Claims

1. Video decoder comprising

a decoding core (94) configured to reconstruct a decoded picture using motion compensated prediction and transform-based residual decoding from one or more video coding units (100) within an access unit, AU, of a video data stream to obtain a reconstructed version (46a) of the decoded picture;

an in-loop filter (90) configured to filter the reconstructed version of the decoded picture to obtain a version (46b) of the decoded picture to be inserted into the decoded picture buffer (92), DPB, of the video decoder; and

a parametrizer configured to parametrize the in-loop filter by

reading in-loop filter control information for parametrizing the in-loop filter from

one or more parameter sets (102, 104) located within the access unit, AU, of the decoded picture which follow, along data stream order, the one or more video coding units (100), and/or

a portion (106) of the one or more video coding units (100) following, along data stream order, data (108) comprised by the one or more video coding units (100), which carries block-based prediction parameter data and prediction residual data, and

parametrizing the in-loop filter so as to filter the reconstructed version of the decoded picture in a manner depending on the in-loop filter control information.

2. Video decoder of claim 1, wherein

the in-loop filter control information comprises one or more filter coefficients for parametrizing the in-loop filter in terms of transfer function.

3. Video decoder of claim 1 or 2, wherein

the in-loop filter control information comprises spatially selective in-loop filter control information for spatially varying the filtering of the reconstructed version of the decoded picture by the in-loop filter.

4. Video decoder of any of claims 1 to 3, wherein

each video coding unit (100) is continuously arithmetically coded along the data stream order across the data to the end of the portion (106).

5. Video decoder of any of claims 1 to 4, wherein

a predetermined parameter set (102) of the one or more parameter sets follows each of the one or more video coding units (100) in data stream order and comprises one or more filter coefficients for parametrizing the in-loop filter in terms of transfer function.

6. Video decoder of any of claims 1 to 5, wherein

the one or more parameter sets (104) comprise for each of the one or more video coding units (100) a further predetermined parameter set which follows in data stream order the respective video coding unit (100) and comprises spatially selective in-loop filter control information for spatially varying the filtering of the reconstructed version of the decoded picture by the in-loop filter within a portion of the picture which is encoded into the respective video coding unit (100).

7. Video decoder of any of claims 1 to 5, wherein

each of the one or more video coding units (100) comprises a filter information section (106) which follows in data stream order a data section (108) of the respective video coding unit (100) wherein the filter information section comprises spatially selective in-loop filter control information for spatially varying the filtering of the reconstructed version of the decoded picture by the in-loop filter within a portion of the picture for which block-based prediction parameter data and prediction residual data is encoded into the data section of the respective video coding unit (100).

8. Video decoder of any of claims 1 to 7, wherein

the parametrizer configured to locate the one or more parameter sets (102, 104) within the access unit, AU, of the decoded picture at a position which follows, along data stream order, the one or more video coding units (100), in case of a predetermined indication in the video data stream assuming a first state, and at a different position within the access unit which precedes all of the one or more video coding units (100) in case of the predetermined indication in the video data stream assuming a second state.

9. Video decoder of any of claims 1 to 8, wherein

the portion (106) of the one or more video coding units (100) at a position following, along data stream order, data (108) comprised by the one or more video coding units (100), which carries block-based prediction parameter data and prediction residual data, in case of a predetermined indication in the video data stream assuming a first state, and at a different positions within the one or more video coding units which are interspersed with the block-based prediction parameter data and prediction residual data, in case of the predetermined indication in the video data stream assuming a second state.

10. Video decoder of claim 8 or 9, configured to read the predetermined indication from the one or more video coding units (100).

11. Video decoder of any of claims 8 to 10, wherein the predetermined indication indicates, in case of assuming the first state, the one or more parameter sets by one or more identifier, and, in case of assuming the second state, different one or more in-loop filter control information parameter sets.

12. Video decoder of any of claims 8 to 11, configured to be responsive to the predetermined indication on a per access unit basis so as to perform locating differently for different access units of the video data stream in case of the predetermined indication being different for the different access units.

13. Video decoder of any of claims 1 to 12, wherein the parametrizer is configured to

reconstruct the decoded picture using the in-loop filter control information included in the previously signalled access unit, AU.

14. Video decoder of any of claims 1 to 13, wherein the video decoder is configured to, in detecting the boundaries of access unit, AU,

interpret video coding units carrying the in-loop filter control information in the form of one or more of parameter sets (102, 104) as not starting an access unit, AU, therefrom, and

interpret video coding units carrying the in-loop filter control information not in the form of one or more of parameter sets (102, 104) as starting an access unit therefrom.

15. Video decoder configured to

decode a video from a video data stream by decoding a decoded picture from one or more video coding units (100) within an access unit, AU, of the video data stream in a manner parametrized using one or more predetermined coding parameters;

derive the predetermined coding parameters (122) from a plurality of parameter sets (120) which are interspersed into video data stream,

read identifiers (200) from a predetermined unit (124) of the access unit, AU, which identify predetermined parameter sets out of the plurality of parameter sets, which comprise the predetermined coding parameters.

16. Video decoder of claim 15, wherein

the predetermined unit of the AU comprises a flag (204) indicative of whether the identifiers (200) are present in the predetermined unit or not.

17. Video decoder of claims 15 or 16, wherein

the plurality of parameter sets (120) are of different hierarchy levels, wherein the one or more video coding units comprise identifiers which refer to first predetermined parameter sets (126) within one or more first predetermined hierarchy levels, wherein

the first predetermined parameter sets (126) within the one or more first predetermined hierarchy levels comprise identifiers which refer to second predetermined parameter sets (128) within one or more second predetermined hierarchy levels, the first and second predetermined parameter sets being contained by the predetermined parameter sets (122).

18. Video decoder of claim 17, wherein the identifiers read from the predetermined unit (124) of the access unit, AU, identify all predetermined parameter sets directly or indirectly referred to by the one or more video coding units of the access unit so that, if all predetermined parameter sets identified by the identifiers are available, the access unit is decodable.

19. Video decoder of any one of claims 15 to 18, wherein

the predetermined unit of the AU comprises a flag (204) indicative (205) of whether either

predetermined identifiers of the identifiers (200) which refer to specific predetermined parameter sets (126b) are present in the predetermined unit (124), or

the predetermined identifiers which refer to the specific predetermined parameter sets (126b) are present in the one or more video coding units (100).

20. Video decoder of any one of claims 15 to 19, wherein

the first predetermined parameter sets (126) comprise

third predetermined parameter sets (126a) which are referred to by identifiers in the one or more video coding units (100), and

fourth predetermined parameter sets (126b) which are referred to by identifiers (200) present in the predetermined unit (124), but are neither referred to by any of the identifiers in the one or more video coding units (100), nor by any of the predetermined parameter sets.

~~21. Video decoder of claim 15, wherein~~

~~the predetermined unit of the AU comprises one or more of~~

~~one or more identifiers of one or more adaptive parameter sets, APSs,~~
~~one or more identifiers of one or more picture parameter sets, PPSs,~~
~~an identifier for a video parameter set, VPS,~~
~~an identifier for a decoder parameter set, DPS, and~~
~~one or more identifiers of one or more sequence parameter sets, SPS.~~

~~22. Video decoder of claim 15 or 21, wherein~~

~~the plurality of parameter sets comprises~~
~~a video parameter set, VPS,~~
~~a decoder parameter set, DPS,~~
~~a sequence parameter set, SPS,~~
~~one or more picture parameter sets, PPSs, and~~
~~one or more adaptive parameter sets, APSs.~~

~~23. Video decoder of any one of claims 15 to 22, wherein~~

~~the predetermined unit of the AU is an access unit delimiter, AUD.~~

~~24. Video decoder configured to~~

~~decode a video from a video data stream by decoding pictures from one or more video coding units (100) of access units, AUs, of the video data stream;~~

~~read one or more parameters from access unit delimiters, AUD, which are arranged in the data stream so as to form the start of the access units, AUs, the one or more parameters~~

~~controlling (300) whether separate access units are defined in the video data stream for pictures relating to one time instant but different layers of the video data stream, or whether the pictures relating to one time instant but different layers of the video data stream are coded into one of the access units, and/or~~

~~indicating (302) a video coding type of video coding units comprised in the access units which is to be assigned to video coding units within one access units in case of a video coding type indication contained the video coding units within the one access unit differing from each other, and/or~~

~~indicating (304) pictures of which access units are not referenced by any other picture, and/or~~

~~indicating (306) pictures not to be output.~~

~~25. Video decoder of claim 24, wherein~~

~~the one or more parameters form a deviation relative to parameters defined by a previous AUD.~~

~~26. Video decoder of claim 24 or 25, wherein~~

~~the AUD comprises an indication whether parameters defined by a previous AUD are to be adopted.~~

~~27. Video decoder of any one of claims 24 to 26, wherein~~

~~the AUD comprises an indication whether the one or more parameters apply to all layers of the video data stream or to a single layer thereof only.~~

~~28. Video decoder of any one of claims 24 to 27, wherein~~

~~the video coding type of the video coding units is indicated by describing a random access property of a multiple pictures.~~

~~29. Video decoder configured to~~

~~decode a video from a video data stream by decoding pictures from one or more video coding units (100) of access units, AUs, of the video data stream;~~

read one or more parameters (308) from access unit delimiters, AUD, which are arranged in the data stream so as to form the start of the access units, AUs, the one or more parameters indicating a characteristic of the access unit, and an indication whether the characteristic applies to all layers of the video data stream or to a single layer thereof only.

30. A method comprising

reconstructing a decoded picture using motion compensated prediction and transform-based residual decoding from one or more video coding units (100) within an access unit, AU, of a video data stream to obtain a reconstructed version of the decoded picture;

filtering the reconstructed version of the decoded picture to obtain a version of the decoded picture to be inserted into the decoded picture buffer, DPB, of the video decoder by using an in-loop filter; and

parametrizing the in-loop filter by

reading in-loop filter control information for parametrizing the in-loop filter from

one or more parameter sets (102, 104) located within the access unit, AU, of the decoded picture which follow, along data stream order, the one or more video coding units (100), and/or

a portion (106) of the one or more video coding units (100) following, along data stream order, data comprised by the one or more video coding units (100), which carries block-based prediction parameter data and prediction residual data,

so as to filter the reconstructed version of the decoded picture in a manner depending on the in-loop filter control information.

31. A method comprising

~~decoding a video from a video data stream by decoding a decoded picture from one or more video coding units (100) within an access unit, AU, of the video data stream in a manner parametrized using one or more predetermined coding parameters;~~

~~deriving the predetermined coding parameters from a plurality of parameter sets which are interspersed into video data stream,~~

~~reading identifiers (200) from a predetermined unit of the access unit, AU, which identify predetermined parameter sets out of the plurality of parameter sets, which comprise the predetermined coding parameters.~~

~~32. A method comprising~~

~~decoding a video from a video data stream by decoding pictures from one or more video coding units (100) of access units, AUs, of the video data stream;~~

~~reading one or more parameters from access unit delimiters, AUD, which are arranged in the data stream so as to form the start of the access units, AUs, the one or more parameters~~

~~controlling (300) whether separate access units are defined in the video data stream for pictures relating to one time instant but different layers of the video data stream, or whether the pictures relating to one time instant but different layers of the video data stream are coded into one of the access units,~~

~~indicating (302) a video coding type of video coding units comprised in the access units which is to be assigned to video coding units within one access units in case of a video coding type indication contained the video coding units within the one access unit differing from each other, and/or~~

~~indicating (304) pictures of which access units are not referenced by any other picture, and/or~~

~~indicating (306) pictures not to be output.~~

~~33. A method comprising~~

~~decoding a video from a video data stream by decoding pictures from one or more video coding units (100) of access units, AUs, of the video data stream;~~

~~reading one or more parameters (308) from access unit delimiters, AUD, which are arranged in the data stream so as to form the start of the access units, AUs, the one or more parameters indicating a characteristic of the access unit, and an indication whether the characteristic applies to all layers of the video data stream or to a single layer thereof only.~~

~~34. A computer program having a program code for performing, when running on computer, a method according to any one of claims 30 to 33.~~

CLAIMS

1. A video decoding apparatus comprising a processor and a memory, the processor, working together with the memory, configured to:

read one or more video coding layer network abstraction layer units, VCL NAL units, within an access unit, AU, in a video data stream;

generate a reconstructed version of a decoded picture from the one or more VCL NAL units;

read an adaptive loop filter adaptive parameter set, ALF APS,

the ALF APS being a suffix adaptive parameter set network abstraction layer unit type, APS NAL unit type, and

the suffix APS NAL unit type indicating that the ALF APS follows the one or more VCL NAL units within the AU; and

perform adaptive loop filtering on the reconstructed version of the decoded picture in a manner depending on one or more coefficients comprised by the ALF APS.

2. The video decoding apparatus of claim 1, wherein the processor, working together with the memory, is configured to read the one or more VCL NAL units prior to the reading of the ALF APS.

3. The video decoding apparatus of claim 1, wherein the one or more VCL NAL units represent one or more slices.

4. The video decoding apparatus of claim 3, wherein the processor, working together with the memory, is configured to read the ALF APS after the reading of data of the one or more slices.

5. The video decoding apparatus of claim 3, wherein the processor, working together with the memory, is configured to parse the one or more slices before the reading of the ALF APS.

6. The video decoding apparatus of claim 1, wherein the ALF APS comprises ALF control information.

7. The video decoding apparatus of claim 6, wherein the ALF control information comprises information regarding whether a Coding Tree Unit, CTU, is filtered or not.

8. The video decoding apparatus of claim 6, wherein the ALF control information comprises information regarding how a Coding Tree Unit, CTU, is filtered.

9. The video decoding apparatus of claim 1, wherein the video decoding apparatus is one of a computer or a mobile device.

10. A method for decoding a video data stream comprising:

reading one or more video coding layer network abstraction layer units, VCL NAL units, within an access unit, AU, in the video data stream;

generating a reconstructed version of a decoded picture from the one or more VCL NAL units;

reading an adaptive loop filter adaptive parameter set, ALF APS,

the ALF APS being a suffix adaptive parameter set network abstraction layer unit type, APS NAL unit type, and

the suffix APS NAL unit type indicating that the ALF APS follows the one or more VCL NAL units within the AU; and

performing adaptive loop filtering on the reconstructed version of the decoded picture in a manner depending on one or more coefficients comprised by the ALF APSA repeater.

11. The method of claim 10, wherein the ALF APS comprises ALF control information.

12. A video encoding apparatus comprising a processor and a memory, the processor, working together with the memory, configured to:

encode one or more video coding layer network abstraction layer units, VCL NAL units, within an access unit, AU, in a video data stream;

generate a reconstructed version of a decoded picture from the one or more VCL NAL units;

derive one or more adaptive loop filter coefficients based on the reconstructed version of the decoded picture; and

encode, in the data stream following the one or more encoded VCL NAL units, the one or more adaptive loop filter coefficients in an adaptive loop filter adaptive parameter set, ALF APS, such that

the ALF APS is a suffix adaptive parameter set network abstraction layer unit type, APS NAL unit type, and

the suffix APS NAL unit type indicating that the ALF APS follows the one or more VCL NAL units within the AU.

13. The video encoding apparatus of claim 12, wherein the processor, working together with the memory, is configured to encode the one or more VCL NAL units prior to the encoding of the ALF APS.

14. The video encoding apparatus of claim 12, wherein the one or more VCL NAL units represent one or more slices.

15. The video encoding apparatus of claim 14, wherein the processor, working together with the memory, is configured to encode the ALF APS after the encoding of data of the one or more slices.

16. The video encoding apparatus of claim 14, wherein the processor, working together with the memory, is configured to send the one or more slices before encoding a whole picture.

17. The video encoding apparatus of claim 14, wherein the processor, working together with the memory, is configured to send the one or more slices while collecting ALF parameters.

18. The video encoding apparatus of claim 12, wherein the ALF APS comprises ALF control information.

19. The video encoding apparatus of claim 18, wherein the ALF control information comprises information regarding whether a Coding Tree Unit, CTU, is filtered or not.

20. The video encoding apparatus of claim 18, wherein the ALF control information comprises information regarding how a Coding Tree Unit, CTU, is filtered.

21. The video encoding apparatus of claim 12, wherein the video encoding apparatus comprises one of a computer or a mobile device.

22. A method for video encoding a video data stream comprising:

encoding one or more video coding layer network abstraction layer units, VCL NAL units, within an access unit, AU, in the video data stream;

generating a reconstructed version of a decoded picture from the one or more VCL NAL units;

deriving one or more adaptive loop filter coefficients based on the reconstructed version of the decoded picture; and

encoding, in the data stream following the one or more encoded VCL NAL units, the one or more adaptive loop filter coefficients in an adaptive loop filter adaptive parameter set, ALF APS, such that

the ALF APS is a suffix adaptive parameter set network abstraction layer unit type, APS NAL unit type, and

the suffix APS NAL unit type indicating that the ALF APS follows the one or more VCL NAL units within the AU.

23. The method of claim 22, wherein the ALF APS comprises ALF control information.

24. A non-transitory computer readable medium storing instructions which, when executed, cause a computer to perform a method, the method comprising:

reading one or more video coding layer network abstraction layer units, VCL NAL units, within an access unit, AU, in the video data stream;

generating a reconstructed version of a decoded picture from the one or more VCL NAL units;

reading an adaptive loop filter adaptive parameter set, ALF APS,

the ALF APS being a suffix adaptive parameter set network abstraction layer unit type, APS NAL unit type, and

the suffix APS NAL unit type indicating that the ALF APS follows the one or more VCL NAL units within the AU; and

performing adaptive loop filtering on the reconstructed version of the decoded picture in a manner depending on one or more coefficients comprised by the ALF APSA repeater.

25. A non-transitory computer readable medium storing instructions which, when executed, cause a computer to perform a method, the method comprising:

encoding one or more video coding layer network abstraction layer units, VCL NAL units, within an access unit, AU, in the video data stream;

generating a reconstructed version of a decoded picture from the one or more VCL NAL units;

deriving one or more adaptive loop filter coefficients based on the reconstructed version of the decoded picture; and

encoding, in the data stream following the one or more encoded VCL NAL units, the one or more adaptive loop filter coefficients in an adaptive loop filter adaptive parameter set, ALF APS, such that

the ALF APS is a suffix adaptive parameter set network abstraction layer unit type, APS NAL unit type, and

the suffix APS NAL unit type indicating that the ALF APS follows the one or more VCL NAL units within the AU.