PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP2018/066880	25.06.2018	26.06.2017

International Patent Classification (IPC) or both national classification and IPC
INV. H04N19/593 H04N19/159

Applicant
THOMSON LICENSING

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Kuhn, Peter Telephone No. +49 89 2399-0

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/EP2018/066880

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:

      ☐ in the form of an Annex C/ST.25 text file.

      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	9-15
	No:	Claims	1-8
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-15
Industrial applicability (IA)	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents:

D1 LI (PEKING UNIV) J ET AL: "Multiple line-based intra prediction", 3. JVET MEETING; 26-5-2016 - 1-6-2016; GENEVA; (THE JOINT VIDEO EXPLORATION TEAM OF ISO/IEC JTC1/SC29/WG11 AND ITU-T SG.16); URL: HTTP://PHENIX.INT-EVRY.FR/JVET/,, no. JVET-C0071, 17 May 2016 (2016-05-17), XP030150177,

D2 PANUSOPONE K ET AL: "Unequal Weight Planar Prediction and Constrained PDPC", 5. JVET MEETING; 12-1-2017 - 20-1-2017; GENEVA; (THE JOINT VIDEO EXPLORATION TEAM OF ISO/IEC JTC1/SC29/WG11 AND ITU-T SG.16); URL: HTTP://PHENIX.INT-EVRY.FR/JVET/,, no. JVET-E0068, 5 January 2017 (2017-01-05), XP030150550,

D3 MATSUO SHOHEI ET AL: "Intra prediction with spatial gradients and multiple reference lines Â", PICTURE CODING SYMPOSIUM 2009; 6-5-2009 - 8-5-2009; CHICAGO,, 6 May 2009 (2009-05-06), XP030081823,

D4 CHEN J ET AL: "Algorithm description of Joint Exploration Test Model 6 (JEM6)", 6. JVET MEETING; 31-3-2017 - 7-4-2017; HOBART; (THE JOINT VIDEO EXPLORATION TEAM OF ISO/IEC JTC1/SC29/WG11 AND ITU-T SG.16); URL: HTTP://PHENIX.INT-EVRY.FR/JVET/,, no. JVET-F1001, 31 May 2017 (2017-05-31), XP030150793,

Independent Claims: Novelty

2 Notwithstanding the clarity objections below, the present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

3 Document D1, which is considered to represent the most relevant state of the art, discloses (references in parentheses applying to this document):

A method, comprising:
forming a plurality of reference arrays from reconstructed samples of neighboring a block of video data, wherein said reconstructed samples are located at pixel positions equal to or greater than one position from said block of video data;

(e.g. par. 2.1: "Refline0 to Refline 3", Fig.1, Fig. 2, par. 2.2: "rows of a prediction block", "columns of a prediction block", "p_{ji}" is the prediction value of each pixel" disclose plurality of reference arrays from reconstructed samples of a block of video data),

predicting a target pixel of the block of video data respectively from one or more of the plurality of reference arrays;

(e.g. par. 2.1, Fig.1, Fig. 2, par. 2.2: "rows of a prediction block", "columns of a prediction block", "p_{ji}" is the prediction value of each pixel" disclose predicting a target pixel of the block of video data respectively from one or more of the plurality of reference arrays),

computing a final intra prediction for the target pixel of the block of video as a function of predictions respectively from one or more of the reference arrays; and,

(e.g. par. 2.1, Fig.1, Fig. 2, par. 2.2 references several equations for computing a final prediction for the target pixel of the block of video as a function of predictions respectively from one or more of the reference arrays),

encoding the block of video using the final prediction.

(implicit in a video encoder).

4 As a consequence claim 1 does not meet the requirements of Article 33 (2) PCT for lack of novelty in this subject-matter.

5 As a note, D2-D4 point into the same direction:

6 D2 (par. 2, Fig.1), D3 (par. 3, Fig.4), D4 (par.2.2.2: Position dependent intra prediction combination) disclose also subject-matter relevant to claim 1.

7 The foregoing objections apply also to closely related claims 2-4 which are also considered not novel.

Dependent Claims - Novelty / Inventive Step

8 Dependent claims 5-15 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect of novelty or inventive step, the reasons being as following:

9 Claim 5 (Novelty): D1 (par. 2.2: "w indicates the weight", "w_k", "w_j") discloses several equations for claimed computing a final prediction using a weighted combination .

10 Claims 6,7 (Novelty): D1 (par. 2.1, Fig.1, Fig. 2, par. 2.2: "rows of a prediction block", "columns of a prediction block") discloses claimed subject-matter of "reference array comprises a row of pixels above, and a column of pixels to the left".

11 Claim 8 (Novelty): D1 (par. 2.2: equations) discloses equations for interpolation of samples in a reference array.

12 Claims 9-12 (Inventive Step): D1 (par.1, Fig.1) together with D1 (par. 2, Fig.2) renders obvious a weighted combination of N reference layers. Determining weights by "offline training" is considered common practice for a person skilled in the art of video coding.

13 The remaining dependent claims do not appear to contain any additional features which, in combination with the features of any claim to which they refer, involve an inventive step because these claims concern commonplace features which appear to be obvious to a person skilled in the art.

Re Item VIII

Certain observations on the international application

Clarity

14 The application does not meet the requirements of Article 6 PCT, because claims 1-15 are not clear.

15 In claim 1 / lines 4-5 the phrase "forming a plurality of reference arrays from reconstructed samples of neighboring a block of video data" is not clear. It is noted that the word "neighboring" seems to be disconnected from the context of claim 1. Further, the word "neighboring" is not present in other independent claims 2-4.

16 In claims 2 / line 15 (and similarly claim 4 / line 9) the phrase "said reconstructed samples" has no antecedent, because claim 2 / line 14 refers to "decoded samples".

17 The terms "weighted combination" (claim 5,), "based on" (claim 7), "offline training" (claim 10) are vague and unclear and leave the reader in doubt as to the meaning of the technical feature to which they refer, thereby rendering the definition of the subject-matter of said claim unclear, Article 6 PCT.

18 Specifically, in claim 1 / line 4 it is unclear how "forming a plurality of reference arrays from reconstructed samples of neighboring a block of video data," is performed.

19 Specifically, in claim 1 / lines 9-10 it is unclear how "computing a final intra prediction for the target pixel of the block of video as a function of predictions respectively from one or more of the reference arrays" is performed, when no particular function is defined.

20 Particularly, in claim 5 it is unclear how: "weighted combination" is to be performed when it is not defined what exactly is weighted and no weights are defined.

21 Particularly, in claim 6 it is unclear how a "function is based on ..." is to be calculated.

Re Item VII

Certain defects in the international application

Two-part form

22 Independent claims 1-4 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be possibly appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(I) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

23 The Independent claims should therefore be redrafted accordingly. If, however, the applicant is of the opinion that the two-part form would be inappropriate, then reasons therefor should be provided. In addition, the applicant should ensure that it is clear from the description which features of the subject-matter of the independent claims are already known in combination from the cited prior art.

Signs

24 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Background Art

25 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents cited above is not mentioned in the description, nor are these documents identified herein.

Amendments

26 In order to facilitate the examination of the conformity of the amended application with the requirements of Article 34(2)(b) PCT, the applicant is requested to clearly identify the amendments carried out, no matter whether the concern amendments by addition, replacement or deletion, and to indicate the passages of the application as filed on which these amendments are based (see also Rule 66.8(a) PCT).