~~**WHAT IS CLAIMED IS:**~~

CLAIMS

1. A method of decoding a bitstream of encoded video data, the method comprising:

determining a single tree structure for a coding unit, wherein the single tree structure applies to a luma component of the coding unit and to a chroma component of the coding unit;

determining a predicted luma quantization parameter (QP) for ~~a~~the luma component of ~~a~~the coding unit;

receiving, as part of a transform unit included in the bitstream of encoded video data, first syntax indicating a luma delta QP value for the luma component;

determining a QP value for the luma component based on the predicted luma QP and the luma delta QP value;

determining a predicted chroma QP for ~~a~~the chroma component of the coding unit;

receiving, ~~in~~as part of the ~~bitstream of encoded video data~~transform unit, second syntax indicating a chroma delta QP value for the chroma component of the coding unit, wherein the first syntax is different than the second syntax;

determining a QP value for the chroma component of the coding unit based on the predicted chroma QP and the chroma delta QP value;

dequantizing a block of luma transform coefficients for the coding unit based on the QP value for the luma component;

dequantizing a block of chroma transform coefficients for the coding unit based on the QP value of the chroma component; and

decoding the coding unit based on the dequantized block of luma transform coefficients and the dequantized block of chroma transform coefficients.

2. The method of claim 1, wherein the first syntax includes a syntax element indicating an absolute value of the luma delta QP value and a syntax element indicating a sign for the luma delta QP value, and wherein the second syntax includes a syntax element indicating an absolute value of the chroma delta QP value and a syntax element indicating a sign for the chroma delta QP value.

3. The method of claim 1, further comprising:

determining a second predicted chroma QP for a second chroma component of the coding unit;

receiving, in the bitstream of encoded video data, third syntax indicating a second chroma delta QP value for the second chroma component of the coding unit;

determining a second QP value for the second chroma component of the coding unit based on the second predicted chroma QP and the second chroma delta QP value;

dequantizing a second block of chroma transform coefficients for the coding unit based on the second QP value of the second chroma component; and

decoding the coding unit based on the dequantized second block of chroma transform coefficients.

4. The method of claim 1, further comprising:

receiving, in the bitstream of encoded video data, the second syntax indicating the chroma delta QP value for the chroma component in response to determining that signaling of chroma delta QP values is enabled for the coding unit.

~~5. The method of claim 1, wherein a coding tree unit (CTU) comprising the coding unit is partitioned using a single tree structure, such that a luma component of the CTU and a chroma component of the CTU have a same partitioning.~~

~~6. The method of claim 1, wherein a coding tree unit (CTU) comprising the coding unit is partitioned using a dual tree structure, such that a luma component of the CTU and a chroma component of the CTU have a different partitioning.~~

~~7. The method of claim 6, wherein receiving, in the bitstream of encoded video data, the second syntax indicating the chroma delta QP value for the chroma component comprises:~~

~~determining a maximum chroma delta QP signaling depth for the chroma component of the CTU;~~

~~determining that the coding unit and at least one other coding unit belong to a split node of the chroma component of the CTU;~~

~~in response to the maximum chroma delta QP signaling depth corresponding to the split node, determining a QP value for a chroma component of the at least one other coding unit based on the chroma delta QP value; and~~

~~dequantizing a block of chroma transform coefficients for the at least one other CU based on the QP value for the chroma component of the at least one other coding unit.~~

~~8~~5. The method of claim 1, wherein decoding the coding unit based on the dequantized block of luma transform coefficients and the dequantized block of chroma transform coefficients further comprises:

inverse transforming the dequantized block of luma transform coefficients to determine a luma residual block;

inverse transforming the dequantized block of chroma transform coefficients to determine a chroma residual block;

determining a luma prediction block;

determining a chroma prediction block;

adding the luma residual block to the luma prediction block to determine a reconstructed luma block of the coding unit; and

adding the chroma residual block to the chroma prediction block to determine a reconstructed chroma block of the coding unit.

~~9~~6. A method of encoding video data, the method comprising:

determining a single tree structure for a coding unit, wherein the single tree structure applies to a luma component of the coding unit and to a chroma component of the coding unit;

determining a quantization parameter (QP) value for ~~a~~the luma component of ~~a~~the coding unit of the video data;

determining a predicted luma QP for the luma component of the coding unit;

based on the QP value for the luma component and the predicted luma QP, determining a delta QP value for the luma component of the coding unit;

generating, for inclusion as part of a transform unit included in a bitstream of encoded video data, first syntax indicating the delta QP value for the luma component of the coding unit;

determining a QP value for ~~a~~the chroma component of the coding unit of the video data;

determining a predicted chroma QP for the chroma component of the coding unit;

based on the QP value for the chroma component and the predicted chroma QP, determining a delta QP value for the chroma component of the coding unit;

generating, for inclusion ~~in the bitstream~~as part of the ~~encoded video data~~transform unit included, second syntax indicating the delta QP value for the chroma component of the coding unit, wherein the first syntax is different than the second syntax; and

outputting, in the bitstream of encoded video data, the first syntax and the second syntax.

~~10~~7. The method of claim ~~9~~6, further comprising:

quantizing a block of luma transform coefficients based on the QP value for the luma component of the coding unit;

quantizing a block of chroma transform coefficients based on the QP value of the chroma component of the coding unit; and

outputting, in the bitstream of encoded video data, syntax indicating values for the quantized block of luma transform coefficients and the quantized block of chroma transform coefficients.

~~11~~8. The method of claim ~~9~~,6, wherein the first syntax includes a syntax element indicating an absolute value of the luma delta QP value and a syntax element indicating a sign for the luma delta QP value, and wherein the second syntax includes a syntax element indicating an absolute value of the chroma delta QP value and a syntax element indicating a sign for the chroma delta QP value.

~~12~~9. The method of claim ~~9~~6, further comprising:

determining a second QP value for a second chroma component of the coding unit;

determining a second predicted chroma QP for the second chroma component of the coding unit;

based on the second QP value for the second chroma component and the second predicted chroma QP, determining a second delta QP value for the second chroma component;

generating, for inclusion in the bitstream of the encoded video data, third syntax indicating the second delta QP value for the second chroma component; and

outputting, in the bitstream of encoded video data, the third syntax.

~~13~~10. The method of claim ~~9~~6, further comprising:

generating, for inclusion in the bitstream of encoded video data, the second syntax indicating the chroma delta QP value for the chroma component in response to determining that signaling of chroma delta QP values is enabled for the coding unit.

~~14. The method of claim 9, wherein a coding tree unit (CTU) comprising the coding unit is partitioned using a single tree structure, such that a luma component of the CTU and a chroma component of the CTU have a same partitioning.~~

~~15. The method of claim 9, wherein a coding tree unit (CTU) comprising the coding unit is partitioned using a dual tree structure, such that a luma component of the CTU and a chroma component of the CTU have a different partitioning.~~

~~16. The method of claim 15, further comprising:~~

~~determining a maximum chroma delta QP signaling depth for the chroma component of the CTU;~~

~~determining that the coding unit and at least one other coding unit belong to a split node of the chroma component of the CTU;~~

~~in response to the maximum chroma delta QP signaling depth corresponding to the split node, determining a QP value for a chroma component of the at least one other coding unit to be equal to the QP value for the chroma component of the coding unit; and~~

~~quantizing a block of chroma transform coefficients for the at least one other CU based on the QP value for the chroma component of the at least one other coding unit.~~

~~17~~11. A device for decoding video data, the device comprising:

a memory configured to store video data;

one or more processors implemented in circuitry and configured to:

determine a single tree structure for a coding unit, wherein the single tree structure applies to a luma component of the coding unit and to a chroma component of the coding unit;

determine a predicted luma quantization parameter (QP) for ~~a~~the luma component of ~~a~~the coding unit;

receive, as part of a transform unit included in the bitstream of encoded video data, first syntax indicating a luma delta QP value for the luma component;

determine a QP value for the luma component based on the predicted luma QP and the luma delta QP value;

determine a predicted chroma QP for ~~a~~the chroma component of the coding unit;

receive, ~~in~~as part of the ~~bitstream of encoded video data~~transform unit, second syntax indicating a chroma delta QP value for the chroma component of the coding unit, wherein the first syntax is different than the second syntax;

determine a QP value for the chroma component of the coding unit based on the predicted chroma QP and the chroma delta QP value;

dequantize a block of luma transform coefficients for the coding unit based on the QP value for the luma component;

dequantize a block of chroma transform coefficients for the coding unit based on the QP value of the chroma component; and

decode the coding unit based on the dequantized block of luma transform coefficients and the dequantized block of chroma transform coefficients.

~~18. The device of claim 17,~~12. The device of claim 11, wherein the first syntax includes a syntax element indicating an absolute value of the luma delta QP value and a syntax element indicating a sign for the luma delta QP value, and wherein the second syntax includes a syntax element indicating an absolute value of the chroma delta QP value and a syntax element indicating a sign for the chroma delta QP value.

~~19~~13. The device of claim ~~17~~11, wherein the one or more processors are further configured to:

determine a second predicted chroma QP for a second chroma component of the coding unit;

receive, in the bitstream of encoded video data, third syntax indicating a second chroma delta QP value for the second chroma component of the coding unit;

determine a second QP value for the second chroma component of the coding unit based on the second predicted chroma QP and the second chroma delta QP value;

dequantize a second block of chroma transform coefficients for the coding unit based on the second QP value of the second chroma component; and

decode the coding unit based on the dequantized second block of chroma transform coefficients.

~~20~~14. The device of claim ~~17~~11, wherein the one or more processors are further configured to:

receive, in the bitstream of encoded video data, the second syntax indicating the chroma delta QP value for the chroma component in response to determining that signaling of chroma delta QP values is enabled for the coding unit.

~~21. The device of claim 17, wherein a coding tree unit (CTU) comprising the coding unit is partitioned using a single tree structure, such that a luma component of the CTU and a chroma component of the CTU have a same partitioning.~~

~~22. The device of claim 17, wherein a coding tree unit (CTU) comprising the coding unit is partitioned using a dual tree structure, such that a luma component of the CTU and a chroma component of the CTU have a different partitioning.~~

~~23. The device of claim 22, wherein to receive, in the bitstream of encoded video data, the second syntax indicating the chroma delta QP value for the chroma component, the one or more processors are further configured to:~~

~~determine a maximum chroma delta QP signaling depth for the chroma component of the CTU;~~

~~determine that the coding unit and at least one other coding unit belong to a split node of the chroma component of the CTU;~~

~~in response to the maximum chroma delta QP signaling depth corresponding to the split node, determine a QP value for a chroma component of the at least one other coding unit based on the chroma delta QP value; and~~

~~dequantize a block of chroma transform coefficients for the at least one other CU based on the QP value for the chroma component of the at least one other coding unit.~~

~~24. The device of claim 17~~15. The device of claim 11, wherein to decode the coding unit based on the dequantized block of luma transform coefficients and the dequantized block of chroma transform coefficients, the one or more processors are further configured to:

inverse transform the dequantized block of luma transform coefficients to determine a luma residual block;

inverse transform the dequantized block of chroma transform coefficients to determine a chroma residual block;

determine a luma prediction block;

determine a chroma prediction block;

adding the luma residual block to the luma prediction block to determine a reconstructed luma block of the coding unit; and

add the chroma residual block to the chroma prediction block to determine a reconstructed chroma block of the coding unit.

~~25~~16. The device of claim ~~17~~11, wherein the device comprises a wireless communication device that includes a display configured to display the decoded block of video data.

~~26~~17. The device of claim ~~17~~11, wherein the wireless communication device comprises a telephone handset that includes a receiver configured to demodulate, according to a wireless communication standard, a signal comprising the encoded representation of the video data.

~~27~~18. A device for encoding video data, the device comprising:

a memory configured to store video data;

one or more processors implemented in circuitry and configured to:

determine a single tree structure for a coding unit, wherein the single tree structure applies to a luma component of the coding unit and to a chroma component of the coding unit;

determine a quantization parameter (QP) value for ~~a~~the luma component of ~~a~~the coding unit of the video data;

determine a predicted luma QP for the luma component of the coding unit;

based on the QP value for the luma component and the predicted luma QP, determine a delta QP value for the luma component of the coding unit;

generate, for inclusion as part of a transform unit included in a bitstream of encoded video data, first syntax indicating the delta QP value for the luma component of the coding unit;

determine a QP value for ~~a~~the chroma component of the coding unit of the video data;

determine a predicted chroma QP for the chroma component of the coding unit;

based on the QP value for the chroma component and the predicted chroma QP, determine a delta QP value for the chroma component of the coding unit;

generate, for inclusion ~~in the bitstream~~as part of the ~~encoded video data~~transform unit, second syntax indicating the delta QP value for the chroma component of the coding unit, wherein the first syntax is different than the second syntax; and

output, in the bitstream of encoded video data, the first syntax and the second syntax.

~~28~~19. The device of claim ~~27~~18, further comprising:

quantize a block of luma transform coefficients based on the QP value for the luma component of the coding unit;

quantize a block of chroma transform coefficients based on the QP value of the chroma component of the coding unit; and

output, in the bitstream of encoded video data, syntax indicating values for the quantized block of luma transform coefficients and the quantized block of chroma transform coefficients.

~~29~~20. The device of claim ~~27,~~18, wherein the first syntax includes a syntax element indicating an absolute value of the luma delta QP value and a syntax element indicating a sign for the luma delta QP value, and wherein the second syntax includes a syntax element indicating an absolute value of the chroma delta QP value and a syntax element indicating a sign for the chroma delta QP value.

~~30~~21. The device of claim ~~27~~18, further comprising:

determine a second QP value for a second chroma component of the coding unit;

determine a second predicted chroma QP for the second chroma component of the coding unit;

based on the second QP value for the second chroma component and the second predicted chroma QP, determine a second delta QP value for the second chroma component;

generate, for inclusion in the bitstream of the encoded video data, third syntax indicating the second delta QP value for the second chroma component; and

output, in the bitstream of encoded video data, the third syntax.

~~31~~22. The device of claim ~~27~~18, further comprising:

generate, for inclusion in the bitstream of encoded video data, the second syntax indicating the chroma delta QP value for the chroma component in response to determining that signaling of chroma delta QP values is enabled for the coding unit.

~~32~~23. The device of claim ~~27, wherein a coding tree unit (CTU) comprising the coding unit is partitioned using a single tree structure, such that a luma component of the CTU and a chroma component of the CTU have a same partitioning.~~

~~33. The device of claim 27, wherein a coding tree unit (CTU) comprising the coding unit is partitioned using a dual tree structure, such that a luma component of the CTU and a chroma component of the CTU have a different partitioning.~~

~~34. The device of claim 33~~21, further comprising:

~~determine a maximum chroma delta QP signaling depth for the chroma component of the CTU;~~

~~determine that the coding unit and at least one other coding unit belong to a split node of the chroma component of the CTU;~~

~~in response to the maximum chroma delta QP signaling depth corresponding to the split node, determine a QP value for a chroma component of the at least one other coding unit to be equal to the QP value for the chroma component of the coding unit; and~~

~~quantize a block of chroma transform coefficients for the at least one other CU based on the QP value for the chroma component of the at least one other coding unit.~~

~~35. The device of claim 30, further comprising:~~

a camera configured to capture the video data.

~~36~~24. An apparatus for decoding a bitstream of encoded video data, the apparatus comprising:

means for determining a single tree structure for a coding unit, wherein the single tree structure applies to a luma component of the coding unit and to a chroma component of the coding unit;

means for determining a predicted luma quantization parameter (QP) for ~~a~~the luma component of ~~a~~the coding unit;

means for receiving, as part of a transform unit included in the bitstream of encoded video data, first syntax indicating a luma delta QP value for the luma component;

means for determining a QP value for the luma component based on the predicted luma QP and the luma delta QP value;

means for determining a predicted chroma QP for ~~a~~the chroma component of the coding unit;

means for receiving, ~~in~~as part of the ~~bitstream of encoded video data~~transform unit, second syntax indicating a chroma delta QP value for the chroma component of the coding unit, wherein the first syntax is different than the second syntax;

means for determining a QP value for the chroma component of the coding unit based on the predicted chroma QP and the chroma delta QP value;

means for dequantizing a block of luma transform coefficients for the coding unit based on the QP value for the luma component;

means for dequantizing a block of chroma transform coefficients for the coding unit based on the QP value of the chroma component; and

means for decoding the coding unit based on the dequantized block of luma transform coefficients and the dequantized block of chroma transform coefficients.

~~37~~25. A computer-readable storage medium storing instructions that when executed by one or more processors cause the one or more processor to:

determine a single tree structure for a coding unit, wherein the single tree structure applies to a luma component of the coding unit and to a chroma component of the coding unit;

determine a predicted luma quantization parameter (QP) for ~~a~~the luma component of ~~a~~the coding unit;

receive, as part of a transform unit included in the bitstream of encoded video data, first syntax indicating a luma delta QP value for the luma component;

determine a QP value for the luma component based on the predicted luma QP and the luma delta QP value;

determine a predicted chroma QP for ~~a~~the chroma component of the coding unit;

receive, ~~in~~as part of the ~~bitstream of encoded video data~~transform unit, second syntax indicating a chroma delta QP value for the chroma component of the coding unit, wherein the first syntax is different than the second syntax;

determine a QP value for the chroma component of the coding unit based on the predicted chroma QP and the chroma delta QP value;

dequantizing a block of luma transform coefficients for the coding unit based on the QP value for the luma component;

dequantize a block of chroma transform coefficients for the coding unit based on the QP value of the chroma component; and

decode the coding unit based on the dequantized block of luma transform coefficients and the dequantized block of chroma transform coefficients.

26. The method of claim 1, further comprising:

receiving third syntax indicating one or more chroma QP offset values; and

determining the QP value for the chroma component of the coding unit based on the predicted chroma QP, the chroma delta QP value, and the one or more chroma QP offset values.

27. The method of claim 1, further comprising:

receiving a chroma delta QP enable flag indicating whether the chroma delta QP value is included in the transform unit; and

receiving the second syntax indicating the chroma delta QP value for the chroma component of the coding unit in response to the chroma delta QP enable flag indicating that the chroma delta QP value is included in the transform unit.

28. The method of claim 27, wherein receiving the chroma delta QP enable flag comprises receiving the chroma delta QP enable flag in a picture parameter set syntax structure.

29. The method of claim 6, further comprising:

determining the QP value for the chroma component of the coding unit based on the predicted chroma QP, the chroma delta QP value, and one or more chroma QP offset values; and

generating, for inclusion in the bitstream of encoded video data, third syntax indicating the one or more chroma QP offset values.

30. The method of claim 6, further comprising:

in response to generating, for inclusion as part of the transform unit included in the bitstream of encoded video data, the second syntax indicating the delta QP value for the chroma component of the coding unit, generating, for inclusion in the bitstream of encoded video data, a chroma delta QP enable flag set to a value indicating that the chroma delta QP value is included in the transform unit.

31. The method of claim 30, wherein generating, for inclusion in the bitstream of encoded video data, the chroma delta QP enable flag comprises including the chroma delta QP enable flag in a picture parameter set syntax structure.

32. The device of claim 11, wherein the one or more processors are further configured to:

receive third syntax indicating one or more chroma QP offset values; and

determine the QP value for the chroma component of the coding unit based on the predicted chroma QP, the chroma delta QP value, and the one or more chroma QP offset values.

33. The device of claim 11, wherein the one or more processors are further configured to:

receive a chroma delta QP enable flag indicating whether chroma delta QP value is included in the transform unit; and

receive the second syntax indicating the chroma delta QP value for the chroma component of the coding unit in response to the chroma delta QP enable flag indicating that the chroma delta QP value is included in the transform unit.

34. The device of claim 33, wherein to receive the chroma delta QP enable flag, the one or more processors are further configured to receive the chroma delta QP enable flag in a picture parameter set syntax structure.

35. The device of claim 18, wherein the one or more processors are further configured to:

determine the QP value for the chroma component of the coding unit based on the predicted chroma QP, the chroma delta QP value, and one or more chroma QP offset values; and

generate, for inclusion in the bitstream of encoded video data, third syntax indicating the one or more chroma QP offset values.

36. The device of claim 18, wherein the one or more processors are further configured to:

in response to generating, for inclusion as part of the transform unit included in the bitstream of encoded video data, the second syntax indicating the delta QP value for the chroma component of the coding unit, generate, for inclusion in the bitstream of encoded video data, a chroma delta QP enable flag set to a value indicating that the chroma delta QP value is included in the transform unit.

37. The device of claim 36, wherein to generate, for inclusion in the bitstream of encoded video data, the chroma delta QP enable flag, the one or more processors are further configured to include the chroma delta QP enable flag in a picture parameter set syntax structure.