# CLAIMS

1. A method for decoding a coded video bitstream, comprising:

obtaining a reference layer syntax element by parsing the coded video bitstream, wherein the value of the reference layer syntax element specifying whether a layer with index k is a direct reference layer for a layer with index i, wherein both i and k are integers and are larger than or equal to 0;

determining whether the layer with index j is a reference layer for the layer with index i based on the value of the reference layer syntax element, wherein the layer with index j is a reference layer for the layer with index k, wherein j is an integer and is larger than or equal to 0; and

in case that a condition is satisfied, predicting a picture of the layer with index i based on the layer with index j, wherein the value of a chroma format related syntax element applied to the layer with index i is the same as the value of a chroma format related syntax element applied to the layer with index j, and wherein the condition comprises the layer with index j is a reference layer for the layer with index i.

2. The method of claim 1, wherein in case that the value of the reference layer syntax element specifies the layer with index k is a direct reference layer for the layer with index i, the layer with index j is a reference layer for the layer with index i.

3. A method for decoding a coded video bitstream, comprising:

obtaining a reference layer syntax element by parsing the coded video bitstream, wherein the value of the reference layer syntax element specifying whether a layer with index j is a direct reference layer for a layer with index i, wherein both i and j are integers and are larger than or equal to 0; and

in case that a condition is satisfied, predicting a picture of the layer with index i based on the layer with index j, wherein the value of a chroma format related syntax element applied to the layer with index i is the same as the value of a chroma format related syntax element applied to the layer with index j, and wherein the condition comprises the value of the reference layer syntax element specifies the layer with index j is a direct reference layer for the layer with index i.

4. The method of any one of claims 1 to 3, wherein the reference layer syntax element is a video parameter set (VPS) level syntax element, wherein the VPS is applied to the layer with index j and the layer with index i.

5. The method of any one of claims 1 to 3, wherein the chroma format related syntax element is a sequence parameter set (SPS) level syntax element, wherein the SPS is applied to the layer with index j or the layer with index i.

6. The method of any one of claims 1 to 5, further comprising:

obtaining the chroma format related syntax element applied to the layer with index i and the chroma format related syntax element applied to the layer with index j by parsing the coded video

bitstream; and wherein the condition further comprises the value of the chroma format related syntax element applied to the layer with index i is the same as the value of the chroma format related syntax element applied to the layer with index j.

7. The method of claim 1 or 2, further comprising:

in case that the layer with index j is a reference layer for the layer with index i, and the value of the chroma format related syntax element applied to the layer with index i is not the same as the value of the chroma format related syntax element applied to the layer with index j, stopping decoding the coded video bitstream.

8. The method of claim 1 or 2, further comprising:

in case that the layer with index j is not a reference layer for the layer with index i, predicting the picture of the layer with index i without using the layer with index j.

9. The method of any one of claims 1 to 8, further comprising:

in case that the condition is satisfied, determining, without obtaining the chroma format related syntax element applied to the layer with index i by parsing the coded video bitstream, that the value of the chroma format related syntax element applied to the layer with index i is the value of the chroma format related syntax element applied to the layer with index j.

~~10. A method for decoding a coded video bitstream, comprising:~~

~~obtaining a reference layer syntax element by parsing the coded video bitstream, wherein the value of the reference layer syntax element specifying whether a layer with index k is a direct reference layer for a layer with index i, wherein both i and k are integers and are larger than or equal to 0;~~

~~determining whether the layer with index j is a reference layer for the layer with an index i based on the value of the reference layer syntax element, wherein the layer with index j is a reference layer for the layer with index k, wherein j is an integer and is larger than or equal to 0; and~~

~~in case that a condition is satisfied, predicting a picture of the layer with index i based on the layer with index j, wherein the value of a bit depth related syntax element applied to the layer with index i is the same as the value of a bit depth related syntax element applied to the layer with index j, and wherein the condition comprises the layer with index j is a reference layer for the layer with index i.~~

~~11. The method of claim 10, wherein in case that the value of the reference layer syntax element specifies the layer with index k is a direct reference layer for the layer with index i, the layer with index j is a reference layer for the layer with index i.~~

~~12. A method for decoding a coded video bitstream, comprising:~~

~~obtaining a reference layer syntax element by parsing the coded video bitstream, wherein the value of the reference layer syntax element specifying whether a layer with index j is a direct reference layer for a layer with index i, wherein both i and j are integers and are larger than or equal to 0; and~~

~~in case that a condition is satisfied, predicting a picture of the layer with index i based on the~~

~~layer with index j, wherein the value of a bit depth related syntax element applied to the layer with index i is the same as the value of a bit depth related syntax element applied to the layer with index j, and wherein the condition comprises the value of the reference layer syntax element specifies the layer with index j is a direct reference layer for the layer with index i.~~

~~13. The method of any one of claims 10 to 12, wherein the reference layer syntax element is a video parameter set (VPS) level syntax element, wherein the VPS is applied to the layer with index j and the layer with index i.~~

~~14. The method of any one of claims 10 to 12, wherein the bit depth related syntax element is a sequence parameter set (SPS) level syntax element, wherein the SPS is applied to the layer with index j or the layer with index i.~~

~~15. The method of any one of claims 10 to 14, further comprising:~~

~~obtaining the bit depth related syntax element applied to the layer with index i and the bit depth related syntax element applied to the layer with index j by parsing the coded video bitstream; and wherein the condition further comprises the value of the bit depth related syntax element applied to the layer with index i is the same as the value of the bit depth related syntax element applied to the layer with index j.~~

~~16. The method of claim 10 or 11, further comprising:~~

~~in case that the layer with index j is a reference layer for the layer with index i, and the value of the bit depth related syntax element applied to the layer with index i is not the same as the value of the bit depth related syntax element applied to the layer with index j, stopping decoding the coded video bitstream.~~

~~17. The method of claim 10 or 11, further comprising:~~

~~in case that the layer with index j is not a reference layer for the layer with index i, predicting the picture of the layer with index i without using the layer with index j.~~

~~18. The method of any one of claims 10 to 17, further comprising:~~

~~in case that the condition is satisfied, determining, without obtaining the bit depth related syntax element applied to the layer with index i by parsing the coded video bitstream, that the value of the bit depth related syntax element applied to the layer with index i is the value of the bit depth related syntax element applied to the layer with index j.~~

~~19. The method of any one of claims 10 to 18, wherein the bit depth related syntax element specifies a bit depth of luma and chroma samples of a picture in a layer to which the bit depth related syntax element is applied.~~

~~20~~10. A method for encoding a video, comprising:

determining whether a layer with index j is a direct reference layer for a layer with index i, both i and j are integers and are larger than or equal to 0; and

in case that the layer with index j is a direct reference layer for the layer with index i, encoding a reference layer syntax element with a value specifying the layer with index j is a direct reference layer for the layer with index i into a video bitstream, and encoding a chroma format related syntax

element applied to the layer with index i and a chroma format related syntax element applied to the layer with index j into the video bitstream, wherein the value of the chroma format related syntax element applied to the layer with index i is the same as the value of the chroma format related syntax element applied to the layer with index j.

~~21~~11. The method of claim ~~20~~10, further comprising:

in case that the layer with index j is the direct reference layer for the layer with index i, predicting a picture of the layer with index i based on the layer with index j.

~~22~~12. The method of claim ~~20~~10, further comprising:

in case that the layer with index j is not a reference layer for the layer with index i, predicting a picture of the layer with index i without using the layer with index j.

~~23. A method for encoding a video, comprising:~~

~~determining whether a layer with index j is a direct reference layer for a layer with index i, both i and j are integers and are larger than or equal to 0; and~~

~~in case that the layer with index j is a direct reference layer for the layer with index i, encoding a reference layer syntax element with a value specifying the layer with index j is a direct reference layer for the layer with index i into a video bitstream, and encoding a bit depth related syntax element applied to the layer with index i and a bit depth related syntax element applied to the layer with index j into the video bitstream, wherein the value of the bit depth related syntax element applied to the layer with index i is the same as the value of the bit depth related syntax element applied to the layer with index j.~~

~~24. The method of claim 23, further comprising:~~

~~in case that the layer with index j is the direct reference layer for the layer with index i, predicting a picture of the layer with index i based on the layer with index j.~~

~~25. The method of claim 23, further comprising:~~

~~in case that the layer with index j is not a reference layer for the layer with index i, predicting a picture of the layer with index i without using the layer with index j.~~

~~26. The method of any one of claims 23 to 25, wherein the bit depth related syntax element specifies a bit depth of luma and chroma samples of a picture in a layer to which the bit depth related syntax element is applied.~~

~~27~~13. An apparatus for decoding a coded video bitstream, comprising:

an obtaining unit, configured to obtain a reference layer syntax element by parsing the coded video bitstream, wherein the value of the reference layer syntax element specifying whether a layer with index k is a direct reference layer for a layer with index i, wherein both i and k are integers and are larger than or equal to 0;

a determining unit, configured to determine whether the layer with index j is a reference layer for the layer with index i based on the value of the reference layer syntax element, wherein the layer with index j is a reference layer for the layer with index k, wherein j is an integer and is larger than or equal to 0; and

a predicting unit, configured to predict a picture of the layer with index i based on the layer with index j in case that a condition is satisfied, wherein the value of a chroma format related syntax element applied to the layer with index i is the same as the value of a chroma format related syntax element applied to the layer with index j, and wherein the condition comprises the layer with index j is a reference layer for the layer with index i.

~~28~~14. The apparatus of claim ~~17~~13, wherein in case that the value of the reference layer syntax element specifies the layer with index k is a direct reference layer for the layer with index i, the layer with index j is a reference layer for the layer with index i.

15. The apparatus of claim 13 or 14, further comprising a stopping unit;

the stopping unit is configured to stop decoding the coded video bitstream in case that the layer with index j is a reference layer for the layer with index i, and the value of the chroma format related syntax element applied to the layer with index i is not the same as the value of the chroma format related syntax element applied to the layer with index j.

16. The apparatus of claim 13 or 14, wherein the obtaining unit is further configured to predict the picture of the layer with index i without using the layer with index j in case that the layer with index j is not a reference layer for the layer with index i.

~~29~~17. An apparatus for decoding a coded video bitstream, comprising:

an obtaining unit, configured to obtain a reference layer syntax element by parsing the coded video bitstream, wherein the value of the reference layer syntax element specifying whether a layer with index j is a direct reference layer for a layer with index i, wherein both i and j are integers and are larger than or equal to 0; and

a predicting unit, configured to predict a picture of the layer with index i based on the layer with index j in case that a condition is satisfied, wherein the value of a chroma format related syntax element applied to the layer with index i is the same as the value of a chroma format related syntax element applied to the layer with index j, and wherein the condition comprises the value of the reference layer syntax element specifies the layer with index j is a direct reference layer for the layer with index i.

~~30~~18. The apparatus of ~~any one of~~ claims ~~27 to 29~~ 17, wherein the reference layer syntax element is a video parameter set (VPS) level syntax element, wherein the VPS is applied to the layer with index j and the layer with index i.

~~31~~19. The apparatus of any one of claims ~~27~~ 17 to ~~29~~18, wherein the chroma format related syntax element is a sequence parameter set (SPS) level syntax element, wherein the SPS is applied to the layer with index j or the layer with index i.

~~32~~20. The apparatus of any one of claims ~~27~~ 17 to ~~31~~19, wherein the obtaining unit is further configured to obtain the chroma format related syntax element applied to the layer with index i and the chroma format related syntax element applied to the layer with index j by parsing the coded video bitstream; and wherein the condition further comprises the value of the chroma format related syntax element applied to the layer with index i is the same as the value of the chroma format related

syntax element applied to the layer with index j.

~~33. The apparatus of claim 27 or 28, further comprising a stopping unit;~~

~~the stopping unit is configured to stop decoding the coded video bitstream in case that the layer with index j is a reference layer for the layer with index i, and the value of the chroma format related syntax element applied to the layer with index i is not the same as the value of the chroma format related syntax element applied to the layer with index j.~~

~~34. The apparatus of claim 27 or 28, wherein the obtaining unit is further configured to predict the picture of the layer with index i without using the layer with index j in case that the layer with index j is not a reference layer for the layer with index i.~~

~~35~~21. The apparatus of any one of claims ~~27~~ 17 to ~~34~~20, wherein the determining unit is further configured to determine, without obtaining the chroma format related syntax element applied to the layer with index i by parsing the coded video bitstream, that the value of the chroma format related syntax element applied to the layer with index i is the value of the chroma format related syntax element applied to the layer with index j in case that the condition is satisfied.

~~36. An apparatus for decoding a coded video bitstream, comprising:~~

~~an obtaining unit, configured to obtain a reference layer syntax element by parsing the coded video bitstream, wherein the value of the reference layer syntax element specifying whether a layer with index k is a direct reference layer for a layer with index i, wherein both i and k are integers and are larger than or equal to 0;~~

~~a determining unit, configured to determine whether the layer with index j is a reference layer for the layer with an index i based on the value of the reference layer syntax element, wherein the layer with index j is a reference layer for the layer with index k, wherein j is an integer and is larger than or equal to 0; and~~

~~a predicting unit, configured to predict a picture of the layer with index i based on the layer with index j in case that a condition is satisfied, wherein the value of a bit depth related syntax element applied to the layer with index i is the same as the value of a bit depth related syntax element applied to the layer with index j, and wherein the condition comprises the layer with index j is a reference layer for the layer with index i.~~

~~37. The apparatus of claim 36, wherein in case that the value of the reference layer syntax element specifies the layer with index k is a direct reference layer for the layer with index i, the layer with index j is a reference layer for the layer with index i.~~

~~38. An apparatus for decoding a coded video bitstream, comprising:~~

~~an obtaining unit, configured to obtain a reference layer syntax element by parsing the coded video bitstream, wherein the value of the reference layer syntax element specifying whether a layer with index j is a direct reference layer for a layer with index i, wherein both i and j are integers and are larger than or equal to 0; and~~

~~a predicting unit, configured to predict a picture of the layer with index i based on the layer with index j in case that a condition is satisfied, wherein the value of a bit depth related syntax~~

~~element applied to the layer with index i is the same as the value of a bit depth related syntax element applied to the layer with index j, and wherein the condition comprises the value of the reference layer syntax element specifies the layer with index j is a direct reference layer for the layer with index i.~~

~~39. The apparatus of any one of claims 36 to 38, wherein the reference layer syntax element is a video parameter set (VPS) level syntax element, wherein the VPS is applied to the layer with index j and the layer with index i.~~

~~40. The apparatus of any one of claims 36 to 38, wherein the bit depth related syntax element is a sequence parameter set (SPS) level syntax element, wherein the SPS is applied to the layer with index j or the layer with index i.~~

~~41. The apparatus of any one of claims 36 to 40, wherein the obtaining unit is further configured to obtain the bit depth related syntax element applied to the layer with index i and the bit depth related syntax element applied to the layer with index j by parsing the coded video bitstream; and wherein the condition further comprises the value of the bit depth related syntax element applied to the layer with index i is the same as the value of the bit depth related syntax element applied to the layer with index j.~~

~~42. The apparatus of claim 36 or 37, further comprising a stopping unit;~~

~~the stopping unit is configured to stop decoding the coded video bitstream in case that the layer with index j is a reference layer for the layer with index i, and the value of the bit depth related syntax element applied to the layer with index i is not the same as the value of the bit depth related syntax element applied to the layer with index j.~~

~~43. The apparatus of claim 36 or 37, wherein the predicting unit is further configured to predict the picture of the layer with index i without using the layer with index j in case that the layer with index j is not a reference layer for the layer with index i.~~

~~44. The apparatus of any one of claims 36 to 43, wherein the determining unit is further configured to determine, without obtaining the bit depth related syntax element applied to the layer with index i by parsing the coded video bitstream, that the value of the bit depth related syntax element applied to the layer with index i is the value of the bit depth related syntax element applied to the layer with index j.~~

~~45. The apparatus of any one of claims 36 to 44, wherein the bit depth related syntax element specifies a bit depth of luma and chroma samples of a picture in a layer to which the bit depth related syntax element is applied.~~

~~46~~22. An apparatus for encoding a video, comprising:

a determining unit, configured to determine whether a layer with index j is a direct reference layer for a layer with index i, both i and j are integers and are larger than or equal to 0; and

an encoding unit, configured to encode a reference layer syntax element with a value specifying the layer with index j is a direct reference layer for the layer with index i into a video bitstream, and encode a chroma format related syntax element applied to the layer with index i and

a chroma format related syntax element applied to the layer with index j into the video bitstream in case that the layer with index j is a direct reference layer for the layer with index i, wherein the value of the chroma format related syntax element applied to the layer with index i is the same as the value of the chroma format related syntax element applied to the layer with index j.

~~47~~23. The apparatus of claim ~~46~~22, further comprising a first predicting unit;

the first predicting unit is configured to predict a picture of the layer with index i based on the layer with index j in case that the layer with index j is the direct reference layer for the layer with index i.

~~48~~24. The apparatus of claim ~~46~~22, further comprising a second predicting unit;

the first predicting unit is configured to predict a picture of the layer with index i without using the layer with index j in case that the layer with index j is not a reference layer for the layer with index i.

~~49. An apparatus for encoding a video, comprising:~~

~~a determining unit, configured to determine whether a layer with index j is a direct reference layer for a layer with index i, both i and j are integers and are larger than or equal to 0; and~~

~~an encoding unit, configured to encode a reference layer syntax element with a value specifying the layer with index j is a direct reference layer for the layer with index i into a video bitstream, and encode a bit depth related syntax element applied to the layer with index i and a bit depth related syntax element applied to the layer with index j into the video bitstream in case that the layer with index j is a direct reference layer for the layer with index i, wherein the value of the bit depth related syntax element applied to the layer with index i is the same as the value of the bit depth related syntax element applied to the layer with index j.~~

~~50. The apparatus of claim 49, further comprising a first predicting unit;~~

~~the first predicting unit is configured to predict a picture of the layer with index i based on the layer with index j in case that the layer with index j is the direct reference layer for the layer with index i.~~

~~51. The apparatus of claim 49, further comprising a second predicting unit;~~

~~the second predicting unit is configured to predict a picture of the layer with index i without using the layer with index j in case that the layer with index j is not a reference layer for the layer with index i.~~

~~52. The apparatus of any one of claims 49 to 51, wherein the bit depth related syntax element specifies a bit depth of luma and chroma samples of a picture in a layer to which the bit depth related syntax element is applied.~~

~~53~~25. An encoder comprising processing circuitry for carrying out the method according to any one of claims ~~20~~ 10 to ~~26~~12.

~~54~~26. A decoder comprising processing circuitry for carrying out the method according to any one of claims 1 to ~~19~~9.

~~55~~27. A computer program product comprising program code for performing the method

according to any one of claims 1 to ~~26~~ 12 when executed on a computer or a processor.

~~56~~28. A decoder, comprising:

one or more processors; and

a non-transitory computer-readable storage medium coupled to the one or more processors and storing programming for execution by the processors, wherein the programming, when executed by the processors, configures the decoder to carry out the method according to any one of claims 1 to ~~19~~9.

~~57~~29. An encoder, comprising:

one or more processors; and

a non-transitory computer-readable storage medium coupled to the processors and storing programming for execution by the processors, wherein the programming, when executed by the processors, configures the encoder to carry out the method according to any one of claims ~~20~~ 10 to ~~26~~12.

~~58~~30. A non-transitory computer-readable medium carrying a program code which, when executed by a computer device, causes the computer device to perform the method of any one of claims 1 to ~~26~~12.

~~59~~31. A non-transitory storage medium which comprises an encoded bitstream decoded by an image decoding device, the bitstream comprises encoded data of at least one layer, wherein the bitstream further comprises a chroma format related syntax element of a layer with index i and a chroma format related syntax element of a layer with index j, wherein the value of the chroma format related syntax element of the layer with index i is the same as the value of the chroma format related syntax element of the layer with index j when the layer with index j is a reference layer for the layer with index i, both i and j are integers and are larger than or equal to 0.

~~60. A non-transitory storage medium which comprises an encoded bitstream decoded by an image decoding device, the bitstream comprises encoded data of at least one layer, wherein the bitstream further comprises a bit depth related syntax element of a layer with index i and a bit depth related syntax element of a layer with index j, wherein the value of the bit depth related syntax element of the layer with index i is the same as the value of the bit depth related syntax element of the layer with index j when the layer with index j is a reference layer for the layer with index i, both i and j are integers and are larger than or equal to 0.~~

~~61. The non-transitory storage medium of claim 60, wherein the bit depth related syntax element specifies a bit depth of luma and chroma samples of a picture in a layer to which the bit depth related syntax element is applied.~~

~~62~~32. The non-transitory storage medium of ~~any one of~~ claim~~s~~ ~~59 to 61~~31, wherein the bitstream further comprises a reference layer syntax element, wherein the layer with index j is a reference layer for the layer with index i comprises: the value of the reference layer syntax element specifying the layer with index j is a direct reference layer for the layer with index i.