CLAIMS

What is claimed is:

1. A method implemented in a decoder, the method comprising:

receiving a bitstream comprising encoded video data for a slice and an adaptation parameter set, APS, wherein the APS comprises an adaptation_parameter_set_id and an aps_params_type, wherein the adaptation_parameter_set_id specifies an identifier for the APS, the aps_params_type specifies a type of parameter that is contained in the APS, wherein when the aps_params_type is equal to ALF_APS, the APS comprises an adaptive loop filter, ALF APS, wherein the ALF APS comprises an ALF luma filter signal flag, alf_luma_filter_signal_flag, and an ALF chroma filter signal flag, alf_chroma_filter_signal_flag, wherein the alf_luma_filter_signal_flag specifies whether a luma filter set is signaled in the ALF APS, the alf_chroma_filter_signal_flag specifies whether a chroma filter set is signaled in the ALF APS, wherein the value of the alf_luma_filter_signal_flag of an APS network abstraction layer, NAL, unit having the aps_params_type equal to ALF_APS and the adaptation_parameter_set_id equal to slice_alf_aps_id_luma[i] is constrained to be equal to one, and the value of the alf_chroma_filter_signal_flag of the APS NAL unit having the aps_params_type equal to ALF_APS and the adaptation_parameter_set_id equal to slice_alf_aps_id_chroma is constrained to be equal to one, wherein the slice_alf_aps_id_luma[i] specifies an adaptation_parameter_set_id of an i-th ALF APS referred to by a luma component of the slice, the slice_alf_aps_id_chroma specifies an adaptation_parameter_set_id of the ALF APS referred to by a chroma component of the slice;

decoding the luma filter set when the alf_luma_filter_signal_flag specifies the luma filter set is signaled in the ALF APS;

decoding the chroma filter set when the alf_chroma_filter_signal_flag specifies the chroma filter set is signaled in the ALF APS; and

decoding a slice based on ALF parameters in the ALF APS, wherein the ALF parameters comprise the luma filter set and/or the chroma filter set.

2. The method of claim 1, wherein the alf_luma_filter_signal_flag equal to 1 specifies that the luma filter set is signaled in the ALF APS, the alf_luma_filter_signal_flag equal to 0 specifies that the luma filter set is not signaled in the ALF APS .

3. The method of claim 1 or 2, wherein the alf_chroma_filter_signal_flag equal to 1 specifies that the chroma filter set is signaled in the ALF APS; the alf_chroma_filter_signal_flag equal to 0 specifies that the chroma filter set is not signaled in the ALF APS.

4. The method of any of claims 1-3, wherein the slice_alf_aps_id_luma [i] and the slice_alf_aps_id_chroma are contained in a slice header of the slice.

5. A method implemented in an encoder, the method comprising:

encoding, a slice into a bitstream as part of an encoded video sequence;

encoding an adaptation parameter set, APS, into the bitstream, wherein the APS comprises an adaptation_parameter_set_id and an aps_params_type, wherein the adaptation_parameter_set_id specifies an identifier for the APS, the aps_params_type specifies a type of parameter that is contained in the APS, wherein when the aps_params_type is equal to ALF_APS, the APS comprises an adaptive loop filter, ALF APS;

determining adaptive loop filter, ALF, parameters for application to the slice, wherein the ALF parameters comprise a luma filter set and/or a chroma filter set;

encoding the ALF parameters into the ALF APS in the bitstream, the ALF APS comprising an ALF luma filter signal flag, alf_luma_filter_signal_flag, and an ALF chroma filter signal flag, alf_chroma_filter_signal_flag, wherein the alf_luma_filter_signal_flag specifies whether the luma filter set is signaled in the ALF APS, the alf_chroma_filter_signal_flag specifies whether the chroma filter set is signaled in the ALF APS, wherein the value of the alf_luma_filter_signal_flag of an APS network abstraction layer, NAL, unit having the aps_params_type equal to ALF_APS and the adaptation_parameter_set_id equal to slice_alf_aps_id_luma[i] is constrained to be equal to one, and the value of the alf_chroma_filter_signal_flag of the APS NAL unit having the aps_params_type equal to ALF_APS and the adaptation_parameter_set_id equal to slice_alf_aps_id_chroma is constrained to be equal to one, wherein the slice_alf_aps_id_luma[i] specifies an adaptation_parameter_set_id of an i-th ALF APS referred to by a luma component of the slice, the slice_alf_aps_id_chroma specifies an adaptation_parameter_set_id of the ALF APS referred to by a chroma component of the slice; and

storing the bitstream for communication toward a decoder.

6. The method of claim 5, wherein the alf_luma_filter_signal_flag equal to 1 specifies that the luma filter set is signaled in the ALF APS, the alf_luma_filter_signal_flag equal to 0 specifies that the luma filter set is not signaled in the ALF APS.

7. The method of claim 5 or 6, wherein the alf_chroma_filter_signal_flag equal to 1 specifies that the chroma filter set is signaled in the ALF APS, the alf_chroma_filter_signal_flag equal to 0 specifies that the chroma filter set is not signaled in the ALF APS.

8. The method of any of claims 5-7, wherein the slice_alf_aps_id_luma[i] and the slice_alf_aps_id_chroma are contained in a slice header of the slice.

9. A video coding device comprising:

a processor, a receiver coupled to the processor, a memory coupled to the processor, and a transmitter coupled to the processor, wherein the processor, receiver, memory, and transmitter are configured to perform the method of any of claims 1-8.

10. A non-transitory computer readable medium comprising a computer program product for use by a video coding device, the computer program product comprising computer executable instructions stored on the non-transitory computer readable medium such that when executed by a processor cause the video coding device to perform the method of any of claims 1-8.

11. A decoder comprising:

a receiving means for receiving a bitstream comprising encoded video data for a slice and an adaptation parameter set, APS, wherein the APS comprises an adaptation_parameter_set_id and an aps_params_type, wherein the adaptation_parameter_set_id specifies an identifier for the APS, the aps_params_type specifies a type of parameter that is contained in the APS, when the aps_params_type is equal to ALF_APS, the APS comprises an adaptive loop filter, ALF APS, wherein the ALF APS comprises an ALF luma filter signal flag, alf_luma_filter_signal_flag, and an ALF chroma filter signal flag, alf_chroma_filter_signal_flag, wherein the alf_luma_filter_signal_flag specifies whether a luma filter set is signaled in the ALF APS, the alf_chroma_filter_signal_flag specifies whether a chroma filter set is signaled in the ALF APS, wherein the value of the alf_luma_filter_signal_flag of an APS network abstraction layer, NAL, unit having the aps_params_type equal to ALF_APS and the adaptation_parameter_set_id equal to slice_alf_aps_id_luma[i] is constrained to be

equal to one, and the value of the alf_chroma_filter_signal_flag of the APS NAL unit having the aps_params_type equal to ALF_APS and the adaptation_parameter_set_id equal to slice_alf_aps_id_chroma is constrained to be equal to one,
wherein the slice_alf_aps_id_luma[i] specifies an adaptation_parameter_set_id of an i-th ALF APS referred to by a luma component of the slice, the slice_alf_aps_id_chroma specifies an adaptation_parameter_set_id of the ALF APS referred to by a chroma component of the slice;

a decoding means for decoding the luma filter set when the alf_luma_filter_signal_flag specifies the luma filter set is signaled in the ALF APS;

a decoding means for the chroma filter set when the alf_chroma_filter_signal_flag specifies the chroma filter set is signaled in the ALF APS;

a decoding means for decoding a slice based on ALF parameters in the ALF APS, wherein the ALF parameters comprise the luma filter set and/or the chroma filter set; and

a forwarding means for forwarding the slice for display as part of a decoded video sequence.

12. The decoder of claim 11, wherein the decoder is further configured to perform the method of any of claims 1-4.

13. An encoder comprising:

a slice encoding means for encoding a slice into a bitstream as part of an encoded video sequence;

an encoding means for encoding an adaptation parameter set, APS, into the bitstream, wherein the APS comprises an adaptation_parameter_set_id and an aps_params_type, wherein the adaptation_parameter_set_id specifies an identifier for the APS, the aps_params_type specifies a type of parameter that is contained in the APS, wherein when the aps_params_type is equal to ALF_APS, the APS comprises an adaptive loop filter, ALF APS;

a determining means for determining adaptive loop filter, ALF, parameters for application to the slice, wherein the ALF parameters comprise a luma filter set and/or a chroma filter set;

an ALF encoding means for encoding the ALF parameters into the ALF APS in the bitstream, the ALF APS comprising an ALF luma filter signal flag, alf_luma_filter_signal_flag, and an ALF chroma filter signal flag, alf_chroma_filter_signal_flag, wherein the alf_luma_filter_signal_flag specifies whether the luma filter set is signaled in the ALF APS, the alf_chroma_filter_signal_flag specifies whether

the chroma filter set is signaled in the ALF APS, wherein the value of the alf_luma_filter_signal_flag of an APS network abstraction layer, NAL, unit having the aps_params_type equal to ALF_APS and the adaptation_parameter_set_id equal to slice_alf_aps_id_luma[i] is constrained to be equal to one, and the value of the alf_chroma_filter_signal_flag of the APS NAL unit having the aps_params_type equal to ALF_APS and the adaptation_parameter_set_id equal to slice_alf_aps_id_chroma is constrained to be equal to one, wherein the slice_alf_aps_id_luma[i] specifies an adaptation_parameter_set_id of an i-th ALF APS referred to by a luma component of the slice, the slice_alf_aps_id_chroma specifies an adaptation_parameter_set_id of the ALF APS referred to by a chroma component of the slice; and

a storing means for storing the bitstream for communication toward a decoder.

14. The encoder of claim 13, wherein the encoder is further configured to perform the method of any of claims 5-8.