WHAT IS CLAIMED IS:

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

decoding a unique identifier for each decoding unit in an access unit, wherein an identifier for one decoding unit is different than an identifier for any other decoding unit in the access unit;

determining which network access layer (NAL) units are associated with which decoding units based on the unique identifier for each decoding unit in the access unit; and

decoding the NAL units of each of the decoding units in the access unit, based on the determination, to reconstruct at least one picture.

2. The method of claim 1,

wherein decoding the unique identifier comprises decoding a first unique identifier from a first decoding unit information supplemental enhancement information (SEI) message for a first decoding unit, and decoding a second unique identifier from a second decoding unit information SEI message for a second decoding unit, and

wherein determining comprises determining that a first SEI NAL unit that includes the first decoding unit information SEI message and all NAL units that follow the first SEI NAL unit up to a second SEI NAL unit that includes the second decoding unit information SEI message are associated with the first decoding unit.

3. The method of claim 1,

wherein decoding the unique identifier comprises decoding the unique identifier in a slice header of a slice NAL unit, and

wherein determining comprises determining which decoding unit the slice NAL unit is associated with based on the unique identifier in the slice header.

4. The method of claim 1, further comprising:

decoding a first decoding unit information supplemental enhancement information (SEI) message that indicates information for a removal time of a decoding unit; and

decoding a second decoding unit information SEI message that is located between two NAL units associated with the decoding unit, wherein the second decoding unit information SEI message is a copy of the first decoding unit information SEI message.

5. The method of claim 1, wherein decoding the unique identifier comprises:

decoding a first identifier for a first decoding unit in the access unit; and

decoding a second, different identifier for a second, different decoding unit in the access unit,

wherein, if a value of the first identifier is less than a value of the second identifier, the first decoding unit precedes the second decoding unit in decoding order.

6. The method of claim 1, further comprising:

decoding a supplemental enhancement information (SEI) message in the access unit; and

decoding a copy of the SEI message in the access unit.

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

determining a unique identifier for each decoding unit in an access unit, wherein an identifier for one decoding unit is different than an identifier for any other decoding unit in the access unit;

determining which network access layer (NAL) units are associated with which decoding units of the access unit; and

generating for output each unique identifier in corresponding decoding units to indicate which NAL units are associated with which decoding units of the access unit.

8. The method of claim 7, wherein generating for output comprises including a first unique identifier for a first decoding unit in a first decoding unit information supplemental enhancement information (SEI) message, the method further comprising:

outputting all NAL units that are associated with the first decoding unit after outputting first decoding unit SEI message;

including a second unique identifier for a second decoding unit in a second decoding unit information SEI message; and

after outputting of all NAL units that are associated with the first decoding unit, outputting the second decoding unit information SEI message that includes the second unique identifier for the second decoding unit.

9. The method of claim 7,

wherein generating for output comprises including each unique identifier in corresponding slice headers of slice NAL units that are associated with corresponding decoding units.

10. The method of claim 7, further comprising:

outputting, as part of a decoding unit, a first decoding unit information supplemental enhancement information (SEI) message that indicates information for a removal time of the decoding unit; and

outputting, as part of the decoding unit, a second decoding unit information SEI message, wherein the second decoding unit information SEI message is a copy of the first decoding unit information SEI message.

11. The method of claim 7, wherein determining the unique identifier comprises:

determining a first identifier for a first decoding unit in the access unit; and

determining a second, different identifier for a second, different decoding unit in the access unit,

wherein, if a value of the first identifier is less than a value of the second identifier, the first decoding unit precedes the second decoding unit in decoding order.

12. The method of claim 7, further comprising:

including a supplemental enhancement information (SEI) message in the access unit; and

including a copy of the SEI message in the access unit.

13. A device for decoding video data, the device comprising a video decoder configured to:

decode a unique identifier for each decoding unit in an access unit, wherein an identifier for one decoding unit is different than an identifier for any other decoding unit in the access unit;

determine which network access layer (NAL) units are associated with which decoding units based on the unique identifier for each decoding unit in the access unit; and

decode the NAL units of each of the decoding units in the access unit, based on the determination, to reconstruct at least one picture.

14. The device of claim 13,

wherein, to decode the unique identifier, the video decoder is configured to decode a first unique identifier from a first decoding unit information supplemental enhancement information (SEI) message for a first decoding unit, and decode a second unique identifier from a second decoding unit information SEI message for a second decoding unit, and

wherein, to determine, the video decoder is configured to determine that a first SEI NAL unit that includes the first decoding unit information SEI message and all NAL units that follow the first SEI NAL unit up to a second SEI NAL unit that includes the second decoding unit information SEI message are associated with the first decoding unit.

15. The device of claim 13,

wherein, to decode the unique identifier, the video decoder is configured to decode the unique identifier in a slice header of a slice NAL unit, and

wherein, to determine, the video decoder is configured to determine which decoding unit the slice NAL unit is associated with based on the unique identifier in the slice header.

16. The device of claim 13, wherein the video decoder is configured to:

decode a first decoding unit information supplemental enhancement information (SEI) message that indicates information for a removal time of a decoding unit; and

decode a second decoding unit information SEI message that is located between two NAL units associated with the decoding unit, wherein the second decoding unit information SEI message is a copy of the first decoding unit information SEI message.

17. The device of claim 13, wherein, to decode the unique identifier, the video decoder is configured to:

decode a first identifier for a first decoding unit in the access unit; and

decode a second, different identifier for a second, different decoding unit in the access unit,

wherein, if a value of the first identifier is less than a value of the second identifier, the first decoding unit precedes the second decoding unit in decoding order.

18. The device of claim 13, wherein the video decoder is configured to:

decode a supplemental enhancement information (SEI) message in the access unit; and

decode a copy of the SEI message in the access unit.

19. The device of claim 13, wherein the device comprises one of:

a microprocessor;

an integrated circuit; and

a wireless device that includes the video decoder.

20. A device for encoding video data, the device comprising a video encoder configured to:

determine a unique identifier for each decoding unit in an access unit, wherein an identifier for one decoding unit is different than an identifier for any other decoding unit in the access unit;

determine which network access layer (NAL) units are associated with which decoding units of the access unit; and

generate for output each unique identifier in corresponding decoding units to indicate which NAL units are associated with which decoding units of the access unit.

21. The device of claim 20,

wherein, to generate for output, the video encoder is configured to include a first unique identifier for a first decoding unit in a first decoding unit information supplemental enhancement information (SEI) message, and

wherein the video encoder is configured to:

output all NAL units that are associated with the first decoding unit after outputting first decoding unit SEI message;

include a second unique identifier for a second decoding unit in a second decoding unit information SEI message; and

after outputting of all NAL units that are associated with the first decoding unit, output the second decoding unit information SEI message that includes the second unique identifier for the second decoding unit.

22. The device of claim 20,

wherein, to generate for output, the video encoder is configured to include each unique identifier in corresponding slice headers of slice NAL units that are associated with corresponding decoding units.

23. The device of claim 20, wherein the video encoder is configured to:

output, as part of a decoding unit, a first decoding unit information supplemental enhancement information (SEI) message that indicates information for a removal time of the decoding unit; and

output, as part of the decoding unit, a second decoding unit information SEI message, wherein the second decoding unit information SEI message is a copy of the first decoding unit information SEI message.

24. The device of claim 20, wherein, to determine the unique identifier, the video encoder is configured to:

determine a first identifier for a first decoding unit in the access unit; and

determine a second, different identifier for a second, different decoding unit in the access unit,

wherein, if a value of the first identifier is less than a value of the second identifier, the first decoding unit precedes the second decoding unit in decoding order.

25. The device of claim 20, wherein the video encoder is configured to:

include a supplemental enhancement information (SEI) message in the access unit; and

include a copy of the SEI message in the access unit.

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

decode a unique identifier for each decoding unit in an access unit, wherein an identifier for one decoding unit is different than an identifier for any other decoding unit in the access unit;

determine which network access layer (NAL) units are associated with which decoding units based on the unique identifier for each decoding unit in the access unit; and

decode the NAL units of each of the decoding units in the access unit, based on the determination, to reconstruct at least one picture.

27. The computer-readable storage medium of claim 26,

wherein the instructions that cause the one or more processors to decode the unique identifier comprise instructions that cause the one or more processors to decode a first unique identifier from a first decoding unit information supplemental enhancement information (SEI) message for a first decoding unit, and decode a second unique identifier from a second decoding unit information SEI message for a second decoding unit, and

wherein the instructions that cause the one or more processors to determine comprise instructions that cause the one or more processors to determine that a first SEI NAL unit that includes the first decoding unit information SEI message and all NAL units that follow the first SEI NAL unit up to a second SEI NAL unit that includes the second decoding unit information SEI message are associated with the first decoding unit.

28. The computer-readable storage medium of claim 26, further comprising instructions that cause the one or more processors to:

decode a supplemental enhancement information (SEI) message in the access unit; and

decode a copy of the SEI message in the access unit.

29. A device for decoding video data, the device comprising:

means for decoding a unique identifier for each decoding unit in an access unit, wherein an identifier for one decoding unit is different than an identifier for any other decoding unit in the access unit;

means for determining which network access layer (NAL) units are associated with which decoding units based on the unique identifier for each decoding unit in the access unit; and

means for decoding the NAL units of each of the decoding units in the access unit, based on the determination, to reconstruct at least one picture.

30. The device of claim 29,

wherein the means for decoding the unique identifier comprises means for decoding a first unique identifier from a first decoding unit information supplemental enhancement information (SEI) message for a first decoding unit, and means for decoding a second unique identifier from a second decoding unit information SEI message for a second decoding unit, and

wherein the means for determining comprises means for determining that a first SEI NAL unit that includes the first decoding unit information SEI message and all NAL units that follow the first SEI NAL unit up to a second SEI NAL unit that includes the second decoding unit information SEI message are associated with the first decoding unit.

31. The device of claim 29, further comprising:

means for decoding a supplemental enhancement information (SEI) message in the access unit; and

means for decoding a copy of the SEI message in the access unit.

CLAIMS

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

decoding, from one or more respective decoding unit information supplemental enhancement information (SEI) messages, a unique identifier for each decoding unit of one or more decoding units in an access unit, wherein an identifier for one decoding unit is different than an identifier for any other decoding unit in the access unit, wherein each of the one or more decoding units includes a plurality of network abstraction layer (NAL) units, and wherein the unique identifier for each of the one or more decoding units is an index of each of the one or more decoding units into a list of all decoding units in the access unit in decoding order;

determining, for the one or more decoding units in the access unit, which of the one or more decoding units include which of the plurality of NAL units based on the unique identifier for each of the one or more decoding units in the access unit; and

decoding the plurality of NAL units of each of the one or more decoding units in the access unit, based on the determination, to reconstruct at least one picture.

2. The method of claim 1,

wherein decoding the unique identifier comprises decoding a first unique identifier from a first decoding unit

information SEI message for a first decoding unit, and decoding a second unique identifier from a second decoding unit information SEI message for a second decoding unit, and

wherein determining comprises determining that a first SEI NAL unit that includes the first decoding unit information SEI message and all NAL units that follow the first SEI NAL unit to a second SEI NAL unit that includes the second decoding unit information SEI message are included in the first decoding unit.

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

wherein decoding the unique identifier comprises decoding the unique identifier in a slice header of a slice NAL unit, and

wherein determining comprises determining which of the one or more decoding units includes the slice NAL unit based on the unique identifier in the slice header.

4. The method of claim **1**, further comprising:

decoding a first decoding unit information SEI message that indicates information for a removal time of a decoding unit; and

decoding a second decoding unit information SEI message that is located between two NAL units included in the decoding unit, wherein the second decoding unit information SEI message is a copy of the first decoding unit information SEI message.

5. The method of claim **1**, wherein decoding the unique identifier comprises:

decoding a first identifier for a first decoding unit in the access unit; and

decoding a second, different identifier for a second, different decoding unit in the access unit,

wherein, based on a value of the first identifier is being less than a value of the second identifier, the first decoding unit precedes the second decoding unit in decoding order.

6. The method of claim **1**, further comprising:

decoding a SEI message other than the decoding unit SEI message in the access unit; and

decoding a copy of the SEI message in the access unit.

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

determining a unique identifier for each decoding unit of one or more decoding units in an access unit, wherein an identifier for one decoding unit is different than an identifier for any other decoding unit in the access unit, wherein each of the one or more decoding units includes a plurality of network abstraction layer (NAL) units, and wherein the unique identifier for each of the one or more decoding units is an index of each of the one or more decoding units into a list of all decoding units in the access unit in decoding order;

determining, for the one or more decoding units in the access unit, which of the one or more decoding units include which of the plurality of NAL units; and

generating for output each unique identifier in one or more respective decoding unit information supplemental enhancement information (SEI) messages of corresponding one or more decoding units to indicate which of the one or more decoding units include which of the plurality of NAL units.

8. The method of claim **7**, wherein generating for output comprises including a first unique identifier for a first decoding unit in a first decoding unit information SEI message, the method further comprising:

outputting all of the plurality of NAL units that are included in the first decoding unit after outputting the first decoding unit SEI message;

including a second unique identifier for a second decoding unit in a second decoding unit information SEI message; and

after outputting of all of the plurality of NAL units that are included in the first decoding unit, outputting the second decoding unit information SEI message that includes the second unique identifier for the second decoding unit.

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

wherein generating for output comprises including each unique identifier in corresponding slice headers of slice NAL units that are included in corresponding decoding units.

10. The method of claim **7**, further comprising:

outputting, as part of a decoding unit, a first decoding unit information SEI message that indicates information for a removal time of the decoding unit; and

outputting, as part of the decoding unit, a second decoding unit information SEI message, wherein the second decoding unit information SEI message is a copy of the first decoding unit information SEI message.

11. The method of claim **7**, wherein determining the unique identifier comprises:

determining a first identifier for a first decoding unit in the access unit; and

determining a second, different identifier for a second, different decoding unit in the access unit,

wherein, based on a value of the first identifier is being less than a value of the second identifier, the first decoding unit precedes the second decoding unit in decoding order.

12. The method of claim 7, further comprising:

including a SEI message other than the decoding unit SEI message in the access unit; and

including a copy of the SEI message in the access unit.

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

a memory configured to store the video data; and

a video decoder configured to:

decode, from one or more respective decoding unit information supplemental enhancement information (SEI) messages of the video data, a unique identifier for each decoding unit of one or more decoding units in an access unit of the video data, wherein an identifier for one decoding unit is different than an identifier for any other decoding unit in the access unit, wherein each of the one or more decoding units includes a plurality of network abstraction layer (NAL) units, and wherein the unique identifier for each of the one or more decoding units is an index of each of the one or more decoding units into a list of all decoding units in the access unit in decoding order;

determine, for the one or more decoding units in the access unit, which of the one or more decoding units include which of the plurality of NAL units based on the unique identifier for each of the one or more decoding units in the access unit; and

decode the plurality of NAL units of each of the one or more decoding units in the access unit, based on the determination, to reconstruct at least one picture.

14. The device of claim 13,

wherein, to decode the unique identifier, the video decoder is configured to decode a first unique identifier

from a first decoding unit information SEI message for a first decoding unit, and decode a second unique identifier from a second decoding unit information SEI message for a second decoding unit, and

wherein, to determine, the video decoder is configured to determine that a first SEI NAL unit that includes the first decoding unit information SEI message and all NAL units that follow the first SEI NAL unit to a second SEI NAL unit that includes the second decoding unit information SEI message are included in the first decoding unit.

15. The device of claim **13**,

wherein, to decode the unique identifier, the video decoder is configured to decode the unique identifier in a slice header of a slice NAL unit, and

wherein, to determine, the video decoder is configured to determine which of the one or more decoding units includes the slice NAL unit based on the unique identifier in the slice header.

16. The device of claim **13**, wherein the video decoder is configured to:

decode a first decoding unit information SEI message that indicates information for a removal time of a decoding unit; and

decode a second decoding unit information SEI message that is located between two NAL units included in the decoding unit, wherein the second decoding unit information SEI message is a copy of the first decoding unit information SEI message.

17. The device of claim **13**, wherein, to decode the unique identifier, the video decoder is configured to:

decode a first identifier for a first decoding unit in the access unit; and

decode a second, different identifier for a second, different

decoding unit in the access unit,

wherein, based on a value of the first identifier being less than a value of the second identifier, the first decoding unit precedes the second decoding unit in decoding order.

18. The device of claim **13**, wherein the video decoder is configured to:

decode a SEI message other than the decoding unit SEI message in the access unit; and

decode a copy of the SEI message in the access unit.

19. The device of claim **13**, wherein the device comprises one of:

a microprocessor;

an integrated circuit; or

a wireless device that includes the video decoder.

20. A device for encoding video data, the device comprising:

a memory configured to store the video data and

a video encoder configured to:

determine a unique identifier for each decoding unit of one or more decoding units in an access unit of the video data, wherein an identifier for one decoding unit is different than an identifier for any other decoding unit in the access unit, wherein each decoding unit includes a plurality of network abstraction layer (NAL) units of the video data, and wherein the unique identifier for each of the one or more decoding units is an index of each of the one or more decoding units into a list of all decoding units in the access unit in decoding order;

determine, for the one or more decoding units in the access unit, which of the one or more decoding units include which of the plurality of NAL units; and

generate for output each unique identifier in one or more respective decoding unit information supplemental enhancement information (SEI) messages of corresponding one or more decoding units to indicate which of the one or more decoding units include which of the plurality of NAL units.

21. The device of claim **20**,

wherein, to generate for output, the video encoder is configured to include a first unique identifier for a first decoding unit in a first decoding unit information SEI message, and

wherein the video encoder is configured to:

output all of the plurality of NAL units that are included in the first decoding unit after outputting the first decoding unit SEI message;

include a second unique identifier for a second decoding unit in a second decoding unit information SEI message; and

after outputting of all of the plurality of NAL units that are included in the first decoding unit, output the second decoding unit information SEI message that includes the second unique identifier for the second decoding unit.

22. The device of claim **20**,

wherein, to generate for output, the video encoder is configured to include each unique identifier in corresponding slice headers of slice NAL units that are included in corresponding decoding units.

23. The device of claim **20**, wherein the video encoder is configured to:

output, as part of a decoding unit, a first decoding unit information SEI message that indicates information for a removal time of the decoding unit; and

output, as part of the decoding unit, a second decoding unit information SEI message, wherein the second decoding unit information SEI message is a copy of the first decoding unit information SEI message.

24. The device of claim **20**, wherein, to determine the unique identifier, the video encoder is configured to:

determine a first identifier for a first decoding unit in the access unit; and

determine a second, different identifier for a second, different decoding unit in the access unit,

wherein, based on a value of the first identifier being less than a value of the second identifier, the first decoding unit precedes the second decoding unit in decoding order.

25. The device of claim **20**, wherein the video encoder is configured to:

include a SEI message other than the decoding unit SEI message in the access unit; and

include a copy of the SEI message in the access unit.

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

decode, from one or more respective decoding unit information supplemental enhancement information (SEI) messages, a unique identifier for each of the one or more decoding units in an access unit, wherein an identifier for one decoding unit is different than an identifier for any other decoding unit in the access unit, wherein each of the one or more decoding units includes a plurality of network abstraction layer (NAL) units, and wherein the unique identifier for each of the one or more decoding units is an index of each of the

one or more decoding units into a list of all decoding units in the access unit in decoding order;

determine, for the one or more decoding units in the access unit, which of the one or more decoding units include which of the plurality of NAL units based on the unique identifier for each of the one or more decoding units in the access unit; and

decode the plurality of NAL units of each of the one or more decoding units in the access unit, based on the determination, to reconstruct at least one picture.

27. The non-transitory computer-readable storage medium of claim **26**,

wherein the instructions that cause the one or more processors to decode the unique identifier comprise instructions that cause the one or more processors to decode a first unique identifier from a first decoding unit information SEI message for a first decoding unit, and decode a second unique identifier from a second decoding unit information SEI message for a second decoding unit, and

wherein the instructions that cause the one or more processors to determine comprise instructions that cause the one or more processors to determine that a first SEI NAL unit that includes the first decoding unit information SEI message and all NAL units that follow the first SEI NAL unit to a second SEI NAL unit that includes the second decoding unit information SEI message are included in the first decoding unit.

28. The non-transitory computer-readable storage medium of claim **26**, further comprising instructions that cause the one or more processors to:

decode a SEI message other than the decoding unit SEI message in the access unit; and

decode a copy of the SEI message in the access unit.

29. A device for decoding video data, the device comprising:

means for decoding, from one or more respective decoding unit information supplemental enhancement information (SEI) messages, a unique identifier for each decoding unit of one or more decoding units in an access unit, wherein an identifier for one decoding unit is different than an identifier for any other decoding unit in the access unit, wherein each of the one or more decoding units includes a plurality of network abstraction layer (NAL) units, and wherein the unique identifier for each of the one or more decoding units is an index of each of the one or more decoding units into a list of all decoding units in the access unit in decoding order;

means for determining, for the one or more decoding units in the access unit, which of the one or more decoding units include which of the plurality of NAL units based on the unique identifier for each of the one or more decoding units in the access unit; and

means for decoding the plurality of NAL units of each of the one or more decoding units in the access unit, based on the determination, to reconstruct at least one picture.

30. The device of claim **29**,

wherein the means for decoding the unique identifier comprises means for decoding a first unique identifier from a first decoding unit information SEI message for a first decoding unit, and means for decoding a second unique identifier from a second decoding unit information SEI message for a second decoding unit, and

wherein the means for determining comprises means for determining that a first SEI NAL unit that includes the first decoding unit information SEI message and all of the NAL units that follow the first SEI NAL unit to a second SEI NAL unit that includes the second decoding unit information SEI message are included in the first decoding unit.

31. The device of claim **29**, further comprising:

means for decoding a SEI message other than the decoding unit SEI message in the access unit; and

means for decoding a copy of the SEI message in the access unit.