

D E S C R I P T I O N

VIDEO CODING APPARATUS AND
VIDEO DECODING APPARATUS

5

Technical Field

The present invention relates to an information transmission scheme of transmitting a coded video picture/still picture using a cable communication network such as an ISDN (Integrated Services Digital Network) or Internet, or a radio communication network such as a PHS or satellite communication, and a coding/decoding apparatus in an information transmission system adopting this method.

15

Background Art

Recently, with the advance of a digital coding technology and broadband network technology for various kinds of information such as a picture, applications using these technologies have extensively been developed. A system of transmitting a compression-coded picture and the like using a communication network is being developed.

20

For example, a videophone, teleconference system, and digital television broadcast adopt a technique of compressing and coding video pictures and speech into small information amounts, multiplexing the compressed video code stream, speech code stream, and another data code stream into one code stream, and transmitting

25

and/or storing the code stream.

As a video signal compression-coding technique, techniques such as motion compensation, discrete cosine transform (DCT), subband coding, pyramid coding, and
5 variable-length coding, and a scheme using a combination of them are developed. The video coding international standard scheme includes ISO MPEG-1 and MPEG-2, and ITU-T H.261, H.262, and H.263. The international standard scheme of multiplexing data and
10 a code stream prepared by compressing video pictures and speech/audio signals includes an ISO MPEG system, and ITU-T H.221 and H.223.

In a conventional video coding scheme such as this video coding international standard scheme, coding is
15 done in units of GOBs (Group Of Block) or macroblocks prepared by dividing a video signal into frames and dividing each frame into smaller regions. Then, pieces of header information representing a coding mode and the like are added to each frame, GOB, and macroblock.
20 These pieces of header information are necessary to decode all the frames, GOBs, and the like.

If errors are mixed in header information in a transmission line/storage medium, and the header information cannot be normally decoded by a video
25 coding apparatus, all the frames, GOBs, and the like including the header information cannot be normally decoded. The quality of a reconstructed video picture

in the video decoding apparatus greatly degrades.

More specifically, in transmitting a
compression-coded picture using a communication network,
the receiving side must execute decoding processing of
5 reconstructing significant information from a
transmitted "0"/"1" bit stream.

For this purpose, the above-described header
information is very important as information
representing the rule of coding a set of predetermined
10 bit streams. Examples of the header information are
information representing the prediction type of frame
being decoded (whether intraframe coding or interframe
coding), information (time reference) representing the
display timing of the frame, and step size information
15 used in performing quantization.

If these pieces of header information are lost,
information transmitted subsequently cannot be normally
decoded.

For example, assume that an error is mixed in a
20 bit stream owing to any cause, and the bit pattern
changes to represent intraframe coding though the
prediction type of frame is supposed to represent
interframe coding. In this case, even if subsequent
actual information is normally transmitted, the
25 decoding side determines the signal as the result of
intraframe coding, and cannot normally decode the
signal at last.



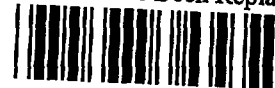
Consequently, the quality of a reconstructed video picture in the video coding apparatus greatly degrades.

Mixture of errors frequently occurs in a system, such as a radio videophone, portable information terminal, or radio digital television receiver, that transmits and/or stores a video picture via a radio transmission line.

The mainstream of conventional picture transmission is a system using a cable communication network. Even in the use of a radio communication network, picture transmission assumes satellite communication whose error rate is very low. The structure of a coded stream to be transmitted does not sufficiently consider the error resilience, and important information such as header information is not satisfactorily protected against the transmission line error.

In a PHS (Portable Handyphone System) expected to become one of the mainstreams of future mobile communication, the error rate is about several hundred thousand to million times that of satellite communication. Therefore, errors cannot be fully corrected only by conventional error correction done for a coded bit stream.

In the Internet expected to become one of the mainstreams of future communication as well as the PHS, time at which an error is mixed and the type of mixed



error are not statistically clarified, and no proper error correction may be done.

However, the conventional construction has problems that the information capable of doubling using HEC includes no information required for coding arbitrary shape picture, and thus when VOP header information is lost by transmission error while the arbitrary shape picture is decoded in units of object, the arbitrary shape picture cannot be correctly decoded.

For this reason, in transmitting a code stream coded using arbitrary shape picture coding, the error resilience of transmission data weakens.

It can be attained by the present invention to make even in an arbitrary shape picture coding to have an error resilience similar to that in a conventional coding method for coding a rectangular picture.

Disclosure of Invention

The first invention provides a video coding apparatus comprising a coder unit for coding an input video picture to obtain a bit stream, an important information constructing unit for extracting, from coded information obtained by the coder unit, important information as information representing a rule of coding a set of predetermined bit streams, thereby constructing the important information, a sync signal generator unit for generating a sync signal, and a bit stream reconstructing unit for adding the sync signal



output from the sync signal generator unit and the important information reconstructed by the important information constructing unit to the bit stream coded by the coder unit, thereby reconstructing the bit stream.

The second invention provides a picture coding apparatus wherein the important information constructing unit in the first invention comprises a conventional picture relating important information constructing unit for constructing, from the coded information, conventional picture relating information as important information in a conventional coding scheme of coding a frame in units of rectangular regions, an arbitrary shape picture relating important information constructing unit for constructing, from the coded information, arbitrary shape picture relating important information as important information in an arbitrary shape coding scheme of coding a picture in the frame in units of arbitrary shape picture regions, an arbitrary shape coding determination unit for determining based on the coded information whether the coded picture is an arbitrary shape picture, a switch unit for outputting the arbitrary shape picture relating important information when the arbitrary shape coding determination unit determines that the coded picture is an arbitrary shape picture, and a multiplexer unit for multiplexing the conventional



picture relating information and an output from the switch unit.

The third invention provides a video decoding apparatus for decoding coded data including a bit stream including sync information that is obtained by coding a video picture, and includes, as header information, important information serving as information representing a rule of coding a set of predetermined bit streams, comprising a demultiplexer unit for demultiplexing an input bit stream into a picture bit stream, a decoder unit for decoding the picture bit stream, a sync signal detector unit for detecting a sync signal from the picture bit stream, and informing the decoder unit of the sync signal, an error check unit for checking presence of an error on the basis of decoded information of the decoder unit, and an important information constructing unit for constructing important information from header information output from the decoder unit, and informing the decoder unit of the important information when the error check unit determines absence of an error.

The fourth invention provides a video decoding apparatus wherein the important information constructing unit in the third invention comprises a conventional picture relating important information constructing unit for constructing conventional picture relating important information from the header



information, an arbitrary shape coding determination unit for determining based on the header information whether a decoded picture is an arbitrary shape picture, an arbitrary shape picture relating important information constructing unit for constructing arbitrary shape picture relating important information from the header information, a first switch unit for inputting the header information to the arbitrary shape picture relating information reconstructing unit when the arbitrary shape coding determination unit determines that the decoded picture is an arbitrary shape picture, and a second switch unit for outputting the arbitrary shape picture relating important information when the arbitrary shape coding determination unit determines that the decoded picture is an arbitrary shape picture.

The fifth invention provides a video decoding apparatus comprising a coder unit for coding an input video picture to obtain a bit stream, an important information constructing unit for extracting, from coded information obtained by the coder unit, important information as information representing a rule of coding a set of predetermined bit streams, thereby constructing the important information, a bit stream divider unit for dividing the bit stream coded by the coder unit, a packet header generator unit for generating a packet header from the important information constructed by the important information



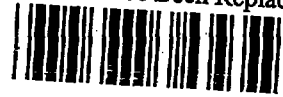
constructing unit, and a packet structure unit for constructing a packet using the bit stream divided by the bit stream divider unit and the packet header generated by the packet header generator unit.

5 The sixth invention provides a video decoding apparatus wherein the important information constructing unit in the fifth invention comprises an arbitrary shape picture relating important information constructing unit for constructing arbitrary shape
10 picture relating important information from the coded information, an expansion header insertion determining unit for determining based on the coded information whether an expansion header holding the arbitrary shape picture relating important information is inserted in
15 the packet header, and a switch unit for inputting the header information to the arbitrary shape picture relating important information when the expansion header insertion determining unit determines that the expansion header is inserted.

20 The seventh invention provides a video decoding apparatus for decoding video picture coded data including a bit stream that is obtained by coding a video picture, and includes, as header information, important information serving as information
25 representing a rule of coding a set of predetermined bit streams, the video decoding apparatus comprising a demultiplexer unit for demultiplexing an input bit

stream into a picture bit stream and packet header
information, a decoder unit for decoding the picture
bit stream, an error check unit for checking presence
of an error on the basis of decoded information of the
5 decoder unit, and an important information constructing
unit for extracting, from the packet header information,
important information serving as information
representing a rule of coding a set of predetermined
bit streams, thereby constructing the important
10 information, and when the error check unit determines
presence of an error, and decoding requires important
information, informing the decoder unit of the
constructed important information.

The eighth invention provides a video decoding
15 apparatus wherein the important information
constructing unit in the seventh invention comprises an
arbitrary shape picture relating important information
constructing unit for constructing arbitrary shape
picture relating important information from the packet
20 header information, an expansion header insertion
determining unit for determining based on the packet
header information whether an expansion header is
inserted in the packet header, and a switch unit for
inputting the packet header information to the
25 arbitrary shape picture relating important information
when the expansion header insertion determining unit
determines that the expansion header is inserted.



According to the present invention, in video coding, a header can be set in coded data. At the same time, an expansion header can be set in the header to include important information in the arbitrary shape picture coding scheme, in addition to important information in the conventional picture coding scheme that is stored in the header. Even if some headers are destroyed, a picture can be decoded at a portion having normal headers. Further, a sync signal inserted in picture data can prevent out-of-synchronization of the video packet VP. The video packet VP is a packet starting from a sync signal RM. Even if an error exists before RM to cause out-of-synchronization, this sync signal RM can establish resynchronization.

Accordingly, the present invention can provide a video coding technique which attains high noise resilience in transmission and can give error resilience equivalent to that of conventional rectangular picture coding to even arbitrary shape picture coding.

Brief Description of Drawings

FIG. 1 is a block diagram showing the basic arrangement of a coder section according to the first embodiment of the present invention;

FIG. 2 is a block diagram showing in detail the basic arrangements of an important information constructing section and bit stream reconstructing



section in the coder section according to the first embodiment of the present invention;

FIG. 3 is a flow chart showing the basic flow of the bit stream reconstructing section according to the first embodiment of the present invention;

FIG. 4 is a view showing the expansion header format of VP according to the first embodiment of the present invention;

FIG. 5 is a block diagram showing the basic arrangement of a decoder section according to the first embodiment of the present invention;

FIG. 6 is a block diagram showing in detail the basic arrangement of an important information constructing section in the decoder section according to the first embodiment of the present invention;

FIG. 7 is a table for explaining a coded word structure used in the present invention;

FIG. 8 is a view showing an example for explaining the effect of variable-length coding;

FIG. 9 is a block diagram showing an arrangement of performing variable-length coding for important information;

FIG. 10 is a block diagram showing the basic arrangement of a coder section according to the second embodiment of the present invention;

FIG. 11 is a block diagram showing the detailed arrangement of an important information constructing



section in the coder section according to the second embodiment of the present invention;

FIG. 12 is a view showing an example of an expansion packet header according to the second embodiment of the present invention;

FIG. 13 is a view showing another example of the expansion packet header (with a marker) according to the second embodiment of the present invention;

FIG. 14 is a block diagram showing the basic arrangement of a decoder section according to the second embodiment of the present invention;

FIG. 15 is a block diagram showing the detailed arrangement of an important information construction section in the decoder section according to the second embodiment of the present invention;

FIG. 16 is a view for explaining coding of an arbitrary shape picture;

FIG. 17 is a view for explaining decoding of an arbitrary shape picture;

FIG. 18 is a view showing the VOP structure of MPEG-4;

FIG. 19 is a view showing the VP structure of MPEG-4;

FIG. 20 is a view showing the VP header format of MPEG-4;

FIG. 21 shows the problem of conventional VP;

FIG. 22 shows the effect of conventional VP;



FIG. 23 shows the effect of VP using HEC;

FIG. 24 is a view showing information necessary for synthesizing and playing back pictures in decoding an arbitrary shape picture;

5 FIG. 25 is a view showing an example of a radio video transmission system adopting a coding/decoding apparatus according to the third embodiment of the present invention;

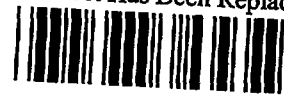
10 FIG. 26 is a block diagram showing a coding apparatus according to the fourth embodiment that corresponds to the coding apparatus according to the first embodiment;

15 FIG. 27 is a block diagram showing a decoding apparatus according to the fourth embodiment that corresponds to the decoding apparatus according to the first embodiment;

20 FIG. 28 is a block diagram showing a decoding apparatus according to the fifth embodiment that corresponds to the coding apparatus according to the second embodiment;

 FIG. 29 is a block diagram showing a decoding apparatus according to the fifth embodiment that corresponds to the decoding apparatus according to the second embodiment; and

25 FIG. 30 is a flowchart of a decoding apparatus according to the third embodiment.



Best Mode for Carrying Out of the Invention

Embodiments of the present invention will be described below with reference to the several views of the accompanying drawing.

5 The embodiments of the present invention will be described below with reference to the several views of the accompanying drawing.

FIG. 1 shows the basic arrangement of a video coding apparatus according to the first embodiment of the present invention. In FIG. 1, the output of a
10 coder section 101 is connected to an important information constructing section 102 and bit stream reconstructing section 104. The output of the important information constructing section 102 is
15 connected to the bit stream reconstructing section 104 together with the output of a sync signal generator section 103. The output of the bit stream reconstructing section 104 is connected to a multiplexer section 105. The output of the multiplexer
20 section 105 is a transmission line 106.

 The coder section 101 codes an input video signal 131 to output it to the bit stream reconstructing section 104, and outputs coded information 133 obtained by coding to the important information constructing
25 section 102. The important information constructing section 102 receives the video signal 131 obtained by coding in the coder section 101, and selects and



outputs only important information 134 necessary for decoding.

5 The sync signal generator section 103 generates a sync signal 135 at an arbitrary interval. The bit stream reconstructing section 104 inserts the sync signal 135 from the sync signal generator section 103 in a bit stream 132. If necessary, the bit stream reconstructing section 104 inserts the important information 134 output from the important information
10 constructing section 102 after the sync signal 135 in accordance with a predetermined format, and outputs the resultant bit stream.

The multiplexer section 105 multiplexes a bit stream 136 reconstructed by the bit stream
15 reconstructing section 104 with another data (e.g., speech data, or bit stream prepared by coding another object) to output a multiplexed bit stream 137 to the transmission line/storage medium 106.

In this arrangement, the input video signal 131 is
20 coded by the coder section 101. The bit stream 132 output from the coder section 101 upon coding is input to the bit stream reconstructing section 104. The coded information 133 obtained by coding in the coder section 101 is input to the important information
25 constructing section 102, which selects and outputs only the important information 134 necessary for decoding.



The bit stream reconstructing section 104 inserts in the bit stream 132 the sync signal 135 output from the sync signal generator section 103 at an arbitrary interval. If necessary, the bit stream reconstructing section 104 inserts the important information 134 output from the important information constructing section 102 after the sync signal 135 in accordance with a predetermined format.

The bit stream 136 reconstructed by the bit stream reconstructing section 104 is input to the multiplexer section 105 where the bit stream 136 is multiplexed with another data (e.g., speech data, or bit stream prepared by coding another object) to output the multiplexed bit stream 137 to the transmission line/storage medium 106.

According to the first embodiment, the sync signal 135 output from the sync signal generator section 103 at an arbitrary interval is inserted in a bit stream obtained by coding a video picture. If necessary, the important information 134 output from the important information constructing section 102 is inserted after the sync signal 135 by the bit stream reconstructing section 104 in accordance with a predetermined format.

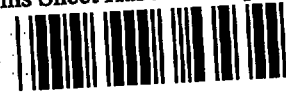
The important information constructing section 102 generates, as the important information 134, information necessary for arbitrary shape picture coding/decoding in MPEG-4, for example in arbitrary



shape picture coding, information about the width VW of the picture size, information about the height VH, information about the x-coordinate VHMSR of the picture position for indicating the display position of a
5 decoded picture, information about the y-coordinate VVMSR, the VOP shape coding type "vop_shape_coding_type (VSCT)" representing the coding mode of shape information, and the flag change_conv_ratio_disable (CCRD) representing whether coding is done after the
10 size of shape information is converted. The pieces of important information are duplicated and inserted in a VP header by the bit stream reconstructing section 104 in accordance with a predetermined format, and then arbitrary shape picture coding can also attain error
15 resilience equivalent to that of rectangular picture coding. Even if some VOP headers or VPs are destructed, a video picture can be decoded.

In MPEG-4, a video object plane "Video Object Plane" corresponds to the frame (FIG. 18). The Video
20 Object Plane (to be referred to as VOP hereinafter) can be divided into a plurality of packets, and each packet is called a video packet "Video Packet" (FIG. 19).

The video packet "Video Packet" (to be referred to as VP hereinafter) is a packet starting from a sync
25 signal (Resync Marker; to be referred to as RM hereinafter). Even if an error exists before RM to cause out-of-synchronization, this sync signal enabled



resynchronization.

Even if, therefore, information is destroyed/lost by an error, subsequent video packets VP could be normally decoded so long as the video packets VP are not a start packet. This is because the start VOP header of the video object plane VOP has been decoded to provide all the pieces of information necessary for decoding (FIG. 20).

As described above, VOP header information includes the coding type (intraframe coding, interframe coding, and the like) of video object plane VOP, the time reference, and the step size. If this information is lost, all the video packets VP could not be decoded (FIGS. 21A and 21B).

In MPEG-4, the header extension code HEC is defined in the header of the video packet VP, and thus thereafter re-describing important information in the VOP header enabled based on the HEC value.

This format is shown in FIGS. 21A and 21B. As shown in FIG. 21A, the video object plane VOP was constructed with a format in which a pattern of a VOP header and subsequent data is set at the start, and a pattern of a video packet VP header and subsequent data is repeated several times.

The header extension code HEC is defined in the VP header, and important information in the VOP header is described again with the HEC value. Unless the video



object plane VOP is destroyed, normal pairs of VP
headers and data could be decoded using information of
the VOP header and data even if one or two pairs of the
headers of video packets VP and subsequent data are
5 destroyed.

In the example of FIGS. 22A and 22B, the header of
the video object plane VOP and its paired data are not
destroyed, but only the header of the first video
packet VP and its paired data are destroyed. In this
10 case, the video object plane VOP and its data are not
destroyed, as shown in FIG. 22B. Thus, the first
region of a picture can be normally decoded. In the
second region, an error occurs to decode a degraded
picture. The third and subsequent regions of the
15 picture are normally decoded. The picture could be
decoded as one which is partially destroyed but almost
completely reconstructed.

In a scheme using no header extension code HEC, if
the VOP header is destroyed, no picture can be decoded
20 regardless of the remaining normal VPs, as shown in
FIG. 22A, and no picture can be obtained under the
influence of the error, as shown in FIG. 22B. Even in
this case, the picture could be reconstructed by the
scheme using the header extension code HEC. That is,
25 in the scheme using the header extension code HEC, when
the header extension code HEC is true, important
information is duplicated after HEC; and when HEC is



false, important information is not duplicated. In using a transmission line whose error rate is high, HEC is set to be true, and important information is duplicated and added after the HEC.

5 Even if an error exists at the start of VOP to fail in decoding, as shown in FIG. 23A, information protected by HEC can be used to decode video packets VP in the second and subsequent regions though the picture of the start region cannot be normally decoded. The
10 picture can be decoded as one which is partially destroyed but almost completely reconstructed can be decoded, as shown in FIG. 23B.

 However, this could only be realized in units of rectangular picture regions. More specifically, VOP
15 header information is duplicated in the VP header using HEC. Even when the VOP header is lost, subsequent data can be normally decoded using the VOP header so long as the VOP header is duplicated in the VP header using HEC. However, information which can be duplicated using HEC
20 does not include any information necessary for arbitrary shape picture coding. Although a conventional rectangular picture can be decoded without any problem, a scheme such as MPEG-4 capable of coding an arbitrary shape picture in units of objects could not
25 decode any picture.

 Arbitrary shape picture coding in units of objects in MPEG-4 uses a larger number of pieces of header



information than in rectangular picture coding. For this reason, it was problems that header information cannot be duplicated.

5 From another viewpoint, as the Internet, intranet, and the like are becoming popular, these networks are often used for communication. Also, Internet videophones and the like are being used. In this case, a video picture is transmitted in real time. However, a video picture transmitted in real time via the
10 Internet, intranet, or the like poses many problems in generally used TCP and UDP protocols. A serious problem is that the header does not have any time information.

To prevent this, an RTP (Real-time Transfer
15 Protocol) recently receives a great deal of attention as a protocol used to transmit video picture/speech data. That is, a protocol such as TCP does not have any time information to each packet, so the receiving side cannot obtain the time when received data is
20 reconstructed. When data is transmitted in units of packets, the receiving side cannot satisfactorily reconstruct video picture data or speech/sound data.

However, RTP adds time information to each packet to allow the receiving side to reconstruct video
25 picture data and speech/sound data based on the time information. In this manner, RTP is suitable for real-time data transmission.



This protocol can define an expansion header for each application.

As described in the prior art, MPEG-4 duplicates VOP header information in a VP header using HEC. Even
5 if the VOP header is lost, subsequent data could be normally decoded using the VOP header as far as the VOP header is duplicated in the VP header using HEC.

However, information which can be duplicated using HEC does not include any information necessary for
10 arbitrary shape picture coding. A conventional rectangular picture can be decoded without any problem. To the contrary, arbitrary shape picture coding uses a larger number of pieces of header information than in rectangular picture coding. Hence, it was serious
15 problems that header information cannot be duplicated.

For example, since the picture size changes in units of VOPs in arbitrary shape picture coding, a width `vop_width` (to be referred to as VW hereinafter) and a height `vop_height` (to be referred to as VH hereinafter) of the picture size are described in
20 the VOP header. Also, an x-coordinate `vop_horizontal_mc_spatial_ref` (to be referred to as VHMSR hereinafter) and a y-coordinate `vop_vertical_mc_spatial_ref` (to be referred to as VMMSR hereinafter) of the picture position for indicating the
25 display position of a decided picture are described. The relationship between these values is shown in



FIG. 24.

When a video picture is to be decoded using only information of the video packet VP without these pieces of information, a picture cannot be normally decoded in arbitrary shape picture coding. In other words, a picture could not be normally decoded in arbitrary shape picture coding without information about the width VW of the picture size, information about the height VH, information about the x-coordinate VHMSR of the picture position for indicating the display position of a decoded picture, and information about the y-coordinate VMSR.

Normally coding a picture also requires a VOP shape coding type "vop_shape_coding_type (to be referred to as VSCT hereinafter) representing the coding mode of shape information, and a flag change_conv_ratio_disable (to be referred to as CCRD hereinafter) representing whether coding is done after the size of shape information is converted.

These pieces of information are not protected in duplication of the VOP header using HEC in MPEG-4.

In this fashion, the system can give error resilience equivalent to that of conventional rectangular picture coding to even arbitrary shape picture coding. The important information constructing section 102 and bit stream reconstructing section 104 as important features of the present invention in the



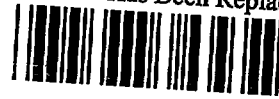
above arrangement will be described in detail with reference to FIG. 2.

The important information constructing section 102 will be explained in detail.

5 As shown in FIG. 2, the important information constructing section 102 is constituted by a conventional picture relating important information constructing section 206, arbitrary shape picture relating important information constructing section 207,
10 arbitrary shape coding determination section 208, and multiplexer section 210.

Of these sections, the conventional picture relating important information constructing section 206 receives the coded information 133 from the coder
15 section 101, selects information (e.g., coding mode and time reference) determined to be important based on the coded information 133 in conventional coding, and outputs the information as conventional picture relating important information 238 to the multiplexer
20 section 210. The arbitrary shape picture relating important information constructing section 207 selects important information (e.g., picture size, position, coding mode, and reduction mode) relating to arbitrary shape picture coding, and outputs the information
25 as arbitrary shape picture relating important information 239.

The arbitrary shape coding determination section



208 determines whether a coded picture is a conventional rectangular picture or arbitrary shape picture, and outputs the determination result as a determination signal 240.

5 A switch section 209 executes switch control of determining based on the determination signal 240 from the arbitrary shape coding determination section 208 whether the arbitrary shape picture relating important information 239 from the conventional picture relating
10 important information constructing section 207 is output to the multiplexer section 210. The multiplexer section 210 multiplexes the conventional picture relating important information 238 from the conventional picture relating important information
15 constructing section 206, and the arbitrary shape picture relating important information 239 output from the arbitrary shape coding determination section 208 in arbitrary shape picture coding, and outputs the multiplexed information as the important
20 information 134.

 In this arrangement, the coded information 133 from the coder section 101 is input to the conventional picture relating important information constructing section 207 as a construction component of the
25 important information constructing section 102. The conventional picture relating important information constructing section 207 selects information (e.g.,



coding mode and time reference) determined to be
important in conventional coding, and outputs the
selected information as the conventional picture
relating important information 238 to the multiplexer
5 section 210. As a result, the conventional picture
relating important information 238 is a set of pieces
of information such as the coding mode and time
reference determined to be important in general coding.

Then, the arbitrary shape picture relating
10 important information constructing section 207 selects
important information (e.g., picture size, position,
coding mode, and reduction mode) relating to arbitrary
shape picture coding, and outputs the selected
information as arbitrary shape picture relating
15 important information 238 to the multiplexer
section 210.

The arbitrary shape coding determination section
208 determines whether a coded picture is a
conventional rectangular picture or arbitrary shape
20 picture, and outputs the determination result as the
determination signal 240. This determination signal
240 controls the switch section 209 which performs
switch control of determining whether the arbitrary
shape picture relating important information 239 from
25 the conventional picture relating important information
constructing section 207 is output.

The multiplexer section 210 multiplexes the



conventional picture relating important information 238
and arbitrary shape picture relating important
information 239 in arbitrary shape picture coding, and
outputs the multiplexed information as the important
5 information 134.

As a result, the conventional picture relating
important information 238 and arbitrary shape picture
relating important information 239 in arbitrary shape
picture coding can be output as the multiplexed
10 important information 134 from the multiplexer section
210. In conventional picture coding, only the
conventional picture relating important information 238
can be output as the important information 134.

The bit stream reconstructing section 104 will be
15 described in detail. As shown in the upper half of
FIG. 2, the bit stream reconstructing section 104 is
comprised of an MB boundary determination section 201,
counter 202, sync signal inserting determination
section 203, header information inserting section 205,
20 and adder section 206.

Of these sections, the MB boundary determination
section 201 determines for the bit stream 132 input
after being coded by the coder section 101 whether data
of the bit stream corresponds to the boundary of a
25 macroblock MB. The number-of-coded-bits counter
section 202 counts the number of coded bits of the bit
stream 132 input after being coded by the preceding



coder section 101.

When the MB boundary determination section 201 determines that the bit stream 132 corresponds to an MB boundary, and the count value of the number-of-
5 coded-bits counter section 202 for the bit stream 132 exceeds a given value, the sync signal inserting determination section 203 outputs an insertion permission signal 234.

The header information inserting section 205
10 prepares header information from the input important information 134 and sync signal 135. When the sync signal inserting determination section 203 determines that insertion is permitted, the header information inserting section 205 outputs header information 237
15 prepared for the coded bit stream 132 to the adder section 206.

The adder section 206 adds the bit stream 132 input after being coded by the coder section 101 to an output from the header information inserting section
20 205, and outputs the sum as the reconstructed bit stream 136 of the bit stream reconstructing section 104.

When the bit stream reconstructing section 104 having this arrangement receives the bit stream 132 coded by the coder section 101, the section 104 inputs
25 the bit stream 132 to the MB boundary determination section 201 and number-of-coded-bits counter section 202 as construction components of the bit stream



reconstructing section 104. The MB boundary determination section 201 determines whether the input bit stream 132 corresponds to an MB boundary.

5 The number-of-coded-bits counter section 202 counts the number of coded bits of the bit stream 132. When the MB boundary determination section 201 determines that the bit stream 132 corresponds to an MB boundary, and the number of coded bits counted by the counter 202 exceeds a given value, the sync signal
10 inserting determination section 203 generates the insertion permission signal 234 to output it to the header information inserting section 205.

 The header information inserting section 205 prepares header information from the input important
15 information 134 and sync signal 135, and outputs the prepared header information 237 to the adder section 206 in order to add the header information 237 to the coded bit stream 132. The adder section 206 inserts
20 the header information 237 in the coded bit stream 132 to output the reconstructed bit stream 136. This bit stream 136 is output from the bit stream reconstructing section 104.

 As a result, the insertion permission signal 234 is generated if the number of coded bits exceeds a
25 predetermined value when the bit stream 132 of picture data input after being coded by the coder section is examined to find that a bit at the boundary position of



the macroblock MB is input. Header information prepared by the header information inserting section 205 based on the input important information 134 and sync signal 135 can be added to the bit stream 132.

5 In the important information constructing section 102, the conventional picture relating important information constructing section 206 as one construction component selects information (e.g., coding mode and time reference) determined to be
10 important in conventional coding based on the coded information 133 from the coder section 101, and outputs the selected information as the conventional picture relating important information 238. The arbitrary shape picture relating important information
15 constructing section 207 as one construction component of the important information constructing section 102 selects important information (e.g., picture size, position, coding mode, and reduction mode) relating to arbitrary shape picture coding, and outputs the
20 selected information as the arbitrary shape picture relating important information 239. Only the conventional picture relating important information 238 is obtained for a conventional picture, whereas the conventional picture relating important information 238
25 and arbitrary shape picture relating important information 239 are multiplexed in coding an arbitrary shape picture. Therefore, header information inserted



in a bit stream can include conventional picture relating important information and arbitrary shape picture relating important information. The VP header can include information necessary to play back the picture of MPEG-4 coded data.

FIG. 3 is a flow chart showing preparation of header information.

As the first step (step S502), the bit stream reconstructing section 104 determines whether a bit stream input from the coder section 101 corresponds to the boundary position of MB (MacroBlock).

If Y in step S502, whether a sync signal RM is to be inserted is determined as the second step (step S503). This determination can be done based on an arbitrary algorithm of the user.

For example, various methods can be adopted: an algorithm of inserting the sync signal RM when the number of bits after a preceding sync signal exceeds a predetermined value, or an algorithm of determining whether RM is inserted along a picture configuration when the number of MBs after a preceding sync signal exceeds a predetermined value.

The video packet VP starts from the sync signal RM. Even if an error exists before the sync signal RM to cause out-of-synchronization, this sync signal RM can establish resynchronization.

If Y in step S503, RM is inserted, and a VP header



subsequent to RM is inserted (step S504 in FIG. 3).

Then, the flow advances to step S505.

In the third step (step S505), whether important information of the VOP header is duplicated as an expansion header is determined.

If Y in step S505, HEC is true, and important information in rectangular picture coding is selected and output from the VOP header (step S506 in FIG. 3). The flow shifts to step S507.

In the last fourth step (step S507), whether the picture is an arbitrary shape picture is determined. If Y in step S507, important information in arbitrary shape picture coding within the VOP header is selected and output (step S508 in FIG. 3).

The VP header is generated through the four steps, and inserted in a bit stream.

FIG. 4 shows a structure of a VP header in an arbitrary shape picture. An expansion header Ex-Header is added to the conventional VP header shown in FIG. 20.

This expansion header Ex-Header additionally includes important information in arbitrary shape picture coding, i.e., the width (VW) and height (VH) of a picture, an x-coordinate (VHMSR) and y-coordinate (VVMRS) at which the picture is pasted, a flag (CCRD) representing whether shape information is reduced and coded, and information (VSCT) about the coding type (intraframe coding, interframe coding, or the like) of picture



information.

Note that important information in arbitrary shape picture coding is not limited to the above information. Depending on an application purpose, another
5 information can be added, or information can be reduced. However, the transmitting and receiving sides must have consensus on the header format.

The video coding apparatus comprises the function of extracting important information in arbitrary shape
10 picture coding, the function of determining whether an arbitrary shape picture is used, and the function of detecting the boundary of a macroblock. The VP header includes an expansion header which includes a sync signal in addition to important information in
15 conventional picture coding, and important information for arbitrary shape picture coding in arbitrary shape picture coding. Even if some headers are destroyed, a picture can be decoded at a portion having normal headers. Further, the sync signal prevents
20 out-of-synchronization of the video packet VP. That is, even if the video packet VP starting from the sync signal RM has an error before the sync signal RM to cause out-of-synchronization, the sync signal RM can establish resynchronization.

25 Accordingly, the first embodiment can provide a video coding technique which attains high noise resilience in transmission and can give error



resilience equivalent to that of conventional rectangular picture coding to even arbitrary shape picture coding.

5 The arrangement and processing on the coding side has been explained in detail. Next, the arrangement and processing on the decoding side will be explained in detail.

10 The decoder section will be described. In the decoder section according to the first embodiment shown in FIG. 5, the output of a demultiplexer section 302 is connected to a decoder section 303 and sync detector section 304. The output of the sync detector section 304 is connected to the other input of the decoder section 303. The output of the decoder section 303 is
15 connected to an error check section 305. The output of the error check section 305 is connected to the output of the decoder section 303 and an important information constructing section 306. The output of the important information constructing section 306 is connected to
20 the decoder section 303.

The demultiplexer section 302 demultiplexes a bit stream 331 received from the transmission line/storage medium 106 into a picture bit stream 332 and another data. The sync detector section 304 detects the sync
25 signal RM from the bit stream 332 output from the demultiplexer section 302. The decoder section 303 decodes the picture bit stream 332 output after being



demultiplexed by the demultiplexer section 302, and
generates picture data. At this time, the decoder
section 303 executes decoding processing in synchronism
with a sync signal detected by the sync detector
5 section 304.

The important information constructing section 306
obtains data being decoded by the decoder section 303.
If VOP (Video Object Plane) being decoded by the
decoder section 303 includes a VOP header, the
10 important information constructing section 306 extracts
information of the VOP header, and outputs it to the
decoder section 303.

The error check section 305 checks decoded
information 334 output from the decoder section 303 to
15 detect whether an error occurs during decoding
operation. If an error is detected, the error check
section 305 informs the important information
constructing section 306 of generation of the error in
decoding processing so as to stop outputting important
20 information to the decoder section 303.

If an error occurs, the decoder section 303
performs processing corresponding to the error. After
processing corresponding to the error, the decoder
section 303 performs decoding operation from the
25 position of a next sync signal detected by the sync
detector section 304.

In this arrangement, the bit stream 331 received



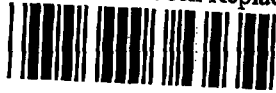
from the transmission line/storage medium 106 is demultiplexed into the picture bit stream 332 and another data by the demultiplexer section 302. This another data is transmitted to a corresponding decoder section.

The picture bit stream 332 demultiplexed by the demultiplexer section 302 is input to the decoder section 303 where the bit stream 332 is decoded. During decoding processing, a sync signal is detected from the bit stream 332 by the sync signal detector section 304.

The error check section 305 checks whether an error occurs during decoding operation, from the decoded information 334 obtained by decoding processing of the decoder section 303. If an error is detected, processing corresponding to the error is executed by the decoder section 303, and decoding operation is done at the position of a next sync signal detected by the sync detector section 304.

The decoder section 303 determines the type of next sync signal. If the signal is the sync signal RM, and an error signal 335 is true, the decoder section 303 obtains VOP header information 343 from the important information constructing section 306.

When a VOP header exists in VOP (Video Object Plane) being decoded by the decoder section 303, the important information constructing section 306 outputs



information of the VOP header; and when no VOP header exists in VOP being decoded, the important information constructing section 306 outputs important information so long as the important information is inserted by HEC within the VP header.

Decoding processing in the decoder section 303 uses important information obtained by the important information constructing section 306. If a VOP header exists in VOP (Video Object Plane) being decoded by the decoder section 303 in the important information obtained by the important information constructing section 306, the information of the VOP header is output; and if no VOP header exists in VOP being decoded, important information is output as far as the important information is inserted by HEC within the VP header. On the coding side, important information includes not only important information in conventional picture coding but also important information in arbitrary shape picture coding. Even if some headers are destroyed, a picture can be decoded from data having normal headers regardless of whether the data is obtained by coding a conventional picture or arbitrary shape picture. Further, the sync signal prevents out-of-synchronization of the video packet VP. That is, even if the video packet VP starting from the sync signal RM has an error before the sync signal RM to cause out-of-synchronization, the sync signal RM can



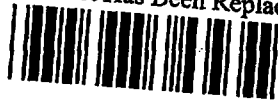
establish resynchronization.

Accordingly, the first embodiment can provide the decoding technique of a video coding technique which attains high noise resilience in transmission and can
5 give error resilience equivalent to that of conventional rectangular picture coding to even arbitrary shape picture coding.

According to this technique, the noise resilience in transmission is attained by transmitting, as header
10 information, not only important information in conventional picture coding but also important information for arbitrary shape picture coding in arbitrary shape picture coding. On the receiving side, it is important how to extract the important
15 information, transmit it to the decoder section 303, and use the important information for decoding processing.

The feature of the first embodiment is, therefore, the important information constructing section 306.
20 The important information constructing section 306 will be described in detail with reference to FIG. 6.

As shown in FIG. 6, the important information constructing section 306 comprises a conventional picture relating important information constructing
25 section 307, arbitrary shape coding determination section 308, switch sections 309 and 311, and arbitrary shape picture relating important information

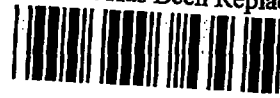


constructing section 310.

When a VP header is detected in the decoder section 303, the conventional picture relating important information constructing section 307 decodes coding mode information, time reference, and the like in information of the VP header, and outputs the decoded information.

The arbitrary shape coding determination section 308 determines whether a picture being decoded by the decoder section 303 is an arbitrary shape picture or conventional rectangular picture. The switch sections 309 and 311 are switched in accordance with the determination result. The switch sections 309 and 311 are system switches for two sections.

The arbitrary shape picture relating important information constructing section 310 decodes important information (e.g., picture size and picture position) relating to an arbitrary shape picture. For an arbitrary shape picture, the switch sections 309 and 311 are switched to be connected to the arbitrary shape picture relating important information constructing section 310. Then, important information relating to the arbitrary shape picture is reconstructed, and supplied to the decoder section 303 in addition to important information relating to a conventional picture from the conventional picture relating important information constructing section 307. Thus,



the decoder section 303 can also decode the arbitrary shape picture.

5 In the important information constructing section 306 having this arrangement, when the decoder section 303 detects a VP header in an input bit stream, the conventional picture relating important information constructing section 307 decodes coding mode information, time reference, and the like.

10 The arbitrary shape coding determination section 308 determines whether a picture being decoded by the decoder section 303 is an arbitrary shape picture or conventional rectangular picture, and generates a control signal corresponding to the determination result.

15 The control signal from the arbitrary shape coding determination section 308 controls the switch sections 309 and 311. For an arbitrary shape picture, the arbitrary shape picture relating important information constructing section 310 decodes important information (e.g., picture size and picture position) relating to
20 the arbitrary shape picture, prepares the final important information 343, and supplies it to the decoder section 303 as an output from the important information constructing section 306. As far as an
25 expansion header is set in a header, and includes important information relating to an arbitrary shape picture, the decoding side can extract the important



information to supply the important information necessary for decoding the arbitrary shape picture to the decoder section 303.

5 In this manner, the first embodiment can give error resilience equivalent to that of conventional rectangular picture coding to even arbitrary shape picture coding.

10 In the first embodiment and the second embodiment (to be described later), "picture size" and "position information" must be described in arbitrary shape picture coding. Each of these pieces of information is expressed by 13 bits in MPEG-4, each of "picture size" and "position information" requires horizontal
15 13 bits = 52 bits are required. These bits may be large redundant data in transmission at a low bit rate. For this reason, the data is transmitted after being compressed as much as possible. This method will be described.

20 The size of the video object plane VOP or the like is expressed by 13 bits in MPEG-4. In many cases, however, all the 13 bits are not used. From this, a method of expressing the size by a variable length and decreasing the number of bits will be considered.

25 Basically, the size is expressed by a pair of "coded word length" + "value". As shown in FIG. 7, a header portion representing the code length and a

subsequent data portion are combined. More specifically, a header "header 1" and header "header 2" are used. The former is made of 1 bit, whereas the latter is made of 3 bits. The value ranges from 1 to 542. The coded word length is made of 5 bits for the values "1" and "2", 6 bits for the values "3" to "6", and 7 bits for the values "7" to "14". The coded word length is made of 8 bits for the values "15" to "30", 9 bits for the values "31" to "94", and 10 bits for the values "95" to "158". The coded word length is made of 11 bits for the values "159" to "286", and 12 bits for the values "287" to "542". From the values "543" to "8222", the header "header 1" is made of 1 bit, whereas the header "header 2" is made of 2 bits. The coded word length is made of 12 bits for the values "543" to "1054", 13 bits for the values "1055" to "2078", 14 bits for the values "2079" to "4126", and 15 bits for the values "4127" to "8222".

With this setting, the word length is not fixed to 13 bits, but can change from 5 bits to 15 bits depending on the numerical value. As a result, the number of bits even including the header can be decreased to 18 bits at maximum, which is smaller by 34 bits than the conventional 52 bits.

In general, a small picture often requires coding at a low bit rate. A large picture, which has a large-size bit stream, often has a margin at a high bit

rate. Also in this sense, it is effective to set a variable code length and assign a short code to a small size.

For example, when a presentation layer
 5 "Presentation Layer" is a QCIF (176 pixels × 144 pixels) picture, the maximum VW and VH are

$$11 \text{ [bits]} \times 2 = 22 \text{ [bits]}$$

The maximum position information (VHMSR and VVMSR) is

$$11 \text{ [bits]} \times 2 = 22 \text{ [bits]}$$

10 The sum of them is 44 [bits], and thus data can be compressed by 8 [bits].

Moreover, in a picture structure as shown in FIG. 8,

$$\text{VW} = 128 \text{ pixels} = 10 \text{ [bits]}$$

15 $\text{VH} = 80 \text{ pixels} = 9 \text{ [bits]}$

$$\text{VHMSR} = 32 \text{ pixels} = 9 \text{ [bits]}$$

$$\text{VVMSR} = 20 \text{ pixels} = 8 \text{ [bits]}$$

The sum of them is

$$10 + 9 + 8 + 9 = 36 \text{ [bits]}$$

20 Consequently, 16 [bits] can be reduced.

FIG. 9 shows the basic arrangement of a modification to the first embodiment. In FIG. 9, reference numeral 1001 denotes a variable-length coder section; and 1002, a variable-length code generator section.
 25 The variable-length code generator section 1002 receives size information to convert it into a coded word. The variable-length coder section 1001

reads size information from input important information 1031 to output size information 1032 to the variable-length code generator section 1002. At the same time, the variable-length coder section 1001
5 outputs a coded word 1033 obtained by the variable-length code generator section 1002 as a coded word 1034.

When important information 1031 is input in this arrangement, it is input to the variable-length coder
10 section 1001. The variable-length coder section 1001 reads size information from the input important information 1031 to send the size information 1032 to the variable-length code generator section 1002 which generates the coded word 1033.

15 The variable-length coder section 1001 outputs the coded word 1034 obtained by performing size information conversion to the coded word 1033 received from the variable-length code generator section 1002.

The first embodiment has exemplified MPEG-4.
20 However, as for transmission of arbitrary shape coding other than MPEG-4, the error resilience can be improved by adding similar information.

Another embodiment will be described as the second embodiment.

25 FIG. 10 is a block diagram showing the basic arrangement of a video coding apparatus according to the second embodiment of the present invention. In the

video coding apparatus according shown in FIG. 10, the output of a coder section 601 is connected to a bit stream divider section 602 and important information constructing section 603. The output of the important information constructing section 603 is connected to a packet header generator section 604. The outputs of the bit stream divider section 602 and packet header generator section are connected to a packet structure section 605. The output of the packet structure section 605 is connected to a transmission line 106.

The coder section 601 codes an input video signal 131 to output it to the bit stream divider section 602, and outputs coded information 634 obtained by coding to the important information constructing section 102.

The important information constructing section 102 receives the coded information 634 obtained by coding by the coder section 101, and selects and outputs only important information 635 necessary for decoding. In particular, the important information constructing section 102 acquires, as the important information 635, not only conventional picture relating important information but also arbitrary shape picture relating important information such as information necessary for arbitrary shape picture coding/decoding in MPEG-4, e.g., in arbitrary shape picture coding, information about the width VW of the picture size, information about the height VH, information about the x-coordinate VHMSR of

the picture position for indicating the display position of a decoded picture, information about the y-coordinate VVMSR, VOP shape coding type "vop_shape_coding_type (VSCT)" representing the coding mode of shape information, and a flag change_conv_ratio_disable (CCRD) representing whether coding is done after the size of shape information is converted. The important information 635 is output to the packet header generator section 604. The packet header generator section 604 reflects conventional picture relating important information on a packet header in a general manner. As for arbitrary shape picture relating important information, the packet header generator section 604 generates a packet header in a unique format to the present invention which is reflected with a predetermined format in an expansion header newly set in the packet header.

The packet header generator section 604 inserts the important information 635 in the packet header to form a packet header 636, and outputs the packet header 636 to the packet structure section 605. The bit stream divider section 602 divides a bit stream 632 output from the coder section 601 into packets, and outputs them.

The packet structure section 605 multiplexes a divided bit stream 633 output from the bit stream divider section 602, and the packet header 636 output

from the packet header generator section 604, and outputs obtained multiplexed data 637 to the transmission line/storage medium 106.

5 In this arrangement, the video signal 131 of an input video picture is coded by the coder section 601. Then, the coder section 601 outputs the coded information 634 obtained by coding to the important information constructing section 603. The important information constructing section 603 selects only the
10 important information 635 necessary for decoding from the input coded information 634, and outputs the important information 635. In the packet header generator section 604, the important information 635 is inserted in a packet header, and output as the packet
15 header 636.

The bit stream divider section 602 divides the bit stream 632 output from the coder section 601 into packets. The packet structure section 605 multiplexes the divided bit stream 633 output from the bit stream
20 divider section 602, and the packet header 636 output from the packet header generator section 604, and outputs the multiplexed data 637 to the transmission line/storage medium 106.

25 According to the second embodiment, the important information 635 output from the bit stream divider section 602 is inserted by the packet header generator section 604 with a predetermined format in the header

of a bit stream obtained by coding a video picture.
The important information 635 is added to coded data of
the video picture, packeted, and transmitted.

5 The packet header has an expansion header which is
used to store and transmit important information other
than conventional picture relating important
information.

10 As important information other than conventional
picture relating important information, the important
information 635 includes information necessary for
arbitrary shape picture coding/decoding in MPEG-4, e.g.,
in arbitrary shape picture coding, information about
the width VW of the picture size, information about the
height VH, information about the x-coordinate VHMSR of
15 the picture position for indicating the display
position of a decoded picture, information about
the y-coordinate VVMSR, VOP shape coding type
"vop_shape_coding_type (VSCT)" representing the
coding mode of shape information, and a flag
20 change_conv_ratio_disable (CCRD) representing whether
coding is done after the size of shape information is
converted. This important information 635 is inserted
as an expansion header in a packet header with a
predetermined format by the packet header generator
25 section 604. If the decoder is constituted to execute
decoding processing using information extracted from
the expansion header of the packet, the decoder can

reconstruct an arbitrary shape picture in units of packets. Even arbitrary shape picture coding can attain error resilience equivalent to that of conventional rectangular picture coding. Even if some
5 VOP headers or VPs are destroyed, a video picture can be decoded.

In this fashion, this system can give error resilience equivalent to that of conventional rectangular picture coding even to arbitrary shape
10 picture coding. The important information constructing section 60 as the important component of the present invention in the above arrangement will be described in detail with reference to FIG. 11.

FIG. 11 is a block diagram showing the important
15 information constructing section 603. The important information constructing section 603 is an important point in the second embodiment. As shown in FIG. 11, the important information constructing section 603 comprises a switch section 2201, expansion header
20 insertion determining section 2202, and arbitrary shape picture relating important information constructing section 2203.

The expansion header insertion determining section 2202 determines whether an expansion header is added to
25 a packet header. The expansion header insertion determining section 2202 determines based on the coded information 634 input from the coder section 601

whether the coder section 601 executes arbitrary shape picture coding. If the coder section 601 executes arbitrary shape picture coding, the expansion header insertion determining section 2202 adds an expansion header to a packet header.

The switch section 2201 is a section opening/closing switch. When the expansion header insertion determining section 2202 determines to add an expansion header to a packet header, the switch section 2201 closes a section to input the coded information 634 from the coder section 601 to the arbitrary shape picture relating important information constructing section 2203 in accordance with a control signal output from the expansion header insertion determining section 2202.

The arbitrary shape picture relating important information constructing section 2203 receives as input coded information 2233 the coded information 634 input via the switch section 2201. Based on the coded information 634, the arbitrary shape picture relating important information constructing section 2203 selects VOP header information relating to arbitrary shape coding, and outputs it as the important information 635.

In this arrangement, the expansion header insertion determining section 2202 determines whether an expansion header is added to a packet header, on the basis of the coded information 634 input from the coder

section 601 to the important information constructing section 603. If the expansion header insertion determining section 2202 determines that an expansion header is added to a packet header, the switch section 5 2201 inputs the input coded information 2233 to the arbitrary shape picture relating important information constructing section 2203. The arbitrary shape picture relating important information constructing section 2203 selects VOP header information relating to 10 arbitrary shape coding from the input coded information 2233, and outputs the important information 635.

Insertion of important information in a packet header will be explained in detail below.

Compared to rectangular picture coding, arbitrary 15 shape picture coding requires the picture width (VW) and height (VH), the x-coordinate (VHMSR) and y-coordinate (VMSR) for arranging a picture, a flag (CCRD) representing whether shape information is reduced and coded, and a shape information coding mode 20 (VSCT). In addition, the important information may include information such as a flag (VCA) and value (VCAV) for keeping the α value constant in α blending, and a flag (VRT) representing a rounding method for keeping coding and decoding calculation precisions 25 equal to each other. In this embodiment, however, VW, VH, VHMSR, VMSR, CCRD, and VSCT are inserted. FIG. 12 shows the format of the expansion header of a packet



header in this case. In FIG. 12, each figure
represents the number of bits, and one horizontal line
represents 32 bits. In MPEG-4, VW, VH, VHMSR, and
VVMSR are expressed by 13 bits each, and CCED and VSCT
5 are expressed by 1 bit each.

Herein, a reserve "Reserve" bit (RV) is inserted
at last in order to align information into 32 bits. If
VW, VH, and the like may successively appear like a bit
stream such as a sync signal, for example, markers (M)
10 may be inserted between respective values to prevent
forming a bit stream like a sync signal which must not
appear, as shown in FIG. 13. The position of the
marker M is not limited to the boundary between pieces
of information, and may be inserted at any position so
15 long as the same rule is established between the
transmitting and receiving sides.

A flag representing the presence of an expansion
header must finally be inserted in conventional header
information. Thus, 1-bit information representing
20 whether an expansion header exists in a conventional
header is inserted. These formats are merely examples.
Alternatively, header information can be formed from
only some of these data or a combination with another
information.

25 According to the second embodiment, in coding and
packetting a video picture, an expansion header can be
added to a packet header for inserting conventional



picture relating important information. When an arbitrary shape picture is to be coded and transmitted, its arbitrary shape picture relating important information is inserted in the expansion header, added
5 as a packet header to data, and packetted. Hence, an arbitrary shape picture can be reconstructed in units of packets. Even arbitrary shape picture coding can attain error resilience equivalent to that of conventional rectangular picture coding. Even if some
10 VOP headers or VPs are destroyed, a video picture can be decoded.

An example of a decoder section for decoding this packet will be described.

An arrangement of the decoder section will be
15 explained. In the decoder section shown in FIG. 14, the output of a demultiplexing section 702 for receiving a coded bit stream is connected to a decoder section 703 and important information construction section 705. The output of the decoder section 703 is
20 connected to the important information construction section 705 via an error check section 704. The output of the important information construction section 705 is connected to the decoder section 703. The demultiplexing section 702 performs demultiplexing for
25 a bit stream 731 input from the transmission line/storage medium 106 into a picture bit stream 732, packet header 735, and another data.

The decoder section 703 decodes the demultiplexed picture bit stream 732 using important information from the important information construction section 705, thereby obtaining original picture data. The error
5 check section 704 checks whether an error occurs during decoding processing, on the basis of decoded information 733 obtained by the decoder section 703.

The important information construction section 705 reconstructs important information from information of
10 the packet header 735 demultiplexed by the demultiplexing section 702, and outputs the reconstructed information to the decoder section 703.

In this arrangement, the bit stream 731 input from the transmission line/storage medium 106 is
15 demultiplexed by the demultiplexing section 702 into the picture bit stream 732, packet header 735, and another data. This another data is transmitted to a corresponding decoder section. The demultiplexed picture bit stream 732 is input to the decoder section
20 703 where the bit stream 732 is decoded. The decoder section 703 performs decoding processing for the demultiplexed picture bit stream 732 using important information from the important information construction section 705.

25 The error check section 704 checks whether an error occurs during decoding processing, from the decoded information 733 from the decoder section 703.

If an error is detected as a result of the check, the important information construction section 705 reconstructs important information 736 present in the packet header 735. Using the important information 736, the decoder section 703 starts decoding a coded bit stream.

In coding and packetting a video picture, this system can add an expansion header to a packet header for inserting conventional picture relating important information. When an arbitrary shape picture is to be coded and transmitted, a packet header having arbitrary shape picture relating important information inserted in the expansion header is added to data. Since a video picture is packetted in this way, arbitrary shape picture relating important information can be acquired from the expansion header to decode an arbitrary shape picture.

The important information construction section 705 as an important component in the third embodiment will be described in detail with reference to FIG. 15.

As shown in FIG. 15, the important information construction section 705 is made up of a switch section 2301, expansion header insertion determining section 2302, and arbitrary shape picture relating important information decoder section 2303.

The expansion header insertion determining section 2302 determines whether an expansion header is added to

a packet header. The expansion header insertion determining section 2302 determines based on information of the packet header 735 input from the demultiplexing section 702 whether arbitrary shape picture coding is executed for the picture bit stream 732. If arbitrary shape picture coding is executed, the expansion header insertion determining section 2302 determines that an expansion header is added to a packet header, and outputs a control signal corresponding to the determination.

The switch section 2301 is a section opening/closing switch. When the expansion header insertion determining section 2302 determines that an expansion header is added to a packet header, the switch section 2301 closes a section to input information of the packet header 735 from the demultiplexing section 702 to the arbitrary shape picture relating important information decoder section 2303 in accordance with the control signal output from the expansion header insertion determining section 2302.

The arbitrary shape picture relating important information decoder section 2303 receives as input information 2333 information of the packet header 735 input via the switch section 2301. Based on this information, the arbitrary shape picture relating important information decoder section 2303 decodes information relating to arbitrary shape coding, and

outputs it as the important information 636.

The operation of the important information construction section 705 having this arrangement will be described.

5 The expansion header insertion determining section 2302 decodes packet header information to determine for the input packet header 735 whether an expansion header is added to the packet header information. If the expansion header insertion determining section 2302
10 determines that an expansion header is added, it controls to close the switch section 2301, thereby outputting the packet header 735 as the packet header information 2333 to the arbitrary shape picture relating important information decoder section 2303.

15 The arbitrary shape picture relating important information decoder section 2303 decodes important information relating to arbitrary shape coding on the basis of the packet header information 2333, and outputs the decoded information as the important
20 information 736 to the decoder section 703.

Accordingly, arbitrary shape picture relating important information can be decoded from information in an expansion header set to allow inserting arbitrary shape picture relating important information.

25 The technique of the second embodiment, as well as the first embodiment, can give error resilience equivalent to that of conventional rectangular picture

coding to even arbitrary shape picture coding. Further,
the expansion header of a transmission line protocol
can be inserted without changing a bit stream for
picture coding. This is effective in using an existing
5 standard scheme and the like.

Similar to the modification to the first
embodiment, the number of coded bits can be reduced by
coding VW, VH, VHMSR, and VVMSR with variable lengths.

Note that the second embodiment has exemplified
10 MPEG-4. However, as for transmission of arbitrary
shape coding other than MPEG-4, the error resilience
can be improved by adding similar information.

As an application of the present invention, the
embodiment of a video picture transmission system
15 adopting the coding apparatus/decoding apparatus of the
present invention will be explained with reference to
FIG. 25.

A video signal input by a camera (not shown)
attached to a personal computer 3001 is coded by a
20 coding apparatus (or coding software) incorporated in
the personal computer 3001. The video signal output
from the coding apparatus is transmitted by radio by a
radio device 3003 together with other speech
information and data information, and received by
25 another radio device 3004. This radio device may be,
e.g., a portable telephone, PHS, or radio LAN device.
The signal received by the radio device 3004 is

demultiplexed into the video signal, speech information, and data information. Of these pieces of information, the video signal is decoded by a decoding apparatus (or decoding software) incorporated in a notebook personal computer 3005, and displayed on the display of the notebook PC 3005.

On the other hand, a video signal input by a camera (not shown) attached to the notebook personal computer 3005 is similarly coded by a coding apparatus (or coding software) incorporated in the notebook personal computer 3005. The generated video signal is multiplexed with other speech information and data information, transmitted by radio by the radio device 3004, and received by the radio device 3003. The signal received by the radio device 3003 is demultiplexed into the video signal, speech information, and data information. Of these pieces of information, the video signal is decoded by a decoding apparatus (or decoding software) incorporated in the personal computer 3001, and displayed on the display of the personal computer 3001.

The coding/decoding apparatus according to the present invention can also be applied to video picture communication between the personal computer 3001 or notebook personal computer 3005 and a portable videophone 3006. A video signal generated by the coding apparatus incorporated in the personal computer

3001 or notebook personal computer 3005 and transmitted by the radio device 3003 or 3004 is received by a radio device incorporated in the portable videophone 3006. The signal received by the radio device is demulti-
5 plexed into the video signal, speech information, and data information. Of these pieces of information, the video picture is decoded by a decoding apparatus (or decoding software) incorporated in the portable videophone 3006, and displayed on the display of the
10 portable videophone 3006.

On the other hand, a video signal input by a camera 3007 incorporated in the portable videophone 3006 is coded by a coding apparatus (or coding software) incorporated in the portable videophone 3006,
15 similar to the personal computer and notebook personal computer 3005. The generated video signal is multiplexed with other speech information and data information, transmitted by radio by the radio device incorporated in the portable videophone 3006, and
20 received by the radio device 3003 or 3004. The signal received by the radio device 3003 or 3004 is demultiplexed into the video signal, speech information, and data information. Of these pieces of information, the video signal is decoded by the decoding apparatus
25 (or decoding software) incorporated in the personal computer 3001 or notebook personal computer 3005, and displayed on the display of the personal computer 3001

or notebook personal computer 3005.

FIG. 26 shows a coding apparatus according to the fourth embodiment that corresponds to the coding apparatus according to the first embodiment in FIG. 1.

5 According to the fourth embodiment, a multiplexed bit stream output from a multiplexer section 105 is stored in a storage medium 107. The storage medium 107 is formatted in accordance with the present invention. That is, the storage medium 107 stores a shape
10 information header, and a plurality of subsequent VOPs. The shape information header is a field storing information processed in common within the coded data, and stores information higher in order than the VOP header. The header stores, for example, the picture
15 size of the rectangular picture and so on. Each VOP includes a plurality of macroblocks, and the first macroblock is made up of a VOP header and MB data set after the VOP header. The following macroblocks each is constructed by a VP header and MB data set after the
20 VP header. The VP header is formatted in accordance with FIG. 4.

FIG. 27 shows a decoding apparatus according to the fifth embodiment that corresponds to the decoding apparatus according to the first embodiment in FIG. 5.
25 The decoding apparatus reads and decodes a multiplexed bit stream stored in the storage medium 107 by the coding apparatus of the fourth embodiment.

FIG. 28 shows a decoding apparatus according to the fifth embodiment that corresponds to the coding apparatus according to the second embodiment in FIG. 10. The coding apparatus stores multiplexed data output
5 from a packet structure section 605 in a storage medium 107 in accordance with the format of the present invention. That is, the format includes a shape information header and a plurality of subsequent VOPs. Each of a plurality of macroblocks of each VOP includes
10 a VOP header.

FIG. 29 shows a decoding apparatus according to the fifth embodiment that corresponds to the decoding apparatus according to the second embodiment in FIG. 14. The decoding apparatus reads and decodes a multiplexed
15 bit stream stored in the storage medium 107 by the coding apparatus of the fifth embodiment.

The processing contents of the decoder section 303 in FIG. 27 will be described with reference to FIG. 30.

Picture code streams are sequentially read from
20 the storage medium 107 to detect sync codes (step S11). If each detected sync code is a VOP start code (YES in step S12), the flow executes processing of outputting a previously decoded VOP (frame) to a picture information output device (step S13). Then, a VOP header (in
25 FIG. 29) subsequent to the VOP start code in the picture code stream is decoded (step S14). If the VOP header is normally decoded (YES in step S15), the

decoded VOP header information (time information, VOP prediction mode, and the like) replaces information stored in the temporary memory section of the decoder section (step S16). Macroblock data (MB data in
5 FIG. 29) subsequent to the VOP header is decoded to decode the video packet (step S17).

If the detected sync code is a resync marker (YES in step S18), a video packet header (macroblock number (MBA), video packet quantization parameter (SQ), and
10 header extension code (HEC)) subsequent to the resync marker is decoded (step S19). If the header extension code HEC = "0" in the video packet header (NO in step S20), the video packet is decoded (step S17). If the header extension code HEC = "1" (YES in step S20),
15 subsequent duplicated information (DUPH in FIG. 29) is decoded (step S21). Whether the picture has an arbitrary shape is checked (step S21-1), and if YES in step S21-1, arbitrary shape picture relating important information is decoded (step S21-2). If NO in step
20 S21-1, the flow jumps to step S22. If the duplicated information is normally decoded (YES in step S22), this duplicated information is compared with information stored in the temporary memory section (step S23). If the duplicated information is the same as the
25 information as a result of comparison (NO in step S23), macroblock data (MB data in FIG. 29) subsequent to the video packet header is decoded to decode the video

packet (step S17). If the duplicated information is different from the information as a result of comparison (YES in step S23), this video packet is determined to belong to a VOP different from the previously decoded VOP. The flow executes processing of outputting a previously decoded VOP to the picture information output device (step S24), and the decoded duplicated information replaces information stored in the temporary memory device (step S25). Further, the video packet is decoded (step S17).

While picture code streams stored in a storage medium 810 are sequentially read, a series of processes starting from sync code detection shown in FIG. 30 are repeated to reconstruct video signals.

Instead of directly storing a picture code stream in the storage medium, a code stream obtained by coding speech and audio signals or a code stream obtained by multiplexing data, control information, and the like may be stored in the storage medium. In this case, before information stored in the storage medium is decoded by a picture coder device 820, a demultiplexer device performs processing of demultiplexing a picture code stream, speech/audio code stream, data, and control information. The demultiplexed picture code stream is decoded by the coder device 820.

In FIG. 29, information stored in the storage medium 810 is transmitted to the decoder device 820 via

a signal line 80. Alternatively, information may be transmitted via a transmission line such as a cable, radio, or infrared rays.

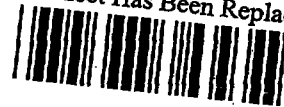
According to the present invention, a code stream
5 stored in the storage medium includes duplicated
important information. Even if an error exists in
information stored in the storage medium, or an error
occurs in a signal line or transmission line for
transmitting information stored in the storage medium
10 to a playback picture, the playback picture almost free
from any degradation can be played back.

As has been described above, the present invention
can realize error resilience equivalent to that of
conventional rectangular picture coding even when an
15 arbitrary shape picture is coded. The present
invention uses the expansion header of RTP as a
protocol used to transmit video/speech data. In
transmitting data in units of packets, the data can be
coded and transmitted in accordance with an existing
20 standard scheme such as MPEG-4. In addition, error
resilience equivalent to that of conventional
rectangular picture coding can be achieved.

Industrial Applicability

According to the present invention described above,
25 the error resilience similar to the conventional
rectangular picture coding method can be attained even
in arbitrary shape picture coding. The present

invention can be applied to an information transmission system for transmitting the coded motion picture/still picture, using a wire communication network such as an ISDN (Integrated Services Digital Network) or internet,
5 or a radio communication network such as PHS or a satellite communication.



C L A I M S

1. A video coding apparatus comprising:

a coder section for generating coded information
obtained by coding an input video picture as a bit
5 stream;

an important information reconstructing section
for extracting, from the coded information obtained by
said coder section, important information representing
a rule of coding a set of predetermined bit streams,
10 and reconstructing the important information;

a sync signal generator section for generating a
sync signal; and

a bit stream reconstructing section for adding the
sync signal output from said sync signal generator
15 means and the important information reconstructed by
said important information reconstructing section to
the bit stream coded by said coder section, to
reconstruct the bit stream.

2. The video coding apparatus according to
20 claim 1, wherein said important information
constructing section comprises:

a first important information reconstructing
section for reconstructing, from the coded information,
conventional picture relating information as important
25 information in a conventional coding scheme of coding a
frame in units of rectangular regions;

a second important information reconstructing





section for reconstructing, from the coded information,
arbitrary shape picture relating important information
as important information in an arbitrary shape coding
scheme of coding a picture in the frame in units of
5 arbitrary shape picture regions;

an arbitrary shape coding determination section
for determining based on the coded information whether
the coded picture is an arbitrary shape picture;

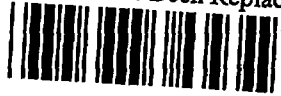
10 a switch section for outputting the arbitrary
shape picture relating important information when said
arbitrary shape coding determination section determines
that the coded picture is an arbitrary shape picture;
and

15 a multiplexer section for multiplexing the
conventional picture relating information and an output
from said switch section.

3. The video coding apparatus according to
claim 2, wherein said arbitrary shape coding
determination section determines whether the coded
20 picture is a rectangular picture or an arbitrary shape
picture to output a determination signal and controls
said switch section in accordance with the
determination signal.

4. The video coding apparatus according to
25 claim 1, wherein said bit stream reconstructing section
doubles the important information in a predetermined
format and insert the doubled important information





into a header.

5 5. The video coding apparatus according to
claim 1, wherein said bit stream reconstructing section
comprises a macroblock boundary determination section
for determining whether or not the coded bit stream is
positioned on a macroblock boundary, a counter for
counting bits of the coded bit stream, a sync signal
inserting determination section for outputting an
insertion permission signal when the macroblock
10 boundary determination section determines the
macroblock boundary for the bit stream and a count
value of the bits of the bit stream exceeds a given
value, a header information inserting section for
forming expansion header information from the important
15 information and the sync signal and adding the
expansion information to the coded bit stream in
response to the insertion permission signal from said
sync signal inserting determination section.

20 6. The video coding apparatus according to
claim 5, wherein the expansion header information is
provided in a video packet starting at the sync signal.

7. A video decoding apparatus comprising:
a bit stream receiving section for receiving a bit
stream including coded video information that is
25 obtained by coding a video picture, sync information
and header information including important information
representing a rule of coding a set of predetermined





bit streams,

a demultiplexer section for demultiplexing the coded bit stream into a picture bit stream corresponding to the video information;

5 a decoder section for decoding the picture bit stream;

a sync signal detector section for detecting a sync signal from the bit stream, and informing said decoder section of the sync signal;

10 an error check section for checking presence of an error on the basis of decoded information of said decoder section; and

an important information reconstructing section for reconstructing important information from the header information output from said decoder section, and informing said decoder section of the important information when said error check section determines absence of an error.

20 8. The video decoding apparatus according to claim 7, wherein said important information reconstructing section comprises:

a first important information reconstructing section for reconstructing conventional picture relating important information from the header information;

25 an arbitrary shape coding determination means for determining based on the header information whether a





picture decoded from the header information is an arbitrary shape picture;

5 a second important information reconstructing means for reconstructing arbitrary shape picture relating important information from the header information;

10 a first switch section for inputting the header information to said second important information reconstructing section when said arbitrary shape coding determination section determines that the decoded picture is an arbitrary shape picture; and

15 a second switch section for outputting the arbitrary shape picture relating important information when said arbitrary shape coding determination section determines that the decoded picture is an arbitrary shape picture.

20 9. The video decoding apparatus according to claim 7, wherein said important information reconstructing section outputs VOP header information when a VOP header is included in the bit stream obtained during decoding of said decoder section, and outputs the important information of the VOP when no VOP header is included in the bit stream obtained during decoding of said decoder section.

25 10. The video decoding apparatus according to claim 9, wherein said important information reconstructing section decodes the conventional picture





relating important information when the VOP header is found from the bit stream in said decoder section.

11. The video decoding apparatus according to claim 7, wherein said decoder section executes a decoding operation from a position of a next sync signal detected by said sync signal detector section after performing a processing corresponding to an error when said error check section detects the error.

12. A video coding apparatus comprising:
a coder section for generating coded information obtained by coding an input video picture as a bit stream;

an important information reconstructing section for extracting, from the coded information obtained by said coder section, important information representing a rule of coding a set of predetermined bit streams, and reconstructing the important information;

a bit stream divider section for dividing the bit stream coded by said coder section into a plurality of divided bit strings;

a packet header generator section for generating a packet header from the important information reconstructed by said important information reconstructing section; and

a packet constructing section for constructing a packet using the divided bit strings and the packet header.





13. The video coding apparatus according to claim 12, wherein said important information reconstructing section comprises:

5. an arbitrary shape picture relating important information reconstructing section for reconstructing arbitrary shape picture relating important information from the coded information;

10. an expansion header insertion determining section for determining based on the coded information whether an expansion header holding the arbitrary shape picture relating important information is to be inserted in the packet header; and

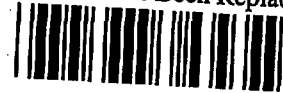
15. a switch section for inputting the header information to the arbitrary shape picture relating important information when said expansion header insertion determining section determines that the expansion header is to be inserted.

20. 14. The video coding apparatus according to claim 12, wherein said packet header generator section outputs the packet header containing the important information therein to said packet constructing section, and said bit stream divider section divides the bit stream output from said coder section in a packet size and outputs it.

25. 15. A video decoding apparatus comprising:

a bit stream receiving section for receiving a bit stream including coded video information obtained by





coding a video picture, sync information, and packet header information including important information representing a rule of coding a set of predetermined bit streams when the video picture is coded;

5 a demultiplexer section for demultiplexing the bit stream into a picture bit string of the video picture information and packet header information;

 a decoder section for decoding the picture bit string;

10 an error check section for checking presence of an error on the basis of decoded information of said decoder section; and

 an important information reconstructing section for extracting and reconstructing the important
15 information from the packet header information, and informing said decoder section of the reconstructed important information, when said error check section determines presence of an error and the important information is required in decoding.

20 16. The video coding apparatus according to claim 15, wherein said important information reconstructing section comprises:

 a first important information reconstructing section for reconstructing arbitrary shape picture
25 relating important information from the packet header information;

 an expansion header insertion determining section





for determining based on the packet header information whether an expansion header is inserted in the packet header; and

5 a switch section for inserting the packet header information to the arbitrary shape picture relating important information when said expansion header insertion determining section determines that the expansion header is inserted.

17. A video transmission system comprising:

10 a server computer including a video coding apparatus for coding a video to generate a coded bit stream;

a transmitter for transmitting the coded bit stream of said server computer;

15 a receiver for receiving the coded bit stream from said server computer; and

a client computer including a video decoding apparatus for decoding the coded bit stream from said receiver, and wherein

20 said video coding apparatus comprises:

a coder section for generating coded information obtained by coding an input video picture as a bit stream;

25 an important information reconstructing section for extracting, from the coded information obtained by said coder section, important information representing a rule of coding a set of predetermined bit streams,





and reconstructing the important information;

a sync signal generator section for generating a sync signal; and

5 a bit stream reconstructing section for adding the sync signal output from said sync signal generator means and the important information reconstructed by said important information reconstructing section to the bit stream coded by said coder section, to reconstruct the bit stream, and

10 said video decoding apparatus comprises:

a demultiplexer section for demultiplexing the received coded bit stream into a picture bit stream corresponding to the video information;

15 a decoder section for decoding the picture bit stream;

a sync signal detector section for detecting a sync signal from the bit stream, and informing said decoder section of the sync signal;

20 an error check section for checking presence of an error on the basis of decoded information of said decoder section; and

25 an important information reconstructing section for reconstructing important information from the header information output from said decoder section, and informing said decoder section of the important information when said error check section determines absence of an error.



18. A video transmission system comprising:

a server computer including a video coding apparatus for coding a video to generate a coded bit stream;

5 a transmitter for transmitting the coded bit stream of said server computer;

a receiver for receiving the coded bit stream from said server computer; and

a client computer including a video decoding apparatus for decoding the coded bit stream from said receiver, and wherein

said video coding apparatus comprises:

15 a coder section for generating coded information obtained by coding an input video picture as a bit stream;

an important information reconstructing section for extracting, from the coded information obtained by said coder section, important information representing a rule of coding a set of predetermined bit streams, and reconstructing the important information;

20 a bit stream divider section for dividing the bit stream coded by said coder section into a plurality of divided bit strings;

a packet header generator section for generating a packet header from the important information reconstructed by said important information constructing section; and





a packet constructing section for constructing a packet using the divided bit strings and the packet header, and

said video decoding apparatus comprises:

5 a demultiplexer section for demultiplexing the received bit stream into a picture bit string of the video picture information and packet header information;

10 a decoder section for decoding the picture bit string;

an error check section for checking presence of an error on the basis of decoded information of said decoder section; and

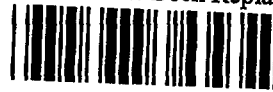
15 an important information reconstructing section for extracting and reconstructing the important information from the packet header information, and informing said decoder section of the reconstructed important information, when said error check section determines presence of an error and the important
20 information is required in decoding.

19. A recording medium storing:

a shape information header storing arbitrary information of a picture to be recorded; and

25 a plurality of VOPs (Video Object Planes) each including a plurality of macroblocks, each of the macroblocks being constructed by a VP header and MB data following the VP header, and the VP header





including important information representing a rule of coding a set of predetermined bit streams.

20. The recording medium according to claim 19, wherein the important information of the VP header
5 includes information about a width of a picture, information about a height of the picture, information about x-and y coordinates at which the picture is pasted, a flag representing whether coding is done after the shape information is scaled-down, and
10 information about a coding type of the shape information.

21. A video decoding apparatus comprising:
demultiplexer means for demultiplexing an input bit stream into a picture stream;
15 decoder means for decoding the picture bit stream;
sync signal detector means for detecting a sync signal from the picture bit stream, and informing said decoder means of the sync signal; and
important information reconstructing means for
20 reconstructing important information from header information output from said decoder means, and informing said decoder means of the important information.

22. A video coding apparatus according to claim 22,
25 further comprising:

means for reconstructing conventional picture relating important information from the header





information;

arbitrary shape coding determination means for determining based on the header information whether a decoded picture is an arbitrary shape picture;

5 arbitrary shape picture relating important information constructing means for reconstructing arbitrary shape picture relating important information from the header information;

switch means for inputting the header information
10 to said arbitrary shape picture relating information reconstructing means when said arbitrary shape coding determination means determines that the decoded picture is an arbitrary shape picture; and

switch means for outputting the arbitrary shape
15 picture relating important information when said arbitrary shape coding determination means determines that the decoded picture is an arbitrary shape picture.

