WHAT IS CLAIMED IS:

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

dividing a picture into a plurality of picture partitions, the picture having a plurality of treeblocks, the picture partitions associated with non-overlapping subsets of the treeblocks of the picture; and

generating a coded slice network abstraction layer (NAL) unit that includes encoded representations of the treeblocks that are associated with a slice of the picture, the encoded representations of the treeblocks grouped within the coded slice NAL unit into segments associated with different ones of the picture partitions, wherein one or more of the segments are padded such that each of the segments begins on a byte boundary.

2. The method of claim 1, wherein generating the coded slice NAL unit comprises generating a slice header that indicates entry points for one or more of the segments.

3. The method of claim 2, wherein the entry points for the segments indicate byte offsets of the segments.

4. The method of claim 1, wherein the picture partitions are tiles or wavefront parallel processing (WPP) waves.

5. The method of claim 1, further comprising generating a parameter set associated with the picture, the parameter set including a flag that has a first value, the first value indicating that the one or more of the segments are padded such that each of the segments begins at a byte boundary, and

wherein when the flag has a second value, the segments may or may not begin at byte boundaries.

6. The method of claim 1,

wherein the segments include a given segment; and

wherein generating the coded slice NAL unit comprises performing a padding operation that appends bits to the given segment if a next treeblock is inside the slice and is associated with a different picture partition than the given segment.

7. The method of claim 1,

wherein the picture partitions are tiles; and

wherein generating the coded slice NAL unit comprises performing a padding operation that ensures that the segments begin at byte boundaries only after determining that the tiles are independent of one another.

8. A method of decoding video data, the method comprising:

storing a coded slice network abstraction layer (NAL) unit that includes encoded representations of treeblocks associated with a slice of a picture, the picture partitioned into a plurality of picture partitions, the encoded representations of the treeblocks grouped into segments associated with different ones of the picture partitions, wherein one or more of the segments are padded such that each of the segments begins at a byte boundary; and

decoding the encoded representations of the treeblocks.

9. The method of claim 8, wherein the coded slice NAL unit comprises a slice header that indicates entry points for one or more of the segments.

10. The method of claim 9, wherein the entry points for the segments indicate byte offsets of the segments.

11. The method of claim 8, wherein the picture partitions are tiles or wavefront parallel processing (WPP) waves.

12. The method of claim 8, further comprising storing a parameter set associated with the picture, the parameter set including a flag that has a first value, the first value indicating that the one or more of the segments are padded such that each of the segments begin at a byte boundary, and

wherein when the flag has a second value, the segments may or may not begin at byte boundaries.

13. The method of claim 8,

wherein the picture partitions are tiles; and

wherein one or more of the segments are padded such that the segments begin at byte boundaries when the tiles are independent of one another.

14. The method of claim 8, wherein decoding the encoded representations of the treeblocks comprises decoding the encoded representations of the treeblocks in two or more of the segments in parallel.

15. A video encoding device that encodes video data, the video encoding device comprises one or more processors configured to:

divide a picture into a plurality of picture partitions, the picture having a plurality of treeblocks, the picture partitions associated with non-overlapping subsets of the treeblocks of the picture; and

generate a coded slice network abstraction layer (NAL) unit that includes encoded representations of the treeblocks that are associated with a slice of the picture, the encoded representations of the treeblocks grouped within the coded slice NAL unit into segments associated with different ones of the picture partitions, wherein one or more of the segments are padded such that each of the segments begins on a byte boundary.

16. The video encoding device of claim 15, wherein the one or more processors are configured to generate the coded slice NAL unit such that the coded slice NAL unit includes a slice header that indicates entry points for one or more of the segments.

17. The video encoding device of claim 16, wherein the entry points for the segments indicate byte offsets of the segments.

18. The video encoding device of claim 15, wherein the picture partitions are tiles or wavefront parallel processing (WPP) waves.

19. The video encoding device of claim 15, wherein the one or more processors are configured to generate a parameter set associated with the picture, the parameter set including a flag that has a first value, the first value indicating that the one or more of the segments are padded such that each of the segments begins at a byte boundary, and

wherein when the flag has a second value, the segments may or may not begin at byte boundaries.

20. The video encoding device of claim 15,

wherein the segments include a given segment; and

wherein the one or more processors are configured to perform a padding operation that appends bits to the given segment if a next treeblock is inside the slice and is associated with a different picture partition than the given segment.

21. The video encoding device of claim 15,

wherein the picture partitions are tiles; and

wherein one or more processors are configured to perform a padding operation that ensures that the segments begin at byte boundaries only after determining that the tiles are independent of one another.

22. The video encoding device of claim 15, wherein the video encoding device is a mobile computing device.

23. A video decoding device that decodes video data, the video decoding device comprising:

a memory that stores a coded slice network abstraction layer (NAL) unit that includes encoded representations of treeblocks associated with a slice of a picture, the picture divided into a plurality of picture partitions, the encoded representations of the treeblocks grouped into segments associated with different ones of the picture partitions, wherein one or more of the segments are padded such that each of the segments begins at a byte boundary; and

one or more processors that are configured to decode the encoded representations of the treeblocks.

24. The video decoding device of claim 23, wherein the coded slice NAL unit comprises a slice header that indicates entry points for one or more of the segments.

25. The video decoding device of claim 24, wherein the entry points for the segments indicate byte offsets of the segments.

26. The video decoding device of claim 23, wherein the picture partitions are tiles or wavefront parallel processing (WPP) waves.

27. The video decoding device of claim 23, wherein the memory stores a parameter set associated with the picture, the parameter set including a flag that has a first value, the first value indicating that the one or more of the segments are padded such that each of the segments begins at a byte boundary, and

wherein when the flag has a second value, the segments may or may not begin at byte boundaries.

28. The video decoding device of claim 23, wherein the video decoding device is a mobile computing device.

29. The video decoding device of claim 23, wherein the one or more processors are configured to decode the encoded representations of the treeblocks in two or more of the segments in parallel.

30. A computer program product that comprises one or more computer-readable storage media that store instructions that, when executed by one or more processors, configure a video encoding device to:

divide a picture into a plurality of picture partitions, the picture having a plurality of treeblocks, the picture partitions associated with non-overlapping subsets of the treeblocks of the picture; and

generate a coded slice network abstraction layer (NAL) unit that includes encoded representations of the treeblocks that are associated with a slice of the picture, the encoded representations of the treeblocks grouped within the coded slice NAL unit into segments associated with different ones of the picture partitions, wherein one or more of the segments are padded such that each of the segments begins on a byte boundary.

31. A computer program product that comprises one or more computer-readable storage media that store instructions that, when executed by one or more processors, configure a video decoding device to:

store a coded slice network abstraction layer (NAL) unit that includes encoded representations of treeblocks associated with a slice of a picture, the picture divided into a plurality of picture partitions, the encoded representations of the treeblocks grouped into segments associated with different ones of the picture partitions, wherein one or more of the segments are padded such that each of the segments begins at a byte boundary; and

decode the encoded representations of the treeblocks.

32. A video encoding device that encodes video data, the video encoding device comprising:

means for dividing a picture into a plurality of picture partitions, the picture having a plurality of treeblocks, the picture partitions associated with non-overlapping subsets of the treeblocks of the picture; and

means for generating a coded slice network abstraction layer (NAL) unit that includes encoded representations of the treeblocks that are associated with a slice of the picture, the encoded representations of the treeblocks grouped within the coded slice NAL unit into segments associated with different ones of the picture partitions, wherein one or more of the segments are padded such that each of the segments begins on a byte boundary.

33. A video decoding device that decodes video data, the video decoding device comprising:

means for storing a coded slice network abstraction layer (NAL) unit that includes encoded representations of treeblocks associated with a slice of a picture, the picture divided into a plurality of picture partitions, the encoded representations of the treeblocks grouped into segments associated with different ones of the picture partitions, wherein one or more of the segments are padded such that each of the segments begins at a byte boundary; and

means for decoding the encoded representations of the treeblocks.

CLAIMS

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

dividing a picture into a plurality of picture partitions, the picture having a plurality of treeblocks, the picture partitions associated with non-overlapping subsets of the treeblocks of the picture; and

generating a coded slice network abstraction layer (NAL) unit that includes encoded representations of the treeblocks that are associated with a slice of the picture, the encoded representations of the treeblocks grouped within the coded slice NAL unit into segments associated with different ones of the picture partitions, wherein:

one or more of the segments are padded such that each of the segments begins on a byte boundary,

the segments include a given segment, and

generating the coded slice NAL unit comprises performing a padding operation that appends bits to the given segment if a next treeblock is inside the slice and is associated with a different picture partition than the given segment.

2. The method of claim **1**, wherein generating the coded slice NAL unit comprises generating a slice header that indicates entry points for one or more of the segments.

3. The method of claim **2**, wherein the entry points for the segments indicate byte offsets of the segments.

4. The method of claim **1**, wherein the picture partitions are tiles or wavefront parallel processing (WPP) waves.

5. The method of claim **1**, further comprising generating a parameter set associated with the picture, the parameter set including a flag that has a first value, the first value indicating that the one or more of the segments are padded such that each of the segments begins at a byte boundary, and

wherein when the flag has a second value, the segments may or may not begin at byte boundaries.

6. The method of claim **1**,

wherein the picture partitions are tiles; and

wherein generating the coded slice NAL unit comprises performing a padding operation that ensures that the segments begin at byte boundaries only after determining that the tiles are independent of one another.

7. A method of decoding video data, the method comprising:

storing a coded slice network abstraction layer (NAL) unit that includes encoded representations of treeblocks associated with a slice of a picture, the picture partitioned into a plurality of picture partitions, the encoded representations of the treeblocks grouped into segments associated with different ones of the picture partitions, wherein:

one or more of the segments are padded such that each of the segments begins at a byte boundary,

the segments include a given segment, and

the coded slice NAL unit includes bits appended to the given segment if a next treeblock is inside the slice and is associated with a different picture partition than the given segment; and

decoding the encoded representations of the treeblocks.

8. The method of claim **7**, wherein the coded slice NAL unit comprises a slice header that indicates entry points for one or more of the segments.

9. The method of claim **8**, wherein the entry points for the segments indicate byte offsets of the segments.

10. The method of claim **7**, wherein the picture partitions are tiles or wavefront parallel processing (WPP) waves.

11. The method of claim **7**, further comprising storing a parameter set associated with the picture, the parameter set including a flag that has a first value, the first value indicating that the one or more of the segments are padded such that each of the segments begin at a byte boundary, and

wherein when the flag has a second value, the segments may or may not begin at byte boundaries.

12. The method of claim **7**,

wherein the picture partitions are tiles; and

wherein one or more of the segments are padded such that the segments begin at byte boundaries when the tiles are independent of one another.

13. The method of claim **7**, wherein decoding the encoded representations of the treeblocks comprises decoding the encoded representations of the treeblocks in two or more of the segments in parallel.

14. A video encoding device that encodes video data, the video encoding device comprising:

a data storage medium configured to store the video data; and

one or more processors configured to:

divide a picture of the video data into a plurality of picture partitions, the picture having a plurality of treeblocks, the picture partitions associated with non-overlapping subsets of the treeblocks of the picture; and

generate a coded slice network abstraction layer (NAL) unit that includes encoded representations of the treeblocks that are associated with a slice of the picture, the encoded representations of the treeblocks grouped within the coded slice NAL unit into segments associated with different ones of the picture partitions, wherein:

one or more of the segments are padded such that each of the segments begins on a byte boundary,

the segments include a given segment, and

the one or more processors are configured to perform a padding operation that appends bits to the given segment if a next treeblock is inside the slice and is associated with a different picture partition than the given segment.

15. The video encoding device of claim **14**, wherein the one or more processors are configured to generate the coded slice NAL unit such that the coded slice NAL unit includes a slice header that indicates entry points for one or more of the segments.

16. The video encoding device of claim **15**, wherein the entry points for the segments indicate byte offsets of the segments.

17. The video encoding device of claim **14**, wherein the picture partitions are tiles or wavefront parallel processing (WPP) waves.

18. The video encoding device of claim **14**, wherein the one or more processors are configured to generate a parameter set associated with the picture, the parameter set including a flag that has a first value, the first value indicating that the one or more of the segments are padded such that each of the segments begins at a byte boundary, and

wherein when the flag has a second value, the segments may or may not begin at byte boundaries.

19. The video encoding device of claim **14**,

wherein the picture partitions are tiles; and

wherein one or more processors are configured to perform a padding operation that ensures that the segments begin at byte boundaries only after determining that the tiles are independent of one another.

20. The video encoding device of claim **14**, wherein the video encoding device is a mobile computing device.

21. A video decoding device that decodes video data, the video decoding device comprising:

a memory that stores a coded slice network abstraction layer (NAL) unit that includes encoded representations of treeblocks associated with a slice of a picture, the

picture divided into a plurality of picture partitions, the encoded representations of the treeblocks grouped into segments associated with different ones of the picture partitions, wherein:

one or more of the segments are padded such that each of the segments begins at a byte boundary,

the segments include a given segment, and

the coded slice NAL unit includes bits appended to the given segment if a next treeblock is inside the slice and is associated with a different picture partition than the given segment; and

one or more processors that are configured to decode the encoded representations of the treeblocks.

22. The video decoding device of claim **21**, wherein the coded slice NAL unit comprises a slice header that indicates entry points for one or more of the segments.

23. The video decoding device of claim **22**, wherein the entry points for the segments indicate byte offsets of the segments.

24. The video decoding device of claim **21**, wherein the picture partitions are tiles or wavefront parallel processing (WPP) waves.

25. The video decoding device of claim **21**, wherein the memory stores a parameter set associated with the picture, the parameter set including a flag that has a first value, the first value indicating that the one or more of the segments are padded such that each of the segments begins at a byte boundary, and

wherein when the flag has a second value, the segments may or may not begin at byte boundaries.

26. The video decoding device of claim **21**, wherein the video decoding device is a mobile computing device.

27. The video decoding device of claim **21**, wherein the one or more processors are configured to decode the encoded representations of the treeblocks in two or more of the segments in parallel.

28. A non-transitory computer-readable storage medium that stores instructions that, when executed by one or more processors, configure a video encoding device to:

divide a picture into a plurality of picture partitions, the picture having a plurality of treeblocks, the picture partitions associated with non-overlapping subsets of the treeblocks of the picture; and

generate a coded slice network abstraction layer (NAL) unit that includes encoded representations of the treeblocks that are associated with a slice of the picture, the encoded representations of the treeblocks grouped within the coded slice NAL unit into segments associated with different ones of the picture partitions, wherein:

one or more of the segments are padded such that each of the segments begins on a byte boundary,

the segments include a given segment, and

the one or more processors are configured to perform a padding operation that appends bits to the given segment if a next treeblock is inside the slice and is associated with a different picture partition than the given segment.

29. A non-transitory computer-readable storage medium that stores instructions that, when executed by one or more processors, configure a video decoding device to:

store a coded slice network abstraction layer (NAL) unit that includes encoded representations of treeblocks associated with a slice of a picture, the picture divided

into a plurality of picture partitions, the encoded representations of the treeblocks grouped into segments associated with different ones of the picture partitions, wherein:

one or more of the segments are padded such that each of the segments begins at a byte boundary,

the segments include a given segment, and

the coded slice NAL unit includes bits appended to the given segment if a next treeblock is inside the slice and is associated with a different picture partition than the given segment; and

decode the encoded representations of the treeblocks.

30. A video encoding device that encodes video data, the video encoding device comprising:

means for dividing a picture into a plurality of picture partitions, the picture having a plurality of treeblocks, the picture partitions associated with non-overlapping subsets of the treeblocks of the picture; and

means for generating a coded slice network abstraction layer (NAL) unit that includes encoded representations of the treeblocks that are associated with a slice of the picture, the encoded representations of the treeblocks grouped within the coded slice NAL unit into segments associated with different ones of the picture partitions, wherein:

one or more of the segments are padded such that each of the segments begins on a byte boundary,

the segments include a given segment, and

generating the coded slice NAL unit comprises performing a padding operation that appends bits to the given segment if a next treeblock is inside the slice and is associated with a different picture partition than the given segment.

31. A video decoding device that decodes video data, the video decoding device comprising:

means for storing a coded slice network abstraction layer (NAL) unit that includes encoded representations of treeblocks associated with a slice of a picture, the picture divided into a plurality of picture partitions, the encoded representations of the treeblocks grouped into segments associated with different ones of the picture partitions, wherein:

one or more of the segments are padded such that each of the segments begins at a byte boundary,

the segments include a given segment, and

the coded slice NAL unit includes bits appended to the given segment if a next treeblock is inside the slice and is associated with a different picture partition than the given segment; and

means for decoding the encoded representations of the treeblocks.