

CLAIMS

What is claimed is:

1. A method implemented by a decoder, comprising:
receiving, by the decoder, a bitstream including a picture parameter set (PPS) including a single slice per subpicture flag;
determining, by the decoder, whether the single slice per subpicture flag has a first value or a second value, wherein the first value specifies that each subpicture referring to the PPS includes one and only one rectangular slice, and wherein the second value specifies that each subpicture referring to the PPS may include one or more rectangular slices; and
decoding, by the decoder, the one and only one rectangular slice when the single slice per subpicture flag has the first value and the one or more rectangular slices when the single slice per subpicture flag has the second value to obtain a decoded picture.
2. The method of claim 1, wherein the single slice per subpicture flag is designated as `pps_single_slice_per_subpic_flag`.
3. The method of any of claims 1-2, wherein the first value is one (1) and the second value is zero (0).
4. The method of any of claims 1-3, wherein the PPS further comprises a number of slices in picture flag, and wherein a value of the number of slices in picture flag plus one specifies a number of slices in each picture referring to the PPS.
5. The method of any of claims 1-4, wherein the number of slices in picture flag is designated as `pps_num_slices_in_pic_minus1`.
6. The method of any of claims 1-5, wherein each subpicture comprises a rectangular region of one or more slices within a picture.
7. The method of any of claims 1-6, further comprising generating an image for display based on the one and only one rectangular slice when the single slice per subpicture flag has the first value and the one or more rectangular slices when the single slice per subpicture flag has the second value.

8. A method implemented by an encoder, the method comprising:
 - setting, by the encoder, a single slice per subpicture flag to a first value when each subpicture referring to a picture parameter set (PPS) includes one and only one rectangular slice and to a second value when each subpicture referring to the PPS may include one or more rectangular slices;
 - encoding, by the encoder, the PPS containing the single slice per subpicture flag into a bitstream; and
 - storing, by the encoder, the bitstream for communication toward a decoder.
9. The method of claim 8, wherein the single slice per subpicture flag is designated as `pps_single_slice_per_subpic_flag`.
10. The method of any of claims 8-9, wherein the first value is one (1) and the second value is zero (0).
11. The method of any of claims 8-10, wherein the PPS further comprises a number of slices in picture flag, and wherein a value of the number of slices in picture flag plus one specifies a number of slices in each picture referring to the PPS.
12. The method of any of claims 8-11, wherein the number of slices in picture flag is designated as `pps_num_slices_in_pic_minus1`.
13. The method of any of claims 8-12, wherein each subpicture comprises a rectangular region of one or more slices within a picture.
14. The method of any of claims 8-13, further comprising transmitting the bitstream toward a video decoder.
15. A decoding device, comprising:
 - a receiver configured to receive a bitstream including a picture parameter set (PPS) containing a single slice per subpicture 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 single slice per subpicture flag has a first value or a second value, wherein the first value specifies that each subpicture referring to the PPS includes one and only one rectangular slice, and wherein the second value specifies that each subpicture referring to the PPS may include one or more rectangular slices; and

decode the one and only one rectangular slice when the single slice per subpicture flag has the first value and the one or more rectangular slices when the single slice per subpicture flag has the second value to obtain a decoded picture.

16. The decoding device of claim 15, wherein the first value is one (1) and the second value is zero (0).

17. The decoding device of any of claims 15-16, wherein the PPS further comprises a number of slices in picture flag, and wherein a value of the number of slices in picture flag plus one specifies a number of slices in each picture referring to the PPS.

18. The decoding device of any of claims 15-17, wherein the number of slices in picture flag is designated as `pps_num_slices_in_pic_minus1`.

19. The decoding device of any of claims 15-18, wherein the processor is further configured to generate an image for display based on the one and only one rectangular slice when the single slice per subpicture flag has the first value and the one or more rectangular slices when the single slice per subpicture flag has the second value.

20. 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 picture parameter set (PPS) containing a single slice per subpicture flag;

set the single slice per subpicture flag to a first value when each subpicture referring to the PPS includes one and only one rectangular slice and to a second value when each subpicture referring to the PPS may include one or more rectangular slices;
and

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

21. The encoding device of claim 20, wherein the first value is one (1) and the second value is zero (0).

22. The encoding device of any of claims 20-21, wherein the PPS further comprises a number of slices in picture flag, and wherein a value of the number of slices in picture flag plus one specifies a number of slices in each picture referring to the PPS.

23. The encoding device of any of claims 20-22, wherein the number of slices in picture flag is designated as pps_num_slices_in_pic_minus1.

24. The encoding device of any of claims 20-23, further comprising storing the bitstream in the memory prior to transmitting the bitstream toward the decoder.

25. 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 any of claims 8 to 14.

26. The coding apparatus of claim 25, further comprising a display configured to display a decoded picture.

27. 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 of claims 15 to 26.

28. 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 of claims 1 to 7 and any of claims 8 to 14.