

CLAIMS

WHAT IS CLAIMED IS:

1. An apparatus for decoding video data, the apparatus comprising:
5 a memory; and
at least one processor coupled to the memory and configured to:
obtain a video bitstream, the video bitstream including adaptive loop filter
(ALF) data;
determine a value of an ALF chroma filter signal flag from the ALF data, the
10 value of the ALF chroma filter signal flag indicating whether chroma ALF filter data is
signaled in the video bitstream; and
process at least a portion of a slice of video data based on the value of the ALF
chroma filter signal flag.
- 15 2. The apparatus of claim 1, wherein the at least one processor is further
configured to:
obtain a slice header for the slice of video data from the video bitstream;
determine a value of an ALF chroma identifier from the slice header, the value of the
ALF chroma identifier indicating whether an ALF can be applied to one or more chroma
20 components of the slice; and
process at least the portion of the slice of video data based on the ALF chroma identifier
from the slice header.
- 25 3. The apparatus of claim 2, wherein the at least one processor is further
configured to:
determine a value of a chroma format identifier from the slice header, the value of the
chroma format identifier and the value of the ALF chroma identifier indicating which chroma
component of the one or more chroma components the ALF is applicable.
- 30 4. The apparatus of claim 3, wherein the value of the ALF chroma filter signal flag
indicates that the chroma ALF filter data is signaled in the video bitstream, and wherein the

chroma ALF filter data is signaled in an adaptation parameter set (APS) for processing at least the portion of the slice of video data.

5 5. The apparatus of claim 4, wherein the at least one processor is configured to:
based on the value of the ALF chroma filter signal flag, obtain the chroma ALF filter
data to be used for processing at least the portion of the slice of video data; and
apply the chroma ALF filter data to at least the portion of the slice of video data.

10 6. The apparatus of claim 1, wherein the at least one processor is configured to
infer that the value of the ALF chroma filter signal flag is zero when the value of the ALF
chroma filter signal flag is not present in the ALF data.

15 7. The apparatus of claim 1, wherein the at least one processor is configured to:
based on the value of the ALF chroma filter signal flag, obtain luma ALF filter data to
be used for one or more chroma components of at least one block of the video bitstream; and
apply the luma ALF filter data to the one or more chroma components of the at least
one block of the video bitstream.

20 8. The apparatus of claim 1, wherein the at least one processor is configured to:
obtain a slice header for the slice of video data from the video bitstream;
determine a value of a chroma format identifier from the slice header; and
based on the value of the chroma format identifier from the slice header, process one or
more chroma components of at least one block of the video bitstream using luma ALF filter
data.

25 9. The apparatus of claim 1, wherein the at least one processor is further
configured to:
process the value of the ALF chroma filter signal flag from the ALF data to determine
that the chroma ALF filter data is signaled in the video bitstream.

30 10. The apparatus of claim 9, wherein the at least one processor is further
configured to:

determine an ALF application parameter set (APS) identifier for a first color component of at least the portion of the slice; and

determine an ALF map for the first color component of at least the portion of the slice.

5 11. The apparatus of claim 9, wherein the at least one processor is further configured to enable ALF filtering for at least two non-luma components of at least the portion of the slice based on components of at least the portion of the slice including shared characteristics.

10 12. The apparatus of claim 11, wherein the at least two non-luma components of at least the portion of the slice comprise a red component, a green component, and a blue component of at least the portion of the slice.

15 13. The apparatus of claim 11, wherein the at least two non-luma components of at least the portion of the slice comprise chroma components of at least the portion of the slice.

14. The apparatus of claim 13, wherein at least the portion of the slice of video data includes 4:4:4 format video data.

20 15. The apparatus of claim 14, wherein the at least one processor is configured to enable ALF filtering for at least two non-luma components of at least the portion of the slice based on at least the portion of the slice including non-4:2:0 format video data.

25 16. The apparatus of claim 9, wherein the at least one processor is configured to:
determine a chroma type array variable for at least the portion of the slice;
determine an ALF chroma application parameter set (APS) identifier for a first component of at least the portion of the slice based on the chroma type array variable for at least the portion of the slice; and
determine a signaled ALF map for the first component of at least the portion of the
30 slice.

17. The apparatus of claim 16, wherein the at least one processor is further configured to:

determine a second signaled ALF map for a second component of at least the portion of the slice based on the chroma type array variable.

18. The apparatus of claim 17, wherein the at least one processor is configured to perform ALF filtering on the first component and the second component of at least the portion of the slice using the signaled ALF map and the second signaled ALF map.

19. The apparatus of claim 17, wherein the at least one processor is further configured to:
10 determine a third signaled ALF map for a third component of at least the portion of the slice based on the chroma type array variable.

20. The apparatus of claim 19, wherein the first component is a luma component, wherein the second component is a first chroma component, and wherein the third component is a second chroma component.

21. The apparatus of claim 19, wherein the first component is a red component, wherein the second component is a green component, and wherein the third component is a blue component.

22. The apparatus of claim 19, wherein the at least one processor is configured to perform ALF processing on a block for each component of at least the portion of the slice based on the chroma type array variable.

23. The apparatus of claim 1, wherein the apparatus comprises a mobile device.

24. The apparatus of claim 1, further comprising a display configured to display one or more images.

25. A method of decoding video data, comprising:
obtaining a video bitstream, the video bitstream including adaptive loop filter (ALF) data;

determining a value of an ALF chroma filter signal flag from the ALF data, the value of the ALF chroma filter signal flag indicating whether chroma ALF filter data is signaled in the video bitstream; and

5 processing at least a portion of a slice of video data based on the value of the ALF chroma filter signal flag.

26. The method of claim 25, further comprising:

obtaining a slice header for the slice of video data from the video bitstream;

10 determining a value of an ALF chroma identifier from the slice header, the value of the ALF chroma identifier indicating whether an ALF can be applied to one or more chroma components of the slice; and

processing at least the portion of the slice based on the ALF chroma identifier from the slice header.

15 27. The method of claim 26, further comprising:

determining a value of a chroma format identifier from the slice header, the value of the chroma format identifier and the value of the ALF chroma identifier indicating which chroma component of the one or more chroma components the ALF is applicable.

20 28. The method of claim 27, wherein the value of the ALF chroma filter signal flag indicates that the chroma ALF filter data is signaled in the video bitstream, and wherein the chroma ALF filter data is signaled in an adaptation parameter set (APS) for processing at least the portion of the slice.

25 29. The method of claim 28, further comprising:

based on the value of the ALF chroma filter signal flag, obtaining the chroma ALF filter data to be used for processing at least the portion of the slice of video data; and

applying the chroma ALF filter data to at least the portion of the slice of video data.

30 30. The method of claim 25, further comprising inferring that the value of the ALF chroma filter signal flag is zero when the value of the ALF chroma filter signal flag is not present in the ALF data.

31. The method of claim 25, further comprising:
based on the value of the ALF chroma filter signal flag, obtaining luma ALF filter data
to be used for one or more chroma components of at least one block of the video bitstream; and
applying the luma ALF filter data to the one or more chroma components of the at least
5 one block of the video bitstream.

32. The method of claim 25, further comprising:
obtaining a slice header for the slice of video data from the video bitstream;
determining a value of a chroma format identifier from the slice header; and
10 based on the value of the chroma format identifier from the slice header, processing one
or more chroma components of at least one block of the video bitstream using luma ALF filter
data.

33. The method of claim 25, further comprising:
15 processing the value of the ALF chroma filter signal flag from the ALF data to
determine that the chroma ALF filter data is signaled in the video bitstream.

34. The method of claim 33, further comprising:
determining an ALF application parameter set (APS) identifier for a first color
20 component of at least the portion of the slice; and
determining an ALF map for the first color component of at least the portion of the
slice.

35. The method of claim 33, further comprising enabling ALF filtering for at least
25 two non-luma components of at least the portion of the slice based on components of at least
the portion of the slice including shared characteristics.

36. The method of claim 35, wherein the at least two non-luma components of at
least the portion of the slice comprise a red component, a green component, and a blue
30 component of at least the portion of the slice.

37. The method of claim 35, wherein the at least two non-luma components of at
least the portion of the slice comprise chroma components of at least the portion of the slice.

38. The method of claim 37, wherein at least the portion of the slice includes 4:4:4 format video data.

5 39. The method of claim 38, further comprising enabling ALF filtering for at least two non-luma components of at least the portion of the slice based on at least the portion of the slice including non-4:2:0 format video data.

10 40. The method of claim 33, further comprising:
determining a chroma type array variable for at least the portion of the slice;
determining an ALF chroma application parameter set (APS) identifier for a first component of at least the portion of the slice based on the chroma type array variable for at least the portion of the slice; and
determining a signaled ALF map for the first component of at least the portion of the
15 slice.

41. The method of claim 40, further comprising:
determining a second signaled ALF map for a second component of at least the portion of the slice based on the chroma type array variable.

20 42. The method of claim 41, further comprising performing ALF filtering on the first component and the second component of at least the portion of the slice using the signaled ALF map and the second signaled ALF map.

25 43. The method of claim 41, further comprising:
determining a third signaled ALF map for a third component of at least the portion of the slice based on the chroma type array variable.

30 44. An apparatus for encoding video data, the apparatus comprising:
a memory; and
at least one processor coupled to the memory and configured to:
generate adaptive loop filter (ALF) data;

determine a value of an ALF chroma filter signal flag for the ALF data, the value of the ALF chroma filter signal flag indicating whether chroma ALF filter data is signaled in a video bitstream; and

generate the video bitstream including the ALF data.