CLAIMS

1. A method of decoding video data, the method comprising:

decoding, from a video bitstream for which adaptive loop filtering is enabled for luma blocks of one or more of a picture, a slice, a tile, or a tile group, a first syntax element indicating a number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, wherein adaptation parameter set carriers adaptive loop filter parameters;

decoding a plurality of first adaptation parameter set indices for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group;

decoding, from the video bitstream for which adaptive loop filtering is enabled for chroma blocks of the one or more of the picture, the slice, the tile, or the tile group, a second adaptation parameter set index for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group;

applying first adaptive loop filters to the luma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the plurality of first adaptation parameter set indices; and

applying a second adaptive loop filter to the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the second adaptation parameter set index.

2. The method of claim 1, further comprising:

receiving the first syntax element indicating the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, the plurality of first adaptation parameter set indices for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, and the second adaptation parameter set index for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group in one or more of a picture header, a slice header, a tile header, or a tile group header of the video bitstream.

3. The method of claim 1, wherein each of the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group includes a respective set of luma adaptive loop filters.

4. The method of claim 3, wherein each of the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group includes only the respective set of luma adaptive loop filters.

5. The method of claim 1, wherein an adaptation parameter set corresponding to the second adaptation parameter set index includes a set of chroma adaptive loop filters.

6. The method of claim 5, wherein the adaptation parameter set corresponding to the second adaptation parameter set index includes only the set of chroma adaptive loop filters.

7. The method of claim 1, further comprising:

decoding, from the video bitstream, a second syntax element indicating if luma adaptive loop filter information for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group is updated; and

decoding, from the video bitstream, a third syntax element indicating if chroma adaptive loop filter information for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group is updated.

8. The method of claim 1, further comprising:

displaying a picture that includes filtered luma blocks of the one or more of the picture, the slice, the tile, or the tile group and filtered chroma blocks of the one or more of the picture, the slice, the tile, or the tile group.

9. An apparatus configured to decode video data, the apparatus comprising:

a memory configured to store luma blocks of one or more of a picture, a slice, a tile, or a tile group and chroma blocks of the one or more of the picture, the slice, the tile, or the tile group; and

one or more processors, implemented in circuitry and in communication with the memory, the one or more processors configured to:

decode, from a video bitstream for which adaptive loop filtering is enabled for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, a first syntax element indicating a number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, wherein adaptation parameter sets include parameters for adaptive loop filters;

decode a plurality of first adaptation parameter set indices for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group;

decode, from the video bitstream for which adaptive loop filtering is enabled for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group, a second adaptation parameter set index for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group;

apply first adaptive loop filters to the luma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the plurality of first adaptation parameter set indices; and

apply a second adaptive loop filter to the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the second adaptation parameter set index.

10. The apparatus of claim 9, wherein the one or more processors are further configured to:

receive the first syntax element indicating the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, the plurality of first adaptation parameter set indices for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, and the second adaptation parameter set index for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group in one or more of a picture header, a slice header, a tile header, or a tile group header of the video bitstream.

11. The apparatus of claim 9, wherein each of the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group includes a respective set of luma adaptive loop filters.

12. The apparatus of claim 11, wherein each of the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group includes only the respective set of luma adaptive loop filters.

13. The apparatus of claim 9, wherein an adaptation parameter set corresponding to the second adaptation parameter set index includes a set of chroma adaptive loop filters.

14. The apparatus of claim 13, wherein the adaptation parameter set corresponding to the second adaptation parameter set index includes only set of chroma adaptive loop filters.

15. The apparatus of claim 9, wherein the one or more processors are further configured to:

decode, from the video bitstream, a second syntax element indicating if luma adaptive loop filter information for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group is updated; and

decode, from the video bitstream, a third syntax element indicating if chroma adaptive loop filter information for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group is updated.

16. The apparatus of claim 9, further comprising:

a display configured to display a picture that includes filtered luma blocks of the one or more of the picture, the slice, the tile, or the tile group and filtered chroma blocks of the one or more of the picture, the slice, the tile, or the tile group.

17. An apparatus configured to decode video data, the apparatus comprising:

means for decoding, from a video bitstream for which adaptive loop filtering is enabled for luma blocks of one or more of a picture, a slice, a tile, or a tile group, a first syntax element indicating a number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, wherein adaptation parameter sets include parameter for adaptive loop filters;

means for decoding a plurality of first adaptation parameter set indices for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group;

means for decoding, from the video bitstream for which adaptive loop filtering is enabled for chroma blocks of the one or more of the picture, the slice, the tile, or the tile group, a second adaptation parameter set index for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group;

means for applying first adaptive loop filters to the luma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the plurality of first adaptation parameter set indices; and

means for applying a second adaptive loop filter to the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the second adaptation parameter set index.

18. A non-transitory computer-readable storage medium storing instructions that, when executed, cause one or more processors of a device configured to decode video data to:

decode, from a video bitstream for which adaptive loop filtering is enabled for luma blocks of one or more of a picture, a slice, a tile, or a tile group, a first syntax element indicating a number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, wherein adaptation parameter sets include parameters for adaptive loop filters;

decode a plurality of first adaptation parameter set indices for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group;

decode, from the video bitstream for which adaptive loop filtering is enabled for chroma blocks of the one or more of the picture, the slice, the tile, or the tile group, a second adaptation parameter set index for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group;

apply first adaptive loop filters to the luma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the plurality of first adaptation parameter set indices; and

apply a second adaptive loop filter to the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the second adaptation parameter set index.

19. A method of encoding video data, the method comprising:

encoding, for a video bitstream for which adaptive loop filtering is enabled for luma blocks of one or more of a picture, a slice, a tile, or a tile group, a first syntax element indicating a number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, wherein adaptation parameter sets include parameters for adaptive loop filters;

encoding a plurality of first adaptation parameter set indices for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group; and

encoding, for the video bitstream for which adaptive loop filtering is enabled for chroma blocks of the one or more of the picture, the slice, the tile, or the tile group, a second adaptation parameter set index for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group.

20. The method of claim 19, further comprising:

signaling the first syntax element indicating the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, the plurality of first adaptation parameter set indices for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, and the second adaptation parameter set index for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group in one or more of a picture header, a slice header, a tile header, or a tile group header of the video bitstream.

21. The method of claim 19, wherein each of the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group includes a respective set of luma adaptive loop filters.

22. The method of claim 21, wherein each of the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group includes only the respective set of luma adaptive loop filters.

23. The method of claim 19, wherein an adaptation parameter set corresponding to the second adaptation parameter set index includes a set of chroma adaptive loop filters.

24. The method of claim 23, wherein the adaptation parameter set corresponding to the second adaptation parameter set index includes only set of chroma adaptive loop filters.

25. The method of claim 19, further comprising:

encoding a second syntax element indicating if luma adaptive loop filter information for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group is updated; and

encoding a third syntax element indicating if chroma adaptive loop filter information for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group is updated.

26. The method of claim 19, further comprising:

capturing a picture that includes the luma blocks of the one or more of the picture, the slice, the tile, or the tile group and the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group.

27. An apparatus configured to encode video data, the apparatus comprising:

a memory configured to store luma blocks of one or more of a picture, a slice, a tile, or a tile group and chroma blocks of the one or more of the picture, the slice, the tile, or the tile group; and

one or more processors, implemented in circuitry and in communication with the memory, the one or more processors configured to:

encode, for a video bitstream for which adaptive loop filtering is enabled for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, a first syntax element indicating a number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, wherein adaptation parameters sets include parameters for adaptive loop filters;

encode a plurality of first adaptation parameter set indices for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group; and

encode, for the video bitstream for which adaptive loop filtering is enabled for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group, a second adaptation parameter set index for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group.

28. The apparatus of claim 27, wherein the one or more processors are further configured to:

signal the first syntax element indicating the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, the plurality of first adaptation parameter set indices for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, and the second adaptation parameter set index for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group in one or more of a picture header, a slice header, a tile header, or a tile group header of the video bitstream.

29. The apparatus of claim 27, wherein each of the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group includes a respective set of luma adaptive loop filters.

30. The apparatus of claim 29, wherein each of the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group includes only the respective set of luma adaptive loop filters.

31. The apparatus of claim 27, wherein an adaptation parameter set corresponding to the second adaptation parameter set index includes a set of chroma adaptive loop filters.

32. The apparatus of claim 31, wherein the adaptation parameter set corresponding to the second adaptation parameter set index includes only set of chroma adaptive loop filters.

33. The apparatus of claim 27, wherein the one or more processors are further configured to:

encode a second syntax element indicating if luma adaptive loop filter information for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group is updated; and

encode a third syntax element indicating if chroma adaptive loop filter information for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group is updated.

34. The apparatus of claim 27, further comprising:

a camera configured to capture a picture that includes the luma blocks of the one or more of the picture, the slice, the tile, or the tile group and the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group.

35. An apparatus configured to encode video data, the apparatus comprising:

means for encoding, for a video bitstream for which adaptive loop filtering is enabled for luma blocks of one or more of a picture, a slice, a tile, or a tile group, a first syntax element indicating a number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, wherein adaptation parameter sets include parameters for adaptive loop filters;

means for encoding a plurality of first adaptation parameter set indices for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group; and

means for encoding, for the video bitstream for which adaptive loop filtering is enabled for chroma blocks of the one or more of the picture, the slice, the tile, or the tile group, a second adaptation parameter set index for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group.

36. A non-transitory computer-readable storage medium storing instructions that, when executed, cause one or more processors of a device configured to encode video data to:

encode, for a video bitstream for which adaptive loop filtering is enabled for luma blocks of one or more of a picture, a slice, a tile, or a tile group, a first syntax element indicating a number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group, wherein adaptation parameter sets include parameters for adaptive loop filters;

encode a plurality of first adaptation parameter set indices for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group based on the number of adaptation parameter sets for the luma blocks of the one or more of the picture, the slice, the tile, or the tile group; and

encode, for the video bitstream for which adaptive loop filtering is enabled for chroma blocks of the one or more of the picture, the slice, the tile, or the tile group, a second adaptation parameter set index for the chroma blocks of the one or more of the picture, the slice, the tile, or the tile group.