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Datasheet for the decision
of 16 November 2010

Case Number:	T 1616/06 - 3.5.04
Application Number:	98906493.6
Publication Number:	0962092
IPC:	H04N 1/00
Language of the proceedings:	EN

Title of invention:
Method and apparatus for recovering quantized coefficients

Applicants:
Mediatek Inc.
Sharp Kabushiki Kaisha

Opponent:
-

Headword:
-

Relevant legal provisions:
RPBA Art. 13(1)

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

Keyword:
"Clarity (no) - main request"
"Support by description (no) - first auxiliary request"
"Admissibility (no) - second auxiliary request"

Decisions cited:
-

Catchword:
-

Case Number: T 1616/06 - 3.5.04

D E C I S I O N
of the Technical Board of Appeal 3.5.04
of 16 November 2010

Appellants:

Mediatek Inc.
No. 1-2
Innovation Road 1
Science Based Industrial Park
Hsin Chu City   (TW)

Sharp Kabushiki Kaisha
22-22, Nagaike-cho
Abeno-ku
Osaka-shi
Osaka 545-8522   (JP)

Representative:

Meldrum, David James
D Young & Co LLP
120 Holborn
London EC1N 2DY   (GB)

Decision under appeal:

Decision of the Examining Division of the European Patent Office posted 2 June 2006 refusing European application No. 98906493.6 pursuant to Article 97(1) EPC 1973.

Composition of the Board:

Chairman: F. Edlinger
Members: M. Paci
                 T. Karamanli

C4975.D

Summary of Facts and Submissions

I.   This appeal is against the decision of the examining
       division to refuse European patent application
       No. 98 906 493.6, published as WO 98/36553 A2.

II.   The decision under appeal was based on the grounds that
       the subject-matter of claims 1, 7 and 9 of the main and
       second auxiliary requests did not involve an inventive
       step (Article 56 EPC 1973) and that the first auxiliary
       request was not admitted into the procedure in
       accordance with Rule 86(3) EPC 1973.

III.   With the statement of grounds of appeal, the
       co-appellants (hereinafter "the appellants") submitted
       complete documents of a main request, first and second
       auxiliary requests, respectively, including pages 1, 2,
       2A and 3 to 14 of the description and drawings
       sheets 1/4 to 4/4.

IV.   In a communication accompanying the summons to oral
       proceedings the board, *inter alia*, expressed doubts as
       to whether claim 1 according to the main request was
       clear and supported by the description (Article 84 EPC
       1973).

V.   With a letter dated 13 October 2010 the appellants
       filed respective sets of amended claims according to a
       main request and an auxiliary request, replacing all
       requests then on file, as well as the following
       document as supporting evidence for the technical
       meaning of certain terms used in claim 1:

D9:   P. Symes, "Digital Video Compression", McGraw-
      Hill, 2004, cover sheets and pages 67-87

VI.   Oral proceedings were held before the board on
       16 November 2010. During the oral proceedings, the
       appellants filed a set of amended claims according to a
       second auxiliary request.

VII.   The appellants' final requests are that the decision
       under appeal be set aside and that a patent be granted
       on the basis of the main request, or, in the
       alternative, the first auxiliary request, both filed
       with a letter of 13 October 2010, or the second
       auxiliary request, filed in the oral proceedings.

VIII. Independent claim 1 according to the **main request** reads
       as follows:

       "A method for adjusting decoded pixel values that are
       representative of an image, where said decoded pixel
       values have previously undergone a transform operation
       and a quantization operation, said method comprising
       the steps of:
            (a) selecting a block of decoded pixel values;
            (b) dividing said block into a plurality of
       subblocks;
            (c) computing an adjustment value for each of said
       subblocks;
            (d) applying a forward transform to the plurality
       of adjustment values corresponding to said plurality of
       subblocks to produce a plurality of transform
       coefficients;
            (e) determining whether said plurality of
       adjustment values should be applied to said decoded

pixel values, said determining step comprising
comparing said plurality of transform coefficients with
a quantization step employed by said quantization
operation; and

    (f) adjusting said decoded pixel values within
each subblock in accordance with said plurality of
adjustment values, if said determining step (e)
determines that said plurality of adjustment values
should be applied, and if said determining step (e)
determines that said plurality of adjustment values
should not be applied to a given subblock, outputting
said given subblock and repeating steps (c) through (f)
for remaining subblocks in said plurality of
subblocks."

Claims 2 to 9 according to the main request have no
bearing on the present decision.

IX.   Independent claim 1 according to the **first auxiliary
request** has the same wording as claim 1 of the main
request except for feature (c):

"…
    (c) computing an adjustment value for each of said
subblocks, said adjustment value being configured to
adjust the median pixel value of each of said plurality
of subblocks;
…"

Claims 2 to 15 according to the first auxiliary request
have no bearing on the present decision.

X.   Independent claim 1 according to the **second auxiliary request** reads as follows:

"A method for adjusting decoded pixel values that are representative of an *inter-coded* image, where said decoded pixel values have previously undergone a transform operation and a quantization operation, said method comprising the steps of:

(a) selecting a block of decoded pixel values *corresponding to the block size of the transform used in the encoder;*

(b) dividing said block into a plurality of subblocks;

(c) computing an adjustment value for each of said subblocks, said adjustment value being configured to adjust the median pixel value of each of said plurality of subblocks *to have a value of zero;*

(d) applying a forward transform to the plurality of adjustment values corresponding to said plurality of subblocks to produce a plurality of transform coefficients*, the forward transform being the same as the transform operation previously applied to the pixel values;*

(e) determining whether said plurality of adjustment values should be applied to said decoded pixel values, said determining step comprising comparing said plurality of transform coefficients with a quantization step employed by said quantization operation;

(f) adjusting said decoded pixel values within each subblock *by applying the respective* adjustment value *to each pixel value of the subblock*, if said determining step (e) determines that said plurality of adjustment values *fit within the quantization step*, and

if said determining step (e) determines that said plurality of adjustment values *for a given subblock do not fit within the quantization step*, outputting said given subblock *without adjustment* and repeating steps (c) through (f) for remaining subblocks in said plurality of subblocks; *and*

(g) if after repeating steps (c) through (f) until no sub-blocks remain, no subblock adjustment values are computed for which the corresponding transform coefficient fits within the quantization step, no adjustment values are applied to any subblock of the selected block."

[The amendments over claim 1 according to the first auxiliary request (essentially added features) are set in italics.]

Claims 2 to 9 according to the second auxiliary request have no bearing on the present decision.

XI. The appellants argued essentially as follows regarding the requirements of Article 84 EPC 1973 for claim 1 according to the main and first auxiliary requests and regarding the admissibility of the second auxiliary request:

Main request - Article 84 EPC 1973

Re "adjustment value"

While the board has expressed doubts as to the clarity of the term "adjustment value" in the context of claim 1, the board seems to express a clear and unambiguous interpretation of this term. The appellants

agree with the interpretation of this term as presented
by the board as this appears to be entirely appropriate
in the context of the presently claimed invention.
Specifically, the appellants believe that the board's
interpretation of "adjustment value" as "a value with
certain limitations which are not clearly defined" to
be, for all practical purposes, the same as "a value".
Thus, the term is clear in the sense required by
Article 84 EPC 1973.

*Re "forward transform" and "plurality of transform
coefficients"*

The appellants disagree that the terms "forward
transform" and "plurality of transform coefficients" in
step (d) of claim 1 lack clarity for the following
reasons.

D9, a textbook on Digital Video Compression, describes
the term "transform" at page 68, first paragraph; the
reversibility of transforms at page 69, last paragraph;
the term "forward transform" at page 82, paragraphs 1
and 4; the production of coefficients using transforms
from the last paragraph on page 70 through the first
full paragraph on page 71, page 75 in its entirety,
page 78, first full paragraph, page 80, lines 4 and 5,
page 80, first full paragraph, and page 87, second full
paragraph; and the term "transform coefficients" at
page 78, first full paragraph, and page 87, second full
paragraph.

Furthermore, the claim clearly defines the role played
by the plurality of transform coefficients as being
part of the determining step (e) and the role of the

forward transform as being to produce the transform coefficients. These uses of the terms and roles of the claim elements are entirely consistent with the knowledge, understanding and/or use of the terms by those skilled in the art. Thus it is submitted that the present claim language "forward transform" and "plurality of transform coefficients" is clear and intelligible to the skilled person, in accordance with Article 84 EPC 1973.

Re Step (e)

Although the appellants do not fully agree with the board's concern, that determining step (e) is merely defined as a result to be achieved and therefore not clear, steps (e) and (f) in claim 1 have been amended to address the board's concern. Specifically, step (e) of claim 1 has been amended to specify that the determining step comprises comparing a plurality of transform coefficients with a quantization step employed by the quantization operation that the decoded pixel values have previously undergone. Also, step (f) of claim 1 has been amended to recite the outcome where the determining in step (e) reaches a negative conclusion. Thus it is submitted that step (e) is clear in the context of the claim as a whole, in accordance with Article 84 EPC 1973.

First auxiliary request – Article 84 EPC 1973

In view of the board's opinion on the clarity of the term "adjustment value", the claims have been amended to indicate a technical definition of this feature relating to other ones of the claim elements. Thus

further technical meaning is imparted to this term such
that the claims are clear in accordance with Article 84
EPC 1973.

Admissibility of the second auxiliary request

The second auxiliary request should be admitted into
the proceedings because the amendments made to claim 1
according to this request overcome the board's
objections under Article 84 EPC 1973. These amendments
could not have been filed earlier because the
appellants did not have all the details of the board's
objections before the oral proceedings.

Reasons for the Decision

1.   The appeal is admissible.

2.   Although D9, to which the appellants referred in
        support of the technical meaning of certain terms, was
        published more than five years after the priority date
        of the present application, the board considers that
        the relevant passages of this extract of a textbook on
        digital video compression do not go beyond the common
        general knowledge at the priority date. The board will
        thus also refer to this textbook extract below.

Main request - Article 84 EPC 1973

3.   The method of claim 1 concerns a "method for adjusting
        decoded pixel values that are representative of an
        image".

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According to the description of the application, the
technical problem solved by the invention is to reduce
blocking and ringing artifacts associated with the
coding of images or video frames (see page 1, lines 8
to 10). The description further states that the method
of the invention solves this problem by recovering or
adjusting quantized coefficients by using a nonlinear
scheme (see page 1, lines 10 to 12, and page 2A,
lines 4 and 5, corresponding to page 2, lines 5 to 7,
of the published application).

4.   *Re the term "adjustment value[s]"*

Claim 1 does not define the term "adjustment value[s]"
in steps (c) to (f). The board does not dispute the
appellants' assertion, supported by a printout of an
internet consultation of the Compact Oxford English
Dictionary filed before the examining division, that
the verb "to adjust" means "to alter slightly so as to
achieve a desired result". The board, however, does not
regard the expression "adjustment value" as having a
clear meaning in the context of claim 1 for the
following reasons. Firstly, in the absence of more
information in the claim, it is ambiguous whether the
"adjustment value" represents the difference between an
initial value and an adjusted value, or the adjusted
value itself. Secondly, claim 1 does not indicate the
desired result of the slight alterations in the meaning
of the dictionary definition. Nor does claim 1 clearly
indicate how the adjustment values are calculated and
to what effect. Whereas claim 1 specifies that the
plurality of forward transformed adjustment values (one
for each of a plurality of subblocks) is used for a
comparison with "a quantization step" for determining

whether the plurality of adjustment values should be applied or not, neither the grouping of values nor the comparison (individually or groupwise) help to clarify the purpose of the adjustments. In the absence of such information the expression "computing an adjustment value" could mean anything ranging from "computing a value" to "computing a value with certain limitations not clearly defined".

The appellants argued that the term "an adjustment value" means, for all practical purposes, "a value".

The board cannot share this view because it is based on the assumption that the word "adjustment" can simply be ignored as having no limiting effect whatsoever. This assumption, however, is not correct because, as the above dictionary definition of the verb "to adjust" indicates, the word "adjustment" must have a limiting effect, both as limiting the range in which the value may be ("to alter slightly") and as to the direction of the alteration ("to achieve a desired result"). Both the range and the direction appear important in steps (d) to (f) of claim 1 in order to determine whether the plurality of adjustment values should be applied or not. Moreover, the board is not convinced that the description of the application supports an interpretation of the term "adjustment value" as broad as put on by the appellants.

5.   *Re the term "forward transform"*

Claim 1 does not provide any information as to the type of the "forward transform". A "transform", according to the definition given on page 68 of D9 is "a

mathematical rule that may be used to convert one set
of values to a different set". The word "forward"
before "transform" is commonly used to distinguish the
transform from its mathematical reciprocal called the
"inverse transform". The expression "forward transform"
in claim 1 thus covers any type of mathematical
transform. By way of contrast, the description states
that the forward transform is "equivalent to the
forward transform that was used in the encoder to
encode the original signal" (see page 2A, lines 8 to 11,
of the description). Such forward transforms used for
encoding blocks of an image are known to be transforms
from the time or spatial domain to the frequency or
spatial frequency domain, such as a Discrete Cosine
Transform (DCT) or a wavelet transform (see page 4,
lines 13 to 16, of the description). The expression
"forward transform" in claim 1 is therefore much more
general than the specific types of transforms referred
to in the description. The application does not
disclose how the technical problem of reducing blocking
and ringing artifacts associated with the coding of
images or video frames could be solved without the
"forward transform" of claim 1 being a transform from
the spatial domain to the spatial frequency domain, in
particular the transform which was used for encoding
where the problem was created in a lossy quantization
step (see page 1, lines 15 to 34, of the description).
The board thus considers that there is a lack of
support in the description for the use of such a broad
expression as "forward transform" without further
limitations.

The appellants referred to passages of D9 to support
their argument that the expression "forward transform"
in claim 1 has a clear meaning.

Even if, contrary to what can be understood from the
description, it were not necessary in the context of
claim 1 that the forward transform is equivalent to the
one used in the encoder, it is still necessary to
distinguish between the different meanings this
expression may have. Pages 68 and 69 of D9, describe
"transforms" in general, and pages 70 to 87 of D9 refer
to a specific class of transforms from the time or
spatial domain to the frequency or spatial frequency
domain, in particular the Fourier transform, and more
particularly the Discrete Cosine Transform (DCT). The
first paragraph on page 68 of D9 confirms the board's
view that a transform also covers "a mathematical rule
that may be used to convert one set of values to a
different set". The passages cited by the appellants on
pages 70 to 87 apply to Fourier transforms, in
particular to DCT transforms. The expression "forward
transform" in claim 1, however, is not limited to these
types of transforms. The appellants' arguments are
based on an unduly narrow meaning of this expression
which also finds no support in D9. Hence the
appellants' arguments fail to convince the board.

Therefore, the board concludes that the expression
"forward transform" has a broad meaning which leads to
a lack of support in the description in the present
case, as explained above.

6.   Moreover, step (d) compounds the problems discussed in sections 4 and 5 *supra* by stating that the "forward transform" is applied to the "adjustment values". This is so because the comparison with a quantization step is made with the transform coefficients which evidently depend on the type of the forward transform.

7.   *Conclusion*

For the above reasons, claim 1 does not fulfil the requirements of Article 84 EPC 1973. Thus the appellants' main request is not allowable.

First auxiliary request - Article 84 EPC 1973

8.   Claim 1 according to the first auxiliary request adds the following phrase at the end of step (c): "said adjustment value being configured to adjust the median pixel value of each of said plurality of subblocks".

This additional phrase essentially states that the adjustment value "adjusts" the median pixel value of each subblock. However, the purpose of the adjustment remains unclear as in claim 1 according to the main request. Whereas claim 1 now specifies that median adjustment values are computed for each subblock (one value per subblock), the effect of the comparison of the "plurality of transform coefficients" (i.e. the transformed median adjustment values) with a quantization step remains unclear. The same is true for the type of the forward transform. The description appears to make an assumption of median values around zero and to make adjustments so that the medians will be caused to be zero (see for instance page 10, lines 5

to 20, and figure 2: 220 to 250). However, the board
does not see support in the description for a
comparison of the plurality of (median) transform
coefficients with a quantization step in general, in
particular where the forward transform is not
necessarily equivalent to the one used in the encoder.
Hence the above additional wording does not overcome
the objections under Article 84 EPC 1973 raised under
sections 4 to 6 *supra*.

Accordingly, the appellants' first auxiliary request is
not allowable.

Second auxiliary request - Article 13 RPBA

9.   According to Article 13(1) RPBA (Rules of Procedure of
        the Boards of Appeal, OJ EPO 2007, 536), any amendment
        to a party's case after it has filed its grounds of
        appeal may be admitted into the proceedings and
        considered at the board's discretion. The discretion
        shall be exercised in view of *inter alia* the complexity
        of the new subject-matter submitted, the current state
        of the proceedings and the need for procedural economy.

10.   In the present appeal proceedings, the appellants filed
        amended claims 1 to 9 during the oral proceedings
        before the board. These claims comprised numerous
        extensive amendments compared to the claims then on
        file or previously considered during the appeal
        proceedings. Some of the amendments were indeed an
        attempt to overcome objections which the board had
        raised in the communication annexed to the summons to
        oral proceedings and further explained in oral
        proceedings. However, at a very late stage of the

appeal proceedings, these amendments also comprised features which had never been discussed before. These new features obviously raised new and complex issues under Article 84 EPC 1973 which needed further examination and discussion. For instance, one of the amendments to claim 1 referred to a "plurality of adjustment values for a given subblock", which contradicts step (c) of the claim stating that there is one adjustment value for each subblock. The presentation of complex subject-matter at such a late stage of proceedings goes, however, against procedural economy.

For the above reasons, the board exercised its discretion under Article 13(1) RPBA and did not admit the appellants' second auxiliary request into the proceedings.

Conclusions

11.   Since the appellants' main and first auxiliary requests are not allowable and the appellants' second auxiliary request was not admitted into the proceedings, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

G. Rauh   F. Edlinger