CLAIMS

What is claimed is:

1. A method implemented in a decoder, the method comprising:

receiving a bitstream comprising a first flag and coded data of a picture including a sub-picture with a sub-picture boundary;

decoding the sub-picture, wherein the subpicture contains one or more slices, and a slice of the one or more slices consists of an integer number of complete tiles;

performing in-loop filtering operations across the sub-picture boundary when the first flag is a first value; and

omitting in-loop filtering operations across the sub-picture boundary when the first flag is a second value;

wherein the bitstream further comprises a second flag, wherein the second flag indicates that in-loop filtering operations across boundaries of a tile is enabled when the second flag is equal to one, and the second flag indicates that in-loop filtering operations are not performed across boundaries of the tile when the second flag is equal to zero.

2. The method of claim 1, wherein the first flag is denoted as a loop_filter_across_subpic _enabled_flag.

3. The method of any of claims 1-2, wherein the loop_filter_across_subpic_enabled _flag is one when specifying that in-loop filtering operations can be performed across boundaries of the subpicture, and wherein the loop_filter_across_subpic_enabled_flag is zero when specifying that in-loop filtering operations are not performed across boundaries of the subpicture.

4. The method of any of claims 1-3, wherein filtering operations include application of a deblocking filter.

5. The method of any of claims 1-4, wherein filtering operations include application of an adaptive loop filter (ALF).

6. The method of any of claims 1-5, wherein filtering operations include application of a sample adaptive offset (SAO) filter.

7. The method of any of claims 1-6, wherein the bitstream further comprises a sequence parameter set (SPS) including a subpic_treated_as_pic _flag[i], wherein i is an index of the sub-picture, and wherein the subpic_treated_as_pic_flag[i] is equal to one to specify that an i-th sub-picture of each coded picture in a coded video sequence (CVS) is treated as a the picture in a decoding process exclusive of in-loop filtering operations.

8. A method implemented in an encoder, the method comprising:

partitioning a picture into a sub-picture with a sub-picture boundary, wherein the subpicture contains one or more slices, and a slice of the one or more slices consists of an integer number of complete tiles;

encoding a first flag in a bitstream to indicate whether in-loop filtering operations are performed across the sub-picture boundary;

encoding a second flag in the bitstream to indicate whether in-loop filtering operations are performed across boundaries of a tile;

encoding the sub-picture in the bitstream.

9. The method of claim 8, further comprising:

decoding the sub-picture for use in a reference picture;

performing filtering operations across the sub-picture boundary when the first flag is set to a first value; and

omitting filtering operations across the sub-picture boundary when the first flag is set to a second value.

10. The method of any of claims 8-9, wherein the first flag is denoted as a loop_filter_across_subpic _enabled_flag.

11. The method of any of claims 8-10, wherein the loop_filter_across_subpic_enabled _flag is set to one when specifying that in-loop filtering operations can be performed across boundaries of the subpicture, and wherein the loop_filter_across_subpic_enabled_flag is set to zero when specifying that in-loop filtering operations are not performed across boundaries of the subpicture.

12. The method of any of claims 8-11, wherein filtering operations include application of a deblocking filter.

13. The method of any of claims 8-12, wherein filtering operations include application of an adaptive loop filter (ALF).

14. The method of any of claims 8-13, wherein filtering operations include application of a sample adaptive offset (SAO) filter.

15. The method of any of claims 8-14, further comprising encoding into the bitstream, by the processor, a sequence parameter set (SPS) including a subpic_treated_as_pic _flag[i], wherein i is an index of the sub-picture, and wherein the subpic_treated_as_pic_flag[i] is set equal to one to specify that an i-th sub-picture of each coded picture in a coded video sequence (CVS) is treated as a picture in a decoding process exclusive of in-loop filtering operations.

16. A video coding device comprising:

a processor, a receiver coupled to the processor, a memory coupled to the processor, and a transmitter coupled to the processor, wherein the processor, receiver, memory, and transmitter are configured to perform the method of any of claims 1-15.

17. A non-transitory computer readable medium comprising a computer program product for use by a video coding device, the computer program product comprising computer executable instructions stored on the non-transitory computer readable medium such that when executed by a processor cause the video coding device to perform the method of any of claims 1-15.

18. A decoder comprising:

a receiving unit, configured to receive a bitstream comprising a first flag and coded data of a picture including a sub-picture with a sub-picture boundary;

a decoding unit, configured to decode the sub-picture, wherein the subpicture contains one or more slices, and a slice of the one or more slices consists of an integer number of complete tiles;

a filtering unit, configured to:

perform in-loop filtering operations across the sub-picture boundary when the first flag is a first value; and

omit in-loop filtering operations across the sub-picture boundary when the first flag is a second value;

wherein the bitstream further comprises a second flag, wherein the second flag indicates that in-loop filtering operations across boundaries of a tile is enabled when the second flag is equal to one, and the second flag indicates that in-loop filtering operations are not performed across boundaries of the tile when the second flag is equal to zero.

19. The decoder of claim 18, wherein the decoder is further configured to perform the method of any of claims 2-7.

20. An encoder comprising:

a partitioning unit, configured to partition a picture into a sub-picture with a sub-picture boundary, wherein the subpicture contains one or more slices, and a slice of the one or more slices consists of an integer number of complete tiles;

a coding unit, configured to:

encode a first flag in a bitstream to indicate whether filtering operations are performed across the sub-picture boundary;

encode the sub-picture in the bitstream; encode a second flag in the bitstream to indicate whether in-loop filtering operations are performed across boundaries of a tile;

a filtering unit, configured to:

perform in-loop filtering operations across the sub-picture boundary when the first flag is set to a first value; and

omit in-loop filtering operations across the sub-picture boundary when the first flag is set to a second value.

21. The encoder of claim 20, wherein the encoder is further configured to perform the method of any of claims 9-15.

22. A computer program product comprising program code for performing the method according to any of claims 1 to 15 when executed on a computer or a processor.

23. A non-transitory storage medium which includes a coded video bitstream, wherein the coded video bitstream comprises a first flag and coded data of a picture including a sub-picture with a sub-picture boundary, wherein the subpicture contains one or more slices, and a slice of the one or more slices consists of an integer number of complete tiles, and the first flag indicates whether in-loop filtering operations across the sub-picture boundary is enabled; wherein the bitstream further comprises a second flag, wherein the second flag indicates that in-loop filtering operations across boundaries of a tile is enabled when the second flag is equal to one, and the second flag indicates that in-loop filtering operations are not performed across boundaries of the tile when the second flag is equal to zero.