

CLAIMS

1. A method of processing Versatile Video Coding, VVC, video data, the method comprising:

obtaining (420) a bitstream that comprises an encoded representation of the video data, wherein the bitstream includes network abstraction layer, NAL, units, including a coded slice NAL unit for a slice of a picture of a current layer of the video data, wherein each NAL unit in the bitstream includes a syntax element specifying a layer identifier and a syntax element specifying a temporal identifier;

determining (422) whether the layer identifier of a Luma Mapping and Chroma Scaling, LMCS, Adaptation Parameter Set, APS, NAL unit, that is applicable to the coded slice NAL unit, is equal to the layer identifier of the coded slice NAL unit and is equal to the layer identifier of any layer that is allowed to be used to predict the current layer of the coded slice NAL unit, wherein a LMCS APS NAL unit that is applicable to a coded slice NAL unit is a LMCS APS NAL unit having an APS identifier specified by a LMCS APS identifier syntax element for the coded slice NAL unit; and

decoding the bitstream in response to determining that the layer identifier of the LMCS APS NAL unit is equal to the layer identifier of the coded slice NAL unit or is equal to the layer identifier of any layer that is allowed to be used to predict the current layer of the coded slice NAL unit, otherwise, in response to determining that the layer identifier of the LMCS APS NAL unit is not equal to the layer identifier of the coded slice NAL unit and is not equal to the layer identifier of any layer that is allowed to be used to predict the current layer of the coded slice NAL unit, generating an error.

2. The method of claim 1, wherein:

the method further comprises determining whether the temporal identifier of the applicable LMCS APS NAL unit is less than or equal to the temporal identifier of the coded slice NAL unit; and

decoding the bitstream in response to determining that the temporal identifier of the applicable LMCS APS NAL is less than or equal to the temporal identifier of the coded slice NAL unit.

3. A method of encoding Versatile Video Coding, VVC, video data, the method comprising:
 - obtaining (400) video data from a video source; and
 - performing (402) an encoding process that encodes the video data according to a video coding standard, to generate a bitstream that includes network abstraction layer, NAL units, wherein each NAL unit in the bitstream includes a syntax element specifying a layer identifier and a syntax element specifying a temporal identifier, and wherein performing the encoding process comprises:
 - generating (404) a Luma Mapping and Chroma Scaling, LMCS, Adaptation Parameter Set, APS, identifier syntax element for a coded slice Network Abstraction Layer, NAL, unit,
 - wherein, the LMCS APS identifier syntax element specifies an APS identifier of a LMCS APS NAL unit,
 - and wherein generating the LMCS APS identifier syntax comprises imposing a constraint on the encoding process that requires the layer identifier of the LMCS APS NAL unit to be equal to a layer identifier of the coded slice NAL unit or equal to a layer identifier of any layer that is allowed to be used to predict the current layer of the coded slice NAL unit.
4. The method of claim 3, wherein the constraint requires the layer identifier of the applicable LMCS APS NAL unit to be equal to the layer identifier of the coded slice NAL unit or equal to the layer identifier of any layer that is used to predict the layer of the coded slice NAL unit.
5. The method of claim 3, wherein:
 - the constraint is a first constraint, and
 - wherein generating the LMCS APS identifier syntax further comprises imposing a second constraint that requires a temporal identifier of the LMCS APS NAL unit to be less than or equal to a temporal identifier of the coded slice NAL unit.
6. A device for processing Versatile Video Coding, VVC, video data, the device comprising:
 - a memory to store the video data; and

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

obtain (420) a bitstream that comprises an encoded representation of the video data, wherein the bitstream includes network abstraction layer, NAL, units, including a coded slice NAL unit for a slice of a picture of a current layer of the video data, wherein each NAL unit in the bitstream includes a syntax element specifying a layer identifier and a syntax element specifying a temporal identifier;

determine (422) whether the layer identifier of Luma Mapping and Chroma Scaling, LMCS, Adaptation Parameter Set, APS, Network Abstraction Layer, NAL, unit, that is applicable to the coded slice NAL unit, is equal to the layer identifier of the coded slice NAL unit and is equal to the layer identifier of any layer that is allowed to be used to predict the current layer of the coded slice NAL unit, wherein a LMCS APS NAL unit that is applicable to a coded slice NAL unit is a LMCS APS NAL unit having an APS identifier specified by a LMCS APS identifier syntax element for the coded slice NAL unit; and

decode the bitstream in response to determining that the layer identifier of a LMCS APS NAL unit is equal to the layer identifier of the coded slice NAL unit or is equal to the layer identifier of any layer that is allowed to be used to predict the current layer of the coded slice NAL unit, otherwise, in response to determining that the layer identifier of the LMCS APS NAL unit is not equal to the layer identifier of the coded slice NAL unit and is not equal to the layer identifier of any layer that is allowed to be used to predict the current layer of the coded slice NAL unit, generate an error.

7. The device of claim 6, further comprising a display configured to display decoded video data.

8. The device of claim 6, wherein:

the one or more processors are further configured to determine whether the temporal identifier of the applicable LMCS APS NAL unit is less than or equal to a temporal identifier of the coded slice NAL unit; and

decode the bitstream in response to determining that the temporal identifier of the applicable LMCS APS NAL is less than or equal to the temporal identifier of the coded slice NAL unit.

9. The device of claim 6, wherein the device comprises one or more of a camera, a computer, a mobile device, a broadcast receiver device, or a set-top box.

10. A device for encoding Versatile Video Coding, VVC, video data, the device comprising:

a memory to store the video data; and

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

obtain (400) video data from a video source; and

perform an encoding process that encodes the video data according to a video coding standard, to generate a bitstream that includes network abstraction layer, NAL units, wherein each NAL unit in the bitstream includes a syntax element specifying a layer identifier and a syntax element specifying a temporal identifier, and wherein the one or more processors are configured such that, as part of performing the encoding process, the one or more processors:

generate (404) a Luma Mapping and Chroma Scaling, LMCS, Adaptation Parameter Set, APS, identifier syntax element for a coded slice Network Abstraction Layer, NAL, unit,

wherein the LMCS APS identifier syntax element specifies an APS identifier of a LMCS APS NAL unit,

and wherein generating the LMCS APS identifier syntax comprises imposing a constraint on the encoding process that requires the layer identifier of the LMCS APS NAL unit to be equal to a layer identifier of the coded slice NAL unit or equal to a layer identifier of any layer that is allowed to be used to predict the current layer of the coded slice NAL unit.

11. The device of claim 10, wherein the one or more processors are further configured to perform the method of claim 4 or claim 5.

12. The device of claim 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.

13. A computer-readable data storage medium having stored thereon instructions that, when executed, cause one or more processors to perform the method of any of claims 1 to 5.