CLAIMS

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

receiving, by the video decoder, a bitstream comprising a coded picture and a supplemental enhancement information (SEI) message, wherein the SEI message includes coded picture buffer (CPB) parameters corresponding to decoding unit (DU)-based hypothetical reference decoder (HRD) operations on sublayers; and

decoding, by the video decoder, the coded picture from the bitstream to obtain a decoded picture.

2. The method of claim 1, wherein the CPB parameters specify a duration between CPB removal times of two decoding units.

3. The method of any of claims 1 to 2, wherein the SEI message is a picture timing (PT) SEI message.

4. The method of claim 3, wherein the CPB parameters comprise a common CPB removal delay increment and a CPB removal delay increment for an access unit (AU) associated with the PT SEI message.

5. The method of any of claims 1 to 4, wherein the SEI message is a PT SEI message that specifies a number of decoding units in the AU associated with the PT SEI message.

6. The method of claim 1, wherein the SEI message is a decoding unit information (DUI) SEI message that provides a temporal identifier (ID) of an SEI NAL unit containing the DUI SEI message.

7. The method of claim 6, wherein the temporal ID specifies a highest sublayer for which CPB removal delay information is contained in the DUI SEI message.

8. A method implemented by a video encoder, comprising:

generating, by the video encoder, a bitstream comprising a coded picture and a supplemental enhancement information (SEI) message, wherein the SEI message includes coded picture buffer (CPB) parameters corresponding to decoding unit (DU)-based hypothetical reference decoder (HRD) operations on sublayers;

performing, by the video encoder, the DU-based HRD operations on the sublayers using the CPB parameters to determine whether the bitstream is conforming; and

storing, by the video encoder, the bitstream for communication toward a video decoder when the bitstream is conforming based on performance of the DU-based HRD operations.

9. A decoding device, comprising:

a receiver configured to receive a bitstream comprising a coded picture and a supplemental enhancement information (SEI) message, wherein the SEI message includes coded picture buffer (CPB) parameters corresponding to decoding unit (DU)-based hypothetical reference decoder (HRD) operations on sublayers;

a memory coupled to the receiver, the memory storing instructions; and

a processor coupled to the memory, the processor configured to execute the instructions to cause the decoding device to decode the coded picture from the bitstream to obtain a decoded picture.

10. The decoding device of claim 9, wherein the CPB parameters specify a duration between CPB removal times of two decoding units.

11. The decoding device of any of claims 9 to 10, wherein the SEI message is a PT SEI message that specifies a number of decoding units in an access unit (AU) associated with the PT SEI message, and wherein the CPB parameters comprise a common CPB removal delay and a CPB removal delay for the AU associated with the PT SEI message.

12. The decoding device of claim 9, wherein the SEI message is a decoding unit information (DUI) SEI message that provides a temporal identifier (ID) of an SEI NAL unit containing the DUI SEI message.

13. The decoding device of claim 12, wherein the temporal ID specifies a highest sublayer for which CPB removal delay information is contained in the DUI SEI message.

14. An encoding device, comprising:

a memory containing instructions;

a processor coupled to the memory, the processor configured to implement the instructions to cause the encoding device to:

generate a bitstream comprising a coded picture and a supplemental enhancement information (SEI) message, wherein the SEI message includes coded picture buffer (CPB) parameters corresponding to decoding unit (DU)-based HRD operations on sublayers;

perform the DU-based HRD operations on the sublayers using the CPB parameters to determine whether the bitstream is conforming; and

a transmitter coupled to the processor, the transmitter configured to transmit the video bitstream toward a video decoder when the bitstream is conforming based on performance of the DU-based HRD operations.

15. A coding apparatus, comprising:

a receiver configured to receive a picture to encode or to receive a bitstream to decode;

a transmitter coupled to the receiver, the transmitter configured to transmit the bitstream to a decoder or to transmit a decoded image to a display;

a memory coupled to at least one of the receiver or the transmitter, the memory configured to store instructions; and

a processor coupled to the memory, the processor configured to execute the instructions stored in the memory to perform the method in any of claims 1 to 7 and claim 8.