CLAIMS

What is claimed is:

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

receiving, by a receiver of the decoder, a bitstream comprising a video parameter set (VPS), one or more sublayers, and a buffering period (BP) maximum sublayers minus one (bp_max_sublayers_minus1) set to a value in a range of zero to a maximum number of sublayers indicated in the VPS; and

decoding, by a processor of the decoder, a picture from the one or more sublayers;

wherein the bp_max_sublayers_minus1 is included in a buffering period (BP) supplemental enhancement information (SEI) message;

wherein the bp_max_sublayers_minus1 specifies the maximum number of sublayers for which an initial coded picture buffer (CPB) removal delay and an initial CPB removal offset are indicated in the BP SEI message;

wherein the initial CPB removal delay and the initial CPB removal offset are used for initialization of a hypothetical reference decoder (HRD) at a position of an associated access unit in decoding order; and

wherein the maximum number of sublayers indicated in the VPS are included in a VPS maximum sublayers minus one (vps_max_sublayers_minus1), and wherein the vps_max_sublayers_minus1 is contained in the VPS.

2. The method of claim 1, wherein the parameters in the BP SEI message include an initial CPB removal delay and an initial CPB removal offset.

3. The method of any of claims 1-2, wherein the bitstream is a temporal scalable bitstream, wherein the one or more sublayers are temporal scalable layers of the bitstream, and wherein each sublayer includes video coding layer (VCL) network abstraction layer (NAL) units and associated non-VCL NAL units with a same value of a temporal identifier (TemporalId) variable.

4. A method implemented by an encoder, the method comprising:

encoding, by a processor of the encoder, a bitstream comprising a video parameter set (VPS) and one or more sublayers;

encoding into the bitstream, by the processor, a buffering period (BP) supplemental enhancement information (SEI) message comprising a BP maximum sublayers minus one (bp_max_sublayers_minus1) set to a value in a range of zero to a maximum number of sublayers indicated in the VPS;

initializing, by the processor, a hypothetical reference decoder (HRD) based on the BP SEI message; and

performing with the HRD, by the processor, a set of bitstream conformance tests on the sublayers;

wherein the bp_max_sublayers_minus1 specifies the maximum number of sublayers for which an initial coded picture buffer (CPB) removal delay and an initial CPB removal offset are indicated in the BP SEI message;

wherein the initial CPB removal delay and the initial CPB removal offset are used for initialization of the HRD at a position of an associated access unit in decoding order; and

wherein the maximum number of sublayers indicated in the VPS are included in a VPS maximum sublayers minus one (vps_max_sublayers_minus1), and wherein the vps_max_sublayers_minus1 is contained in the VPS.

5. The method of claim 4, wherein the parameters in the BP SEI message include an initial CPB removal delay and an initial CPB removal offset.

6. The method of any of claims 4-5, wherein the bitstream is a temporal scalable bitstream, wherein the one or more sublayers are temporal scalable layers of the bitstream, and wherein each sublayer includes video coding layer (VCL) network abstraction layer (NAL) units and associated non-VCL NAL units with a same value of a temporal identifier (TemporalId) variable.

7. 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 1-6.

8. 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 1-6.

9. A decoder comprising:

a receiving means for receiving a bitstream comprising a video parameter set (VPS), one or more sublayers, and a buffering period (BP) maximum sublayers minus one (bp_max_sublayers_minus1) set to a value in a range of zero to a maximum number of sublayers indicated in the VPS;

a decoding means for decoding a picture from the one or more sublayers;

wherein the bp_max_sublayers_minus1 is included in a buffering period (BP) supplemental enhancement information (SEI) message;

wherein the bp_max_sublayers_minus1 specifies the maximum number of sublayers for which an initial coded picture buffer (CPB) removal delay and an initial CPB removal offset are indicated in the BP SEI message;

wherein the initial CPB removal delay and the initial CPB removal offset are used for initialization of a hypothetical reference decoder (HRD) at a position of an associated access unit in decoding order; and

wherein the maximum number of sublayers indicated in the VPS are included in a VPS maximum sublayers minus one (vps_max_sublayers_minus1), and wherein the vps_max_sublayers_minus1 is contained in the VPS.

10. The decoder of claim 9, wherein the decoder is further configured to perform the method of any of claims 2-3.

11. An encoder comprising:

an encoding means for:

encoding a bitstream comprising a video parameter set (VPS) and one or more sublayers; and

encoding into the bitstream a buffering period (BP) supplemental enhancement information (SEI) message comprising a BP maximum sublayers minus one (bp_max_sublayers_minus1) set to a value in a range of zero to a maximum number of sublayers indicated in the VPS;

an initializing means for initializing a hypothetical reference decoder (HRD) based on the BP SEI message;

a HRD means for performing a set of bitstream conformance tests on the sublayers;

wherein the bp_max_sublayers_minus1 specifies the maximum number of sublayers for which an initial coded picture buffer (CPB) removal delay and an initial CPB removal offset are indicated in the BP SEI message;

wherein the initial CPB removal delay and the initial CPB removal offset are used for initialization of the HRD at a position of an associated access unit in decoding order; and

wherein the maximum number of sublayers indicated in the VPS are included in a VPS maximum sublayers minus one (vps_max_sublayers_minus1), and wherein the vps_max_sublayers_minus1 is contained in the VPS.

12. The encoder of claim 11, wherein the encoder is further configured to perform the method of any of claims 5-6.

13. A computer-readable medium comprising a bitstream encoded or decoded by the method of any one of claims 1-6.