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Datasheet for the decision of 17 October 2023

Case Number: T 2665/19 - 3.5.04

Application Number: 12837786.8

Publication Number: 2765771

IPC: H04N19/52, H04N19/51, H04N19/96, H04N19/593

Language of the proceedings: EN

Title of invention:
IMAGE ENCODING METHOD, IMAGE ENCODING DEVICE, IMAGE DECODING METHOD, IMAGE DECODING DEVICE, AND IMAGE ENCODING/DECODING DEVICE

Applicant:
Sun Patent Trust

Headword:

Relevant legal provisions:
EPC Art. 56, 123(2)
RPBA 2020 Art. 13(1), 13(2)

Keyword:
Main request - inventive step (no)
Auxiliary request 1 - amendment to appeal case - amendment overcomes issues raised (no)
Auxiliary request 2 - amendments - added subject-matter (yes)

Decisions cited:

Catchword:

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Beschwerdekammern

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Case Number: T 2665/19 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 17 October 2023

Appellant: (Applicant)	Sun Patent Trust 450 Lexington Avenue, 38th Floor New York, NY 10017 (US)
Representative:	Grünecker Patent- und Rechtsanwälte PartG mbB Leopoldstraße 4 80802 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 28 May 2019 refusing European patent application No. 12837786.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair	B. Müller
Members:	A. Seeger
	B. Le Guen

Summary of Facts and Submissions

I. The appeal is against the examining division's decision to refuse European patent application No. 12 837 786.8, published as international patent application WO 2013/051209 A1.

II. The prior-art documents cited in the decision under appeal included the following:

D4: Y. Zheng et al., "Merge Candidate Selection in 2NxN, Nx2N, and NxN Mode", 6th JCT-VC Meeting, No. JCTVC-F302, 2 July 2011, XP030009325

III. The decision under appeal was based on the following grounds.

- Claims 1 and 5 of the then main request were not clear (Article 84 EPC). Claims 1, 5 and 6 of the then main request contained subject-matter that extended beyond the content of the application as filed (Article 123(2) EPC).

- The subject-matter of claims 1, 5 and 6 of the then first and second auxiliary requests did not involve an inventive step within the meaning of Article 56 EPC in view of the disclosure of document D4.

- Claims 1 and 5 of the then third auxiliary request were not clear (Article 84 EPC). Claims 1, 5 and 6 of the then third auxiliary request contained subject-matter that extended beyond the content of the application as filed (Article 123(2) EPC).

IV. The applicant (appellant) filed notice of appeal. With the statement of grounds of appeal, the appellant filed claims of a main request and a first auxiliary request. According to the appellant, the claims of the main request were identical to those of the first auxiliary request on which the decision under appeal was based. In addition, the appellant filed an extract from the following document:

T. Wiegand et al., "WD3: Working Draft 3 of High-Efficiency Video Coding", 5th JVT-VC Meeting, 16 to 23 March 2011, No. JCTVC-E603.

This document will be referred to below as D7.

V. The appellant was summoned to oral proceedings. In a communication under Article 15(1) RPBA 2020, the board gave the following preliminary opinion.

Main request

- The subject-matter of claim 1 did not involve an inventive step within the meaning of Article 56 EPC in view of the disclosure of document D4 as the closest prior art.

First auxiliary request

- It was not clear (Article 84 EPC) what was meant by the following features of claim 1: "*a partition index of the second prediction block unit is 1*", "*a prediction block unit with partition index 0*".
- Claim 1 did not meet the requirements of Article 123(2) EPC because the feature "*wherein the first condition is satisfied if the second prediction block unit has a height equal to a*

height of the current coding block unit ... and a height smaller than the height of the current coding unit" was not disclosed in the application as filed.

- The subject-matter of claim 1 lacked inventive step over the disclosure of document D4.

VI. By letter of reply dated 5 October 2023, the appellant filed a new set of claims, which formed the basis of a new auxiliary request 1. The claim set entitled "First Auxiliary Request", which had been filed with the statement of grounds of appeal, formed the basis of a new auxiliary request 2.

VII. The board held oral proceedings on 17 October 2023.

The appellant's final requests were that the decision under appeal be set aside and that a European patent be granted on the basis of the claims of the main request filed with the statement of grounds of appeal or, alternatively, of auxiliary request 1 filed with the letter dated 5 October 2023, or auxiliary request 2 filed as first auxiliary request with the statement of grounds of appeal.

At the end of the oral proceedings, the chair announced the board's decision.

VIII. Claim 1 of the main request reads as follows:

"An image decoding method for decoding, on a block-by-block basis, image data included in an encoded bitstream, the method comprising:

dividing a current coding block unit, that is a unit of decoding, into a plurality of prediction block units,

including a first prediction block unit and a second prediction block unit, each of which is a unit of prediction;

deriving, for each of the plurality of prediction block units, one or more prediction information candidates each of which is a candidate for prediction information indicating a reference picture list, a motion vector, and a reference picture index;

obtaining, from the encoded bitstream and for each of the plurality of prediction block units, an index for selecting a prediction information candidate from among the one or more prediction information candidates; and

decoding each of the plurality of prediction block units using the prediction information candidate selected by the respective index,

wherein the deriving includes:

determining whether or not a neighboring prediction block unit of the second prediction block unit is included in the current coding block unit, and when the neighboring prediction block unit is not included in the current coding block unit, determining the neighboring prediction block unit to be a reference block available to the second prediction block unit, and when the neighboring prediction block unit is included in the current coding block unit, determining the neighboring prediction block unit not to be the reference block; and

deriving a prediction information candidate of the second prediction block unit from prediction information of the reference block."

IX. Claim 1 of auxiliary request 1 differs from claim 1 of the main request only in the last paragraph. This last paragraph of claim 1 of auxiliary request 1 reads as follows:

"wherein the one or more prediction information candidates includes a prediction information candidate derived from prediction information of the reference block."

X. Claim 1 of auxiliary request 2 reads as follows (features added compared with claim 1 of the main request are underlined and deleted features are ~~struck through~~):

"An image decoding method for decoding, on a block-by-block basis, image data included in an encoded bitstream, the method comprising:

dividing a current coding block unit, that is a unit of decoding, into a plurality of prediction block units, including a first prediction block unit and a second prediction block unit, each of which is a unit of prediction;

deriving, for each of the plurality of prediction block units, one or more prediction information candidates each of which is a candidate for prediction information indicating a reference picture list, a motion vector, and a reference picture index;

obtaining, from the encoded bitstream and for each of the plurality of prediction block units, an index for selecting a prediction information candidate from among the one or more prediction information candidates; and

decoding each of the plurality of prediction block units using the prediction information candidate selected by the respective index,

wherein the deriving includes:

determining ~~whether or not~~ a neighboring prediction block unit ~~is included in the current coding block unit, and when the neighboring prediction block unit is not included in the current coding block unit, determining the neighboring prediction block unit~~ to be a reference block available to the second prediction block unit if at least one of a first condition, a second condition, and a third condition is not satisfied, and ~~when the neighboring prediction block unit is included in the current coding block unit,~~ determining the neighboring prediction block unit not to be the reference block if all of the first condition, the second condition, and the third condition are satisfied,

wherein the first condition is satisfied if the second prediction block unit has a height equal to a height of the current coding block unit and a width smaller than a width of the current coding block unit or when the prediction block unit has a width equal to the width of the current coding block unit and a height smaller than the height of the current coding block unit,

wherein the second condition is satisfied if a partition index of the second prediction block unit is 1,

wherein the third condition is satisfied if the neighboring prediction block unit is included in a

prediction block unit with partition index 0 of the plurality of prediction block units included in the current coding block unit; and

deriving a prediction information candidate of the second prediction block unit from prediction information of the reference block."

Reasons for the Decision

1. The appeal is admissible.

2. Main request - inventive step (Article 56 EPC)

2.1 It is undisputed that document D4 is an appropriate starting point for the assessment of inventive step of the subject-matter of claim 1.

2.2 Document D4 discloses an image decoding method for decoding, on a block-by-block basis, image data included in an encoded bitstream (see the block structure shown in Figure 1, and section 1: "*In Merge mode, neighboring information is borrowed and directly used for a current block*"), the method comprising:

dividing a current coding block unit, that is a unit of decoding, into a plurality of prediction block units, including a first prediction block unit and a second prediction block unit, each of which is a unit of prediction (see Figure 1 showing coding units (CUs) divided into either two or four prediction units (PUs), and section 1: "*in Figure 1, potential candidate locations for deriving motion information for the second or fourth PU (marked in orange) are indicated with green blocks*");

deriving, for each of the plurality of prediction block units, one or more prediction information candidates each of which is a candidate for prediction information (see section 1: "*In Merge mode, neighboring information is borrowed and directly used for a current block*" and "*potential candidate locations for deriving motion information for the second or fourth PU (marked in orange) are indicated with green blocks"*) indicating a reference picture list, a motion vector, and a reference picture index (the reference to "*the current HM3.0*" in section 1 implies that motion information for a previous PU comprises information indicating a reference picture list (L0, L1), an index identifying a reference image within that list and a motion vector identifying a part in this reference image);

obtaining, from the encoded bitstream and for each of the plurality of prediction block units, an index for selecting a prediction information candidate from among the one or more prediction information candidates (see abstract: "*PU's merge index*"); and

decoding each of the plurality of prediction block units using the prediction information candidate selected by the respective index (see section 1: "*In Merge mode, neighboring information is borrowed and directly used for a current block*"),

wherein the deriving includes:

deriving a prediction information candidate of the second prediction block unit from prediction information of a reference block (see Figure 1: "*Merge candidate checking positions PUs*", and section 1: "*For Nx2N and 2NxN as shown in Figure 1, when coding the second PU (PU_1), motion information of each merge*

candidate (L, A, T, RA, and BL) will be compared with that of the first PU (PU_0). If some candidate has the same motion information as PU_0, the candidate will be set invalid and to be avoided").

2.3 It is common ground that document D4 does not disclose the steps defined in claim 1 of "*determining whether or not a neighboring prediction block unit of the second prediction block unit is included in the current coding block unit, and when the neighboring prediction block unit is not included in the current coding block unit, determining the neighboring prediction block unit to be a reference block available to the second prediction block unit, and when the neighboring prediction block unit is included in the current coding block unit, determining the neighbouring prediction block unit not to be the reference block*".

2.4 Instead, document D4 discloses the following:

"*such checking is performed as follows:*

For Nx2N and 2NxN as shown in Figure 1, when coding the second PU (PU_1), motion information of each merge candidate (L, A, T, RA, and BL) will be compared with that of the first PU (PU_0). If some candidate has the same motion information as PU_0, the candidate will be set invalid and to be avoided.

For NxN mode as shown in Figure 1, when coding the last PU (PU_3), motion information of each candidate (L, A, T, RA, and BL) will be compared with those of PU_1 and PU_2, to avoid forming the 2Nx2N, Nx2N or 2NxN modes which are redundant."

2.5 The appellant argued that, by considering the location of a neighbouring prediction block relative to the current coding unit rather than comparing its motion information with that of one of the prediction units within the current coding unit, the process of determining a list of merging candidates was improved and the complexity of this process was reduced (see statement of grounds of appeal, page 5, third and fourth full paragraphs).

The board is not convinced that the steps identified in point 2.3 above reduce the complexity of - or otherwise improve - the process of determining a list of merging candidates disclosed in document D4. Whilst these steps avoid the need to compare the motion information of the neighbouring prediction blocks included in the current coding unit (**and only the motion information of those specific neighbouring prediction blocks**) with the motion information of one of the prediction units within the current coding unit, those steps may make it necessary to determine, for **each** current prediction block, whether **each** of the neighbouring prediction blocks ("L", "A", "T", "RA" and "BL") is included in the current coding block. The board is not convinced that determining, for each current prediction block, whether each of the neighbouring prediction blocks is included in the current coding block is less complex than comparing the motion information of the neighbouring prediction blocks included in the current coding unit with the motion information of one of the prediction units within the current coding unit. Claim 1 does not specify how it is determined whether a neighbouring prediction block is included in the current coding block unit.

2.6 The appellant also argued that, by considering the location of the neighbouring prediction block relative to the current coding unit rather than performing a comparison of its motion information with the motion information of another prediction unit, the decoder was able to construct the same list of merging candidates as the encoder even if packets were lost in the transmission path. Thus, the subject-matter of claim 1 improved the parsing robustness of the process of determining the list of merging candidates.

The board is not convinced by this argument because claim 1 does not exclude further steps being carried out to restrict which neighbouring prediction blocks serve as reference blocks, from which prediction information candidates can be derived. Thus, claim 1 does not exclude the motion information of a neighbouring prediction block being compared with the motion information of other prediction units after it has been determined that the neighbouring prediction block in question is not included in the current coding unit. For that reason alone, the appellant's argument must fail.

For the sake of completeness, the board notes that the application in hand supports a broad reading of claim 1. Dependent claim 2 specifies further conditions under which a neighbouring prediction block not included in the current coding block unit is discarded. Furthermore, no embodiment can be identified - in the description or the drawings - in which a neighbouring prediction block is necessarily included in the final list of merging candidates once it has been determined that this neighbouring prediction block is not included in the current coding unit. For example, step S113 in Figure 15 of the application sets out that identical

candidates are removed from the list of merging block candidates even if they have been determined to be "*usable for merging*" in step S111.

2.7 In view of the two previous points, the steps identified in point 2.3 above merely represent an alternative way of discarding the neighbouring prediction block unit(s) corresponding to "L" and/or "A" as possible merge candidates.

2.8 The objective technical problem may thus be formulated as finding an alternative way of discarding the neighbouring prediction block unit(s) corresponding to "L" and/or "A" as possible merge candidates.

2.9 For the following reasons, the board is of the view that the alternative identified in point 2.3 above would have been obvious to the person skilled in the art.

2.9.1 The person skilled in the art would have understood the following from the disclosure of document D4:

For the case Nx2N shown on the left-hand side of Figure 1, one of the merge candidates is "L". This candidate is included in PU_0 and thus necessarily has the same motion information as PU_0. Hence, applying the test of identical motion information (see point 2.4 above) will always lead to the exclusion of PU_0 as a merge candidate for PU_1.

For the case 2NxN shown in the middle of Figure 1, one of the merge candidates is "A". This candidate is included in PU_0 and thus necessarily has the same motion information as PU_0. Hence, applying the test of

identical motion information will always lead to the exclusion of PU_0 as a merge candidate for PU_1.

For the case NxN shown on the right-hand side of Figure 1, the candidates "A" and "L" are included in PU_1 and PU_2, and they thus necessarily have the same motion information as PU_1 and PU_2. Hence, applying the test of identical motion information will always lead to the exclusion of PU_1 and PU_2 as merge candidates for PU_3.

Therefore, testing for identical motion vector information will necessarily lead to the exclusion of the left and the upper merge candidates.

This insight was expressed by the authors of document D4 as: "*According to the current HM3.0, motion information of the candidate that's located inside the left or upper neighboring PU is always not to be used.*" (See D4, section 1).

2.9.2 In the light of the previous point, the person skilled in the art would have realised that comparing the motion information of the "L" (or the "A") candidate with the motion information of PU_0 was superfluous in the Nx2N (or the 2NxN) case, since it would have been known from the outset that these candidates will be discarded. Similarly, the person skilled in the art would have realised that comparing the motion information of the "L" and "A" candidates with the motion information of PU_1 and PU_2 in the NxN case was superfluous. Since all these candidates have the obvious common property of being the only candidates within the current coding unit, the idea of discarding a candidate depending on whether or not it is included in the current coding unit would have been obvious to

the person skilled in the art faced with the objective technical problem.

Thus, the board agrees with the examining division that the indications provided by document D4 would have been sufficient for the person skilled in the art to arrive at the subject-matter of claim 1 without the need for inventive activity (see point 4.1.4 of the decision under appeal).

2.10 The appellant argued that the passage of document D4 quoted under point 2.9.1 above referred only to candidates that were located inside the left or the upper neighbouring prediction unit rather than referring to candidates (neighbouring prediction blocks) that were located inside the same coding unit (see statement of grounds of appeal, section IV, second paragraph).

The board is not convinced by this argument. Although it is correct that document D4 refers to candidates located inside the left or the upper neighbouring prediction unit, the person skilled in the art would have realised that the discarded candidates are the only candidates included in the current coding unit.

2.11 The appellant argued that there was no indication in document D4 or any of the other cited references that the process of generating the list of merging candidates as defined in the third working draft of the HEVC standard (i.e. document D7) could be significantly improved by considering the location of a neighbouring prediction block relative to the current coding unit rather than performing a comparison of its motion information with motion information of one of the prediction units within the current coding unit.

According to the appellant such a modification to the third working draft of the HEVC standard implied that neighbouring prediction blocks that were not included in the current coding unit but shared the same motion information would be included in the list of merging candidates, thus resulting in redundant entries (see statement of grounds of appeal, section IV, penultimate paragraph).

The board is not convinced by this argument because - as indicated in point 2.6 above - claim 1 does not exclude further steps being carried out to restrict which neighbouring prediction blocks serve as reference blocks, from which prediction information candidates can be derived. Hence, claim 1 encompasses the exclusion as a reference block of a neighbouring prediction block having the same motion information as one of the prediction block units within the current coding block unit even after it has been determined that the neighbouring prediction block in question is not included in the current coding block unit.

2.12 The appellant further argued that the person skilled in the art would not have modified the method disclosed in document D4 so as to determine the availability of a reference block on the basis of its location relative to the current coding unit. According to the appellant, doing so would have been contrary to the purpose specified in D4, namely "*to avoid assigning the whole CU into a merge mode which is already available under a larger size partition, such as 2Nx2N*".

The board is not convinced by this argument, for the following reasons. In point 2.8 above, the objective technical problem starting from the disclosure of section 1 of document D4 was formulated merely as

finding an alternative way of discarding the neighbouring prediction block unit(s) corresponding to "L" and/or "A" as possible merge candidates. In view of this objective technical problem, the person skilled in the art would have had no reason to modify the method disclosed in section 1 of document D4 in such a way that the content of the final candidate list taught in that section would be changed. Hence, the person skilled in the art would still have arrived at a method in which motion information of a merge candidate not included in the current coding unit is set as "invalid" in the conditions set out in point 2.4 above (conditions not excluded by the wording of claim 1), i.e. at a method achieving the purpose specified in D4, namely "*to avoid assigning the whole CU into a merge mode which is already available under a larger size partition, such as 2Nx2N*".

2.13 In view of the above, the board agrees with the examining division that the subject-matter of claim 1 does not involve an inventive step within the meaning of Article 56 EPC.

3. Auxiliary request 1 - admittance (Article 13(2) RPBA 2020)

3.1 Auxiliary request 1 was filed after notification of the summons to oral proceedings. This auxiliary request is therefore an amendment within the meaning of Article 13(2) RPBA 2020.

3.2 Under Article 13(2) RPBA 2020, any amendment to a party's appeal case made after notification of a summons to oral proceedings is, in principle, not to be taken into account unless there are exceptional

circumstances, which have been justified with cogent reasons.

Article 13(2) RPBA 2020 imposes the most stringent limitations on appeal submissions made at an advanced stage of the proceedings (see Supplementary publication 2, OJ EPO 2020, Explanatory remarks on Article 13(2), first paragraph, second sentence).

When exercising its discretion under Article 13(2) RPBA 2020, the board may also rely on criteria set out in Article 13(1) RPBA 2020 (see ibid., Explanatory remarks on Article 13(2), fourth paragraph).

Under Article 13(1) RPBA 2020, in the case of an amendment to a patent application, the board is to exercise its discretion in view of, inter alia, whether the appellant has demonstrated that any such amendment, prima facie, overcomes the issues raised by the board.

3.3 The last paragraph of claim 1 of auxiliary request 1 has been amended in relation to claim 1 of the main request and reads: "*wherein the one or more prediction information candidates includes a prediction information candidate derived from prediction information of the reference block.*"

3.4 The appellant submitted that the feature set out in the previous point clarified that the prediction information candidate derived from the prediction information of the reference block was part of the one or more prediction information candidates that were referenced by the index obtained from the encoded bitstream (see letter of reply dated 5 October 2023, page 2, first full paragraph).

The board is not convinced that this amendment resolves the objection of lack of inventive step raised against claim 1 of the main request. The reason is that claim 1 of auxiliary request 1 still does not exclude further steps being carried out to restrict which neighbouring prediction blocks serve as reference blocks, from which prediction information candidates can be derived (see points 2.6 and 2.11 above).

3.5 Therefore, the board finds that the appellant has not demonstrated that this amendment, prima facie, overcomes the objection of lack of inventive step raised by the board.

3.6 As a consequence, the board exercised its discretion under Article 13(2) RPBA 2020, taking into account the criteria set out in Article 13(1) RPBA 2020, in deciding not to admit auxiliary request 1 into the appeal proceedings.

4. Auxiliary request 2 - added subject-matter (Article 123(2) EPC)

4.1 Claim 1 contains the following feature added by amendment: "*wherein the first condition is satisfied if the second prediction block has a height equal to a height of the current coding block ... and a height smaller than the height of the current coding unit*".

4.2 As a basis for this feature the appellant referred to step S151 in Figure 17 and paragraph [130] of the description (see statement of grounds of appeal, section II, third paragraph).

4.3 Paragraph [130] of the description reads, in the relevant part, as follows: "*the merging block candidate*

calculation unit 114 determines whether it is true that (i) the PU of a prediction target block is one of 2N x N, 2N x nU, 2N x nD, N x 2N, nL x 2N, or NR x 2N".

4.4 In the board's view, testing whether a PU is "*one of 2N x N, 2N x nU, 2N x nD, N x 2N, nL x 2N, or NR x 2N*" is obviously not the same as testing whether a PU has a height (or width, respectively) equal to the height (or width, respectively) of the current CU and a width (or height, respectively) smaller than a width (or height, respectively) of the current CU, although these two steps may lead to the same result in specific circumstances. The former test does not necessarily require the comparing of the dimensions of the PU with those of the CU. The latter test is less stringent than the former test, which defines a limited set of possible PU dimensions satisfying the latter test.

4.5 Therefore, the board finds that claim 1 of auxiliary request 2 does not meet the requirements of Article 123(2) EPC.

5. Conclusion

The main request is not allowable because the subject-matter of claim 1 of this request does not involve an inventive step within the meaning of Article 56 EPC. Auxiliary request 1 was not admitted into the appeal proceedings under Article 13(2) RPBA 2020. Auxiliary request 2 is not allowable because claim 1 thereof does not meet the requirements of Article 123(2) EPC. Since none of the appellant's requests is allowable, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

K. Boelicke B. Müller

Decision electronically authenticated