

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS INC.,
Petitioner,

v.

VELOS MEDIA, LLC,
Patent Owner.

IPR2019-00707
Patent 9,979,981 B2

Before DANIEL J. GALLIGAN, JASON W. MELVIN, and
AARON W. MOORE, *Administrative Patent Judges*.

MELVIN, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

I. INTRODUCTION

Petitioner, Unified Patents, Inc., filed a Petition (Paper 3, “Pet.”) requesting *inter partes* review of claims 1–8 (“the challenged claims”) of U.S. Patent No. 9,979,981 B2 (Ex. 1001, “the ’981 patent”). Patent Owner, Velos Media, LLC, filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). We instituted review of the challenged claims. Paper 8 (“Institution Decision” or “Inst.”).

Patent Owner filed a Response. Paper 23 (“PO Resp.”). Petitioner filed a Reply. Paper 28 (“Pet. Reply”). Patent Owner filed a Sur-Reply. Paper 36 (“PO Sur-Reply”). Patent Owner filed a Contingent Motion to Amend. Paper 22. Petitioner filed an Opposition to the Contingent Motion to Amend. Paper 29. As Patent Owner requested, we provided Preliminary Guidance to the Contingent Motion to Amend. Paper 33 (“Prelim. Guidance MTA”). Patent Owner filed a Revised Contingent Motion to Amend. Paper 37 (“MTA”). Petitioner filed an Opposition to the Revised Contingent Motion to Amend. Paper 42 (“MTA Opp.”). Patent Owner filed a Reply to that Opposition. Paper 45 (“MTA Reply”). Petitioner filed a Sur-Reply to the Revised Contingent Motion to Amend. Paper 49 (“MTA Sur-Reply”). We held a hearing on July 7, 2020, and a transcript appears in the record. Paper 54 (“Tr.”).

This is a final written decision as to the patentability of the challenged claims and the proposed substitute claims. For the reasons discussed below, we determine Petitioner has shown by a preponderance of the evidence that each of the challenged claims is unpatentable. We also determine that Petitioner has shown each of Patent Owner’s proposed substitute claims is

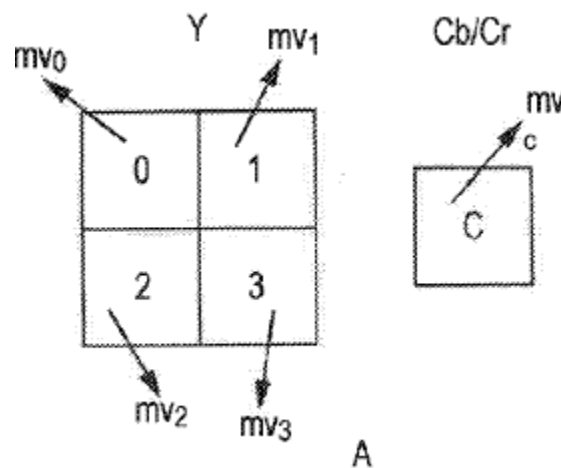
unpatentable and therefore deny Patent Owner's Revised Contingent Motion to Amend.

A. THE '981 PATENT

The '981 patent is titled "Image Processing Device and Method" and relates to encoding efficiency for color-difference signals and reduction in address calculations for memory access. Ex. 1001, codes (54), (57). Video data comprises a series of images made from individual pixels. Rather than representing pixel data using three chrominance (color/chroma) components (e.g., red, green, and blue), digital video systems may represent pixel data using a luminance (brightness/luma) component and two chrominance components. *See* PO Resp. 11. That format permits one resolution to be used for the luminance components while a different (lower) resolution is used for chrominance components. *Id.* at 12. The so-called 4:2:0 subsampling scheme means that a given space of pixels is represented with four luminance samples and two chrominance samples. *Id.*; *see also* Ex. 1008, 17–18, Fig. 2.11.

Besides reducing information through subsampling, another video-compression technique is termed "motion compensated prediction," which divides the image pixels into blocks and predicts or matches that block to another one in a prior image or another region of the current image. PO Resp. 12. In the motion-estimation approach, a block is coded as the difference in both content and position from a reference block, known as the predictor. *Id.* at 13. The content difference between a current block and its predictor is known as a residual block, and the position offset is known as a block's motion vector. *Id.*

Because sampling luminance and chrominance information creates image regions with different pixel densities, blocks of the image will be different sizes. For example, with the 4:2:0 subsampling scheme, when processing luminance information in 4×4 blocks, the associated chrominance information will exist in 2×2 blocks. Ex. 1001, 5:19–22, 16:33–38. Such a difference may cause issues during processing, complicating memory access. *Id.* at 5:23–33. Thus, the '981 patent discloses an approach of grouping the chrominance information into, for example, a 4×4 block comprised of four 2×2 blocks and corresponding that 4×4 block with a group of 4×4 luminance blocks. *Id.* at 5:45–60; 17:26–36 (disclosing that, for encoding producing “four 4×4 pixel blocks” of luminance information and “four color difference signal 2×2 blocks,” “a single color difference signal 4×4 block is re-corresponded with the four luminance signal blocks”). Designated portion A of Figure 9 is reproduced below:



Portion A of Figure 9 “illustrates an example of color differences signals with a case where a macroblock of luminance signals is configured of four 4×4 pixel blocks” and shows that “four luminance signal blocks are corresponded with one color difference signal 4×4 block appended with C.”

Id. at 17:17–20, 17:26–30. In the case where 2×2 color-difference blocks are first formed, the '981 patent discloses creating a new 4×4 color-difference block, containing the information corresponding to four 4×4 luminance blocks. *Id.* at 17:36–38.

Because the luminance blocks each have a corresponding motion vector, as shown above in Portion A of Figure 9, the coding system makes a choice regarding the motion vector to use with the color-difference block.¹ *See id.* at 17:39–45, 19:14–19. The '981 patent refers to this aspect as performed by the “color difference motion vector generating unit.” *Id.* at 17:39–45. In the general sense, the color-difference motion vector is derived from the four luminance motion vectors. *Id.* at 17:41–47. The Specification describes that a color-difference motion vector may be calculated by averaging the four luminance motion vectors (*id.* at 17:48–64) or by selecting the single luminance motion vector that “realizes the highest coding efficiency with the smallest residual” (*id.* at 18:44–19:13).

B. CHALLENGED CLAIMS

Petitioner challenges claims 1–8 (all claims in the '981 patent), of which claims 1, 3, 5, and 7 are independent. Claim 1 is illustrative and is reproduced below:

1. An image processing device comprising:
circuitry configured to
assign four luma blocks of a block size including a luma
component of an image to one first chroma block of
the block size including first chroma component of

¹ The color-difference block comprises information from regions of the image represented by all four luminance blocks, but processing the color-difference information as a block requires a single motion vector.

the image and one second chroma block of the block size including second chroma component of the image which is different from the first chroma component in a format of 4:2:0 including a luma signal and a chroma signal and that the block size is 4×4.

Id. at 53:26–36. The other independent claims recite similar limitations.

C. PRIOR ART AND ASSERTED GROUNDS

Petitioner asserts that the challenged claims are unpatentable on the following grounds:

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–4	102(b) ²	Bjontegaard ³
5–8	103(a)	Bjontegaard, Song ⁴
1–2, 5–8	103(a)	H.263 ⁵ , Bjontegaard II ⁶ , Song
3, 4	103(a)	H.263, Bjontegaard II

Pet. 4–5. Petitioner also relies on the Declaration of Dr. Vijay Madiseti (Ex. 1002). *See generally* Pet. 5–77.

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102/103, effective March 16, 2013. Because the application from which the ’981 patent issued was filed before this date, the pre-AIA version of §§ 102/103 applies.

³ U.S. Pub. 2008/0056376 A1, published Mar. 6, 2008 (Ex. 1004).

⁴ U.S. Pub. 2006/0008038 A1, published Jan. 12, 2006 (Ex. 1005).

⁵ ITU-T Recommendation H.263, “Video Coding for Low Bit Rate Communication.” ITU-T Study Group 15, March 1996 (Ex. 1006).

⁶ “Coding improvement by using 4×4 blocks for motion vectors and transform,” SG16/Q15 VCEG 3, Meeting Document Q15-C23, Dec. 1997 (Ex. 1007).

II. ANALYSIS

A. CLAIM CONSTRUCTION

For an *inter partes* review petition filed after November 13, 2018, we construe claim terms “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2019); Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51340, 51358 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018).

Petitioner asserts that we should construe the claim language “assign four luma blocks . . . to one first chroma block . . . and one second chroma block” (all challenged claims) and “assigning unit” (claim 7). Pet. 26–28. Patent Owner disputes that we should construe “assigning unit” (*see* PO Resp. 29–30) and disputes the correct construction for the “assign” phrase (*id.* at 20–29).

1. “assign four luma blocks . . . to one first chroma block . . . and one second chroma block”

In the Institution Decision, we agreed with Patent Owner that the claims require “a step of creating the correspondence between luma and chroma blocks or, in the case of the apparatus claims, a device configured to perform such a step.” Inst. 7. That construction is supported by the Specification’s statement that blocks are “corresponded” with each other. *See* Ex. 1001, 17:26–38. Petitioner submits that our construction was correct. Pet. Reply 3. Similarly, Patent Owner submits that “this construction, at a fundamental level, aligns with Patent Owner’s views that

require active assigning or corresponding of luma blocks to chroma blocks.”
PO Sur-Reply 3.

We explained further in the Institution Decision that “the claimed assigning step encompasses creating a chroma block in the claimed 4×4 size.” Inst. 7. Patent Owner takes issue with the “creating” language because “Patent Owner does not believe that the mere creation of a block for subsequent processing discloses the ‘assign’ limitation, under a proper understanding of that term.” PO Sur-Reply 3. Instead, according to Patent Owner, an additional operation must be performed on a block to meet the “assign” limitation. *Id.* at 3–4. Patent Owner contends such a requirement would be consistent with the Specification’s statement that “a single color difference signal 4×4 block is newly made to correspond to the four luminance signal blocks.” Ex. 1001, 17:36–38; *see* PO Sur-Reply 4. According to Patent Owner, “the key is the action of corresponding . . . not simply the creation.” PO Sur-Reply 4. Patent Owner, however, misreads the Specification, which does not express “corresponding” as a separate action. Rather, it states that the block “is newly made to correspond”—indicating that the required correspondence occurs with the block’s creation. Ex. 1001, 17:36–38. Moreover, that description in the Specification considers the case where luminance information is represented in 4×4 blocks while color-difference information is represented in 2×2 blocks. *Id.* at 17:26–32. Thus, the Specification describes that a 4×4 color-difference block is “re-corresponded” or “newly made to correspond” to the luminance blocks. *Id.* at 17:32–38. That does not mean that the Specification excludes creating 4×4 color-difference blocks in the first place.

Thus, we maintain the view of claim scope expressed in the Institution Decision—the “assign” claim language encompasses creating chroma blocks in the claimed 4×4 size such that the chroma blocks correspond to the four luma blocks, but does not require creating the chroma blocks and then corresponding them in separate steps.

Patent Owner argues that our claim construction allows for “spatial correspondence” to control, such that the active claimed “assign” is improperly replaced with passive “correspondence.” PO Resp. 22–23. We do not agree. As Petitioner explains, 4:2:0 coding “does not require any specific number of luma blocks and chroma blocks to be corresponded” and instead refers to the number of respective luma and chroma samples. Pet. Reply 5–6 (citing Ex. 2022 ¶ 72 (Patent Owner’s declarant testifying that the 4:2:0 subsampling scheme means “there are 4 sample points of luma per single sample point of Cb and Cr”); PO Resp. 12 (“[I]t is important to recognize that the 4:2:0 ratio defines a relationship between samples, as opposed to blocks.” (emphases omitted)); Ex. 1001, 17:33–36 (explaining that the “encoding stipulations” provide “four color difference signal 2×2 blocks corresponding” with four luminance signal blocks)). Because a particular subsampling strategy does not necessarily satisfy the claim language, we do not agree with Patent Owner that it reads “assign” out of the claims to construe them such that “assign” reads on creating the claimed 4×4 chroma blocks, without an additional step. *See* PO Resp. 22–23.

We determine that the Specification only generally describes assignment as described above and does not impose the specific requirement Patent Owner seeks with its claim-construction arguments. Thus, “assign four luma blocks . . . to one first chroma block . . . and one second chroma

block” means creating or corresponding two chroma blocks for subsequent processing.

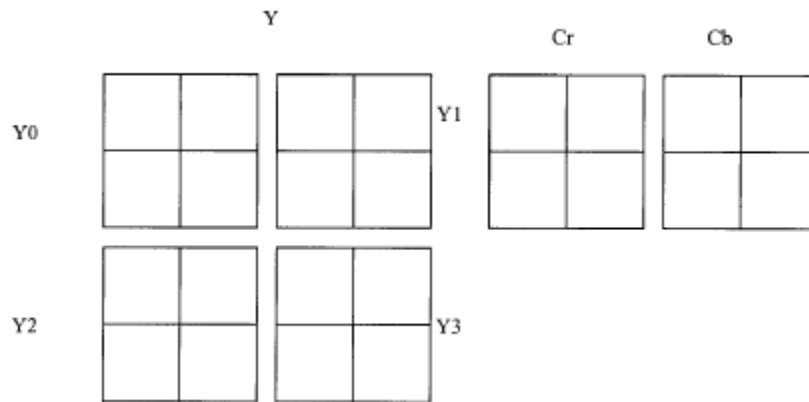
2. “assigning unit”

Petitioner proposes a construction for the term “assigning unit” in claim 7. Pet. 27–28. However, we agree with Patent Owner that this proceeding does not require construction of “assigning unit.” See PO Resp. 29–30. Petitioner does not challenge that view in the Reply and neither party raises an argument that would require such a construction.

B. ANTICIPATION BY BJONTEGAARD

Bjontegaard relates to preprocessing video data before encoding and transmission. Ex. 1004, code (57). As background, Bjontegaard discloses that video-coding standards like H.263 and H.264 process images using prediction, to represent differences representing movement in blocks of image data between various parts of a sequence. *Id.* ¶¶ 6–9. Bjontegaard discloses that image data may be processed in macroblocks comprising both luma and chroma subblocks including “two chrominance components (Cr, Cb) with half the resolution both horizontally and vertically compared with luminance.” *Id.* ¶¶ 10–11.

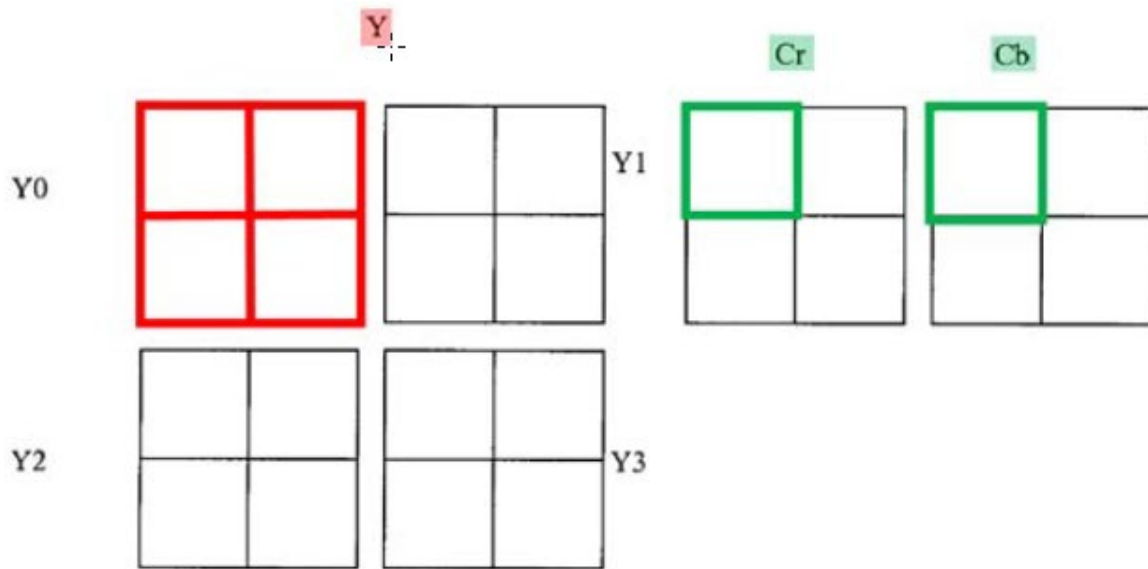
Bjontegaard provides an example macroblock in Figure 1, reproduced below:



As Bjontegaard describes:

FIG. 1 illustrates a typical denotation and grouping of pixels in a macroblock for luminance and chrominance, respectively. The macroblock consists of 16×16 luminance pixels and two chrominance components with 8×8 pixels each. Each of the components is here further broken down into 4×4 blocks, which are represented by the small squares. For coding purposes, both luma and chroma 4×4 blocks are grouped together in 8×8 sub blocks and designated Y0-Y3 and Cr, Cb.

Id. ¶ 13. Petitioner asserts that the Y0 luminance block (comprising four 4×4 blocks) corresponds to the upper left 4×4 block of Cr and the upper left 4×4 block of Cb. Pet. 30–31, 34–35. Petitioner provides an annotated version of Bjontegaard’s Figure 1, reproduced below:



Pet. 35. Petitioner asserts that, in the figure, “four luma blocks (Y, outlined in red) correspond to one first chroma block (Cr, outlined in green) and one second chroma block (Cb, outlined in green).” *Id.* at 34. Thus, according to Petitioner, Bjontegaard discloses circuitry configured to assign four luma blocks to one first chroma block and one second chrome block, all with 4×4 block sizes, as claimed. Pet. 33–35, 38–39.

Patent Owner argues first that Petitioner’s assertions fail because they require that we adopt a construction without any “active assignment” requirement. PO Resp. 38–43. According to Patent Owner, any relationship between the highlighted areas in Petitioner’s annotated version of Bjontegaard’s Figure 1 “is simply a function of the well-known 4:2:0 format.” *Id.* at 43. As explained above regarding the construction for “assign,” we do not agree that coding with the 4:2:0 format necessarily satisfies the claim language, because that format does not dictate how to form blocks of pixel information. *See supra* at 9. Thus, the relationship

Petitioner highlights in Bjontegaard's blocks is not merely a result of the 4:2:0 format.

Bjontegaard states that Figure 1 "illustrates a typical denotation and grouping of pixels in a macroblock" and that each of the luminance and chrominance "components is here further broken down into 4×4 blocks, which are represented by the small squares." Ex. 1004 ¶ 13. As we pointed out in the Institution Decision, Bjontegaard states that, "[f]or coding purposes, both luma and chroma 4×4 blocks are grouped together in 8×8 sub blocks." Inst. 11 (quoting Ex. 1004 ¶ 13). Petitioner submits that Bjontegaard's statement about 4×4 blocks satisfies the "assign" limitation notwithstanding that "the transform blocks can be grouped into larger sub-blocks at later encoding stages" because that later grouping "does not negate the creation and processing of transform blocks performed by the encoder." Pet. Reply 12.

That said, we are not persuaded by Petitioner's argument regarding Bjontegaard's statement that "[e]ach of the components is here further broken down in to 4×4 blocks." *See* Ex. 1004 ¶ 13. That language does not indicate that Bjontegaard's process actually creates the depicted 4×4 blocks. Rather, it supports that the blocks are only illustrated in the figure. Thus, when Bjontegaard states that "[f]or coding purposes, both luma and chroma 4×4 blocks are grouped together in 8×8 sub blocks," it indicates that the coding process uses 8×8 blocks, not 4×4 blocks as claimed.

Because Petitioner has not shown that Bjontegaard discloses the limitations of claim 1, Petitioner has not shown by a preponderance of the evidence that claim 1 was anticipated by Bjontegaard. Petitioner relies on the same assertions regarding Bjontegaard for claim 3 (*see* Pet. 42) and we

therefore reach the same conclusion for that claim. And because claims 2 and 4 depend from claims 1 and 3, respectively, Petitioner has also failed to show that Bjontegaard anticipated those claims.

C. OBVIOUSNESS OVER BJONTEGAARD AND SONG

Petitioner relies on Song for “a computing environment (100) used to implement embodiments of the disclosed video encoding or decoding techniques.” Pet. 43. But in all other ways, Petitioner relies on Bjontegaard for claims 5–8 just as it does for claim 1. Pet. 48–54. Accordingly, we reach the same conclusion for claims 5–8 as for claim 1.

D. OBVIOUSNESS OVER H.263, BJONTEGAARD II, AND SONG

H.263 describes a video-coding standard. Ex. 1006, 1. In the coding it describes, “[e]ach picture is divided into groups of blocks (GOBs),” each comprising a number of lines of pixels from the picture. *Id.* at 4–5. Then,

[e]ach [Group Of Blocks] GOB is divided into macroblocks. A macroblock relates to 16 pixels by 16 lines of Y and the spatially corresponding 8 pixels by 8 lines of CB and CR. Further, a macroblock consists of four luminance blocks and the two spatially corresponding colour difference blocks as shown in Figure 5. Each luminance or chrominance block relates to 8 pixels by 8 lines of Y, C_B or C_R.

Ex. 1006, 6 (§ 4.2.1). H.263’s Figure 5 is reproduced below:

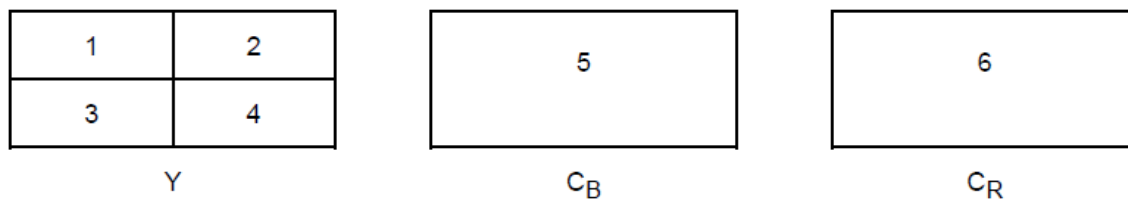


FIGURE 5/H.263

Arrangement of blocks in a macroblock

Id. at 7. Figure 5 depicts the arrangement of blocks in a macroblock as described above. *See id.* at 6 (§ 4.2.1). Because H.263 discusses luminance and chrominance blocks that are 8×8, rather than the claimed 4×4, Petitioner relies additionally on Bjontegaard II. Pet. 57–62.

Bjontegaard II describes its author’s work “to improve on motion prediction by allowing 4x4 blocks to be used for motion vectors” and “for the transform.” Ex. 1007, 1. It describes that the author modified H.263’s approach, “replac[ing] the 8x8 blocks by 4x4 blocks to obtain better prediction in «complicated» areas of the picture.” *Id.* Bjontegaard II notes that, in its approach, “less bits are used for coding” as compared to H.263. *Id.* After presenting simulation results for the described method, Bjontegaard II concludes that “[t]he described 4×4 block based coding gives significant improvements - both objective and subjective - compared to H.263+.” *Id.* at 6. Petitioner asserts that the above statements in Bjontegaard II provided express motivation for a skilled artisan to modify H.263 by using a 4×4 block size. Pet. 60–62.

Patent Owner argues that, like it asserts for Bjontegaard discussed above, H.263 does not disclose any active assignment as claimed.

PO Resp. 48–56. We do not agree. According to H.263, the “macroblock consists of four luminance blocks and the two spatially corresponding colour difference blocks.” Ex. 1006, 6 (§ 4.2.1). Thus, it explains the relationship between the blocks (spatial correspondence). We understand Patent Owner to argue that mere spatial correspondence of pixel information is insufficient, because even spatially correlating pixels “are not blocks.”

PO Resp. 51. That argument, however, does not undermine Petitioner’s reliance on H.263 because H.263 uses active language to describe the process of generating the described blocks. For example, it states that “[p]ictures *are coded* as luminance and two colour difference components (Y, CB and CR)” and “[e]ach GOB *is divided* into macroblocks” Ex. 1006, 4 (§ 4.1) (emphasis added), 6 (§ 4.2.1) (emphasis added). We agree with Petitioner that block operations, like those disclosed by H.263, show affirmative action regarding correspondence. *See* Pet. Reply 6 (“As Dr. Richardson testified, blocks are units that are created and processed during video coding. *See* EX2022, ¶72. Accordingly, when a reference discloses a correspondence between blocks, a POSA would reasonably infer that a step was taken to create the correspondence.”).⁷

To resolve any doubt that H.263 satisfies the requirement for active assignment, Petitioner points out that “H.263 discloses that “[m]otion vector MVD_{CHR} for both chrominance blocks is derived by calculating the sum of the four luminance vectors and dividing this sum by 8.” Pet. Reply 9 (quoting Ex. 1006, 37). That disclosure supports that H.263’s chroma blocks are actively processed with the corresponding luma blocks. Indeed, as

⁷ Although Petitioner cites paragraph 72, the relevant testimony from Dr. Richardson appears in paragraph 74.

Petitioner points out (Pet. Reply 9), it supports even the unclaimed feature that Patent Owner touches on—“the use of a function of the set of luma block motion vectors for the assigned and linked chroma block sets.” *See* PO Resp. 18.

We conclude that, although the 4:2:0 sampling format for H.263’s pixel information is necessary but not sufficient for Petitioner’s showing, H.263’s specific division of that pixel information into blocks (as modified by Bjontegaard II) satisfies the “assign” claim limitation.

Patent Owner does not challenge Petitioner’s remaining assertions for claims 1, 2, or 5–8. *See* PO Resp. 48–56. Accordingly, any such arguments have been waived. *See* Paper 9, 7 (“Patent Owner is cautioned that any arguments for patentability not raised in the response may be deemed waived”). We have considered the entirety of the record in light of Petitioner’s assertions in this ground of unpatentability (Pet. 54–77), and we are persuaded by Petitioner’s contentions. In particular, independent claims 5 and 7 recite substantially similar subject matter to claim 1, and, to the extent claims 5 and 7 differ from claim 1, Petitioner persuasively explains how the asserted prior art teaches these slight differences in recited subject matter, such as the “computer-readable medium” of claim 5 and the “assigning unit” of claim 7. *See* Pet. 74–76. Dependent claims 2, 6, and 8 recite that “the format is a color format written as Y/Cb/Cr, the luma component is Y, the first chroma component is Cb, and the second chroma component is Cr.” This is the format disclosed in H.263, as discussed above. *See* Ex. 1006, 4 (“Pictures are coded as luminance and two colour difference components (Y, C_B and C_R).”), Fig. 5; Pet. 72–73.

Having reviewed the full record, we conclude that Petitioner has shown the unpatentability of claims 1, 2, and 5–8 by a preponderance of the record.

E. OBVIOUSNESS OVER H.263 AND BJONTEGAARD II

For claims 3 and 4, Petitioner relies on H.263 and Bjontegaard II, without additional teachings from Song. Pet. 77. That difference results from the lack of “circuitry configured to” language in claims 3 and 4. Claim 4 depends from claim 3 and recites the same additional subject matter as claims 2, 6, and 8. Patent Owner makes no arguments unique to this ground and thus has waived any such challenge. *See* Paper 9, 7.

For the reasons discussed above regarding obviousness over H.263, Bjontegaard II, and Song, and as supported in the Petition (Pet. 77), we conclude that Petitioner has shown by a preponderance of the evidence that claims 3 and 4 are unpatentable over H.263 and Bjontegaard II.

F. REAL PARTIES IN INTEREST

Patent Owner argues that we should dismiss the Petition because it does not name all real parties in interest. PO Resp. 59–64. Patent Owner identifies ten companies (including three that joined after we instituted review) that have paid membership fees to Petitioner and asserts that those companies should have been named as real parties in interest. *Id.*

Petitioner challenges Patent Owner’s assertions, arguing that Unified Patents Inc. is the sole real party in interest. Pet. Reply 17–26. Petitioner cites evidence that it alone controls this proceeding (Ex. 2152, 5, 10–11; Ex. 2138, 31:25–33:2; Ex. 1016, 3, 4; Ex. 2161, 93:5–17) and does not communicate with its members about potential validity challenges before

filing IPRs (Ex. 2138, 222:16–223:4). Petitioner searched for and could not identify any communications with its members regarding the '981 patent or this proceeding other than public announcements. Pet. Reply 21; Ex. 2010; Ex. 2161, 68:22–69:9. Petitioner confirms that “[n]o Unified member funded this petition.” Pet. Reply 21 (citing Ex. 1016, 6). Petitioner further points out that no alleged unnamed real party in interest would be subject to a time bar under § 315(b). *Id.*

We have considered the parties’ submissions and determine that Petitioner has adequately identified the real party in interest. Patent Owner has introduced no evidence specific to this proceeding that causes us to question Petitioner’s identification and has not identified an aspect of Petitioner’s business structure that we view as showing the alleged unnamed real parties in interest are clear beneficiaries with respect to this proceeding that have a preexisting, established relationship with Petitioner. *See Ventex Co. v. Columbia Sportswear N. Am., Inc.*, IPR2017-00651, Paper 152, 6–11 (Jan. 24, 2019) (precedential).

G. THE BOARD’S CONSTITUTIONALITY

Patent Owner asserts that the “Board lacks the authority to issue a Final Written Decision in this proceeding because the Administrative Patent Judges (‘APJs’) are principal officers of the United States that must be appointed by the President and confirmed by the Senate.” PO Resp. 57–58. According to Patent Owner, the Federal Circuit’s decision in *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320 (Fed. Cir. 2019), “did not actually fix the problem.” PO Resp. 58.

We decline to consider Patent Owner’s constitutional challenge as the issue has been addressed by the Federal Circuit in *Arthrex*. *See Arthrex*, 941

F.3d at 1337 (“This as-applied severance . . . cures the constitutional violation . . .”).

III. REVISED CONTINGENT MOTION TO AMEND

Patent Owner requests that, if we find any of the challenged claims unpatentable, we grant entry of proposed substitute claims 9–16, corresponding to original claims 1–8, respectively. MTA 2.

A. APPLICABLE LAW

In an *inter partes* review, amended claims are not added to a patent as of right, but rather must be proposed as a part of a motion to amend. 35 U.S.C. § 316(d). The Board must assess the patentability of proposed substitute claims “without placing the burden of persuasion on the patent owner.” *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1328 (Fed. Cir. 2017) (en banc); *see also Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 3–4 (PTAB Feb. 25, 2019) (precedential). Subsequent to the issuance of *Aqua Products*, the Federal Circuit issued a decision in *Bosch Automotive Service Solutions, LLC v. Matal*, 878 F.3d 1027 (Fed. Cir. 2017) (“*Bosch*”), as well as a follow-up order amending that decision on rehearing. *See Bosch Auto. Serv. Sols., LLC v. Iancu*, No. 2015-1928 (Fed. Cir. Mar. 15, 2018) (Order on Petition for Panel Rehearing).

In accordance with *Aqua Products*, *Bosch*, and *Lectrosonics*, a patent owner does not bear the burden of persuasion to demonstrate the patentability of the substitute claims presented in the motion to amend. Rather, ordinarily, “the petitioner bears the burden of proving that the proposed amended claims are unpatentable by a preponderance of the evidence.” *Bosch*, 878 F.3d at 1040 (as amended on rehearing);

Lectrosonics, Paper 15 at 3–4. In determining whether a petitioner has proven unpatentability of the proposed substitute claims, the Board focuses on “arguments and theories raised by the petitioner in its petition or opposition to the motion to amend.” *Nike, Inc. v. Adidas AG*, 955 F.3d 45, 51 (Fed. Cir. 2020). Ultimately, the Board determines whether the proposed substitute claims are unpatentable by a preponderance of the evidence based on the entirety of the record, including any opposition made by the Petitioner. *See Lectrosonics*, Paper 15 at 4.

Notwithstanding the foregoing, Patent Owner’s proposed substitute claims 9–16 must meet the statutory requirements of 35 U.S.C. § 316(d) and the procedural requirements of 37 C.F.R. § 42.121. *Lectrosonics*, Paper 15 at 4–8. Accordingly, Patent Owner must demonstrate: (1) the amendment proposes a reasonable number of substitute claims; (2) the amendment responds to a ground of unpatentability involved in the trial, (3) the proposed claims are supported in the original disclosure (and any earlier filed disclosure for which the benefit of filing date is sought); and (4) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter. *See* 35 U.S.C. § 316(d); 37 C.F.R. § 42.121.

B. PROPOSED SUBSTITUTE CLAIMS

Proposed claim 9 would replace claim 1 and recites:

[pre]9. An image processing device comprising:

[a] circuitry configured to

[b] assign four luma blocks of a block size including a luma component of an image to one first chroma block of the block size including first chroma component of the image and one second chroma block of the block size including second chroma component of the image which is different from the

first chroma component in a format of 4:2:0 including a luma signal and a chroma signal and that the block size is 4x4[[]];

- [c] calculate four chroma motion vectors, mv_{c0} , mv_{c1} , mv_{c2} , and mv_{c3} , based on mv_0 , mv_1 , mv_2 , and mv_3 , wherein each of mv_0 , mv_1 , mv_2 , and mv_3 is a motion vector of a respective luma block of the four luma blocks;
- [d] for the first chroma block,
 - [f] select a first motion vector as mv_{cb} from mv_{c0} , mv_{c1} , mv_{c2} , and mv_{c3} , wherein mv_{cb} is a motion vector for the first chroma block,
 - [g] generate a first flag indicating the selected first motion vector for the first chroma block,
 - [h] transmit the first flag for a horizontal direction of the selected first motion vector, and
 - [i] transmit the first flag for a vertical direction of the selected first motion vector separately from the transmission of the first flag for the horizontal direction of the selected first motion vector; and
- [j] for the second chroma block,
 - [l] select a second motion vector as mv_{cr} from mv_{c0} , mv_{c1} , mv_{c2} , and mv_{c3} , wherein mv_{cr} is a motion vector for the second chroma block,
 - [m] generate a second flag indicating the selected second motion vector for the second chroma block,
 - [n] transmit the second flag for a horizontal direction of the selected second motion vector, and
 - [o] transmit the second flag for a vertical direction of the selected second motion vector separately from the transmission of the second flag for the horizontal direction of the selected second motion vector.

MTA 26–27 (claims appendix).⁸

C. STATUTORY AND REGULATORY REQUIREMENTS

1. Reasonable Number of Claims
35 U.S.C. § 316(d)(1)(B); 37 C.F.R. § 42.121(a)(3)

“There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim.”
Lectrosonics, Paper 15 at 4–5 (citing 37 C.F.R. § 42.121(a)(3)). Patent Owner proposes one substitute claim for each challenged claim (*see* MTA 5) and thus proposes a reasonable number of substitute claims.

2. Respond to a Ground of Unpatentability
37 C.F.R. § 42.121(a)(2)(i)

Patent Owner contends that the proposed substitute claims are responsive to the grounds in this trial “because the additional narrowing limitations in the proposed claims create a patent claim scope that is neither anticipated nor rendered obvious by any of the four grounds on which trial has been instituted.” MTA 8. We agree that the proposed substitute claims adequately assert additional limitations relevant to the issues in the instituted grounds. Thus, the proposed claims satisfy the requirement.

3. Scope of Amended Claims
35 U.S.C. § 316(d)(3); 37 C.F.R. § 42.121(a)(2)(ii)

“A substitute claim will meet the requirements of § 42.121(a)(2)(i) and (ii) if it narrows the scope of at least one claim of the patent, for example, the challenged claim it replaces, in a way that is responsive to a

⁸ As noted by Patent Owner, the bracketed claim-element designations intentionally omit [e] and [k]. MTA 26–27.

ground of unpatentability involved in the trial.” *Lectrosonics*, Paper 15 at 6-7. Patent Owner explains that its “proposed substitute claims retain all features of the original claims while adding further limitations to recite, among other things, calculating, identifying, and generating motion vector information.” MTA 7. We agree with Patent Owner that the proposed substitute claims are of narrower scope than the respective challenged claims.

4. New Matter or Written Description
35 U.S.C. § 316(d)(3); 37 C.F.R. § 41.121(b)(1)

An amendment cannot introduce new matter. 35 U.S.C. § 316(d)(3). Thus, the motion to amend must set forth the support in the original disclosure of the patent for each claim that is added or amended. 37 C.F.R. § 41.121(b)(1); *Lectrosonics*, Paper 15 at 7. Whether a disclosure complies with the written-description requirement depends on whether the disclosure reasonably conveys to a person of ordinary skill in the art that the inventor had possession of the claimed subject matter at the time of filing, rather than the presence or absence of literal support in the specification for the claim language. *See Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). Petitioner argues that Patent Owner fails to show written description for the proposed substitute claims in several regards.

a. 9[c] – calculating four motion vectors

Limitation 9[c] requires circuitry configured to “calculate four chroma motion vectors, mv_{c0} , mv_{c1} , mv_{c2} , and mv_{c3} , based on mv_0 , mv_1 , mv_2 , and mv_3 , wherein each of mv_0 , mv_1 , mv_2 , and mv_3 is a motion vector of a respective luma block of the four luma blocks.” MTA 26 (claims appendix). Patent Owner identifies paragraphs in the original application that it relies on for

written-description support of limitation 9[c]. MTA 14 (citing Ex. 2015 ¶¶ 129–131, 140–141; Ex. 2027 ¶¶ 89, 91, 93, 95); *see also id.* at 16–17 (citing Ex. 2027 ¶¶ 98–101). In Petitioner’s view, limitation 9[c] lacks adequate written description for several reasons.

First, Petitioner asserts paragraphs 129–131 do not support the limitation because they disclose calculating only *one* chroma motion vector using all four luma motion vectors, whereas the limitation requires calculating four chroma motion vectors. MTA Opp. 3–6.

With the claimed coding scheme, using 4:2:0 sampling and 4×4 blocks for both the luma information and chroma information, a given pixel region is represented with four luma blocks and one chroma block for each of the coded chroma channels (Cb and Cr). *See* Ex. 2015 ¶¶ 126, 128, Fig. 9. The Specification⁹ describes several approaches to calculating a motion vector for the chroma blocks. As a general form, it provides Equation 8, which states that the chroma motion vector information, mv_c , is a function of the four luma motion vectors: “ $mv_c = f(mv_0, mv_1, mv_2, mv_3)$.” *Id.* ¶¶ 129–130. The Specification gives examples of that general form, in the first example explaining that the four luma motion vectors may be averaged, as shown in Equation 9, reproduced below:

$$mv_c = \frac{mv_0 + mv_1 + mv_2 + mv_3 + 4}{8} \quad \dots(9)$$

⁹ For the issue of written-description support, the parties refer to Ex. 2015, the Specification filed with the application that resulted in the ’981 patent. *See* Ex. 1001, code (21); MTA 9 n.6. Thus, our use of “Specification” in this discussion refers to Ex. 2015.

Id. ¶ 131. Equation 9 shows a sum of the four luma motion vectors, along with a scalar addition (offset) and a division (resolution scaling factor). *Id.* ¶¶ 131–132. The Specification explains that Equation 9 is calculated “for each of the horizontal component and vertical component, as shown in . . . [Equation] (9).” *Id.* ¶ 131.

Petitioner points out that Equations 8 and 9 disclose calculating only a single chroma motion vector, not the four recited in limitation 9[c]. MTA Opp. 4–6. Thus, reasons Petitioner, paragraphs 129–131 cannot provide written-description support for the limitation. *Id.*

In its original Contingent Motion to Amend, Patent Owner proposed substitute claims that included a particular equation for calculating the claimed chroma motion vectors. Paper 22, 28 (reciting an equation in limitation 9[c]). Our Preliminary Guidance informed Patent Owner that those proposed claims introduced a potential indefiniteness because they treated “motion vector” as both a scalar and vector quantity. Paper 33, 7–8. In the Revised Contingent Motion to Amend, as noted, Patent Owner proposes substitute claims without a particular equation to calculate the chroma motion vectors. MTA 26–27 (claims appendix). Thus, Patent Owner intentionally broadened the proposed claims in the Revised Motion as compared to the original motion. Although we agree with Petitioner that paragraph 131 describes using the four luma motion vectors to calculate a single chroma motion vector, limitation 9[c] does not preclude this because, for example, doing so repeatedly would produce four identical chroma motion vectors, and, therefore, “calculate four chroma motion vectors.” Accordingly, limitation 9[c] is supported by the disclosure in paragraph 131. We note that Patent Owner appears to have embraced such claim scope by

changing the proposed substitute claims to remove limitation to a particular calculation and asserting that the broader claim language is supported by paragraphs 129–131. *See* MTA 16–17 (citing ¶¶ 129–131 and asserting that portion of the Specification “teaches the calculation of four chroma motion vectors based on four luma motion vectors”).

The parties dispute a further aspect of Patent Owner’s asserted support, in which Patent Owner cites but does not discuss paragraphs 140–141. *Compare* MTA 14 (limitation 9[c]), *with id.* at 16–17.

The Specification states that, “besides processing by averaging, processing shown in the next [Equation] (12), for example, may be performed for $f()$ in the above-described [Equation] (8).” Ex. 2015 ¶ 140. The Specification gives an example of this non-averaging approach as Equation (12), reproduced below:

$$mv_{ci} = \frac{mv_i + 1}{2} ; i=0, \dots, 3 \quad \dots(12)$$

Id. ¶ 141. Equation (12) indicates that four color-difference motion vectors are calculated by applying the equation to each of the four luminance motion vectors (“the motion vector information mv_0 , mv_1 , mv_2 , mv_3 , corresponding to the four luminance signal blocks”). *Id.*

Petitioner argues that paragraphs 140–141 fail to support limitation 9[c] because “they describe a method to calculate a scalar quantity, not a vector,” whereas the limitation requires calculation of a vector quantity. MTA Opp. 6–7; MTA Sur-Reply 6–8. Petitioner notes that Equation (12) calculates a scalar quantity because it includes the addition of a scalar quantity. MTA Opp. 7 (citing Ex. 1045 ¶ 15; MTA 21). Patent Owner responds that, just like Equation (9) discussed above, Equation (12)

refers to the horizontal and vertical components of a vector, calculated separately. MTA Reply 5–9.

We agree with Patent Owner. As discussed, the Specification discloses the approach captured in Equation (12) as an alternative to the approach captured in Equation (9). Ex. 2015 ¶ 140 (“Also, besides processing by averaging, processing shown in the next [Equation] (12), for example, may be performed for $f()$ in the above-described [Equation] (8).”). We agree with Patent Owner also that a skilled artisan would read paragraphs 140–141 and understand that “the motion vector information mv_c is calculated at the color difference motion vector generating unit 92 for each of the horizontal component and vertical component” as the Specification discloses in conjunction with Equation (9). Ex. 2015 ¶ 131; *see also id.* ¶ 104 (“Note that, in reality, processing is independently performed as to each of the components in the horizontal direction and vertical direction of the motion vector information.”). Accordingly, Equation (12) reflects scalar components of a motion vector, consistent with other disclosures in the Specification.

Petitioner argues additionally that Equation (12) does not support limitation 9[c] because the limitation requires calculating four motion vectors such that each is calculated based on four motion vectors. MTA Opp. 3 (“This limitation requires calculating **four** chroma motion vectors, where each chroma motion vector is calculated based on **four** motion vectors of respective luma blocks.”), 7 (“[E]ach scalar output mv_{ci} of equation 12 is not based on the four luma motion vectors mv_0 , mv_1 , mv_2 , **and** mv_3 , as limitation 9[c] further requires.”); MTA Sur-Reply 9–10. Patent Owner disputes that construction, arguing that the limitation requires that

four motion vectors— mv_0 , mv_1 , mv_2 , and mv_3 —be used to calculate the claimed “four chroma motion vectors,” not that the four inputs be used to calculate *each* of the four motion vectors. MTA Reply 11. We agree with Patent Owner that Petitioner’s construction would unduly restrict the claims.

The claim language is not as specific as Petitioner asserts. Rather, it recites: “calculate four chroma motion vectors, mv_{c0} , mv_{c1} , mv_{c2} , and mv_{c3} , based on mv_0 , mv_1 , mv_2 , and mv_3 .” Notably, it does not require calculating *each* of the four chroma motion vectors based on all four luma motion vectors. Rather, it treats the “based on” requirement as applying to the “four chroma motion vectors” as a unit. Thus, we do not read proposed substitute claim 9 as *requiring* four luma motion vectors be used to calculate each of four chroma motion vectors.¹⁰ And that understanding is consistent with the Specification, as discussed above.

Finally, Petitioner argues that Patent Owner provides only a string citation to show written-description support, without including adequate explanation for how Patent Owner believes the cited paragraphs provide support. MTA Sur-Reply 2–4; *see also* MTA Opp. 6 (“The RMTA does not explain how paragraphs 140-141 provide written support to limitation 9[c] (RMTA, 16-17). Dr. Richardson’s declaration only has a passing reference to paragraphs 140-141 . . .”). In this proceeding, where Patent Owner cited two contiguous portions totaling five paragraphs, and where those

¹⁰ Significantly, however, we also do not agree with Patent Owner’s assertion that we should read the claim as including the word “respectively,” such that each chroma motion vector is calculated from exactly one luma motion vector. *See* Tr. 73:1–74:1. Patent Owner’s argument in that regard attempts to limit the claim to Equation 12 without a basis in the claim language.

paragraphs directly address the limitation at issue, we are satisfied that Patent Owner met its initial burden. To be clear, we do not establish or follow a set threshold to determine whether Patent Owner satisfied its burden in the Revised Contingent Motion to Amend. Rather, we consider whether Patent Owner reasonably asserted support such that Petitioner could respond. Petitioner raised its arguments regarding limitation 9[c] in opposition, and we conclude that Patent Owner was entitled to respond to those arguments. In its Reply to Petitioner's Opposition, Patent Owner does not rely on additional paragraphs from the Specification beyond the five cited in the Revised Contingent Motion to Amend. Thus, we also do not agree with Petitioner that Patent Owner has raised impermissible new arguments in its Reply. *See* MTA Sur-Reply 5.

Having reviewed the record in full, we are persuaded that Patent Owner adequately demonstrates written-description support for limitation 9[c] and, thus, that the limitation does not introduce new matter.

b. 9[f], 9[l] – selecting a motion vector

Limitation 9[f] requires circuitry configured to “select a first motion vector as mv_{cb} from mv_{c0} , mv_{c1} , mv_{c2} , and mv_{c3} , wherein mv_{cb} is a motion vector for the first chroma block”; limitation 9[l] applies that same requirement to the second chroma block, such that mv_{cr} is selected from the same set of four calculated chroma motion vectors. Patent Owner identifies paragraphs in the original application that it relies on for written-description support of limitations 9[f] and 9[l]. MTA 14 (citing Ex. 2015 ¶¶ 136, 140–142), 18.

In Petitioner's view, limitations 9[f] and 9[l] lack adequate support because of the mismatch between calculating a scalar quantity and selecting

a vector quantity. MTA Opp. 8–9. This argument follows Petitioner’s argument regarding limitation 9[c], discussed above. That is, once we accept that a skilled artisan would read paragraphs 140–141 and understand to apply Equation 12 in a piecewise fashion—to the horizontal and vertical components of a vector separately—then, in practice, Equation 12 produces a vector quantity. Thus, there is no mismatch between the calculated chroma motion vectors and the requirement to select a motion vector.

Perhaps more significantly, the claim language plainly requires calculating and selecting vector quantities (“calculate four chroma motion vectors, mv_{c0} , mv_{c1} , mv_{c2} , and mv_{c3} . . . select a first motion vector as mv_{cb} from mv_{c0} , mv_{c1} , mv_{c2} , and mv_{c3} ”). And paragraph 142 plainly describes selecting a vector quantity. Ex. 2015 ¶ 142 (“[T]he color difference motion vector generating unit 92 selects from the motion vectors for the corresponding luminance signal blocks that which yields the highest encoding efficiency as to color difference signals”). Thus, the Specification supports the language of limitations 9[f] and 9[l].

Having reviewed the record in full, we are persuaded that Patent Owner adequately demonstrates written-description support for limitations 9[f] and 9[l] and, thus, that the limitations do not introduce new matter.

c. 9[g], 9[m] – generating flags for the MV vertical and horizontal directions

Limitation 9[g] requires circuitry configured to “generate a first flag indicating the selected first motion vector for the first chroma block”; limitation 9[m] applies that same requirement to the second chroma block. Patent Owner identifies paragraphs in the original application that it relies on

for written-description support of limitations 9[g] and 9[m]. MTA 14–15 (citing Ex. 2015 ¶¶ 140–142); *see also id.* at 19 (citing Ex. 2027 ¶¶ 105–106).

Petitioner argues that limitations 9[g] and 9[m] lack adequate support because the flags discussed in the Specification “indicate scalar quantities, not vectors.” MTA Opp. 10. As with the foregoing dispute about limitations 9[f] and 9[l], this dispute turns on our resolution of Petitioner’s argument regarding limitation 9[c], discussed above. We conclude that the Specification supports applying the approach described in paragraphs 140–142 such that vectors are calculated in a piecewise fashion to obtain a vector’s horizontal and vertical components. *See* Ex. 2015 ¶ 142 (“[T]he color difference motion vector generating unit 92 generates a flag relating to which i was used from i_ = 0 through 3, and supplies this to the lossless encoding unit 66, so as to be added to the header of the compressed image to be transmitted to the decoding side.”); *see also id.* ¶ 143 (“The flag may be transmitted separately for the horizontal direction and vertical direction, or a single flag may be transmitted for both the horizontal direction and vertical direction.”).

Having reviewed the record in full, we are persuaded that Patent Owner adequately demonstrates written-description support for limitations 9[g] and 9[m], and thus that the limitations do not introduce new matter.

D. UNPATENTABILITY OF THE PROPOSED SUBSTITUTE CLAIMS

Petitioner argues that the proposed substitute claims are unpatentable both because they include limitations that render the claim scope indefinite

(MTA Opp. 11–15) and also because they are rendered obvious by the prior art (*id.* at 15–25).

1. Indefiniteness

Petitioner asserts that performing the limitation “calculating four chroma motion vectors” in accordance with approach described in paragraphs 129–131 (Equations (8) or (9)) produces a single chroma motion vector using the four luma motion vectors as inputs. MTA Opp. 14. As discussed above, Patent Owner relies on those paragraphs to assert that the Specification supports the claims. MTA 16–17; *see supra* at 24–27. As also discussed above, we agree with Petitioner that calculating the claimed chroma motion vectors as described in paragraphs 131–132 would produce four identical motion vectors. *See supra* at 26.

Petitioner argues that a skilled artisan would not be able to select a chroma motion vector from four identical options because “[s]uch a task is clearly ambiguous and would be unclear how to perform.” MTA Opp. 14 (citing Ex. 1045 ¶¶ 34, 35); *see Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014) (“[A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.”); *In re Packard*, 751 F.3d 1307, 1311 (Fed. Cir. 2014) (holding a claim is indefinite when it contains words or phrases whose meaning is “unclear in describing and defining the claimed invention”). As Petitioner notes, Patent Owner does not respond to this argument. MTA Sur-Reply 10. We agree with Petitioner that the claim is indefinite. By encompassing a calculation that produces four identical results, the claim language presents a case where a skilled artisan would

have no criterion on which to select one of the four calculated motion vectors. Moreover, Patent Owner has identified no record evidence to support that a skilled artisan would understand how to apply the claim language to a set of four identical results. In this regard, we credit the testimony of Petitioner's declarant. Ex. 1045 ¶¶ 34–35.

Having reviewed the full record, we conclude that Petitioner has shown proposed substitute claim 9 is indefinite and, therefore, unpatentable. Because all proposed substitute claims suffer from the same problem, we reach the same conclusion for all the proposed substitute claims. Accordingly, we deny Patent Owner's Revised Contingent Motion to Amend.¹¹

2. Obviousness over H.263, Bjontegaard II, Song, and Holcomb

Petitioner argues additionally that the proposed substitute claims would have been obvious over a combination of H.263, Bjontegaard II, Song, and Holcomb.¹² MTA Opp. 15–25. Although we need not address this obviousness contention, having determined the claims unpatentable as indefinite, we conclude that Petitioner's assertions fall short in one regard.¹³

Petitioner relies on Holcomb's Figure 40, which is reproduced below:

¹¹ Having determined the claims unpatentable on the basis discussed, we do not address Petitioner's other argument for indefiniteness. *See* MTA Opp. 12–13.

¹² U.S. Pat. No. 7,317,839, issued Jan. 8, 2008 (Ex. 1040).

¹³ The indefinite claim limitation discussed above does not impact our obviousness analysis, which is limited to Petitioner's failure to show how the prior art teaches different claimed subject matter.

Figure 40

```
MotionVector SelectChromaMVFrom4MV ()
{
    MotionVector SelectedMV;

    if the corresponding MB used 1 MV
    then use that MV
    else    // 4 MV's to pick from
    {

        Count the number of same field and opposite field MV's

        if (OppFieldCount > SameFieldCount)
        then use only the opposite field MV's in next step
        // i.e. opposite is the chosen polarity
        else use only the same field MV's in the next step
        // i.e. same is the chosen polarity

        Count the number of MV's of the chosen polarity
        if (Chosen MVs = 3) {
            SelectedMV = Median of 3 of the chosen MV's
        }
        else if (Chosen MVs = 2) {
            SelectedMV = Average of the chosen MV's
        }
        else if (Chosen MVs = 1) {
            SelectedMV = The chosen MV
        }
        else { // all 4 are of the chosen polarity
            SelectedMV = Median of 4 of the chosen MV's
        }
    }

    return (SelectedMV);
}
```

Ex. 1040, Fig. 40; *see* MTA Opp. 18. Figure 40 depicts pseudocode for selecting luminance motion vectors that contribute to chroma motion vectors for motion-compensated macroblocks. Ex. 1040, 19:39–41. Figure 40 presents a function, `SelectChromaMVFrom4MV`, which returns a motion vector based on characteristics of the luma motion vectors. *Id.* at Fig. 40, 49:61–50:23. As part of determining what motion vector to return, the

function in Figure 40 uses a variable “Chosen MVs,” which is determined by “Count[ing] the number of MV’s of the chosen polarity.” *Id.* at Fig. 40.

Limitations 9[g], 9[h], and 9[i] together require that the claimed device “generate a first flag indicating the selected first motion vector for the first chroma block” and then transmit that flag for the horizontal and vertical directions separately. Petitioner contends that H.263 and Holcomb together disclose the limitations. MTA Opp. 22–23. In particular, Petitioner asserts that Holcomb’s variable “Chosen MVs” “indicates which of the four first chroma motion vectors is returned by function ‘SelectChromaMVFrom4MV’” (*id.* at 22) and that “the corresponding values of the first flag, ‘Chosen MVs,’ must also be transmitted for each direction, so that the decoder is informed about the chosen polarity of the luma motion vectors” (*id.* at 24).

Patent Owner challenges Petitioner’s contentions, arguing that Petitioner fails to show a flag that identifies a motion vector’s index. MTA Reply 12. We agree with Patent Owner that Petitioner fails to identify an adequate disclosure in Holcomb. We need not agree that the claimed flag must identify a motion vector’s index because Petitioner’s contentions fail to adequately support why an internal variable (Chosen MVs) would be transmitted, and we do not see how Figure 40’s pseudocode provides support for such a conclusion.

Having reviewed the record, we conclude that Petitioner has not shown that proposed substitute claim 9 would have been obvious over H.263, Bjontegaard II, Song, and Holcomb. Because Petitioner relies on the same aspect of Holcomb for the parallel limitations in the other proposed substitute claims (MTA Opp. 27), for the same reason we conclude that

Petitioner has not shown any of the proposed substitute claims would have been obvious.

IV. CONCLUSION¹⁴

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–4	102(b)	Bjontegaard		1–4
5–8	103	Bjontegaard and Song		5–8
1, 2, 5–8	103	H.263, Bjontegaard II, Song	1, 2, 5–8	
3, 4	103	H.263, Bjontegaard II	3, 4	
Overall Outcome			1–8	

Revised Motion to Amend Outcome	Claims
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	9–16
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	9–16
Substitute Claims: Not Reached	

¹⁴ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

V. ORDER

Upon consideration of the record, it is:

ORDERED that claims 1–8 of U.S. Patent No. 9,979,981 B2 are unpatentable;

FURTHER ORDERED that Patent Owner’s Revised Contingent Motion to Amend is denied; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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