

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AMAZON.COM, INC., AMAZON.COM SERVICES LLC,
Petitioner,

v.

NOKIA TECHNOLOGIES OY,
Patent Owner.

IPR2024-01503
Patent 9,571,833 B2

Before JAMESON LEE, STEVEN M. AMUNDSON,
and JASON M. REPKO, *Administrative Patent Judges*.

LEE, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Amazon.com, Inc. and Amazon.com Services LLC (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 9–14, 16, 18, and 26–30 (“challenged claims”) of U.S. Patent No. 9,571,833 B2 (Ex. 1001, “the ’833 patent”). Paper 3 (“Pet.”). Nokia Technologies Oy (“Patent Owner”) filed a Preliminary Response. Paper 8 (“Prelim. Resp.”).

We have authority to determine whether to institute an *inter partes* review. *See* 35 U.S.C. § 314 (2024); 37 C.F.R. § 42.4(a) (2024). An *inter partes* review may not be instituted unless the information presented in the Petition “shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). The “reasonable likelihood” standard is “a higher standard than mere notice pleading” but “lower than the ‘preponderance’ standard to prevail in a final written decision.” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (PTAB Dec. 20, 2019) (precedential).

Upon consideration of the contentions and the evidence of record before us, we conclude Petitioner has shown a reasonable likelihood that it would prevail in establishing unpatentability of at least one challenged claim of the ’833 patent. Accordingly, we institute an *inter partes* review of all challenged claims of the ’833 patent on all grounds set forth in the Petition.

II. BACKGROUND

A. *Real Parties in Interest*

Petitioner identifies itself as real party in interest. Pet. 92. Patent Owner identifies itself as real party in interest. Paper 6, 2.

B. Related Matters

The parties each identify *Nokia Techs. Oy v. Amazon.com, Inc.*, No. 1:23-cv-01236 (D. Del.), as related to the '833 patent. Pet. 92; Paper 6, 2.

Petitioner further identifies the following matters as related:

Nokia Corp. et al. v. Amazon.com, Inc. et al., No. 1:23-cv-01232 (D. Del.);

Nokia Techs. Oy v. HP Inc., No. 1:23-cv-01237 (D. Del);

In the Matter of Certain Video Capable Electronic Devices, Including Computers, Streaming Devices, Televisions, and Components and Modules Thereof, Inv. No. 337-TA-1380 (USITC);

Amazon.com, Inc. v. Nokia Technologies Oy, IPR2024-00604 (PTAB); and

Amazon.com, Inc. v. Nokia Technologies Oy, IPR2024-00605 (PTAB).

Pet. 92–93.

Petitioner also has filed another petition against other claims in the '833 patent. IPR2024-01505, Paper 3.

C. The '833 Patent

The '833 patent issued from Application No. 13/666,680, filed November 1, 2012, which claims priority to Provisional Application No. 61/555,703, filed November 4, 2011. Ex. 1001, codes (21), (22), (60).

The '833 patent relates to encoding and decoding video information. Ex. 1001, code (57). Generally, video information may be encoded in two phases. *Id.* at 1:29–32. The '833 patent describes:

In the first phase, pixel values in a certain picture area or “block” are predicted. The pixel values can be predicted for example, by motion compensation mechanisms, which involve finding and indicating an area in one of the previously encoded video frames (or a later coded video frame) that corresponds closely to the

block being coded. Additionally, pixel values can be predicted by spatial mechanisms which involve finding and indicating a spatial region relationship, for example by using pixel values around the block to be coded in a specific manner.

Prediction approaches using image information from a previous (or a later) image can also be called as Inter prediction methods, and prediction approaches using image information within the same image can also be called as Intra prediction methods.

The second phase is one of coding the error between the predicted block of pixels and the original block of pixels.

Id. at 1:32–48. The decoder reconstructs the output video by applying a prediction mechanism similar to that used by the encoder and by applying prediction error decoding to recover the prediction error signal. *Id.* at 1:60–67. “After applying pixel prediction and error decoding processes the decoder combines the prediction and the prediction error signals (the pixel values) to form the output video frame.” *Id.* at 2:1–4.

The ’833 patent introduces a method for generating a motion vector prediction list for an image block. Ex. 1001, 4:7–8. The motion prediction candidate list is constructed in a way that reduces the complexity of list construction. *Id.* at 4:7–11. The method performs only a limited number of motion information comparisons between candidate pairs to remove redundant candidates rather than perform a comparison for every available candidate pair, to construct the motion prediction candidate list. *Id.* at 4:7–14. “The decision of whether comparing two candidates may depend on the order of the candidates to be considered for the list and/or coding/prediction mode and/or location of the blocks associated with the candidates.” *Id.* at 4:14–18. By this method, a list of motion prediction candidates is created

from which one of the candidates is to be signaled as the motion information for the current coding or prediction unit. *Id.* at 4:18–23.

Figure 9 of the '833 patent is reproduced below:

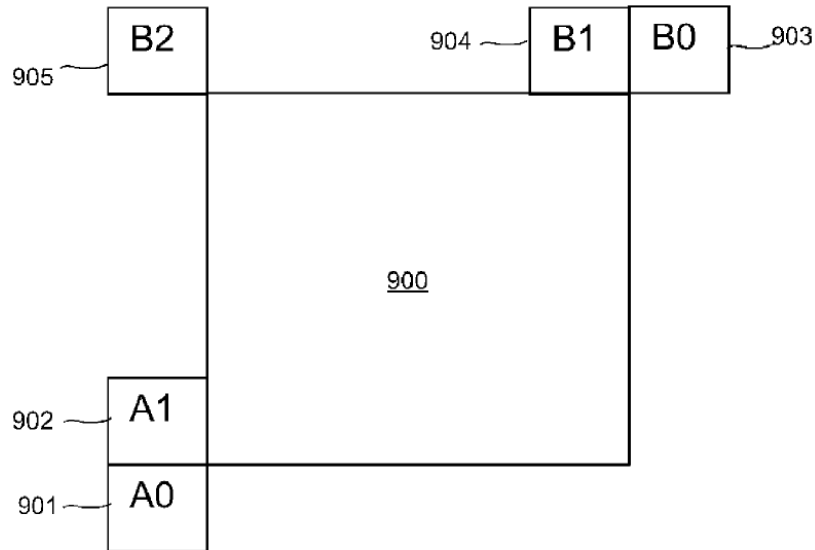


Fig. 9

Figure 9 illustrates an example of a coding unit and some neighboring blocks of the coding unit. Ex. 1001, 7:62–63. In this example the spatial motion prediction candidates are spatial neighboring blocks A0, A1, B0, B1, and B2. *Id.* at 14:52–53. These candidates for the current block being coded can be processed in a predetermined order, for example A1, B1, B0, A0, and B2. *Id.* at 15:3–15.

The '833 patent describes that a coding unit may be vertically split into two rectangular prediction units or horizontally split into two rectangular prediction units. Ex. 1001, 15:38–15:60. Figures 11a and 11b are reproduced below:

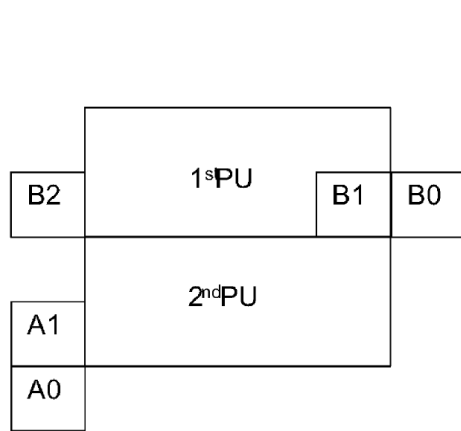


Fig. 11a

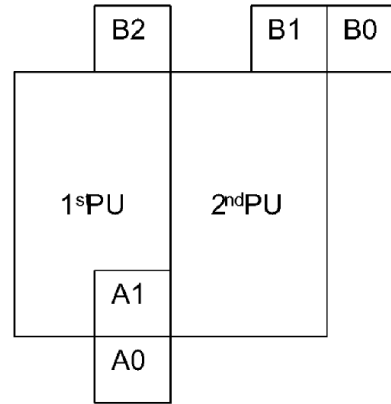


Fig. 11b

Figure 11a illustrates locations of five spatial neighbors A0, A1, B0, B1, and B2 for a prediction unit (PU) generated as the second prediction unit of a horizontally divided coding unit. Ex. 1001, 8:1–3. Figure 11b illustrates locations of five spatial neighbors for a prediction unit generated as the second prediction unit of a vertically divided coding unit. *Id.* at 8:5–7.

The '833 patent describes that if the current coding unit is horizontally split into two rectangular prediction units and the current prediction unit is the second prediction unit in the coding/decoding order, then A1 is compared only with B1, and if A1 has the same motion information as B1, then A1 would not be included in the list being constructed. Ex. 1001, 15:49–56. In contrast, if the comparison indicates A1 does not have the same motion information as B1, then A1 would be included in the list as a spatial motion prediction candidate, assuming that the list does not already contain a maximum number of spatial motion prediction candidates. *Id.* at 15:5–10, 15:60–62.

The '833 patent describes that if the current coding unit is horizontally split into two rectangular prediction units and the current prediction unit is the second prediction unit in the coding/decoding order, then B1 is not included in the list being constructed. Ex. 1001, 15:63–16:4. If the current coding unit is not horizontally split into two rectangular prediction units and if block B1 has the same motion information as block A1, then B1 is not included in the list. *Id.* at 16:4–9. Otherwise, B1 is included in the list as a spatial motion prediction candidate, assuming that the list does not already contain a maximum number of spatial motion prediction candidates. *Id.* at 15:6–17, 16:9–11.

The '833 patent describes that if the spatial motion prediction candidate is block B0, then it is not included in the list if it has the same motion information as block B1. Ex. 1001, 16:13–16. The '833 patent describes that, otherwise, if the number of spatial motion prediction candidates in the list is less than the maximum number of spatial motion prediction candidates, then block B0 is included in the list. *Id.* at 16:16–20.

The '833 patent describes that if the spatial motion prediction candidate is block A0, then it is not included in the list if it has the same motion information as block A1. Ex. 1001, 16:21–24. The '833 patent describes that, otherwise, if the number of spatial motion prediction candidates in the list is less than the maximum number of spatial motion prediction candidates, then block A0 is included in the list. *Id.* at 16:24–28.

The '833 patent describes that if the spatial motion prediction candidate is block B2, then it is not included in the list if it has the same motion information as block A1. Ex. 1001, 16:35–39. The '833 patent indicates that, otherwise, if the number of spatial motion prediction

candidates in the list is less than the maximum number of spatial motion prediction candidates, then block B2 is included in the list. *See id.* at 15:10–17, 15:34–37.

Claims 9, 16, and 18 are independent and reproduced below:¹

9. [pre] A method comprising:
- [a] receiving an encoded block of pixels including a prediction unit and information identifying a respective spatial motion vector prediction candidate from a merge list constructed by an encoder;
 - [b] determining a set of spatial motion vector prediction candidates for the encoded block of pixels; the spatial motion vector prediction candidates being provided with motion information;
 - [c] selecting a first spatial motion vector prediction candidate from the set of spatial motion vector prediction candidates as a potential spatial motion vector prediction candidate to be included in a merge list for the prediction unit, where the merge list is constructed based on the motion information of the spatial motion vector prediction candidates;
 - [d] determining a subset of spatial motion vector prediction candidates based on the location of the block associated with the first spatial motion vector prediction candidate;
 - [e] comparing motion information of the first spatial motion vector prediction candidate with motion information of another spatial motion vector prediction candidate of the [subset] of spatial motion vector prediction candidates without making a comparison of each possible candidate pair from the set of spatial motion vector prediction candidates, wherein comparing comprises performing an equivalence check or comparing a

¹ The bracketed headings correspond to those used by Petitioner to reference the claim elements. *See* Pet. 30–50, 63–64. We use the same headings here for ease of reference, understanding, and consistency. Alteration in limitation [9e] reflects that reflected in a Certificate of Correction. Ex. 3001.

difference in motion information to a threshold or other similarity metric;

[f] if at least one of the comparisons indicates that the motion vector information of the spatial motion vector prediction candidates correspond with each other, excluding the first spatial motion vector prediction candidate from the merge list; and

[g] selecting a spatial motion vector prediction candidate from the merge list for use in decoding the encoded block of pixels, wherein the spatial motion vector prediction candidate is selected from the merge list using the information that was received identifying a respective spatial motion vector prediction candidate.

Ex. 1001, 33:33–34:6.

16. [pre] An apparatus comprising a processor and a memory including computer program code, the memory and the computer program code configured to, with the processor, cause the apparatus to:

[a] receive an encoded block of pixels including a prediction unit and information identifying a respective spatial motion vector prediction candidate from a merge list constructed by an encoder;

[b] determine a set of spatial motion vector prediction candidates for the encoded block of pixels; the spatial motion vector prediction candidates being provided with motion information;

[c] select a first spatial motion vector prediction candidate from the set of spatial motion vector prediction candidates as a potential spatial motion vector prediction candidate to be included in a merge list for the prediction unit, where the merge list is constructed based on the motion information of the spatial motion vector prediction candidates;

[d] determine a subset of spatial motion vector prediction candidates based on the location of the block associated with the first spatial motion vector prediction candidate;

[e] compare motion information of the first spatial motion vector prediction candidate with motion information of the spatial motion vector prediction candidate in the determined subset of spatial motion vector prediction candidates without making a comparison of each possible candidate pair from the set of spatial motion vector prediction candidates, wherein comparing comprises performing an equivalence check or comparing a difference in motion information to a threshold or other similarity metric;

[f] exclude the first spatial motion vector prediction candidate from the merge list, if at least one of the comparisons indicates that the motion vector information of the spatial motion vector prediction candidates correspond with each other; and

[g] select a spatial motion vector prediction candidate from the merge list for use in decoding the encoded block of pixels, wherein the spatial motion vector prediction candidate is selected from the merge list using the information that was received identifying a respective spatial motion vector prediction candidate.

Id. at 36:4–49.

18. [pre] A non-transitory computer readable medium having stored thereon a computer executable program code for use by an encoder, said program codes comprise instructions for use by an encoder, said program code comprises instructions for:

[a] receiving an encoded block of pixels including a prediction unit and information identifying a respective spatial motion vector prediction candidate from a merge list constructed by an encoder;

[b] determining a set of spatial motion vector prediction candidates for the encoded block of pixels; the spatial motion vector prediction candidates being provided with motion information;

[c] selecting a first spatial motion vector prediction candidate from the set of spatial motion vector prediction candidates as a potential spatial motion vector prediction candidate to be included in a merge list for the prediction unit, where the merge

list is constructed based on the motion information of the spatial motion vector prediction candidates;

[d] determining a subset of spatial motion vector prediction candidates based on the location of the block associated with the first spatial motion vector prediction candidate;

[e] comparing motion information of the first spatial motion vector prediction candidate with motion information of the spatial motion vector prediction candidate in the determined subset of spatial motion vector prediction candidates without making a comparison of each possible candidate pair from the set of spatial motion vector prediction candidates, wherein comparing comprises performing an equivalence check or comparing a difference in motion information to a threshold or other similarity metric;

[f] if at least one of the comparisons indicates that the motion vector information of the spatial motion vector prediction candidates correspond with each other, excluding the first spatial motion vector prediction candidate from the merge list; and

[g] selecting a spatial motion vector prediction candidate from the merge list for use in decoding the encoded block of pixels, wherein the spatial motion vector is selected from the merge list using the information that was received identifying a respective spatial motion vector prediction candidate.

Id. at 37:26–38:3.

D. The Applied Prior Art and Declarations

Petitioner relies on the following evidence:

Name	Patent Document/Publication	Exhibit
Rusert ²	US Pat. Pub. No. 2011/0194609	1004
Zheng ³	US Pat. Pub. No. 2013/0077691	1005
Nakamura Document ⁴	Nakamura et al., “Unification of Derivation Process for Merge Mode and MVP,” Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, 6 th Meeting, Torino, Italy, July 14–22, 2011 (Document JCTVC-F419).	1007
Nakamura WD Description ⁵	Nakamura et al., “WD Description of JCTVC-F419 Proposal 1” for “Unification of Derivation Process for Merge Mode and MVP,” Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, 6 th Meeting, Torino, Italy, July 14–22, 2011 (Document JCTVC-F419).	1008
Nakamura Presentation ⁶	Nakamura et al., “Unification of Derivation Process for Merge Mode and MVP,” Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, 6 th Meeting, Torino, Italy, July 14–22, 2011 (Document JCTVC-F419).	1009
WD4	Bross et al., “WD4: Working Draft 4 of High-Efficiency Video Coding,” Joint Collaborative Team on Video Coding (JCT-VC) of ITC-T SG16 WP3 and ISO/IEC JCT1/SC29/WG11, 6 th Meeting: Torino, IT, July 14–22, 2011 (Document JCTVC-F803).	1010

² Published August 11, 2011. Ex. 1004, code (43).

³ Published March 28, 2013. Ex. 1005, code (43).

⁴ Published July 2011.

⁵ Published July 2011.

⁶ Published July 2011.

Petitioner also relies on the Declaration of Charles D. Creusere, Ph.D. Ex. 1003. With regard to the status of Nakamura and WD4 as prior art printed publications, Petitioner additionally relies on the Declarations of Vivienne Sze, Ph.D. (Ex. 1014) and Clifford Reader, Ph.D. (Ex. 1050).⁷ Patent Owner relies on the Declaration of Iain E. Richardson, Ph.D. (Ex. 2001).

E. The Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims of the '833 patent are unpatentable based on the following grounds (Pet. 14):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
9–14, 16, 18, 26–30	103(a) ⁸	Rusert, Zheng
9–14, 16, 18, 26–30	103(a)	Nakamura, ⁹ WD4

⁷ Patent Owner disputes that WD4 constitutes prior art as of the effective filing date of the '833 patent. Prelim. Resp. 64–68. However, we need not reach the issue because, as discussed below, the alleged ground of unpatentability based on Nakamura and WD4 lacks sufficient substantive merit.

⁸ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103. Because the '833 patent claims priority to an application filed before March 16, 2013 (the effective date of the amendments), the pre-AIA version of § 103 applies.

⁹ Petitioner uses the name “Nakamura” to refer to a collection of three files, i.e., the “Nakamura Document” (Ex. 1007), the “Nakamura WD Description” (Ex. 1008), and the “Nakamura Presentation” (Ex. 1009). Pet. 1, 67. Petitioner asserts that “they were jointly presented in a single proposal, by the same author, packaged together in a single zip, and meant to be read together, teaching related aspects of Nakamura’s proposal.” *Id.* at 67.

III. ANALYSIS

A. *Legal Standards*

A claim is unpatentable under 35 U.S.C. § 103(a) “if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” 35 U.S.C. § 103(a); *see KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations of nonobviousness.¹⁰ *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. *Level of Ordinary Skill in the Art*

Citing testimony from Dr. Creusere, Petitioner asserts a person of ordinary skill in the art (hereinafter “POSITA”) “would have had (1) a bachelor’s degree in electrical engineering, computer engineering, computer science, or a comparable field of study such as physics, and (2) approximately two to three years of practical experience with video encoding/decoding.” Pet. 22 (citing Ex. 1003 ¶¶ 37–39).

Patent Owner states that it “has applied Petitioner’s POSITA for the sake of this Response.” Prelim. Resp. 42.

On this record, we adopt Petitioner’s statement of the level of ordinary skill in the art. It is supported by the testimony of Dr. Creusere and not

¹⁰ The record does not include any evidence of secondary considerations of nonobviousness.

disputed by Patent Owner. Further, it appears consistent with what is reflected by the content of the applied prior art. *Cf. Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (the applied prior art may reflect an appropriate level of skill).

C. Claim Interpretation

We use the same claim construction standard that would be used to construe a claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b). The claim construction standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc) is applicable.

Claim terms are generally given their ordinary and customary meaning as would be understood by one with ordinary skill in the art in the context of the specification, the prosecution history, other claims, and extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Phillips*, 415 F.3d at 1312–17. Usually, the specification is dispositive, and it is the single best guide to the meaning of a disputed term. *Id.* at 1315.

The specification may reveal a special definition given to a claim term by the patentee, or the specification or prosecution history may reveal an intentional disclaimer or disavowal of claim scope by the inventor. *Phillips*, 415 F.3d at 1316. “There are only two exceptions to this general rule [concerning ordinary and customary meaning]: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee

disavows the full scope of a claim term either in the specification or during prosecution.” *Thorner v. Sony Comput. Ent. Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

If an inventor acts as a lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). The disavowal, if any, can be effectuated by language in the specification or the prosecution history. *Poly-Am., L.P. v. API Indus., Inc.*, 839 F.3d 1131, 1136 (Fed. Cir. 2016).

Only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

1. “*spatial motion vector prediction candidate*”

Petitioner construes the term “spatial motion vector prediction candidate” in independent claims 9, 16, and 18 to mean “a candidate motion vector obtained from one or more previously-encoded blocks in the current frame.” Pet. 22. Petitioner explains:

The '833 patent states “a spatial motion vector *prediction* is a prediction obtained only on the basis of information of one or more blocks of the same frame than the current frame.” Ex-1001, 2:65-3:3. A “*candidate motion vector*” uses “one or more neighbour blocks and/or other blocks of the current block *in the same frame*” and “represents the motion vector of one or more already encoded block.” Ex-1001, 12:38-43; Ex-1003, ¶43.

Id. Patent Owner has not expressed any view with respect to the meaning of

“spatial motion vector prediction candidate.” Nor has Patent Owner disputed Petitioner’s proposed meaning for the term.

Because no dispute hinges on the meaning of this term, we do not find it necessary to construe this term at this stage of the proceeding.

2. *“subset of . . . candidates”*

Petitioner construes the term “subset of . . . candidates” in independent claims 9, 16, and 18 to mean a subset of one or more candidates. Pet. 23–24. Patent Owner does not present any contrary position or argument. Because no dispute hinges on the meaning of this term, we do not find it necessary to construe this term at this stage of the proceeding.

3. *“the block”*

Petitioner asserts:

Limitation [9d] recites “the block,” which could be interpreted to refer to either (a) the “block of pixels” introduced in [9a], or (b) the block from which the first spatial motion vector candidate is obtained. A POSITA would have understood that “the block” refers back to the “block of pixels” introduced in [9a] because there is no other block mentioned in the claim. Ex-1003, ¶46. During prosecution the Examiner applied the first interpretation, with “the” block as the “current block” (Ex-1002, 000198), which the Applicant did not dispute (Ex-1002, 000785-788). For purposes of this IPR, Petitioner applies the Examiner’s interpretation, where “the block” finds antecedent basis in the “block of pixels” in [9a]. Ex-1003, ¶46.

Pet. 23.

Notably, Petitioner recognizes that there are two potential choices of what is referred to by “the block” in limitation [9d], one being the block of pixels recited in limitation [9a], i.e., the current block being processed, and the other being a block, not previously recited in the claim, but from which

the first spatial motion vector candidate is obtained. Overlooked by Petitioner is that the words “the block” are a part of the bigger term “the block *associated with* the first spatial motion vector prediction candidate.” Ex. 1001, 31:50–52 (emphasis added). The same is true with respect to “the block” appearing in “the block associated with the first spatial motion vector prediction candidate” within independent claims 16 and 18. *Id.* at 35:50–52, 37:5–7.

That specific claim language of association indicates a relationship between “the block” and the first spatial motion vector prediction candidate, that is more than how every single prediction candidate broadly may be regarded in general as related to the current block being processed, the block for which a motion vector prediction list is being generated. The modifier “associated with the first spatial motion vector prediction candidate” clearly modifies “the block” at issue here and cannot be discarded or ignored.

Further, if “the block” refers to the block recited in limitation [9a], i.e., the current block being processed, then the modifying phrase “associated with the first spatial motion vector prediction candidate” would be superfluous and have no meaning, because “the block,” without the modifying phrase, would already derive its antecedent basis from “a block of pixels” recited in limitation [9a]. We decline to adopt a construction that reads out “associated with the first spatial motion vector prediction candidate.” Construing the claim according to what the claim language actually states, without excluding any part of the claim language recited, is more appropriate.

The Specification of the ’833 patent is consistent with the plain reading of “the block associated with the first spatial motion vector

prediction candidate.” Each selected first candidate to evaluate for inclusion in a prediction list for the current block is compared with a subset of candidates based on identity of the first selected candidate. Ex. 1001, 15:49–16:39. Patent Owner is also correct in noting:

[T]he ’833 Patent makes clear that the candidate motion vectors for the current frame use either “one or more . . . motion vectors of one or more neighbour blocks . . . of the current block in the same frame and/or co-located blocks . . . of the current block in one or more other frames[,]” i.e., these are *motion vectors associated with other blocks, rather than the current block*, to define a list of suitable motion vector candidates for the current block, as would be understood by a POSITA [person of ordinary skill in the art].

Prelim. Resp. 47 (emphasis added). Patent Owner further correctly notes that Petitioner’s interpretation reads out the words “associated with the ***first spatial motion vector prediction candidate***” from the full claim term. *Id.* at 47 n.7 (emphasis in original).

Another reason Petitioner provides for its construction is that an Examiner had taken that interpretation during prosecution of the application which issued as the ’833 patent. Pet. 23. However, the entirety of the Petitioner’s assertion is this single sentence: “During prosecution the Examiner applied the first interpretation [Petitioner’s proposed construction], with ‘the’ block as the ‘current block’ (Ex-1002, 000198), which the Applicant did not dispute (Ex-1002, 000785-788).” *Id.*

Petitioner provides no meaningful explanation of how the Examiner is deemed to have read “the block associated with the first spatial motion vector prediction candidate” as meaning the current block. We have read the cited portion of the prosecution history, which is merely one page (Ex. 1002, 198), and do not see that the Examiner has engaged in or otherwise adopted

such a reading for “the block associated with the first spatial motion vector prediction candidate.” The Examiner expressed that by selecting one of the motion vectors from the motion vectors of neighboring blocks, a subset is formed. That does not, however, indicate on what basis is the selection of that subset made, for example, based on the location of the current block or based on the location of the block associated with the first spatial motion vector prediction candidate. Petitioner’s argument is unavailing.

In any event, even assuming the Examiner did in fact make the construction Petitioner asserts the Examiner made, that does not mean the proposed construction is proper. Claim construction is a question of law, and during examination, claim terms are construed according to their broadest reasonable interpretation, which is different from the *Phillips* standard applicable here. *See Phillips*, 415 F.3d at 1316 (citing *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004)). We are not bound by an earlier construction of the Examiner.

For the foregoing reasons, we disagree with Petitioner’s proposed construction of “the block” to mean the “block of pixels” in limitation [9a]. Rather, “the block” in limitation [9d] means “the block associated with the first spatial motion vector prediction candidate,” as limitation [9d] states. And the same is true with respect to “the block” as recited in independent claims 16 and 18.

D. Alleged Obviousness of Claims 9–14, 16, 18, and 26–30 over Rusert and Zheng

1. Overview of Rusert (Exhibit 1004)

Rusert's disclosure relates to a method of selecting predicted motion vector (PMV) candidates, a video coding apparatus, a video decoding apparatus, and a computer-readable medium. Ex. 1004 ¶ 1.

Figure 1 of Rusert is reproduced below:

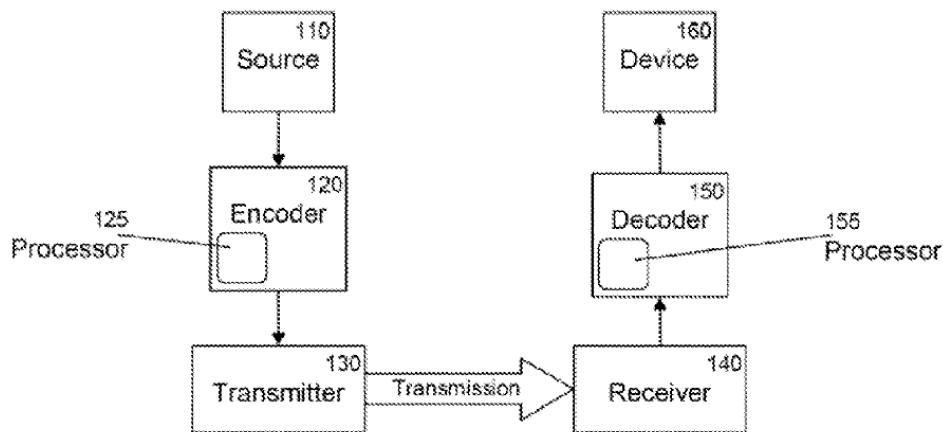


Fig. 1

Figure 1 illustrates a video coding and transmission system according to Rusert. Ex. 1004 ¶ 28.

In the illustrated coding system of Figure 1, a video signal from source 110 is ultimately delivered to device 160. Ex. 1004 ¶ 34. The video signal from source 110 is passed through encoder 120 containing processor 125. *Id.* Encoder 120 applies an encoding process to the video signal to create an encoded video stream, which is sent to transmitter 130. *Id.* Receiver 140 receives the transmitted encoded stream and passes it to decoder 150. *Id.* Decoder 150 contains processor 155 which is used to decode the encoded video stream. *Id.* The decoder outputs a decoded video stream to device 160.

Rusert describes:

The methods disclosed herein are performed in the encoder during encoding, and also in the decoder during decoding. This is achieved even though the generation of the signaling bits is done in the encoder. During decoding the decoder parses the bits and mimics of the encoder in order to achieve encoder/decoder synchronization. Because the encoder and decoder follow the same rules for creating and modifying the set of PMV candidates, the respective lists of PMV candidates stored in the encoder and decoder maintain synchronization[.] Still, explicit signaling of PMV candidate lists may be performed under certain circumstances.

The described methods assume coding of a motion vector (MV) 210 using predictive coding techniques, where a predicted motion vector (PMV) 220 is used to predict a MV 210, and the prediction error or difference (DMV) 230 is found according to $DMV = MV - PMV$. DMV 230 is signaled from the encoder 120 to the decoder 150. Additionally, a code “index” 250 is sent to select a particular PMV candidate, in this case 242 from a list of PMV candidates, PMV_CANDS 240 as shown in FIG. 2a. The index 250 may be sent once together with each transmitted motion vector MV 210, i.e., per sub-block (e.g. 8x8 pixel block). Likewise, the index may be sent for groups of motion vectors, e.g. per macroblock (16x16 block).

Ex. 1004 ¶¶ 35–36. The list PMV_CANDS 240 is identically available at both the encoder and decoder. *Id.* ¶ 37. “Using the transmitted index, the decoder 150 can determine the PMV 220 as used in the encoder as shown in FIG. 2b, and thus may reconstruct $MV = DMV + PMV$.” *Id.*

Rusert describes a method of selecting PMV candidates, wherein each PMV candidate corresponds to a motion vector used for coding of a previous block within an allowed distance from the current block. Ex. 1004 ¶ 11. The method comprises selecting a set of PMV candidates as a subset of the previously coded motion vectors that were used for previous blocks having an allowed distance from the current block. *Id.*

According to Rusert, a list of prediction motion vector candidates, named PMV_CANDS, is generated for each block, both at the encoder and decoder, and then an index is sent from the encoder to the decoder to select a particular candidate from the list. Ex. 1004 ¶¶ 35–36. Using the index, the decoder may construct the motion vector for the current block by adding the selected prediction motion vector from the list and a difference motion vector determined by the encoder and also transmitted to the decoder. *Id.* ¶¶ 36–37. The PMV_CANDS list is used for coding a motion vector for the current block. *Id.* ¶ 41.

Figure 3n is reproduced below:

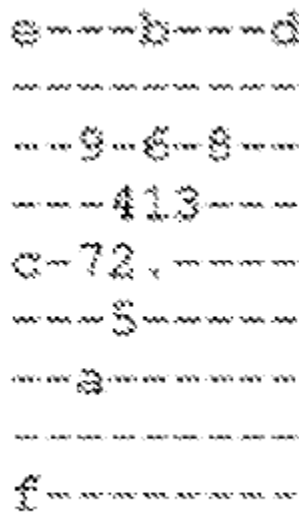


Fig. 3n

Figure 3n shows a scan sequence, 1, 2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f, of neighboring blocks surrounding the current block being encoded (the center dot), for consideration to generate the PMV_CANDS list for the current block. Ex. 1004 ¶¶ 65–66.

Rusert further describes:

A PMV candidate list is created by selecting a subset of the motion vectors previously used for previous blocks. Restricting the previous blocks that are considered reduces the number of previous motion vectors that must be considered meaning that less computation is needed, improving the processor efficiency of the coding.

Identifying allowed distance values means that certain distance values may not be allowed. These not allowed distance values result in skipped layers of blocks. The size of the PMV candidate list is limited because a very large list would require long code words to identify which PMV candidate to use[.] Skipping layers can provide increased coding efficiency by ensuring that not only the nearest neighbor previous blocks are considered, but also previous blocks. This allows a candidate list to be produced using motion vectors from a wide range of previous blocks, but that is not excessively long.

Ex. 1004 ¶¶ 12–13.

Rusert additionally describes:

The PMV_CANDS list used for coding a motion vector associated with a current motion compensation block can be dynamically generated specifically for the current motion compensation block, i.e. without consideration of the PMV_CANDS lists used for coding of MVs associated with motion compensation blocks previously coded. In that case, before a block is processed, a PMV_CANDS list is initialized and then updated with a number of previously coded or predefined motion vectors.

Ex. 1004 ¶ 41.

Rusert also describes a way to reduce the number of candidates in the PMV_CANDS list:

One measure for reducing the number of candidates is to avoid duplicate occurrences of the same motion vector in a given PMV_CANDS list. This can be done, when updating the list, by comparing the candidates already in the list with the new

vector that could be added, and if a duplicate is found, either removing the duplicate vector or skipping the new vector. It is preferable to skip the new vector, otherwise a subsequent duplicate from a distant block may cause a candidate high in the order of the list to be put at the end of the list.

Ex. 1004 ¶ 71.

2. *Overview of Zheng (Exhibit 1005)*

Zheng relates to “techniques for determining a set of motion vector prediction candidates in a motion vector prediction process.” Ex. 1005 ¶ 2.

According to Zheng:

[A] video frame may be partitioned into coding units. A coding unit (CU) generally refers to an image region that serves as a basic unit to which various coding tools are applied for video compression. A CU usually has a luminance component, which may be denoted as Y, and two chroma components, which may be denoted as U and V. Depending on the video sampling format, the size of the U and V components, in terms of number of samples, may be the same as or different from the size of the Y component. A CU is typically square, and may be considered to be similar to a so-called macroblock, e.g., under other video coding standards such as ITU-T H.264.

Id. ¶ 28. Zheng further explains:

[E]ach coding unit may be further partitioned into prediction units (PUs) and transform units (TUs). Prediction units may be considered to be similar to so-called partitions under other video coding standards, such as H.264. Transform units (TUs) refer to blocks of residual data to which a transform is applied to produce transform coefficients.

Id. ¶ 29.

Zheng discloses techniques “directed to the ‘merge’ mode of motion vector prediction.” Ex. 1005 ¶ 41. According to Zheng:

In merge mode, a video encoder instructs a decoder, through bitstream signaling of prediction syntax, to copy a motion vector, reference index (identifying a reference frame, in a given

reference picture list, to which the motion vector points) and the motion prediction direction (which identifies the reference picture list (List 0 or List 1), i.e., in terms of whether the reference frame temporally precedes or follows the [current] frame) from a selected candidate motion vector for a current portion of the frame.

Id.

Zheng “describes techniques for determining a set of merge candidates in a merge mode motion vector prediction process.” Ex. 1005 ¶ 6. Zheng further teaches “generating a merge candidate set for a current prediction unit of a coding unit without comparing the motion information of any merge candidates with the motion information of any other prediction units in the same coding unit.” *Id.* ¶ 7. According to Zheng, “[i]n this way, merge candidate sets for multiple prediction units of coding unit may be generated in parallel, as the generation of specific merge candidate does not rely on a comparison to motion vector information in other prediction units that may or may not have been already determined.” *Id.*

Zheng “further proposes to remove merge candidates from a merge candidate set for a current prediction unit that are contained within another prediction unit of the same coding unit.” Ex. 1005 ¶ 8. According to Zheng, “[i]n this way, the likelihood that all prediction units of one coding unit will use the same motion vector information is limited, thus preserving the advantage of partitioning a coding unit into multiple prediction units.” *Id.*

3. *Independent Claim 9*

a. *Preamble recitation [9pre]*

The preamble recites: “A method comprising:” Ex. 1001, 33:33. Petitioner cites to Ruser’s Abstract as disclosing “a method . . . of selecting a spatial motion vector prediction candidate.” Pet. 30 (citing Ex. 1004, code

(57); Ex. 1003 ¶¶ 66–67) (emphasis omitted). Petitioner also refers to its discussion of limitations [9a] through [9g]. *Id.* Patent Owner does not present a counter argument with respect to this general preamble recitation of “A method, comprising.” Petitioner sufficiently has shown that Rusert discloses the preamble of claim 9.

b. Limitation [9a]

Limitation [9a] recites: “receiving an encoded block of pixels including a prediction unit and information identifying a respective spatial motion vector prediction candidate from a merge list constructed by an encoder.” Ex. 1001, 33:34–37. Petitioner explains that Rusert teaches receiving a transmitted encoded video stream which includes blocks of pixels, and that Rusert encodes the video and transmits it to a receiver which passes the video stream to a decoder. Pet. 30 (citing Ex. 1004 ¶¶ 2, 34, 36, Fig. 1; Ex. 1003 ¶ 69). Figure 1 of Rusert is reproduced below:

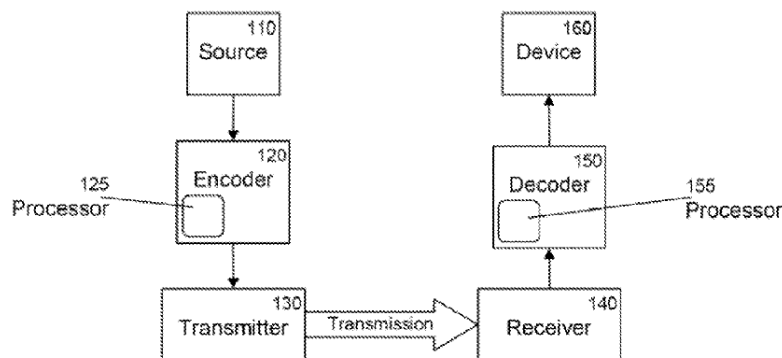


Fig. 1

Figure 1 shows a video coding and transmission system according to Rusert. Ex. 1004 ¶ 28.

We understand Petitioner to be asserting that receiver 140 as well as decoder 150 receives a block of pixels including a prediction unit.

Regarding the block of pixels including a prediction unit, Petitioner explains:

Rusert's encoder selects motion vectors for blocks of pixels. Ex-1004, ¶¶2-5, ¶36, ¶43. In Rusert's nomenclature, the block of pixels for which a motion vector is to be selected is the PU [prediction unit], because the block is the unit to which motion vectors are assigned for motion prediction. Ex-1004, ¶¶2-4, ¶36, ¶43; Ex-1003, ¶70.

Ground 1 combines Rusert's teachings regarding blocks to Zheng's teaching of PUs (H.265 nomenclature). Rusert's encoder operates in the context of H.264. Ex-1004, ¶¶2-5, ¶36, ¶43. Zheng's encoding process for motion vectors is in the context of H.265, and explains that a PU is a type of block for which motion vectors are assigned. Ex-1005, ¶3, ¶¶27-29, ¶38; Ex-1055, ¶2, ¶¶19-22, ¶24. It would have been obvious to apply Rusert's motion vector encoding process to Zheng's PUs in the H.265 context, and thus the combination [of Rusert and Zheng] teaches receiving an encoded block of pixels including a PU. *See e.g.*, Ex-1005, ¶107, Ex-1055, ¶63; Ex-1003, ¶¶70-71.

Pet. 31.

Further regarding a motivation to combine Rusert and Zheng with regard to the concept of a prediction unit PU, Petitioner explains:

Rusert does not itself use H.265 terminology. Nonetheless, Rusert explains that, while its examples were “given in the context of H.264/AVC, the principles disclosed herein can also be applied to . . . other coding standard[s], and indeed any coding system which uses prediction motion vectors.” Ex-1004, ¶116; Ex-1003, ¶73. Zheng teaches the concept of PUs in H.265, which was emerging as the successor standard to H.264—both were drafted by the ITU-T—sharing the same concept of block-based video encoding with predicted motion vectors. Ex-1005, ¶3, ¶38; Ex-1055, ¶2, ¶24. Zheng teaches H.265 concepts including PUs. A POSITA would also have been motivated to combine teachings from Rusert and Zheng, with Rusert's PMV_CANDS used as a merge list for

Zheng's block of pixels called a PU. This would have been a simple application of Rusert's teachings in an H.265 context.

Pet. 24–25.

Regarding receiving information identifying a respective spatial motion vector prediction candidate from a merge list constructed by an encoder, Petitioner explains:

Rusert teaches an encoder sending an index to the decoder to identify a specific “candidate . . . from a list of PMV candidates, PMV_CANDS[.]” Ex-1004, ¶¶36-37, Fig. 1. Rusert's decoder uses the information in the index to select the correct candidate that should be used to reconstruct the motion vector for the current block. *Id.* Rusert teaches constructing the same candidate list as both the encoder and decoder, using the same construction and indexing scheme. Ex-1004, ¶35, ¶37, ¶39, ¶¶88-95. When combined with Zheng's teachings, the index is an index into a merge list, identifying a specific candidate based on its position in the list. Ex-1003, ¶90. The combination of Rusert and Zheng teaches dynamically generating the PMV_CANDS list. When the PMV_CANDS list is completed, it is a merge list. When the PMV_CANDS list is completed, it is a merge list. Ex-1003, ¶91. A POSITA would have understood that Zheng's merge candidate set and a merge list refer to the same concept in the encoding process of generating motion prediction candidates, and that this teaching is applicable to Rusert's construction of the PMV_CANDS list. Ex-1003, ¶92.

Pet. 31–32 (alterations by Petitioner).

Further addressing a motivation to combine teachings of Rusert and Zheng with respect to the concept of a merge list, Petitioner states: “To the extent that the claims require H.265 PUs and a merge list, those were already in H.265 drafts and taught by Zheng. A POSITA would have been motivated to apply Rusert's teachings to H.265 PUs, *merge lists*, and related

concepts. Ex-1003, ¶¶72, ¶96.” Pet. 24 (emphasis added). Petitioner additionally explains:

The prior art also provides motivation to combine Rusert and Zheng and to use Zheng’s merge mode. It was known in the art that neighboring blocks in a frame’s background had the same motion information. Ex-1005, ¶¶49-50; Ex-1055, ¶¶33-34; Ex-1005, ¶69; Ex-1055, ¶41; Ex-1007, Fig. 1 (“Remove candidates with the same motion information”), Table 3; Ex-1009, 000013. Using merge mode increased coding efficiency, which both Rusert and Zheng are directed towards. Ex-1003, ¶¶81, ¶98, ¶102. Therefore, the prior art provides express motivation to apply Rusert’s teachings to other standards, including H.265, as taught by Zheng. Ex-1003, ¶¶74-76, ¶96.

Id. at 25. Petitioner adds: “A POSITA would have been motivated to apply Zheng’s merge mode in Rusert because it improved encoding efficiency for large areas of uniform motion, e.g., a static background. Merge mode improved coding efficiency by eliminating the need to signal a difference motion vector. Ex-1005, ¶41; Ex-1055, ¶¶26-27; *see also* Ex-1006, ¶7; Ex-1003, ¶97.” *Id.* at 26.

Petitioner’s assertions are supported by the cited evidence and not disputed by Patent Owner. Petitioner sufficiently has shown that Rusert and Zheng, as combined by Petitioner, together disclose limitation [9a].

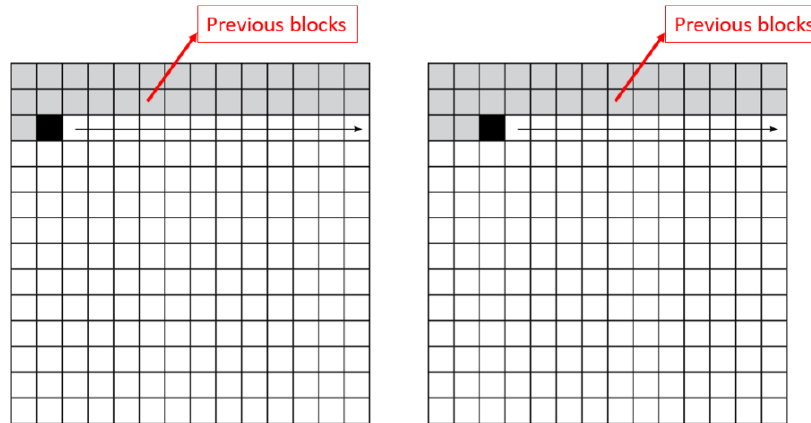
c. Limitation [9b]

Limitation [9b] recites: “determining a set of spatial motion vector prediction candidates for the encoded block of pixels; the spatial motion vector prediction candidates being provided with motion information.”

Ex. 1001, 33:38–41. Petitioner explains:

For a given block N that is currently being encoded, the set of spatial motion vector prediction candidates encompasses all previously encoded blocks from 1 up to N-1. Ex-1003, ¶109. As Rusert encodes or decodes the frame, each block will have its

own set of previously-coded motion vectors, that is specific to the current block, with later blocks having a commensurate larger set. *Supra* §V.A; Ex-1004, ¶59; Ex-1003, ¶¶110-11.



[The illustration includes two diagrams each showing the current block in contrast to all previously coded blocks; the current block in the diagram on the right is one block subsequent to the current block in the diagram on the left.]

Pet. 33.

Regarding the spatial motion vector prediction candidates being provided with motion information, Petitioner further explains:

PMV_CANDS is a “list of PMV candidates.” Ex-1004, ¶37. Each candidate is a motion vector (Ex-1004, ¶11, ¶¶24-25, ¶¶39-41) including “x and y components.” Ex-1004, ¶36, ¶¶91-94, ¶100, ¶106. Thus, Ruser’s spatial motion vector prediction candidates stored in PMV_CANDS include motion information, including the associated motion vectors (x- and y- components) of the PMV candidates. Ex-1004, ¶¶2-3; Ex-1003, ¶112.

Zheng teaches that candidates in its merge list include motion information, e.g., “encoder instructs a decoder . . . to copy a motion vector” (Ex-1005, ¶41; Ex-1055, ¶¶26-27), and thus Ground 1 teaches that candidates include motion information and candidates stored in Ruser’s PMV_CANDS is a merge list. Ex-1003, ¶¶113-15.

Pet. 33–34.

Notwithstanding Patent Owner's arguments, discussed below, Petitioner's assertions are supported by the cited evidence.

Pointing to Petitioner's identification of all previously encoded blocks as the determined set of spatial motion vector prediction candidates and the visual illustrations on page 33 of the Petition, Patent Owner argues:

Contrary to the petition's assertion, this inclusion of all blocks in the frame shows that no "determining of a set of spatial motion vector prediction candidates" is performed "for the encoded block of pixels." Ex-2001 at ¶ 104. If the set is everything, it is either never determined, or impossible not to satisfy, effectively reading the limitation out of the claim. *Id.* at ¶ 104-105.

Prelim. Resp. 49. The argument is unpersuasive. Limitation [9b] does not restrict the claimed set in any way. It would be unduly narrow and improper to impose extraneous restrictions on the set. We see nothing wrong with Petitioner's identification in Rusert of the claimed set. The set is determined because by the time the current block is being encoded, all previously encoded blocks are known and have been recognized and each has its corresponding spatial motion prediction vector. The limitation is also not impossible not to satisfy, because encoding of previous blocks is required. Even assuming that the limitation is impossible not to satisfy, that consequence is due to the breadth of the claim recitation and not a reason to add extraneous conditions.

Patent Owner also asserts:

The plain language of the claims also requires order between the performance of limitations [9b], [9c], and [9e]. Ex-2001 at ¶ 106. The set must be "determined" before the "first spatial motion vector prediction candidate" is selected from the set, and a vector cannot be part of a "possible candidate pair from the set" until that vector has been determined to be in the set. Ex-

2001 at ¶ 106. However, in Rusert a block is not inspected for a PMV (and if so added to the “set of spatial motion vector prediction candidates”) until the block is reached in Rusert’s scan order. Ex-2001 at ¶ 107; Ex-1004 at [0048]-[0049], [0054]. Accordingly, in Rusert whether a position in scan order contains a motion vector (and thus whether the motion vector is part of the set) [is] not determined until a block is reached in scan order. Ex-2001 at ¶¶ 107-108. The set is therefore never determined until the list is full or available candidates are exhausted, and this is not determined until after the “first motion vector prediction candidate” is selected and the comparison is conducted. As these steps must occur after the set is determined, Rusert cannot teach limitations [9b], [16b], or [18b]. Ex-2001 at ¶¶ 107-109.

Prelim. Resp. 49–50.

Limitation [9b] requires determining a set of spatial motion vector prediction candidates and limitation [9c] requires selecting a first spatial motion vector prediction candidate from the set of spatial motion vector prediction candidates. We agree with Patent Owner that the set must be determined prior to selecting a candidate from the set.

Limitation [9e] requires comparing motion information of the first spatial motion vector prediction candidate with motion information of another spatial motion vector prediction candidate in a subset of the set of spatial motion vector prediction candidates, without making a comparison of each possible candidate pair from the set of spatial motion vector prediction candidates. We agree with Patent Owner that a vector cannot be a “possible candidate pair from the set” until that vector has been determined to be in the set.

However, none of this undermines Petitioner’s identifying the set of previously coded motion vectors, relative to the current block being coded, as satisfying the determining step of limitation [9b]. The arguments of

Patent Owner are misplaced. We disagree with Patent Owner's assertion that in Rusert the set is never determined until PMV_CANDS is full or available candidates are exhausted, and that the set is not determined until after the "first motion vector prediction candidate" is selected and the comparison is conducted. There is a set of previously coded motion vectors corresponding to previously coded blocks whenever a new block is being coded.

As we noted above in Section III.D.1., Rusert describes a method of selecting PMV candidates, "wherein each PMV candidate corresponds to a motion vector *used for coding a previous block*" within an allowed distance from the current block. Ex. 1004 ¶ 11 (emphasis added). The method "comprises selecting a set of PMV candidates as a subset of the set of previously coded motion vectors that were used for previous blocks having an allowed distance from the current block." *Id.* Rusert states: "A PMV candidate list is created by selecting a subset of the motion vectors previously used for previous blocks." *Id.* ¶ 12.

Thus, the determined set of candidates as identified by Petitioner is the set encompassing all previously coded blocks prior to coding the current block. When coding the current block, including creation of a merge list (PMV_CANDS) of spatial motion vector prediction candidates for the current block by use of a scanning pattern according to Rusert's Figure 3n, blocks previously coded are already determined and known. The scanning pattern of Rusert's Figure 3n is used to create the PMV_CANDS merge list associated with the current block being coded. During the entire time PMV_CANDS is dynamically generated, candidate by candidate, there is already a set of previously coded blocks, except when the current block is

the first block of the frame. Thus, the set of previously coded blocks is already determined when a first motion vector prediction candidate is selected from the set for consideration when coding the current block. *See, e.g.,* Pet. 28 (citing Ex. 1003, ¶91). Patent Owner appears to have regarded, mistakenly, the final state of the list PMV_CANDS as the set of spatial motion vector prediction candidates rather than all previously coded blocks as specifically identified by Petitioner.

Petitioner sufficiently has shown that Rusert and Zheng, as combined by Petitioner, together disclose limitation [9b].

d. Limitation [9c]

Limitation [9c] recites:

selecting a first spatial motion vector prediction candidate from the set of spatial motion vector prediction candidates as a potential spatial motion vector prediction candidate to be included in a merge list for the prediction unit, where the merge list is constructed based on the motion information of the spatial motion vector prediction candidates;

Ex. 1001, 33:42–48.

Petitioner explains:

Rusert teaches “selecting . . . PMV candidates” for a current block from the “set of previously coded motion vectors that were used for previous blocks.” Ex-1004, ¶¶11-12, ¶15, ¶¶24-25, ¶39, ¶44, ¶¶51-66, ¶113, Fig. 6. As Rusert encodes the blocks of a frame, each block has its own set of previously-coded motion vectors from which to select a candidate for the current block. *Supra* §V.A, §VI.A.2[9b]; Ex-1003, ¶118. Rusert teaches that the candidates are selected based on a “scan . . . around the current block” for potential inclusion in PMV_CANDS, and thus are spatial motion vector prediction candidates. Ex-1004, ¶44, ¶¶51-66. Rusert teaches many scan patterns (*see* Ex-1004, Figs. 3a-n), including the scan pattern in Figure 3n, which “has been found to combine good compression efficiency (i.e., finding

good motion vectors) with good computation performance.” Ex-1004, ¶66, Fig. 3n:

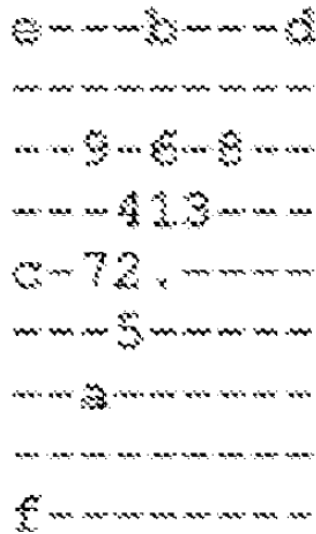


Fig. 3n

[Figure 3n illustrates a possible scan pattern and distance measurements for a plurality of blocks surrounding a current block]

Ex-1003, ¶¶118-19.

Each iteration of Rusert’s algorithm selects a new spatial motion vector candidate based on the correspondence between the iteration number and the block as indicated in Figure 3n, with the blocks being visit[ed] sequentially, e.g., 1 to 5. Ex-1003, ¶120.

Pet. 34–35 (first and second alterations by Petitioner).

Petitioner explains that in view of Zheng, Rusert’s PMV_CANDS is a merge list for the prediction unit, because Rusert operates on blocks of pixels, which is the unit for which motion vectors are assigned. Pet. 36 (citing Ex. 1003 ¶¶ 123–124). Petitioner further asserts: “Rusert teaches that the candidates in its PMV_CANDS include motion information. PMV-CANDS is a ‘list of PMV candidates’ for predicting the motion of the current block. Ex-1004, ¶37. These motion vectors include ‘x and y

components.’ Ex-1004, ¶106, ¶36, ¶¶91-94, ¶100. Rusert’s PMV_CANDS is updated based on comparisons involving the candidate’s motion information. Ex-1004, ¶¶71-72; *infra* §VI.A.2[9e]; Ex-1003, ¶¶126-27.” *Id.* at 37.

Petitioner asserts that a “POSITA would have understood that Zheng’s candidate set and a merge list refer to the same concept in the encoding process of generating motion prediction candidates, and that this teaching is applicable to Rusert’s construction of the PMV_CANDS list.” Pet. 32 (citing Ex. 1003 ¶ 92). Petitioner further notes that “Zheng teaches **receiving information identifying a spatial motion vector prediction candidate** from its merge list, based on identifying the best candidate in the merge list for use in motion prediction for the current block. *Id.* (citing Ex. 1003 ¶¶ 93–95; Ex. 1005 ¶¶ 107, 109; Ex. 1055 ¶¶ 63–64).

Patent Owner does not dispute these assertions. Petitioner’s assertions are supported by the cited evidence. Petitioner sufficiently shows that Rusert and Zheng, as combined by Petitioner, together disclose limitation [9c].

e. Limitation [9d]

Limitation [9d] recites: “determining a subset of spatial motion vector prediction candidates based on the location of the block associated with the first spatial motion vector prediction candidate.” Ex. 1001, 33:49–52.

Petitioner asserts that Rusert selects a set of PMV candidates as a “subset” of the set of the previously coded motion vectors that were used for previous blocks, and that the subset members have an allowed distance from the current block and an allowed position. Pet. 37 (citing Ex. 1004 ¶¶ 11, 12, 15, 24, 25, 37, Figs. 2a–2b; Ex. 1003 ¶¶ 130–131).

The following annotated version of Rusert's Figure 3n is provided on page 39 of the Petition:

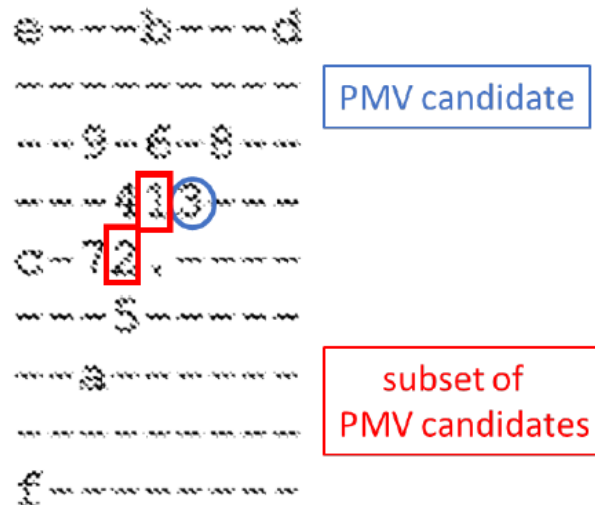


Fig. 3n

Figure 3n shows a scan pattern and distance measurements for a plurality of blocks surrounding a current block. Ex. 1004 ¶ 30. In this annotated version of Figure 3n, Petitioner has labeled a selected prediction motion vector candidate blue and a subset of prediction motion vector candidates red. Petitioner explains:

As Rusert's scan progresses, the subset of PMV candidates comprises the previously-coded PMV candidates obtained from previous blocks in the scan pattern from the initial block (e.g., 1) up to a candidate being evaluated (e.g., 3). Ex-1004, ¶¶ 4-5, ¶¶ 36-39, ¶¶ 43-44, ¶¶ 51-56. For example, using the scan pattern of Fig. 3n, when block "3" is selected in limitation [9c], the subset of PMV candidates comprises the candidates from blocks 1 and 2 as illustrated below [shown here above]. *Id.* When block "4" is selected, the subset comprises the candidates from blocks 1, 2, and 3, and so on. *Id.*; Ex-1003, ¶ 132.

Pet. 38. Petitioner further explains: “Rusert’s subset of candidates are a subset of *the larger set of all previously-coded motion vectors* as explained. *Supra* §VI.A.2[9b]; Ex-1003, ¶133.” *Id.* at 39 (emphasis added).

For the requirement that determining the subset must be “based on a location of the block associated with the first spatial motion vector prediction candidate,” Petitioner presents reasoning by assuming “the block associated with the first spatial motion vector prediction candidate” means the block introduced in limitation [9a] and refers to the current block for which the candidates are considered. Pet. 40–41. However, in Section III.C.3 above, we rejected that proposed construction. Instead, we determined that “the block” in limitation [9d] means “the block associated with the first spatial motion vector prediction candidate,” as limitation [9d] expressly states. Thus, Petitioner’s arguments are unpersuasive.

In the alternative, Petitioner asserts:

Even if “the block” was interpreted as the block from which the selected first candidate is obtained, Rusert teaches this. *Supra* §V.B. The “position” of a block’s PMV candidate is represented as (xpos, ypos), i.e., a location of the block associated with the first spatial motion vector prediction candidate. Ex-1004, ¶¶51-52. Based on the block’s location, the subset of PMV candidates with which the PMV candidate is compared includes the candidates of blocks located in the scan pattern up to the PMV candidate. Ex-1004, ¶44. For example, in Fig. 3n, the PMV candidate for block “3” is compared with a subset of PMV candidates for blocks “1” and “2” for de-duplication, as explained for [9c]-[9e]. Ex-1004, ¶44, ¶¶65-66, Fig. 3n: [reproduced above]

Ex-1003, ¶140.

Pet. 41–42. Notwithstanding Patent Owner’s argument, discussed below, Petitioner sufficiently has shown, based on its alternate argument, that

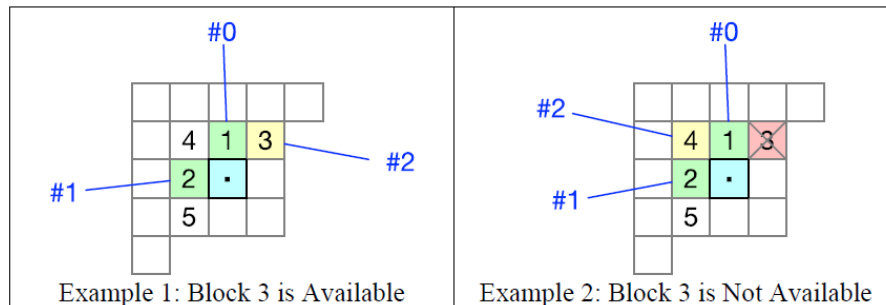
Rusert and Zheng, as combined by Petitioner, together disclose limitation [9d].

Patent Owner argues:

In the Petition’s treatment of Rusert, the “subset” is the PMV_CANDS list determined from the previously traversed blocks in Rusert’s scan order. Pet. at 37–43. This subset is determined prior to the selection of the first motion vector prediction candidate of limitation [9c], and therefore cannot be “based on a location of the block associated with the first spatial motion vector prediction candidate” as required by [9d]. Ex-2001 at ¶¶ 117–125. Instead, the PMV_CANDS list is based upon a series of comparisons and availability checks made **before** the first spatial motion vector prediction candidate of limitation [9c] is selected.

As a result, the “subset” identified in the Petition can be different at the same “location of the block associated with the first spatial motion vector prediction candidate” or can be the same for different “location[s] of the block associated with the first spatial motion vector prediction candidate.” Ex-2001 at ¶¶ 122–127.

For example, if the selected “first spatial motion vector prediction candidate” under the Petition’s application of Rusert were the candidate from the block labeled “3” below, the current PMV_CANDS list could be empty, include 1, include 2, or include 1 and 2. If Rusert’s availability check on 3 fails (there is no available MV from 3), then block location 4 would have the same possible PMV_CANDS list at the candidate from block 3. Ex-2001 at ¶¶ 119-125.



[The figures show Patent Owner's representation of what could be in PMV_CANDS depending on availability of blocks]

Prelim. Resp. 53–54 (first alteration by Patent Owner). Patent Owner further states:

Put another way, the “determining” that occurs in the construction of PMV_CANDS through scan order “1” and “2” does not depend on the position or existence of a candidate at scan order 3. Whether one, both, or neither is represented in PMV_CANDS is fixed before the third position in scan order is reached. As a result, PMV_CANDS following scan order position “2” is not “based on” scan order position 3. As a result, Rusert cannot satisfy this limitation, and Petitioner's first Ground is unlikely to succeed.

Id. at 46.

These arguments are unavailing. Although PMV_CANDS may have content before selection of the first motion vector prediction candidate of limitation 1[c], that content takes on special significance as grouped candidates upon selection of the first motion vector prediction candidate, i.e., that group is to be compared with the selected first motion vector prediction candidate. Thus, it is reasonable to regard the group as determined based on a location of the block associated with the first spatial motion vector prediction candidate.

For instance, assuming all candidates are available, if the selected first candidate is block 3, then the subset is the group including blocks 1 and 2, and if the selected first candidate is block 4, then the subset is the group including blocks 1, 2, and 3. Thus, the determined subset is based on the location of the selected first motion vector prediction candidate, at least when all previous candidates in the scan order are available. That is sufficient for satisfying limitation [9d].

Even if some of the previous candidates in the scan order are not available, the conclusion would be no different, based on the current record. For instance, in the case of selected first motion vector prediction candidate “3,” whether the previous candidates is the group of “1,” “2,” or both “1” and “2,” each is a subset of the set identified by Petitioner. Patent Owner mentions that the previous candidates may be none, or “0,” but does not represent that that is always the case. The limitation need not be met in all possible circumstances and all modes of operation including rarely occurring conditions. If the limitation is met in some mode of standard or normal operation, it is met. *See Hewlett-Packard Co. v. Mustek Sys., Inc.*, 340 F.3d 1314, 1326 (Fed. Cir. 2003).

Further, it is inconsequential that due to unavailability of certain candidates, the determined subset for selected first motion vector prediction candidate “3” may be the same as the determined subset of selected first motion vector prediction candidate “4.” The claims do not require the subsets determined for different selected first motion vector prediction candidate be different. All that is required is “determining a subset of spatial motion vector prediction candidates based on a location of the block associated with the first spatial motion vector prediction candidate.”

Our view is consistent with the specification of the ’833 patent, where each motion prediction candidate of neighboring blocks A0, A1, B0, B1, and B2 is already known and is a subset of the full set A0, A1, B0, B1, and B2, when one of them is selected as first candidate to evaluate for inclusion in the merge list by comparison with an associated or particular subset. Ex. 1001, 14:52–53, 15:3–17, 15:49–62, 16:4–20, Figs. 9, 11a, 11b.

For the foregoing reasons, Petitioner sufficiently has shown that Rusert and Zheng, as combined by Petitioner, together disclose limitation [9d].

f. Limitation [9e]

Limitation [9e] recites:

comparing motion information of the first spatial motion vector prediction candidate with motion information of another spatial motion vector prediction candidate of the [sub]set of spatial motion vector prediction candidates without making a comparison of each possible candidate pair from the set of spatial motion vector prediction candidates, wherein comparing comprises performing an equivalence check or comparing a difference in motion information to a threshold or other similarity metric;

Ex. 1001, 33:53–62.¹¹

Petitioner asserts: “Rusert teaches three comparisons that comprise an equivalence check, comparing a difference in motion information to a threshold, or other similarity metric, each of which satisfies [9[e]]. Ex-1004, ¶21, ¶¶71-72; *supra* §VI.A.2[9c]; Ex-1003, ¶144.” Pet. 43. With regard to the first comparison, Petitioner explains that “[a] potential PMV candidate is selected and compared with each PMV candidate in the subset of preceding PMV candidates in Rusert’s scan pattern, which are the candidates already stored in PMV_CANDS. *Supra* §VI.A.2[9d]. If the x- and y- components of two motion vectors are the same, they are equivalent and the potential candidate is excluded.” *Id.* at 44 (citing Ex. 1003 ¶ 145 and previous discussion regarding limitation [9d]).

¹¹ Alteration in limitation [9e] reflects that reflected in a Certificate of Correction. Ex. 3001.

With regard to the second and third comparisons, Petitioner explains:

Second, Rusert compares whether “the PMV candidate is . . . within a threshold distance of an existing PMV candidate” in the subset of candidates stored in PMV_CANDS, e.g., using “a similarity measure” such as Euclidean distance to calculate whether the difference between the x- and y- components of their motion vectors is ‘smaller than a pre-defined threshold.” Ex-1004, ¶21, ¶72, ¶87. The distance between duplicate DMV candidates is zero. Ex-1003, ¶146, ¶146 n.4.

Third, Rusert compares whether “at least one alternative PMV candidate will allow motion vectors to be coded using fewer bits” (Ex-1004, 21) thereby using a “similarity metric” by “removing PMV candidates” that “will never be used” because another candidate stored in PMV_CANDS facilitates “a bit sequence that is shorter or of the same length compared for all possible motion vectors.” Ex-1004, ¶¶90-94, ¶95 (teaching exemplary PMV/DMV combinations requiring fewer bits); Ex-1003, ¶¶147-48.

Pet. 44–45 (alteration by Petitioner). Petitioner further explains that “[a]ll three compare a potential candidate with at least one other candidate from the subset of preceding candidates in Rusert’s scan pattern.” *Id.* at 45.

These foregoing assertions are supported by the cited evidence and not disputed by Patent Owner.

With regard to the recitation “comparing . . . without making a comparison of each possible candidate pair from the set of spatial motion vector prediction candidates,” Petitioner explains:

Each of Rusert’s three comparisons (explained above) compares motion information of a selected candidate with the subset of PMV candidates stored in PMV_CANDS, without making a comparison of each possible pair from the set of motion vectors used for all previous blocks. Ex-1004, ¶¶11-13, ¶¶15-16, ¶113. Rusert teaches that the subset of PMV candidates is a “*subset of the motion vectors previously used for previous blocks*” meaning Rusert does not compare each possible pair from the “set of

previously coded motion vectors . . . used for previous blocks[.]”
Ex-1004, ¶¶11-12, ¶¶24-25.

Pet. 45–46 (emphasis added, alteration by Petitioner). The assertion is supported by the cited evidence. The scan pattern in Figure 3n of Rusert, reproduced below, does not pass through all previously coded blocks prior to the current block:

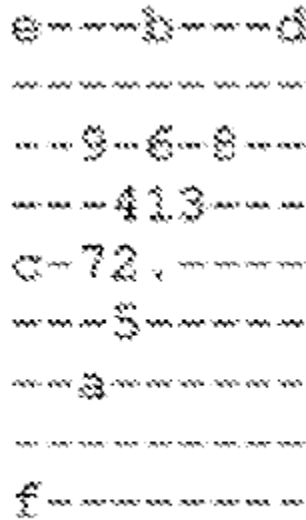


Fig. 3n

Figure 3n illustrates a possible scan pattern and distance measurements for a plurality of blocks surrounding the current block. Ex. 1004 ¶ 30.

Petitioner explains that because the subset is limited to candidates having an allowed distance and position, candidates from previous blocks outside the allowed distance and position are not compared. Pet. 47 (citing Ex. 1004 ¶ 15 and previous discussion of limitation [9d]). Petitioner points out that Rusert’s scan patterns 3m and 3n even exclude certain blocks within the allowed distance. *Id.* (citing Ex. 1004 ¶¶ 64–65). Petitioner states: “Given these excluded blocks, there is no comparison of each pair of vectors

from the set of all previously-coded blocks.” *Id.* (citing Ex. 1003 ¶¶ 152–153).¹²

Notwithstanding Patent Owner’s arguments to the contrary, discussed below and concerning the requirement of comparing “without making a comparison of each possible candidate pair from the set of spatial motion vector prediction candidates,” Petitioner sufficiently accounts for limitation [9e].

Patent Owner contends:

If the set is all motion vectors from previously coded blocks in Rusert’s scan order, then the set is not determined before the ‘first motion vector prediction candidate’ is selected (limitation [9c]) because the availability check in Rusert is performed as part of the scan, and limitation [9b] is not satisfied. Further, before the availability check, even if an unchecked motion vector from a later point in the scan order (i.e., a future scan order position) could be considered part of the set, it cannot yet be part of a “possible candidate pair” because its existence is unknown to Rusert’s scan order system. Ex-2001 at ¶¶ 130-138.

If, on the other hand, the “set” for the “first motion vector prediction candidate” only includes those candidates in the scan order through the block associated with “first motion vector prediction candidate,” the Rusert’s system teaches that the

¹² Petitioner alternatively notes that if we looked at just blocks in Rusert’s scan pattern, e.g., as shown in Figure 3n, Rusert teaches that a scan may be terminated as soon as a pre-defined number of unique PMV candidates have been found, and thus Rusert does not make comparison with each possible pairs of blocks within the scan order. Pet. 46. Petitioner also alternatively notes that even within the scan order, Rusert compares potential candidates with preceding candidates in PMV_CANDS, which are just a subset of all candidates in the scan order. These alternative contentions are unavailing because all blocks in Rusert’s scan order as shown in Figure 3n are not the “set” of spatial motion vector prediction candidates Petitioner identified for limitation [9b].

motion vector for each “first motion vector prediction candidate” is compared to all prior candidates, and thus all possible candidate pairs including the “first motion vector prediction candidate” are compared. If a prior scan position candidate is on the PMV_CANDS list, its motion information is compared with the motion information for the “first motion vector prediction candidate.” If a prior scan position candidate is not on the PMV_CANDS list because its motion information was redundant with the motion information for another candidate already on the PMV_CANDS list, then its motion information is still compared, indirectly, to the motion information for the “first motion vector prediction candidate.” Ex-2001 at ¶¶ 130-138.

As a result, whether the “set of spatial motion vector prediction candidates” includes potential candidates from future scan order positions or not in Petitioner’s theory for Ground 1, Rusert cannot satisfy limitation [9e] or the corresponding limitations [16e] or [18e].

Prelim. Resp. 54–55.

The above-quoted argument of Patent Owner are unavailing because they regard or assume the determined set of spatial motion vector prediction candidates are the candidates in Rusert’s scan order, for instance, as shown in Rusert’s Figure 3n. They do not address Petitioner’s identification, in the context of limitation [9b] discussed above, of all previously encoded blocks as the determined set of spatial motion vector prediction candidates.

For the foregoing reasons, Petitioner sufficiently has shown that Rusert and Zheng, combined as Petitioner has proposed, together disclose limitation [9e].

g. Limitation [9f]

Limitation [9f] recites: “if at least one of the comparisons indicates that the motion vector information of the spatial motion vector prediction candidates correspond with each other, excluding the first spatial motion vector prediction candidate from the merge list.” Ex. 1001, 33:63–67.

Petitioner explains:

As explained, Rusert determines whether to exclude the selected first spatial motion vector prediction candidate from the merge list stored in PMV_CANDS, based on one of the comparisons explained for [9e]. Rusert removes “unnecessary PMV candidates” to “ensure[] the length of the [PMV_CANDS] list is not unnecessarily long, which would reduce coding efficiency.” Ex-1004, ¶¶20–21. Rusert explains that “[a] PMV candidate may be determined to be unnecessary” and therefore excluded based on the comparisons. Ex-1004, ¶ 21; *supra* §§VI.A.2[9e]. . . .

Rusert excludes unnecessary candidates when deciding whether to add a new candidate to the subset of PMV candidates stored in PMV_CANDS. Ex-1004, ¶21, ¶¶71-72; *supra* §VI.A.2[9e]. As part of the “update” process whereby new candidates are added, Rusert determines whether a selected PMV candidate should be included, meaning it is excluded based on any of the comparisons from [9e]. Ex-1004, ¶¶71-72. Additionally, this would have been obvious because Rusert teaches the advantages of reducing the number of candidates in PMV_CANDS using the comparisons from [9e] (Ex-1004, ¶12, ¶21, ¶70, ¶84, ¶90), and the natural time to perform the comparisons would have been when evaluating whether to add a candidate to the subset of PMV candidates stored in PMV_CANDS.

Pet. 47–48 (first to third alterations by Petitioner). These assertions are supported by the cited evidence and not disputed by Patent Owner.

Petitioner sufficiently has shown that Rusert and Zheng, combined as Petitioner has proposed, together disclose limitation [9f].

h. Limitation [9g]

Limitation [9g] recites: “selecting a spatial motion vector prediction candidate from the merge list for use in decoding the encoded block of pixels, wherein the spatial motion vector prediction candidate is selected

from the merge list using the information that was received identifying a respective spatial motion vector prediction candidate.” Ex. 1001, 34:1–6.

Petitioner explains:

Rusert teaches “a particular PMV candidate” is selected “from a list of PMV candidates, PMV_CANDS[,]” using “a code ‘index’” sent “from the encoder” and received by the decoder. Ex-1004, ¶¶36-37. The received index is information that identifies a respective PMV candidate from PMV_CANDS by pointing to a particular candidate based on its position in PMV_CANDS. In this way, it is an index into PMV_CANDS. Rusert teaches zero-based indexing examples, starting with zero for the first candidate and ending with N-1 for a list of N candidates. Ex-1004, ¶¶99-95; Ex-1003, ¶167.

Pet. 49 (alteration by Petitioner). These assertions are supported by the cited evidence and not disputed by Patent Owner.

Petitioner sufficiently has shown that Rusert and Zheng, combined as Petitioner has proposed, together disclose limitation [9g].

i. Preliminary Conclusion for Claim 9

For the foregoing reasons, Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claim 9 over Rusert and Zheng.

4. Dependent Claims 10–14

Claims 10–14 each depend, directly or indirectly, from claim 9. Ex. 1001, 34:7–35:28. Petitioner addresses claims 10–14 on pages 51–63 of the Petition. Petitioner’s assertions are supported by the cited evidence and not separately disputed by Patent Owner apart from independent claim 9.

We determine that Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claims 10–14 over Rusert and Zheng.

5. *Independent Claims 16 and 18*

Petitioner asserts: “Beyond the preambles, claims 16 and 18 are nearly identical to claim 9, with limitations [16a]-[16g]/[18a]-[18g] having only minor differences with [9a]-[9g], respectively, and being satisfied for reasons explained above. *Supra* §§VI.A.2[9a]-[9g]; Ex-1003, ¶¶242-72.” Pet. 63–64.

The preamble of claim 16 (“[16pre]”) reads: “An apparatus comprising a processor and a memory including computer program code, the memory and the computer program code configured to, with the processor, cause the apparatus to.” Ex. 1001, 36:4–7.

The preamble of claim 18 (“[18pre]”) reads: “A non-transitory computer readable medium having stored thereon a computer executable program code for use by an encoder, said program codes comprise instructions for use by an encoder, said program code comprises instructions for.” Ex. 1001, 37:26–30.

Petitioner further asserts: “Ground 1 teaches [16pre] and [18pre], e.g., with a video encoding/decoding ‘apparatus’ comprising ‘a processor’ and ‘computer-readable medium, carrying instructions, which when executed[,]. . . causes [the processor] to carry out any of the methods disclosed herein.’ Ex-1004, ¶1, ¶¶24-27, ¶114, ¶116, claims 17-19; Ex-1003, ¶¶242-44, ¶¶258-61.” Pet. 64 (alterations by Petitioner).

Petitioner’s assertions regarding the preambles of claims 16 and 18 and regarding the limitations of claims 16 and 18 as compared to the limitations of claim 9 are supported by the cited evidence and not disputed by Patent Owner. Based on our reasoning discussed above for claim 9, and based on Petitioner’s explanation for the preambles of claims 16 and 18, we

determine Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claims 16 and 18 over Rusert and Zheng.

6. *Dependent Claims 26–30*

Claims 26–30 each depend, directly or indirectly, from claim 16. Ex. 1001, 39:34–40:62. Petitioner asserts that other than the preambles, “claims 26-30 are identical to claims 10-14.” Pet. 65. Petitioner asserts that the preambles are accounted for by reference to the discussion of the preamble of claim 16, and the rest of claims 26–30 are addressed by reference to the discussions for claims 10–14. *Id.*

We have already addressed Petitioner’s accounting for claims 10–14 and claim 16. Patent Owner does not separately argue claims 26–30 apart from its arguments for claim 16. For substantially the same reasons as we have provided for claims 10–14 and 16, Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claims 26–30 over Rusert and Zheng.

E. *Alleged Obviousness of Claims 9–14, 16, 18, and 26–30 over Nakamura and WD4*

1. *Overview of Nakamura (Exhibits 1007, 1008, and 1009)*

As noted above, Petitioner Uses the name “Nakamura” to refer to a collection of three files, i.e., the “Nakamura Document” (Ex. 1007), the “Nakamura WD Description” (Ex. 1008), and the “Nakamura Presentation” (Ex. 1009). Pet. 1, 65. Petitioner asserts that “they were jointly presented in a single proposal, by the same author, packaged together in a single zip, and meant to be read together, teaching related aspects of Nakamura’s proposal.” *Id.* at 67. Here, we focus on the Nakamura document (Ex. 1007).

In its introduction paragraph, the Nakamura document states: “This proposal is for the improvement of derivation method of the candidates for

merge mode and motion vector predictor (MVP).” Ex. 1007 § 1. It unifies the location of spatial neighbors for merge mode and MVP by proposing that “the positions of the spatial neighbors that can be used as merging candidates are as same as the positions of the spatial MVP candidates.” *Id.* It also proposes to unify the derivation process for merge mode and for MVP. *Id.* The proposal “tries to reduce the number of candidates in the spatial derivation process to reduce the number of times of comparison in the removal process.” *Id.* at Abstr. It states: “The proposed techniques simplify the derivation process for merge mode and MVP.” *Id.* § 2.2.

Section 2.2.1 of the Nakamura document describes its proposed technique for merge mode and is reproduced below:

2.2.1 Proposal 1: Proposed technique for merge mode

Changes of our proposal for merge modes from HM3.0 are as follows:

- The positions of the spatial neighbors that can be used for merging candidates are as [sic] same as the positions of the spatial MVP candidates. That is unification of the location of spatial neighbor for merge mode and MVP.
- Two spatial merging candidates are derived in the spatial derivation process.
- The merging candidate list is constructed of two spatial merging candidates and a temporal merging candidate.

Figures 2 (a) and (b) illustrate the position of the spatial neighbors A, B, C, D and E relative to the current prediction unit in the HM3.0 and the proposed technique, respectively.

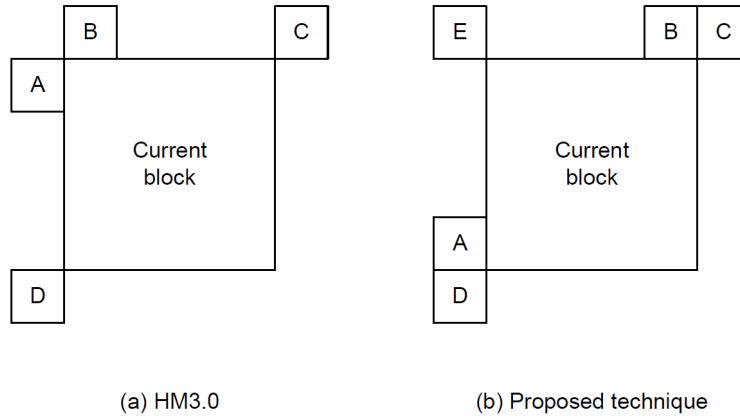


Figure 2 Spatial neighbors that can be used as merging candidates.

[Figure 2(a) shows spatial neighbors that can be used as merging candidates in existing HM3.0, and Figure 2(b) shows spatial neighbors that can be used as merging candidates in Nakamura's proposed technique]

In this proposal, two spatial candidates and a temporal candidate are derived. The number of candidates is reduced in the spatial derivation process to reduce the number of times of comparison in the removal process. Table 1 presents the number of times of comparison in the removal process in each the number of candidates. The number of times of comparison in the removal process in HM3.0 is ten times. On the other hand, the number of times of comparison in the removal process in the proposed technique is three times.

Table 1 The number of comparison in the removal process

The number of candidates in the spatial and temporal derivation process	The number of times of comparison in the removal process	Notes
3 (=2+1)	3 [times]	Proposed technique
4 (=3+1)	6 [times]	-
5 (=4+1)	10 [times]	HM3.0
6 (=5+1)	15 [times]	-

[Table 1 shows the number of comparisons in the removal process]

Table 2 presents the comparison between HM3.0 and proposed technique for merge mode:

Table 2 Comparison between HM3.0 and proposed technique for merge mode

	HM3.0	Proposal 1
The number of spatial candidates	4 in 4 [positions]	2 in 5 [positions]
Spatial derivation order	A, B, C, D	A, B, C, D, E
The number of times of comparison of redundant candidates in the spatial derivation process	0 [time]	0 [time]
The number of temporal candidates	1	1
Merging candidate list order	A, B, Col, C, D	S ₀ , S ₁ , Col
The number of times of comparison in the removal process	10 [times] (A vs B, Col, C, D, B vs Col, C, D, Col vs C, D, and C vs D)	3 [times] (S ₀ vs S ₁ , S ₀ vs Col, and S ₁ vs Col)

[Table 2 shows the comparison between HM3.0
and proposed technique for merge mode]

Notes:

S₀: The first spatial candidate found in the spatial derivation process.

S₁: The second spatial candidate found in the spatial derivation process.

Ex. 1007, 2–4.

2. *WD4 (Exhibit 1010)*

WD4 is a 222-page document titled “WD4: Working Draft 4 of High-Efficiency Video Coding.” Ex. 1010, i. It bears the following header on its title page:

Joint Collaborative Team on Video Coding (JCT-VC)
of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11
6th Meeting: Torino, IT, 14-22 July, 2011

Id.

WD4 defines a merge index, `merge_idx`, that “specifies the merging candidate index of the merging candidate list.” Ex. 1010 § 7.4.7. This merge index appears in WD4’s “prediction unit syntax” corresponding to information encoded for a prediction unit. *Id.* § 7.3.7 (emphasis omitted).

3. *Independent Claim 9*

a. *Preamble [9pre]*

With regard to the preamble “A method, comprising,” Petitioner asserts: “Ground 2 teaches [9pre], e.g., ‘improvement of derivation method of the candidates for merge mode’ comprising the below-described steps. Ex-1007, §1, Abstract, §2.1, Fig. 1; Ex-1010, §8.4.2.1.2, §8.4.2.1.8; *infra* §§VI.B.2[9a]-[9g]; Ex-1003, ¶¶301-04.” Pet. 68. These assertions are supported by the cited evidence and not disputed by Patent Owner.

b. *Limitation [9a]*

Limitation [9a] recites: “receiving an encoded block of pixels including a prediction unit and information identifying a respective spatial motion vector prediction candidate from a merge list constructed by an encoder.” Ex. 1001, 33:34–37. Petitioner explains:

WD4 explains that the encoder transmits the video to a decoder via a bitstream. Ex-1010, §3.11. That bitstream represents an encoded version of the frame of the video that is divided into blocks of pixels, which include PUs. Ex-1010, §0.2, §3.11, §3.12, §3.21, §3.34, §3.38, §7.3.7; Ex-1003, ¶306.

Pet. 68. Petitioner further explains: “WD4 teaches a merge index (e.g., ‘merge_idx’) that ‘specifies the merging candidate index of the merging candidate list[.]’ Ex-1010, §7.4.7. The transmitted merge_idx is information used by the decoder to select the correct candidate to use for decoding and reconstructing the PU.” *Id.* (citing Ex. 1010 § 8.4.2.1.1; § 7.3.7; Ex. 1003 ¶307) (alteration by Petitioner). Petitioner additionally explains:

The merge list, which WD4 refers to as mergeCandList, is constructed by both the encoder and decoder, as part of the encoding and decoding process, respectively. Ex-1008, §8.4.2.1.1; Ex-1010, §7.3.7, §7.4.7, §8.4.2.1.1; Ex-1003, ¶310.

The `merge_idx` is selected by the encoder and is information encoded for a PU, based on the merge list, that is then used by the decoder during the decoding process. The `merge_idx` points to a specific merging candidate used for predicting the motion vector for the current block. Ex-1008, §8.4.2.1.1; Ex-1010, §7.3.7, §7.4.7, §8.4.2.1.1; Ex-1003, ¶¶307-08.

The `merge_idx` is information received by WD4's decoder to identify the correct spatial motion vector prediction candidate from the merge list as signaled by the encoder, to be used for decoding the encoded block of pixels. Ground 2 teaches, or at least suggests, that the decoder receives `merge_idx` as selected by the encoder when encoding the bitstream, for use in decoding. Ex-1010, §3.11, §3.12, §3.34, §3.38, §8.4.2.1.1; Ex-1003, ¶¶310-11.

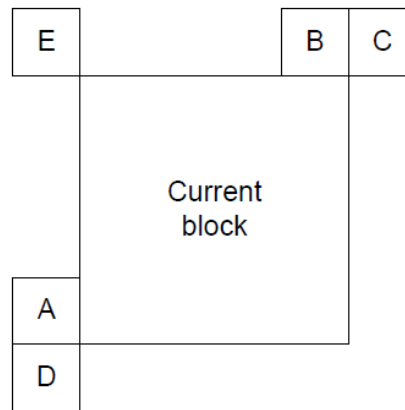
Id. at 70–71. These assertions are supported by the cited evidence and not disputed by Patent Owner.

c. Limitation [9b]

Limitation [9b] recites: “determining a set of spatial motion prediction candidates for the encoded block of pixels; the spatial motion vector prediction candidates being provided with motion information.”

Ex. 1001, 33:38–41. Petitioner explains:

Nakamura identifies two spatial motion vector prediction candidates (S_0 and S_1) from a set of motion vector candidates from “the position[s] of the spatial neighbors A, B, C, D, and E relative to the current prediction unit” which “can be used for . . . candidates” for the current block. Ex-1007, §2.2.1, Abstract, §1, Tables 2, 4, Figure 1; Ex-1009, 000008, 000010, 000014. The candidates are spatial motion vector prediction candidates because each is a candidate motion vector obtained from one or more previously-encoded blocks in the current-frame (A–E). E.g., Ex-1007, §2.2.1; *supra* §V.A. The spatial neighbors are blocks A–E:



(b) Proposed technique

[The figure shows spatial neighbors that can be used as merging candidates, Ex. 1007 § 2.2.1]

Ex-1007, Figure 2(b); Ex-1003, ¶314. Blocks A–E represent blocks that have already been encoded due to the raster scan processing of the frame. *See* Ex-1010, §3.83 (explaining “raster scan”), §3.101; Ex-1003, ¶315. WD4 explicitly states that its teachings are applicable to both the encoding and decoding process. Ex-1010, §3.34, §3.38; Ex-1003, ¶¶315-16.

Pet. 71–72 (first and second alterations by Petitioner). Petitioner further explains that each such spatial motion vector prediction candidate in Nakamura comprises availability flags, reference indices, prediction list utilization flags, and motion vectors for prediction, and that motion vectors are motion information that is used in the decoding process for prediction units to derive the pixels for a block of pixels. *Id.* at 72 (citing Ex. 1008 § 8.4.2.1.2; Ex. 1010 § 8.4.2, § 3; Ex. 1003 ¶ 317). Thus, Petitioner identifies in Nakamura the set of spatial vector motion prediction candidates as that corresponding to neighboring blocks A, B, C, D, and E.

These assertions are supported by the cited evidence and not disputed by Patent Owner.

d. Limitation [9c]

Limitation [9c] recites:

selecting a first spatial motion vector prediction candidate from the set of spatial motion vector prediction candidates as a potential spatial motion vector prediction candidate to be included in a merge list for the prediction unit, where the merge list is constructed based on the motion information of the spatial motion vector prediction candidates;

Ex. 1001, 33:42–48.

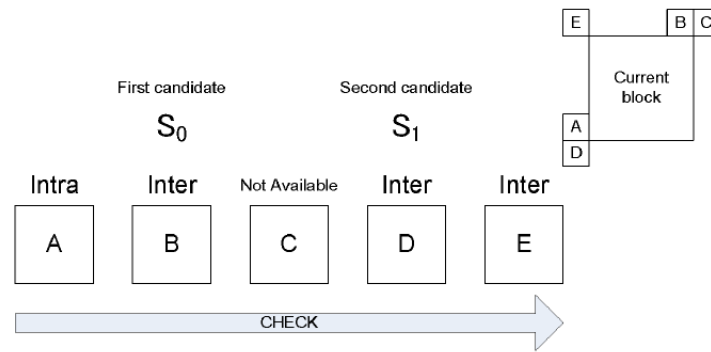
Regarding “selecting a first spatial motion vector prediction candidate from the set of spatial motion vector prediction candidates,” Petitioner asserts that Nakamura’s selection of a candidate from a spatial neighbor for S_1 satisfies the claimed step for selection a first spatial motion vector prediction candidate from the set of candidates. Pet. 73 (citing Ex. 1003 ¶ 320). Petitioner notes that although Nakamura refers to S_1 as a second candidate, not first, it is irrelevant how Nakamura applies its own “first” and “second” labels. *Id.* at 73 n.10 (citing Ex. 1003 ¶ 320). These assertion are supported by the cited evidence and not disputed by Patent Owner.

Regarding “as a potential spatial motion vector prediction candidate to be included in a merge list for the prediction unit,” Petitioner explains:

A “merging candidate list is constructed of two spatial merging candidates” (S_0 and S_1) selected in a “[s]patial derivation order” from the five spatial neighbor candidates “relative to the current prediction unit[.]” Ex-1007, §2.2.1, Tables 2-4; Ex-1008, §8.4.2.1.1; Ex-1009, 000008, 000010, 000012-14. Following the spatial derivation order, Nakamura steps through blocks A–E until two spatial candidates (S_0 and S_1) are selected for potential inclusion in the merging candidate list. Ex-1009, 000008; Ex-1007, §2.2.1, Table 2; Ex-1003, ¶¶321-23.

Spatial derivation order for Proposal 1 (merge mode)

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HOLDINGS



[The illustration shows “Spatial derivation order for Proposal 1 (merge mode)”]

Ex-1009, 000008. The merging candidate list is a merge list for the PU. Nakamura teaches that one candidate in its merging candidate list is assigned as the motion vector for the PU. Ex-1008, §8.4.2.1.1; Ex-1003, ¶¶324-25.

Pet. 74–75 (first and second alterations by Petitioner). Petitioner further explains that Nakamura’s merging candidate list is constructed of spatial candidates and includes information of those candidates in the list, including motion vectors. *Id.* at 75 (citing Ex. 1003 ¶ 326; Ex. 1008 § 8.4.2.1.2; Ex. 1010 § 8.4.2.1.2).

Petitioner’s assertions are supported by the cited evidence and not disputed by Patent Owner.

e. Limitation [9d]

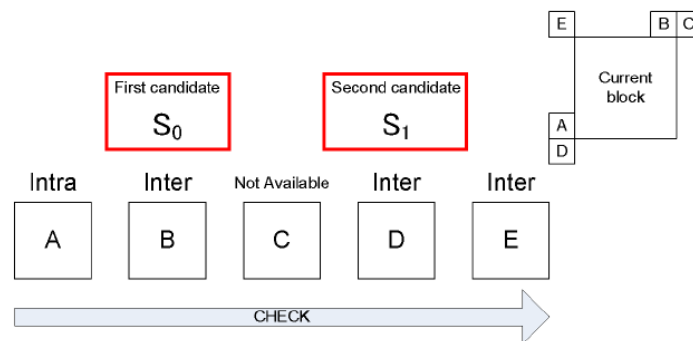
Limitation [9d] recites: “determining a subset of spatial motion vector prediction candidates based on the location of the block associated with the first spatial motion vector prediction candidate.” Ex. 1001, 33:49–52.

Regarding “determining a subset of spatial motion vector prediction candidates,” Petitioner explains:

Nakamura teaches “[t]wo spatial merging candidates” (S_0 , S_1) “are derived in the spatial derivation process[.]” from five “spatial neighbors A, B, C, D, and E relative to the current prediction unit[.]” Ex-1007, §2.2.1, Tables 1, 2, 4; Ex-1009, 000008, 000010, 000014; *supra* §V.C. For S_1 , Nakamura teaches a subset (S_0) with which S_1 is compared to determine whether to include or exclude S_1 . Ex-1007, Tables 2, 4; Ex-1008, §8.4.2.1.1; Ex-1009, 000010, 13; Ex-1010, §8.4.2.1.1; Ex-1003, ¶¶329-30.

Spatial derivation order for Proposal 1 (merge mode)

JVC KENWOOD
HOLDINGS



[The figure shows a spatial derivation order for Proposal 1 in Merge Mode from the Nakamura Presentation (Ex. 1009)]

Ex-1009, 000008.

Pet. 75–76 (first to third alterations by Petitioner). The above-quoted assertions are supported by the cited evidence and not disputed by Patent Owner.

Limitation [9d], however, further requires that determination of the subset be “based on a location of the block associated with the first spatial motion vector prediction candidate.” Ex. 1001, 33:50–52. For this requirement, Petitioner explains:

The subset is determined from a set of “spatial neighbors A, B, C, D and E relative to the current prediction unit” for the current block. Ex-1007, §2.2.1, Fig. 2(b); Ex-1009, 000008. Additionally, the subset (S_0) is based on the location of S_1

following Nakamura's spatial derivation order, which is based on relative positions of blocks around the current block. Ex-1007, §2.2.1, Fig. 2; Ex-1008, 8.4.2.1.2, Fig. 8-3; Ex-1009, 000008, 000010; Ex-1003, ¶¶331-35.

Pet. 76.

Petitioner's explanation is unpersuasive. First, as we have already determined above in Section III.C.3., "the block associated with the first spatial motion vector prediction candidate" does not refer to the current block, but refers to "the block associated with the first spatial motion vector prediction candidate." Second, there is inadequate explanation as to why S_0 is determined on the basis of the location of S_1 , where S_0 and S_1 are selected in a "spatial derivation order" from the five spatial neighbor candidates relative to the current prediction unit. Ex. 1007 § 2.2.1; Ex. 1009, 8, 10. As Patent Owner notes, the subset S_0 for comparison is already determined regardless of what the selection of S_1 thereafter might be. Prelim. Resp. 58–59. The subset S_0 does not change depending on the later selection of S_1 .

The cited testimony of Dr. Creusere does not support Petitioner's assertion that S_0 is determined on the basis of the location of S_1 . Dr. Creusere regards the block associated with the first spatial motion vector prediction candidate as "the current block for which motion vector prediction candidates are being analyzed." Ex. 1003 ¶¶ 332–334. Dr. Creusere does not explain why S_0 is determined on the basis of the location of any particular S_1 .

On this record, the subset S_0 has not been sufficiently shown as based on a location of the block associated with the first spatial motion vector prediction candidate, S_1 . Petitioner has not adequately shown the satisfaction of limitation [9d].

f. Motivation to Combine Nakamura and WD4

The deficiency discussed above relating to limitation [9d] and the disclosure of Nakamura already alone undermines the alleged unpatentability of claim 9 over Nakamura and WD4. Additionally, we have concerns regarding Petitioner's stated motivation for one of ordinary skill in the art to combine the teachings of Nakamura with the teachings of WD4.

With regard to motivation to combine the teachings of Nakamura and WD4, Petitioner explains:

Nakamura is an H.265 proposal for “reduc[ing] the number of candidates in the spatial derivation process to reduce the number of . . . comparison[s] in the removal process.” Ex-1007, Abstract. When applied to WD4, Nakamura's teachings satisfy the challenged claims. Ex-1003, ¶287.

A POSITA would have been motivated to apply Nakamura's teachings to the draft H.265 standard because that was its express purpose. Nakamura was proposed at the 6th JCT-VC meeting for inclusion into the standard. WD4 was the output of that meeting, reflecting the state of the draft H.265 standard at that time. Nakamura proposed “simplifications” and “improvement[s]” to H.265. Ex-1007, 000001, §6. WD4 “[i]ncorporated spatial merge candidate positions unification” from Nakamura. Ex-1010, Abstract. There was clear motivation to apply Nakamura to WD4. Ex-1003, ¶¶287-89. This was a combination of prior art elements according to known methods to yield predictable results. Ex-1003, ¶¶290–91.

Ground 2 applies Nakamura's known techniques to a known method (WD4) ready for improvement to yield predictable results. Nakamura teaches its “proposed technique is implemented into” the H.265 model software. Ex-1007, §2.3.1. Nakamura measured actual improvements from the combination. Ex-1007, §3; Ex-1003, ¶¶289-90, ¶294.

A POSITA would have been motivated by the references' striking similarities and common purpose. Both are directed to H.265. Both derive motion vector prediction candidates, while

seeking to reduce the number of candidates, for block-based inter-prediction. Ex-1010, §0.1, §0.6, §§8.4.2.1.1-8.4.2.1.3; Ex-1007, Abstract. WD4 provides context for Nakamura's teachings. Ex-1010, §3, §8; Ex-1003, ¶¶292-94.

Pet. 65–66 (alterations by Petitioner).

On motivation to combine, Petitioner does not specifically address the particular teachings sought to be combined. Rather, it appears, according to Petitioner, anything in Nakamura properly can be combined with anything in WD4 simply because Nakamura is a proposal for the next draft version of new standard H.265, i.e., version 4, and WD4 is the resulting draft version 4 of H.265 after all the proposals had been considered. Pet. 65–66.

Petitioner's reasoning is flawed and based on mere speculation.

Nakamura is not a proposal to revise or modify WD4. WD4 did not yet exist at the time the Nakamura proposal was made. Even if some suggestions of Nakamura made it into WD4, as Petitioner asserts (Pet. 65), i.e., spatial merge candidate positions unification, that does not mean one of ordinary skill in the art would have had reason to combine other teachings of Nakamura with particular disclosures of WD4. Even assuming Nakamura and WD4 have striking similarities in some way and also a common purpose to some general extent, that still does not mean everything in one is combinable with everything in the other, without specific consideration and discussion of what are proposed to be combined and in what manner.

g. Preliminary Conclusion for Claim 9

For the foregoing reasons, Petitioner has not shown a reasonable likelihood that it would prevail in establishing obviousness of claim 9 over Nakamura and WD4.

4. *Dependent Claims 10–14*

Claims 10–14 each depend, directly or indirectly, from claim 9. Ex. 1001, 34:7–35:28. The deficiency of Petitioner’s accounting for claim 9 equally applies to claims 10–14. Petitioner has not shown a reasonable likelihood that it would prevail in establishing the obviousness of claims 10–14 over Nakamura and WD4.

5. *Independent Claims 16 and 18*

Petitioner asserts: “Beyond the preambles, claims 16 and 18 are nearly identical to claim 9, with limitations [16a]-[16g]/[18a]-[18g] having minor differences with [9a]-[9g], respectively, and are satisfied as explained above. *Supra* §§VI.B.2[9a]-[9g]; Ex-1003, ¶¶407-34.” Pet. 88.

Claim 16, via its preamble, is directed to an apparatus comprising a processor and a memory including computer program code, where the memory and the computer program code are configured, with the processor, to cause the apparatus to perform functions recited in the body of claim 16. Ex. 1001, 36:4–7. The functions largely correspond to the steps in claim 9. *Id.* at 36:8–49. Claim 18 is directed to a non-transitory computer readable medium having stored thereon a computer executable program code comprising instructions for actions largely corresponding to the steps of claim 9. *Id.* at 37:26–38:3.

Similar to claim 9, claim 16 includes the limitation “determine a subset of spatial motion vector-prediction candidates based on the location of the block associated with the first spatial motion vector prediction candidate.” Ex. 1001, 35:49–52. Similar to claim 9, claim 18 includes the limitation “determining a subset of spatial motion vector prediction

candidates based on the location of the block associated with the first spatial motion vector prediction candidate.” *Id.* at 37:4–7.

The same deficiency discussed above regarding Petitioner’s showing for limitation [9d], “determining a subset of spatial motion vector prediction candidates based on the location of the block associated with the first spatial motion vector prediction candidate,” applies to claims 16 and 18.

Additionally, we also have the same concerns regarding Petitioner’s stated motivation to combine the teachings of Nakamura and WD4, as discussed above in the context of claim 9.

Petitioner has not shown a reasonable likelihood that it would prevail in establishing obviousness of claims 16 and 18 over Nakamura and WD4.

6. *Dependent Claims 26–30*

Claims 26–30 each depend, directly or indirectly, from claim 16. Ex. 1001, 39:34–40:62. The deficiency of Petitioner’s accounting for claim 16, discussed above, equally applies to claims 26–30. Petitioner has not shown a reasonable likelihood that it would prevail in establishing the obviousness of claims 26–30 over Nakamura and WD4.

F. *Discretionary Denial Under 35 U.S.C. § 325(d)*

Patent Owner contends that we should exercise discretion to deny institution under 35 U.S.C. § 325(d) based on the framework set forth in *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020) (precedential). Prelim. Resp. 68–71.

1. *Analytical Framework*

Section 325(d) provides that “[i]n determining whether to institute” an *inter partes* review, “the Director may take into account whether, and reject

the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d).

When deciding whether to exercise our discretion under § 325(d), we follow the two-part framework set forth in *Advanced Bionics*. Specifically, we must first determine “whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office.” *Advanced Bionics*, Paper 6 at 8. That determination involves “two separate issues”:

- (1) “whether the petition presents to the Office the same or substantially the same art previously presented to the Office”; and
- (2) “whether the petition presents to the Office the same or substantially the same arguments previously presented to the Office.”

Id. at 7. “Previously presented art includes art made of record by the Examiner, and art provided to the Office by an applicant,” e.g., with an information-disclosure statement. *Id.* at 7–8.

If “either condition of first part of the framework is satisfied,” we must then determine “whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.” *Advanced Bionics*, Paper 6 at 8. “An example of a material error may include misapprehending or overlooking specific teachings of the relevant prior art where those teachings impact patentability of the challenged claims.” *Id.* at 8 n.9.

When deciding whether to exercise our discretion under § 325(d) in view of the *Advanced Bionics* framework, we weigh the following nonexclusive factors:

- (a) the similarities and material differences between the asserted references and the prior art involved during prosecution;
- (b) the cumulative nature of the asserted references and the prior art evaluated during prosecution;
- (c) the extent to which the asserted references were evaluated during prosecution, including whether a rejection rested on any reference;
- (d) the extent of overlap between the arguments made during prosecution and Petitioner's reliance on the asserted references or Patent Owner's contentions concerning them;
- (e) whether Petitioner has pointed out sufficiently how the Examiner erred in analyzing the asserted references; and
- (f) the extent to which additional evidence and facts presented in the petition warrant reconsideration of the asserted references or arguments.

See Becton, Dickinson & Co. v. B. Braun Melsungen AG, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first paragraph) (“*Becton*”).

Under the *Advanced Bionics* framework, *Becton* factors (a), (b), and (d) relate to “whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office.” *Advanced Bionics*, IPR2019-01469, Paper 6 at 8, 10. *Becton* factors (c), (e), and (f) relate to “whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.” *See id.* at 7–8, 10.

2. *Analysis*

Patent Owner does not assert that either Rusert or Zheng was in the prosecution record of the application which issued as the '833 patent. Patent

Owner also does not assert that either Rusert or Zheng is cumulative of any prior art reference in that prosecution record. Instead, Patent Owner analyzes § 325(d) solely with respect to Nakamura and WD4. Prelim. Resp. 68–71.

We must grant or deny institution on both of Petitioner’s grounds. *See* 37 C.F.R. § 42.108(a). Petitioner has made a sufficient showing based on Rusert and Zheng for the Board to institute review, but not Nakamura and WD4. Here, § 325(d) is not sufficiently implicated that its statutory purpose would be undermined. Rather, the benefits of holding a trial to resolve the Rusert-Zheng ground for which Petitioner has shown a likelihood of prevailing outweigh any theoretical burden of addressing the weaker Nakamura-WD4 ground, to the extent that the Examiner considered Nakamura and WD4. *See Dril-Quip, Inc., v. FMC Tech., Inc.*, PGR2021-00049, Paper 10 at 13–14 (PTAB Aug. 4, 2021) (declining to exercise discretion to deny institution under § 325(d) even though one asserted ground was “weak” on the merits).

Thus, we do not exercise our discretion to deny institution based on § 325(d).

3. *Conclusion*

We find that the same or substantially the same prior art or arguments, i.e., Rusert (Ex. 1004) and Zheng (Ex. 1005), previously were not presented to the Office. We need not proceed past the first stage of the *Advanced Bionics* framework. We decline to exercise discretion under § 325(d) to deny the Petition.

G. Petitioner's Filing of Multiple Parallel Petitions

The instant Petition is one of two petitions Petitioner filed against the '833 patent, one filed on October 22, 2024 (IPR2024-01505) and this one filed on October 18, 2024 (IPR2024-01503). No previous petition had been filed by Petitioner against the '833 patent.

The Board has indicated that “one petition should be sufficient to challenge the claims of a patent in most situations.” Consolidated Trial Practice Guide 59 (Nov. 2019) (“CTPG”).¹³ But “the Board recognizes that there may be circumstances in which more than one petition may be necessary.” *Id.*

Petitioner has filed a paper explaining why in its view two petitions are appropriate in this case against the '833 patent, and ranking the two petitions, if it is permitted only to file a single petition. Paper 4. Petitioner ranks the petition here in IPR2024-01503, challenging claims 9–14, 16, 18, and 26–30 of the '833 patent, first, ahead of the petition in IPR2024-01505, challenging claims 1–8, 15, 17, and 19–25 of the '833 patent. *Id.* at 1.

Petitioner explains: “Here, two petitions are necessary because of the large number of challenged claims (30). Because Nokia has not yet identified the claims it intends to assert in district court, all of the challenged claims therefore remain material to the parties’ dispute.” Paper 4, 1.

Petitioner further explains:

[M]ultiple petitions are warranted because the '833 patent has 30 claims, reciting complex subject matter. The First and Second Petition each respectively challenge 13 and 17 non-overlapping claims. Addressing all 30 challenged claims in one petition would materially reduce the petitions’ thoroughness and unduly

¹³ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

burden the Board with overly terse analysis that would be more difficult to analyze. Filing two petitions allows for clearer and more detailed analysis for this volume of claims.

Institution of both Petitions would not be an inefficient use of resources because the challenged claims share some common limitations and similar subject matter. Two petitions are necessary as discussed below to address non-overlapping limitations related to encoding/decoding with different disclosures from the same prior art.

Id. at 2–3.

Petitioner additionally explains that this is not a situation where multiple petitions attack the same claims. Paper 4, 3. Petitioner notes that the claims challenged in this proceeding are directed to receiving and decoding encoded block of pixels based on motion vectors, and that the claims challenged in IPR2024-01505 are directed to encoding blocks of pixels based on motion vectors. *Id.* Petitioner notes that although the two petitions are based on the same prior art, different disclosures from the prior art references are relied upon in the two petitions. *Id.* at 4. Petitioner asserts that “multiple petitions are warranted due to the complex nature of the claims,” and that “[t]he ’833 claims recite granular details of operations performed during encoding and decoding video based on motion prediction.” *Id.* at 5.

Although we do not think 30 claims are typically too numerous for one petition to cover, many claims in the ’833 patent are extraordinarily lengthy and include numerous limitations. For example, claim 6, which depends from claim 5, which depends from claim 1, is itself approximately the length of a full column in the ’833 patent in addition to the lengths of claims 1 and 5. The length of claim 23, which depends from claim 22, which depends from claim 15, is itself approximately the length of a full

column in the '833 patent in addition to the lengths of claims 15 and 22. Additionally, we agree with Petitioner that the subject matter of the '833 patent is complex. We further agree with Petitioner that the division of claims among the two petitions, i.e., encoder claims in IPR2024-01505 and decoder claims in IPR2024-01503, is a structured division which helps to facilitate the handling of two petitions.

Patent Owner has not presented arguments urging that the filing of two petitions by Petitioner against the '833 patent is excessive.

For the foregoing reasons, we determine that the filing of two petitions by Petitioner against the '833 patent is reasonable under these circumstances. We decline to exercise discretion to deny either petition on the ground of the Petitioner filing an excessive number of petitions against the '833 patent.

IV. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has shown a reasonable likelihood that it would prevail in establishing that at least one of claims 9–14, 16, 18, and 26–30 of the '833 patent is unpatentable.

V. ORDER

In consideration of the foregoing, it is

ORDERED that an *inter partes* review of all challenged claims, i.e., claims 9–14, 16, 18, and 26–30 of the '833 patent, is instituted on all grounds listed in the Table presented on page 17 of the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this decision.

IPR2024-01503
Patent 9,571,833 B2

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