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Datasheet for the decision of 6 February 2025

Case Number:	T 1248/22 - 3.5.04
Application Number:	18185240.1
Publication Number:	3410716
IPC:	H04N19/50, H04N19/70, H04N19/46, H04N19/51, H04N19/91, H04N19/18, H04N19/59, H04N19/139, H04N19/176, H04N19/129, H04N19/124, H04N19/136, H04N19/13, H04N19/61
Language of the proceedings:	EN

Title of invention:
CODING OF SIGNIFICANCE MAPS AND TRANSFORM COEFFICIENT BLOCKS

Patent Proprietor:
GE Video Compression, LLC

Opponent:
Unified Patents, LLC

Relevant legal provisions:
EPC Art. 100(a), 54, 56
RPBA 2020 Art. 13(2)

Keyword:

Granted patent - novelty (no)
Auxiliary request I - novelty (no)
Auxiliary request II - added subject-matter (yes)
Auxiliary requests III to VI - inventive step (no)
Amendment after summons - taken into account (no)

Decisions cited:

T 1473/19

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Case Number: T 1248/22 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 6 February 2025

Appellant: (Patent Proprietor)	GE Video Compression, LLC 8 Southwoods Boulevard Albany, NY 12211 (US)
Representative:	Eisenführ Speiser Patentanwälte Rechtsanwälte PartGmbB Gollierstraße 4 80339 München (DE)
Appellant: (Opponent)	Unified Patents, LLC 1875 Connecticut Ave. NW, Floor 10 Washington D.C., DC 20009 (US)
Representative:	HGF HGF Limited 1 City Walk Leeds LS11 9DX (GB)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 7 March 2022 concerning maintenance of the European Patent No. 3410716 in amended form.**

Composition of the Board:

Chair	B. Willems
Members:	F. Sanahuja
	G. Decker

Summary of Facts and Submissions

I. The present appeals are against the opposition division's interlocutory decision dated 7 March 2022 that, account being taken of the amendments made by the patent proprietor during the opposition proceedings, European patent No. 3 410 716 and the invention to which it relates met the requirements of the EPC (Article 101(3)(a) and 106(2) EPC).

II. In the opposition proceedings, the grounds for opposition according to Article 100(a) together with Articles 54(1) and 56 EPC, Article 100(b) and Article 100(c) EPC were raised.

III. The documents cited in the decision under appeal included the following:

D4 US 2008/0219578 A1

IV. In its decision, the opposition division reached the following conclusions.

- The ground for opposition under Article 100(a) EPC prejudiced maintenance of the patent as granted because the subject-matter of claims 1, 3, 5, 6, 7 and 9 lacked novelty over the disclosure of document D4 (Article 54 EPC).

- Auxiliary request I was not allowable because the subject-matter of claims 1, 3, 5, 6, 7 and 9 of this request lacked novelty over the disclosure of document D4 (Article 54 EPC).

- Auxiliary request II did not meet the requirements of Article 123(2) EPC.

- Auxiliary request III met the requirements of the EPC (Article 101(3)(a) EPC).

V. Both the patent proprietor and the opponent filed notice of appeal and a statement of grounds of appeal.

VI. With its reply to the opponent's statement of grounds of appeal dated 1 December 2022, the patent proprietor filed an amended set of claims according to auxiliary request IV.

VII. The board issued summons to oral proceedings and a communication under Article 15(1) RPBA. In this communication, the board gave, *inter alia*, the following preliminary opinion.

- Document D4 disclosed the claimed neighbourhood. Hence, the ground for opposition under Articles 100(a), 54 EPC prejudiced maintenance of the patent as granted.

- The subject-matter of claim 1 of auxiliary request I was not new over the disclosure of document D4 (Article 54 EPC).

- Claim 1 of auxiliary request II contained subject-matter which extended beyond the content of the application as filed (Article 123(2) EPC).

- There might be a need to discuss whether claim 1 of auxiliary request III involved an inventive step in

view of the disclosure of document D4 (Article 56 EPC).

VIII. In its letter of reply dated 9 December 2024, the opponent argued, *inter alia*, that auxiliary request IV should not be admitted into the proceedings and that claims 1 and 9 of this request did not meet the requirements of Articles 123(2), 76(1), 84 and 56 EPC.

IX. In its reply dated 13 December 2024, the patent proprietor requested suspension of the appeal proceedings in view of pending referral G 1/24. It submitted amended claims according to auxiliary requests V and VI.

The patent proprietor contested the board's interpretation of claim 1 of the granted patent and auxiliary requests I and II. It submitted that the correct interpretation of the term "neighborhood" - as being situated within a single transform coefficient block - rendered the subject-matter of the independent claims of these requests novel over document D4. Additionally, it argued that the claims of auxiliary request II met the requirements of Article 123(2) EPC. The patent proprietor further contended that, when correctly interpreted, the subject-matter of the independent claims of auxiliary requests III and IV involved an inventive step.

The patent proprietor argued for the admission of auxiliary requests V and VI into the proceedings, indicated a basis for the amended claims of these requests and reasoned that the subject-matter of claim 1 of these requests met the requirements of Article 56 EPC.

X. By a communication dated 9 January 2025, the board refused the patent proprietor's request for suspension of the proceedings.

XI. With its reply dated 20 January 2025, the opponent requested that auxiliary requests V and VI not be admitted into the appeal proceedings.

XII. The patent proprietor's final requests were that the appeal proceedings be suspended in view of pending referral G 1/24, or, as a main request, that the decision under appeal be set aside and that the opposition be rejected, i.e. that the patent be maintained as granted. Alternatively, it requested that the patent be maintained as amended on the basis of the claims of either auxiliary request I or II filed with the statement of grounds of appeal, or, as auxiliary request III, that the opponent's appeal be dismissed, i.e. that the interlocutory decision of the opposition division of 7 March 2022 be maintained, i.e. that the patent be maintained on the basis of the claims of auxiliary request III filed by letter dated 19 November 2021, or that the patent be maintained as amended on the basis of the claims of auxiliary request IV filed by letter dated 1 December 2022, or on the basis of the claims of one of auxiliary requests V and VI filed by letter dated 13 December 2024. It further requested that the objections raised by the opponent for the first time in its statement of grounds of appeal not be admitted into the proceedings.

The opponent's final requests were that the decision under appeal be set aside and that the patent be revoked in its entirety. It further requested that the

patent proprietor's auxiliary requests IV, V and VI not be admitted into the appeal proceedings.

XIII. The features of claim 1 of the **main request** are identified as follows:

1.1 *"Decoder for decoding a data stream (30) to reconstruct a reconstructed version of a sample array (20), configured to extract from the data stream a transform coefficient block for each of blocks (40) of the sample array, and reconstruct the reconstructed version by performing an inverse transform on each of the transform coefficient blocks,*

1.2 *extract, by entropy decoding, information on the transform coefficient blocks from the data stream by decoding a significance map indicating positions of significant transform coefficients within a transform coefficient block from the data stream by*

1.3 *extracting a significance map indicating positions of significant transform coefficients within the transform coefficient block, and then the values of the significant transform coefficients within the transform coefficient block from a data stream, with, in extracting the significance map,*

1.4 *sequentially extracting first-type syntax elements from the data stream by context-adaptive entropy decoding, the first-type syntax elements indicating, for associated positions within the transform coefficient block as to whether at the respective position a significant or*

insignificant transform coefficient is situated; and

1.5 *sequentially associating the sequentially extracted first-type syntax elements to the positions of the transform coefficient block in a predetermined scan order among the positions of the transform coefficient block,*

1.6 *using, in context-adaptively entropy decoding the first-type syntax elements, contexts which are individually selected for each of the first-type syntax elements depending on a number of positions at which according to the previously extracted and associated first-type syntax elements significant transform coefficients are situated,*

1.7 *in a neighborhood of the position with which a current first-type syntax element is associated."*

XIV. Claim 1 of **auxiliary request I** differs from claim 1 of the granted patent in that the term "neighborhood" in feature 1.7 has been amended to "predetermined neighborhood".

XV. Claim 1 of **auxiliary request II** differs from claim 1 of auxiliary request I in that the following feature has been inserted at the end of the claim:

", *the predetermined neighborhood being situated within the transform coefficient block*"

XVI. Claim 1 of **auxiliary request III** differs from claim 1 of auxiliary request II in that the following feature has been inserted at the end of the claim:

", *the size of the transform coefficient block being larger than 8x8*"

XVII. Claim 1 of **auxiliary request IV** differs from claim 1 of auxiliary request III in that the following feature has been inserted at the end of feature 1.7:

", *wherein only the positions are counted at which according to the previously extracted and associated first-type syntax elements significant transform coefficients are situated*"

XVIII. Claim 1 of **auxiliary request V** differs from claim 1 of auxiliary request III in that the term "a number" in feature 1.6 has been amended to "the number".

XIX. Claim 1 of **auxiliary request VI** differs from claim 1 of auxiliary request IV in that the term "a number" in feature 1.6 has been amended to "the number".

Reasons for the Decision

1. *Interpretation of the term "neighborhood"*

1.1 Claim 1 of the granted patent and auxiliary request I specifies selecting a context for first-type syntax elements "*depending on a number of positions at which according to the previously extracted and associated first-type syntax elements significant transform coefficients are situated, in a [predetermined]*

neighborhood of the position with which a current first-type syntax element is associated".

1.2 The wording of the claims should typically be given its broadest technically sensible meaning by the person skilled in the art (see Case Law of the Boards of Appeal of the European Patent Office, 10th edition, 2022, "Case Law", II.A.6.1).

The description and drawings are used to interpret the claims and identify their subject-matter, in particular in order to judge whether it is novel and not obvious (see Case Law, II.A.6.3.1).

Terms used in patent documents should be given their normal meaning in the relevant art, unless the description gives them a special meaning. The patent document may be its own dictionary provided that the description gives unambiguous definitions of these terms (see Case Law, II.A.6.3.3).

1.3 The patent proprietor submitted that the term "neighborhood" should not be interpreted in isolation. Taking the context of features 1.3 to 1.7 of granted claim 1, the person skilled in the art understood that the claimed "neighborhood" related to positions within the transform coefficient block. The significance map in feature 1.2 related to a single transform coefficient block. Features 1.3 to 1.7 specified extracting the significance map and consistently referred to the same transform coefficient block of feature 1.2. Feature 1.6 referred to positions of "*the previously extracted and associated first-type syntax elements*" specified in features 1.4 and 1.5 for context selection, indicating that these positions were located within the same transform coefficient block.

Consequently, the "neighborhood" of feature 1.7 had to be situated within the transform coefficient block.

Further, each position in a transform coefficient block was associated with a first-type syntax element and the corresponding transform coefficient, i.e. a spectral component. The neighbourhood of a given position included a number of positions within the current transform coefficient block, each associated with different spectral components. While a spatially neighbouring transform coefficient block was a neighbour of the current transform coefficient block, its spectral components could not be regarded as neighbours of a position associated with a spectral element of the current transform coefficient block. This was particularly true because spectral correlations were lost across block boundaries.

In addition, including previously decoded blocks in the neighbourhood was not technically sensible. These blocks might not even be spatial neighbours of the current block because claim 1 did not specify the spatial arrangement between coding blocks.

Therefore, the person skilled in the art would not have considered a position within a previously decoded transform coefficient block to be a part of the neighbourhood of a position within the current transform coefficient block.

1.4 The opponent argued that claim 1 did not indicate that the concept of "neighborhood" referred specifically to neighbouring positions within the transform coefficient block. The term "neighborhood" in feature 1.7 was unqualified. Features 1.2 to 1.5 referred to the transform coefficient block for specifying the

significance map but did not define the neighbourhood. Further, since claim 1 specified decoding a plurality of blocks including their respective significance maps, the reference to positions of "*the previously extracted and associated first-type syntax elements*" for context selection was not necessarily limited to the positions within the current transform coefficient block. Consequently, the neighbourhood was not confined to the spectral domain within the current transform coefficient block but could also include positions in neighbouring transform coefficient blocks in the spatial domain.

The person skilled in the art understood that the blocks in claim 1 were adjacent to each other. Any other interpretation would contradict the common general knowledge in the field of block-based video coding. Therefore, transform coefficients at the edge of a block were neighbours of transform coefficients in an adjacent, previously decoded block.

1.5 The board finds that the context of claim 1 does not dictate that the "neighborhood" of a position associated with a first-type syntax element has to be restricted to positions within a current transform coefficient block.

1.5.1 Claim 1 does not impose any limitation on the "neighborhood" of a position associated with a first-type syntax element. Features 1.3 to 1.5 define the characteristics of the significance map and the first-type syntax element, but not the "neighborhood". The reference to positions of the "*previously extracted and associated first-type syntax elements*" in feature 1.6 does not restrict these positions to the current transform coefficient block. As is common in

video coding - and as is explicitly defined in claim 1 - decoding involves processing a plurality of transform coefficient blocks. Therefore, the person skilled in the art would interpret the positions of "*the previously extracted and associated first-type syntax elements*" to include positions of first-type syntax elements from previously decoded transform coefficient blocks. Whilst a neighbourhood of a spectral component (i.e. a transform coefficient) may include positions of other spectral components in the same transform coefficient block, it does not exclude positions of transform coefficients in spatially neighbouring transform coefficient blocks.

1.5.2 In the context of video coding, in which the claim is to be construed, it is well established that neighbouring blocks are correlated. This correlation has been widely exploited in context-adaptive entropy coding. Since claim 1 defines a decoder configured to extract first-type syntax elements by context-adaptive entropy decoding, it is technically sensible to consider neighbouring blocks to be part of the claimed "neighborhood".

1.5.3 The board is not convinced that the omission of a spatial block arrangement in claim 1 would lead the person skilled in the art to disregard previously decoded blocks as neighbours. In block-based video coding it is common practice to code blocks in a way that ensures that neighbouring blocks are available at the decoder, thereby enabling the exploitation of correlations for efficient coding.

1.6 When interpreting claim 1 in the context of the description, the patent proprietor submitted that the sole embodiment disclosed the neighbourhood as being

within the current transform coefficient block, referring to paragraphs [0020], [0040] and [0067] of the patent description. Paragraph [0020] disclosed that, in particular, the neighbourhood could be situated within the transform coefficient block. The terms in brackets in the phrase "predetermined neighbourhood (inside the transform block)" in paragraph [0067] did not qualify the neighbourhood, but merely reiterated the same term. The description did not support a broad interpretation of the term "neighborhood" including neighbouring blocks. This would contradict the disclosure in these paragraphs.

A formal definition of the term "neighborhood" was not necessary. Claim 1 was to be interpreted such that it did not contradict the disclosure of the sole embodiment.

The reference to a "spatial neighbourhood" in paragraph [0056] should, in light of paragraph [0040], be interpreted as referring to spatial neighbours in the spectral domain, i.e. the neighbouring transform coefficients within the current transform coefficient block. Further, the disclosure in paragraph [0060] that context models could be selected using statistics of previously coded transform coefficient blocks related to an embodiment that was not claimed.

1.7 The opponent argued that the description could not be used to restrict the broad interpretation of the term "neighborhood" of claim 1, in particular because the term was not unambiguously defined in a way that excluded neighbourhoods outside the transform coefficient block.

Paragraph [0020] of the patent description did not specify that the neighbourhood was confined within the transform coefficient block. Paragraph [0060] disclosed that statistics from previously coded transform blocks were taken into account, indicating that using a neighbourhood including those blocks was a possible interpretation. In paragraph [0056], the context model for the first-type syntax element claimed was selected using a spatial neighbourhood of the current scan position. Additionally, the terms in brackets in paragraph [0067] explicitly qualified the preceding term "neighborhood", implying that when the term was used without such qualification, it had a broader meaning.

1.8 The board considers that interpreting claim 1 in the light of the description does not narrow the broad interpretation of the term "neighborhood".

1.8.1 The description discloses embodiments in which the neighbourhood is situated within the current transform coefficient block (see, for example, the last sentence in paragraph [0020] or paragraph [0067]). However, these are specific embodiments of the more general teaching that a context may be selected for a syntax element of the significance map depending on a number of significant transform coefficients in an unqualified (see the first sentence in paragraph [0020]) or not unambiguously defined (see paragraph [0056]) neighbourhood of the syntax element.

The patent proprietor's argument that the "spatial neighbourhood" in paragraph [0056] should be interpreted as being within the transform coefficient block in light of paragraph [0040] is not convincing. This is because paragraph [0056] discloses a

self-contained embodiment and there is no apparent relationship between these two distant paragraphs.

1.8.2 Further, a claim need not be interpreted as covering only the embodiments described in the application.

The mere fact that a claim feature is interpreted in a technically sensible manner not explicitly disclosed in the description does not invalidate this interpretation, in particular if neither the description nor the drawings exclude it (see T 1473/19, point 4.4 of the Reasons).

The board considers that a broad interpretation of the term "neighbourhood" to include positions associated with first-type syntax elements in neighbouring transform coefficient blocks does not contradict the disclosure of the description and drawings of the patent. Rather, the claim wording encompasses additional alternatives.

1.9 In view of the above, claim 1 is not limited to the interpretation submitted by the patent proprietor and encompasses using neighbourhoods not situated within the current transform coefficient block for context selection for first-type syntax elements.

2. *Request for suspension of the appeal proceedings*

The patent proprietor's request for suspension of the appeal proceedings in view of pending referral G 1/24 was based on the question of how certain features were to be interpreted and whether the description was to be taken into account in answering this question. However, since the board's interpretation of the term "neighborhood" is the same regardless of whether or not

the description is taken into account for interpretation purposes (see point 1. above), any possible outcome of pending referral G 1/24 has no impact on the case in hand. Consequently, the board finds that the patent proprietor's suspension request is no longer relevant.

3. *Patent as granted and auxiliary request I - novelty over document D4 (Article 100(a) EPC together with Article 54(1) EPC)*

3.1 Under Articles 100(a) and 101(2) EPC, the subject-matter of a European patent must be patentable under Articles 52 to 57 EPC.

An invention is to be considered new if it does not form part of the state of the art (Article 54(1) EPC).

3.2 The patent proprietor argued that document D4 did not disclose selecting a context "*depending on a number of positions at which according to the previously extracted and associated first-type syntax elements significant transform coefficients are situated, in a [predetermined] neighborhood of the position with which a current first-type syntax element is associated*" as defined in claim 1 of the patent as granted and auxiliary request I.

3.3 In point 1.9 above, the board considered that there was no reason to interpret the term "neighborhood" in claim 1 of the patent as granted and auxiliary request I as excluding using neighbourhoods not situated within the current transform coefficient block for context selection for first-type syntax elements.

Document D4 discloses selecting a context for entropy coding first-type syntax elements, where the selection depends on the number of positions at which significant transform coefficients are situated in a predetermined neighbourhood of a current first-type syntax element. This predetermined neighbourhood comprises positions in the neighbouring transform coefficient blocks to the left of and above the current transform coefficient block that correspond to the position associated with the current first-type syntax element (see e.g. paragraph [0071]).

Therefore, the board concurs with the opposition division's finding that the subject-matter of claim 1 of the granted patent is not new over the disclosure of document D4 (see point 12.3.2 of the decision under appeal). The same applies to the subject-matter of claim 1 of auxiliary request I (see point 12.4 of the decision under appeal).

3.4 In view of the above, the board finds that the ground for opposition under Article 100(a) EPC prejudices maintenance of the patent as granted (main request) and that the subject-matter of claim 1 of auxiliary request I is not new over document D4 (Article 54 EPC).

4. *Auxiliary request II - amendments (Article 123(2) EPC)*

4.1 The European patent application may not be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC).

Under the case law of the boards of appeal, an amendment can only be made within the limits of what the person skilled in the art would derive directly and

unambiguously, using common general knowledge, and seen objectively and relative to the date of filing, from the whole disclosure of the description, claims and drawings of the application as filed (see Case Law, II.E.1.1).

4.2 Claim 1 of auxiliary request II has been amended to specify that the "*predetermined neighborhood*" is "*situated within the transform coefficient block*".

4.3 The opposition division found that the amendment infringed Article 123(2) EPC.

4.4 The patent proprietor cited page 22, lines 8 to 11 of the description as filed as a basis for the amendment.

This passage disclosed that "*the context model selection for larger transform blocks (e.g., for blocks greater than 8x8) is based on the number of already coded significant transform coefficients in a predefined neighbourhood (inside the transform block)*".

Moreover, page 22, line 30 to page 23, line 5 of the description specified that "*the size of the transform block may be equal to or greater than 8x8 positions*".

From these disclosures, the person skilled in the art understood that the context model selection could be applied to transform coefficient blocks of size 8x8 or larger.

4.5 The opponent argued that the first passage cited by the patent proprietor relied on the use of large transform coefficient blocks of sizes greater that 8x8 and that there was no mention of large transform blocks of

size 8x8. Further, the application as filed did not provide a basis for using any transform block size.

4.6 The board finds that the person skilled in the art would not directly and unambiguously derive, on the basis of the whole disclosure of the application as filed, that the context model selection of claim 1 applied to transform coefficient blocks of any size.

Indeed, the passage on page 22, lines 1 to 6, which directly precedes the first quoted passage in point 4.4 above, describes context modelling strategies for transform coefficient blocks of sizes 4x4 and 8x8. In that context, the phrase "*context model selection for larger transform blocks (e.g. for blocks greater than 8x8)*" in the quoted passage must be understood as referring specifically to transform coefficient blocks larger than 8x8. Therefore, it cannot provide a basis for applying the context model selection to transform blocks of any block size. The same applies to the paragraph bridging pages 22 and 23 of the description, which states that the size of transform blocks is "*equal to or greater than 8x8 positions*".

4.7 In view of points 4.2 to 4.6 above, claim 1 of auxiliary request II contains subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC).

5. *Auxiliary request III - inventive step starting from the disclosure of document D4 (Article 56 EPC)*

5.1 An 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 (Article 56 EPC).

Below, the board applies the established "problem-solution approach" to the assessment of whether the subject-matter of claim 1 involves an inventive step (see Case Law, I.D.2).

5.2 Document D4, which can be taken as a promising starting point in the prior art for the examination of inventive step, does not disclose the following features of claim 1:

> "*the predetermined neighborhood being situated within the transform coefficient block, the size of the transform coefficient block being larger than 8x8*"

5.3 In the context of claim 1 of auxiliary request III, it is first to be determined how the term "predetermined neigborhood" should be interpreted.

5.3.1 The patent proprietor argued that the term "neighborhood" inherently implied proximity and closeness, meaning that a region distant from a current scanning position in a transform coefficient block could not be considered a neighbour. If the term "neighborhood" encompassed all positions in the transform coefficient block it would be meaningless. However, terms in a claim should not be meaningless. Therefore, the claimed neighbourhood included at least positions that were close to a current scanning position but did not extend to all positions within the transform coefficient block.

5.3.2 The opponent submitted that claim 1 only specified that the neighbourhood was situated within the transform coefficient block. Therefore, the neighbourhood could

include some or all positions of the transform coefficient block.

Further, paragraph [0020] of the patent description disclosed a relationship between the neighbourhood and a cluster of significant transform coefficients. However, this relationship was absent from the claim wording. It was thus not apparent how close two positions had to be within a transform coefficient block to be considered "close".

5.3.3 The board agrees with the opponent that the claim merely requires the "neighborhood" to be situated within the transform coefficient block. Consequently, the term "neighborhood" is not limited to positions that would generally be considered close (e.g. adjacent positions), nor does it necessarily include such positions (see also paragraph [0068]). Additionally, the claim does not impose a limitation on size.

5.4 Taking this interpretation of the term "neighborhood" as basis, the technical effect of the distinguishing features will be discussed as a next step.

5.4.1 The patent proprietor attributed to the distinguishing features the technical effect of increasing the efficiency of entropy coding for the first-type syntax element, which indicated whether a significant transform coefficient was situated at an associated position in a transform coefficient block. Since significant transform coefficients tended to cluster in certain areas within a transform coefficient block, taking account of the neighbourhood of the significant transform coefficients resulted in better adaptation of the context.

Regardless of the size of the neighbourhood or its position within the transform coefficient block, an improvement in coding efficiency was always achieved compared to the context selection of document D4. This was because even large neighbourhoods captured relevant information about the cluster of significant transform coefficients within the block.

It was not necessary to specify the position of the cluster in claim 1 because using a neighbourhood within the transform coefficient block inherently exploited the cluster, irrespective of its position. In other words, the probability of encountering significant transform coefficients was higher for scanning positions within a cluster and *vice versa*.

The broadness of the claim was justified by the varying sizes of clusters, which depended on the statistical properties of the video sequence being coded.

In addition, the combination of transform blocks larger than 8x8 and a neighbourhood within the transform coefficient block achieved a synergistic effect. This was because the clusters of significant transform coefficients created by the large transform blocks could be exploited in entropy coding of the first-type syntax elements.

5.4.2 The opponent argued that the application did not demonstrate that using large neighbourhoods improved coding efficiency. A large neighbourhood encompassed positions extending beyond any local clustering of significant transform coefficients, e.g. positions not restricted to an area around the current scan position. Such a neighbourhood diluted the context, preventing effective exploitation of local clustering. There was

no correlation between the presence of a significant transform coefficient at a current scan position and the presence of significant transform coefficients at positions distant from the current scan position. The presence of significant transform coefficients at distant positions in the transform coefficient block was not indicative of the probability that there was a significant transform coefficient at the current scan position. Therefore, considering those positions when selecting a context did not necessarily improve coding efficiency. Only very specific neighbourhoods could exploit the cluster. Therefore, no discernible technical effect was achieved across the entire breadth of claim 1.

Moreover, the alleged synergistic effect was not achieved by the distinguishing features because the claimed "neighborhood" did not effectively capture information about the clustering of significant transform coefficients.

5.4.3 The board finds that the neighbourhood specified in claim 1 does not credibly improve the efficiency of entropy coding for the first-type syntax element across the whole claimed scope of neighbourhoods.

Using large neighbourhoods dilutes the information about local clusters of significant transform coefficients. Since the claimed neighbourhood is not required to be so close to the current scan position or so limited in size as to exploit the clustering of coefficients (see point 5.3.3 above), it is not apparent that information about significant transform coefficients in distant positions correlates with the presence of a significant transform coefficient at the current scan position. As a result, the claimed

neighbourhood cannot effectively exploit the information about clusters of significant transform coefficients to improve coding efficiency.

The board finds that, regardless of how and whether clusters of transform coefficients are created, it is not apparent that the claimed "neighborhood" captures information about the clustering of significant transform coefficients which could result in overall improved coding efficiency.

Consequently, the distinguishing features do not achieve the alleged improvements.

5.4.4 During the oral proceedings before the board, the patent proprietor submitted that the distinguishing features provided a computational advantage by eliminating the need to store the significance map or the transform coefficients of previous blocks. Therefore, the claimed context selection reduced memory access and storage requirements compared to document D4.

5.4.5 The opponent argued that there were no exceptional circumstances which justified asserting this alleged technical effect for the first time at such a late stage of the appeal proceedings and submitted that this submission should not be taken into account under Article 13(2) RPBA.

5.4.6 Under Article 12(2) and (4) RPBA, a submission constitutes an amendment if it is not directed to the requests, facts, objections, arguments and evidence on which the decision under appeal was based.

Under Article 13(2) RPBA, any amendment to a party's appeal case after notification of a communication under Article 15(1) RPBA is, in principle, not to be taken into account unless there are exceptional circumstances which have been justified with cogent reasons by the party concerned.

5.4.7 The technical effect of a computational advantage was submitted for the first time during the oral proceedings before the board.

In its statement of grounds of appeal (see sections 12.1 and 20), the opponent contested that the broadness of the term "neighborhood" achieved a discernible technical effect across the entire breadth of claim 1.

Since this objection was clearly stated from the outset of the opposition appeal proceedings, the board cannot identify any exceptional circumstances in the case in hand which would justify submitting a new technical effect only after notification of the board's communication under Article 15(1) RPBA. Therefore, the board, exercising its discretion under Article 13(2) RPBA, decided not to take into account this submission in the appeal proceedings.

5.5 The formulation of the objective technical problem and the obviousness of the solution will be discussed next.

5.5.1 The patent proprietor argued that, to arrive at the claimed subject-matter by means of an alternative, document D4 should at least prompt a skilled person to seek such an alternative. The person skilled in the art would not go against the teaching of document D4, which explicitly disclosed using only positions in

neighbouring blocks for context selection. There was a technical prejudice against considering positions situated outside the neighbouring blocks for context selection.

Further, under the Case Law of the boards of appeal (see section I.D.4.5), when looking for an alternative to a known solution, it might not be required to justify the selection of a particular solution known in the art. However, this implied that the alternative had to be known in the art - meaning that the person skilled in the art was aware of it and could thus select it from a known set of alternatives. In the case in hand, neither document D4 nor the available prior art disclosed or suggested that positions within the transform coefficient block were suitable for selecting a context for entropy coding of the first-type syntax elements.

5.5.2 The opponent submitted that no pointer from the closest prior art was needed when modifying the context selection known from said prior art in an arbitrary manner. The claimed context selection method was an arbitrary modification of the known context selection and not driven by technical considerations. It would result in significantly lower coding efficiency across a broad range of claimed scope. Further, the opponent contested that there was a technical prejudice against using neighbourhoods within the transform coefficient block. The fact that correlations existed inside a block was known in the art, for example, from H.264/ AVC.

5.5.3 The board holds that the distinguishing features do not achieve the alleged improvements (see point 5.4.3 above). Consequently, the neighbourhood known from

document D4 has been modified in an arbitrary manner and the modification does not provide a relevant technical effect.

The objective technical problem may thus be formulated as finding a different solution for context selection in entropy coding of the first-type syntax element.

In cases such as the one in hand, involving such an arbitrary selection, the prior art does not need to prompt the skilled person to select the particular solution claimed. Instead, all possible solutions have to be regarded as being equally suitable and obvious candidates for solving the objective technical problem. Therefore, they all have to be considered to be suggested to the skilled person (see Case Law, I.D.9.21.9 a)).

The board agrees with the opponent that the existence of correlations within the transform coefficient block is known in the art. For example, it is well known that transform coefficients typically show large values for coefficients in positions corresponding to low-frequency regions. The coefficient values decrease to small or zero values for coefficients in positions corresponding to high-frequency regions. The person skilled in the art would have found it obvious to exploit this known correlation between transform coefficient positions when seeking a different solution for context selection in entropy coding of the first-type syntax element.

5.6 In view of the above, the subject-matter of claim 1 of auxiliary request III lacks inventive step over the disclosure of document D4 and the common general

knowledge of the person skilled in the art (Article 56 EPC).

6. *Auxiliary request IV – inventive step starting from the disclosure of document D4 (Article 56 EPC)*

6.1 Claim 1 of auxiliary request IV has been amended with respect to claim 1 of auxiliary request III so as to specify that "*only the positions are counted at which according to the previously extracted and associated first-type syntax elements significant transform coefficients are situated*".

6.2 The patent proprietor submitted that counting these positions indicated whether the scan position associated with a first-type syntax element to be coded was situated in a cluster of significant transform coefficients. A low count of significant transform coefficients in the neighbourhood of that scan position indicated a low density of significant transform coefficients and a correspondingly low probability of the presence of a significant transform coefficient at the scan position. As the count reduced the claimed scope, the technical effect of improving coding efficiency was now achieved over the whole claimed scope.

Further, the count was performed incrementally at each new scan position. An update of the count value for a new scan position indicated that the position was located in a cluster of significant transform coefficients.

6.3 The opponent argued that the count did not limit the scope of the claim with respect to claim 1 of auxiliary

request III which already referred to a number of positions.

Further, neither claim 1 nor the description specified monitoring a count value.

6.4 The board finds that, for the same reasons as set out in relation to claim 1 of auxiliary request III, the amended feature in claim 1 does not change the fact that the claimed neighbourhood cannot effectively exploit the information about clusters of significant transform coefficients to improve coding efficiency.

Further, it is not apparent from the wording of claim 1 that the count is incrementally updated or that such an update is used for any purpose.

6.5 Since the amended feature of claim 1 of auxiliary request IV does not contribute to improving coding efficiency and no further technical effect is apparent with respect to claim 1 of auxiliary request III, the board sees no reason to depart from the conclusion reached with respect to claim 1 of auxiliary request III.

6.6 In view of the above, the board finds that the subject-matter of claim 1 of auxiliary request IV lacks inventive step over the disclosure of document D4 and the common general knowledge of the person skilled in the art (Article 56 EPC). In view of this result, the board left open the question of admittance of auxiliary request IV.

7. *Auxiliary requests V and VI - inventive step starting from the disclosure of document D4 (Article 56 EPC)*

7.1 Claim 1 of auxiliary requests V and VI differs from claim 1 of auxiliary requests III and IV, respectively, in that the phrase "a number" in feature 1.6 has been amended to "the number".

7.2 Neither the patent proprietor nor the opponent submitted further comments.

7.3 The board interpreted the phrase "a number" in the amended sense for the higher ranking claim requests (see point 3.3 above). Consequently, for the same reasons as set out with respect to auxiliary requests III and IV, the subject-matter of claim 1 of auxiliary requests V and VI lacks inventive step over the disclosure of document D4 and the common general knowledge of the person skilled in the art (Article 56 EPC). In view of this result, the board left open the question of admittance of auxiliary requests V and VI.

8. *Conclusion*

The ground for opposition under Article 100(a) EPC prejudices maintenance of the patent as granted. The subject-matter of claim 1 of auxiliary request I does not meet the requirements of Article 54 EPC. Claim 1 of auxiliary request II does not meet the requirements of Article 123(2) EPC. The subject-matter of claim 1 of auxiliary request III to VI does not meet the requirements of Article 56 EPC. Since none of the patent proprietor's requests is allowable, the decision under appeal is to be set aside and the patent is to be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chair:

K. Boelicke B. Willems

Decision electronically authenticated