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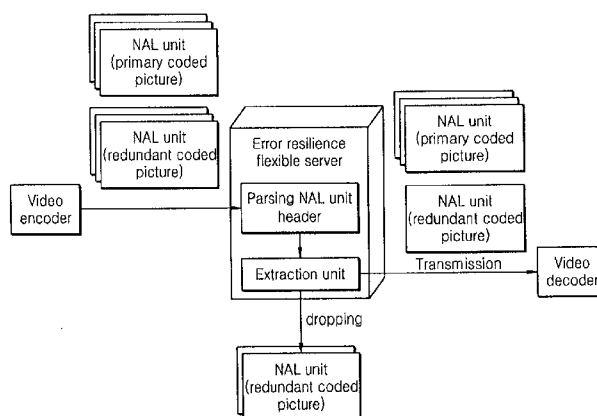
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(54) Title: METHOD DEFINING NAL UNIT TYPE AND SYSTEM OF TRANSMISSION BITSTREAM AND REDUNDANT SLICE CODING



(57) Abstract: With current H.264/AVC, scalable video coding (SVC), and multi-view coding (MVC), a redundant coded slice can be identified by parsing a slice header. However, the parsing of the slice header aggravates the burden on a processor and increases costs. A NAL unit type is used to indicate a redundant coded picture when H.264/AVC, SVC, or MVC does not use a data partition and a NAL unit to be transmitted is the redundant coded picture. A bitstream transmitting apparatus includes: a header parser parsing a header of a NAL unit of a coded bitstream including the header of the NAL unit on which a NAL unit type indicating a redundant coded picture is recorded and determining if the NAL unit is the redundant coded picture; and a transmission determiner, if the header parser determines that the NAL unit is the redundant coded picture, determining whether to transmit the NAL unit to a network according to the status of the network, thereby easily and simply transmitting or dropping the redundant coded slice without parsing a slice header when the bitstream is decoded.

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METHOD DEFINING NAL UNIT TYPE AND SYSTEM OF TRANSMISSION BITSTREAM AND REDUNDANT SLICE CODING

TECHNICAL FIELD

The present invention relates to a method of indicating a network abstraction layer (NAL) unit type and apparatuses for transmitting a bitstream and coding a redundant slice, and more particularly, to a method and apparatus for directly indicating a redundant coded picture in a NAL unit type in order to transmit a bitstream or perform coding using error resilient coding methods such as H.264/AVC, scalable video coding (SVC), and multi-view coding (MVC).

BACKGROUND ART

Currently, error resilient coding methods provide scalable video stream error-resilience aimed at predefined network condition. However, in reality, one error resilient scalable video stream may be transmitted over networks with different packet loss rates (PLRs).

In this case, when bit streams that are strongly protected against errors are transmitted over networks with a lower PLR, video compression efficiency is decreased due to the strong protection.

However, if error protection data can be flexibly changed according to network conditions, a bandwidth used to transmit protection data can be used to transmit the error protection data. In this way, the bandwidth can be reasonably assigned between the error protection data and video data.

With current H.264/AVC, scalable video coding (SVC), and multi-view coding (MVC), the redundant coded slice can be identified by parsing a slice header. However, the parsing of the slice header aggravates the burden on a processor and increases costs.

Considering the current H.264/AVC, SVC, and MVC, as in the sequence parameter set extension RBSP syntax, an auxiliary coded picture is indicated by a syntax element `aux_format_idc`.

When the auxiliary coded picture is used, `nal_unit_type` 19 is used to indicate that the coded slice in a current NAL Unit is a part of one auxiliary coded picture. When the auxiliary coded picture is not used, the NAL Unit that is the `nal_unit_type` 19 does not exist in the bitstream.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a location relationship between a video coding layer (VCL) and a network abstraction layer (NAL) in H/264/AVC according to an embodiment of the present invention;

FIG. 2 is a block diagram of a network intermediate node for regulating error resilience according to an embodiment of the present invention;

FIG. 3 is a block diagram of a bitstream transmission device disposed between an encoder and a decoder according to an embodiment of the present invention;

FIG. 4 is a block diagram of a redundant slice encoding device according to an embodiment of the present invention;

FIG. 5 is a table illustrating changes in syntax of nal_unit-type according to an embodiment of the present invention;

FIG. 6 is a table illustrating changes in syntax of nal_unit-type according to another embodiment of the present invention;

FIG. 7 is a flowchart of a bitstream transmitting method according to an embodiment of the present invention;

FIG. 8 is a flowchart of a coding method according to an embodiment of the present invention; and

FIG. 9 is a flowchart of a coding method based on the status of a network according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Technical Goal of the Invention

The present invention provides a method of indicating a current network abstraction layer (NAL) unit as a redundant coded picture using nal-unit-type 19 when an auxiliary coded picture is not used.

The present invention also provides a codec including an encoder and a decoder for performing redundant slice coding using the method.

The present invention also provides a system for simply parsing a parsing NAL unit header without parsing a slice header in a network node, selecting a redundant coded picture, resiliently transmitting the redundant coded picture, and adjusting error-resilience using the method.

Disclosure of the Invention

According to an aspect of the present invention, there is provided an encoder for coding a redundant slice, comprising: if a predetermined network abstraction layer (NAL) unit of a bitstream is a redundant coded picture, recording a NAL unit type indicating the redundant coded picture on a header of a NAL unit and encoding the bitstream.

According to another aspect of the present invention, there is provided a decoder for coding a redundant slice, comprising: parsing a header of a predetermined NAL unit of a bitstream, determining if a NAL unit type indicating a redundant coded picture exists in the bitstream, and decoding the bitstream.

According to another aspect of the present invention, there is provided a bitstream transmitting apparatus, comprising: a header parser parsing a header of a NAL unit of a coded bitstream including the header of the NAL unit on which a NAL unit type indicating a redundant coded picture is recorded and determining if the NAL unit is the redundant coded picture; and a transmission determiner, wherein if the header parser determines that the NAL unit is the redundant coded picture, the transmission determiner determines whether to transmit the NAL unit according to the status of the network.

According to another aspect of the present invention, there is provided an apparatus for encoding a redundant slice, comprising: an encoder, wherein if a predetermined NAL unit of a bitstream is a redundant coded picture, the encoder records a NAL unit type indicating the redundant coded picture on a header of the NAL unit and encodes the bitstream; a header parser parsing the header of the NAL unit of the encoded bitstream and determining if the NAL unit is the redundant coded picture; and a transmission determiner, wherein if the header parser determines that the NAL unit is the redundant coded picture, the transmission determiner determines whether to transmit the NAL unit according to the status of the network.

Effect of the Invention

The method of indicating a NAL unit type does not increase bits in the current H.264/AVC, scalable video coding (SVC), and multi-view coding (MVC), and does not reduce coding compression efficiency.

When an auxiliary coded picture or data partition is used, current video coding standards remain unchanged.

When the auxiliary coded picture and data partition is not used, a redundant

coded slice non-instantaneous decoder refresh (IDR) picture can be indicated by parsing a header of a NAL unit. In this way, the redundant coded slice can be simply and easily discarded without parsing a slice header, which reduces the burden on a processor and allows efficient use of network resources (bandwidth).

BEST MODE FOR CARRYING OUT THE INVENTION

The network abstraction layer (NAL) unit type is used to indicate a redundant coded picture when H.264/AVC does not use a data partition and a NAL unit to be transmitted is the redundant coded picture.

In scalable video coding or multi-view coding, the redundant coded picture indicates a NAL unit type 19.

An encoder for coding a redundant slice, comprising: if a predetermined network abstraction layer (NAL) unit of a bitstream is a redundant coded picture, recording a NAL unit type indicating the redundant coded picture on a header of a NAL unit and encoding the bitstream.

If scalable video coding (SVC) or multi-view coding (MVC) is applied to the bitstream, a NAL unit type 19 may be recorded on the header of the NAL unit and the bitstream may be encoded.

A decoder for coding a redundant slice, comprising: parsing a header of a predetermined NAL unit of a bitstream, determining if a NAL unit type indicating a redundant coded picture exists in the bitstream, and decoding the bitstream.

If SVC or MVC is applied to the bitstream, it may be determined if a NAL unit type 19 exists in the bitstream and the bitstream may be decoded.

If it is determined that the NAL unit type indicating the redundant coded picture does not exist in the bitstream, the bitstream may be decoded using a primary coded picture, and, if it is determined that the NAL unit type indicating the redundant coded picture exists in the bitstream, the bitstream may be decoded using one of the primary coded picture and the redundant coded picture.

A bitstream transmitting apparatus, comprising: a header parser parsing a header of a NAL unit of a coded bitstream including the header of the NAL unit on which a NAL unit type indicating a redundant coded picture is recorded and determining if the NAL unit is the redundant coded picture; and a transmission determiner, wherein if the header parser determines that the NAL unit is the redundant coded picture, the transmission determiner determines whether to transmit the NAL unit according to the status of the network.

The header parser, when SVC or MVC is applied to the bitstream, may parse the header of the NAL unit of the bitstream, and, if a NAL unit type 19 is included in the bitstream, may determine the NAL unit as the redundant coded picture.

The transmission determiner may transmit or drop the NAL unit according to the status of the network.

The transmission determiner may determine whether to transmit the NAL unit to the network according to a packet-loss rate (PLR), an error occurrence rate, or a bandwidth of the network.

A codec for performing redundant slice coding, comprising: an encoder, wherein if a predetermined NAL unit of a bitstream is a redundant coded picture, the encoder records a NAL unit type indicating the redundant coded picture on a header of the NAL unit and encodes the bitstream; and a decoder parsing a header of a predetermined NAL unit of the bitstream, determining if a NAL unit type indicating the redundant coded picture exists in the bitstream, and decoding the bitstream.

If SVC or MVC is applied to the bitstream, the encoder may record a NAL unit type 19 on the header of the NAL unit and encode the bitstream.

If SVC or MVC is applied to the bitstream, the decoder may determine if a NAL unit type 19 exists in the bitstream and may decode the bitstream.

The decoder, wherein if a NAL unit type indicating the redundant coded picture does not exist in the bitstream, may decode the bitstream using a primary coded picture, and, if the NAL unit type exists in the bitstream, decode the bitstream using one of a primary coded picture and the redundant coded picture.

An apparatus for encoding a redundant slice, comprising: an encoder, wherein if a predetermined NAL unit of a bitstream is a redundant coded picture, the encoder records a NAL unit type indicating the redundant coded picture on a header of the NAL unit and encodes the bitstream; a header parser parsing the header of the NAL unit of the encoded bitstream and determining if the NAL unit is the redundant coded picture; and a transmission determiner, wherein if the header parser determines that the NAL unit is the redundant coded picture, the transmission determiner determines whether to transmit the NAL unit according to the status of the network.

If SVC or MVC is applied to the bitstream, the encoder may record a NAL unit type 19 on the header of the NAL unit and encode the bitstream.

The apparatus may further comprise: a decoder, if SVC or MVC is applied to the bitstream, determining if a NAL unit type 19 exists in the bitstream and decoding

the bitstream.

The transmission determiner may determine whether to transmit the NAL unit to the network according to a PLR, an error occurrence rate, or a bandwidth of the network.

The decoder, wherein if a NAL unit type indicating the redundant coded picture does not exist in the bitstream, may decode the bitstream using a primary coded picture, and, if the NAL unit type exists in the bitstream, decode the bitstream using one of a primary coded picture and the redundant coded picture.

A method of encoding a redundant slice, wherein, if a predetermined NAL unit of a bitstream is a redundant coded picture, a NAL unit type indicating the redundant coded picture is recorded on a header of the NAL unit and the bitstream is encoded.

A method of decoding a redundant slice, comprising: parsing a header of a predetermined NAL unit of a bitstream, determining if a NAL unit type indicating a redundant coded picture exists in the bitstream, and decoding the bitstream.

A bitstream transmitting method, comprising: (a) parsing a header of a NAL unit of a coded bitstream including the header of the NAL unit on which a NAL unit type indicating a redundant coded picture is recorded and determining if the NAL unit is the redundant coded picture; and (b) if the header parser determines that the NAL unit is the redundant coded picture, determining whether to transmit the NAL unit according to the status of the network.

In (a), when SVC or MVC is applied to the bitstream, the header of the NAL unit of the bitstream may be parsed, and, if a NAL unit type 19 is include in the bitstream, the NAL unit may be determined as the redundant coded picture.

In (b), the NAL unit may be transmitted to the network or dropped according to the status of the network.

In (b), it may be determined whether the NAL unit is transmitted to the network according to a PLR, an error occurrence rate, or a bandwidth of the network.

A method of coding a redundant slice, wherein, (a) if a predetermined NAL unit of a bitstream is a redundant coded picture, recording a NAL unit type indicating the redundant coded picture on a header of the NAL unit and encoding the bitstream; and (b) parsing a header of a predetermined NAL unit of a bitstream, determining if a NAL unit type indicating a redundant coded picture exists in the bitstream, and decoding the bitstream.

In (a), if SVC or MVC is applied to the bitstream, a NAL unit type 19 is recorded on the header of the NAL unit and the bitstream is encoded.

In (b), if SVC or MVC is applied to the bitstream, determining if a NAL unit type 19 exists in the bitstream and decoding the bitstream.

In (b), if it is determined that the NAL unit type indicating the redundant coded picture does not exist in the bitstream, the bitstream is decoded using a primary coded picture, and, if it is determined that the NAL unit type indicating the redundant coded picture exists in the bitstream, the bitstream is decoded using one of the primary coded picture and the redundant coded picture.

A method of coding a redundant slice, wherein, (a) if a predetermined NAL unit of a bitstream is a redundant coded picture, recording a NAL unit type indicating the redundant coded picture on a header of the NAL unit and encoding the bitstream; (b) parsing a header of a NAL unit of a coded bitstream including the header of the NAL unit on which a NAL unit type indicating a redundant coded picture is recorded and determining if the NAL unit is the redundant coded picture; (c) if the header parser determines that the NAL unit is the redundant coded picture, determining whether to transmit the NAL unit according to the status of the network; and (d) decoding the bitstream using a primary coded picture included in the NAL unit of the bitstream or the redundant coded picture included in the transmitted NAL unit.

In (a), if SVC or MVC is applied to the bitstream, a NAL unit type 19 is recorded on the header of the NAL unit and the bitstream is encoded.

In (b), if SVC or MVC is applied to the bitstream, determining if a NAL unit type 19 exists in the bitstream and decoding the bitstream.

In (b), it may be determined whether the NAL unit is transmitted to the network according to a PLR, an error occurrence rate, or a bandwidth of the network.

In (d), if it is determined that the NAL unit type indicating the redundant coded picture does not exist in the bitstream, the bitstream is decoded using a primary coded picture, and, if it is determined that the NAL unit type indicating the redundant coded picture exists in the bitstream, the bitstream is decoded using one of the primary coded picture and the redundant coded picture.

EMBODIMENTS

FIG. 1 illustrates a location relationship between a video coding layer (VCL) and a network abstraction layer (NAL) in H.264/AVC according to an embodiment of the present invention. Referring to FIG. 1, H.264/AVC is divided into the VCL, the NAL, and a system.

A primary coded picture is well-known image compression information that influences a decoding process. That is, the primary coded picture is information indispensable to the decoding process.

A redundant coded picture can be understood as a duplicate of the primary coded picture, which is used for error-resilience.

If the primary coded picture loss occurs in an error-prone environment, the image can be restored as the redundant coded picture.

The primary coded picture is basically defined in video standards. The video standards describe how to decode the primary coded picture.

Therefore, a non-error environment does not need the redundant coded picture but requires the primary coded picture. Thus, the video standards describe that the redundant coded picture is not allowed to influence the decoding process.

An auxiliary coded picture is information auxiliary to the primary coded picture. The redundant coded picture is a kind of auxiliary coded picture. The auxiliary coded picture is not indispensable to the decoding process but is additional information used for a predetermined purpose (for example, the redundant coded picture is used in an error prone environment).

In H.264/AVC error resilience tools, redundant slice coding is an effective video communication tool resilient to packet-loss. The redundant slice coding means that slices are made redundant or are coded using different coding parameters. For example, a redundant slice can be coded with higher quantization (QP).

The H.264/AVC defines the NAL disposed between the VCL that performs video coding and the lower system that transmits coded information and stores the information so that the VCL and the NAL are separated from each other.

Parameter sets such as a sequence parameter set (SPS), a picture parameter set (PPS), and supplemental enhancement information (SEI) (additional information for decoding the VCL including timing information on each picture, information on a predetermined access, etc.) that are coding information on a sequence and pictures are separated from fresh information in the VCL.

In addition, mapping of a bitstream of the lower system such as formatting of an H.264/AVC file, a real-time transport protocol (RTP), an MPEG-2 system, etc. are made based on a basic unit of the NAL, [NAL unit]. A header of a NAL unit includes `nal_ref_idc` indicating whether another slice referring to the NAL unit exists and `nal_unit_type` indicating the type of the NAL unit.

The ISO/IEC MEGP part 10 AVC/H.264 standards currently designate a NAL type 19 as a coded slice of an auxiliary coded picture without partitioning slice_layer_without_partitioning_rbsp().

A slice header needs to be parsed in order to determine if a predetermined NAL unit is the redundant coded picture in an H.264/AVC bitstream.

If a network has a high packet-loss rate (PLR) when the H.264/AVC bitstream is transmitted, the redundant coded picture is inserted into the H.264/AVC bitstream, thereby increasing decoding quality in a decoder.

However, the insertion of the redundant coded picture increases a total bit rate, which may deteriorate the average quality of the bitstream. Therefore, it is advantageous that the redundant coded picture is not used in a network having an insignificant PLR.

FIG. 2 is a block diagram of a network intermediate node for regulating error resilience according to an embodiment of the present invention. Referring to FIG. 2, a server which can efficiently regulate an error is assigned to the network intermediate node disposed between an encoder and a decoder. A parsing NAL unit header receives a NAL unit from the encoder, parses the header of the NAL unit, and determines if the NAL unit is a primary coded picture or a redundant coded picture. An extraction unit determines whether the NAL unit, which is determined to be the redundant coded picture, is to be transmitted or dropped according to the status or environment of a network which is transmitted to the decoder.

The network intermediate node can easily and conveniently drop the NAL unit which is determined to be the redundant coded picture. In detail, the redundant coded picture included in a bitstream is transmitted in a network having a high PLR, and dropped in a network having a low PLR, thereby reducing a total bit rate.

FIG. 3 is a block diagram of a bitstream transmission device 310 disposed between an encoder 300 and a decoder 320 according to an embodiment of the present invention. Referring to FIG. 3, the bitstream transmission device 310 includes a header parser 311 and a transmission determiner 312.

The header parser 311 parses a header of a NAL unit of a coded bitstream including the header of the NAL unit on which a NAL unit type indicating a redundant coded picture is recorded and determines if the NAL unit is the redundant coded picture.

When scalable video coding (SVC) or multi-view coding (MVC) is applied to the bitstream, if it is determined that a NAL unit type 19 exists in the bitstream by

parsing the header of the NAL unit of the bitstream, the NAL unit is determined as the redundant coded picture.

If the header parser 311 determines that the NAL unit is the redundant coded picture, the transmission determiner 312 determines whether to transmit or drop the NAL unit according to the status of the network.

FIG. 4 is a block diagram of a redundant slice encoding device according to an embodiment of the present invention. Referring to FIG. 4, the redundant slice encoding device includes an encoder 400, a header parser 410, a transmission determiner 420, and a decoder 430.

If a predetermined NAL unit of a bitstream is a redundant coded picture, the encoder 400 records a NAL unit type indicating the redundant coded picture on a header of the NAL unit and encodes the bitstream.

The header parser 410 parses the header of the NAL unit of the encoded bitstream and determines if the NAL unit is the redundant coded picture.

If the header parser 410 determines that the NAL unit is the redundant coded picture, the transmission determiner 420 determines whether to transmit the NAL unit according to the status of the network.

The decoder 430 decodes the bitstream using a primary coded picture or the redundant coded picture included in the NAL unit transmitted from the transmission determiner 420.

FIG. 5 is a table illustrating changes in syntax of nal_unit-type according to an embodiment of the present invention. Referring to FIG. 5, when it is determined that a coded slice of a NAL unit does not belong to an instantaneous decoder refresh (IDR) picture but instead belongs to a redundant coded picture by the changes in context of nal_unit-type, a header of the NAL unit is only parsed to determine if the coded slice is a nal_unit_type 19.

FIG. 6 is a table illustrating changes in syntax of nal_unit-type according to another embodiment of the present invention. The SVC standards describe that a nal_unit_type 19 indicates that a coded slice of a current NAL unit does not belong to an IDR picture but instead belongs to a redundant coded picture.

In this case, a redundant coded slice has information on temporal_level, dependency_id, and quality_level, which is used to give differential significance to the redundant coded slice.

The information on temporal_level, dependency_id, and quality_level of the current NAL unit can be acquired by only parsing a header of the NAL unit. Referring

to FIG. 6, the redundant coded slice can be selectively dropped according to the environment of a network to which the redundant coded slice is transmitted according to the changes in syntax of nal_unit-type.

FIG. 7 is a flowchart of a bitstream transmitting method according to an embodiment of the present invention. Referring to FIG. 7, a header of a NAL unit of an encoded bitstream including the header of the NAL unit on which the NAL unit type indicating a redundant coded picture is recorded is parsed to determine if the NAL unit is the redundant coded picture (Operation 700).

If the NAL unit is determined to be the redundant coded picture (Operation 710), it is determined whether to transmit the NAL unit according to the status of the network (Operation 720).

FIG. 8 is a flowchart of a coding method according to an embodiment of the present invention. Referring to FIG. 8, if a predetermined NAL unit of a bitstream is a redundant coded picture, a NAL unit type indicating the redundant coded picture is recorded on a header of a NAL unit and the bitstream is encoded (Operation 800).

The header of the NAL unit of the encoded bitstream is parsed to determine if a NAL unit type indicating the redundant coded picture exists in the bitstream (Operation 810).

If it is determined that the NAL unit type indicating the redundant coded picture does not exist in the bitstream, the bitstream is decoded using a primary coded picture (Operation 830). If it is determined that the NAL unit type indicating the redundant coded picture exists in the bitstream, the bitstream is decoded using the primary coded picture or the redundant coded picture (Operation 820).

FIG. 9 is a flowchart of a coding method based on the status of a network according to an embodiment of the present invention. Referring to FIG. 9, if a predetermined NAL unit of a bitstream is a redundant coded picture, a NAL unit type indicating the redundant coded picture is recorded on a header of a NAL unit and the bitstream is encoded (Operation 900).

The header of the NAL unit of the encoded bitstream is parsed to determine if the NAL unit is the redundant coded picture (Operation 910).

If it is determined that the NAL unit is the redundant coded picture, it is determined whether to transmit the NAL unit according to the status of the network (Operation 920). The bitstream is decoded (Operation 940) using one of a primary coded picture and the redundant coded picture, which exist in the transmitted NAL unit (Operation 930).

While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the present invention as defined by the following claims. The preferred embodiments should be considered in a descriptive
5 sense only and not for purposes of limitation. Therefore, the scope of the invention is defined not by the detailed description of the invention but by the appended claims, and all differences within the scope will be construed as being included in the present invention.

CLAIMS

1. An encoder for coding a redundant slice, wherein,
if a predetermined network abstraction layer (NAL) unit of a bitstream is a redundant coded picture, a NAL unit type indicating the redundant coded picture is recorded on a header of a NAL unit and the bitstream is encoded.
2. The encoder of claim 1, wherein, if scalable video coding (SVC) or multi-view coding (MVC) is applied to the bitstream, a NAL unit type 19 is recorded on the header of the NAL unit and the bitstream is encoded.
3. A decoder for coding a redundant slice, comprising:
parsing a header of a predetermined NAL unit of a bitstream, determining if a NAL unit type indicating a redundant coded picture exists in the bitstream, and decoding the bitstream.
4. The decoder of claim 3, wherein, if SVC or MVC is applied to the bitstream, it is determined if a NAL unit type 19 exists in the bitstream and the bitstream is decoded.
5. The decoder of claim 3, wherein if it is determined that the NAL unit type indicating the redundant coded picture does not exist in the bitstream, the bitstream is decoded using a primary coded picture, and, if it is determined that the NAL unit type indicating the redundant coded picture exists in the bitstream, the bitstream is decoded using one of the primary coded picture and the redundant coded picture.
6. A bitstream transmitting apparatus, comprising:
a header parser parsing a header of a NAL unit of a coded bitstream including the header of the NAL unit on which a NAL unit type indicating a redundant coded picture is recorded and determining if the NAL unit is the redundant coded picture;
and
a transmission determiner, wherein if the header parser determines that the NAL unit is the redundant coded picture, the transmission determiner determines whether to transmit the NAL unit according to the status of the network.

7. The apparatus of claim 6, wherein the header parser, when SVC or MVC is applied to the bitstream, parses the header of the NAL unit of the bitstream, and, if a NAL unit type 19 is included in the bitstream, determines the NAL unit as the redundant coded picture.

8. The apparatus of claim 6, wherein the transmission determiner transmits or drops the NAL unit according to the status of the network.

9. The apparatus of claim 6, wherein the transmission determiner determines whether to transmit the NAL unit to the network according to a packet-loss rate (PLR), an error occurrence rate, or a bandwidth of the network.

10. An apparatus for encoding a redundant slice, comprising:
an encoder, wherein if a predetermined NAL unit of a bitstream is a redundant coded picture, the encoder records a NAL unit type indicating the redundant coded picture on a header of the NAL unit and encodes the bitstream;
a header parser parsing the header of the NAL unit of the encoded bitstream and determining if the NAL unit is the redundant coded picture; and
a transmission determiner, wherein if the header parser determines that the NAL unit is the redundant coded picture, the transmission determiner determines whether to transmit the NAL unit according to the status of the network.

11. The apparatus of claim 10, wherein, if SVC or MVC is applied to the bitstream, the encoder records a NAL unit type 19 on the header of the NAL unit and encodes the bitstream.

12. The apparatus of claim 10, wherein the transmission determiner determines whether to transmit the NAL unit to the network according to a PLR, an error occurrence rate, or a bandwidth of the network.

13. The apparatus of claim 10, further comprising:
a decoder, wherein if a NAL unit type indicating the redundant coded picture does not exist in the bitstream, the decoder decodes the bitstream using a primary coded picture, and, if the NAL unit type exists in the bitstream, decodes the bitstream

using one of a primary coded picture and the redundant coded picture.

14. A method of encoding a redundant slice, wherein, if a predetermined NAL unit of a bitstream is a redundant coded picture, a NAL unit type indicating the redundant coded picture is recorded on a header of the NAL unit and the bitstream is encoded.

15. The method of claim 14, wherein, if SVC or MVC is applied to the bitstream, a NAL unit type 19 is recorded on the header of the NAL unit and the bitstream is encoded.

16. A method of decoding a redundant slice, comprising:
parsing a header of a predetermined NAL unit of a bitstream, determining if a NAL unit type indicating a redundant coded picture exists in the bitstream, and decoding the bitstream.

17. The method of claim 16, wherein, if SVC or MVC is applied to the bitstream, determining if a NAL unit type 19 exists in the bitstream and decoding the bitstream.

18. The method of claim 16, wherein if it is determined that the NAL unit type indicating the redundant coded picture does not exist in the bitstream, the bitstream is decoded using a primary coded picture, and, if it is determined that the NAL unit type indicating the redundant coded picture exists in the bitstream, the bitstream is decoded using one of the primary coded picture and the redundant coded picture.

19. A bitstream transmitting method, comprising:
(a) parsing a header of a NAL unit of a coded bitstream including the header of the NAL unit on which a NAL unit type indicating a redundant coded picture is recorded and determining if the NAL unit is the redundant coded picture; and
(b) if the header parser determines that the NAL unit is the redundant coded picture, determining whether to transmit the NAL unit according to the status of the network.

20. The method of claim 19, wherein in (a), when SVC or MVC is applied to the bitstream, the header of the NAL unit of the bitstream is parsed, and, if a NAL unit type 19 is included in the bitstream, the NAL unit is determined as the redundant coded picture.

21. The method of claim 19, wherein in (b), the NAL unit is transmitted to the network or dropped according to the status of the network.

22. The method of claim 19, wherein in (b), it is determined whether the NAL unit is transmitted to the network according to a PLR, an error occurrence rate, or a bandwidth of the network.

FIG. 1

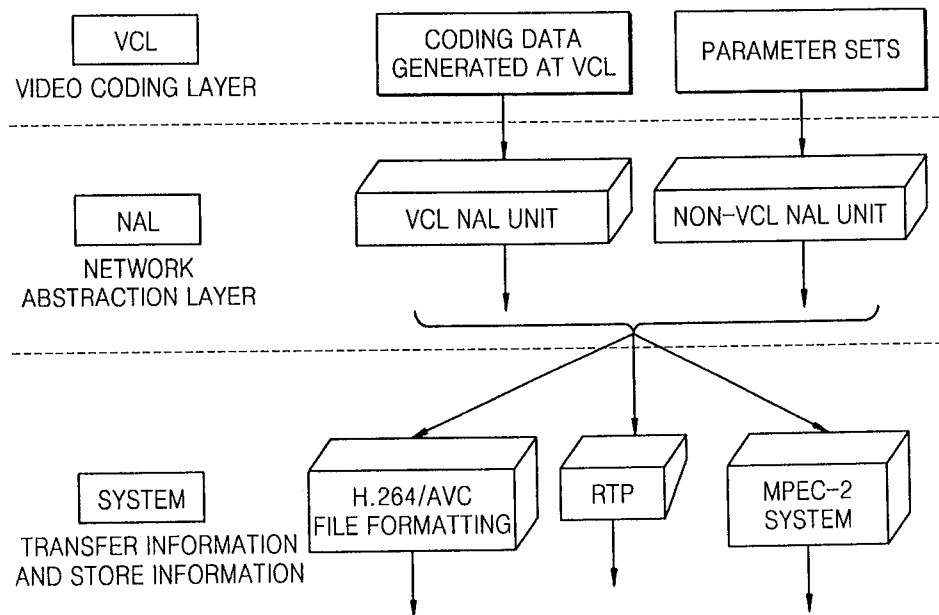


FIG. 2

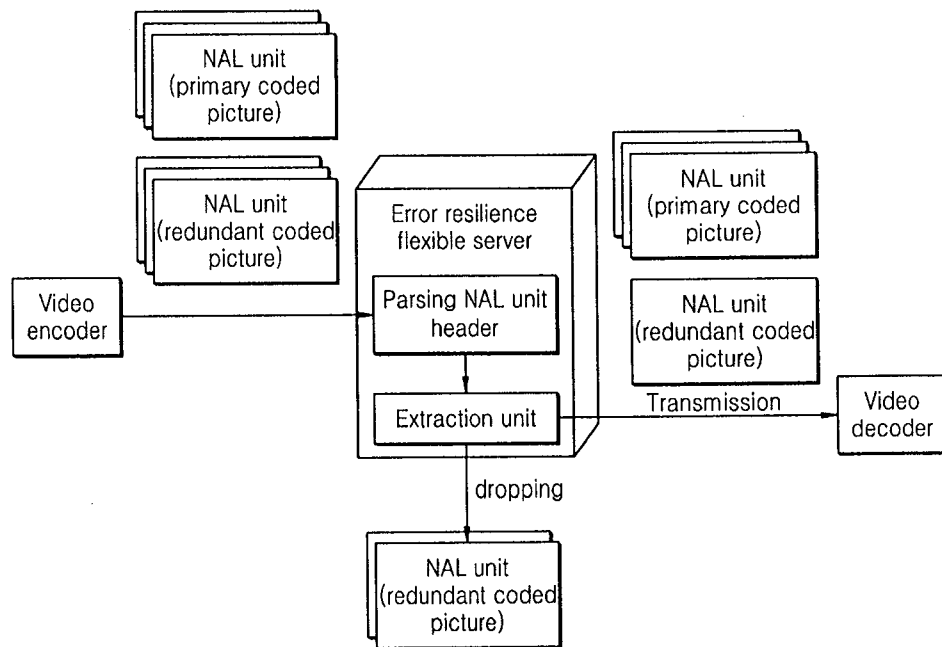


FIG. 3

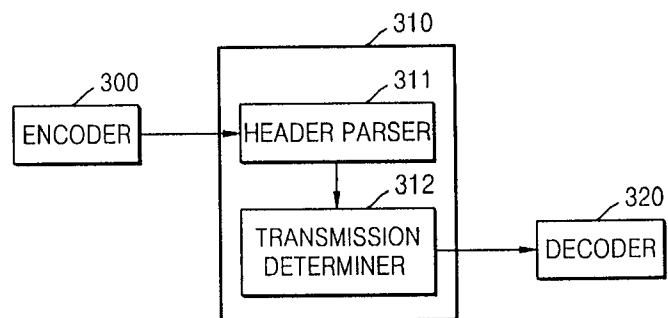


FIG. 4

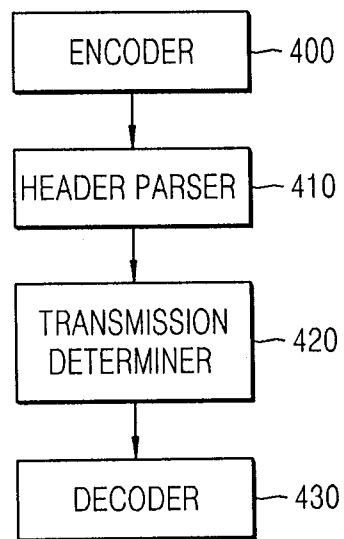


FIG. 5

nal_unit_type	Content of NAL unit and RBSP syntax structure	C
0	Unspecified	
1	Coded slice of a non-IDR picture slice_layer_without_partitioning_rbsp()	2, 3, 4
2	Coded slice data partition A slice_data_partition_a_layer_rbsp()	2
3	Coded slice data partition B slice_data_partition_b_layer_rbsp()	3
4	Coded slice data partition C slice_data_partition_c_layer_rbsp()	4
5	Coded slice of an IDR picture slice_layer_without_partitioning_rbsp()	2, 3
6	Supplemental enhancement information (SEI) sei_rbsp()	5
7	Sequence parameter set seq_parameter_set_rbsp()	0
8	Picture parameter set pic_parameter_set_rbsp()	1
9	Access unit delimiter access_unit_delimiter_rbsp()	6
10	End of sequence end_of_seq_rbsp()	7
11	End of stream end_of_stream_rbsp()	8
12	Filler data filler_data_rbsp()	9
13	Sequence parameter set extension seq_parameter_set_extension_rbsp()	10
14..18	Reserved	
19	Coded slice of an auxiliary coded picture or a non-IDR redundant coded picture in scalable extension without Partitioning slice_layer_without_partitioning_rbsp() or slice_layer_in_scalable_extension_rbsp()	2, 3, 4
20	Coded slice of a non-IDR picture in scalable extension slice_layer_in_scalable_extension_rbsp()	2, 3, 4
21	Coded slice of an IDR picture in scalable extension slice_layer_in_scalable_extension_rbsp()	2, 3
22..23	Reserved	
24..31	Unspecified	

FIG. 6

nal_unit(NumBytesInNALunit) {	C	Descriptor
forbidden_zero_bit	All	f(1)
nal_ref_idc	All	u(2)
nal_unit_type	All	u(5)
nalUnitHeaderBytes = 1		
if(nal_unit_type == 20 nal_unit_type == 21 nal_unit_type == 19) {		
simple_priority_id	All	u(6)
discordable_flag	All	u(1)
extension_flag	All	u(1)
if(extension_flag == 1) {		
temporal_level	All	u(3)
dependency_id	All	u(3)
quality_level	All	u(2)
nalUnitHeaderBytes++		
}		
nalUnitHeaderBytes++		
}		
NumBytesInRBSP = 0		
for(i = nalUnitHeaderBytes; i < NumBytesInNALunit; i++) {		
if(i + 2 < NumBytesInNALunit && next_bits(24) == 0x000003) {		
rbsp_byte[NumBytesInRBSP++]	All	b(8)
rbsp_byte[NumBytesInRBSP++]	All	b(8)
i += 2		
emulation_prevention_three_byte /* equal to 0x03 */	All	f(8)
} else		
rbsp_byte[NumBytesInRBSP++]	All	b(8)
}		
}		

FIG. 7

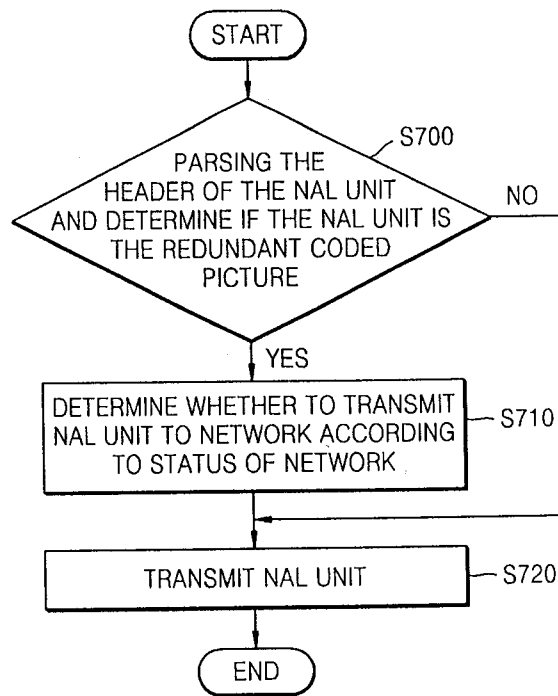


FIG. 8

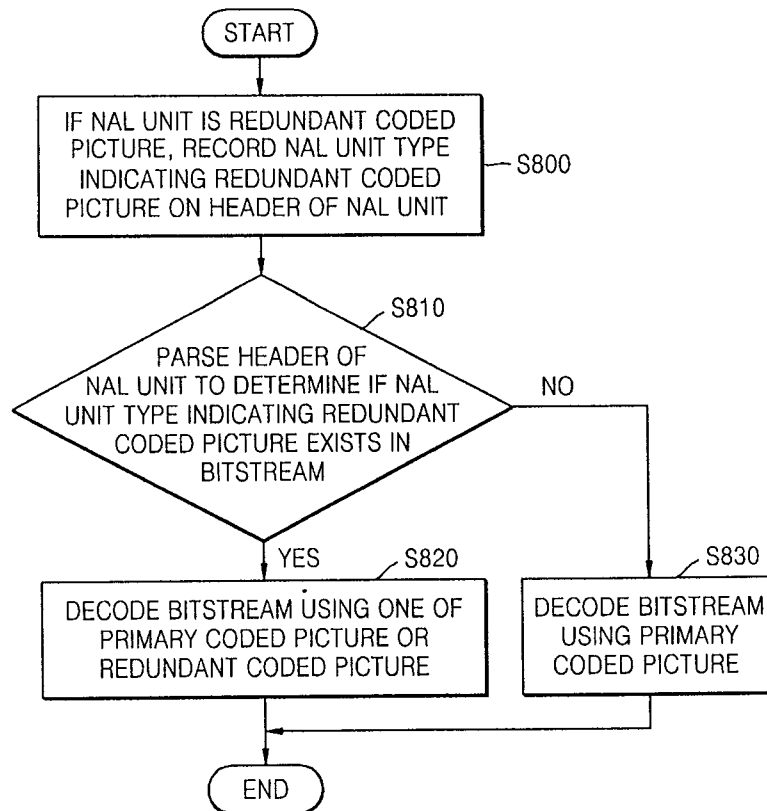
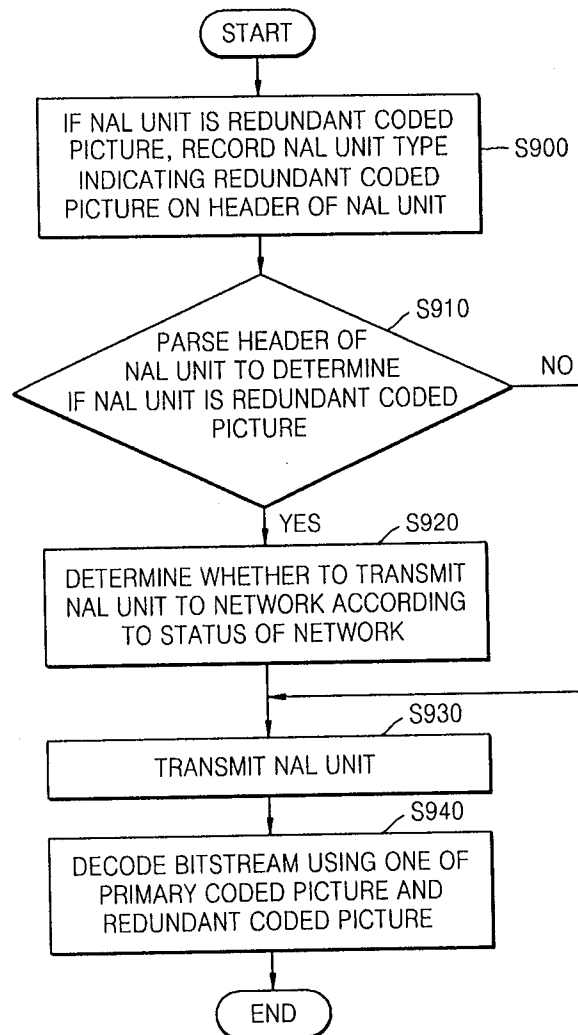


FIG. 9



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2007/000169**A. CLASSIFICATION OF SUBJECT MATTER****H04N 7/64(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC8 H04N7/12 H04N7/64

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO internal), "Keyword: nal, picture, redundant, coding, coded, and similar terms"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2004218669 A1 (NOKIA CORPORATION) 4 Nov. 2004 See the abstract, claims 1-18, columns 7-8	1-22
A	US 2002176025 A1 (CHANG-SU KIM, et al.) 28 Nov. 2002 See the abstract, columns 13-19	1-22

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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Date of the actual completion of the international search

20 APRIL 2007 (20.04.2007)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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