Amended Set of Claims 1 to 48

1. A method for coding video data, the method comprising:

coding samples of a block of video data using quantized pulse code modulation according to an output bit-depth, wherein the samples of the block of video data have a bit-depth different than the output bit-depth so as to introduce loss to the samples.

2. The method of claim 1, wherein coding samples of the block of video data using quantized pulse code modulation according to an output bit-depth comprises:

quantizing the samples of the block of video data according to a quantization step defining an amount of quantization to produce the output bit-depth; and

pulse code modulating the quantized samples.

3. The method of claim 2, wherein the output bit-depth is a definable parameter.

4. The method of claim 3, further comprising:

selecting the quantization step for the quantized samples to define the output bit-depth.

5. The method of claim 4, wherein selecting the quantization step comprises selecting the quantization step based on one or more characteristics of the video data.

6. The method of claim 2, wherein quantizing the samples of the block of video data according to a quantization step comprises a number of right shifts of the samples of the block of video data, wherein the number of right shifts is based on the quantization step.

7. The method of claim 1, wherein coding samples of a block of video data using quantized pulse code modulation comprises:

quantizing samples of multiple blocks of video data according to a common quantization step; and

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pulse code modulating the quantized samples in the multiple blocks of video data.

8. The method of claim 1, wherein coding samples of a block of video data using quantized pulse code modulation comprises:

quantizing samples of a first block of video data according to a first quantization step;

quantizing samples of a second block of video data according to a second quantization step different from the first quantization step; and

pulse code modulating the quantized samples in the first and second blocks of video data.

9. The method of claim 8, further comprising:

representing the first quantization step and the second quantization step as delta values relative to a base quantization step.

10. The method of claim 1, further comprising:

generating an indication of the output bit-depth and including the indication in an encoded bitstream.

11. The method of claim 10, further comprising:

including the indication of the output bit-depth in a sequence header as a syntax element.

12. The method of claim 10, further comprising:

including an indication of a round offset in an encoded bitstream that includes the coded block of video data.

13. A method for decoding a coded block of video data, the method comprising:

decoding samples of the coded block of video data that have been encoded with quantized pulse code modulation according to an output bit-depth, wherein the samples

of the block of video data have a bit-depth different than the output bit-depth so as to introduce loss to the samples.

14. The method of claim 13, wherein decoding samples of a block of video data according to an output bit-depth comprises:

decoding the samples of the coded block of video data using pulse code demodulation; and

inverse quantizing the decoded samples according to a quantization step.

15. The method of claim 14, wherein the quantization step is based on the output bit-depth.

16. The method of claim 15, wherein inverse quantizing the decoded samples comprises:

inverse quantizing the decoded samples according to the quantization step and a rounding offset.

17. The method of claim 16, further comprising:

receiving at least one of the output bit-depth, the quantization step and the rounding offset from an encoded bitstream that includes the coded block of video data.

18. The method of claim 14, further comprising:

determining the quantization step based on one or more characteristics of the coded block of video data.

19. An apparatus configured to code video data, the apparatus comprising:

a video encoding unit configured to code samples of a block of video data using quantized pulse code modulation according to an output bit-depth, wherein the samples of the block of video data have a bit-depth different than the output bit-depth so as to introduce loss to the samples.

20. The apparatus of claim 19, wherein the video encoding unit comprises:

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a quantization unit configured to quantize the samples of the block of video data according to a quantization step defining an amount of quantization to produce the output bit-depth; and

a modulation unit configured to code the quantized samples using pulse code modulation.

21. The apparatus of claim 20, wherein the output bit-depth is a definable parameter.

22. The apparatus of claim 21, wherein the video coding unit is further configured to select the quantization step for the quantized samples to define the output bit-depth.

23. The apparatus of claim 22, wherein the video encoding unit is configured to select the quantization step based on one or more characteristics of the video data.

24. The apparatus of claim 20, wherein the quantization unit is configured to quantize the samples of the block of video data using a number of right shifts of the samples of the block of video data, wherein the number of right shifts is based on the quantization step.

25. The apparatus of claim 19, wherein the video encoding unit comprises:

a quantization unit configured to quantize samples of multiple blocks of video data according to a common quantization step; and

a modulation unit configured to code the quantized samples using pulse code modulation in the multiple blocks of video data.

26. The apparatus of claim 19, wherein the video encoding unit comprises:

a quantization unit configured to quantize samples of a first block of video data according to a first quantization step and to quantize samples of a second block of video data according to a second quantization step different from the first quantization step; and

a modulation unit configured to code the quantized samples in the first and second blocks of video data using pulse code modulation.

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27. The apparatus of claim 26, wherein the video encoding unit is further configured to represent the first quantization step and the second quantization step as delta values relative to a base quantization step.

28. The apparatus of claim 19, wherein the video encoding unit is further configured to generate an indication of the output bit-depth and to include the indication in an encoded bitstream.

29. The apparatus of claim 28, wherein the video encoding unit is further configured include the indication of the output bit-depth in a sequence header as a syntax element.

30. The apparatus of claim 28, wherein the video encoding unit is further configure include an indication of a round offset in an encoded bitstream that includes the coded block of video data.

31. An apparatus configured to decode a coded block of video data, the apparatus comprising:

a video decoding unit configured to decode samples of the coded block of video data that have been encoded with quantized pulse code modulation according to an output bit-depth, wherein the samples of the block of video data have a bit-depth different than the output bit-depth so as to introduce loss to the samples.

32. The apparatus of claim 31, wherein the video decoding unit comprises:

a demodulation unit configured to decode the samples of the coded block of video data using pulse code demodulation; and

an inverse quantization unit configure to inverse quantize the decoded samples according to a quantization step.

33. The apparatus of claim 32, wherein the quantization step is based on the output bit-depth.

34. The apparatus of claim 33, wherein the inverse quantization unit is further configured to inverse quantize the decoded samples according to the quantization step and a rounding offset.

35. The apparatus of claim 34, wherein the video decoding unit is further configured to receive at least one of the output bit-depth, the quantization step and the rounding offset from an encoded bitstream that includes the coded block of video data.

36. The apparatus of claim 32, wherein the video decoding unit is further configured to determine the quantization step based on one or more characteristics of the coded block of video data.

37. An apparatus configured to code video data, the apparatus comprising:

means for quantizing the samples of a block of video data according to a quantization step defining an amount of quantization to produce the output bit-depth, wherein the samples of the block of video data have a bit-depth different than the output bit-depth so as to introduce loss to the samples; and

means for pulse code modulating the quantized samples.

38. The apparatus of claim 37, further comprising:

means for generating an indication of the output bit-depth and including the indication of the output bit-depth in a sequence header as a element.

39. An apparatus configured to decode a coded block of video data, the apparatus comprising:

means for decoding samples of the coded block of video data using pulse code demodulation; and

means for inverse quantizing the decoded samples according to a quantization step, wherein the samples of the block of video data have a bit-depth different than an output bit-depth of the samples so as to introduce loss to the samples.

40. The apparatus of claim 39, wherein the quantization step is based on the output bit-depth.

41. The apparatus of claim 39, further comprising:

means for receiving at least one of the output bit-depth, the quantization step and the rounding offset from an encoded bitstream that includes the coded block of video data.

42. A computer program product comprising a computer-readable storage medium having stored thereon instructions that, when executed, cause a processor of a device for coding video to:

code samples of a block of video data using quantized pulse code modulation according to an output bit-depth, wherein the samples of the block of video data have a bit-depth different than the output bit-depth so as to introduce loss to the samples.

43. The computer program product of claim 42, wherein the instructions to code samples of a block of video data using quantized pulse code modulation according to an output bit-depth comprise instructions to:

quantize the samples of the block of video data according to a quantization step defining an amount of quantization to produce the output bit-depth; and

pulse code modulate the quantized samples.

44. The computer program product of claim 42, further causing a processor to:

generate an indication of the output bit-depth and including the indication of the output bit-depth in a sequence header as a syntax element.

45. A computer program product comprising a computer-readable storage medium having stored thereon instructions that, when executed, cause a processor of a device for decoding a coded block of video data to:

decode samples of the coded block of video data that have been encoded with quantized pulse code modulation according to an output bit-depth, wherein the samples

of the block of video data have a bit-depth different than the output bit-depth so as to introduce loss to the samples.

46. The computer program product of claim 45, wherein the instructions to decode samples of a block of video data according to an output bit-depth comprise instructions to:

decode the samples of the coded block of video data using pulse code demodulation; and

inverse quantize the decoded samples according to a quantization step.

47. The computer program product of claim 45, wherein the quantization step is based on the output bit-depth.

48. The computer program product of claim 45, further causing a processor to:

receive at least one of the output bit-depth, the quantization step and the rounding offset from an encoded bitstream that includes the coded block of video data.

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Claims

1. A method for encoding video data, the method comprising:

encoding at least one block of a frame of video data using intra-prediction relative to a first other block of the frame of video data; and

encoding samples of one or more second other blocks of the frame of video data using quantized pulse code modulation according to an output bit-depth, wherein encoding the samples is performed without any frequency domain transformation of the samples, and wherein the samples of the one or more second other blocks of video data have a bit-depth different than the output bit-depth so as to introduce loss to the samples.

2. The method of claim 1, wherein encoding samples of the one or more second other blocks of video data using quantized pulse code modulation according to the output bit-depth comprises:

quantizing the samples of the one or more second other blocks of video data according to a quantization step defining an amount of quantization to produce the output bit-depth; and

pulse code modulating the quantized samples.

3. The method of claim 2, wherein the output bit-depth is a definable parameter.

4. The method of claim 3, further comprising:

selecting the quantization step for the quantized samples to define the output bit-depth.

5. The method of claim 4, wherein selecting the quantization step comprises selecting the quantization step based on one or more characteristics of the video data.

6. The method of claim 2, wherein quantizing the samples of the one or more second other blocks of video data according to the quantization step comprises a number of right shifts of the samples of the one or more second other blocks of video data, wherein the number of right shifts is based on the quantization step.

7. The method of claim 1, wherein encoding samples of the one or more second

other blocks of video data using quantized pulse code modulation comprises:

quantizing samples of multiple blocks of the one or more second other blocks of video data according to a common quantization step; and

pulse code modulating the quantized samples in the multiple blocks of video data.

8. The method of claim 1, wherein encoding samples of the one or more second other blocks of video data using quantized pulse code modulation comprises:

quantizing samples of a first block of the one or more second other blocks of video data according to a first quantization step;

quantizing samples of a second block of the one or more second other blocks of video data according to a second quantization step different from the first quantization step; and

pulse code modulating the quantized samples in the first and second blocks of video data.

9. The method of claim 8, further comprising:

representing the first quantization step and the second quantization step as delta values relative to a base quantization step.

10. The method of claim 1, further comprising:

generating an indication of the output bit-depth and including the indication in an encoded bitstream.

11. The method of claim 10, further comprising:

including the indication of the output bit-depth in a sequence header as a syntax element.

12. The method of claim 10, further comprising:

including an indication of a round offset in an encoded bitstream that includes the encoded one or more second other blocks of video data.

13. A method for decoding video data, the method comprising:

decoding at least one block of a frame of video data using intra-prediction relative to a first other block of the frame of video data; and

decoding samples of one or more second other blocks of the frame of video data that have been encoded with quantized pulse code modulation according to an output bit-depth to create decoded samples, wherein decoding the samples is performed without any frequency domain transformation of the decoded samples, and wherein the decoded samples have a bit-depth different than the output bit-depth.

14. The method of claim 13, wherein decoding samples of the one or more second other blocks of video data according to the output bit-depth comprises:

decoding the samples of the one or more second other blocks of video data using pulse code demodulation; and

inverse quantizing the decoded samples according to a quantization step.

15. The method of claim 14, wherein the quantization step is based on the output bit-depth.

16. The method of claim 15, wherein inverse quantizing the decoded samples comprises:

inverse quantizing the decoded samples according to the quantization step and a rounding offset.

17. The method of claim 13, further comprising:

receiving the output bit-depth in an encoded bitstream that includes the frame of video data.

18. The method of claim 14, further comprising:

determining the quantization step based on one or more characteristics of the frame of video data.

19. An apparatus configured to encode video data, the apparatus comprising:

a memory configured to store video data; and

a video encoding unit configured to:

encode at least one block of a frame of the video data using intra-prediction relative to a first other block of the frame of video data; and

encode samples of one or more second other blocks of the frame of video data using quantized pulse code modulation according to an output bit-depth, wherein encoding the samples is performed without any frequency domain transformation of the samples, and wherein the samples of the one or more second other blocks of video data have a bit-depth different than the output bit-depth so as to introduce loss to the samples.

20. The apparatus of claim 19, wherein the video encoding unit comprises:

a quantization unit configured to quantize the samples of the one or more second other blocks of video data according to a quantization step defining an amount of quantization to produce the output bit-depth; and

a modulation unit configured to code the quantized samples using pulse code modulation.

21. The apparatus of claim 20, wherein the output bit-depth is a definable parameter.

22. The apparatus of claim 21, wherein the video encoding unit is further configured to select the quantization step for the quantized samples to define the output bit-depth.

23. The apparatus of claim 22, wherein the video encoding unit is configured to select the quantization step based on one or more characteristics of the video data.

24. The apparatus of claim 20, wherein the quantization unit is configured to quantize the samples of the one or more second other blocks of video data using a number of right shifts of the samples of the one or more second other blocks of video data, wherein the number of right shifts is based on the quantization step.

25. The apparatus of claim 19, wherein the video encoding unit comprises:

a quantization unit configured to quantize samples of multiple blocks of the one or more second other blocks of video data according to a common quantization step; and

a modulation unit configured to code the quantized samples using pulse code modulation in the multiple blocks of video data.

26. The apparatus of claim 19, wherein the video encoding unit comprises:

a quantization unit configured to quantize samples of a first block of the one or more second other blocks of video data according to a first quantization step and to quantize samples of a second block of the one or more second other blocks of video data according to a second quantization step different from the first quantization step; and

a modulation unit configured to code the quantized samples in the first and second blocks of video data using pulse code modulation.

27. The apparatus of claim 26, wherein the video encoding unit is further configured to represent the first quantization step and the second quantization step as delta values relative to a base quantization step.

28. The apparatus of claim 19, wherein the video encoding unit is further configured to generate an indication of the output bit-depth and to include the indication in an encoded bitstream.

29. The apparatus of claim 28, wherein the video encoding unit is further configured include the indication of the output bit-depth in a sequence header as a syntax element.

30. The apparatus of claim 28, wherein the video encoding unit is further configure include an indication of a round offset in an encoded bitstream that includes the encoded one or more second other blocks of video data.

31. An apparatus configured to decode video data, the apparatus comprising:

a memory configured to store video data; and

a video decoding unit configured to:

decode at least one block of a frame of the video data using intra-prediction relative to a first other block of the frame of video data; and

decode samples of one or more second other blocks of the frame of video data that have been encoded with quantized pulse code modulation according to an output bit-depth to create decoded samples, wherein decoding the samples is performed without any frequency domain transformation of the samples, and wherein the decoded samples have a bit-depth different than the output bit-depth.

32. The apparatus of claim 31, wherein the video decoding unit comprises:

a demodulation unit configured to decode the samples of the one or more second other blocks of video data using pulse code demodulation; and

an inverse quantization unit configure to inverse quantize the decoded samples according to a quantization step.

33. The apparatus of claim 32, wherein the quantization step is based on the output bit-depth.

34. The apparatus of claim 33, wherein the inverse quantization unit is further configured to inverse quantize the decoded samples according to the quantization step and a rounding offset.

35. The apparatus of claim 31, wherein the video decoding unit is further configured to receive the output bit-depth in an encoded bitstream that includes the frame of video data.

36. The apparatus of claim 32, wherein the video decoding unit is further configured to determine the quantization step based on one or more characteristics of the one or more second other blocks of video data.

37. An apparatus configured to encode video data, the apparatus comprising:

means for encoding at least one block of a frame of video data using intra-prediction relative to a first other block of the frame of video data; and

means for encoding samples of one or more second other blocks of the frame of video data using quantized pulse code modulation according to an output bit-depth, wherein encoding the samples is performed without any frequency domain transformation of the samples, and wherein the samples of the one or more second other blocks of video data have a bit-depth different than the output bit-depth so as to introduce loss to the samples.

38. The apparatus of claim 37, further comprising:

means for generating an indication of the output bit-depth and including the indication of the output bit-depth in a sequence header as a syntax element.

39. An apparatus configured to decode video data, the apparatus comprising:

means for decoding at least one block of a frame of video data using intra-prediction relative to a first other block of the frame of video data; and

means for decoding samples of one or more second other blocks of the frame of video data that have been encoded with quantized pulse code modulation according to an output bit-depth to create decoded samples, wherein decoding the samples is performed without any frequency domain transformation of the samples, and wherein the decoded samples have a bit-depth different than the output bit-depth.

40. The apparatus of claim 39, further comprising:

means for receiving the output bit-depth in an encoded bitstream that includes the frame of video data.

41. A non-transitory computer-readable storage medium having stored thereon instructions that, when executed, cause one or more processors of a device for encoding video to:

encode at least one block of a frame of video data using intra-prediction relative to a first other block of the frame of video data; and

encode samples of one or more second other blocks of the frame of video data using quantized pulse code modulation according to an output bit-depth, wherein encoding the samples is performed without any frequency domain transformation of the samples, and wherein the samples of the one or more second other blocks of video data have a bit-depth different than the output bit-depth so as to introduce loss to the samples.

42. The non-transitory computer-readable storage medium of claim 41, wherein the instructions to encode samples of the one or more second other blocks of video data using quantized pulse code modulation according to an output bit-depth comprise instructions to:

quantize the samples of the one or more second other blocks of video data according to a quantization step defining an amount of quantization to produce the output bit-depth; and

pulse code modulate the quantized samples.

43. The non-transitory computer-readable storage medium of claim 41, further

causing a processor to:

generate an indication of the output bit-depth and including the indication of the output bit-depth in a sequence header as a syntax element.

44. A non-transitory computer-readable storage medium having stored thereon instructions that, when executed, cause one or more processors of a device for decoding video data to:

decode at least one block of a frame of video data using intra-prediction relative to a first other block of the frame of video data; and

decode samples of one or more second other blocks of the frame of video data that have been encoded with quantized pulse code modulation according to an output bit-depth to create decoded samples, wherein decoding the samples is performed without any frequency domain transformation of the samples, and wherein the decoded samples have a bit-depth different than the output bit-depth.

45. The non-transitory computer-readable storage medium of claim 44, wherein the instructions to decode samples of the one or more second other blocks of video data according to an output bit-depth comprise instructions to:

decode the samples of the one or more second other blocks of video data using pulse code demodulation; and

inverse quantize the decoded samples according to a quantization step.

46. The non-transitory computer-readable storage medium of claim 44, wherein the quantization step is based on the output bit-depth.

47. The non-transitory computer-readable storage medium of claim 44, the instructions further causing a processor to:

receive the output bit-depth in an encoded bitstream that includes the frame of video data.