

CLAIMS

What is claimed is:

1. A method of decoding implemented by a video decoder, comprising:
receiving, by the video decoder, a sub-bitstream having a sequence parameter set (SPS) with a profile tier level (PTL) syntax structure for an output layer set (OLS) with only one layer;
setting, by the video decoder, a number of layers in the OLS equal to one based on the OLS having the only one layer;
obtaining, by the video decoder, the PTL syntax structure for the OLS with the one layer from the SPS when the number of layers in the OLS has been set equal to one; and
decoding, by the video decoder, a picture from the only one layer using the PTL syntax structure to obtain a decoded picture.
2. The method of claim 1, wherein the PTL syntax structure is designated `profile_tier_level()`.
3. The method of any of claims 1 to 2, wherein the only one layer is the i-th layer, and wherein the OLS is the i-th OLS.
4. The method of any of claims 1 to 3, wherein the PTL syntax structure is present in an i-th `profile_tier_level()` syntax structure in the SPS.
5. The method of any of claims 1 to 4, wherein the sub-bitstream does not include a video parameter set (VPS).
6. The method of any of claims 1 to 5, wherein the number of layers in the OLS is a variable designated `NumLayersInOls[i]`.
7. The method of any of claims 1 to 6, wherein the SPS is referred to by the only one layer in the OLS.

8. The method of any of claims 1 to 7, further comprising displaying the decoded picture on a display of an electronic device.
9. A method of encoding implemented by a video encoder, the method comprising:
 - generating, by the video encoder, a video parameter set (VPS) and a sequence parameter set (SPS), wherein the VPS includes a list of profile tier level (PTL) syntax structures for all output layer sets (OLSs), and wherein the SPS includes the PTL syntax structure for each OLS having only one layer;
 - encoding, by the video encoder, the VPS and the SPS into a video bitstream; and
 - storing, by the video encoder, the video bitstream for communication toward a video decoder.
10. The method of claim 9, wherein the VPS includes an index to the list of PTL syntax structures, and wherein the index is designated `vps_ols_ptl_idx[ i ]`.
11. The method of any of claims 9 to 10, wherein a value of `vps_ols_ptl_idx[ i ]` is in a range of zero to a total number of the PTL syntax structures in the VPS.
12. The method of any of claims 10 to 11, wherein the VPS includes `vps_num_ptls_minus1`, and wherein `vps_num_ptls_minus1` plus 1 specifies the total number of the PTL syntax structures in the VPS.
13. The method of any of claims 10 to 12, further comprising extracting a sub-bitstream from the bitstream, wherein the sub-bitstream includes the SPS from the bitstream but does not include the VPS from the bitstream.
14. The method of any of claims 10 to 13, further comprising transmitting the sub-bitstream toward a video decoder.

15. A decoding device, comprising:
- a receiver configured to receive a sub-bitstream having a sequence parameter set (SPS) with a profile tier level (PTL) syntax structure for an output layer set (OLS) with only one layer; and
 - a processor coupled to the memory, the processor configured to execute the instructions to cause the decoding device to:
 - set a number of layers in the OLS equal to one based on the OLS having the only one layer;
 - obtain the PTL syntax structure for the OLS with the one layer from the SPS when the number of layers in the OLS has been set equal to one; and
 - decode a picture from the only one layer using the PTL syntax structure to obtain a decoded picture.
16. The decoding device of claim 15, wherein the PTL syntax structure is designated `profile_tier_level()`, wherein the only one layer is the *i*-th layer, and wherein the OLS is the *i*-th OLS.
17. The decoding device of any of claims 15 to 16, wherein the PTL syntax structure is present in an *i*-th `profile_tier_level()` syntax structure in the SPS.
18. The decoding device of any of claims 15 to 17, wherein the sub-bitstream does not include a video parameter set (VPS).
19. The decoding device of any of claims 15 to 18, wherein the number of layers in the OLS is a variable designated `NumLayersInOls[i]`; and wherein the SPS is referred to by the only one layer in the OLS.
20. The decoding device of any of claims 15 to 19, further comprising a display configured to display the decoded picture.

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:
generate a video parameter set (VPS) and a sequence parameter set (SPS),
wherein the VPS includes a list of profile tier level (PTL) syntax structures for all output layer sets (OLSs), and wherein the SPS includes the PTL syntax structure for each OLS having only one layer; and
encode the VPS and the SPS into a video bitstream; and
a transmitter coupled to the processor, the transmitter configured to transmit the video bitstream toward a video decoder.
22. The encoding device of claim 21, wherein the VPS includes an index to the list of PTL syntax structures, and wherein the index is designated `vps_ols_ptl_idx[ i ]`.
23. The encoding device of any of claims 21 to 22, wherein a value of `vps_ols_ptl_idx[ i ]` is in a range of zero to a total number of the PTL syntax structures in the VPS.
24. The encoding device of any of claims 23 to 25, wherein the VPS includes `vps_num_ptls_minus1`, and wherein `vps_num_ptls_minus1` plus 1 specifies the total number of the PTL syntax structures in the VPS.
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 8 and any of claims 9 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 8 and any of claims 9 to 14.