CLAIMS

What is claimed is:

1. A method implemented by a decoder, comprising:

receiving, by the decoder, a bitstream including a sequence parameter set (SPS), a picture parameter set (PPS), and a plurality of subpictures associated with a subpicture identifier (ID) mapping, wherein the SPS includes an SPS flag;

determining, by the decoder, whether the SPS flag has a first value or a second value, wherein the SPS flag having the first value specifies that the subpicture ID mapping is signaled in the SPS, and wherein the SPS flag having the second value specifies that the subpicture ID mapping is signaled in the PPS;

obtaining, by the decoder, the subpicture ID mapping from the SPS when the SPS flag has the first value and from the PPS when the SPS flag has the second value; and

decoding, by the decoder, the plurality of subpictures using the subpicture ID mapping.

2. The method of claim 1, wherein the PPS includes a PPS flag, and the method further comprises:

determining, by the decoder, whether the PPS flag has the first value or the second value, wherein the PPS flag having the first value specifies that the subpicture ID mapping is signaled in the PPS, and wherein the PPS flag having the second value specifies that the subpicture ID mapping is not signaled in the PPS; and

obtaining, by the decoder, the subpicture ID mapping from the PPS when the PPS flag has the first value.

3. The method of claim 1 or 2, wherein the SPS flag has the first value when the PPS flag has the second value, and wherein the SPS flag has the second value when the PPS flag has the first value.

4. The method of any one of claims 1-3, wherein the first value is one and the second value is zero.

5. The method of any one of claims 1-4, wherein the SPS includes a second SPS flag, and wherein the second SPS flag specifies whether the subpicture ID mapping is explicitly signaled in the SPS or the PPS.

6. The method of any one of claims 1-5, wherein the bitstream further comprises a coded video sequence (CVS) change flag, and wherein the CVS change flag indicates whether the subpicture ID mapping is permitted to change within a coded video sequence (CVS) of the bitstream.

7. The method of any one of claims 1-6, wherein the bitstream comprises a merged bitstream, and wherein the subpicture ID mapping has changed within the CVS of the bitstream.

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

encoding, by the decoder, a bitstream including a sequence parameter set (SPS), a picture parameter set (PPS), and a plurality of subpictures associated with a subpicture identifier (ID) mapping, wherein the SPS includes an SPS flag;

setting, by the decoder, the SPS flag to a first value when the subpicture ID mapping is signaled in the SPS and to a second value when the subpicture ID mapping is signaled in the PPS; and

storing, by the decoder, the bitstream for communication toward a decoder.

9. The method of claim 8, further setting, by the decoder, a PPS flag in the PPS to the first value when the subpicture ID mapping is signaled in the PPS and to the second value when the subpicture ID mapping is not signaled in the PPS.

10. The method of claim 8 or 9, wherein the SPS flag has the first value when the PPS flag has the second value, and wherein the SPS flag has the second value when the PPS flag has the first value.

11. The method of any one of claims 8-10, wherein the first value is one and the second value is zero.

12. The method of any one of claims 8-11, wherein the SPS includes a second SPS flag, and wherein the second SPS flag specifies whether the subpicture mapping is explicitly signaled in the SPS or the PPS.

13. The method of any one of claims 8-12, wherein the bitstream further comprises a coded video sequence (CVS) change flag, and wherein the CVS change flag indicates whether the subpicture ID mapping may change within a coded video sequence (CVS) of the bitstream.

14. The method of any one of claims 8-13, wherein the bitstream comprises a merged bitstream, and wherein the subpicture ID mapping has changed within the CVS of the bitstream.

15. A decoding device, comprising:

a receiver configured to receive a video bitstream including a sequence parameter set (SPS), a picture parameter set (PPS), and a plurality of subpictures associated with a subpicture identifier (ID) mapping, wherein the SPS includes an SPS flag;

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:

determine whether the SPS flag has a first value or a second value, wherein the SPS flag having the first value specifies that the subpicture ID mapping is signaled in the SPS, and wherein the SPS flag having the second value specifies that the subpicture ID mapping is signaled in the PPS;

obtain the subpicture ID mapping from the SPS when the SPS flag has the first value and from the PPS when the SPS flag has the second value; and

decode the plurality of subpictures using the subpicture ID mapping.

16. The decoding device of claim 15, wherein the PPS includes a PPS flag, and the processor is further configured to:

determine whether the PPS flag has the first value or the second value, wherein the PPS flag having the first value specifies that the subpicture ID mapping is signaled in the PPS, and wherein the PPS flag having the second value specifies that the subpicture ID mapping is not signaled in the PPS; and

obtain the subpicture ID mapping from the PPS when the PPS flag has the first value.

17. The decoding device of claim 15 or 16, wherein the SPS flag has the first value when the PPS flag has the second value, wherein the SPS flag has the second value when the PPS flag has the first value, and wherein the first value is one and the second value is zero.

18. The decoding device of any one of claims 15-17, wherein the SPS includes a second SPS flag, and wherein the second SPS flag specifies whether the subpicture mapping is explicitly signaled in the SPS or the PPS.

19. The decoding device of any one of claims 15-18, wherein the bitstream further comprises a coded video sequence (CVS) change flag, and wherein the CVS change flag indicates whether the subpicture ID mapping may change within a coded video sequence (CVS) of the bitstream.

20. The decoding device of any one of claims 15-19, wherein the bitstream comprises a merged bitstream, and wherein the subpicture ID mapping has changed within the CVS of the bitstream.

21. 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:

encode a bitstream including a sequence parameter set (SPS), a picture parameter set (PPS), and a plurality of subpictures associated with a subpicture identifier (ID) mapping, wherein the SPS includes an SPS flag;

set the SPS flag to a first value when the subpicture ID mapping is signaled in the SPS and to a second value when the subpicture ID mapping is signaled in the PPS;

set a PPS flag in the PPS to the first value when the subpicture ID mapping is signaled in the PPS and to the second value when the subpicture ID mapping is not signaled in the PPS; and

a transmitter coupled to the processor, the transmitter configured to transmit the bitstream toward a video decoder.

22. The encoding device of claim 21, wherein the SPS flag has the first value when the PPS flag has the second value, and wherein the SPS flag has the second value when the PPS flag has the first value.

23. The encoding device of claim 21 or 22, wherein the first value is one and the second value is zero.

24. The encoding device of any one of claims 21-23, wherein the bitstream further comprises a coded video sequence (CVS) change flag, and wherein the CVS change flag indicates whether the subpicture ID mapping may change within a coded video sequence (CVS) of the bitstream.

25. The encoding device of any one of claims 21-24, wherein the PPS ID specifies a value of a second PPS ID for a PPS in use, and wherein the second PPS ID identifies the PPS for reference by the syntax elements.

26. The encoding device of any one of claims 21-25, wherein the bitstream comprises a merged bitstream, and wherein the subpicture ID mapping has changed within the CVS of the bitstream.

27. 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 one of claims 1 to 7 and any one of claims 8 to 14.

28. The coding apparatus of claim 27, further comprising a display configured to display a decoded picture.

29. A system, comprising:

an encoder; and

a decoder in communication with the encoder, wherein the encoder or the decoder includes the decoding device, the encoding device, or the coding apparatus of any one of claims 15 to 27.

30. A means for coding, comprising:

receiving means configured to receive a picture to encode or to receive a bitstream to decode;

transmission means coupled to the receiving means, the transmission means configured to transmit the bitstream to a decoding means or to transmit a decoded image to a display means;

storage means coupled to at least one of the receiving means or the transmission means, the storage means configured to store instructions; and

processing means coupled to the storage means, the processing means configured to execute the instructions stored in the storage means to perform the method in any one of claims 1 to 7 and any one of claims 8 to 14.

31. A computer-readable medium comprising a bitstream encoded or decoded by the method of any one of claims 1 to 14.