Internal distribution code:

(A) [-] Publication in OJ
(B) [-] To Chairmen and Members
(C) [-] To Chairmen
(D) [X] No distribution

Datasheet for the decision of 28 June 2018

Case Number: T 1208/14 - 3.5.04

Application Number: 11164454.8

Publication Number: 2348738

IPC: H04N11/04, H04N7/26, H04N5/44, H04N5/14

Language of the proceedings: EN

Title of invention:
Image information encoding method and encoder, and image information decoding method and decoder

Applicant:
Sony Corporation

Headword:

Relevant legal provisions:
EPC Art. 76(1)

Keyword:
Amendments - extension beyond the content of the earlier application as filed (yes)

Decisions cited:
G 0001/06

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1208/14 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 28 June 2018

Appellant: (Applicant)	Sony Corporation 1-7-1 Konan Minato-ku Tokyo 108-0075 (JP)
Representative:	Beder, Jens Mitscherlich PartmbB Patent- und Rechtsanwälte Sonnenstraße 33 80331 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 7 November 2013 refusing European patent application No. 11164454.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	C. Kunzelmann
Members:	M. Paci
	T. Karamanli

Summary of Facts and Submissions

I. The appeal is against the decision of the examining division refusing European patent application No. 11 164 454.8, published as EP 2 348 738 A2, a divisional application from the earlier European patent application No. 02 783 717.8, published as EP 1 353 517 A1.

II. The following document was cited in the decision under appeal:

D3: "ITU-T RECOMMENDATION H.262 (07/95), INTERNATIONAL STANDARD ISO/IEC 13818-2, MPEG-2 VIDEO, TRANSMISSION OF NON-TELEPHONE SIGNALS, INFORMATION TECHNOLOGY - GENERIC CODING OF MOVING PICTURES AND ASSOCIATED AUDIO INFORMATION: VIDEO", ITU-T TELECOMMUNICATION STANDARDIZATION SECTOR OF ITU, Geneva, Switzerland, July 1995, pages i-viii and 1-201, XP000198491.

III. The application was refused on the grounds that the claims of the then main request did not meet the requirements of Article 123(2) EPC and lacked essential features of the invention, contrary to the requirements of Article 84 EPC, in conjunction with Rule 43(1) and (3) EPC, and that the subject-matter of the claims of the then auxiliary request did not involve an inventive step (Article 56 EPC) in view of prior-art document D3.

IV. With the statement of grounds of appeal, the appellant filed amended claims according to a sole request replacing all the claims previously on file.

V. The board issued a summons to oral proceedings and, in a communication annexed to the summons, informed the

appellant that three consecutive days had been scheduled for holding oral proceedings in the present appeal case and in five related appeal cases. It then issued a communication under Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA, OJ EPO 2007, 536) in which it explained how it understood the invention and raised objections under Articles 76(1) and 84 EPC.

VI. With a letter dated 25 May 2018, the appellant filed two sets of amended claims according to AUXILIARY REQUESTS I and II.

VII. The board held oral proceedings in the present case on 28 June 2018.

During the oral proceedings, the board explained that claims 1 and 2 according to all three requests on file did not meet the requirements of Article 76(1) EPC because the claimed methods and apparatuses comprised features disclosed in separate embodiments in the earlier application as filed.

At the end of the oral proceedings, the appellant's requests were that the decision under appeal be set aside and that a patent be granted on the basis of the claims according to the main request filed as sole request with the statement of grounds of appeal or, in the alternative, according to AUXILIARY REQUEST I or AUXILIARY REQUEST II filed with the letter dated 25 May 2018.

VIII. Claims 1 and 2 according to the appellant's **main request** read as follows:

"1. A decoding method comprising the step of:

performing (38, 40), in units of a macro-block, motion compensation of a decoded image signal including a luma signal and chroma signal with an accuracy of 1/4 pixel for a luma motion vector, wherein the number of chroma pixels is vertically different from the number of luma pixels,
characterized in that

for motion compensation based on a chroma format, the phase of the chroma signal in a reference image block is vertically shifted by mv/2-1/4 so that the reference image block will coincide in phase of the chroma signal with a current block, wherein mv is the vertical component in the luma motion vector, wherein motion compensation is performed in field motion compensation mode on the macro-block basis, wherein a reference field is a bottom field and a current field is a top field, **or**

the phase of the chroma signal is shifted by mv/2+1/4 so that the reference signal will coincide in phase of the chroma signal with the current block, wherein mv is the vertical component in the luma motion vector, wherein motion compensation is performed in field motion compensation mode on the macro-block basis, wherein a reference field is a top field and a current field is a bottom field."

"2. A decoding apparatus comprising:

motion compensate means (38, 40) for performing, in units of a macro-block, motion compensation of a decoded image signal including a luma signal and chroma signal with an accuracy of 1/4 pixel for a luma motion vector, wherein the number of chroma pixels is vertically different from the number of luma pixels, characterized in that
said motion compensate means (38, 40) is adapted to vertically shift, for motion compensation, the phase of

the chroma signal in a reference image block by mv/2-1/4 so that the reference image block will coincide in phase of the chroma signal with a current block, wherein mv is the vertical component in the luma motion vector, wherein motion compensation is performed in field motion compensation mode on the macro-block basis, wherein a reference field is a bottom field and a current field is a top field **or**
is adapted to vertically shift the phase of the chroma signal by mv/2+1/4 so that the reference signal will coincide in phase of the chroma signal with the current block, wherein mv is the vertical component in the luma motion vector, wherein motion compensation is performed in field motion compensation mode on the macro-block basis, wherein a reference field is a top field and a current field is a bottom field."

IX. Claims 1 and 2 according to the appellant's **AUXILIARY REQUEST I** read as follows:

"1. A decoding method comprising the step of:
- performing (38, 40), in units of macroblocks, motion compensation of a decoded image signal having a format of 4:2:0 and including a luma signal and chroma signal, wherein each macroblock of the macroblocks comprises a top field and a bottom field,
- wherein in a first alternative:
a reference field in a reference macroblock of a reference frame is a bottom field of the reference macroblock and a current field of a current macroblock of a current frame is a top field for the motion compensation, and
when the motion compensation is performed with an accuracy of 1/4 pixel for a luma motion vector, generating, new chroma samples within the reference field at a position in the reference field, which is

vertically displaced by mv/2 – 1/4 from a position of a corresponding chroma sample in the reference field, so that the luma motion vectors between luma samples of the reference field and luma samples of the current field are parallel to chroma motion vectors between chroma samples of the reference field and chroma samples of the current field,
wherein mv is a vertical component of the luma motion vectors,
- wherein in a second alternative instead of the first alternative:
the reference field in the reference macroblock of the reference frame is the top field of the reference macroblock and the current field of the current macroblock of the current frame is the bottom field for the motion compensation, and
when the motion compensation is performed with the accuracy of 1/4 pixel for the luma motion vector, generating, new chroma samples within the reference field at a position in the reference field, which is vertically displaced by mv/2 + 1/4 from a position of a corresponding chroma sample in the reference field, so that the luma motion vectors between luma samples of the reference field and luma samples of the current field are parallel to chroma motion vectors between chroma samples of the reference field and chroma samples of the current field,
wherein mv is a vertical component of the luma motion vectors."

"2. A decoding apparatus configured and intended to perform the method according to claim 1."

X. Claims 1 and 2 according to the appellant's **AUXILIARY REQUEST II** read as follows:

"1. A decoding method comprising the step of:
- performing (38, 40), in units of macroblocks, motion compensation of a decoded image signal having a format of 4:2:0 and including a luma signal and chroma signal, wherein each macroblock of the macroblocks comprises a top field and a bottom field,
- wherein in a first alternative:
a reference field in a reference macroblock of a reference frame is a bottom field of the reference macroblock and a current field of a current macroblock of a current frame is a top field for the motion compensation, and
when the motion compensation is performed with an accuracy of 1/4 pixel for a luma motion vector, generating, new chroma samples within the reference field at a position in the reference field, which is vertically displaced by mv/2 - 1/4 from a position of a corresponding chroma sample in the reference field, so that the luma motion vectors between luma samples of the reference field and luma samples of the current field are parallel to chroma motion vectors between chroma samples of the reference field and chroma samples of the current field, and determining a value of each generated chroma sample by linear interpolation or by using a FIR filter with several taps,
wherein mv is a vertical component of the luma motion vectors,
wherein a unit of mv is, in a vertical direction, a distance between two adjacent luma samples in the reference field, and a unit of mv/2 - 1/4 is, in the vertical direction, a distance between two adjacent chroma samples in the reference field, wherein a negative value of mv indicates a direction of the vertical component of the luma motion vectors towards a top of the reference field, a negative value of mv/2-1/4 indicates a vertical displacement towards the top

of the reference field, a positive value of mv indicates a direction of the vertical component of the luma motion vectors towards a bottom of the reference field and a positive value of mv/2- 1/4 indicates a vertical displacement towards the bottom of the reference field,

- wherein in a second alternative instead of the first alternative:

the reference field in the reference macroblock of the reference frame is the top field of the reference macroblock and the current field of the current macroblock of the current frame is the bottom field for the motion compensation, and

when the motion compensation is performed with the accuracy of 1/4 pixel for the luma motion vector, generating, new chroma samples within the reference field at a position in the reference field, which is vertically displaced by mv/2 + 1/4 from a position of a corresponding chroma sample in the reference field, so that the luma motion vectors between luma samples of the reference field and luma samples of the current field are parallel to chroma motion vectors between chroma samples of the reference field and chroma samples of the current field, and

determining a value of each generated chroma sample by linear interpolation or by using a FIR filter with several taps,

wherein mv is a vertical component of the luma motion vectors,

wherein a unit of mv is, in a vertical direction, a distance between two adjacent luma samples in the reference field, and a unit of mv/2 + 1/4 is, in the vertical direction, a distance between two adjacent chroma samples in the reference field,

wherein a negative value of mv indicates a direction of the vertical component of the luma motion vectors

towards a top of the reference field, a negative value of mv/2 + 1/4 indicates a vertical displacement towards the top of the reference field, a positive value of mv indicates a direction of the vertical component of the luma motion vectors towards a bottom of the reference field and a positive value of mv/2 + 1/4 indicates a vertical displacement towards the bottom of the reference field."

"2. A decoding apparatus configured and intended to perform the method according to claim 1."

XI. The appellant's arguments regarding its amended claims, where relevant to the present decision, are summarised and addressed by the board in the "Reasons for the Decision" below.

Reasons for the Decision

1. The appeal is admissible.

The invention

2. The present invention relates to a specific problem in the field of image compression and assumes that the reader has knowledge of several video compression standards, which were either already finalised (e.g. MPEG-2: see document D3) or still under development at the priority date. The board understands the invention described in the application as filed as follows:

Several video compression standards, most notably MPEG-2, use what is known as the **4:2:0 format** for encoding **chroma** information ("**color-difference** signal" in the present application) and **luma** information

("**brightness** signal" in the present application) in each picture of a video. According to the 4:2:0 format, the chroma information is encoded with four times fewer pixels than the luma information (see, for instance, figure 6-1 on page 14 of D3). In order to compensate for their smaller numbers, the chroma pixels are four times as big as the luma pixels.

MPEG-2 and other standards also allow a picture to be either **interlaced** or **progressive**. In a progressive picture, all the pixels are in a single **frame** and represent the same instant in time. In an interlaced image, the picture consists of **two fields**, one field comprising all the even lines, the other field comprising all the odd lines. The two fields represent different instants in time separated by half the time between two successive frames.

When an interlaced picture is encoded in the 4:2:0 format, the luma and chroma pixels are distributed between the two fields as shown on figures 6-2 and 6-3 on pages 15 and 16 of D3 (figure 6-2 of D3 is identical to figure 3 of the application as filed), with half of the chroma pixels ending up in each field.

Because there are fewer chroma pixels than luma pixels in each of the two fields of an interlaced picture, the following **problem** occurs at the decoder during reconstruction with motion compensation, i.e. during the prediction of the chroma and luma pixel values of the current macroblock of a picture by using a motion vector and a reference macroblock of a previous picture: in order to use this motion vector to correctly predict the values of the chroma pixels at certain locations within the current macroblock, chroma pixels would need to exist within the reference

macroblock at locations where there are none (see, in figures 8 and 9 of the application as filed, the squares showing the positions of the existing chroma pixels in the two fields of the reference picture and the triangles showing the positions in those two fields where chroma pixels would be necessary for correct motion compensation).

3. The **solution** of the invention to the above problem is essentially to create chroma pixels at these necessary locations **in the reference field**. These missing chroma pixels are given values obtained by interpolation from the nearby existing chroma pixels in the reference field (see figures 12 to 15 for frame-based motion compensation and figures 16 to 23 for field-based motion compensation).

4. The appellant stated during the oral proceedings that it shared the board's understanding of the invention.

Main request - Article 76(1) EPC

5. According to Article 76(1), second sentence, EPC, a European divisional application "may be filed only in respect of subject-matter which does not extend beyond the content of the earlier application as filed".

According to the established jurisprudence of the boards of appeal, this requirement means that anything disclosed in the divisional application must be **directly and unambiguously derivable** from what is disclosed in the earlier application as filed (see decision G 1/06, OJ EPO 2008, 307, Order, and Case Law of the Boards of Appeal of the European Patent Office, 8th edition 2016, II.F.2.1.1).

6. The decoding method of claim 1 comprises the step of:

performing [...] motion compensation of a decoded image signal [...],

characterized in that

for motion compensation based on a chroma format,

the phase of the chroma signal [...] is vertically shifted by mv/2 - 1/4 [...], **or**

the phase of the chroma signal [...] is vertically shifted by mv/2 + 1/4 [...].

In other words, the decoding method of claim 1 comprises a step of performing motion compensation which may be performed according to a **first** technique (shift by mv/2 - 1/4) or a **second** technique (shift by mv/2 + 1/4).

7. In the earlier application as filed, the sole embodiment corresponding to the above **first** technique is the embodiment shown in figures 18 and 19, whereas the sole embodiment corresponding to the above **second** technique is the embodiment shown in figures 20 and 21.

It is, however, not **directly and unambiguously derivable** from the earlier application as filed that a single decoding method is able to perform motion compensation according to **either** the **first** technique **or** the **second** technique. Indeed, the disclosure of the earlier application as filed presents the embodiments of figures 18-19 and of figures 20-21 as alternative embodiments, not as embodiments which may be both performed by a single decoding method.

A similar objection applies to the decoding apparatus of claim 2 comprising motion compensation means which is adapted to vertically shift [...] by mv/2 - 1/4 or adapted to vertically shift [...] by mv/2 + 1/4.

The appellant argued that the subject-matter of claim 1 was two alternative decoding methods and the subject-matter of claim 2 was two alternative decoding apparatuses.

The board does not find this argument persuasive because, even ignoring the fact that the "or" might not be an exclusive "or", claim 1 does not define two alternative methods, but a single method having one step which may be performed in either of two possible ways. Similar considerations apply to the decoding apparatus of claim 2, which does not define two alternative apparatuses, but a single apparatus which comprises motion compensation means able to perform two different ways of motion compensation.

8. For the above reasons, the board considers that claims 1 and 2 according to the main request do not meet the requirements of Article 76(1) EPC.

9. Hence the appellant's main request is not allowable.

AUXILIARY REQUESTS I and II - Article 76(1) EPC

10. In both AUXILIARY REQUEST I and AUXILIARY REQUEST II, claims 1 and 2 are drafted with the following structure:

1. A decoding method comprising the step of:
- performing [...] motion compensation [...],
- wherein in a first alternative:
[...] is vertically displaced by mv/2 - 1/4 [...],
- wherein in a second alternative instead of the first alternative:
[...] is vertically displaced by mv/2 + 1/4 [...].

2. A decoding apparatus configured and intended to perform the method according to claim 1.

11. Although the structure is slightly different from that of claims 1 and 2 of the main request, the objections under Article 76(1) EPC under point 6 *supra* apply too to claims 1 and 2 of AUXILIARY REQUEST I and AUXILIARY REQUEST II.

12. It follows that AUXILIARY REQUEST I and AUXILIARY REQUEST II do not fulfil the requirements of Article 76(1) EPC and thus are not allowable.

Conclusion

13. 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 Chairman:

K. Boelicke C. Kunzelmann

Decision electronically authenticated