~~**WHAT IS CLAIMED IS:**~~

CLAIMS

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

for each respective location in a plurality of locations in a filter support, coding an adaptive loop filter (ALF) clipping index for the respective location in the filter support as a fixed-length unsigned integer regardless of a value of a corresponding filter coefficient of an ALF, wherein the corresponding filter coefficient of the ALF is a filter coefficient for the respective location in the filter support; and

applying~~, based on~~ the ALF ~~clipping index, an ALF~~ to a block of a picture of the video data~~.~~, wherein applying the ALF to the block comprises, for each respective sample of the block:

for each respective location in the plurality of locations in the filter support:

using the ALF clipping index for the respective location in the filter support to determine a set of clipping values for the respective location in the filter support;

using the clipping values for the respective location in the filter support to clip a value for a sample at the respective location in the filter support, wherein the clipping values for the respective location in the filter support specify an upper limit and a lower limit on the value for the sample at the respective location in the filter support; and

generating a multiplication product for the respective location in the filter support by multiplying the clipped value for the sample at the respective location in the filter support by the filter coefficient for the respective location in the filter support; and

determining a filtered value for the respective sample of the block based on a value of the respective sample of the block and a sum of the multiplication products for the plurality of locations in the filter support.

2. The method of claim 1, wherein, for each respective location in the plurality of locations in the filter support, the ALF clipping index for the respective location in the filter support is a luma ALF clipping index.

3. The method of claim 1, wherein, for each respective location in the plurality of locations in the filter support, the ALF clipping index for the respective location in the filter support is a chroma ALF clipping index.

4. The method of claim 1, wherein:

the filter support is a first filter support,

for each respective location in the plurality of locations in the first filter support, the ALF clipping index for the respective location in the first filter support is a luma ALF clipping index and the block of the picture is a luma block, and

the method further comprises:

for each respective location in a plurality of locations in a second filter support, coding a chroma ALF clipping index for the respective location in the second filter support as a fixed-length unsigned integer; and

applying~~, based on the ALF clipping index,~~ the ALF to a chroma block of the picture~~.~~

~~5. The method of claim 1~~, wherein ~~coding the~~applying the ALF to the chroma block comprises, for each respective sample of the chroma block:

for each respective location in the plurality of locations in the second filter support:

using the chroma ALF clipping index ~~comprises coding the ALF~~for the respective location in the second filter support to determine a set of clipping values for the respective location in the second filter support;

using the clipping ~~index regardless of~~ values for the respective location in the second filter support to clip a value ~~of a corresponding~~for a chroma sample at the respective location in the second filter support, wherein the clipping values for the respective location in the second filter support specify an upper limit and a lower limit on the value for the chroma sample at the respective location in the second filter support; and

generating a multiplication product for the respective location in the second filter support by multiplying the clipped value for the chroma sample at

the respective location in the second filter support by a filter coefficient ~~of the ALF.~~for the respective location in the second filter support; and

determining a filtered value for the respective sample of the chroma block based on a value of the respective sample of the chroma block and a sum of the multiplication products for the plurality of locations in the second filter support.

~~6~~5. The method of claim ~~5~~1, wherein the method further comprises determining that the corresponding filter coefficient of the ALF is equal to 0.

~~7~~6. The method of claim 1, wherein coding comprises decoding.

~~8~~7. The method of claim 6, wherein coding the ALF clipping index for the respective location in the filter support comprises parsing the fixed-length unsigned integer from a bitstream that includes an encoded representation of the video data.

~~9~~8. The method of claim 1, wherein coding comprises encoding.

~~10~~9. The method of claim ~~9~~8, wherein coding the ALF clipping index for the respective location in the filter support comprises including the fixed-length unsigned integer in a bitstream that includes an encoded representation of the video data.

~~11~~10. A device for coding video data, the device comprising:

a memory configured to store the video data; and

one or more processors implemented in circuitry, the one or more processors configured to:

for each respective location in a plurality of locations in a filter support, code an adaptive loop filter (ALF) clipping index for the respective location in the filter support as a fixed-length unsigned integer regardless of a value of a corresponding filter coefficient of an ALF, wherein the corresponding filter coefficient of the ALF is a filter coefficient for the respective location in the filter support; and

apply~~, based on~~ the ALF ~~clipping index, an ALF~~ to a block of a picture of the video data~~.~~, wherein the one or more processors are configured to, as part of applying the ALF to the block, for each respective sample of the block:

for each respective location in the plurality of locations in the filter support:

use the ALF clipping index for the respective location in the filter support to determine a set of clipping values for the respective location in the filter support;

use the clipping values for the respective location in the filter support to clip a value for a sample at the respective location in the filter support, wherein the clipping values for the respective location in the filter support specify an upper limit and a lower limit on the value for the sample at the respective location in the filter support; and

generate a multiplication product for the respective location in the filter support by multiplying the clipped value for the sample at the respective location in the filter support by the filter coefficient for the respective location in the filter support; and

determine a filtered value for the respective sample of the block based on a value of the respective sample of the block and a sum of the multiplication products for the plurality of locations in the filter support.

~~12~~11. The device of claim ~~11~~10, wherein, for each respective location in the plurality of locations in the filter support, the ALF clipping index for the respective location in the filter support is a luma ALF clipping index.

~~13~~12. The device of claim ~~11~~10, wherein, for each respective location in the plurality of locations in the filter support, the ALF clipping index for the respective location in the filter support is a chroma ALF clipping index.

~~14~~13. The device of claim ~~11~~10, wherein:

the filter support is a first filter support,

for each respective location in the plurality of locations in the first filter support, the ALF clipping index for the respective location in the first filter support is a luma ALF clipping index and the block of the picture is a luma block, and

the one or more processors are further configured to:

for each respective location in a plurality of locations in a second filter support, code a chroma ALF clipping index for the respective location in the second filter support as a fixed-length unsigned integer; and

apply~~, based on the ALF clipping index,~~ the ALF to a chroma block of the picture~~.~~

~~15. The device of claim 11~~, wherein the one or more processors are configured ~~such that~~to, as part of ~~coding~~applying the ALF ~~clipping index, the one or more processors code~~to the ~~ALF clipping index regardless of a value of a corresponding filter coefficient of the ALF.~~chroma block, for each respective sample of the chroma block:

for each respective location in the plurality of locations in the second filter support:

use the chroma ALF clipping index for the respective location in the second filter support to determine a set of clipping values for the respective location in the second filter support;

use the clipping values for the respective location in the second filter support to clip a value for a chroma sample at the respective location in the second filter support, wherein the clipping values for the respective location in the second filter support specify an upper limit and a lower limit on the value for the chroma sample at the respective location in the second filter support; and

generate a multiplication product for the respective location in the second filter support by multiplying the clipped value for the chroma sample at the respective location in the second filter support by a filter coefficient for the respective location in the second filter support; and

determine a filtered value for the respective sample of the chroma block based on a value of the respective sample of the chroma block and a sum of the multiplication products for the plurality of locations in the second filter support.

~~16~~14. The device of claim ~~15~~10, wherein the one or more processors are configured to determine that the corresponding filter coefficient of the ALF is equal to 0.

~~17~~15. The device of claim ~~11~~10, wherein, to code the ALF clipping index for the respective location in the filter support, the one or more processors are configured to parse the fixed-length unsigned integer from a bitstream that includes an encoded representation of the video data.

~~18~~16. The device of claim ~~11~~10, wherein, to code the ALF clipping index for the respective location in the filter support, the one or more processors are configured to include the fixed-length unsigned integer in a bitstream that includes an encoded representation of the video data.

~~19~~17. The device of claim ~~11~~10, further comprising a display configured to display decoded video data.

~~20~~18. The device of claim ~~11~~10, wherein the device comprises one or more of a camera, a computer, a mobile device, a broadcast receiver device, or a set-top box.

~~21~~19. The device of claim ~~11~~10, wherein the device comprises a video decoder.

~~22~~20. The device of claim ~~11~~10, wherein the device comprises a video encoder.

~~23~~21. A device for coding video data, the device comprising:

means for coding, for each respective location in a plurality of locations in a filter support, an adaptive loop filter (ALF) clipping index for the respective location in the filter support as a fixed-length unsigned integer regardless of a value of a corresponding filter coefficient of an ALF, wherein the corresponding filter coefficient of the ALF is a filter coefficient for the respective location in the filter support; and

means for applying~~, based on~~ the ALF ~~clipping index, an ALF~~ to a block of a picture of the video data~~.~~, wherein the means for applying the ALF to the block comprises, for each respective sample of the block:

for each respective location in the plurality of locations in the filter support:

means for using the ALF clipping index for the respective location in the filter support to determine a set of clipping values for the respective location in the filter support;

means for using the clipping values for the respective location in the filter support to clip a value for a sample at the respective location in the filter support, wherein the clipping values for the respective location in the filter support specify an upper limit and a lower limit on the value for the sample at the respective location in the filter support; and

means for generating a multiplication product for the respective location in the filter support by multiplying the clipped value for the sample at the respective location in the filter support by the filter coefficient for the respective location in the filter support; and

means for determining a filtered value for the respective sample of the block based on a value of the respective sample of the block and a sum of the multiplication products for the plurality of locations in the filter support.

~~24~~22. The device of claim ~~23~~21, wherein, for each respective location in the plurality of locations in the filter support, the ALF clipping index for the respective location in the filter support is a luma ALF clipping index.

~~25~~23. The device of claim ~~23~~21, wherein, for each respective location in the plurality of locations in the filter support, the ALF clipping index for the respective location in the filter support is a chroma ALF clipping index.

~~26~~24. The device of claim ~~23~~21, wherein:

~~the ALF clipping index~~the filter support is a first filter support,

for each respective location in the plurality of locations in the first filter support, the ALF clipping index for the respective location in the first filter support is a luma ALF clipping index and the block of the picture is a luma block, and

the device further comprises:

for each respective location in a plurality of locations in a second filter support, means for coding a chroma ALF clipping index for the respective location in the second filter support as a fixed-length unsigned integer; and

means for applying~~, based on the ALF clipping index,~~ the ALF to a chroma block of the picture~~.~~

~~27. The device of claim 23~~, wherein the means for ~~coding the~~applying the ALF to the chroma block comprises, for each respective sample of the chroma block:

for each respective location in the plurality of locations in the second filter support:

means for using the chroma ALF clipping index ~~comprises~~ for the respective location in the second filter support to determine a set of clipping values for the respective location in the second filter support;

means for ~~coding~~using the~~ ALF~~ clipping ~~index regardless of~~ values for the respective location in the second filter support to clip a value ~~of a corresponding~~for a chroma sample at the respective location in the second filter support, wherein the clipping values for the respective location in the second filter support specify an upper limit and a lower limit on the value for the chroma sample at the respective location in the second filter support; and

means for generating a multiplication product for the respective location in the second filter support by multiplying the clipped value for the chroma sample at the respective location in the second filter support by a filter coefficient ~~of the ALF.~~for the respective location in the second filter support; and

means for determining a filtered value for the respective sample of the chroma block based on a value of the respective sample of the chroma block and a sum of the multiplication products for the plurality of locations in the second filter support.

~~28~~25. The device of claim ~~27~~21, further comprising means for determining that the corresponding filter coefficient of the ALF is equal to 0.

~~29~~26. The device of claim ~~23~~21, wherein the means for coding the ALF clipping index for the respective location in the filter support comprises means for parsing the fixed-length unsigned integer from a bitstream that includes an encoded representation of the video data.

~~30~~27. The device of claim ~~23~~21, wherein the means for coding the ALF clipping index for the respective location in the filter support comprises means for including the fixed-length unsigned integer in a bitstream that includes an encoded representation of the video data.

~~31~~28. A non-transitory computer-readable storage medium having stored thereon instructions that, when executed, cause one or more processors to:

for each respective location in a plurality of locations in a filter support, code an adaptive loop filter (ALF) clipping index for the respective location in the filter support as a fixed-length unsigned integer regardless of a value of a corresponding filter coefficient of an ALF, wherein the corresponding filter coefficient of the ALF is a filter coefficient for the respective location in the filter support; and

apply~~, based on~~ the ALF ~~clipping index, an ALF~~ to a block of a picture of video data~~.~~, wherein the instructions that cause the one or more processors to apply the ALF to the block comprises instructions that, when executed, cause the one or more processors to, for each respective sample of the block:

for each respective location in the plurality of locations in the filter support:

use the ALF clipping index for the respective location in the filter support to determine a set of clipping values for the respective location in the filter support;

use the clipping values for the respective location in the filter support to clip a value for a sample at the respective location in the filter support, wherein the clipping values for the respective location in the filter support specify an

upper limit and a lower limit on the value for the sample at the respective location in the filter support; and

generate a multiplication product for the respective location in the filter support by multiplying the clipped value for the sample at the respective location in the filter support by the filter coefficient for the respective location in the filter support; and

determine a filtered value for the respective sample of the block based on a value of the respective sample of the block and a sum of the multiplication products for the plurality of locations in the filter support.

~~32~~29. The non-transitory computer-readable storage medium of claim ~~31, wherein~~28, wherein, for each respective location in the plurality of locations in the filter support, the ALF clipping index for the respective location in the filter support is a luma ALF clipping index.

~~33~~30. The non-transitory computer-readable storage medium of claim ~~31~~28, wherein, for each respective location in the plurality of locations in the filter support, the ALF clipping index for the respective location in the filter support is a chroma ALF clipping index.

~~34~~31. The non-transitory computer-readable storage medium of claim ~~31~~28, wherein:

the filter support is a first filter support,

for each respective location in the plurality of locations in the first filter support, the ALF clipping index for the respective location in the first filter support is a luma ALF clipping index and the block of the picture is a luma block, and

execution of the instructions further causes the one or more processors to:

for each respective location in a plurality of locations in a second filter support, code a chroma ALF clipping index for the respective location in the second filter support as a fixed-length unsigned integer; and

apply~~, based on the ALF clipping index,~~ the ALF to a chroma block of the picture~~.~~

~~35. The computer-readable storage medium of claim 31~~, wherein the instructions that cause the one or more processors to ~~code~~apply the ALF ~~clipping index~~to the chroma

block comprise instructions that, when executed, cause the one or more processors to ~~code the ALF clipping index regardless of a value of a corresponding filter coefficient of the ALF.~~, for each respective sample of the chroma block:

for each respective location in the plurality of locations in the second filter support:

use the chroma ALF clipping index for the respective location in the second filter support to determine a set of clipping values for the respective location in the second filter support;

use the clipping values for the respective location in the second filter support to clip a value for a chroma sample at the respective location in the second filter support, wherein the clipping values for the respective location in the second filter support specify an upper limit and a lower limit on the value for the chroma sample at the respective location in the second filter support; and

generate a multiplication product for the respective location in the second filter support by multiplying the clipped value for the chroma sample at the respective location in the second filter support by a filter coefficient for the respective location in the second filter support; and

determine a filtered value for the respective sample of the chroma block based on a value of the respective sample of the chroma block and a sum of the multiplication products for the plurality of locations in the second filter support.

~~36~~32. The non-transitory computer-readable storage medium of claim ~~35~~28, wherein execution of the instructions further causes the one or more processors to determine that the corresponding filter coefficient of the ALF is equal to 0.

~~37~~33. The non-transitory computer-readable storage medium of claim ~~31~~28, wherein the instructions that cause the one or more processors to code the ALF clipping index for the respective location in the filter support include instructions that cause the one or more processors to parse the fixed-length unsigned integer from a bitstream that includes an encoded representation of the video data.