

122004WO

46

Clean Version

Amended Set of Claims 1 to 47

1. A method for processing video data, the method comprising:
 - decoding a first block of video data and a second block of video data, wherein the first block of video data and the second block of video data share a common edge;
 - determining a first luminance quantization parameter for the first block of video data and a second luminance quantization parameter for the second block of video data;
 - for each of one or more chrominance components, determining a chrominance quantization parameter offset value;
 - for each of the one or more chrominance components, calculating a chrominance quantization parameter used to configure a chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, and the chrominance quantization parameter offset value for the chrominance component;
 - for each of the one or more chrominance components, determining a strength for the chrominance component deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge; and
 - for each of the one or more chrominance components, applying the chrominance component deblocking filter according to the determined strength to deblock the common edge,
 - wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises:
 - calculating an average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data; and
 - applying the chrominance quantization parameter offset value to the average.
2. The method of claim 1, wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises calculating:

$$Q_{pUV} \left((Q_{P_{Y,P}} + Q_{P_{Y,Q}} + 1) / 2 + c_{qp_offset} \right),$$

123004WO

47

Clean Version

wherein QpUV comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset$,

wherein c_qp_offset comprises the chrominance quantization parameter offset value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1) / 2$ comprises the average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data.

3. The method of claim 1, wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises calculating:

$\text{Clip3}(0, 51, (QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset)$,

wherein c_qp_offset comprises the chrominance quantization parameter offset value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1) / 2$ comprises the average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data.

4. The method of claim 1, wherein the chrominance quantization parameter offset value is signaled in a picture parameter set.

5. The method of claim 1, further comprising at least one of:

applying the chrominance quantization parameter offset value to the first luminance quantization parameter for the first block of video data to determine a first chrominance quantization parameter for the first block of video data; or

122004WO

48

Clean Version

applying the chrominance quantization parameter offset value to the second luminance quantization parameter for the second block of video data to determine a second chrominance quantization parameter for the second block of video data.

6. The method of claim 1, wherein determining a strength for the deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises determining a t_c parameter based on the chrominance quantization parameter, wherein the t_c parameter is applied in a clipping operation of the deblocking filter.

7. The method of claim 1,
 wherein the chrominance quantization parameter offset value comprises a picture-level chrominance quantization parameter offset value associated with all video blocks within a picture, the picture comprising one or more slices,
 the method further comprising, for each of the one or more chrominance components, determining a slice-level chrominance quantization parameter offset value associated with all video blocks within one of the slices, and
 wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises calculating the chrominance quantization parameter based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component.

8. The method of claim 7, wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises calculating:

$$Qp_{UV} \left((Qp_{Y,P} + Qp_{Y,Q} + 1)/2 + c_qp_offset + slice_qp_delta_c \right),$$

wherein Qp_{UV} comprises a table that specifies values of the chrominance quantization parameter used to configured the chrominance component deblocking filter for the common edge based on values of $(Qp_{Y,P} + Qp_{Y,Q} + 1)/2 + c_qp_offset + slice_qp_delta_c$,

122004WO

49

Clean Version

wherein c_qp_offset comprises the picture-level chrominance quantization parameter offset value,

wherein $slice_qp_delta_c$ comprises the slice-level chrominance quantization parameter offset value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1) / 2$ comprises an average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data.

9. The method of claim 7,

wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein determining the slice-level chrominance quantization parameter offset value comprises selecting one of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

10. The method of claim 7,

wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein determining the slice-level chrominance quantization parameter offset value comprises determining an average of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

11. The method of claim 7, wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated

122004WO

50

Clean Version

with a second slice-level chrominance quantization parameter offset value, and wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises calculating:

$$QpUV ((QP_{Y,P} + slice_qp_delta_P + QP_{Y,Q} + slice_qp_delta_Q + 1)/2 + c_qp_offset),$$

wherein $QpUV$ comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(QP_{Y,P} + slice_qp_delta_P + QP_{Y,Q} + slice_qp_delta_Q + 1)/2 + c_qp_offset$,

wherein c_qp_offset comprises the picture-level chrominance quantization parameter offset value,

wherein $slice_qp_delta_P$ comprises the first slice-level chrominance quantization parameter offset value,

wherein $slice_qp_delta_Q$ comprises the second slice-level chrominance quantization parameter offset value, and

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data.

12. The method of claim 7, wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises calculating:

$$(QpUV (QP_{Y,P} + c_qp_offset + slice_qp_delta_P) + QpUV (QP_{Y,Q} + c_qp_offset + slice_qp_delta_Q) + 1) / 2,$$

wherein $QpUV$ comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $QP_{Y,P} + c_qp_offset + slice_qp_delta_P$ and $QP_{Y,Q} + c_qp_offset + slice_qp_delta_Q$,

wherein c_qp_offset comprises the picture-level chrominance quantization parameter offset value,

wherein $slice_qp_delta_P$ comprises the first slice-level chrominance

122004WO

51

Clean Version

quantization parameter offset value,

wherein slice_qp_delta_Q comprises the second slice-level chrominance quantization parameter offset value, and

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data.

13. The method of claim 7,

further comprising determining a chrominance format,

wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component comprises determining whether either of the picture-level chrominance quantization parameter offset value and the slice-level chrominance quantization parameter offset value are used to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the chrominance format.

14. The method of claim 7,

further comprising determining one of a profile or level associated with the video data,

wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component comprises determining whether either of the picture-level chrominance quantization parameter offset value and the slice-level chrominance quantization parameter offset value are used to calculate the chrominance quantization parameter

122004WO

Clean Version

52

used to configure the chrominance component deblocking filter for the common edge based on the profile or level.

15. The method of claim 1, wherein decoding the first block of video data and the second block of video data comprises decoding the first and second blocks of video data by a decoder for presentation of the video data to a user.

16. The method of claim 1,
wherein applying the deblocking filter comprises applying the deblocking filter by an encoder for in-loop filtering of the video data prior to storage in a reference picture list.

17. An apparatus for processing video data, the apparatus comprising a video coder configured to:

decode a first block of video data and a second block of video data, wherein the first block of video data and the second block of video data share a common edge;

determine a first luminance quantization parameter for the first block of video data and a second luminance quantization parameter for the second block of video data;

for each of one or more chrominance components, determine a chrominance quantization parameter offset value;

for each of the one or more chrominance components, calculate a chrominance quantization parameter used to configure a chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, and the chrominance quantization parameter offset value for the chrominance component;

for each of the one or more chrominance components, determine a strength for the deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge; and

for each of the one or more chrominance components, apply the deblocking filter according to the determined strength to deblock the common edge,

wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is

122004WO

53

Clean Version

configured to:

calculate an average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data; and

apply the chrominance quantization parameter offset value to the average.

18. The apparatus of claim 17, wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for common the edge, the video coder is configured to calculate:

$QpUV \left((QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset \right),$

wherein $QpUV$ comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset$, wherein c_qp_offset comprises the chrominance quantization parameter offset value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1) / 2$ comprises the average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data.

19. The apparatus of claim 17, wherein to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is configured to calculate:

$Clip3(0, 51, (QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset),$

wherein c_qp_offset comprises the chrominance quantization parameter offset value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1) / 2$ comprises the average of the first luminance quantization parameter for the first block of video data and the second luminance

I22004WO

Clean Version

54

quantization parameter for the second block of video data.

20. The apparatus of claim 17, wherein the chrominance quantization parameter offset value is signaled in a picture parameter set.

21. The apparatus of claim 17, wherein the video coder is further configured to at least one of:

apply the chrominance quantization parameter offset value to the first luminance quantization parameter for the first block of video data to determine a first chrominance quantization parameter for the first block of video data; or

apply the chrominance quantization parameter offset value to the second luminance quantization parameter for the second block of video data to determine a second chrominance quantization parameter for the second block of video data.

22. The apparatus of claim 17, wherein, to determine the strength for the deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is configured to determine a t_c parameter based on the chrominance quantization parameter, wherein the t_c parameter is applied in a clipping operation of the deblocking filter.

23. The apparatus of claim 17,

wherein the chrominance quantization parameter offset value comprises a picture-level chrominance quantization parameter offset value associated with all video blocks within a picture, the picture comprising one or more slices,

wherein the video coder is further configured to, for each of the one or more chrominance components, determine a slice-level chrominance quantization parameter offset value associated with all video blocks within one of the slices, and

wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is further configured to calculate the chrominance quantization parameter based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and

122004WO

55

Clean Version

the slice-level chrominance quantization parameter offset value for the chrominance component.

24. The apparatus of claim 23, wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is configured to calculate:

$$Qp_{UV} \left((QP_{Y,P} + QP_{Y,Q} + 1)/2 + c_qp_offset + slice_qp_delta_c \right),$$

wherein Qp_{UV} comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(QP_{Y,P} + QP_{Y,Q} + 1)/2 + c_qp_offset + slice_qp_delta_c$,

wherein c_qp_offset comprises the picture-level chrominance quantization parameter offset value,

wherein $slice_qp_delta_c$ comprises the slice-level chrominance quantization parameter offset value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1)/2$ comprises an average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data.

25. The apparatus of claim 23,

wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein to determine the slice-level chrominance quantization parameter offset value, the video coder is configured to select one of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

26. The apparatus of claim 23,

wherein the first block of video data is within a first one of the slices associated

122004WO

Clean Version

56

with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein, to determine the slice-level chrominance quantization parameter offset value, the video coder is configured to determine an average of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

27. The apparatus of claim 23, wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is configured to calculate:

$$QpUV ((QP_{Y,P} + slice_qp_delta_P + QP_{Y,Q} + slice_qp_delta_Q + 1)/2 + c_qp_offset),$$

wherein $QpUV$ comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(QP_{Y,P} + slice_qp_delta_P + QP_{Y,Q} + slice_qp_delta_Q + 1)/2 + c_qp_offset$,

wherein c_qp_offset comprises the picture-level chrominance quantization parameter offset value,

wherein $slice_qp_delta_P$ comprises the first slice-level chrominance quantization parameter offset value,

wherein $slice_qp_delta_Q$ comprises the second slice-level chrominance quantization parameter offset value, and

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data.

28. The apparatus of claim 23, wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices

122004WO

Clean Version

57

associated with a second slice-level chrominance quantization parameter offset value, and wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is configured to calculate:

$$(QpUV(QP_{Y,P} + c_qp_offset + slice_qp_delta_P) + QpUV(QP_{Y,Q} + c_qp_offset + slice_qp_delta_Q) + 1) / 2,$$

wherein $QpUV$ comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $QP_{Y,P} + c_qp_offset + slice_qp_delta_P$ and $QP_{Y,Q} + c_qp_offset + slice_qp_delta_Q$,

wherein c_qp_offset comprises the picture-level chrominance quantization parameter offset value,

wherein $slice_qp_delta_P$ comprises the first slice-level chrominance quantization parameter offset value,

wherein $slice_qp_delta_Q$ comprises the second slice-level chrominance quantization parameter offset value, and

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data.

29. The apparatus of claim 23,

wherein the video coder is further configured to determine a chrominance format,

wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component, the video coder is configured to determine whether either of the picture-level chrominance quantization parameter offset value and the slice-level chrominance quantization parameter offset value are used to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the chrominance format.

I22004WO

58

Clean Version

30. The apparatus of claim 23,
wherein the video coder is further configured to determine one of a profile or level associated with the video data,
wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component, the video coder is configured to determine whether either of the picture-level chrominance quantization parameter offset value and the slice-level chrominance quantization parameter offset value are used to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the profile or level.
31. The apparatus of claim 17, wherein the video coder comprises a video decoder configured to decode the first block of video data and the second block of video data for presentation of the video data to a user.
32. The apparatus of claim 17,
wherein the video coder comprises a video encoder configured to apply the deblocking filter for in-loop filtering of the video data prior to storage in a reference picture list.
33. The apparatus of claim 17, wherein the apparatus comprises at least one of:
an integrated circuit;
a microprocessor; and
a wireless communication device that includes the video coder.
34. An apparatus for processing video data, the apparatus comprising:
means for decoding a first block of video data and a second block of video data,
wherein the first block of video data and the second block of video data share a common edge;

122004WO

59

Clean Version

means for determining a first luminance quantization parameter for the first block of video data and a second luminance quantization parameter for the second block of video data;

means for, for each of one or more chrominance components, determining a chrominance quantization parameter offset value;

means for, for each of the one or more chrominance components, calculating a chrominance quantization parameter used to configure a chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, and the chrominance quantization parameter offset value for the chrominance component;

means for, for each of the one or more chrominance components, determining a strength for the deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge; and

means for, for each of the one or more chrominance components, applying the deblocking filter according to the determined strength to deblock the common edge,

wherein the means for calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises:

means for calculating an average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data; and

means for applying the chrominance quantization parameter offset value to the average.

35. The apparatus of claim 34, wherein the means for calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises means for calculating:

$$Qp_{UV} ((QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset),$$

wherein Qp_{UV} comprises a table that specifies values for the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset$,

wherein c_qp_offset comprises the chrominance quantization parameter offset

122004WO

60

Clean Version

value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1) / 2$ comprises the average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data.

36. The apparatus of claim 34, wherein the chrominance quantization parameter offset value is signaled in a picture parameter set.

37. The apparatus of claim 34, wherein the means for determining a strength for a deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises means for determining a t_c parameter based on the chrominance quantization parameter, wherein the t_c parameter is applied in a clipping operation of the deblocking filter.

38. The apparatus of claim 34,
wherein the chrominance quantization parameter offset value comprises a picture-level chrominance quantization parameter offset value associated with all video blocks within a picture, the picture comprising one or more slices,
the apparatus further comprising means for, for each of the one or more chrominance components, determining a slice-level chrominance quantization parameter offset value associated with all video blocks within one of the slices, and
wherein the means for calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises means for calculating the chrominance quantization parameter based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component.

122004WO

Clean Version

61

39. The apparatus of claim 38,

wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein the means for determining the slice-level chrominance quantization parameter offset value comprises means for selecting one of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

40. The apparatus of claim 38,

wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein the means for determining the slice-level chrominance quantization parameter offset value comprises means for determining an average of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

41. A computer-readable storage medium comprising instructions stored thereon that, when executed, cause a processor of a video coder to:

decode a first block of video data and a second block of video data, wherein the first block of video data and the second block of video data share a common edge;

determine a first luminance quantization parameter for the first block of video data and a second luminance quantization parameter for the second block of video data;

for each of one or more chrominance components, determine a chrominance quantization parameter offset value;

for each of the one or more chrominance components, calculate a chrominance quantization parameter used to configure a chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, and the chrominance quantization parameter offset value for the chrominance component;

122004WQ

62

Clean Version

for each of the one or more chrominance components, determine a strength for the deblocking filter for the common edge based on the chrominance quantization parameter used to configure a chrominance component deblocking filter for the common edge; and

for each of the one or more chrominance components, apply the deblocking filter according to the determined strength to deblock the common edge,

wherein the instructions that cause the processor calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprise instructions that cause the processor to:

calculate an average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data; and

apply the chrominance quantization parameter offset value to the average.

42. The computer-readable storage medium of claim 41, wherein the instructions that cause the processor to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprise instructions that cause the processor to calculate:

$$Qp_{UV} \left((Qp_{Y,P} + Qp_{Y,Q} + 1) / 2 + c_{qp_offset} \right),$$

wherein Qp_{UV} comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(Qp_{Y,P} + Qp_{Y,Q} + 1) / 2 + c_{qp_offset}$,

wherein c_{qp_offset} comprises the chrominance quantization parameter offset value,

wherein $Qp_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $Qp_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $Qp_{UV} \left((Qp_{Y,P} + Qp_{Y,Q} + 1) / 2 \right)$ comprises the average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data,

43. The computer-readable storage medium of claim 41, wherein the chrominance quantization parameter offset value is signaled in a picture parameter set,

122004WO

Clean Version

63

44. The computer-readable storage medium of claim 41, wherein the instructions that cause a processor to determine a strength for a deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprise instructions that cause the processor to determine a t_c parameter based on the chrominance quantization parameter, wherein the t_c parameter is applied in a clipping operation of the deblocking filter,

45. The computer-readable storage medium of claim 41, wherein the chrominance quantization parameter offset value comprises a picture-level chrominance quantization parameter offset value associated with all video blocks within a picture, the picture comprising one or more slices,

the medium further comprising instructions that cause the processor to, for each of the one or more chrominance components, determine a slice-level chrominance quantization parameter offset value associated with all video blocks within one of the slices, and

wherein the instructions that cause the processor to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprise instructions that cause the processor to calculate the chrominance quantization parameter based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component.

46. The computer-readable storage medium of claim 45, wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein the instructions that cause the processor to determine the slice-level chrominance quantization parameter offset value comprise instructions that cause the

122004WO

64

Clean Version

processor to select one of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

47. The computer-readable storage medium of claim 45,
wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and
wherein the instructions that cause the processor to determine the slice-level chrominance quantization parameter offset value comprise instructions that cause the processor to determine an average of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

CLAIMS

Claim 1: A method for processing video data, the method comprising:

- decoding a first block of video data and a second block of video data, wherein the first block of video data and the second block of video data share a common edge;
- determining a first luminance quantization parameter for the first block of video data and a second luminance quantization parameter for the second block of video data;
- for each of one or more chrominance components, determining a chrominance quantization parameter offset value;
- for each of the one or more chrominance components, calculating a chrominance quantization parameter used to configure a chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, and the chrominance quantization parameter offset value for the chrominance component;
- for each of the one or more chrominance components, determining a strength for the chrominance component deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge; and
- for each of the one or more chrominance components, applying the chrominance component deblocking filter according to the determined strength to deblock the common edge,

wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises:

- calculating an average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data; and
- applying the chrominance quantization parameter offset value to the average.

Claim 2: The method of claim 1, wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises calculating:

$$Q_{pUV} \left((QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_{qp_offset} \right),$$

wherein Q_{pUV} comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for

the common edge based on values of $(QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset$,

wherein c_qp_offset comprises the chrominance quantization parameter offset value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1) / 2$ comprises the average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data.

Claim 3: The method of claim 1, wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises calculating:

$\text{Clip3}(0, 51, (QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset)$,

wherein c_qp_offset comprises the chrominance quantization parameter offset value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1) / 2$ comprises the average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data.

Claim 4: The method of claim 1, wherein the chrominance quantization parameter offset value is signaled in a picture parameter set.

Claim 5: The method of claim 1, further comprising at least one of:

applying the chrominance quantization parameter offset value to the first luminance quantization parameter for the first block of video data to determine a first chrominance quantization parameter for the first block of video data; or

applying the chrominance quantization parameter offset value to the second luminance quantization parameter for the second block of video data to determine a second chrominance quantization parameter for the second block of video data.

Claim 6: The method of claim 1, wherein determining a strength for the deblocking filter for the common edge based on the chrominance quantization parameter used to

configure the chrominance component deblocking filter for the common edge comprises determining a first parameter based on the chrominance quantization parameter, wherein the first parameter is applied in a clipping operation of the deblocking filter.

Claim 7: The method of claim 1,

wherein the chrominance quantization parameter offset value comprises a picture-level chrominance quantization parameter offset value associated with all video blocks within a picture, the picture comprising one or more slices,

the method further comprising, for each of the one or more chrominance components, determining a slice-level chrominance quantization parameter offset value associated with all video blocks within one of the slices, and

wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises calculating the chrominance quantization parameter based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component.

Claim 8: The method of claim 7, wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises calculating:

$$Qp_{UV} \left((Qp_{Y,P} + Qp_{Y,Q} + 1) / 2 + c_qp_offset + slice_qp_delta_c \right),$$

wherein Qp_{UV} comprises a table that specifies values of the chrominance quantization parameter used to configured the chrominance component deblocking filter for the common edge based on values of $(Qp_{Y,P} + Qp_{Y,Q} + 1) / 2 + c_qp_offset + slice_qp_delta_c$,

wherein c_qp_offset comprises the picture-level chrominance quantization parameter offset value,

wherein $slice_qp_delta_c$ comprises the slice-level chrominance quantization parameter offset value,

wherein $Qp_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $Qp_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $(Qp_{Y,P} + Qp_{Y,Q} + 1) / 2$ comprises an average of the first luminance

quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data.

Claim 9: The method of claim 7,

wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein determining the slice-level chrominance quantization parameter offset value comprises selecting one of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

Claim 10: The method of claim 7,

wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein determining the slice-level chrominance quantization parameter offset value comprises determining an average of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

Claim 11: The method of claim 10, wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises calculating:

$$QpUV ((QP_{Y,P} + slice_qp_delta_P + QP_{Y,Q} + slice_qp_delta_Q + 1)/2 + c_qp_offset),$$

wherein QpUV comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(QP_{Y,P} + slice_qp_delta_P + QP_{Y,Q} + slice_qp_delta_Q + 1)/2 + c_qp_offset$,

wherein c_qp_offset comprises the picture-level chrominance quantization parameter offset value,

wherein slice_qp_delta_P comprises the first slice-level chrominance quantization parameter offset value,

wherein slice_qp_delta_Q comprises the second slice-level chrominance quantization parameter offset value, and

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data.

Claim 12: The method of claim 10, wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises calculating:

$$(QpUV (QP_{Y,P} + c_qp_offset + slice_qp_delta_P) + QpUV (QP_{Y,Q} + c_qp_offset + slice_qp_delta_Q) + 1) / 2,$$

wherein QpUV comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $QP_{Y,P} + c_qp_offset + slice_qp_delta_P$ and $QP_{Y,Q} + c_qp_offset + slice_qp_delta_Q$,

wherein c_qp_offset comprises the picture-level chrominance quantization parameter offset value,

wherein slice_qp_delta_P comprises the first slice-level chrominance quantization parameter offset value,

wherein slice_qp_delta_Q comprises the second slice-level chrominance quantization parameter offset value, and

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data.

Claim 13: The method of claim 7,
further comprising determining a chrominance format,
wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component comprises determining whether either of the picture-level chrominance quantization parameter offset value and the slice-level chrominance quantization parameter offset value are used to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the chrominance format.

Claim 14: The method of claim 7,
further comprising determining one of a profile or level associated with the video data,
wherein calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component comprises determining whether either of the picture-level chrominance quantization parameter offset value and the slice-level chrominance quantization parameter offset value are used to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the profile or level.

Claim 15: The method of claim 1, wherein decoding the first block of video data and the second block of video data comprises decoding the first and second blocks of video data by a decoder for presentation of the video data to a user.

Claim 16: The method of claim 1,

wherein applying the deblocking filter comprises applying the deblocking filter by an encoder for in-loop filtering of the video data prior to storage in a reference picture list.

Claim 17: An apparatus for processing video data, the apparatus comprising:

a memory configured to store the video data; and

a video coder configured to:

decode a first block of the video data and a second block of the video data, wherein the first block of the video data and the second block of the video data share a common edge;

determine a first luminance quantization parameter for the first block of the video data and a second luminance quantization parameter for the second block of the video data;

for each of one or more chrominance components, determine a chrominance quantization parameter offset value;

for each of the one or more chrominance components, calculate a chrominance quantization parameter used to configure a chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of the video data, the second luminance quantization parameter for the second block of the video data, and the chrominance quantization parameter offset value for the chrominance component;

for each of the one or more chrominance components, determine a strength for the deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common for the edge; and

for each of the one or more chrominance components, apply the deblocking filter according to the determined strength to deblock the common edge,

wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is configured to:

calculate an average of the first luminance quantization parameter for the first block of the video data and the second luminance quantization parameter for the second block of the video data; and

apply the chrominance quantization parameter offset value to the

average.

Claim 18: The apparatus of claim 17, wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is configured to calculate:

$$QpUV \left((QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset \right),$$

wherein QpUV comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset$,

wherein c_qp_offset comprises the chrominance quantization parameter offset value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of the video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of the video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1) / 2$ comprises the average of the first luminance quantization parameter for the first block of the video data and the second luminance quantization parameter for the second block of the video data.

Claim 19: The apparatus of claim 17, wherein to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is configured to calculate:

$$\text{Clip3}(0, 51, (QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset),$$

wherein c_qp_offset comprises the chrominance quantization parameter offset value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of the video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of the video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1) / 2$ comprises the average of the first luminance quantization parameter for the first block of the video data and the second luminance quantization parameter for the second block of the video data.

Claim 20: The apparatus of claim 17, wherein the chrominance quantization parameter offset value is signaled in a picture parameter set.

Claim 21: The apparatus of claim 17, wherein the video coder is further configured to at least one of:

apply the chrominance quantization parameter offset value to the first luminance quantization parameter for the first block of the video data to determine a first chrominance quantization parameter for the first block of the video data; or

apply the chrominance quantization parameter offset value to the second luminance quantization parameter for the second block of the video data to determine a second chrominance quantization parameter for the second block of the video data.

Claim 22: The apparatus of claim 17, wherein, to determine the strength for the deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is configured to determine a first parameter based on the chrominance quantization parameter, wherein the first parameter is applied in a clipping operation of the deblocking filter.

Claim 23: The apparatus of claim 17,

wherein the chrominance quantization parameter offset value comprises a picture-level chrominance quantization parameter offset value associated with all video blocks within a picture, the picture comprising one or more slices,

wherein the video coder is further configured to, for each of the one or more chrominance components, determine a slice-level chrominance quantization parameter offset value associated with all video blocks within one of the slices, and

wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is further configured to calculate the chrominance quantization parameter based on the first luminance quantization parameter for the first block of the video data, the second luminance quantization parameter for the second block of the video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component.

Claim 24: The apparatus of claim 23, wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is configured to calculate:

$$QpUV \left((QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset + slice_qp_delta_c \right),$$

wherein QpUV comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset + slice_qp_delta_c$,

wherein c_qp_offset comprises the picture-level chrominance quantization parameter offset value,

wherein $slice_qp_delta_c$ comprises the slice-level chrominance quantization parameter offset value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of the video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of the video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1) / 2$ comprises an average of the first luminance quantization parameter for the first block of the video data and the second luminance quantization parameter for the second block of the video data.

Claim 25: The apparatus of claim 23,

wherein the first block of the video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of the video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein to determine the slice-level chrominance quantization parameter offset value, the video coder is configured to select one of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

Claim 26: The apparatus of claim 23,

wherein the first block of the video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of the video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein, to determine the slice-level chrominance quantization parameter offset value, the video coder is configured to determine an average of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

Claim 27: The apparatus of claim 26, wherein the first block of the video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of the video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is configured to calculate:

$$QpUV ((QP_{Y,P} + slice_qp_delta_P + QP_{Y,Q} + slice_qp_delta_Q + 1)/2 + c_qp_offset),$$
 wherein QpUV comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(QP_{Y,P} + slice_qp_delta_P + QP_{Y,Q} + slice_qp_delta_Q + 1)/2 + c_qp_offset$,

wherein c_qp_offset comprises the picture-level chrominance quantization parameter offset value,

wherein slice_qp_delta_P comprises the first slice-level chrominance quantization parameter offset value,

wherein slice_qp_delta_Q comprises the second slice-level chrominance quantization parameter offset value, and

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of the video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of the video data.

Claim 28: The apparatus of claim 26, wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge, the video coder is configured to calculate:

$$(QpUV (QP_{Y,P} + c_qp_offset + slice_qp_delta_P) + QpUV (QP_{Y,Q} + c_qp_offset +$$

$\text{slice_qp_delta_Q}) + 1) / 2,$

wherein QpUV comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $\text{QP}_{Y,P} + \text{c_qp_offset} + \text{slice_qp_delta_P}$ and $\text{QP}_{Y,Q} + \text{c_qp_offset} + \text{slice_qp_delta_Q}$,

wherein c_qp_offset comprises the picture-level chrominance quantization parameter offset value,

wherein slice_qp_delta_P comprises the first slice-level chrominance quantization parameter offset value,

wherein slice_qp_delta_Q comprises the second slice-level chrominance quantization parameter offset value, and

wherein $\text{QP}_{Y,P}$ comprises the first luminance quantization parameter for the first block of the video data and $\text{QP}_{Y,Q}$ comprises the second luminance quantization parameter for the second block of the video data.

Claim 29: The apparatus of claim 23,

wherein the video coder is further configured to determine a chrominance format,

wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of the video data, the second luminance quantization parameter for the second block of the video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component, the video coder is configured to determine whether either of the picture-level chrominance quantization parameter offset value and the slice-level chrominance quantization parameter offset value are used to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the chrominance format.

Claim 30: The apparatus of claim 23,

wherein the video coder is further configured to determine one of a profile or level associated with the video data,

wherein, to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the first luminance

quantization parameter for the first block of the video data, the second luminance quantization parameter for the second block of the video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component, the video coder is configured to determine whether either of the picture-level chrominance quantization parameter offset value and the slice-level chrominance quantization parameter offset value are used to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on the profile or level.

Claim 31: The apparatus of claim 17, further comprising a display configured to display the first block of the video data and the second block of the video data, wherein the video coder comprises a video decoder configured to decode the first block of the video data and the second block of the video data for presentation of the video data to a user via the display.

Claim 32: The apparatus of claim 17, further comprising a video camera configured to capture a picture that includes the first block of the video data and the second block of the video data, wherein the video coder comprises a video encoder configured to apply the deblocking filter for in-loop filtering of the video data prior to storage of the picture in a reference picture list.

Claim 33: The apparatus of claim 17, wherein the apparatus comprises at least one of:
 an integrated circuit;
 a microprocessor; and
 a wireless communication device that includes the video coder.

Claim 34: An apparatus for processing video data, the apparatus comprising:
 means for decoding a first block of video data and a second block of video data,
 wherein the first block of video data and the second block of video data share a common edge;
 means for determining a first luminance quantization parameter for the first block of video data and a second luminance quantization parameter for the second block of video data;
 means for, for each of one or more chrominance components, determining a chrominance quantization parameter offset value;
 means for, for each of the one or more chrominance components, calculating a

chrominance quantization parameter used to configure a chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, and the chrominance quantization parameter offset value for the chrominance component;

means for, for each of the one or more chrominance components, determining a strength for the deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge; and

means for, for each of the one or more chrominance components, applying the deblocking filter according to the determined strength to deblock the common edge,

wherein the means for calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises:

means for calculating an average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data; and

means for applying the chrominance quantization parameter offset value to the average.

Claim 35: The apparatus of claim 34, wherein the means for calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises means for calculating:

$$QpUV ((QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset),$$

wherein $QpUV$ comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset$,

wherein c_qp_offset comprises the chrominance quantization parameter offset value,

wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $(QP_{Y,P} + QP_{Y,Q} + 1) / 2$ comprises the average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data.

Claim 36: The apparatus of claim 34, wherein the chrominance quantization parameter offset value is signaled in a picture parameter set.

Claim 37: The apparatus of claim 34, wherein the means for determining a strength for a deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises means for determining a first parameter based on the chrominance quantization parameter, wherein the first parameter is applied in a clipping operation of the deblocking filter.

Claim 38: The apparatus of claim 34,

wherein the chrominance quantization parameter offset value comprises a picture-level chrominance quantization parameter offset value associated with all video blocks within a picture, the picture comprising one or more slices,

the apparatus further comprising means for, for each of the one or more chrominance components, determining a slice-level chrominance quantization parameter offset value associated with all video blocks within one of the slices, and

wherein the means for calculating the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprises means for calculating the chrominance quantization parameter based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component.

Claim 39: The apparatus of claim 38,

wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein the means for determining the slice-level chrominance quantization parameter offset value comprises means for selecting one of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

Claim 40: The apparatus of claim 38,

wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein the means for determining the slice-level chrominance quantization parameter offset value comprises means for determining an average of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

Claim 41: A non-transitory computer-readable storage medium comprising instructions stored thereon that, when executed, cause a processor of a video coder to:

decode a first block of video data and a second block of video data, wherein the first block of video data and the second block of video data share a common edge;

determine a first luminance quantization parameter for the first block of video data and a second luminance quantization parameter for the second block of video data;

for each of one or more chrominance components, determine a chrominance quantization parameter offset value;

for each of the one or more chrominance components, calculate a chrominance quantization parameter used to configure a chrominance component deblocking filter for the common edge based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, and the chrominance quantization parameter offset value for the chrominance component;

for each of the one or more chrominance components, determine a strength for the deblocking filter for the common edge based on the chrominance quantization parameter used to configure a chrominance component deblocking filter for the common edge; and

for each of the one or more chrominance components, apply the deblocking filter according to the determined strength to deblock the common edge,

wherein the instructions that cause the processor calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprise instructions that cause the processor to:

calculate an average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data; and

apply the chrominance quantization parameter offset value to the average.

Claim 42: The non-transitory computer-readable storage medium of claim 41, wherein the instructions that cause the processor to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprise instructions that cause the processor to calculate:

$$QpUV \left((QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset \right),$$

wherein QpUV comprises a table that specifies values of the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge based on values of $(QP_{Y,P} + QP_{Y,Q} + 1) / 2 + c_qp_offset$,
 wherein c_qp_offset comprises the chrominance quantization parameter offset value,
 wherein $QP_{Y,P}$ comprises the first luminance quantization parameter for the first block of video data and $QP_{Y,Q}$ comprises the second luminance quantization parameter for the second block of video data, and

wherein $QpUV \left((QP_{Y,P} + QP_{Y,Q} + 1) / 2 \right)$ comprises the average of the first luminance quantization parameter for the first block of video data and the second luminance quantization parameter for the second block of video data,

Claim 43: The non-transitory computer-readable storage medium of claim 41, wherein the chrominance quantization parameter offset value is signaled in a picture parameter set.

Claim 44: The non-transitory computer-readable storage medium of claim 41, wherein the instructions that cause a processor to determine a strength for a deblocking filter for the common edge based on the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprise instructions that cause the processor to determine a first parameter based on the chrominance quantization parameter, wherein the first parameter is applied in a clipping operation of the deblocking filter,

Claim 45: The non-transitory computer-readable storage medium of claim 41,
 wherein the chrominance quantization parameter offset value comprises a picture-level chrominance quantization parameter offset value associated with all video blocks within a picture, the picture comprising one or more slices,
 the medium further comprising instructions that cause the processor to, for each of the

one or more chrominance components, determine a slice-level chrominance quantization parameter offset value associated with all video blocks within one of the slices, and

wherein the instructions that cause the processor to calculate the chrominance quantization parameter used to configure the chrominance component deblocking filter for the common edge comprise instructions that cause the processor to calculate the chrominance quantization parameter based on the first luminance quantization parameter for the first block of video data, the second luminance quantization parameter for the second block of video data, the picture-level chrominance quantization parameter offset value for the chrominance component, and the slice-level chrominance quantization parameter offset value for the chrominance component.

Claim 46: The non-transitory computer-readable storage medium of claim 45,

wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein the instructions that cause the processor to determine the slice-level chrominance quantization parameter offset value comprise instructions that cause the processor to select one of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.

Claim 47: The non-transitory computer-readable storage medium of claim 45,

wherein the first block of video data is within a first one of the slices associated with a first slice-level chrominance quantization parameter offset value, and the second block of video data is within a second one of the slices associated with a second slice-level chrominance quantization parameter offset value, and

wherein the instructions that cause the processor to determine the slice-level chrominance quantization parameter offset value comprise instructions that cause the processor to determine an average of the first slice-level chrominance quantization parameter offset value and the second slice-level chrominance quantization parameter offset value.