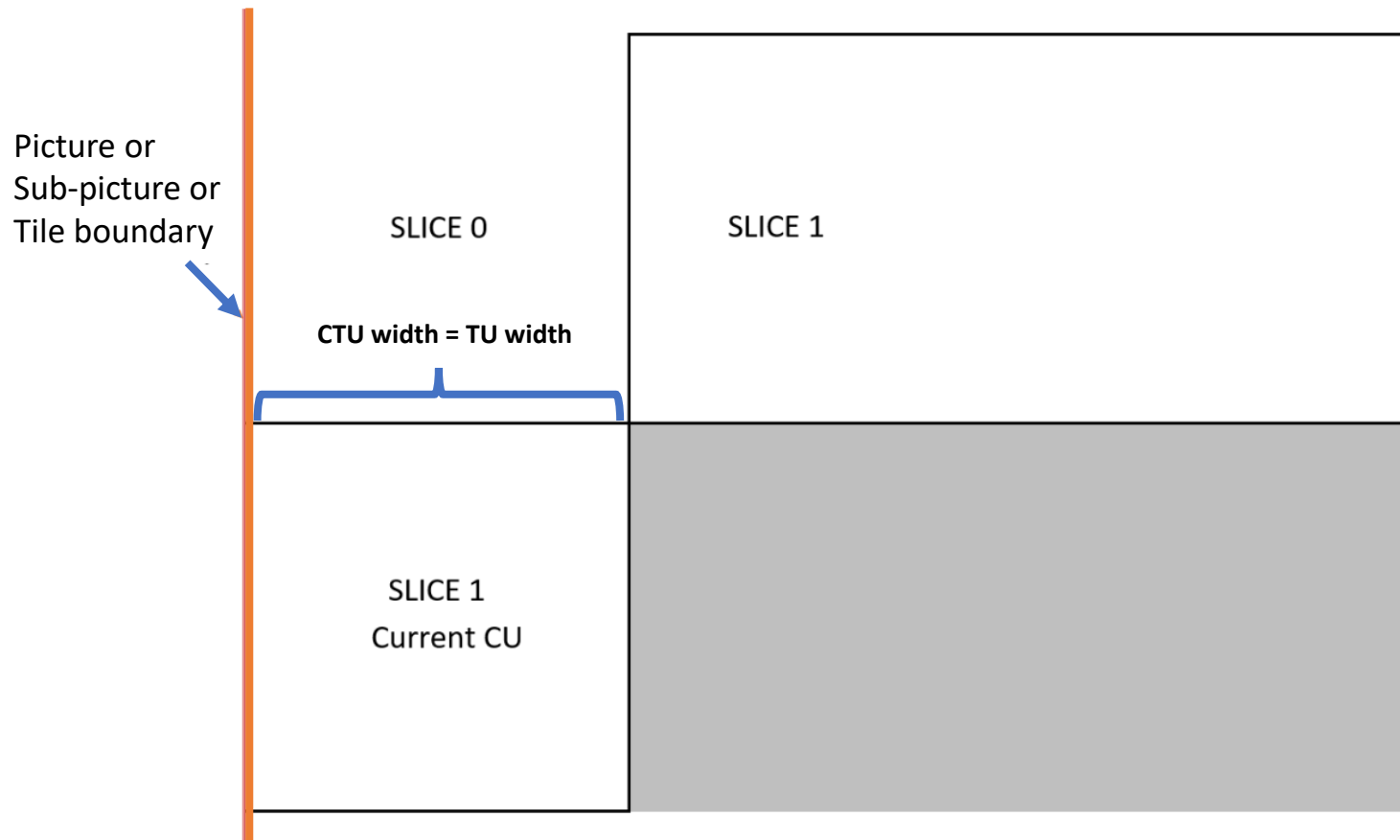
Jungwon Kang (ETRI)

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 by the draft and the reconstruction by the software can be different in non-CTC cases.
- In this contribution, we present the case and propose two methods to fix the mismatch.

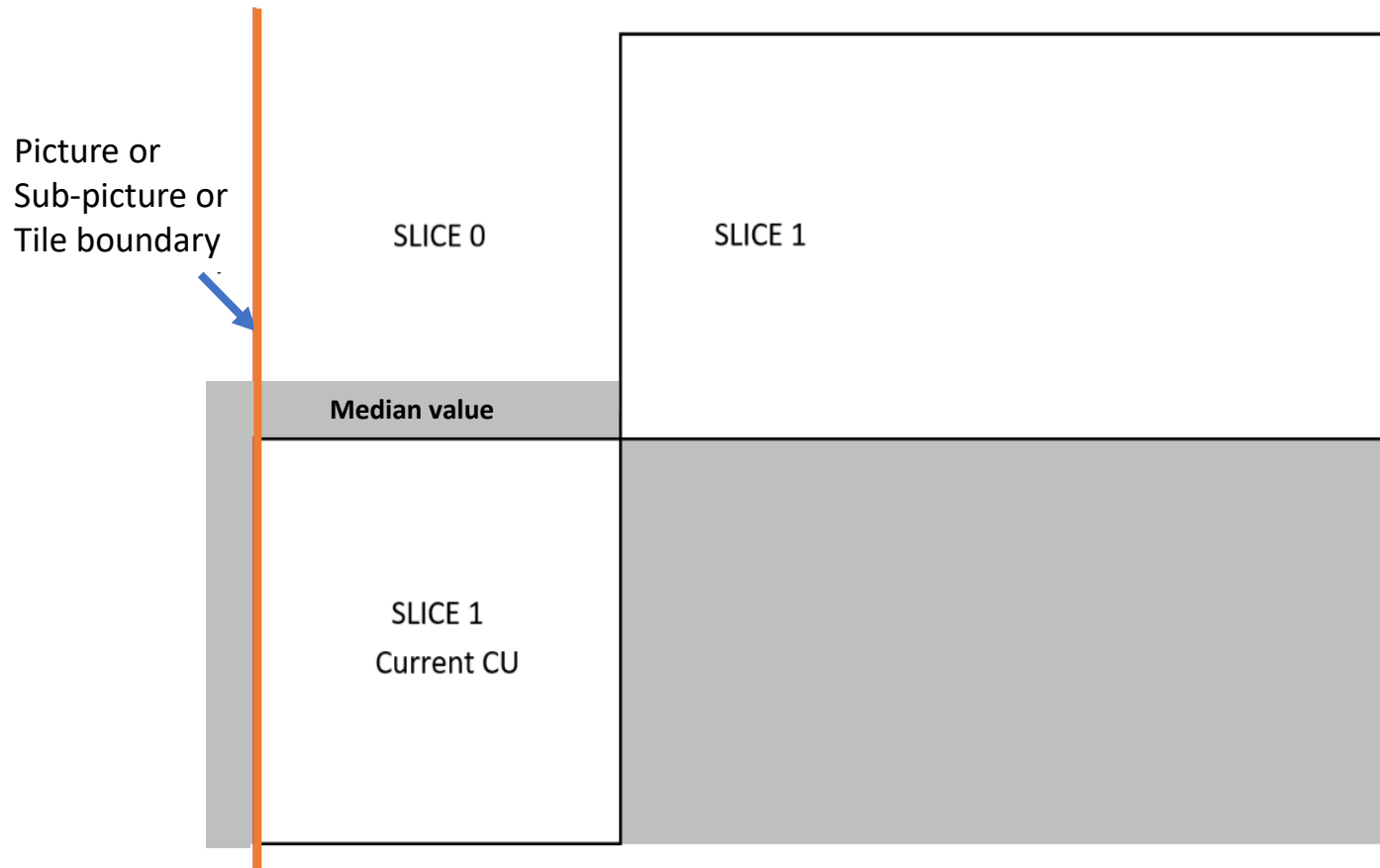
Problem Statement

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



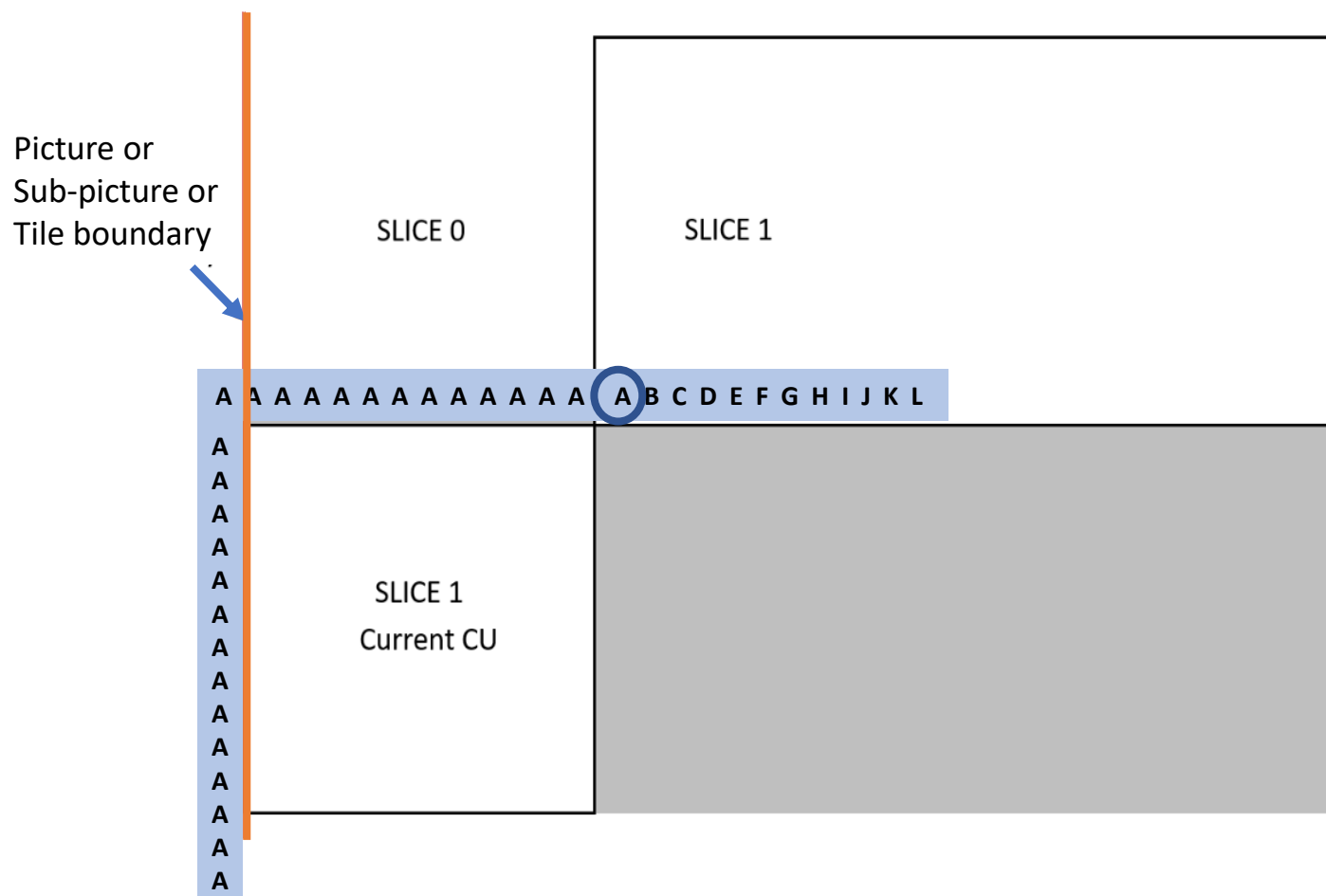
Problem Statement

- 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 (text change) - 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

- The generated reference samples can be shared in RDO process.
- Method #2 (S/W change) - 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

- The generated reference samples cannot be shared in RDO process.
- **Suggestion : Method #1 to solve the mismatch problem.**

Proposed text changes (method #1)

8.4.5.2.1 Matrix-based intra sample prediction

...

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 ($x_{\text{TbCmp}}, y_{\text{TbCmp}}$), 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, a mismatch can occur in non-CTC cases.
- To remove the mismatch, it is proposed 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 the proposed method into the next version of VVC draft.**