# INTERACTION BETWEEN SUBPICTURE AND TILE ROW SIGNALING

## CROSS REFERENCE TO RELATED APPLICATIONS

**[001]** This application is based on International Patent Application No. PCT/US2021/019235, filed on February 23, 2021, which~~Under the applicable patent law and/or rules pursuant to the Paris Convention, this application is made to timely~~ claims the priority to and benefits of U.S. Provisional Patent Application No. 62/980,963, filed on February 24, 2020. All the aforementioned patent applications are hereby incorporated by reference in their entireties. ~~For all purposes under the law, the entire disclosure of the aforementioned application is incorporated by reference as part of the disclosure of this application.~~

## TECHNICAL FIELD

**[002]** This patent document relates to image and video coding and decoding.

## BACKGROUND

**[003]** Digital video accounts for the largest bandwidth use on the internet and other digital communication networks. As the number of connected user devices capable of receiving and displaying video increases, it is expected that the bandwidth demand for digital video usage will continue to grow.

## SUMMARY

**[004]** The present document discloses techniques that can be used by video encoders and decoders for processing coded representation of video using control information useful for decoding of the coded representation.

**[005]** In one example aspect, a video processing method is disclosed. The method includes performing a conversion between a video comprising one or more video pictures and a bitstream of the video, wherein each video picture comprises one or more tiles that include one or more tile columns, wherein the bitstream conforms to a format rule, and wherein the format rule specifies that a tile column index is derived for each coding tree unit (CTU) column of a tile of a video picture.

**[006]** In another example aspect, a video processing method is disclosed. The method includes performing a conversion between a video comprising one or more video pictures and a bitstream of the video, wherein each video picture comprises one or more tiles that include one or more tile

CLAIMS

1. A method of video processing, comprising:

making a determination, according to a rule, about whether a height of a subpicture of a video picture of a video is less than a height of a tile row of the video picture; and

performing, using the determination, a conversion between the video and a bitstream of the video.

2. The method of claim 1,

wherein the rule specifies that the height of the subpicture is less than one tile row when:

the subpicture only includes coding tree units (CTUs) from the one tile row, and

either a first set of CTUs located on top of the subpicture are not the same as a second set of CTUs located on top of the one tile row, or a third set of CTUs located on the bottom of the subpicture are not the same as a fourth set of CTUs located on the bottom of the one tile row.

3. The method of claim 1,

wherein when each subpicture of the video picture includes only one slice and the height of the subpicture is less than one tile row, for each slice with picture-level slice index *i* of the video picture, a value of CtbAddrInSlice[ i ][ j ] is derived from a picture raster scan CTU address of a j-th CTU in a CTU raster scan of the subpicture, and

wherein j is in a range of 0 to a number of CTUs in a slice minus 1, inclusive.

4. The method of claim 1,

wherein the rule specifies that the height of the subpicture is less than the one tile row when:

a distance between a first set of CTUs located on top of the subpicture and a second set of CTUs located on the bottom of the subpicture is less than a second height of a tile of the video picture, wherein the second height of the tile is based on a number of CTUs of the subpicture.

5. The method of claim 1,

wherein when each subpicture of the video picture includes only one slice and the height

1. A method of video processing, comprising:

making a determination, according to a rule, about whether a height of a subpicture of a video picture of a video is less than a height of a tile row of the video picture; and

performing, using the determination, a conversion between the video and a bitstream of the video.

2. The method of claim 1,

wherein the rule specifies that the height of the subpicture is less than one tile row when:

the subpicture only includes coding tree units (CTUs) from the one tile row, and

either a first set of CTUs located on top of the subpicture are not the same as a second set of CTUs located on top of the one tile row, or a third set of CTUs located on bottom of the subpicture are not the same as a fourth set of CTUs located on bottom of the one tile row.

3. The method of claim 1,

wherein when each subpicture of the video picture includes only one slice and the height of the subpicture is less than one tile row, for each slice with a picture-level slice index *i* of the video picture, a value of CtbAddrInSlice[ i ][ j ] specifying a picture raster scan coding tree block (CTB) address of a j-th CTB within the slice is derived from the picture raster scan CTB address of the j-th CTB in a CTB raster scan of the subpicture, and

wherein i is in a range of 0 to a number of slices in the video picture minus 1, inclusive and j is in a range of 0 to a number of CTUs in a slice minus 1, inclusive.

4. The method of claim 1,

wherein the rule specifies that the height of the subpicture is less than one tile row when:

a distance between a first set of CTUs located on top of the subpicture and a second set of CTUs located on bottom of the subpicture is less than a second height of a tile of the video picture, wherein the second height of the tile is based on a number of CTUs of the tile.

5. The method of claim 1,

wherein when each subpicture of the video picture includes only one slice and the height

of the subpicture is greater than or equal to one tile row, for each slice with picture-level slice index *i* of the video picture, a value of CtbAddrInSlice[ i ][ j ] is derived from a picture raster scan CTU address of a j-th CTU in an order of CTUs in the subpicture, and

wherein j is in a range of 0 to a number of CTUs in a slice minus 1, inclusive.

6. The method of claim 5,

wherein the order of the CTUs in the subpicture is such that a first CTU in a first tile with a first tile index is placed before a second CTU in a second tile with a second tile index, and

wherein a value of the first tile index is less than that of the second tile index.

7. The method of claim 5,

wherein the order of the CTUs in the subpicture is such that CTUs within one tile in the subpicture are ordered in a raster scan of the CTUs in the one tile.

8. The method of any of claims 1 to 7, wherein the performing the conversion comprising encoding the video into the bitstream.

9. The method of any of claims 1 to 7, wherein the performing the conversion comprises encoding the video into the bitstream, and the method further comprises storing the bitstream in a non-transitory computer-readable recording medium.

10. The method of any of claims 1 to 7, wherein the performing the conversion comprises decoding the video from the bitstream.

11. A video decoding apparatus comprising a processor configured to implement a method recited in one or more of claims 1 to 10.

12. A video encoding apparatus comprising a processor configured to implement a method recited in one or more of claims 1 to 10.

of the subpicture is greater than or equal to one tile row, for each slice with a picture-level slice index *i* of the video picture, a value of CtbAddrInSlice[ i ][ j ] specifying a picture raster scan coding tree block (CTB) address of a j-th CTB within the slice is derived from the picture raster scan CTB address of the j-th CTB in an order of CTBs in the subpicture, and

wherein i is in a range of 0 to a number of slices in the video picture minus 1, inclusive and j is in a range of 0 to a number of CTUs in a slice minus 1, inclusive.

6. The method of claim 5,

wherein the order of the CTBs in the subpicture is such that a first CTB in a first tile with a first tile index is placed before a second CTB in a second tile with a second tile index, and

wherein a value of the first tile index is less than a value of the second tile index.

7. The method of claim 5 or 6,

wherein the order of the CTBs within one tile in the subpicture is ordered in a raster scan of the CTBs in the one tile.

8. The method of any one of claims 1-7, wherein performing the conversion comprises encoding the video into the bitstream.

9. The method of any one of claims 1-7, wherein performing the conversion comprises decoding the video from the bitstream.

10. An apparatus for processing video data comprising a processor and a non-transitory memory with instructions thereon, wherein the instructions upon execution by the processor, cause the processor to:

make a determination, according to a rule, about whether a height of a subpicture of a video picture of a video is less than a height of a tile row of the video picture; and

perform, using the determination, a conversion between the video and a bitstream of the video.

11. The apparatus of claim 10,

~~13. A computer program product having computer instructions stored thereon, the instructions, when executed by a processor, causes the processor to implement a method recited in any of claims 1 to 10.~~

~~14. A non-transitory computer-readable storage medium that stores a bitstream generated according to the method in any one of claims 1 to 10.~~

~~15. A non-transitory computer-readable storage medium storing instructions that cause a processor to implement a method recited in any of claims 1 to 10.~~

~~16. A method of bitstream generation, comprising:~~

~~generating a bitstream of a video according to a method recited in any of claims 1 to 10, and~~

~~storing the bitstream on a computer-readable program medium.~~

~~17. A method, an apparatus, a bitstream generated according to a disclosed method or a system described in the present document.~~

wherein when each subpicture of the video picture includes only one slice and the height of the subpicture is less than one tile row, for each slice with a picture-level slice index *i* of the video picture, a value of CtbAddrInSlice[ i ][ j ] specifying a picture raster scan coding tree block (CTB) address of a j-th CTB within the slice is derived from the picture raster scan CTB address of the j-th CTB in a CTB raster scan of the subpicture, and

wherein i is in a range of 0 to a number of slices in the video picture minus 1, inclusive and j is in a range of 0 to a number of CTUs in a slice minus 1, inclusive.

12. The apparatus of claim 10,

wherein the rule specifies that the height of the subpicture is less than one tile row when:

a distance between a first set of CTUs located on top of the subpicture and a second set of CTUs located on bottom of the subpicture is less than a second height of a tile of the video picture, wherein the second height of the tile is based on a number of CTUs of the tile.

13. The apparatus of claim 10,

wherein when each subpicture of the video picture includes only one slice and the height of the subpicture is greater than or equal to one tile row, for each slice with a picture-level slice index *i* of the video picture, a value of CtbAddrInSlice[ i ][ j ] specifying a picture raster scan coding tree block (CTB) address of a j-th CTB within the slice is derived from the picture raster scan CTB address of the j-th CTB in an order of CTBs in the subpicture,

wherein i is in a range of 0 to a number of slices in the video picture minus 1, inclusive and j is in a range of 0 to a number of CTUs in a slice minus 1, inclusive,

wherein the order of the CTBs in the subpicture is such that a first CTB in a first tile with a first tile index is placed before a second CTB in a second tile with a second tile index,

wherein a value of the first tile index is less than a value of the second tile index, and

wherein the order of the CTBs within one tile in the subpicture is ordered in a raster scan of the CTBs in the one tile.

14. A non-transitory computer-readable storage medium storing instructions that cause a processor to:

make a determination, according to a rule, about whether a height of a subpicture of a video picture of a video is less than a height of a tile row of the video picture; and

perform, using the determination, a conversion between the video and a bitstream of the video.

15. The non-transitory computer-readable storage medium of claim 14,

wherein the rule specifies that the height of the subpicture is less than one tile row when:

a distance between a first set of CTUs located on top of the subpicture and a second set of CTUs located on bottom of the subpicture is less than a second height of a tile of the video picture, wherein the second height of the tile is based on a number of CTUs of the tile,

wherein when each subpicture of the video picture includes only one slice and the height of the subpicture is less than one tile row, for each slice with a picture-level slice index *i* of the video picture, a value of CtbAddrInSlice[ i ][ j ] specifying a picture raster scan coding tree block (CTB) address of a j-th CTB within the slice is derived from the picture raster scan CTB address of the j-th CTB in a CTB raster scan of the subpicture, and

wherein i is in a range of 0 to a number of slices in the video picture minus 1, inclusive and j is in a range of 0 to a number of CTUs in a slice minus 1, inclusive.

16. The non-transitory computer-readable storage medium of claim 14,

wherein when each subpicture of the video picture includes only one slice and the height of the subpicture is greater than or equal to one tile row, for each slice with a picture-level slice index *i* of the video picture, a value of CtbAddrInSlice[ i ][ j ] specifying a picture raster scan coding tree block (CTB) address of a j-th CTB within the slice is derived from the picture raster scan CTB address of the j-th CTB in an order of CTBs in the subpicture,

wherein i is in a range of 0 to a number of slices in the video picture minus 1, inclusive and j is in a range of 0 to a number of CTUs in a slice minus 1, inclusive,

wherein the order of the CTBs in the subpicture is such that a first CTB in a first tile with a first tile index is placed before a second CTB in a second tile with a second tile index,

wherein a value of the first tile index is less than a value of the second tile index, and

wherein the order of the CTBs within one tile in the subpicture is ordered in a raster scan of the CTBs in the one tile.

17. A non-transitory computer-readable recording medium storing a bitstream of a video which is generated by a method performed by a video processing apparatus, wherein the method comprises:

making a determination, according to a rule, about whether a height of a subpicture of a video picture of a video is less than a height of a tile row of the video picture; and

generating, using the determination, the bitstream of the video.

18. The non-transitory computer-readable recording medium of claim 17,

wherein when each subpicture of the video picture includes only one slice and the height of the subpicture is less than one tile row, for each slice with a picture-level slice index *i* of the video picture, a value of CtbAddrInSlice[ i ][ j ] specifying a picture raster scan coding tree block (CTB) address of a j-th CTB within the slice is derived from the picture raster scan CTB address of the j-th CTB in a CTB raster scan of the subpicture, and

wherein i is in a range of 0 to a number of slices in the video picture minus 1, inclusive and j is in a range of 0 to a number of CTUs in a slice minus 1, inclusive.

19. The non-transitory computer-readable recording medium of claim 17,

wherein the rule specifies that the height of the subpicture is less than one tile row when:

a distance between a first set of CTUs located on top of the subpicture and a second set of CTUs located on bottom of the subpicture is less than a second height of a tile of the video picture, wherein the second height of the tile is based on a number of CTUs of the tile.

20. The non-transitory computer-readable recording medium of claim 17,

wherein when each subpicture of the video picture includes only one slice and the height of the subpicture is greater than or equal to one tile row, for each slice with a picture-level slice index *i* of the video picture, a value of CtbAddrInSlice[ i ][ j ] specifying a picture raster scan coding tree block (CTB) address of a j-th CTB within the slice is derived from the picture raster scan CTB address of the j-th CTB in an order of CTBs in the subpicture,

wherein i is in a range of 0 to a number of slices in the video picture minus 1, inclusive and j is in a range of 0 to a number of CTUs in a slice minus 1, inclusive,

wherein the order of the CTBs in the subpicture is such that a first CTB in a first tile with a first tile index is placed before a second CTB in a second tile with a second tile index,

wherein a value of the first tile index is less than a value of the second tile index, and

wherein the order of the CTBs within one tile in the subpicture is ordered in a raster scan of the CTBs in the one tile.