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**Datasheet for the decision
of 25 June 2009**

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**Case Number:**              T 0497/05 - 3.5.04

**Application Number:**        00122983.0

**Publication Number:**        1079629

**IPC:**                       H04N 7/24

**Language of the proceedings:**   EN

**Title of invention:**
Encoding apparatus, decoding apparatus, encoding method, and
picture processing apparatus

**Applicant:**
MITSUBISHI DENKI KABUSHIKI KAISHA

**Opponent:**
–

**Headword:**
–

**Relevant legal provisions:**
EPC Art. 123(2)

**Relevant legal provisions (EPC 1973):**
EPC Art. 84

**Keyword:**
"Amendments - added subject-matter (main request: yes)"
"Claims - support by description (first auxiliary request:
no)"
"Claims - support by description (second auxiliary request:
yes)"

**Decisions cited:**
–

**Catchword:**
–

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**Case Number:** T 0497/05 - 3.5.04

# D E C I S I O N
## of the Technical Board of Appeal 3.5.04
## of 25 June 2009

| | |
|---|---|
| **Appellant:** | MITSUBISHI DENKI KABUSHIKI KAISHA<br>7-3, Marunouchi 2-chome<br>Chiyoda-ku<br>Tokyo 100-8310  (JP) |
| **Representative:** | Pfenning, Meinig & Partner GbR<br>Patent- und Rechtsanwälte<br>Theresienhöhe 13<br>D-80339 München  (DE) |
| **Decision under appeal:** | **Decision of the Examining Division of the European Patent Office posted 1 October 2004 refusing European application No. 00122983.0 pursuant to Article 97(1) EPC 1973.** |

**Composition of the Board:**

**Chairman:**     F. Edlinger
**Members:**      A. Dumont
                  T. Karamanli

C2468.D

## Summary of Facts and Submissions

I.      The appeal is directed against the decision by the
        examining division to refuse European patent
        application 00122983.0, published as EP 1 079 629 A1.

II.     The application was refused on the ground that the
        subject-matter of the independent claims according to
        the requests then on file lacked support by the
        description (Article 84 EPC 1973). The examining
        division further found that claims 1 and 11 according
        to the second auxiliary request then on file in
        addition also infringed Article 123(2) EPC.

III.    The applicant appealed and with the statement of
        grounds of appeal filed several sets of amended
        independent claims 1, 6, 11 and 13.

IV.     In a communication sent in preparation for the oral
        proceedings the board drew attention to remaining
        deficiencies and informed the appellant that oral
        proceedings concerning the three cases T 1149/05,
        T 0497/05 and T 1558/07 (the parent application and two
        divisional applications, respectively) would be held
        jointly on three consecutive days.

V.      With a letter dated 25 May 2009 the appellant filed a
        set of amended claims 1, 2, 6, 7 and 11 to 14 of a new
        main request.

VI.     Oral proceedings were held on 23, 24 and 25 June 2009
        jointly in the three cases T 1149/05, T 0497/05 and
        T 1558/07. The debate on the present case took place on
        24 June 2009, and the decision was given on 25 June

2009. In the oral proceedings the appellant filed *inter alia* a first and a second auxiliary request comprising claims 1 to 44.

VII.    Before the closure of the debate the appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request comprising claims 1, 2, 6, 7 and 11 to 14 filed with the letter dated 25 May 2009 and the dependent claims 3 to 5, 8 to 10 and 15 to 44 filed with the letter dated 18 September 2003, and a description to be adapted.

Alternatively, the appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the first auxiliary request comprising claims 1 to 44 filed in the oral proceedings, and a description to be adapted.

Alternatively, the appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the second auxiliary request comprising claims 1 to 44 filed in the oral proceedings, and a description to be adapted.

VIII.   Claim 1 according to the main request reads as follows:

"An encoding apparatus (400), comprising:

a picture element memory (1) for receiving and storing a value of an encoding picture element to be encoded, and for outputting values of encoded picture elements adjacent to the encoding picture element as values of reference picture elements;

a mode determinator (2) for determining one of a
specific encoding mode and an encoding mode other than
the specific encoding mode from a plurality of
predefined encoding modes for the encoding picture
element;

a first encoding section (101) for predicting the value
of the encoding picture element, determining a
prediction result whether the prediction is correct or
not, encoding the value of the encoding picture element
based on the prediction result of the determination,
and for outputting a codeword representing the encoding
picture element under the determined specific encoding
mode;

a second encoding section (102) for predicting the
value of the encoding picture element, encoding the
value of the encoding picture element, and for
outputting a codeword representing the encoding picture
element under the encoding mode other than the specific
encoding mode; and

an encoding controller (11) for selectively operating
the first encoding section and the second encoding
section based on a determined encoding mode of the mode
determinator (2)

wherein the first encoding section (101) comprises:
a first predictor (3) for calculating a prediction
value of the encoding picture element based on the
values of the reference picture elements;
a first prediction error calculator (30) for
calculating a difference between the value of the

encoding picture element and the prediction value calculated by the first predictor (3) as a prediction error;

a zero determinator (4) for determining whether the prediction error calculated by the first prediction error calculator (30) is zero indicating that the prediction is correct, and for outputting a prediction result of the determination;

a first encoder (5) for receiving and encoding the prediction result of the determination output from the zero determinator (4), and for outputting the codeword representing whether the prediction result of the zero determinator is correct or not; and

a second encoder (6) for encoding the prediction error calculated by the first prediction error calculator (30) into the codeword using a first error-to-symbol converter (36) for receiving the prediction error and converting the prediction error into a sequence of binary symbols and comprising a first conversion table not including the prediction error value zero when the prediction error is not zero for the encoding picture element, a second probability estimator (26) for receiving the sequence of binary symbols and estimating an occurrence probability of one of the binary symbols, and a second codeword allotter (16) for encoding the sequence of binary symbols, said second encoder outputting the codeword representing the encoding picture element,

wherein the second encoding section (102) comprises:
a second predictor (7) for calculating a prediction value of the encoding picture element based on the values of the reference picture elements, a second prediction error calculator (31) for calculating

difference between the value of the encoding picture
element and the prediction value calculated by the
second predictor (7) as a prediction error; and
a third encoder (8) for encoding the prediction error
calculated by the second prediction error calculator
(31) into the codeword and using a second error-to-
symbol converter (38) for receiving the prediction
error and converting the prediction error into a
sequence of binary symbols and comprising a second
conversion table including the prediction error value
zero, a third probability estimator (28) for receiving
the sequence of binary symbols and estimating an
occurrence probability of one of the binary symbols,
and a third codeword allotter (18) for encoding the
sequence of binary symbols, said third encoder
outputting the codeword representing the encoding
picture element, and

wherein the mode determinator (2) receives the values
of the reference picture elements output from said
picture element memory and the prediction result of the
determination output from said zero determinator (4),
and determines the encoding mode based on the
prediction results of the determination and whether all
the values of the reference picture elements have the
same value."

IX.   Claim 1 according to the first auxiliary request reads
      as follows:

      "An encoding apparatus (400), comprising:

      a picture element memory (1) for receiving and storing
      a value of an encoding picture element to be encoded,

and for outputting values of encoded picture elements
adjacent to the encoding picture element as values of
reference picture elements;

a mode determinator (2) for determining one of a
specific encoding mode and an encoding mode other than
the specific encoding mode from a plurality of
predefined encoding modes for the encoding picture
element;

a first encoding section (101) for predicting the value
of the encoding picture element, determining a
prediction result whether the prediction is correct or
not, encoding the value of the encoding picture element
based on the prediction result of the determination,
and for outputting a codeword representing the encoding
picture element under the determined specific encoding
mode;

a second encoding section (102) for predicting the
value of the encoding picture element, encoding the
value of the encoding picture element, and for
outputting a codeword representing the encoding picture
element under the encoding mode other than the specific
encoding mode; and

an encoding controller (11) for selectively operating
the first encoding section and the second encoding
section based on a determined encoding mode of the mode
determinator (2)

wherein the first encoding section (101) comprises:
a first predictor (3) for calculating a prediction
value of the encoding picture element based on the
values of the reference picture elements;
a first prediction error calculator (30) for
calculating a difference between the value of the
encoding picture element and the prediction value
calculated by the first predictor (3) as a prediction
error;
a zero determinator (4) for determining whether the
prediction error calculated by the first prediction
error calculator (30) is zero indicating that the
prediction is correct, and for outputting a prediction
result of the determination;
a first encoder (5) for receiving and encoding the
prediction result of the determination output from the
zero determinator (4), and for outputting the codeword
representing whether the prediction result of the zero
determinator is correct or not; and
a second encoder (6) for encoding the prediction error
calculated by the first prediction error calculator (30)
into the codeword using a first error-to-symbol
converter (36) for receiving the prediction error and
converting the prediction error into a sequence of
binary symbols and comprising a first conversion table
not including the prediction error value zero when the
prediction error is not zero for the encoding picture
element, a second probability estimator (26) for
receiving the sequence of binary symbols and estimating
an occurrence probability of one of the binary symbols,
and a second codeword allotter (16) for encoding the
sequence of binary symbols, said second encoder
outputting the codeword representing the encoding
picture element,

wherein the second encoding section (102) comprises:
a second predictor (7) for calculating a prediction
value of the encoding picture element based on the
values of the reference picture elements,
a second prediction error calculator (31) for
calculating difference between the value of the
encoding picture element and the prediction value
calculated by the second predictor (7) as a prediction
error; and
a third encoder (8) for encoding the prediction error
calculated by the second prediction error calculator
(31) into the codeword and using a second error-to-
symbol converter (38) for receiving the prediction
error and converting the prediction error into a
sequence of binary symbols and comprising a second
conversion table including the prediction error value
zero, a third probability estimator (28) for receiving
the sequence of binary symbols and estimating an
occurrence probability of one of the binary symbols,
and a third codeword allotter (18) for encoding the
sequence of binary symbols, said third encoder
outputting the codeword representing the encoding
picture element, and

wherein the mode determinator (2) receives the values
of the reference picture elements output from said
picture element memory and the prediction result of the
determination output from said zero determinator (4),
and selects an encoding mode between the specific
encoding mode (Mode A) used by the first encoding
section (101) and the encoding mode (Mode B) other than
the specific encoding mode used by the second encoding
section (102) such that the specific encoding mode

(Mode A) is continued when the determinator (4) determines that the prediction has proved to be correct, when the determinator (4) determines that the prediction has proved to be incorrect the encoding picture element is coded in the specific encoding mode (Mode A) and then the encoding mode (Mode B) other than the specific encoding mode is set, the specific encoding mode (Mode A) is selected when the value of adjacent reference picture elements are the same and the encoding mode (Mode B) other than the specific encoding mode is continued when the values of the reference picture elements are not the same."

X.    The independent claims according to the second auxiliary request read as follows:

"1. An encoding apparatus (400), comprising:

a picture element memory (1) for receiving and storing a value of an encoding picture element to be encoded, and for outputting values of encoded picture elements adjacent to the encoding picture element as values of reference picture elements;

a mode determinator (2) for determining one of a specific encoding mode and an encoding mode other than the specific encoding mode from a plurality of predefined encoding modes for the encoding picture element;

a first encoding section (101) for predicting the value of the encoding picture element, determining a prediction result whether the prediction is correct or not, encoding the value of the encoding picture element

based on the prediction result of the determination, and for outputting a codeword representing the encoding picture element under the determined specific encoding mode;

a second encoding section (102) for predicting the value of the encoding picture element, encoding the value of the encoding picture element, and for outputting a codeword representing the encoding picture element under the encoding mode other than the specific encoding mode; and

an encoding controller (11) for selectively operating the first encoding section and the second encoding section based on a determined encoding mode of the mode determinator (2)

wherein the first encoding section (101) comprises:
a first predictor (3) for calculating a prediction value of the encoding picture element based on the values of the reference picture elements;
a first prediction error calculator (30) for calculating a difference between the value of the encoding picture element and the prediction value calculated by the first predictor (3) as a prediction error;
a zero determinator (4) for determining whether the prediction error calculated by the first prediction error calculator (30) is zero indicating that the prediction is correct, and for outputting a prediction result of the determination;
a first encoder (5) for receiving and encoding the prediction result of the determination output from the zero determinator (4), the first encoder (5) comprising

a first probability estimator (25) for receiving the
result of the determination output from the
determinator (4) as a sequence of binary symbols and
estimating an occurrence probability of one of the
binary symbols, and a first codeword allotter (15) for
encoding the sequence of binary symbols into a codeword
and for outputting said codeword,
a second encoder (6) for encoding the prediction error
calculated by the first prediction error calculator (30)
into the codeword using a first error-to-symbol
converter (36) for receiving the prediction error and
converting the prediction error into a sequence of
binary symbols and comprising a first conversion table
not including the prediction error value zero when the
prediction error is not zero for the encoding picture
element, a second probability estimator (26) for
receiving the sequence of binary symbols and estimating
an occurrence probability of one of the binary symbols,
and a second codeword allotter (16) for encoding the
sequence of binary symbols, said second encoder
outputting the codeword representing the encoding
picture element,

wherein the second encoding section (102) comprises:
a second predictor (7) for calculating a prediction
value of the encoding picture element based on the
values of the reference picture elements,
a second prediction error calculator (31) for
calculating a difference between the value of the
encoding picture element and the prediction value
calculated by the second predictor (7) as a prediction
error; and
a third encoder (8) for encoding the prediction error
calculated by the second prediction error calculator

(31) into the codeword and using a second error-to-
symbol converter (38) for receiving the prediction
error and converting the prediction error into a
sequence of binary symbols and comprising a second
conversion table including the prediction error value
zero, a third probability estimator (28) for receiving
the sequence of binary symbols and estimating an
occurrence probability of one of the binary symbols,
and a third codeword allotter (18) for encoding the
sequence of binary symbols, said third encoder
outputting the codeword representing the encoding
picture element, and

wherein the mode determinator (2) receives the values
of the reference picture elements output from said
picture element memory and the prediction result of the
determination output from said zero determinator (4),
and selects an encoding mode between the specific
encoding mode (Mode A) used by the first encoding
section (101) and the encoding mode (Mode B) other than
the specific encoding mode used by the second encoding
section (102) such that the specific encoding mode
(Mode A) is continued when the determinator (4)
determines that the prediction has proved to be correct,
when the determinator (4) determines that the
prediction has proved to be incorrect the encoding
picture element is coded in the specific encoding mode
(Mode A) and then the encoding mode (Mode B) other than
the specific encoding mode is set, the specific
encoding mode (Mode A) is selected when the value of
adjacent reference picture elements are the same and
the encoding mode (Mode B) other than the specific
encoding mode is continued when the values of the
reference picture elements are not the same."

"6. A decoding apparatus (500), comprising:

a picture element memory (41) for storing the value of a decoding picture element to be decoded, and outputting the values of the decoded picture elements adjacent to a decoding picture element as values of reference picture elements;

a mode determinator (42) for determining one of a specific decoding mode and a decoding mode other than the specific decoding mode from a plurality of predefined decoding modes for the decoding picture element;

a first decoding section (201) for receiving a codeword, predicting a value of the decoding picture element, determining a prediction result whether the prediction is correct or not, and for decoding the codeword into the value of the decoding picture element based on the prediction result of the determination under the determined specific decoding mode;

a second decoding section (202) for receiving a codeword representing the decoding picture element, predicting the value of the decoding picture element, decoding the codeword under the decoding mode other than the specific encoding mode; and

a decoding controller (43) for selectively operating the first decoding section and the second decoding section based on a determined decoding mode of the mode determinator (42),

wherein the first decoding section (201) comprises:
a first predictor (3) for calculating a prediction
value of the decoding picture element based on the
values of the reference picture elements;
a first decoder (45) for decoding the codeword
representing the decoding picture element, the first
decoder (45) having a first symbol restoring device (55)
for receiving the codeword and decoding the codeword
into a sequence of binary symbols and a first
probability estimator (75) for estimating an occurrence
probability of one of the binary symbols, and wherein
the first decoder outputs one of the binary symbols as
a result of determination indicating whether a
prediction error is zero;
a second decoder (46) for decoding the codeword
representing the decoding picture element having the
prediction error not zero into the prediction error not
zero having a second symbol restoring device (56) for
receiving the codeword and decoding the codeword into a
sequence of binary symbols, a second probability
estimator (76) for receiving the binary symbols and
estimating an occurrence probability of one of the
binary symbols, and a first symbol-to-error converter
(86), comprising a first conversion table not including
the prediction error value zero, for receiving the
sequence of binary symbols and converting the sequence
of binary symbols into the prediction error;
a first decoding picture element calculator (32) for
calculating the value of the decoding picture element
based on the prediction value of the decoding picture
element calculated by the first predictor (3), and the
prediction error obtained by the second decoder (46),

wherein the second decoding section (202) comprises:
a second predictor (7) for calculating a prediction
value of the decoding picture element based on the
value of the reference picture element;
a third decoder (48) for decoding the codeword
representing the decoding picture element into the
prediction error having a third symbol restoring device
(58) for receiving the codeword and decoding the
codeword into a sequence of binary symbols, a third
probability estimator (78) for receiving the binary
symbols and estimating an occurrence probability of one
of the binary symbols, and a second symbol-to error
converter (88) comprising a second conversion table
including the prediction error value zero, for
receiving the sequence of binary symbols and converting
the sequence of binary symbols into the prediction
error;
a second decoding picture element calculator (33) for
calculating the value of the decoding picture element
based on the prediction value of the decoding picture
element calculated by the second predictor (7) and the
prediction error obtained by the third decoder (48),
and

wherein the mode determinator receives the values of
the reference picture elements output from said picture
element memory and the prediction result of the
determination decoded by said first decoder, and
selects a decoding mode between the specific decoding
mode used by the first decoding section (201) and the
decoding mode other than the specific decoding mode
used by the second decoding section (202), such that
the specific decoding mode (Mode A) is continued when
the prediction result of determination determines that

the prediction has proved to be correct, when the prediction result determines that the prediction has proved to be incorrect the decoding picture element is decoded in the specific decoding mode (Mode A) and then the decoding mode (Mode B) other than the specific decoding mode is set, the specific decoding mode (Mode A) is selected when the values of adjacent reference picture elements are the same and the decoding mode other than the specific decoding mode is continued when the values of adjacent reference picture elements are not the same."

"11. An encoding method comprising:

an outputting step of receiving and storing a value of an encoding picture element to be encoded, and outputting values of encoded picture elements adjacent to the encoding picture element as values of reference picture elements;

a mode deciding step of determining one of a specific encoding mode and an encoding mode other than the specific encoding mode from a plurality of predefined encoding modes for the encoding picture element;

a first main encoding step of predicting the value of the encoding picture element, determining a prediction result whether the prediction is correct or not, encoding the value of the encoding picture element based on a prediction result of determination, and outputting a codeword representing the encoding picture element under the determined specific encoding mode;

a second main encoding step of predicting the value of
the encoding picture element, encoding the value of the
encoding picture element, and outputting a codeword
representing the encoding picture element under the
encoding mode other than the specific encoding mode;
and

an encoding controlling step of selectively operating
the first main encoding step and the second main
encoding step based on a determined encoding mode of
the mode deciding step,

wherein the first main encoding step comprises:
a first predicting step of calculating a prediction
value of the encoding picture element based on the
values of the reference picture elements;
a first prediction error calculating step of
calculating a difference between the value of the
encoding picture element and the prediction value
calculated by the first predicting step as a prediction
error;
a zero determination step of determining whether the
prediction error calculated by the first prediction
error calculating step is zero indicating that the
prediction is correct, and outputting a prediction
result of the determination;
a first encoding step of receiving and encoding the
prediction result of the determination output by the
zero determination step, the first encoding step
comprising a first probability estimating step of
receiving the result of the determination output by the
determination step as a sequence of binary symbols and
estimating an occurrence probability of one of the
binary symbols and a first codeword allotting step of

encoding the sequence of binary symbols into a codeword
and outputting said codeword,

a second encoding step of encoding the prediction error
calculated by the first prediction error calculating
step into the code word using a first error-to-symbol
converting step of receiving the prediction error and
converting the prediction error into a sequence of
binary symbols, and using a first conversion table not
including the prediction error value zero when the
prediction error is not zero for the encoding picture
element, a second probability estimating step of
receiving the sequence of binary symbols and estimating
an occurrence probability of one of the binary symbols,
and a second codeword allotting step of encoding the
sequence of binary symbols, said second encoding step
outputting the codeword representing the encoding
picture element,

wherein the second main encoding step comprises:
a second predicting step of calculating a prediction
values of the encoding picture elements based on the
value of the reference picture element;
a second prediction error calculating step of
calculating a difference between the value of the
encoding picture element and the prediction value
calculated by the second predicting step as a
prediction error; and
a third encoding step of encoding the prediction error
calculated by the second prediction error calculating
step into the codeword using a second error-to-symbol
converting step of receiving the prediction error and
converting the prediction error into a sequence of
binary symbols, and using a second conversion table

including the prediction error value zero, a third
probability estimating step of receiving the sequence
of binary symbols and estimating an occurrence
probability of one of the binary symbols, and a third
codeword allotting step of encoding the sequence of
binary symbols, and said third encoding step outputting
the codeword representing the encoding picture element,
and

wherein the mode deciding step receives the values of
the reference picture elements output from said
outputting step and the prediction result of the
determination output from said zero determination step,
and selects an encoding mode between the specific
encoding mode (Mode A) used by the first encoding
section (101) and the encoding mode (Mode B) other than
the specific encoding mode used by the second encoding
section (102) such that the specific encoding mode
(Mode A) is continued when the determinator (4)
determines that the prediction has proved to be correct,
when the determinator (4) determines that the
prediction has proved to be incorrect the encoding
picture element is coded in the specific encoding mode
(Mode A) and then the encoding mode (Mode B) other than
the specific encoding mode is set, the specific
encoding mode (Mode A) is selected when the value of
adjacent reference picture elements are the same and
the encoding mode (Mode B) other than the specific
encoding mode is continued when the values of the
reference picture elements are not the same."

"13. A decoding method, comprising:

an outputting step of storing a value of a decoding
picture element to be decoded, and outputting the
values of the decoded picture elements adjacent to a
decoding picture element as values of reference picture
elements:

a mode deciding step of determining one of a specific
decoding mode and a decoding mode other than the
specific decoding mode from a plurality of predefined
encoding modes for the decoding picture element;

a first main decoding step of receiving a codeword,
predicting a value of the decoding picture element,
determining a prediction result whether the prediction
is correct or not, and decoding the codeword into the
value of the decoding picture element based on a
prediction result of the determination under the
determined specific decoding mode;

a second main decoding step of receiving a codeword,
predicting the value of the decoding picture element,
and decoding the codeword into the value of the
decoding picture element under the decoding mode other
than the specific encoding mode; and

a decoding controlling step of selectively operating
the first main decoding step and the second main
decoding step based on a determined decoding mode of
the mode deciding step,

wherein the first main decoding step comprises:
a first predicting step of calculating a prediction
value of the decoding picture element based on the
value(s) of the reference picture element(s);
a first decoding step of decoding the codeword
representing the decoding picture element, the first
decoding step comprising a first symbol restoring step
for receiving the codeword and decoding the codeword
into a sequence of binary symbols and a first
probability estimating step of estimating an occurrence
probability of one of the binary symbols, and a step of
outputting one of the binary symbols as a result of the
determination indicating whether a prediction error is
zero,
a second decoding step of decoding the codeword for the
decoding picture element and having the prediction
error not zero into the prediction error not zero using
a second symbol restoring step of receiving the
codeword and decoding the codeword into a sequence of
binary symbols, a second probability estimating step of
estimating an occurrence probability of one of the
binary symbols, and a first symbol-to-error converting
step using a first conversion table not including the
prediction error value zero, of receiving the sequence
of binary symbols and converting the sequence of binary
symbols into the prediction error; and
a first decoding picture element calculating step of
calculating the value of the decoding picture element
based on the prediction value for the decoding picture
element calculated by the first predicting step, and
the prediction error not zero obtained by the second
decoding step,

wherein the second main decoding step comprises:
a second predicting step of calculating a prediction
value(s) of the decoding picture element(s) based on
the value of the reference picture element;
a third decoding step of decoding the codeword for the
decoding picture element using a third symbol restoring
step of receiving the codeword and decoding the
codeword into a sequence of binary symbols, a third
probability estimating step of receiving the binary
symbols and estimating an occurrence probability of one
of the binary symbols, and a second symbol-to-error
converting step of receiving the sequence of binary
symbols and converting the sequence of binary symbols
into the prediction error using a second conversion
table including the prediction error value zero; and
a second decoding picture element calculating step of
calculating the value of the decoding picture element
based on the prediction value calculated by the second
predicting step and the prediction error calculated by
the third decoding step, and

wherein the mode deciding step receives the values of
the reference picture elements output from said
outputting step and the result of the determination
decoded by said first decoding step, and selects a
decoding mode between the specific decoding mode used
by the first decoding section (201) and the decoding
mode other than the specific decoding mode used by the
second decoding section (202), such that the specific
decoding mode (Mode A) is continued when the prediction
result of determination determines that the prediction
has proved to be correct, when the prediction result
determines that the prediction has proved to be
incorrect the decoding picture element is decoded in

the specific decoding mode (Mode A) and then the
decoding mode (Mode B) other than the specific decoding
mode is set, the specific decoding mode (Mode A) is
selected when the values of adjacent reference picture
elements are the same and the decoding mode other than
the specific decoding mode is continued when the values
of adjacent reference picture elements are not the
same."

XI.    The reasoning in the decision under appeal, insofar as
       it is relevant for the present decision, may be
       summarised as follows.

       (a)   The problem to which the application is directed
             is to provide efficient encoding and decoding by
             switching between different types of encoding and
             decoding systems.

             Claim 1 defines a first and a second encoding
             section, each comprising an encoder. Claim 1 does
             not imply that the above (second and third)
             encoders are different and output different
             codewords. Switching between them thus serves no
             technical purpose.

             The mode determinator of claim 1 is a broad
             generalisation of the flow chart of figure 10, and
             the relationship between the technical nature of
             the various modes and the "combination pattern" is
             neither defined nor implied. Claim 1 is not
             limited to the embodiment of figure 4 and the
             switching according to figure 10.

As a result, claim 1 allows embodiments not
solving the technical problem and not making
technical sense. It is therefore not supported by
the description.

(b)   Claims defining the codeword output by the first
encoder having a "small codeword length" and the
codeword output by the second encoder having a
"greater codeword length" infringe Article 123(2)
EPC.

XII.   The appellant's argumentation may be summarised as
follows.

An essential inventive feature of the encoding
apparatus lies in the first encoder encoding the
(binary) result of the test as to whether the
prediction error is zero, indicating that the
prediction is correct, in contrast to the other
encoders encoding the prediction error.

Claim 1 has to be considered as a whole, *i.e.* the
interaction between the different parts of the
apparatus has to be considered. The first encoding
section comprises a first encoder encoding all the
picture elements having a zero prediction error in a
way different from those having a non-zero prediction
error, and a second encoder encoding non-zero
prediction errors. The third encoder in the second
encoding section encodes all the other prediction
errors. The skilled person furthermore gathers from
claim 1 that the choice of the encoding mode and/or
encoder depends on the prediction result and on a
condition for the reference picture elements.

The person skilled in the technical field of encoding
thus deduces from the claim that the first encoding
section (comprising the second encoder) may encode
picture elements differently from the second encoding
section (comprising the third encoder) and may be used
when a good predictability is given.

The application as a whole has to sufficiently disclose
the invention for it to be carried out as required by
Article 83 EPC, which is not at issue in the present
case. In contrast, Article 84 EPC does not require that
the claim define the details of the embodiments. The
description teaches that in case of good predictability
a very high efficiency can be achieved by the first
encoder providing a codeword encoding a number of
prediction results before an incorrect prediction
result is determined. The description also teaches that
the second encoder generates shorter codewords than the
third encoder because it is designed not to encode the
zero prediction error. Setting out these details in
claim 1 is however not necessary because claim 1 gives
enough technical information for the person skilled in
the art to routinely implement the apparatus and solve
the technical problem of enhancing coding efficiency.

The structure of the apparatus and the rules for
choosing a mode and/or an encoder according to claim 1
provide sufficient flexibility for the skilled person
to design an implementation having an enhanced
compression efficiency, and to routinely discard
disadvantageous or technically senseless
implementations, even if those are in principle allowed
by the claim.

As a result, claim 1 and the further corresponding
independent claims are supported by the description.

A basis for the last paragraph of claim 1 according to
the main request may be essentially found in the
definition of the mode determinator in paragraph [0037]
of the present application as published together with
figure 10 and the corresponding passages in the
description. The claim complies therefore with the
requirements of Article 123(2) EPC.

## Reasons for the Decision

1.    The appeal is admissible.

2.    *Main request*

2.1   The last paragraph of claim 1 sets out that the mode
      determinator "determines the encoding mode based on the
      prediction results of the determination and whether all
      the values of the reference picture elements have the
      same value". In the context of claim 1 this means that
      one of the plurality of predefined encoding modes,
      namely the specific encoding mode (Mode A) or the
      encoding mode other than the specific encoding mode
      (Mode B), is determined based on any combination of the
      two conditions.

2.2   Paragraph [0037] (in the following all the references
      to paragraph numbers relate to the present divisional
      application as published) discloses that the mode
      determinator selects an encoding mode "based on the

value of the reference picture element" (an identical
wording is used on page 17, paragraph 1, of the
divisional application as filed). The mode deciding
operation shown in the flow chart of figure 10
essentially discloses that Mode A is initially set (S11)
and newly set when, being in Mode B, the reference
picture elements have the same value (decision box S16).
Mode B is set (S17) when, being in Mode A, the zero
determinator indicates that the prediction result is
not correct (not zero; decision box S15). A very small
prediction error is also considered as a correct
prediction result (see paragraphs [0117] and [0140]).

2.3     Figure 10 and the corresponding passages in the
        description do not disclose a mode determination based
        on another combination of the prediction results and of
        whether all the reference picture elements have the
        same value, for instance by setting (back) Mode A based
        on the prediction results or setting Mode B based on a
        particular other combination of both the prediction
        results and all the reference picture elements having
        the same value.

2.4     The above feature of claim 1 is also not derivable from
        another embodiment in the flow chart of figure 18, in
        which the encoding mode is determined based only on
        whether all the reference picture elements have the
        same value (see decision box S3). Similarly it is also
        not derivable from an alternative combination of
        reference picture elements envisaged in
        paragraph [0268], which corresponds to the last
        paragraph on page 119 of the divisional application as
        filed.

2.5     Therefore claim 1 of the main request does not comply
        with the requirements of Article 123(2) EPC.

2.6     As a result, the main request is not allowable.

3.      *First auxiliary request*

3.1     Concerning the problems solved by the present
        application, the description refers to a "related
        art 2" for counting and encoding a number of
        consecutive more probable symbols (MPS) into a codeword
        using a plurality of codeword tables. The codeword
        tables must allot an (at least one-bit long) code for
        each picture element regardless of whether or not the
        prediction has proved to be correct (see
        paragraphs [0011] and [0028]; figures 67 and 68). The
        description also refers to a "related art 3" switching
        between a mode A and a mode B for encoding/decoding
        depending on a condition for the value(s) of reference
        picture element(s) (see paragraph [0019]; figure 69).
        According to a further "related art 4", an apparatus
        switches between an encoding section comprising a lossy
        picture compression circuit and an encoding section
        comprising a lossless picture compression circuit
        according to the condition (see paragraph [0029];
        figure 70).

3.2     The most general object of the present invention is to
        efficiently implement encoding and decoding of picture
        information, in particular by switching between
        different types of encoding and decoding systems (see
        paragraphs [0031] and [0032]).

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3.3     The claims according to the first auxiliary request are
        directed to the first embodiment described (see, for
        instance, figure 4 for the encoding apparatus and
        figure 10 for the flow chart of the mode deciding
        operation).

3.4     As is apparent from the description, in view of this
        background encoding efficiency is considerably enhanced
        in the first place by the first encoder outputting a
        codeword for a series of more probable symbols (MPS),
        essentially by forming a codeword reflecting the count
        of consecutive MPS (see paragraphs [0144], [0145] and
        [0163]). The first encoder encodes into a single
        codeword a series of consecutive MPS as prediction
        results indicating a correct prediction (*i.e.* Boolean-
        type match/mismatch binary information), for instance a
        series of zeroes (see figure 67). Encoding the count of
        correct prediction results instead of each (zero)
        prediction error (for each of which at least a one-bit
        code is required) can greatly reduce the number of
        encoding bits for images with good predictability. The
        first encoder operates under these favourable
        conditions only if the rules for switching the encoding
        mode under which the first encoder operates are chosen
        such that the first encoder predominantly receives
        series of MPS.

        Therefore the features are presented as essential which
        make the first encoder suitable for predominantly
        processing series of picture elements yielding
        prediction results consecutively indicating a correct
        prediction, by switching the encoding mode according to
        judicious rules, and for efficiently encoding such

series of prediction results representing the encoding picture elements.

The disclosure in the description having regard to the technical problems and the advantageous effects of the invention supports a claim where these features constitute the improvement over the known pieces of "related art" referred to in the description. The board can see no support in the description for a generalised teaching that a combination of switching between encoding modes and, in one of the modes, switching between two encoders would provide an enhanced coding efficiency. It follows that the requirement of support by the description according to Article 84 EPC 1973 is fulfilled only if the claimed encoding apparatus reflects these essential features.

3.5     The last paragraph of claim 1 sets out rules for determining and operating a particular encoding mode (and encoder) essentially as shown in the flow chart of figure 10, in particular continuing the specific encoding mode (Mode A; under which the first encoder operates) when the prediction has proved to be correct (*i.e.* when the prediction error is zero); in the alternative setting the other than the specific encoding mode (Mode B) and switching from Mode B to Mode A when the values of adjacent reference picture elements are the same. The skilled person would recognise that determining whether the values of adjacent reference picture elements are the same or not provides an indication of the predictability of a picture element, *i.e.* of the likelihood that the prediction result for the encoding picture element will be correct (see figure 69 and the condition boxes S15

and S16 in the flow chart of figure 10). The specific
encoding mode (under which the first and second
encoders operate) is thus predominantly determined for
predictable picture elements.

3.6     However the first encoder according to claim 1 is
        merely defined as "for receiving and encoding the
        prediction result of the determination output from the
        zero determinator (4), and for outputting the codeword
        representing whether the prediction result of the zero
        determinator is correct or not". It may output a
        codeword for each prediction result and may, for
        instance, also be used together with the second encoder
        to output a codeword for a given picture element (see
        "outputting a codeword representing the encoding
        picture element" in the feature specifying the first
        encoding section). Claim 1 is thus not explicitly
        limited to the first encoder receiving and encoding a
        prediction result indicating a correct prediction into
        a codeword, let alone encoding a series or a sequence
        thereof into the codeword. The board also does not see
        a limitation on the first encoder that would implicitly
        result from the determination of the encoding mode (see
        the foregoing section) and from the definition of the
        second encoder. As a result, claim 1 does not define
        all the features of the first encoder identified in
        section 3.4 above as being necessary to achieve
        enhanced coding efficiency.

3.7     The board accepts that the first encoder encoding
        prediction results (*i.e.* binary results), rather than
        prediction errors (*i.e.* values in the range [-255, +255]
        in the examples of figures 8 and 9), is a crucial
        feature of the invention. It is however *per se* not

sufficient to bring about the enhanced coding
efficiency, if claim 1 does not specify the essential
features to ensure that the first encoder predominantly
receives and encodes sequences of more probable binary
symbols representing such prediction results as a
codeword.

3.8    The appellant argues that an apparatus with two
       sections and three encoders is more flexible and
       therefore may be more optimal than the prior art
       systems. However this does not take into account that
       encoding apparatuses with several encoders are
       acknowledged in the description as being prior art, in
       particular according to the "related art 3" or the
       "related art 4" disclosing the switching between two
       encoding modes or sections (see section 3.1 above). The
       present invention seeks to improve such prior art (see
       paragraphs [0022] to [0024] and [0029]). The board
       agrees with the appellant that three encoders allow in
       principle more flexibility than one or two and that
       they _may_ be implemented so as to bring about the
       sought-after advantage. This structure alone is however
       not sufficient in the board's view to bring about the
       enhanced efficiency of the present invention.

3.9    The appellant argues that the skilled person would not
       contemplate embodiments of the invention not regarded
       as advantageous, _i.e._ embodiments not achieving an
       enhanced efficiency. However in accordance with
       Article 84 EPC 1973 the claims shall define the matter
       for which protection is sought. To this effect they
       have to explicitly specify all of the essential
       features needed to define the invention as it can be
       understood from the description.

3.10   In conclusion, claim 1 is not supported by the
       description and therefore infringes Article 84 EPC 1973.

3.11   As a result, the first auxiliary request is not
       allowable.

4.     *Second auxiliary request*

4.1    The claims according to this request are also directed
       at the first embodiment described.

4.2    Claim 1, as distinguished from claim 1 of the first
       auxiliary request, specifies an encoding apparatus with
       a first encoder according to figure 5, comprising *inter
       alia* a first probability estimator for receiving the
       result of the determination output from the
       determinator as a sequence of binary symbols, and a
       first codeword allotter for encoding the sequence of
       binary symbols into a codeword and for outputting said
       codeword. The last paragraph of claim 1 sets out the
       mode determinator switching between the two encoding
       modes (Mode A, Mode B) in the same terms as the first
       auxiliary request.

       Claim 1 thus defines both the first encoder coding a
       sequence of binary symbols into a codeword and the
       rules ensuring that the first encoder predominantly
       receives and encodes more probable binary symbols (see
       sections 3.4 and 3.5 above).

4.3    As a result, claim 1 defines the technical features
       ensuring that enhanced coding efficiency may be

achieved and it is supported by the description in the meaning of Article 84 EPC 1973.

4.4    The examining division objected that claim 1 was not so worded as to imply that the second and third encoders would be different and output different codewords. The board is of the opinion that the (amended) definition of the criteria essentially according to the flow chart of figure 10 for switching between the two encoding modes (Mode A, Mode B), *i.e.* between the first and second encoding sections respectively comprising the second and third encoders, ensures that the first encoding section (comprising the second encoder) and thus a specific encoding mode is selected when identical values of the reference picture elements hint at good predictability. The second encoding section (comprising the third encoder) and thus the encoding mode other than the specific encoding mode is only selected when the values of the reference picture elements hint at bad predictability. Moreover claim 1 now also specifies that the second and third encoders have different conversion tables, one including the prediction error value zero and the other not. Switching between them thus makes technical sense under these conditions because both the second and third encoders can be adapted to their different tasks, the second encoder only encoding the prediction error before the mode is changed and the third encoder encoding prediction errors in case of bad predictability, regardless of whether the prediction is correct.

4.5    Corresponding definitions are included in the other independent claims relating to the corresponding

decoding apparatus (claim 6), encoding method (claim 11)
and decoding method (claim 13). These claims are
therefore also supported by the description in the
meaning of Article 84 EPC 1973.

4.6     In conclusion the grounds for refusing the present
        application under Article 84 EPC 1973 do not apply any
        more to the claims according to the second auxiliary
        request.

5.      The expressions "small codeword length" and "greater
        codeword length" found to infringe Article 123(2) EPC
        in the decision under appeal are not comprised in the
        independent claims according to the present second
        auxiliary request. As a result, the ground for refusing
        the present application under Article 123(2) EPC no
        longer applies.

6.      Hence, none of the grounds for refusing the present
        application applies any more to the second auxiliary
        request, and the decision under appeal must be set
        aside.

7.      *Remittal to the first instance*

        The examining division has dealt essentially with the
        issue of support by the description in the examination
        proceedings. A full examination as to whether the
        application complies with the other requirements of the
        EPC is still outstanding. In view of these
        circumstances the board exercises its discretion in
        accordance with Article 111(1) EPC 1973 and decides to
        remit the case to the first instance for further
        prosecution on the basis of the second auxiliary

request. The board has noted that the set of claims
still shows several linguistic and typographical errors
which are reproduced in the set of claims above as they
were filed.


**Order**


**For these reasons it is decided that:**


1.      The decision under appeal is set aside.


2.      The case is remitted to the first instance for further
        prosecution.


The Registrar                               The Chairman




L. Fernández Gómez                          F. Edlinger