CLAIMS

1. A method of multiplexing video data so as to identify a reproduction status of the video data, the method comprising:

encoding pictures forming the video data based on data units having a hierarchical structure;

in response to a transmission request for the encoded data from a decoding apparatus, determining whether the transmission request is according to normal reproduction or is for a random access; and

adding predetermined syntax to transmission unit data to multiplex an intra picture used in the random access and having leading pictures that precede the intra picture in a display order but are encoded after the intra picture in an encoding order, according to a result of the determining, wherein the predetermined syntax indicates which request from among a request via the normal reproduction and a request via the random access is related to the intra picture.

2. The method of claim 1, wherein the transmission unit data is in a network abstraction layer (NAL) unit.

3. The method of claim 2, wherein the predetermined syntax is an identifier (nal unit type) indicating a type of the NAL unit, and an NAL unit that is used to multiplex an intra picture provided according to the request via the normal reproduction has an identifier (nal unit type) different from an identifier (nal unit type) of an NAL unit that is used to multiplex an intra picture provided according to the request via the random access.

4. The method of claim 1, wherein the adding of the predetermined syntax comprises:

adding a picture order count (POC) of a brother picture to the transmission unit data, wherein the brother picture precedes the intra picture in the encoding order and is used as a reference picture of the leading pictures;

obtaining a POC discontinuity counter (PDC) whose count increases whenever

the POC is reset or the intra picture is encoded while pictures before the intra picture are encoded; and

adding the PDC to the transmission unit data.

5. The method of claim 1, wherein the encoding comprises

determining tree-structure encoding units comprising encoding units with encoding depths from among deeper encoding units according to depths which are hierarchically formed according to depths indicating a spatial split count of at least one maximum encoding unit obtained by splitting a picture forming the video data by using a maximum size encoding unit, determining a partition for prediction encoding for each of the encoding units with encoding depths, performing transformation based on hierarchical-structure transformation units, and then determining tree-structure transformation units.

6. An apparatus for multiplexing video data so as to identify a reproduction status of the video data, the apparatus comprising:

a video encoder for encoding pictures forming the video data based on data units having a hierarchical structure;

a reproduction status identifier for, in response to a transmission request for the encoded data from a decoding apparatus, determining whether the transmission request is according to normal reproduction or is for a random access; and

a multiplexer for adding predetermined syntax to transmission unit data to multiplex an intra picture used in the random access and having leading pictures that precede the intra picture in a display order but are encoded after the intra picture in an encoding order, according to a result of the determining, wherein the predetermined syntax indicates which request from among a request via the normal reproduction and a request via the random access is related to the intra picture.

7. A method of de-multiplexing video data so as to identify a reproduction status of the video data, the method comprising:

receiving transmission unit data used to multiplex a bitstream generated by encoding pictures forming the video data based on hierarchical-structure data units;

obtaining predetermined syntax from the transmission unit data to multiplex an intra picture used in a random access and having leading pictures that precede the intra picture in a display order but are encoded after the intra picture in a decoding order, wherein the predetermined syntax indicates whether the intra picture is decoded according to a normal reproduction status or according to a random access status; and

identifying whether the intra picture is reproduced according to normal reproduction or according to a random access, based on the obtained predetermined syntax.

8. The method of claim 7, wherein the transmission unit data is in a network abstraction layer (NAL) unit.

9. The method of claim 8, wherein the predetermined syntax is an identifier (nal unit type) indicating a type of the NAL unit, and an NAL unit that is used to multiplex an intra picture provided according to the normal reproduction has an identifier (nal unit type) different from an identifier (nal unit type) of an NAL unit that is used to multiplex an intra picture provided according to the random access.

10. The method of claim 7, wherein the predetermined syntax comprises a picture order count (POC) of a brother picture that precedes the intra picture in the decoding order and that is used as a reference picture of the leading pictures, and a POC discontinuity counter (PDC) whose count increases whenever the POC is reset or the intra picture is decoded while pictures before the intra picture are decoded.

11. The method of claim 10, wherein the identifying comprises:

increasing the count of the PDC of a decoding apparatus whenever the POC is reset or the intra picture is decoded while the pictures before the intra picture are decoded;

comparing a count of a PDC obtained from the transmission unit data with the count of the PDC of the decoding apparatus; and

determining whether the intra picture is reproduced according to the normal reproduction or according to the random access, based on a result of the comparing.

12. The method of claim 11, wherein, when the count of the PDC obtained from the transmission unit data does not match with the count of the PDC of the decoding apparatus, the determining comprises determining the intra picture as a picture that is reproduced according to the random access.

13. The method of claim 7, when the intra picture is decoded according to the random access, further comprising skipping a process of decoding the leading pictures.

14. The method of claim 7, wherein the bitstream is encoded by determining tree-structure encoding units comprising encoding units with encoding depths from among deeper encoding units according to depths which are hierarchically formed according to depths indicating a spatial split count of at least one maximum encoding unit obtained by splitting a picture forming the video data by using a maximum size encoding unit, determining a partition for prediction encoding for each of the encoding units with encoding depths, performing transformation based on hierarchical-structure transformation units, and then determining tree-structure transformation units.

15. An apparatus for de-multiplexing video data so as to identify a reproduction status of the video data, the apparatus comprising:

an inverse-multiplexer for receiving transmission unit data used to multiplex a bitstream generated by encoding pictures forming the video data based on hierarchical-structure data units, obtaining predetermined syntax from the transmission unit data to multiplex an intra picture used in a random access and having leading pictures that precede the intra picture in a display order but are encoded after the intra picture in a decoding order, wherein the predetermined syntax indicates whether the intra picture is decoded according to a normal reproduction status or according to a random access status; and

a reproduction status identifier for identifying whether the intra picture is reproduced according to normal reproduction or according to a random access, based on the obtained predetermined syntax.

Claims

1. A video decoding apparatus comprising:

an inverse-multiplexer for receiving transmission unit data comprising a header, obtaining type information indicating a type of a current picture included in the transmission unit data from the header, and identifying whether the current picture is a clean random access (CRA) picture for a random access based on the type information; and

a decoder for decoding the CRA picture.