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Datasheet for the decision of 22 October 2021

Case Number: T 0321/17 - 3.5.04

Application Number: 10800749.3

Publication Number: 2532160

IPC: H04N7/26

Language of the proceedings: EN

Title of invention:
MANAGING PREDICTED MOTION VECTOR CANDIDATES

Applicant:
Telefonaktiebolaget LM Ericsson (publ)

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (no)

Decisions cited:

Catchword:

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Boards of Appeal

Chambres de recours

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Case Number: T 0321/17 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 22 October 2021

Appellant: (Applicant)	Telefonaktiebolaget LM Ericsson (publ) 164 83 Stockholm (SE)
Representative:	Ericsson Patent Development Torshamnsgatan 21-23 164 80 Stockholm (SE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 16 September 2016 refusing European patent application No. 10800749.3 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair	B. Willems
Members:	A. Seeger
	B. Müller

Summary of Facts and Submissions

I. The appeal is against the examining division's decision to refuse European patent application No. 10 800 749.3, published as international application WO 2011/095260 A1.

II. As requested by the applicant, the decision under appeal was a decision according to the state of the file (EPO Form 2061) referring to a previous communication dated 10 March 2016 for the grounds.

The documents cited in this previous communication included the following:

D1: WO 2009/115901 A2

D2: G. Laroche et al: "*RD Optimized Coding for Motion Vector Predictor Selection*", IEEE Transactions on Circuits and Systems for Video Technology, vol. 18, no. 9, September 2008, pages 1247 to 1257, XP011231739, DOI:10.1109/TCSVT.2008.928882

D3: J. Yang et al: "*Motion vector coding using optimal predictor*", 16th IEEE International Conference on Image Processing (ICIP), 7 November 2009, pages 1033 to 1036, XP031628425, DOI: 10.1109/ICIP.2009.5413726

III. The decision under appeal was, *inter alia*, based on the grounds that independent claims 1 and 9 to 11 of the then sole request did not meet the requirements of Article 84 EPC and Article 123(2) EPC and their subject-matter did not involve an inventive step over

the combined disclosures of documents D1 and D2 or D1 and D3 (Article 56 EPC).

IV. The applicant ("appellant") filed notice of appeal. With the statement of grounds of appeal, the appellant filed claims according to a sole request. The appellant requested that the decision under appeal be set aside and that a European patent be granted on the basis of the claims of the sole request. It indicated a basis in the application as filed for the claimed subject-matter and provided arguments as to why the claims met the requirements of Articles 56 and 84 EPC.

V. The board issued a summons to oral proceedings and a communication under Article 15(1) of the Rules of Procedure of the Boards of Appeal in the 2020 version (RPBA 2020, OJ EPO 2019, A63). In that communication, the board expressed its preliminary opinion that the objections raised by the examining division under Article 123(2) EPC and Article 84 EPC no longer applied but the subject-matter of independent claims 1, 6 and 7 according to the sole request did not involve an inventive step within the meaning of Article 56 EPC.

VI. By letter dated 23 September 2021 the appellant withdrew its request for oral proceedings.

VII. On 23 September 2021 the board cancelled the oral proceedings.

VIII. Therefore, from the file it appears that the appellant's final request is that the decision under appeal be set aside and that a European patent be granted on the basis of the claims of the sole request filed with the statement of grounds of appeal.

IX. Claim 1 of the sole request reads as follows:

"A method of managing Predicted Motion Vector candidates, PMV candidates (240), for a current block in a frame, wherein each PMV candidate (240) corresponds to a motion vector used for coding of a previous block in the frame, and wherein the PMV candidates are used in a block-based motion model in video coding, the method comprising:

selecting (510) a set of PMV candidates (240) as a subset of the previously coded motion vectors (210) used for coding of previous blocks in the frame;

removing (520) duplicate PMV candidates from the set of PMV candidates (240);

ordering (530) PMV candidates from the set of PMV candidates in order of their expected usage, wherein the expected usage of each PMV candidate is determined from a distance of the current block to a previous block for which the PMV candidate was used as a motion vector;

assigning (540) a code value to each PMV candidate (240) in the set of PMV candidates (240), wherein the code values vary in length and are assigned to the PMV candidates (240) in order of expected usage such that the PMV candidate (240) having the highest expected usage has the shortest code value."

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

(a) The subject-matter of claim 1 differed from the disclosure of document D1 on account of the

following feature: "*removing duplicate PMV candidates from the set of PMV candidates*" (see statement of grounds of appeal, page 4, third and fourth paragraphs).

(b) The technical effect of this difference was that the number of PMV candidates from the set of PMV candidates was reduced. This resulted in reduced code-value lengths as there were fewer PMV candidates to be coded. As a consequence, a lower bit rate was needed for coding the PMV candidates or, in an equivalent manner, the coding efficiency was increased. The objective technical problem solved by this difference was thus to increase coding efficiency when coding the PMV candidates. Since this objective technical problem was not addressed in document D1, and the solution according to the subject-matter of the independent claims was not indicated or implied in document D1, the skilled person would not have arrived at the claimed solution starting from document D1 (see statement of grounds of appeal, page 4, the last three paragraphs).

Reasons for the Decision

1. The appeal is admissible.

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

2.1 According to Article 56 EPC, "*[a]n invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art*". It is established case law that the "problem and solution approach" is an appropriate method for assessing whether claimed

subject-matter fulfils the requirements of Article 56 EPC (see Case Law of the Boards of Appeal of the European Patent Office, 9th edition 2019, I.D.2).

2.2 The examining division identified document D1 as the closest prior art for the assessment of inventive step (see communication dated 10 March 2016, point 5.1.1). This was not contested by the appellant (see statement of grounds of appeal, section entitled "Inventive Step") and the board agrees with this assessment.

2.3 The board holds that document D1 discloses a method of managing Predicted Motion Vector candidates, PMV candidates (see page 3, lines 5 to 8: "*selects a number of candidate motion vector predictors*"), for a current block in a frame (see block "*P*" in Figures 5(a) and 5(b)), wherein each PMV candidate corresponds to a motion vector used for coding of a previous block in the frame (see blocks A, B, C in Figures 5(a) and 5(b) and page 8, lines 34 to 35: "*Candidate vectors vecA, vecB and vecC ... belong to respective neighboring blocks A, B and C, respectively*"), and wherein the PMV candidates are used in a block-based motion model (see page 8, lines 13 to 16: "*to determine the motion vector prediction, for a given motion block, a decoder first selects a number of candidate motion vector predictors*") in video coding (see page 7, line 17: "*video encoder*" and line 35: "*video decoder*"), the method comprising:

- selecting a set of PMV candidates as a subset of the previously coded motion vectors used for coding of previous blocks in the frame (see page 3, lines 5 to 12 and lines 32 to 36; page 8, lines 12 to 23 in combination with Figure 4),

- removing duplicate PMV candidates from the set of PMV candidates (see Figure 6: "*Duplicates Removed from Candidate Motion Vector List*" 650, page 9, lines 15 to 16 and page 11, lines 12 to 13),

- ordering PMV candidates from the set of PMV candidates in order of their expected usage (see page 9, lines 10 to 11, according to which candidate motion vectors having the same reference index as the current block P are placed in the candidate motion vector list in the order of vecA, vecB, vecC),

- assigning a code value to each PMV candidate in the set of PMV candidates, wherein the code values vary in length and are assigned to the PMV candidates in order of expected usage such that the PMV candidate having the highest expected usage has the shortest code value (see page 9, lines 24 to 27; page 11, line 35 to page 12, line 2; these passages disclose that variable-length Huffman codes can be used to signal the motion vector candidates. Variable-length Huffman codes are entropy codes that assign shorter code words to the most probable source symbols, i.e. those motion vector candidates with the highest expected usage.).

2.4 The appellant argued that the subject-matter of claim 1 differed from the disclosure of document D1 on account of the following feature: "*removing duplicate PMV candidates from the set of PMV candidates*" (see point X(a) above).

2.5 The board is not convinced by this argument due to the explicit disclosure of this feature in Figure 6 of document D1: "*Duplicates Removed from Candidate Motion*

Vector List" 650, on page 9, lines 15 to 16: "*At 650, duplicates are removed from the candidate motion vector list*" and on page 11, lines 12 to 13: "*If the candidate vector list contains motion vectors that are equal to each other, then only one of those vectors remain in the list, and others are removed*".

Therefore, the board does not agree with the appellant that the subject-matter of claim 1 differs from the disclosure of document D1 on account of the feature referred to in point 2.4 above.

As a consequence, the board is also not convinced by the appellant's arguments in favour of inventive step based on this identified difference (see point X(b) above).

2.6 However, the board finds that the subject-matter of claim 1 differs from the disclosure of document D1 in that "*the expected usage of each PMV candidate is determined from a distance of the current block to a previous block for which the PMV candidate was used as a motion vector*".

According to document D1, page 8, lines 34 to 35, the ordered candidate vectors vecA, vecB and vecC belong to neighbouring blocks A, B and C, respectively. Figures 5(a) and 5(b) of document D1 illustrate the locations of blocks A, B and C relative to block P that is to be predicted. These figures show that block C is located at a greater distance from block P than blocks A or B; however, document D1 does not explicitly disclose that this difference in distance is decisive for ordering vecC after vecA and vecB.

2.7 The technical effect of this difference is to improve the ordering of PMV candidates such that PMV candidates having a higher expected usage are placed before PMV candidates having a lower expected usage.

2.8 The objective technical problem may thus be formulated as that of improving the ordering of PMV candidates such that PMV candidates having a higher expected usage are placed before PMV candidates having a lower expected usage.

2.9 The board agrees with the examining division that it is common general knowledge in the field of video coding that motion vectors used to code spatially adjacent blocks tend to be highly correlated and that the correlation decreases with increasing distance of the blocks (see communication dated 10 March 2016, point 6.2).

2.10 It would thus have been obvious for the skilled person to order the PMV candidates in document D1 according to a distance between a previous block and the block to be encoded. In this document, PMV candidates having a shorter distance between a previous block and the block to be encoded are placed before candidates having a greater distance between a previous block and the block to be encoded. Based on the common general knowledge set out above, this orders the PMV candidates according to their expected usage.

By this ordering of the PMV candidates, the skilled person would have arrived at the subject-matter of claim 1 in a straightforward manner.

2.11 Therefore, the board concludes that the subject-matter of claim 1 of the sole request lacks inventive step

over the disclosure of document D1 combined with the common general knowledge of the person skilled in the art (Article 56 EPC).

3. Since the appellant's sole request is not allowable, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

K. Boelicke B. Willems

Decision electronically authenticated