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Datasheet for the decision
of 6 October 2015

Case Number:	T 2015/10 - 3.5.04
Application Number:	06825695.7
Publication Number:	1949702
IPC:	H04N7/26
Language of the proceedings:	EN

Title of invention:
METHODS AND APPARATUS FOR WEIGHTED PREDICTION IN SCALABLE
VIDEO ENCODING AND DECODING

Applicant:
Thomson Licensing

Headword:

Relevant legal provisions:
EPC 1973 Art. 56

Keyword:
Inventive step - (no)

Decisions cited:

Catchword:

Beschwerdekammern
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Chambres de recours

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Case Number: T 2015/10 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 6 October 2015

Appellant: (Applicant)	Thomson Licensing 1-5, rue Jeanne d'Arc 92130 Issy-les-Moulineaux (FR)
Representative:	Hofstetter, Schurack & Partner Patent- und Rechtsanwaltskanzlei Partnerschaftsgesellschaft mbB Balanstraße 57 81541 München (DE)
Decision under appeal:	Decision of the Examining Division of the European Patent Office posted on 19 May 2010 refusing European patent application No. 06825695.7 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman	C. Kunzelmann
Members:	R. Gerdes
	T. Karamanli

Summary of Facts and Submissions

I.   The appeal is directed against the decision to refuse
       European patent application No. 06 825 695.7, published
       as international application WO 2007/047271 A2.

II.   The patent application was refused by the examining
       division on the grounds of lack of novelty
       (Article 54(1) and (2) EPC) of the subject-matter of
       the independent claims of the main request and first
       auxiliary request then on file in view of document

       D1: YIN P ET AL: "Weighted Prediction in SVC", JOINT
            VIDEO TEAM (JVT) OF ISO/IEC MPEG & ITU-T VCEG
            (ISO/IEC JTC1/SC29/WG11 AND ITU-T SG16 Q6),
            25 July 2005, pages 1 to 10, XP002399866.

       Moreover, the subject-matter of claim 1 of the second
       auxiliary request then on file was found not to involve
       an inventive step (Article 56 EPC) in view of D1 and
       the common general knowledge.

III.   The applicant appealed against this decision and
       submitted claims of a third auxiliary request together
       with its statement of grounds.

IV.   The board issued summons to oral proceedings and
       indicated in the annex to the summons that it tended to
       concur with the findings in the decision under appeal.
       With respect to the claims of the third auxiliary
       request, the board indicated that inventive step in
       view of D1 would have to be discussed at the oral
       proceedings.

V.   The appellant replied with a letter dated
       4 September 2015 submitting claims of a new main

request and first to third auxiliary requests as well
as arguments relating to clarity and inventive step.

VI.   The board held oral proceedings on 6 October 2015. As
        announced beforehand the appellant was not represented
        at the oral proceedings. The chairman noted that the
        appellant had requested in writing that the decision
        under appeal be set aside and that a patent be granted
        on the basis of the claims of the main request or, in
        the alternative, on the basis of the claims of one of
        the first to third auxiliary requests, all requests
        filed with the letter dated 4 September 2015.

VII.   Claim 1 of the main request and of the first auxiliary
        request reads as follows:

        "A method for scalable video encoding, comprising:

        encoding a block in a layer of a picture which is lower
        than an enhancement layer of said picture by applying a
        weighting parameter to a lower layer reference picture,

        encoding (700, 1100) a block in said enhancement layer
        of said picture by applying a weighting parameter to an
        enhancement layer reference picture, wherein the
        weighting parameter used to encode the block in the
        enhancement layer is adaptively selected from between
        the weighting parameter applied to the lower layer
        reference picture and a different weighting parameter
        applicable in the enhancement layer, the block in the
        enhancement layer corresponding to the block in the
        lower layer, and the enhancement layer reference
        picture corresponding to the lower layer reference
        picture,

        wherein upon adaptively selecting

a) use is made of a rate distortion optimization technique to decide on the weighting parameter to be used for each inter-layer predicted macroblock and wherein the different weighting parameter is used for all other macroblocks, or

b) wherein the cost of encoding of inter-layer macroblocks with weighting parameters applied to the lower layer reference picture is compared to the costs of encoding with different parameters for inter-layer macroblocks and for non inter-layer macroblocks."

VIII. Claim 1 of the second and third auxiliary requests reads as follows:

"A method for scalable video encoding, comprising:

encoding a block in a layer of a picture which is lower than an enhancement layer of said picture by applying a weighting parameter to a lower layer reference picture,

encoding (700, 1100) a block in said enhancement layer of said picture by applying a weighting parameter to an enhancement layer reference picture, wherein the weighting parameter used to encode the block in the enhancement layer is adaptively selected from between the weighting parameter applied to the lower layer reference picture and a different weighting parameter applicable in the enhancement layer, the block in the enhancement layer corresponding to the block in the lower layer, and the enhancement layer reference picture corresponding to the lower layer reference picture;

wherein adaptive selection of weighting parameters used
to encode the block in the enhancement layer is
determined by a slice header field which can have one
of three values,

a first value indicating that said enhancement layer
does not inherit weighting parameters from said layer
of a picture which is lower than an enhancement layer
and weighting parameters applicable in the enhancement
layer are always used for all macroblocks;

a second value indicating that macroblocks in said
enhancement layer inherit weighting parameters from
said layer of a picture which is lower than an
enhancement layer; and

a third value indicating that weighting parameters used
to encode the block in the enhancement layer are
selected based on macroblock type, wherein inter-layer
predicted macroblocks in said enhancement layer use
said weighting parameters applied to the lower layer
reference picture and all other macroblocks in said
enhancement layer use weighting parameters applicable
in the enhancement layer."

IX.   In the decision under appeal, the examining division
       held that D1 disclosed the subject-matter of claim 1 of
       the main request and the first auxiliary request then
       on file. D1 suggested to re-use the base layer
       weighting parameters for the enhancement layer if the
       corresponding base layer existed and to keep the
       flexibility to use different weighting parameters for
       the enhancement layer. It also dealt with adaptively
       re-using the base layer weighting parameters when
       encoding a block in the enhancement layer (see
       Reasons 8.). The division also stated that the subject-

matter of the dependent claims was not new or did not
involve an inventive step in view of the arguments
given in the communication issued 13 November 2008. In
that communication, the examining division argued with
reference to D1, abstract and page 1, paragraph 1 as
well as page 2, paragraph 2 that setting the
base_pred_weight_table flag to indicate weighting
parameters for inter-layer coded and not inter-layer
coded blocks was implicitly disclosed by D1, where the
SVC standard, that used similar techniques for inter-
layer residual prediction, was mentioned. The
additional feature of claim 5, wherein the encoding
method added a rephrased base_pred_weight_table_flag
capable of assuming one of three values, was
anticipated by D1.

With respect to the then second auxiliary request, the
examining division found that claim 1 of that request
was distinguished from D1 by the two features relating
to the use of either a rate distortion technique or the
cost of encoding to adaptively select from between the
weighting parameters applied to the enhancement or base
layer. The technical problem was how to determine
weights in the coding method proposed by D1. The use of
rate distortion optimisation had been well known in the
art and also had been used in the reference software of
the SVC standard video codec. In addition, a trade-off
between memory, complexity and coding efficiency had
been suggested in D1. Hence, the subject-matter of
claim 1 was obvious from D1.

X.   The appellant's arguments, as far as they are relevant
        for the present decision, may be summarised as follows:

        In the statement of grounds the appellant argued with
        respect to claim 1 of the then second auxiliary request

(essentially corresponding to claim 1 of the present
main request and the first auxiliary request) that D1
did not give any hint how to implement a decision as to
which weighting parameters to take. Starting from D1,
the technical problem could be formulated as "[i]f
document D1 is interpreted in the manner as done by the
Examining Division, what can one further do?" (see
statement of grounds, section V).

With respect to the subject-matter of claim 1 of the
third auxiliary request filed with the statement of
grounds (essentially corresponding to claim 1 of the
present second and third auxiliary requests), the
appellant argued that D1 did not disclose weighted
prediction in SVC at the macroblock level. It was also
silent with regard to selectivity for inter-layer
prediction, use of three values for the slice header
field to enable selectivity and determination of
whether a lower layer's weighting parameter was used
for weighted prediction in an enhancement layer by use
of the macroblock type. Even if one followed the
interpretation of the examining division, one would
have to admit that the subject-matter of claim 1 was at
least novel. The technical problem of that subject-
matter was to provide an encoding apparatus for
weighted prediction in scalable video coding so as to
improve coding performance without additional syntax,
especially for localised intensity variations. By
providing the adaptive selection of weighting
parameters, the invention could provide better coding
efficiency for cases of localised intensity changes
(see statement of grounds, section VI).

In its letter of reply to the summons to oral
proceedings dated 4 September 2015, point 3.3, the
appellant cited the following document:

D4:   Zhang, K. et al.: "Selective Inter-Layer
      Prediction in Scalable Video Coding", 26. Picture
      Coding Symposium, 7.-9. November 2007, Lisbon,
      XP030080475.

D4 referred to the "SVC reference software JSVM [3]",
wherein the encoder determines whether to use inter-
layer prediction or not "based on the well-known rate
distortion optimization (RDO) technique [4]." This
wording was similar to the finding of the examining
division in the decision under appeal. However,
reference document [3] was published after the priority
date of the present application. Therefore, the
argumentation of the examining division was not well-
grounded. In addition, according to D4, the RDO
technique was used for making the binary decision
"whether to use inter-layer prediction or not". In
contrast to that, according to claim 1 of the main and
first auxiliary requests, RDO was used "to decide on
the weighting parameters for each inter-layer predicted
macroblock".

With respect to claim 1 of the second and third
auxiliary requests, the appellant argued in its letter
of reply to the summons that D1 only provided two
values for the base_pred_weight_table_flag. It was
silent as to what weighting parameters to use when the
flag was equal to 0. The provision of three different
values for the flag was especially useful when the base
layer did not use weighted prediction but the
enhancement layer did, and the sequence included local
intensity variations.

Reasons for the Decision

1.   The appeal is admissible.

Main request and first auxiliary request

2.   It is common ground that D1 may be considered as the
        closest prior art with respect to the subject-matter of
        claim 1 of the main request and of the first auxiliary
        request.

2.1   D1 relates to weighted prediction in scalable video
        coding. It discloses a method for scalable video
        encoding, comprising the steps of encoding a block in a
        base layer of a picture by applying base layer
        weighting parameters to the base layer reference
        picture (see D1, abstract). An enhancement layer block
        of the picture is also encoded by applying weighting
        parameters (see introduction, first sentence), wherein
        the weighting parameters used to encode the enhancement
        layer block are adaptively selected from between the
        weighting parameters applied to the corresponding base
        layer reference picture and different weighting
        parameters applicable in the enhancement layer (see
        chapter 2, second and third paragraphs, and chapter 4).

2.2   D1 does not disclose the following steps of the method
        of claim 1:

        (a) to use a rate distortion optimisation technique to
        decide on the weighting parameters to be used for each
        inter-layer predicted macroblock and to use different
        weighting parameters for all other macroblocks, or

(b) to compare the cost of encoding of inter-layer macroblocks with lower/base layer weighting parameters with the costs of encoding with different parameters for inter-layer macroblocks and for non inter-layer macroblocks.

2.3   Distinguishing feature (a) provides the technical effect that weighting parameters are chosen from those available for the base and enhancement layer such that rate distortion is optimised. Similarly, distinguishing feature (b) provides the effect of optimising the cost of encoding. Therefore, the technical problem can be regarded as how to determine weights in the coding method proposed by D1.

2.4   The board agrees with the arguments of the examining division (see point IX above) that the use of rate distortion optimisation was well known in the art. Similarly, the cost of encoding was a well-known criterion. In addition, a trade-off between memory, complexity and coding efficiency had been suggested in D1. Hence, the subject-matter of claim 1 was obvious from D1.

2.5   The appellant referred to D4 to show that the examining division's reasoning was not well-grounded. D4 states: "In the SVC reference software JSVM [3], the encoder determines whether to use inter-layer prediction or not with an algorithm based on the well-known rate distortion optimization (RDO) technique [4]." It is correct that D4 and the referenced document [3] were published after the priority date of the present application. However, this fact does not allow the conclusion to be drawn that the SVC reference software JSVM did not use RDO before the priority date of the present application. If anything follows from the cited

passage of D4, then it is the fact that RDO was employed for video compression before the priority date, because referenced document [4] is entitled "Rate-Distortion Optimization for Video Compression" and was published before that date.

In addition, the appellant argued that, according to D4, the RDO technique was used for making the binary decision "whether to use inter-layer prediction or not". In contrast to that, according to claim 1 of the main and first auxiliary requests, RDO was used "to decide on the weighting parameters for each inter-layer predicted macroblock". However, in both cases the RDO criterion was employed to optimise video transmission parameters.

The appellant also argued that the technical problem should be formulated as "[i]f document D1 is interpreted in the manner as done by the Examining Division, what can one further do?" (see point X above). The board cannot accept this formulation, since it is unspecific for the present case. Hence, the problem is not based on the technical effect of exactly those features distinguishing the claim from the prior art (see Case Law of the Boards of Appeal of the European Patent Office, 7th edition, 2013, section I.D. 4.3)

In conclusion, the appellant's arguments did not convince the board.

2.6   As a result, the subject-matter of claim 1 of the main request and the first auxiliary request was obvious to a person skilled in the art in view of D1 and common general knowledge. Hence, it lacks an inventive step (Article 56 EPC 1973).

Second and third auxiliary requests

3.   Claim 1 according to the second and third auxiliary
        requests does not specify the above criteria (a) and
        (b) to decide on the weighting parameters. Instead, it
        defines different selections of applicable enhancement
        layer weighting parameters and how these are indicated
        by a three-valued slice header field:

        (c) a first value [of the slice header field]
        indicating that said enhancement layer does not inherit
        weighting parameters from said [base] layer of a
        picture which is lower than an enhancement layer and
        weighting parameters applicable in the enhancement
        layer are always used for all macroblocks;

        (d) a second value indicating that macroblocks in said
        enhancement layer inherit weighting parameters from
        said layer of a picture which is lower than an
        enhancement layer; and

        (e) a third value indicating that weighting parameters
        used to encode the block in the enhancement layer are
        selected based on macroblock type, wherein inter-layer
        predicted macroblocks in said enhancement layer use
        said weighting parameters applied to the lower layer
        reference picture and all other macroblocks in said
        enhancement layer use weighting parameters applicable
        in the enhancement layer.

3.1   Feature (d) specifying the use of base layer weighting
        parameters in the enhancement layer is disclosed in D1
        (see third paragraph of chapter 2,
        base_pred_weight_table_flag equal to 1). However, D1
        does not disclose which weighting parameters are

applied to the enhancement layer if the binary slice
header field base_pred_weight_table_flag is equal to 0.
Hence, features (c) and (e) as well as the use of a
three-valued slice header field to indicate the
selection of weighting parameters were not disclosed in
D1.

3.2   In the decision under appeal, the examining division
        referred to the dependent claims of the requests
        underlying the decision under appeal, those dependent
        claims containing features corresponding to
        features (c) and (e). The examining division stated
        that the subject-matter of the dependent claims was not
        new or did not involve an inventive step in view of the
        arguments given in the communication issued on
        13 November 2008. In that communication, the examining
        division argued with reference to D1, abstract and
        page 1, paragraph 1 as well as page 2, paragraph 2 that
        setting the base_pred_weight_table flag to indicate
        weighting parameters for inter-layer coded and not
        inter-layer coded blocks was implicitly disclosed by
        D1, where the SVC standard, that used similar
        techniques for inter-layer residual prediction, was
        mentioned. It also addressed claims 5 and 6, which
        specified that the rephrased
        base_pred_weight_table_flag was capable of assuming one
        of three values and that it indicated different
        weighting parameters for use in the enhancement layer.
        Hence, the examining division considered the subject-
        matter of the dependent claims underlying the decision
        under appeal to lack at least inventive step in view of
        D1 and the common general knowledge.

        In its statement of grounds, point VI, and its letter
        dated 4 September 2015, point 5.3, the appellant
        provided arguments in support of novelty. It also

formulated the technical problem solved by the alleged
invention, and specified a technical effect achieved by
the claimed subject-matter.

However, the board sees no reason why the board should
deviate from the examining division's assessment of
inventive step, in particular why the division's
evaluation of the distinguishing features in view of
the common general knowledge was wrong (Article 56
EPC 1973), and the appellant did not provide arguments
in this respect. For these reasons alone, the board
concludes that the decision under appeal with respect
to the subject-matter of claim 1 of the second and
third auxiliary requests should not be overturned.

3.3   In addition, the board notes the following with respect
        to these distinguishing features. The redefinition of a
        flag to represent three optional values instead of two
        is a common measure in video coding. This measure has
        apparent advantages and disadvantages, such as the
        ability to signal additional encoder modes versus the
        need for a modification of the standard and the need to
        reserve an additional bit for this flag, which are well
        known to the skilled person. With respect to
        feature (c), it is noted that D1 (see abstract)
        disclosed that the enhancement layer could have a
        weighting table containing different parameters from
        the base layer. It is obvious to provide an indication
        that this table is selected as an alternative to the
        base layer weighting table. The skilled person would
        have considered providing such indication in the same
        way as for the base layer weighting table, i.e. by
        using the corresponding flag in the slice header.
        Similarly, feature (e) is regarded as obvious for the
        skilled person (see application itself, page 19,
        lines 3 to 7 and D1, chapter 1, first paragraph and the

reasoning of the examining division in the
communication dated 16 December 2009, point 5).

3.4   As set out above, the appellant's arguments essentially
        concern the novelty of the claimed subject-matter,
        which is not disputed. Additionally, the appellant
        identified as a relevant technical effect that - by
        providing the adaptive selection of weighting
        parameters - the invention could provide better coding
        efficiency for cases of localised intensity changes
        (see statement of grounds, section VI and letter dated
        4 September 2015, point 5.3). However, according to the
        application as filed (see page 11, lines 10 to 13 und
        page 26, lines 26 to 29), this effect is achieved by
        the provision of an adaptive selection of weighting
        parameters which feature is disclosed in D1.

3.5   As a result, the board finds that the subject-matter of
        claim 1 according to the second and third auxiliary
        requests lacks an inventive step (Article 56 EPC 1973).

Conclusion

4.   It follows from the above that none of the appellant's
        requests is allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

K. Boelicke   C. Kunzelmann

Decision electronically authenticated