Claims

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

receiving, by the decoder, a bitstream comprising a plurality of coded sequences of point cloud coding (PCC) frames, wherein the plurality of coded sequences of PCC frames represent a plurality of PCC attributes including geometry, texture, and one or more of reflectance, transparency, and normal, and wherein each coded PCC frame is represented by one or more PCC network abstraction layer (NAL) units;

parsing, by the decoder, the bitstream to obtain an indication for each of the PCC NAL units that indicates whether each of the PCC NAL units belongs to a corresponding one of the PCC attributes, and to which of the PCC attributes the PCC NAL unit belongs when the PCC NAL unit belongs to the corresponding PCC attribute; and

decoding, by the decoder, the bitstream based on the indications.

2. The method of claim 1, wherein each coded sequence of PCC frames is associated with a sequence-level data unit containing sequence-level parameters, and wherein the sequence-level data unit comprises a first syntax element indicating a number of PCC attributes carried in the coded sequence of PCC frames and a second syntax element indicating each of the PCC attributes.

3. The method of claim 2, wherein the second syntax element is an attribute type element contained in a group of frames header in the bitstream.

4. The method of any of claims 2-3, wherein the first syntax element is a number of attributes element contained in a group of frames header in the bitstream.

5. The method of any of claims 2-4, wherein a group of frames header in the bitstream comprises a third syntax element indicating a number of streams for each of the PCC attributes.

6. The method of any of claims 2-5, wherein a group of frames header in the bitstream comprises an attributes first ordering flag set to indicate PCC network abstraction layer units for each of the PCC attributes are included in stream order within a corresponding PCC access unit.

7. The method of any of claims 2-6, wherein a group of frames header in the bitstream comprises an attributes first ordering flag set to indicate PCC network abstraction layer units for each of the PCC attributes are included in attribute order within a corresponding PCC access unit.

8. The method of claim 6 or 7, wherein each of the PCC access units includes zero to four attribute streams for each of the PCC attributes, and wherein at least one of the attribute streams includes a non-constant frame rate.

9. The method of any of claims 2-8, further comprising forwarding, by the decoder, a decoded sequence of PCC frames from the bitstream toward a display for presentation.

10. A method implemented by a encoder, the method comprising:

encoding, by the encoder, a sequence of point cloud coding (PCC) frames into a bitstream, wherein the sequence of PCC frames represent a plurality of PCC attributes including geometry, texture, and one or more of reflectance, transparency, and normal, and wherein each PCC frame is encoded in a number of PCC network abstraction layer (NAL) units;

encoding, by the encoder, an indication for each of the PCC NAL units that indicates whether each of the PCC NAL units belongs to a corresponding one of the PCC attributes, and to which of the PCC attributes the PCC NAL unit belongs when the PCC NAL unit belongs to the corresponding PCC attribute; and

transmitting, by the encoder, the bitstream toward a decoder.

11. The method of claim 10, wherein the bitstream is associated with a sequence-level data unit containing sequence-level parameters, and wherein the sequence-level data unit comprises a first syntax element indicating a number of PCC attributes carried in the bitstream and a second syntax element indicating each of the PCC attributes.

12. The method of claim 11, wherein the second syntax element is an attribute type element contained in a group of frames header in the bitstream.

13. The method of any of claims 11-12, wherein the first syntax element is a number of attributes element contained in a group of frames header in the bitstream.

14. The method of any of claims 11-13, wherein a group of frames header in the bitstream comprises a third syntax element indicating a number of streams for each of the PCC attributes.

15. The method of any of claims 11-14, wherein a group of frames header in the bitstream comprises an attributes first ordering flag set to indicate PCC network abstraction layer units for each of the PCC attributes are included in stream order within a corresponding PCC access unit.

16. The method of claim 15 or 16, wherein a group of frames header in the bitstream comprises an attributes first ordering flag set to indicate PCC network abstraction layer units for each of the PCC attributes are included in attribute order within a corresponding PCC access unit.

17. The method of any of claims 11-16, wherein each of the PCC access units includes zero to four attribute streams for each of the PCC attributes, and wherein at least one of the attribute streams includes a non-constant frame rate.

18. A video data decoding device, comprising:

a non-transitory memory storage, configured to store video data in a form of a bitstream; and

a decoder, configured to perform any of the methods according to the claims 1 to 9.

19. A video data encoding device, comprising:

a non-transitory memory storage, configured to store video data in a form of a bitstream; and

a encoder, configured to perform any of the methods according to the claims 10 to 17.

20. A computer program comprising computer executable instructions stored on a non-transitory computer readable media such that when executed by one or more processors of the computer cause the one or more processors to perform the method of any of claims 1-17.

21. A decoder comprising processing circuitry for carrying out the method according to any one of claims 1 to 9.

22. An encoder comprising processing circuitry for carrying out the method according to any one of claims 10 to 17.

23. A non-transitory computer readable storage medium comprising a plurality of computer executable instructions which,

when the computer executable instructions are executed by one or more processors of the computer, cause the one or more processors to perform the method of any one of the claims 1 to 17.

24. An encoder comprising:

a frame encoding means for encoding a sequence of point cloud coding (PCC) frames into a bitstream, wherein the sequence of PCC frames represent a plurality of PCC attributes including geometry, texture, and one or more of reflectance, transparency, and normal, and wherein each PCC frame is encoded in a number of PCC network abstraction layer (NAL) units;

a parameter encoding means for encoding an indication for each of the PCC NAL units that indicates whether each of the PCC NAL units belongs to a corresponding one of the PCC attributes, and to which of the PCC attributes the PCC

NAL unit belongs when the PCC NAL unit belongs to the corresponding PCC attribute; and

a transmitting means for transmitting the bitstream toward a decoder.

25. The encoder of claim 24, wherein the encoder is further configured to perform the method of any of claims 10-17.

26. A decoder comprising:

a receiving means for receiving a bitstream comprising a plurality of coded sequences of point cloud coding (PCC) frames, wherein the plurality of coded sequences of PCC frames represent a plurality of PCC attributes including geometry, texture, and one or more of reflectance, transparency, and normal, and wherein each coded PCC frame is represented by one or more PCC network abstraction layer (NAL) units;

a parsing means for parsing the bitstream to obtain an indication for each of the PCC NAL units that indicates whether each of the PCC NAL units belongs to a corresponding one of the PCC attributes, and to which of the PCC attributes the PCC NAL unit belongs when the PCC NAL unit belongs to the corresponding PCC attribute; and

a decoding means for decoding the bitstream based on the indications.

27. The decoder of claim 26, wherein the encoder is further configured to perform the method of any of claims 1-9.