

WHAT IS CLAIMED IS

1. A method comprising:
encoding an uncompressed picture into a coded picture comprising a slice, the encoding comprising:
5 classifying syntax elements for the slice into a first set and a second set;
determining syntax element values for the first set and the second set;
encoding the first set selectively in a first group of slices parameter set or a slice header, wherein said encoding comprises one of the following:
providing an indication of an inclusion of the respective first set from another group of slices
10 parameter set; or
encoding the syntax element values of the first set; or
omitting both of the above; and
encoding the second set selectively in a second group of slices parameter set or the slice header, wherein said encoding comprises one of the following:
15 providing an indication of an inclusion of the respective second set from another group of slices parameter set; or
encoding the syntax element values of the second set; or
omitting both of the above.

20 2. The method according to claim 1 comprising inferring the contents or the instance of group of slices parameter set from other syntax structures already encoded or decoded or present in a bitstream.

25 3. The method according to claim 1 or 2 comprising forming the group of slices parameter set from a slice header of a texture view component of a base view.

30 4. The method according to any of the claims 1 to 3, wherein a group of slices parameter set is valid within a particular access unit associated with it, wherein the group of slices parameter set syntax structure is included in a network abstraction layer unit sequence for a particular access unit, where the sequence is in decoding or bitstream order, and the group of slices parameter set is valid from its appearance location until the end of the access unit.

35 5. The method according to any of the claims 1 to 4 comprising determining whether at least a subset of syntax element values in a slice header to be coded would be the same in a subsequent slice header, and if so encoding the group of slices parameter set in a bitstream.

40 6. The method according to any of the claims 1 to 5 comprising using a group of slices parameter set identifier values for a first group of slices parameter set and subsequently for a second group of slices parameter set, if the first group of slices parameter set is subsequently not referred to by any slice header or group of slices parameter set.

7. The method according to any of the claims 1 to 6 comprising identifying the group of slices parameter set syntax structure using a bitstream order of group of slices parameter set syntax structures and a pre-defined numbering scheme.

8. The method according to any of the claims 1 to 7 comprising forming the set of syntax elements for the group of slices parameter set from at least one of the following:

Syntax elements indicating a scalable layer and/or other scalability features;

Syntax elements indicating a view and/or other multiview features;

Syntax elements related to a particular component type of a multiview video;

Syntax elements related to access unit identification;

Syntax elements related to decoding order;

Syntax elements related to output order;

Syntax elements related to other syntax elements which may stay unchanged for all slices of an access unit;

Syntax elements which may stay unchanged in all slices of a view component;

Syntax elements related to reference picture list modification;

Syntax elements related to a reference picture set used;

Syntax elements related to decoding reference picture marking;

Syntax elements related to prediction weight tables for weighted prediction;

Syntax elements for controlling deblocking filtering;

Syntax elements for controlling adaptive loop filtering;

Syntax elements for controlling sample adaptive offset.

9. An apparatus comprising at least one processor and at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus to:

classify syntax elements for a slice of a coded picture comprising into a first set and a second set;

determine syntax element values for the first set and the second set;

encode the first set selectively in a first group of slices parameter set or a slice header comprising one of the following:

providing an indication of an inclusion of the respective first set from another group of slices parameter set; or

encoding the syntax element values of the first set; or

omitting both of the above; and

encode the second set selectively in a second group of slices parameter set or the slice header comprising one of the following:

providing an indication of an inclusion of the respective second set from another group of slices parameter set; or

encoding the syntax element values of the second set; or
omitting both of the above.

10. A computer program product including one or more sequences of one or more
instructions which, when executed by one or more processors, cause an apparatus to at least perform the
following:

classify syntax elements for a slice of a coded picture comprising into a first set and a second set;
determine syntax element values for the first set and the second set;
encode the first set selectively in a first group of slices parameter set or a slice header comprising
one of the following:

providing an indication of an inclusion of the respective first set from another group of slices
parameter set; or

encoding the syntax element values of the first set; or
omitting both of the above; and

encode the second set selectively in a second group of slices parameter set or the slice header
comprising one of the following:

providing an indication of an inclusion of the respective second set from another group of slices
parameter set; or

encoding the syntax element values of the second set; or
omitting both of the above.

11. An apparatus comprising:

means for classifying syntax elements for a slice of a coded picture comprising into a first set and
a second set;

means for determining syntax element values for the first set and the second set;

means for encoding the first set selectively in a first group of slices parameter set or a slice
header comprising one of the following:

providing an indication of an inclusion of the respective first set from another group of slices
parameter set; or

encoding the syntax element values of the first set; or
omitting both of the above; and

means for encoding the second set selectively in a second group of slices parameter set or the
slice header comprising one of the following:

providing an indication of an inclusion of the respective second set from another group of slices
parameter set; or

encoding the syntax element values of the second set; or
omitting both of the above.

12. A method comprising:

decoding a coded slice of a coded picture, the decoding comprising:

identifying a first location of a first set of syntax elements and a second location of a second set of syntax elements to be used for decoding the coded slice to be one of a slice header or a group of slices parameter set,

decoding the first set of syntax elements and the second set of syntax elements to be used for decoding the coded slice, comprising:

decoding a first indication of an inclusion of the respective first set from a third group of slices parameter set, and as a response to the first indication being indicative of the third group of slices parameter set, decoding a respective first set of syntax elements from the third group of slices parameter set; and

decoding a second indication of an inclusion of the respective second set from a fourth group of slices parameter set, and as response to the first indication being indicative of the fourth group of slices parameter set, decoding a respective first set of syntax elements from the fourth group of slices parameter set; and

decoding the coded slice using the decoded first set and the second set of syntax elements.

13 An apparatus comprising at least one processor and at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus to:

decode a coded slice of a coded picture by:

identifying a first location of a first set of syntax elements and a second location of a second set of syntax elements to be used for decoding the coded slice to be one of a slice header or a group of slices parameter set,

decoding the first set of syntax elements and the second set of syntax elements to be used for decoding the coded slice, comprising:

decoding a first indication of an inclusion of the respective first set from a third group of slices parameter set, and as a response to the first indication being indicative of the third group of slices parameter set, decoding a respective first set of syntax elements from the third group of slices parameter set; and

decoding a second indication of an inclusion of the respective second set from a fourth group of slices parameter set, and as response to the first indication being indicative of the fourth group of slices parameter set, decoding a respective first set of syntax elements from the fourth group of slices parameter set; and

decoding the coded slice using the decoded first set and the second set of syntax elements.

14 A computer program product including one or more sequences of one or more instructions which, when executed by one or more processors, cause an apparatus to at least perform the following:

decode a coded slice of a coded picture by:

identifying a first location of a first set of syntax elements and a second location of a second set of syntax elements to be used for decoding the coded slice to be one of a slice header or a group of slices parameter set,

decoding the first set of syntax elements and the second set of syntax elements to be used for decoding the coded slice, comprising:

decoding a first indication of an inclusion of the respective first set from a third group of slices parameter set, and as a response to the first indication being indicative of the third group of slices parameter set, decoding a respective first set of syntax elements from the third group of slices parameter set; and

decoding a second indication of an inclusion of the respective second set from a fourth group of slices parameter set, and as response to the first indication being indicative of the fourth group of slices parameter set, decoding a respective first set of syntax elements from the fourth group of slices parameter set; and

decoding the coded slice using the decoded first set and the second set of syntax elements.

15 A method comprising:

decoding a coded slice of a coded picture, the decoding comprising:

identifying a first location of a first set of syntax elements and a second location of a second set of syntax elements to be used for decoding the coded slice to be one of a slice header or a group of slices parameter set,

decoding the first set of syntax elements and the second set of syntax elements to be used for decoding the coded slice, comprising:

decoding a first indication of an inclusion of the respective first set from a third group of slices parameter set, and as a response to the first indication being indicative of the third group of slices parameter set, decoding a respective first set of syntax elements from the third group of slices parameter set; or if the first indication is not indicative of the third group of slices parameter set, decoding syntax elements of the first set; and

decoding a second indication of an inclusion of the respective second set from a fourth group of slices parameter set, and as response to the first indication being indicative of the fourth group of slices parameter set, decoding a respective first set of syntax elements from the fourth group of slices parameter set; or if the second indication is not indicative of the fourth group of slices parameter set, decoding syntax elements of the second set; and

decoding the coded slice using the decoded first set of syntax elements and the second set of syntax elements.

16. The method according to claim 15 comprising inferring the contents or the instance of group of slices parameter set from other syntax structures already encoded or decoded or present in a bitstream.

17. The method according to claim 15 or 16, wherein a group of slices parameter set is valid within a particular access unit associated with it, wherein the group of slices parameter set syntax structure is included in a network abstraction layer unit sequence for a particular access unit, where the sequence is in decoding or bitstream order, and the group of slices parameter set is valid from its appearance location until the end of the access unit.

18. An apparatus comprising at least one processor and at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus to:

decode a coded slice of a coded picture by:

identifying a first location of a first set of syntax elements and a second location of a second set of syntax elements to be used for decoding the coded slice to be one of a slice header or a group of slices parameter set,

decoding the first set of syntax elements and the second set of syntax elements to be used for decoding the coded slice, comprising:

decoding a first indication of an inclusion of the respective first set from a third group of slices parameter set, and as a response to the first indication being indicative of the third group of slices parameter set, decoding a respective first set of syntax elements from the third group of slices parameter set; or if the first indication is not indicative of the third group of slices parameter set, decode syntax elements of the first set; and

decoding a second indication of an inclusion of the respective second set from a fourth group of slices parameter set, and as response to the first indication being indicative of the fourth group of slices parameter set, decoding a respective first set of syntax elements from the fourth group of slices parameter set; or if the second indication is not indicative of the fourth group of slices parameter set, decode syntax elements of the second set; and

decoding the coded slice using the decoded first set of syntax elements and the second set of syntax elements.

19. A computer program product including one or more sequences of one or more instructions which, when executed by one or more processors, cause an apparatus to at least perform the following:

decode a coded slice of a coded picture by:

identifying a first location of a first set of syntax elements and a second location of a second set of syntax elements to be used for decoding the coded slice to be one of a slice header or a group of slices parameter set,

decoding the first set of syntax elements and the second set of syntax elements to be used for decoding the coded slice, comprising:

decoding a first indication of an inclusion of the respective first set from a third group of slices parameter set, and as a response to the first indication being indicative of the third group of slices parameter set, decoding a respective first set of syntax elements from the third group of slices parameter

set; or if the first indication is not indicative of the third group of slices parameter set, decoding syntax elements of the first set; and

decoding a second indication of an inclusion of the respective second set from a fourth group of slices parameter set, and as response to the first indication being indicative of the fourth group of slices parameter set, decoding a respective first set of syntax elements from the fourth group of slices parameter set; or if the second indication is not indicative of the fourth group of slices parameter set, decoding syntax elements of the second set; and

decoding the coded slice using the decoded first set of syntax elements and the second set of syntax elements.

20. A method comprising:

means for decoding a coded slice of a coded picture, the decoding comprising:

means for identifying a first location of a first set of syntax elements and a second location of a second set of syntax elements to be used for decoding the coded slice to be one of a slice header or a group of slices parameter set,

means for decoding the first set of syntax elements and the second set of syntax elements to be used for decoding the coded slice, comprising:

means for decoding a first indication of an inclusion of the respective first set from a third group of slices parameter set, and as a response to the first indication being indicative of the third group of slices parameter set, decoding a respective first set of syntax elements from the third group of slices parameter set; or if the first indication is not indicative of the third group of slices parameter set, decoding syntax elements of the first set; and

means for decoding a second indication of an inclusion of the respective second set from a fourth group of slices parameter set, and as response to the first indication being indicative of the fourth group of slices parameter set, decoding a respective first set of syntax elements from the fourth group of slices parameter set; or if the second indication is not indicative of the fourth group of slices parameter set, decoding syntax elements of the second set; and

means for decoding the coded slice using the decoded first set of syntax elements and the second set of syntax elements.

WHAT IS CLAIMED IS

1. A method for encoding three-dimensional (3D) video content comprising a texture view component and a depth view component, comprising:

5 encoding an uncompressed picture into a coded picture comprising a coded slice of the texture view component and a coded slice of the depth view component, the encoding comprising:
classifying syntax elements for the slice of the depth view component into a first set and a second set;

determining syntax element values for the first set and the second set;

10 encoding syntax element values for the first set selectively in a group of slices parameter set or slice header of the slice of the depth view component;

providing an indication, in the slice header of the slice of the depth view component, whether the syntax element values for the first set is to be inferred from the group of slices parameter set, or included in the slice header of the slice of the depth view component; and

15 encoding the syntax element values of the second set in the slice header of the slice of the depth view component.

2. The method according to claim 1, further comprising:

forming the group of slices parameter set from a slice header of the slice of the texture view component.

3. The method according to claim 1, further comprising:

forming the group of slices parameter set from a slice header of another slice of same view as the slice of the depth view component.

4. The method according to any one of the claims 1 to 3, wherein the group of slices parameter set is valid within a particular access unit associated with it, wherein the group of slices parameter set syntax structure is included in a network abstraction layer unit sequence for a particular access unit, where the sequence is in decoding or bitstream order, and the group of slices parameter set is valid from its appearance location until the end of the access unit.

5. The method according to any one of the claims 1 to 3, further comprising:

forming the set of syntax elements for the group of slices parameter set from at least one of the following:

Syntax elements indicating a scalable layer and/or other scalability features;

Syntax elements indicating a view and/or other multiview features;

Syntax elements related to a particular component type of a multiview video;

Syntax elements related to access unit identification;

Syntax elements related to decoding order;

Syntax elements related to output order;

Syntax elements related to other syntax elements which may stay unchanged for all slices of an access unit;

Syntax elements which may stay unchanged in all slices of a view component;

Syntax elements related to reference picture list modification;

5 Syntax elements related to a reference picture set used;

Syntax elements related to decoding reference picture marking;

Syntax elements related to prediction weight tables for weighted prediction;

Syntax elements for controlling deblocking filtering;

Syntax elements for controlling adaptive loop filtering;

10 Syntax elements for controlling sample adaptive offset.

6. An apparatus for encoding three-dimensional (3D) video content comprising a texture view component and a depth view component, the apparatus comprising at least one processor and at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus to:

15 encode an uncompressed picture into a coded picture comprising a coded slice of the texture view component and a coded slice of the depth view component, the encoding comprising:

classify syntax elements for the slice of the depth view component into a first set and a second set;

20 determine syntax element values for the first set and the second set;

encode syntax element values for the first set selectively in a group of slices parameter set or slice header of the slice of the depth view component;

25 provide an indication, in the slice header of the slice of the depth view component, whether the syntax element values for the first set is to be inferred from the group of slices parameter set, or included in the slice header of the slice of the depth view component; and

encode the syntax element values of the second set in the slice header of the slice of the depth view component.

7. The apparatus according to claim 6, wherein the computer code further cause apparatus to:

30 form the group of slices parameter set from a slice header of the slice of the texture view component.

8. The apparatus according to claim 6, wherein the computer code further cause apparatus to:

35 form the group of slices parameter set from a slice header of another slice of same view as the slice of the depth view component.

9. The apparatus according to any one of the claims 6 to 8, wherein the group of slices parameter set is valid within a particular access unit associated with it, wherein the group of slices parameter set syntax structure is included in a network abstraction layer unit sequence for a particular access unit, where the sequence is in decoding or bitstream order, and the group of slices parameter set is valid from its appearance location until the end of the access unit.

10. The apparatus according to any one of the claims 6 to 8, wherein the computer code further cause apparatus to:

form the set of syntax elements for the group of slices parameter set from at least one of the following:

Syntax elements indicating a scalable layer and/or other scalability features;

Syntax elements indicating a view and/or other multiview features;

Syntax elements related to a particular component type of a multiview video;

Syntax elements related to access unit identification;

Syntax elements related to decoding order;

Syntax elements related to output order;

Syntax elements related to other syntax elements which may stay unchanged for all slices of an access unit;

Syntax elements which may stay unchanged in all slices of a view component;

Syntax elements related to reference picture list modification;

Syntax elements related to a reference picture set used;

Syntax elements related to decoding reference picture marking;

Syntax elements related to prediction weight tables for weighted prediction;

Syntax elements for controlling deblocking filtering;

Syntax elements for controlling adaptive loop filtering;

Syntax elements for controlling sample adaptive offset.

11. A computer program product for encoding three-dimensional (3D) video content comprising a texture view component and a depth view component, the computer program product including one or more sequences of one or more instructions which, when executed by one or more processors, cause an apparatus to at least perform the following:

encode an uncompressed picture into a coded picture comprising a coded slice of the texture view component and a coded slice of the depth view component, the encoding comprising:

classify syntax elements for the slice of the depth view component into a first set and a second set;

determine syntax element values for the first set and the second set;

encode syntax element values for the first set selectively in a group of slices parameter set or slice header of the slice of the depth view component;

provide an indication, in the slice header of the slice of the depth view component, whether the syntax element values for the first set is to be inferred from the group of slices parameter set, or included in the slice header of the slice of the depth view component ; and

5 encode the syntax element values of the second set in the slice header of the slice of the depth view component.

12. A method for decoding coded three-dimensional (3D) video content comprising a texture view component and a depth view component, the method comprising:

 decoding a coded slice of the depth view component;

10 identifying a first location of a first set of syntax elements and a second location of a second set of syntax elements to be used for decoding the coded slice of the depth view component to be one of a slice header of the slice of the depth view component or a group of slices parameter set,

 decoding from the slice header of the slice of the depth view component a first indication whether the syntax element values for the first set is to be inferred from the group of slices parameter set, or included in the slice header of the slice of the depth view component;

15 in response to the first indication indicating that the syntax element values for the first set is included in the slice header of the slice of the depth view component, decoding the syntax element values of the first set from the slice header of the slice of the depth view component, otherwise, predicting the syntax element values for the first set from the group of slices parameter set;

20 decoding the syntax element values of the second set from the slice header of the slice of the depth view component; and

 decoding the coded slice of a depth view component using the decoded first set and the second set of syntax elements.

25 13. The method according to claim 12, further comprising:

 forming the group of slices parameter set from a slice header of the slice of the texture view component.

30 14. The method according to claim 12, further comprising:

 forming the group of slices parameter set from a slice header of another slice of same view as the slice of the depth view component.

35 15. The method according to any one of the claims 12 to 14, wherein the group of slices parameter set is valid within a particular access unit associated with it, wherein the group of slices parameter set syntax structure is included in a network abstraction layer unit sequence for a particular access unit, where the sequence is in decoding or bitstream order, and the group of slices parameter set is valid from its appearance location until the end of the access unit.

16. The method according to any one of the claims 12 to 14, further comprising:

forming the set of syntax elements for the group of slices parameter set from at least one of the following:

Syntax elements indicating a scalable layer and/or other scalability features;

Syntax elements indicating a view and/or other multiview features;

5 Syntax elements related to a particular component type of a multiview video;

Syntax elements related to access unit identification;

Syntax elements related to decoding order;

Syntax elements related to output order;

10 Syntax elements related to other syntax elements which may stay unchanged for all slices of an access unit;

Syntax elements which may stay unchanged in all slices of a view component;

Syntax elements related to reference picture list modification;

Syntax elements related to a reference picture set used;

Syntax elements related to decoding reference picture marking;

15 Syntax elements related to prediction weight tables for weighted prediction;

Syntax elements for controlling deblocking filtering;

Syntax elements for controlling adaptive loop filtering;

Syntax elements for controlling sample adaptive offset.

20 17. An apparatus for decoding coded three-dimensional (3D) video content comprising a texture view component and a depth view component, the apparatus comprising at least one processor and at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus to:

decode a coded slice of the depth view component;

25 identify a first location of a first set of syntax elements and a second location of a second set of syntax elements to be used for decoding the coded slice of the depth view component to be one of a slice header of the slice of the depth view component or a group of slices parameter set,

30 decode from the slice header of the slice of the depth view component a first indication whether the syntax element values for the first set is to be inferred from the group of slices parameter set, or included in the slice header of the slice of the depth view component;

in response to the first indication indicating that the syntax element values for the first set is included in the slice header of the slice of the depth view component, decode the syntax element values of the first set from the slice header of the slice of the depth view component, otherwise, predicting the syntax element values for the first set from the group of slices parameter set;

35 decode the syntax element values of the second set from the slice header of the slice of the depth view component; and

decode the coded slice of a depth view component using the decoded first set and the second set of syntax elements.

18. The apparatus according to claim 17, wherein the computer code further cause apparatus to:

form the group of slices parameter set from a slice header of the slice of the texture view component.

19. The apparatus according to claim 17, wherein the computer code further cause apparatus to:

form the group of slices parameter set from a slice header of another slice of same view as the slice of the depth view component.

20. The apparatus according to any one of the claims 17 to 19, wherein the group of slices parameter set is valid within a particular access unit associated with it, wherein the group of slices parameter set syntax structure is included in a network abstraction layer unit sequence for a particular access unit, where the sequence is in decoding or bitstream order, and the group of slices parameter set is valid from its appearance location until the end of the access unit.

21. The apparatus according to any one of the claims 17 to 19, wherein the computer code further cause apparatus to:

form the set of syntax elements for the group of slices parameter set from at least one of the following:

Syntax elements indicating a scalable layer and/or other scalability features;

Syntax elements indicating a view and/or other multiview features;

Syntax elements related to a particular component type of a multiview video;

Syntax elements related to access unit identification;

Syntax elements related to decoding order;

Syntax elements related to output order;

Syntax elements related to other syntax elements which may stay unchanged for all slices of an access unit;

Syntax elements which may stay unchanged in all slices of a view component;

Syntax elements related to reference picture list modification;

Syntax elements related to a reference picture set used;

Syntax elements related to decoding reference picture marking;

Syntax elements related to prediction weight tables for weighted prediction;

Syntax elements for controlling deblocking filtering;

Syntax elements for controlling adaptive loop filtering;

Syntax elements for controlling sample adaptive offset.

22. A computer program product for decoding coded three-dimensional (3D) video content comprising a texture view component and a depth view component, the computer program product including one or more sequences of one or more instructions which, when executed by one or more processors, cause an apparatus to at least perform the following:

- 5 decode a coded slice of the depth view component;
 identify a first location of a first set of syntax elements and a second location of a second set of syntax elements to be used for decoding the coded slice of the depth view component to be one of a slice header of the slice of the depth view component or a group of slices parameter set,
 decode from the slice header of the slice of the depth view component a first indication whether
- 10 the syntax element values for the first set is to be inferred from the group of slices parameter set, or included in the slice header of the slice of the depth view component;
 in response to the first indication indicating that the syntax element values for the first set is included in the slice header of the slice of the depth view component, decode the syntax element values of the first set from the slice header of the slice of the depth view component, otherwise, predicting the
- 15 syntax element values for the first set from the group of slices parameter set;
 decode the syntax element values of the second set from the slice header of the slice of the depth view component; and
 decode the coded slice of a depth view component using the decoded first set and the second set of syntax elements.

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