

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NETFLIX INC. and HULU, LLC,
Petitioner,

v.

DIVX, LLC,
Patent Owner.

IPR2020-00052
Patent 8,139,651 B2

Before MONICA S. ULLAGADDI, SCOTT B. HOWARD, and
IFTIKHAR AHMED, *Administrative Patent Judges*.

AHMED, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining No Challenged Claims Unpatentable
Granting In Part Petitioner's Motion to Exclude
Granting In Part Patent Owner's Motion to Exclude
35 U.S.C. § 318(a)

I. INTRODUCTION

This is a Final Written Decision in an *inter partes* review challenging the patentability claims 1, 2, 4, and 17–19 (the “challenged claims”) of U.S. Patent No. 8,139,651 B2 (Ex. 1001, “the ’651 patent”). We have jurisdiction under 35 U.S.C. § 6.

Petitioner has the burden of proving unpatentability of the challenged claims by a preponderance of the evidence. 35 U.S.C. § 316(e). Having reviewed the parties’ arguments and supporting evidence, for the reasons discussed below, we find that Petitioner has not demonstrated by a preponderance of the evidence that the challenged claims are unpatentable. Additionally, for the reasons discussed below, we grant in part, deny in part, and dismiss in part the parties’ motions to exclude evidence (Papers 72, 73).

II. BACKGROUND

A. Procedural History

Netflix Inc. and Hulu, LLC (collectively “Petitioner”) requested an *inter partes* review of the challenged claims of the ’651 patent. Paper 1 (“Petition” or “Pet.”). In view of the preliminary record, we concluded that Petitioner satisfied the burden, under 35 U.S.C. § 314(a), to show that there was a reasonable likelihood that Petitioner would prevail with respect to at least one of the challenged claims. Accordingly, we instituted an *inter partes* review of all the challenged claims on the asserted grounds. Paper 31 (“Inst. Dec.”); Paper 42 (public version).

After institution, DivX, LLC (“Patent Owner”) filed a Response. Paper 54 (“PO Resp.”). Petitioner filed a Corrected Reply. Paper 67¹ (“Pet.

¹ Petitioner’s original Reply (Paper 64) was expunged on request of the parties.

Reply”). Patent Owner filed a Sur-reply. Paper 71 (“Sur-reply”). On February 1, 2021, we held an oral hearing, the transcript of which is in the record. Paper 81 (“Tr.”).

B. Related Proceedings

The ’651 patent is asserted in *DivX, LLC v. Netflix, Inc.*, No. 2:19-cv-01602 (C.D. Cal.), and *DivX, LLC v. Hulu, LLC*, No. 2:19-cv-01606 (C.D. Cal.). Pet. 87; Paper 5, 1. Unified Patents Inc. filed an *inter partes* review petition relating to the ’651 patent on which the Board entered judgment on February 8, 2021. IPR2019-01379 (“Unified IPR”), Paper 52.

C. The ’651 Patent

The ’651 patent, titled “Video Deblocking Filter,” was filed on May 26, 2010, and claims priority to a provisional application filed on September 20, 2004. Ex. 1001, codes (54), (22), (60).

The ’651 patent concerns a method for “deblocking” a reconstructed video frame. *Id.* at code (57). “Digital video sequences are composed of frames of pixels, where the characteristics of the pixels are represented using digital information.” *Id.* at 1:17–19. “Encoding schemes, such as the scheme described in the MPEG-4 standard, can include video compression algorithms that divide frames into blocks of pixels and use the characteristics of the pixels within the blocks to encode the blocks of the video frame,”² resulting in “artifacts at block boundaries when an encoded video frame is reconstructed.” *Id.* at 1:25–31. Those artifacts can be removed from a reconstructed image by “applying a deblocking filter to pixels adjacent block boundaries.” *Id.* at 1:32–34.

² The MPEG-4 standard was developed by the Motion Picture Experts Group. *Id.* at 1:35–36.

Figure 1 of the '651 patent is reproduced below.

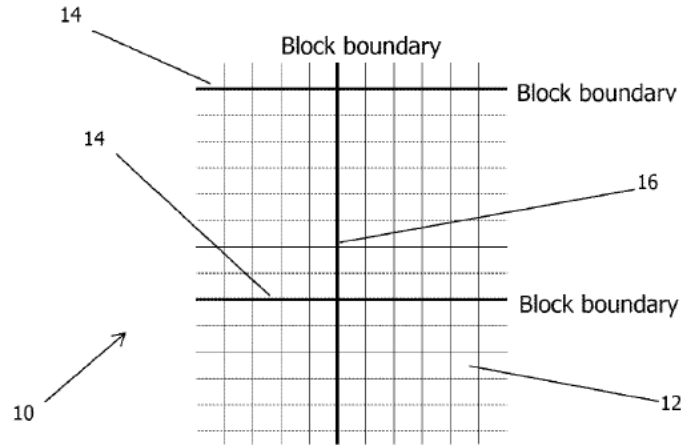


FIG. 1

Figure 1, above, illustrates a portion of reconstructed video frame 10, made up of a number of pixels 12. *Id.* at 8:6–8. Each block is made up of an 8 x 8 area of pixels, and the deblocking filter can be applied to the pixels both along horizontal boundaries 14 and vertical boundaries 16 between the reconstructed blocks. *Id.*

Figure 2 of the '651 patent is reproduced below.

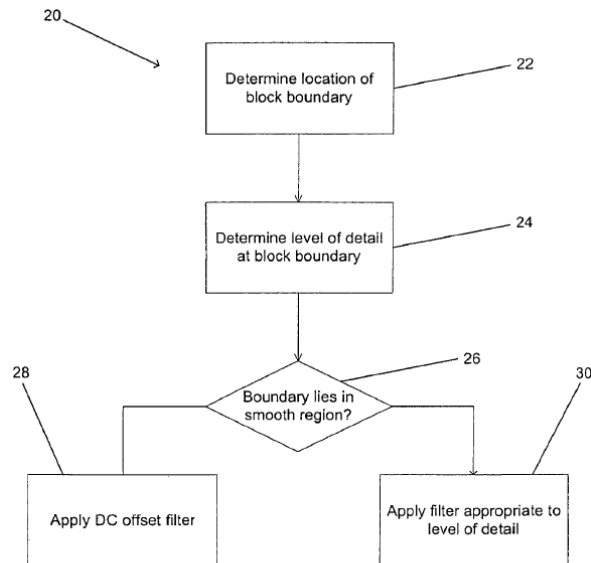


FIG. 2

Figure 2, above, illustrates the steps for applying a deblocking filter by “identifying (22) the location[s] of horizontal and vertical block boundaries,” determining (24) “[t]he level of detail of the region of the video frame in which the block boundary is located,” and applying either dc offset filter (28) or another filter appropriate to level of detail (30) to pixels adjacent the boundary depending on a determination (26) of whether the boundary lies in a smooth region or in a region with a higher level of detail. *Id.* at 8:20–31. A deblocking filter can be applied to pixel chrominance and/or to pixel luminance. *Id.* at 8:34–37.

D. Challenged Claims

Petitioner challenges claims 1, 2, 4, and 17–19. Challenged claim 1 is the only independent claim and is reproduced below.

1. A method of deblocking a reconstructed video frame, comprising:
 - identifying a boundary between two blocks of the reconstructed video frame;
 - determining the level of detail of the reconstructed video frame across a region in which the block boundary is located, wherein the region includes pixels from multiple rows and multiple columns of the reconstructed video frame that encompass pixels immediately adjacent to at least two sides of the block boundary and includes at least one pixel that is not immediately adjacent to the block boundary;
 - selecting a filter to apply to predetermined pixels on either side of the block boundary based upon the determined level of detail.

Ex. 1001, 13:7–22.

E. Prior Art and Instituted Grounds of Unpatentability

We instituted trial based on the following ground of unpatentability:

Claims Challenged	35 U.S.C. § ³	Reference(s)/Basis
1, 17, 18	102(b)	Vehviläinen ⁴
1, 17–19	103(a)	Vehviläinen
1, 2, 4, 17–19	103(a)	Vehviläinen, Kadono ⁵

Inst. Dec. 57–58; Pet. 9, 19–86.

In support of its patentability challenges, Petitioner relies on the declaration testimony of Dr. Victor Michael Bove, Jr. *See* Ex. 1003. Patent Owner relies on the declaration testimony of Dr. Chandrajit Bajaj. *See* Ex. 2050.

III. ANALYSIS

A. Principles of Law

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never

³ Because the application leading to the ’651 patent was filed before March 16, 2013, patentability is governed by the versions of 35 U.S.C. §§ 102 and 103 preceding the Leahy-Smith America Invents Act (“AIA”), Pub L. No. 112–29, 125 Stat. 284 (2011).

⁴ U.S. Patent No. 6,504,873 B1, issued Jan. 7, 2003 (Ex. 1004, “Vehviläinen”).

⁵ U.S. Patent Appl. Pub. No. 2004/0076237 A1, published Apr. 22, 2004 (Ex. 1005, “Kadono”).

shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008); *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). Although the elements must be arranged or combined in the *same way* as in the claim, “the reference need not satisfy an *ipsissimis verbis* test,” i.e., identity of terminology is not required. *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009); *accord In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990). Further, to be anticipating, a prior art reference must be enabling and must describe the claimed invention sufficiently to have placed it in possession of a person of ordinary skill in the field of the invention. *Helifix Ltd. v. Blok-Lok, Ltd.*, 208 F.3d 1339, 1346 (Fed. Cir. 2000); *In re Paulsen*, 30 F.3d 1475, 1479 (Fed. Cir. 1994).

As set forth in 35 U.S.C. § 103(a),

[a] patent may not be obtained . . . 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.

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 ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

An obviousness determination requires finding “a motivation to combine accompanied by a reasonable expectation of achieving what is claimed in the patent-at-issue.” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016). Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016). Instead, Petitioner must articulate a reason why a person of ordinary skill in the art would have combined the prior art references. *In re NuVasive*, 842 F.3d 1376, 1382 (Fed. Cir. 2016).

To prevail in its challenges to Patent Owner’s claims, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d) (2019).

Petitioner asserts that Vehviläinen anticipates certain claims of the ’651 patent, and that Vehviläinen, either alone or in combination with Kadono, would have rendered the subject matter of certain claims of the ’651 patent obvious to one of ordinary skill in the art at the time of the invention. Pet. 19–86. We analyze the asserted grounds of unpatentability in accordance with these principles to determine whether Petitioner has met its burden in establishing unpatentability of the challenged claims at trial.

B. Level of Ordinary Skill in the Art

We review Petitioner’s asserted obviousness grounds in view of the understanding of a person of ordinary skill in the art at the time of the invention. *Graham*, 383 U.S. at 17. Petitioner proposes that a person of ordinary skill in the art “would have had a bachelor’s degree in electrical engineering, computer engineering, computer science, or a related subject, and at least two to three years of work experience in image and/or video

processing, including previous work on the development and application of video compression and decompression methods, in particular deblocking techniques.” Pet. 13 (citing Ex. 1003 ¶¶ 59–60). In our institution decision, we adopted Petitioner’s proposed level without the qualifier “at least” as to the years of work experience. Inst. Dec. 19–20.

Patent Owner argues that “[t]he proper level is that of a Bachelor’s degree holder with 2–3 years of experience in video compression—not experience with deblocking techniques in particular.” PO Resp. 12. According to Patent Owner, deblocking is merely a specialized technique in the video compression field, not a separate field of its own. *Id.* at 12–13 (citing Ex. 1001, 1:15–16; Ex. 2050 ¶¶ 26–28). Patent Owner contends that while video compression is a widely recognized field, it would not have been ordinary for persons of this education and experience level in video compression to have had experience specifically in deblocking compressed video and related techniques. *Id.* at 13–14 (citing Ex. 2081; Ex. 2046; Ex. 2047; Ex. 2052; Ex. 2053; Ex. 2050 ¶¶ 29–31).

Petitioner responds that a person of ordinary skill in the art (“POSITA”) is presumed to be aware of all pertinent prior art, that Dr. Bajaj admitted that a person of ordinary skill in the art “would be knowledgeable about the blocking methods . . . because it was also adopted by the MPEG-4 standard at that time,” and that “deblocking is necessarily part of the decoding.” Pet. Reply 17 (citing Ex. 1017, 45:19–46:2, 51:19–52:14, 44:19–25, 46:9–47:5, 151:10–152:25, 144:20–145:18). Petitioner therefore contends that deblocking is not a niche field.

Patent Owner responds that even assuming Petitioner’s assertions are correct, that still does not address the point that a person of ordinary skill in

the art would not have been ordinarily able to develop a new deblocking scheme. Sur-reply 19.

We are not persuaded that the level of ordinary skill in the art requires previous work experience in development of deblocking techniques. The person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention. *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field. *Id.* In a given case, one or more factors may predominate. *Id.*

The '651 patent relates generally to video compression. Ex. 1001, 1:15. Additionally, the prior art relied upon by the examiner during prosecution of the '651 patent also relates generally to video compression, not just to deblocking techniques. *See* Ex. 1002, 73–81; *see also* Ex. 1010, codes (54), (57) (the Kim reference cited by the examiner, titled “Reducing Blocking and Ringing Artifacts in Low Bit-Rate [Video] Coding”).

Although we agree with the parties that deblocking would have been part of decoding techniques related to video compression and that a person of ordinary skill in the art would have been knowledgeable of deblocking, we are not persuaded that work experience in those specific techniques is necessary.⁶ As long as a person has had work experience in the development and application of video compression and decompression

⁶ Notably, Petitioner discusses other related concepts of video processing that a POSITA would have been familiar with but does not include those in its proposed definition of the level of ordinary skill. Pet. 13–14.

methods and Petitioner’s proposed educational background in an electrical/computer engineering or science discipline, that would sufficiently prepare a person for work in the art pertaining to the ’651 patent. Accordingly, the level of ordinary skill in the art of the ’651 patent is that of a person having a bachelor’s degree in electrical engineering, computer engineering, computer science, or a related subject, and two to three years of work experience in image and/or video processing, including previous work on the development and application of video compression and decompression methods. Our determination is consistent with the Board’s determination of the level of ordinary skill for the ’651 patent in the Unified IPR. *See* IPR2019-01379, Paper 52, 9–10.

We note, though, that we do not find any instance in which the differences between the parties’ respective descriptions of the level of ordinary skill in the art impacts our findings or conclusions in this case. *See infra* §§ III.E–III.F. The parties also do not identify any specific dispute that is impacted by the differences between the parties’ respective descriptions. *See, e.g.*, PO Resp. 14 (arguing that “the Petition fails regardless of which level of ordinary skill is adopted by the Board”).

C. *Claim Construction*

We apply the same claim construction standard that would be used in a civil action under 35 U.S.C. § 282(b), following the standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b) (2019). In applying this standard, we generally give claim terms their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art, at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13.

In our institution decision, we construed the term “level of detail” as “level of variation in visual elements across adjacent pixels.” Inst. Dec. 20–22. Patent Owner asserts that the Board’s construction is correct, supported by the specification and the testimony of both parties’ experts. PO Resp. 15–16 (citing Ex. 1001, 1:52–57, Ex. 2050 ¶¶ 53–57; Ex. 2049, 69:6–12). Patent Owner contends that the ’651 patent “expressly defines the claimed ‘detail’ in this context: The term ‘detail’ is typically used to describe visual elements of a video frame that vary significantly across adjacent pixels.” *Id.* at 15 (quoting Ex. 1001, 1:55–57).

Petitioner does not disagree with our preliminary construction. Pet. Reply 5 (“This is consistent with the Petition and Dr. Bove’s analysis.”). Petitioner, however, argues that the manner in which Patent Owner applies the construction improperly narrows the claims to the sum of absolute differences (“SAD”) formula disclosed in the specification and claimed. *Id.* at 7–8.

For the reasons discussed in our institution decision (Inst. Dec. 20–22), which we incorporate by reference, we maintain our prior construction of the term “level of detail” as “level of variation in visual elements across adjacent pixels.” As the parties point out, the Specification defines the term “detail” consistent with its ordinary meaning as the amount of variation in visual elements of a video frame across adjacent pixels. Ex. 1001, 1:55–57; PO Resp. 15; Pet 16. The Specification provides examples of calculating the level of detail using chrominance or luminance values. *See, e.g., id.* at 2:5–7, 3:56–57, 4:1–2. The Specification further supports that the calculation of the variation is done for *adjacent* pixels, and does not use the term in a manner inconsistent with the typical understanding. *See e.g., id.* at 3:34–36,

3:41–42, 4:32–33. We therefore maintain that the meaning of “level of detail” is “level of variation in visual elements across adjacent pixels.”

We address Petitioner’s arguments regarding Patent Owner’s application of the construction to the prior art as part of our obviousness analysis. *See infra* § III.E.1.a.4.

D. Overview of the Asserted Prior Art

1. Vehviläinen (Ex. 1004)

Vehviläinen relates to a method of filtering compressed video “based on the amount of activity inside the adjacent video blocks and the activity at the boundary between the adjacent video blocks.” Ex. 1004, codes (54), (57). Vehviläinen discloses that

If there is [a] lot of activity inside two adjacent video blocks, and at the boundary between them, that part of video frame most probably includes important information, and filtering at that area should be outlined to the minimum or completely omitted. On the other hand, if there is no or very little (probably just noise) activity in that area, the area is supposed to be “smooth” (e.g., a wall of one color), and an efficient filter can be used for a relatively large area to minimize the visible blocking effect, which is as its worst just at the “smooth” areas.

Id. at 2:46–55.

Figure 5A of Vehviläinen is reproduced below.

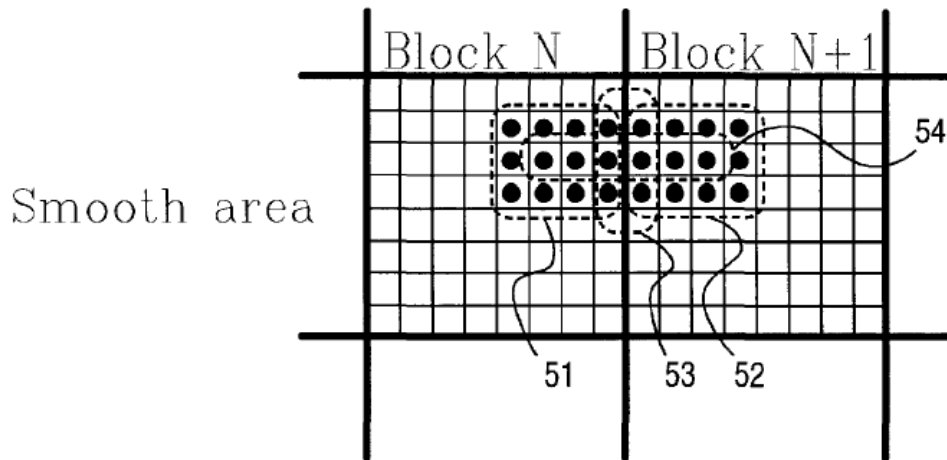


Figure 5A

Figure 5A, above, illustrates a pixel area that is used for calculation of picture activity within an area of the video frame. *Id.* at 4:11–14.

Vehviläinen discloses that calculation of variance inside the block N is done using the 12 video pixels (51) marked with black circles, using equation (4), which follows:

$$S_{IN} = x_{max} - x_{min}$$

Equation (4) uses the difference between the largest and smallest pixel value within a given set of pixels. *Id.* at 10:44–55. It is an estimation of Vehviläinen's variance calculation method provided in equation (3), which follows:

$$S = \frac{1}{(N - 1)} \sum_{i=1}^N (x_i - \bar{x})^2$$

Vehviläinen also discloses a selection process for the filtering method to be used based on whether a given area is smooth, moderate, or high activity.

Figure 6 of Vehviläinen is reproduced below.

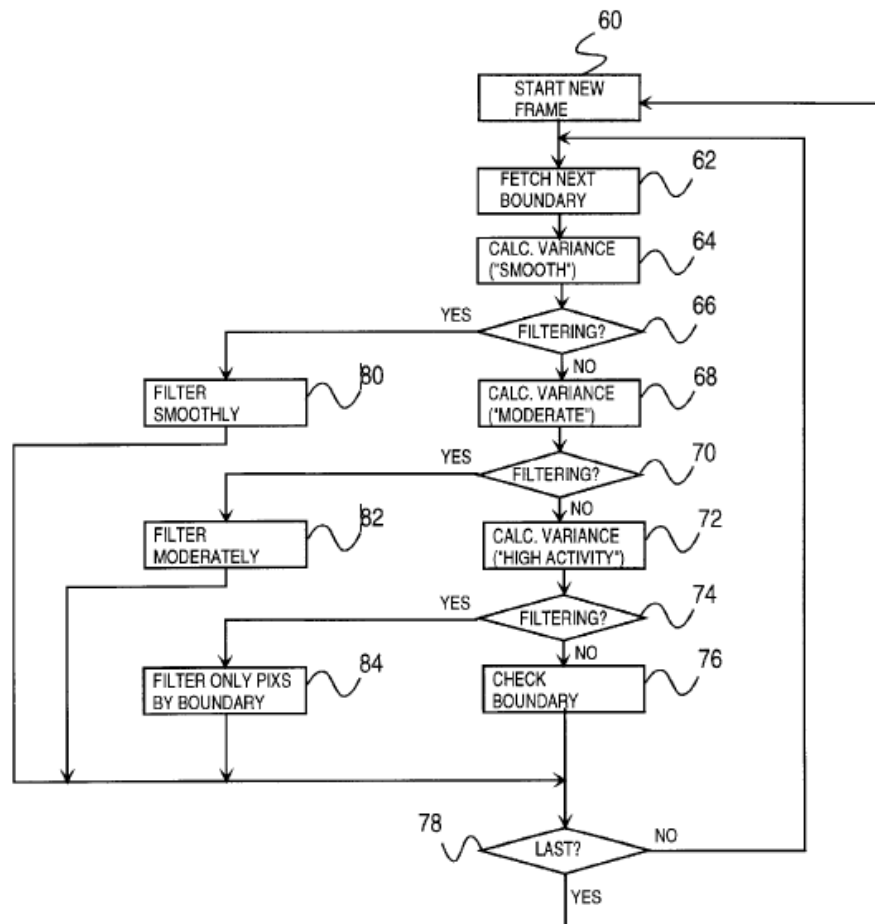


Figure 6

Figure 6, above, illustrates a flowchart for the filter selection process of Vehviläinen, including conditional steps 66, 70, and 74 that determine the filter to be applied in steps 80, 82, and 84. *Id.* at 11:4–12:6. Vehviläinen uses the same conditional equation for each of conditional steps 66, 70, and 74 to determine whether filtering is required at the boundary between adjacent video blocks. *Id.* at 9:51–53, 10:5–9. This conditional equation, labeled “equation (2),” is reproduced below:

$$IF \left[\begin{array}{c} activity_{IN} < activity_{EDGE} + MQUANT \\ AND \\ activity_{IN} < THRESHOLD_{IN} \end{array} \right] = TRUE$$

In equation (2) above, “activity_{IN} is a variance inside the block, activity_{EDGE} is a variance over the edge between adjacent blocks, THRESHOLD_{IN} is a threshold value, [and] MQUANT is a quantization value for the block under processing.” *Id.* at 9:51–66, 10:6–9.

2. *Kadono (Ex. 1005)*

Kadono discloses methods related to selectively applying a deblocking filter to compressed video by first determining whether deblocking is necessary. Ex. 1005, code (57). In one embodiment, Kadono discloses comparing pixel values for groups of pixels that are symmetrically located on left and right sides of the block boundary. *Id.* ¶ 204. Figure 19 of Kadono is reproduced below.

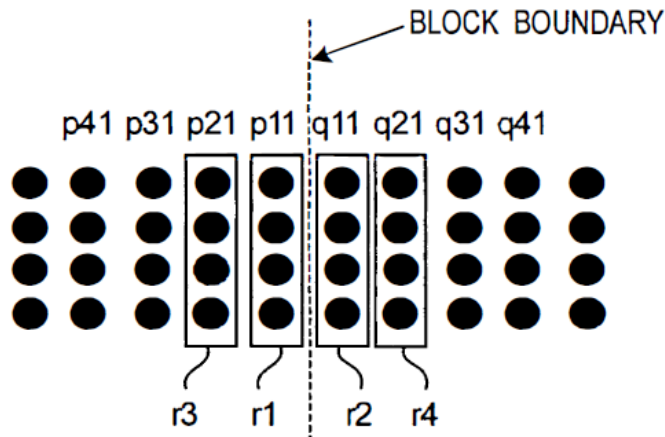


Figure 19, above, illustrates groups of four pixels r1 and r2 that Kadono’s process compares to determine the level of deblocking to be applied to the pixels on either side of the block boundary. *Id.*

Figure 6 of Kadono is reproduced below.

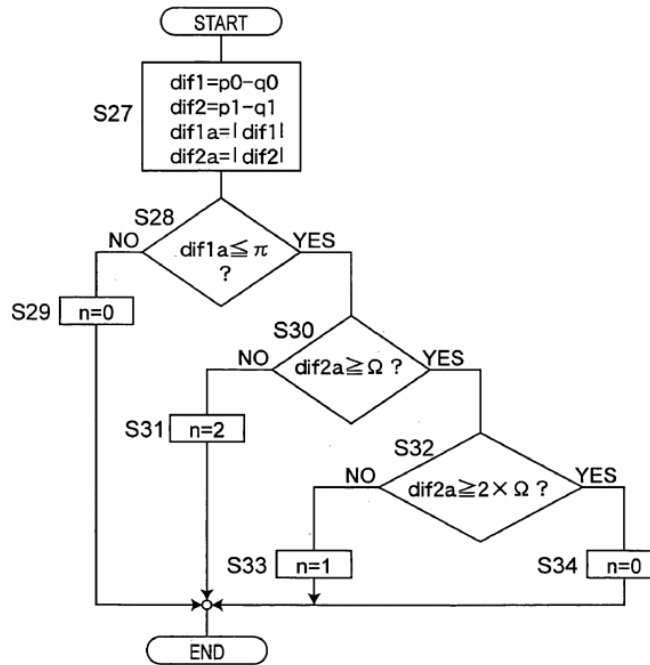


Figure 6, above, is a flowchart showing how the level of filtering to be applied to pixels is determined based on a comparison of the difference between pixel values on either side of a block boundary to a threshold value, Ω , according to one of Kadono's embodiments. *Id.* ¶¶ 120–129, Figs. 6, 8(b).

E. Anticipation and Obviousness based on Vehviläinen

Petitioner contends that claims 1, 17, and 18 are unpatentable as anticipated by or obvious over Vehviläinen. Pet. 19–49. Petitioner also contends that claim 19 is unpatentable as obvious over Vehviläinen. *Id.* at 49–52. For the reasons that follow, we are not persuaded that Petitioner has established by a preponderance of the evidence that these claims are unpatentable under §§ 102 or 103(a) in view of Vehviläinen.

1. Independent Claim 1

Patent Owner argues that Vehviläinen fails to teach or suggest the “determining the level of detail” limitation of independent claim 1. PO Resp. 14–22. We, therefore, begin our discussion with the parties’ arguments on this limitation.

a) “determining the level of detail of the reconstructed video frame across a region in which the block boundary is located, wherein the region includes pixels from multiple rows and multiple columns of the reconstructed video frame that encompass pixels immediately adjacent to at least two sides of the block boundary and includes at least one pixel that is not immediately adjacent to the block boundary;”

(1) The Petition

Petitioner contends that Vehviläinen’s calculation of activity_{IN} as a measure of variance for the pixels marked by dots in Figure 5A teaches determining the level of detail in a region of the reconstructed video frame where the block boundary is located. Pet. 33 (citing Ex. 1004, 9:50–67, 11:30–41, Fig. 5A; Ex. 1003 ¶ 113).⁷ Petitioner reproduces an annotated version of Vehviläinen’s Figure 5A (*id.* at 34), as shown below.

⁷ Petitioner presents the same contentions with respect to this limitation under both its anticipation and obviousness grounds based on Vehviläinen. Pet. 33–43. We therefore address these grounds together.

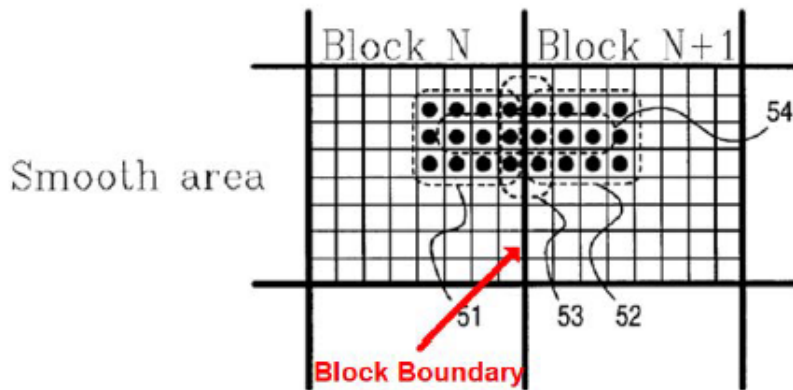


Figure 5A

(Annotations added)

Petitioner’s annotated Figure 5A of Vehviläinen, above, show an 8 x 3 pixel area 54, comprising *two* regions 51 and 52 on either side of a vertical block boundary, annotated in red, and a third 2 x 3 region 53 comprising pixels immediately adjacent to the block boundary. Pet. 33–34 (citing Ex. 1004, 10:1–15, 11:29–41, Fig. 5A; Ex. 1003 ¶ 114). Referring to Figure 5A, Petitioner argues that Vehviläinen analyzes the pixels marked by dots to determine if the block boundary lies in a “smooth area.” *Id.* According to Petitioner, Vehviläinen’s teaching “is mirrored by embodiments of the ’651 patent, which similarly analyze whether the block boundary is ‘located within very *smooth* regions of a video frame’ or whether it ‘lies in a region possessing a *high level of detail*,’” and “calculates the level of detail based on the level of variation across pixels in the region.” *Id.* (citing Ex. 1001, 1:45–63).

Petitioner contends that Vehviläinen’s “min-max approximation” of pixel variance “takes the difference between the largest and smallest pixel values in an area.” Pet. 35 (citing Ex. 1004, 9:51–67, 10:44–55; Ex. 1003 ¶ 115). Petitioner further contends that Vehviläinen teaches

calculating the variance of pixels on the left side of the block boundary, shown in Figure 5A as marked pixels (dots) in block N, labelled 51, then calculating the variance of pixels on the right side of the block boundary, shown as marked pixels in block N+1, labelled 52, and then averaging the two variance calculations into a single variance value ('activity_{IN}') for the area.

Id. (citing Ex. 1004, 11:29–46, 11:56–12:10, Fig. 5A; Ex. 1003 ¶ 115); *see also id.* (discussing also the numerical examples provided by Vehviläinen for each of those calculations). Petitioner further asserts that “[t]he variance at the boundary is called ‘activity_{EDGE}’ and ‘is calculated using formula (5)’ with the 6 pixels labelled (53).” *Id.* at 35–36. According to Petitioner, Vehviläinen teaches equation (2), which uses those variance parameters, activity_{IN} and activity_{EDGE}, together with THRESHOLD_{IN} and MQUANT values to determine whether to apply a smooth filter. *Id.* at 36. Petitioner asserts that calculations for the moderate and high activity areas are performed “in a similar manner.” *Id.* at 36 (citing Ex. 1004, 11:56–12:10, Figs. 5B–5C; Ex. 1003 ¶ 115). Petitioner thus argues that Vehviläinen teaches determining a level of detail (activity_{IN}) across a region (the dotted area in Figure 5A) that includes a block boundary (the center line in Figure 5A) by taking an average of the variance calculations in the region. *Id.* (citing Ex. 1004, 11:29–46; Ex. 1003 ¶ 116).

Petitioner further argues that a person of ordinary skill in the art would have found it obvious to apply Vehviläinen’s teaching of taking the average of the variance calculations for determining the level of detail of the region containing all marked pixels in Figure 5A. *Id.* (citing Ex. 1003 ¶ 116). Petitioner contends that doing so would have provided “a simple, efficient, and accurate method for determining the level of detail of the

region.” *Id.* Petitioner contends that it would have also been obvious for one of ordinary skill in the art to determine the level of detail for just the “smooth” area (the one shown in Figure 5A) and then select the smooth filter, if the area is smooth, or the high/moderate activity filter otherwise. Pet. 38, 39 (citing Ex. 1003 ¶ 120).

(2) *Patent Owner’s Response*

In response, Patent Owner argues that the Petition relies on an incorrect understanding of the claimed “level of detail,” and that “Vehviläinen’s variance calculation (or its approximation proxy) does not determine the level of change across adjacent pixels, as required under the proper construction of ‘level of detail.’” PO Resp. 16. As discussed above, Patent Owner contends that our preliminary construction of the term “is correct, supported by the specification and the testimony of both parties’ experts.” *Id.* at 15.

Patent Owner contends that Vehviläinen teaches *not* filtering adjacent pixels “in comparison with each other,” and discloses a process of choosing to apply filters consistent with that teaching. *Id.* at 16–17. Patent Owner asserts that Vehviläinen’s method “[r]educes the disappearance of the resolution in the picture in the filtering process according to the invention because the adjacent video pixels as such are not filtered in comparison with each other but are adjusted in comparison to the reference line.” *Id.* at 17 (quoting Ex. 1004, 2:41–45). Patent Owner annotates Figure 4 of Vehviläinen, reproduced below.

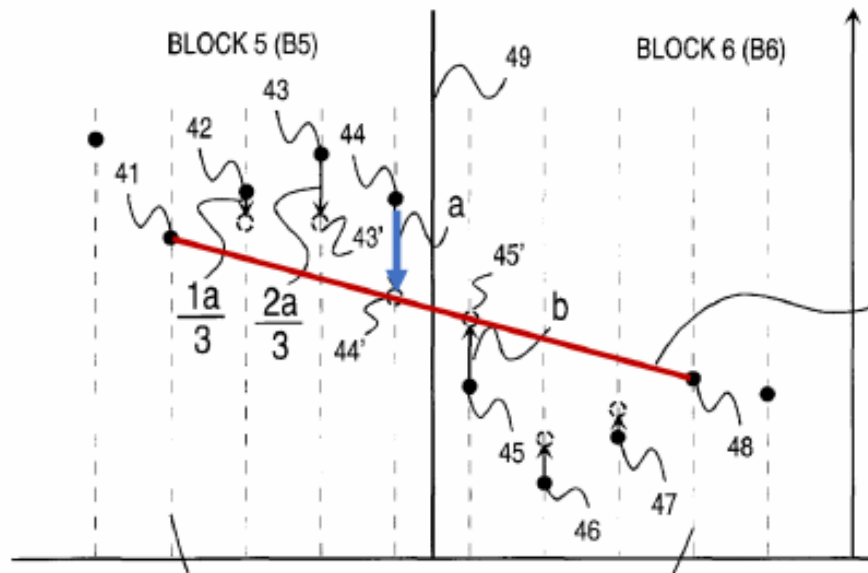


Figure 4, above, annotated by Patent Owner, shows the forwarding of the numerical values of each individual video pixel (shown in blue) towards the reference line (shown in red) at the boundary between the adjacent video blocks, when using smooth filtering mode. Ex. 1004, 4:8–10; PO Resp. 17–18 (citing Ex. 1004 Fig. 4; 8:29–62. Ex. 2050 ¶¶ 59–60). Patent Owner contends that Vehviläinen’s filter is designed to “maintain numerical differences between adjacent video pixels” in order to preserve “the details in the picture,” and “deliberately sets out to avoid founding its filtering scheme upon the differences in the values of adjacent pixels, instead moving all pixels towards a reference line.” PO Resp. 18 (citing Ex. 1004, 8:63–9:6; Ex. 2050 ¶ 61).

Patent Owner argues that Vehviläinen’s filter selection process, matching its filter application process, also does not analyze adjacent pixels in comparison with each other, but instead, utilizes a statistical variance calculation to determine whether or not to apply a particular filter to a particular region. PO Resp. 18 (citing Ex. 1004, 9:51–67; 10:32–44). Patent Owner contends that consistent with a POSITA’s understanding,

Vehviläinen discloses that “variance” is a known statistical calculation measuring the difference between the value of each pixel in the region and the average value of all pixels in the region, and *not* the difference in value between adjacent pixels. *Id.* (citing Ex. 1004, 10:32–43, 2:41–45). To highlight that distinction, Patent Owner provides “a side-by-side comparison of an exemplary equation for calculating the level of detail in the [’651 patent] and the equation Vehviläinen teaches for the calculation of variance.” *Id.* at 18–19 (citing Ex. 1001, 3:50; Ex. 1004, 10:35 (equation 3); Ex. 2050 ¶¶ 62–65).

The calculation shown in equation 4 of Vehviläinen, Patent Owner contends, “is simply a proxy for its variance calculation, and therefore does not provide an assessment of level of change across ‘adjacent’ pixels for the same reason that variance does not.” *Id.* at 20 (citing Ex. 2050 ¶ 66). Patent Owner argues that if Vehviläinen’s variance (equation 3) fails to capture the level of change across adjacent pixels, so too does its proxy min-max estimation (equation 4). *Id.* (citing Ex. 1004, 10:32–55; Ex. 2049, 149:4–9; Ex. 2050 ¶ 67). Moreover, Patent Owner contends, the min-max estimation is not related to the level of change across adjacent pixels and fails to capture what happens between adjacent pixels that lie between the pixels with the minimum and maximum values. *Id.* at 21 (citing Ex. 2050 ¶ 68).

(3) *Petitioner’s Reply*

In its Reply, Petitioner responds that its analysis is consistent with our construction of the term and that Patent Owner interprets the claim limitation to limit it to the disclosed embodiments. Pet. Reply 5–9. Petitioner contends that Patent Owner rewrites the Board’s construction for “level of detail” as the level of variation in visual elements *between* adjacent pixels.

Id. at 7 (citing PO Resp. 18, 19, 32). According to Petitioner, Patent Owner’s interpretation “narrows the claims to SAD formulas of exemplary embodiments, which is improper because those SAD formulas *are recited within unchallenged dependent claims.*” *Id.* at 7–8 (citing *GE Lighting Sols., LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309–10 (Fed. Cir. 2014)).

Petitioner argues that Vehviläinen calculates variance across the adjacent pixels in each region using the min-max approximation which analyzes all pixels in the region to determine the largest and smallest value. *Id.* at 5 (citing Ex. 1004, 10:32–55; Ex. 2049, 185:10–188:14 (“[I]f you take the group of pixels inside a region and you calculate the variables across that group of pixels, that will give you a good estimate as to whether this is a high or low activity.”), 143:13–17). Petitioner further contends “Vehviläinen uses variance and its min-max approximation as statistical measures of variation to characterize how much the adjacent pixels in regions 5A-5C vary from each other—and thus whether regions 5A-5C are smooth, moderate, or high activity.” *Id.* at 6 (citing Ex. 1004, 9:51–60, 10:32–55, 11:29–12:10, Figs. 5A–5C; Ex.1003 ¶¶ 100–101, 115–116). Petitioner faults Patent Owner for conflating the step of determining level of detail with the subsequent filtering process. *Id.* (citing Inst. Dec. 48).

Even under an interpretation requiring that the level of detail be determined across adjacent pixels, Petitioner argues Vehviläinen’s Figure 5C teaches calculating variance across adjacent pixels because each row in that figure has one pair of adjacent pixels on each side of the block boundary. *Id.* at 9–10 (citing Ex. 1004, 11:67–12:3, 11:29–46).

(4) *Analysis*

On consideration of the full record, we agree with Patent Owner that Vehviläinen does not teach or suggest determining the “level of detail” as we have construed it—as the level of variation in visual elements *across adjacent pixels*. We are not persuaded by Petitioner’s arguments (Pet. Reply 7) that our construction of the term, requiring evaluation of adjacent pixels, improperly narrows the claim term to the disclosed embodiments. Instead, the construction is based on what the Specification describes as the typical understanding, i.e., the ordinary meaning of the term “detail” (Ex. 1001, 1:55–57)—which both parties agree on—and which is reflected in every disclosed embodiment. For example, our construction does not require the level of detail determination to be made using the sum of absolute differences formula or for *each* adjacent pair of pixels in each row or column of a given region, as performed by some of the disclosed embodiments. *See id.* at 3:41–42, 3:50, 4:32–33. We agree with Petitioner that those limitations are recited in some of the dependent claims. *See, e.g., id.* at 13:25–27 (dependent claim 2 requiring that “the determination of the level of detail . . . further comprises taking *the sum of the absolute difference of at least some* of the pixels within a set of pixels surrounding the block boundary”), 13:39–51 (dependent claim 5 reciting a formula for calculating the following sum). Our construction therefore embodies the ordinary meaning of the term without importing further limitations of the disclosed embodiments. Petitioner’s proposal, on the other hand, eliminates the requirement that detail be calculated across *adjacent* pixels, improperly broadening the limitation to a determination of variation in visual elements

across the entire claimed region. Petitioner offers no support in the Specification or elsewhere for such an interpretation.

In view of our construction, we are not persuaded that Vehviläinen’s variance teaches or suggests determining the level of detail. Vehviläinen uses “variance” to determine activity in a given region. Ex. 1004, 10:32–43. Vehviläinen explains,

Normal variance calculation is an exhausting operation, and performed according to equation 3.

$$S = \frac{1}{(N - 1)} \sum_{i=1}^N (x_i - \bar{x})^2$$

where

x_i is the numerical picture value of each individual video pixel, and

\bar{x} is the *mean value* of all N samples.

Id. (emphasis added). Dr. Bajaj testifies, consistent with Vehviläinen’s disclosed equation, that a “POSITA would understand, ‘variance’ is a statistical calculation measuring the *difference between the value of the pixels in the region and the average value of all pixels in the region*—not the difference in value between adjacent pixels.” Ex. 2050 ¶ 63. We find that testimony persuasive. Thus, equation 3 does not disclose determining the “level of variation in visual elements across adjacent pixels.”

With regard to its equation (4), Vehviläinen clearly states that equation (4) is merely an approximation of equation (3):

The variance can be estimated by *a more simple method* called min-max *approximation*. This method defines the variance as

$$S_{IN} = x_{max} - x_{min}$$

where

x_{max} is the largest one of numerical picture values of the video pixels inside the picture area under examination, and

x_{min} is the smallest one.

Ex. 1004, 10:44–55. Dr. Bajaj testifies that this calculation “is simply a proxy for its variance calculation” and does not determine the level of change across adjacent pixels. Ex. 2050 ¶¶ 65, 66. Dr. Bove does not disagree with that assessment.⁸ Ex. 2049, 149:4–9 (“Q. So if it’s fair to say that a person of ordinary skill in the art could understand that equation (4) would provide a reasonable and acceptable estimation of equation (3) with much less calculation? A. Yes, one would understand that.”). We agree that equation 4 is a simpler method of arriving at the same variance calculation as equation 3, and therefore, does not teach or suggest comparing adjacent pixels to calculate activity within a region.

Even considering the min-max calculation as applied specifically to high-activity regions (shown in Vehviläinen’s Figure 5C, reproduced below), we do not agree with Petitioner that because each row has one pair

⁸ Patent Owner argues that we should find all of Dr. Bove’s testimony not credible because he offered “uncandid testimony with respect to his career history and qualifications.” PO Resp. 9–11 (citing Ex. 1003, 5, 123–125; Ex. 2049, 173:11–20, 174:13–19; Ex. 2078; Ex. 2079). Petitioner responds that Dr. Bove was truthful in his testimony. See Pet. Reply 27. We have reviewed Patent Owner’s cited evidence and do not find any inconsistencies in Dr. Bove’s testimony. We therefore find Dr. Bove’s testimony with respect to his career history and qualifications credible.

of adjacent pixels on each side of the block boundary, calculating min-max necessarily includes determining the level of variation in visual elements across each pair of adjacent pixels. Pet. Reply 10.

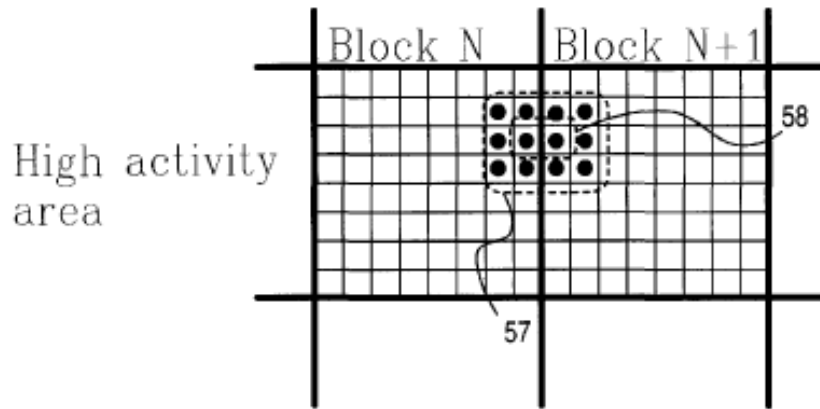


Figure 5C

Figure 5C, above, illustrates a pixel area that is used for calculation of picture activity within a high activity area of the video frame. Ex. 1004, 4:11–14. The calculation of variance is performed for block 57 (similar to block 52 of Figure 5A), applying equation (4) to the smallest and the largest values of the six pixels of that block. *Id.* at 11:33–39. Although this calculation takes into account each of the pixel values of the region, the result of that determination does not reflect variation between adjacent pixels and is instead driven by the difference between pixel values across the entire region being evaluated.⁹

⁹ We agree with Patent Owner that the possibility alone that two adjacent pixels may have a minimum and maximum pixel value and may consequently be compared when evaluated by equation (4) is insufficient to meet the claim limitation. See *In re Facebook, Inc.*, 743 F. App'x. 998, 1001-1002 (Fed Cir. 2018) (reversing the Board's anticipation and obviousness determinations and deciding that an example in the prior art reference showing that it is *possible* for image elements to be contiguous is not sufficient to teach a claim limitation that requires contiguity); *In re*

Dr. Bajaj testifies that this method of calculating variance is key to Vehviläinen’s filter design which seeks to maintain differences between adjacent video pixels so as to preserve picture detail, and therefore moves the values of adjacent pixels in unison towards a reference line. Ex. 2050 ¶¶ 61, 62. This testimony is consistent with Vehviläinen’s disclosure:

The filtering method according to the invention is designed to *maintain numerical differences between adjacent video pixels* in each block, like the differences in numerical values of pixels 41, 42, 43 and 44 in block 5 and correspondingly the differences between pixels 45, 46, 47 and 48. *When the differences in the numerical values of the video pixels are preserved, the details in the picture will as well*, and the resolution of the video picture will preferably not decrease and small details will not vanish in a disturbingly manner.

Ex. 1004, 8:63–9:6 (referring to Fig. 4, reproduced above); *see also id.* at 2:41–45. Dr. Bajaj further testifies that “Vehviläinen deliberately sets out to avoid founding its filtering scheme upon the differences in the values of adjacent pixels” and instead utilizes a variance calculation that looks to difference between pixel values across an entire region to be filtered. *Id.* (citing Ex. 1004, 9:51–67; 10:32–44). We credit Dr. Bajaj’s testimony because it is consistent with Vehviläinen’s own discussion of its determining and filtering step, and we are persuaded that Vehviläinen’s variance calculation works in lock-step with its goal of preserving even small details. We are therefore not persuaded by Petitioner’s argument and Dr. Bove’s testimony that Vehviläinen’s min-max approximation evaluates “level of

Felton, 484 F.2d 495, 500 (CCPA 1973) (reversing anticipation and obviousness determinations where “it would be mere happenstance if any structure made according to [the prior art] met the limitations of the claims.”).

variation in visual elements across adjacent pixels.” Pet. Reply 6 (citing Ex. 2049, 143:13–17), 10.

For the same reasons, we are also not persuaded by Petitioner’s arguments that Vehviläinen teaches calculating level of detail according to the typical usage of the term (*id.* at 6) or that variance, min-max, and SAD calculations are all valid ways to assess level of detail that were used in the art for the same purpose (*id.* at 9). On the contrary, the hypotheticals presented by the parties highlight that, for a given set of pixel values, Vehviläinen’s variance calculation can result in a very different calculation than that resulting from the SAD embodiment disclosed in the ’651 patent, thereby leading to a different filter choice for the same pixel set. *Id.* at 8–9.

Based on the evidence in the entire trial record, we find that Petitioner has not established by a preponderance of the evidence that Vehviläinen teaches or suggests the determining limitation of claim 1.

2. *Conclusion on Anticipation and Obviousness of Claims 1, 17, 18, and 19 based on Vehviläinen*

Based on the foregoing, we determine Petitioner has not shown by a preponderance of the evidence that independent claim 1 or its dependent claims 17 and 18 are anticipated by Vehviläinen.

“Once all relevant facts are found, the ultimate legal determination [of obviousness] involves the weighing of the fact findings to conclude whether the claimed combination would have been obvious to an ordinary artisan.” *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1361 (Fed. Cir. 2017). On balance, considering the full record before us, we determine that Petitioner has not established, by a preponderance of the evidence, that Vehviläinen would have rendered the subject matter of

independent claim 1 or its dependent claims 17–19 obvious to one of ordinary skill in the art at the time of the invention.¹⁰ *Mylan Pharms.*, 914 F.3d at 1376 (“Dependent claims, with added limitations, are generally not obvious when their parent claims are not.”).

F. Obviousness over Vehviläinen and Kadono

Petitioner contends that claims 1, 2, 4, and 17–19 are unpatentable under 35 U.S.C. § 103 as obvious over Vehviläinen and Kadono. Pet. 52–86. For the reasons that follow, we are not persuaded that Petitioner has established by a preponderance of the evidence that claims 1, 2, 4, and 17–19 are unpatentable under § 103(a) in view of Vehviläinen and Kadono.

1. Independent Claim 1

Patent Owner argues that the combination of Vehviläinen and Kadono fails to teach or suggest the “determining the level of detail” limitation of independent claim 1. PO Resp. 14–22. We, therefore, begin our discussion with the parties’ arguments on this limitation.

¹⁰ Given our determination that Petitioner has failed to establish, by a preponderance of the evidence, that Vehviläinen teaches or suggests all of the limitations of the only independent claim of the ’651 patent, we need not assess Patent Owner’s objective evidence of non-obviousness. *See, e.g., Hamilton Beach Brands, Inc. v. f’real Foods, LLC*, 908 F.3d 1328, 1343 (Fed. Cir. 2018) (holding, in affirming a Board decision determining that petitioner had not shown unpatentability, that “objective indicia of nonobviousness” “need not [be] addressed” because the court “affirmed the Board’s findings regarding the failure of the prior art to teach or suggest all [claim] limitations”); *see also Mylan Pharm. Inc. v. Research Corp. Techs., Inc.*, 914 F.3d 1366, 1376 (Fed. Cir. 2019).

a) “determining the level of detail of the reconstructed video frame across a region in which the block boundary is located, wherein the region includes pixels from multiple rows and multiple columns of the reconstructed video frame that encompass pixels immediately adjacent to at least two sides of the block boundary and includes at least one pixel that is not immediately adjacent to the block boundary”

(1) *The Petition*

Petitioner contends that both Vehviläinen and Kadono teach this limitation and, when combined, the level of detail would be calculated using a sum of absolute differences between pixels to determine whether to apply deblocking to an area on both sides of a block boundary. Pet. at 64 (citing Ex. 1005 ¶ 203; Ex. 1003 ¶ 156). Petitioner argues that the combined teachings of Vehviläinen and Kadono render obvious the step of determining the level of detail of the reconstructed video frame across a region, i.e., the pixels marked by dots in Vehviläinen Figure 5A. *Id.*

Petitioner further argues the combination of Vehviläinen and Kadono renders this claim limitation obvious based on the application of Kadono’s Ω threshold to Vehviläinen step 80 (of Figure 6) by including an additional comparison to Ω for selecting between the “smooth” filter and a stronger filter. *Id.* at 65 (citing 1003 ¶ 157). For that second comparison, Petitioner contends that an ordinarily skilled artisan could have also used the area marked by pixel groups r1, r2, r3, and r4 in Figure 19 of Kadono (reproduced above) instead of the region shown in Figure 5A of Vehviläinen. *Id.* (citing Ex. 1005, Fig. 19; Ex. 1003 ¶ 157). According to Petitioner, Kadono’s 4 x 4 pixel region comprising four adjacent column regions r3, r1, r2, and r4 also teaches the claimed region. *Id.* at 66–67.

Petitioner argues that a person of ordinary skill in the art would have been motivated to combine the teachings of Vehviläinen with Kadono by starting with Vehviläinen’s teachings regarding adaptive deblocking and applying Kadono’s calculation of pixel variation using the sum of absolute differences or SAD. Pet. 52 (citing Ex. 1003 ¶ 141). Petitioner argues that Vehviläinen and Kadono teach similar deblocking techniques, both determine the level of detail by calculating pixel variance for two-dimensional areas around block boundaries to select appropriate filters, and both are designed to perform the same function (deblocking) for commonly used video standards. *Id.* at 52–53 (citing Ex. 1004, 2:19–25, 11:29–55, 9:51–67, 4:26–27, Fig. 5A; Ex. 1005 ¶¶ 8, 13, 125, 142, 205, 206, Fig. 19; Ex. 1003 ¶¶ 141, 142). Petitioner argues that given the similarities between the two references, a person of ordinary skill in the art would have recognized the compatibility between them and combined their teachings. *Id.* at 53–54. Petitioner asserts that “[i]t was common in the art of video processing to combine various filtering techniques, and a POSTIA would have regarded the combination of teachings from Vehviläinen and Kadono as typical in the field.” *Id.* at 53 (citing Ex. 1003 ¶ 142). Petitioner also asserts that “[i]t was common in the art of video encoding to use different settings and tweaks to optimize visual quality and performance for particular applications, computer platforms, and types of content.” *Id.* at 54 (citing Ex. 1003 ¶ 143; Ex. 1004, 12:13–16; Ex. 1005 ¶¶ 282–283).

Specifically as to the use of Kadono’s SAD calculation, Petitioner argues that a person of ordinary skill in the art would have found it obvious to apply that calculation to Vehviläinen’s method by replacing Vehviläinen’s variance calculations (equation (4)) with Kadono’s teachings regarding

calculating the sum of absolute values of differences between pairs of pixels in corresponding columns across the block boundary to form a representative difference, and then averaging the representative differences between column groups together. Pet. 54 (citing Ex. 1004, 10:44–55; Ex. 1005 ¶¶ 205, 206, Fig. 19; Ex. 1003 ¶ 144). Petitioner contends that this would have been a simple substitution of one known element for another, with predictable results. *Id.* at 54–55 (citing Ex. 1003 ¶ 144).

Petitioner provides two reasons for the proposed SAD substitution. Petitioner argues that an ordinarily skilled artisan would have been motivated to make the proposed replacement because SAD was a widely used technique for calculating the level of detail and was widely recognized as an accurate and effective method for analyzing pixel variation. *Id.* at 55 (citing Ex. 1009 ¶¶ 55–65; Ex. 1003 ¶ 145). Petitioner further argues that by 2004, single instruction multiple data (“SIMD”) processors were common in the industry, and Kadono’s teaching of using such processors to accelerate SAD calculations would have motivated an ordinarily skilled artisan to improve Vehviläinen’s method by applying Kadono’s teachings, particularly for use on SIMD computer platforms. *Id.* (citing Ex. 1005 ¶¶ 204, 205; Ex. 1003 ¶ 145).

(2) *Patent Owner’s Response*

Patent Owner responds that Petitioner’s theory directly contradicts Vehviläinen’s express teachings and fails to provide any reason why a person of ordinary skill in the art would have even attempted the proposed modification. PO Resp. 14–15, 23 (citing Ex. 2050 ¶ 72). Patent Owner argues that Petitioner offers no analysis or other evidence showing that Kadono’s SAD calculation was superior to Vehviläinen’s variance method.

Id. at 24. On the contrary, Patent Owner contends, Dr. Bove admitted that Vehviläinen’s unmodified variance calculation was already “accurate and effective.” *Id.* (citing Ex. 2049, 144:2–8, 149:4–9; Ex. 2050 ¶¶ 74–75). Patent Owner further contends that aside from allowing the use of SIMD processors, Kadono does not teach any benefit to using its SAD calculation. *Id.* at 25 (citing Ex. 2049, 163:8–23). Patent Owner argues that “in addition to Vehviläinen’s aversion to focusing on the differences between adjacent pixels, . . . Vehviläinen expressly seeks to avoid even the general type of filtering (low pass filtering) that both the [’651 patent] and Kadono utilize.” *Id.* at 26 (citing Ex. 1001, 10:45; Ex. 1005 ¶ 132; Ex. 1004, 2:21–25, 6:40–45). According to Patent Owner, “[e]ach of Vehviläinen and Kodono utilizes the calculation that best suits its own subsequent filtering process, each of which is, according to each reference ostensibly complete,” and an ordinarily skilled artisan would not be motivated to combine two references that independently operate effectively to accomplish similar functions. *Id.* at 27–28 (citing Ex. 2050 ¶ 77; *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1369 (Fed. Cir. 2012)).

With regard to Petitioner’s claimed motivation based on the implementation of Kadono’s SAD calculation on SIMD processors, Patent Owner argues that the benefits of using SIMD to speed up calculation would have worked just as well to speed up Vehviläinen’s existing variance-based calculations. PO Resp. 28–29 (citing Ex. 2050 ¶¶ 82, 83; Ex. 2016, 64 (describing variance calculations in the very first SIMD supercomputer in 1975)). Patent Owner contends that Petitioner offers no basis to conclude that any benefits from using SIMD would have been superior with SAD as opposed to variance such that it would motivate an ordinarily skilled artisan

to modify Vehviläinen to use SAD instead of its own variance. *Id.* at 29. Patent Owner asserts that SIMD and its utility were known and widely available at the time of Vehviläinen, which nonetheless chose to utilize variance calculations, not SAD. *Id.* at 30 (citing Ex. 2017, 2; Ex. 2018, 1; Ex. 2019, 7) (discussing SIMD architecture in processors from Hewlett-Packard, Sun Microsystems, and Intel). Moreover, Patent Owner asserts, the use of SAD instructions in video compression and its implementation in SIMD processors were well known in the art before Vehviläinen. *Id.* at 30–31 (citing Ex. 2020, 57, 58). Patent Owner argues that Vehviläinen used variance not because SAD techniques were unavailable or unknown to Vehviläinen, but because Vehviläinen’s filtering analysis is designedly based on analysis of pixels in comparison to an average of all pixels and not to adjacent pixels. *Id.* (citing Ex. 2050 ¶ 85).

(3) *Petitioner’s Reply*

In its Reply, Petitioner argues that Patent Owner’s requirement that the determining the level of detail step must be tailored to the filter selection step is contradicted by the ’651 patent and Vehviläinen, which both suggest flexibility in swapping out components. Pet. Reply 21. Petitioner asserts that the ’651 patent mentions that where the level of detail calculation indicates a smooth region, the MPEG-4 DC offset filter can be used, and that other smoothing filters can be applied. *Id.* (citing Ex. 1001, 10:12–19). Similarly, Petitioner asserts, Vehviläinen interchanges variance or min-max for calculating level of detail. *Id.* at 22 (citing Ex. 1004, 10:32–55). Petitioner relies on Dr. Bove’s testimony that SAD “would yield a classification of the same sort” as Vehviläinen’s variance calculation, and that “[b]oth of these techniques were well known in the art many years prior

. . . so the classification technique would be regarded as interchangeable . . . in terms of building an adaptive deblocking system,” to argue that a person or ordinary skill in the art would be motivated to apply Kadono’s SAD calculation to Vehviläinen. *Id.* (quoting Ex. 2049, 183:24–184:23; Ex. 1003 ¶¶ 144–146).

Petitioner also argues, for the first time in its Reply, that a person of ordinary skill in the art “would have been motivated to apply [Kadono’s SAD calculation] when using computers *with special SIMD instructions for SAD*—this was common given the popularity of the technique.” *Id.* (emphasis added) (citing Ex. 1020, 5). According to Petitioner, “[t]here are certain SIMD instruction sets that explicitly can calculate sum of absolute difference in parallel on multiple pixels at on[c]e . . . those hardware platforms might not be able to implement the comparisons needed to do min-max as efficiently.” *Id.* (quoting Ex. 2049, 182:13–183:17). Specifically, Petitioner points to the PSADBW instruction in Intel’s SIMD extensions that “calculate[] the sum of the absolute values of the differences between two packed unsigned byte integer vectors . . . in one step.” *Id.* at 22–23 (citing Ex. 1020, 5).

(4) *Analysis*

On consideration of the full record, we determine that Petitioner does not articulate an adequate motivation to combine Vehviläinen and Kadono to arrive at the claimed invention. As discussed above, we are persuaded by Patent Owner’s argument that Vehviläinen’s variance calculation is tied closely to its filter design, which seeks to maintain differences between adjacent video pixels, and therefore does not look to differences between adjacent pixels in determining the level of detail for filter selection.

See supra § III.E.1.a.4. Vehviläinen’s stated goal is to reduce blocking artifacts without significantly degrading the picture resolution, which it seeks to realize with a filter that shifts pixel values *toward a reference line* and “not by low-pass filtering.” Ex. 1004, 2:18–24; *see also id.* at 6:40–45 (“The main idea of this invented filter is to reduce blocking artefacts without significantly degrading the picture details.”), 1:61–67 (“One significant disadvantage of filtering is that the sharpness of the video picture is reduced.”), code (57) (“If the filtering according to the invention is performed, it is focused to a certain number of bits . . . close to the boundary [and] is done by adjusting the numerical values of each video pixel close to the boundary towards a reference line . . .”).

Vehviläinen repeatedly makes the point that its filtering method works better at preserving picture resolution because it *does not* factor in differences between adjacent pixels:

This reduces the disappearance of the resolution in the picture in the filtering process according to the invention because the *adjacent video pixels as such are not filtered in comparison with each other* but are adjusted in comparison to the reference line.

Id. at 2:41–45; *see also id.* 8:63–9:6. Dr. Bajaj’s testimony that “Vehviläinen deliberately sets out to avoid founding its filtering scheme upon the differences in the values of adjacent pixels” is therefore persuasive. Ex. 2050 ¶¶ 61, 62 (citing Ex. 1004, 9:51–67; 10:32–44). Vehviläinen’s filter selection is tied directly to its variance calculation and “uses three branches (smooth, moderate, and high activity) according to the activity inside adjacent blocks and along the boundary between two adjacent blocks.” Ex. 1004, 6:46–49, 10:1–31 (detailing Vehviläinen’s branch selection process). Vehviläinen discloses that the manner in which the

reference line is defined and number of pixels that are moved toward the reference line depend directly upon the filter selection, i.e., the variance determination. *Id.* at 7:11–8:10; Figs. 3A–3F, 4. Thus, replacing Vehviläinen’s variance calculation with Kadono’s SAD calculation to select a filter based on the differences between adjacent pixels rather than variance across the entire region would have been understood by an ordinarily skilled artisan as changing the basic principle of Vehviläinen’s operation, consequently dissuading the combination with Kadono. *See In re Ratti*, 270 F.2d 810, 813 (CCPA 1959) (holding that a proposed combination of references is not proper where it would change the basic principles of operation of one of the references); *Plas-Pak Indus., Inc. v. Sulzer Mixpac AG*, 600 F. App’x. 755, 759 (Fed. Cir. 2015) (“a change in a reference’s ‘principle of operation’ is unlikely to motivate a person of ordinary skill to pursue a combination with that reference”). A person of ordinary skill in the art would have no motivation to make Petitioner’s proposed modification to Vehviläinen because that person would have also understood the two calculation methods to be considerably different as to have a significant impact on Vehviläinen’s filter operation, defeating its stated goal of reducing blocking artefacts without significantly degrading the picture details. *See e.g.*, Ex. 1004, 2:18–24.

Petitioner’s reliance on the ’651 patent as “suggest[ing] flexibility in swapping out components” is also misplaced. Pet. Reply 21–22 (citing Ex. 1001, 10:12–19). First, that general statement from the ’651 patent Specification that “other smoothing filters can be applied” *in other embodiments* does not suggest that any smoothing filter can be plugged into the disclosed embodiment. Second, relying on the challenged patent in

determining whether a person of ordinary skill would have been led to make the proposed modification requires use of hindsight. *See Cardiac Pacemakers, Inc. v. St. Jude Medical, Inc.*, 381 F.3d 1371, 1376 (Fed. Cir. 2004) (“the suggestion to combine references must not be derived by hindsight from knowledge of the invention itself.”); *Otsuka Pharma. Co., v. Sandoz, Inc.*, 678 F.3d 1280, 1296 (Fed. Cir. 2012) (“The inventor’s own path itself never leads to a conclusion of obviousness; that is hindsight.”).

Petitioner also points us to the fact that Vehviläinen has at least two different methods of variance calculation as suggesting flexibility in swapping out components. *Id.* at 22 (citing Ex. 1004, 10:32–55). Those two different methods, however, arrive at the *same* result, i.e., variance. Ex. 1004, 10:32–55 (“variance can be estimated by a more simple method called min-max approximation”); Ex. 2049, 149:4–9; Ex. 2050 ¶ 67. That Vehviläinen provides a simpler method to calculate the *same* property, i.e., variance, does not support Petitioner’s contention that it provides the flexibility to change its filter selection decision based on an entirely different determination. *See Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020) (“Fundamental differences between the references are central to th[e] motivation to combine inquiry.”).

Dr. Bove’s testimony that “[t]he substitution of one for the other would not have changed the principle of operation for either reference because Vehviläinen and Kadono use similar mechanisms for a similar purpose,” is unpersuasive. *See* Ex. 1003 ¶ 144. As Dr. Bove himself explains, “one of ordinary skill in the art in making that choice *would want to have assurance* that either determining step being considered would generally classify high-activity blocks *in the same way*, despite doing a

different calculation.” Ex. 2049, 169:6–1 (emphasis added); *see also id.* at 170:16–19 (“Now, in so doing, one of ordinary skill in the art would read the teachings and would say, How is this thing described.”). Yet, Petitioner and Dr. Bove fail to reconcile the fundamental differences in the filtering techniques of Vehviläinen and Kadono. Instead, Dr. Bove disregards such concerns as “not a significant barrier” because “that sort of thing was well known in the art, much prior to the period of time we’re talking about here.” *Id.* at 169:12–15. We are not persuaded that an ordinarily skilled artisan, mindful of how Vehviläinen’s filter mechanism works, would be motivated to replace its variance calculation with Kadono’s SAD calculation merely because the two were well known in the art, especially given that such a person would understand Vehviläinen variance calculation “to be an accurate and effective way to determine the activity inside a block.” *Id.* at 144:2–8. In view of the inconsistencies between Dr. Bove’s testimony and the teachings of Vehviläinen, we do not give substantial weight to his opinion.

For the same reasons, we are not persuaded that an ordinarily skilled artisan would have been motivated to apply Kadono’s teachings to improve Vehviläinen’s techniques based on Kadono’s use of SIMD processors. Pet. 55. Because we determine that the use of Kadono’s SAD calculation in Vehviläinen’s system would change its basic operation and prevent Vehviläinen’s filter from operating in its desired manner, Kadono’s use of SIMD processors for SAD calculation would not have motivated a person of ordinary skill in the art to switch Vehviläinen’s variance calculation.¹¹ Here

¹¹ We consider Petitioner’s Reply argument that a POSITA would have been motivated to the combination by special SIMD computer instructions for

too, we credit Dr. Bajaj’s testimony that a person of ordinary skill in the art would not have altered Vehviläinen’s variance calculation and filtering mechanism in view of Kadono. *See* Ex. 2050 ¶¶ 81–85 (“These techniques were widely known, yet Vehviläinen nevertheless utilized variance-based calculations, not because SAD techniques were unavailable or unknown to Vehviläinen, but because Vehviläinen’s filtering analysis is designedly based on analysis of pixels in comparison to an average of all pixels and not to adjacent pixels.”).

Based on the evidence in the entire trial record, we find that Petitioner has not articulated an adequate motivation to combine Vehviläinen and Kadono to arrive at the claimed invention.

2. *Conclusion on Obviousness of Claims 1, 2, 4, 17–19 based on Vehviläinen and Kadono*

“Once all relevant facts are found, the ultimate legal determination [of obviousness] involves the weighing of the fact findings to conclude whether the claimed combination would have been obvious to an ordinary artisan.” *Arctic Cat*, 876 F.3d at 1361. On balance, considering the full record before us, we determine that Petitioner has not established, by a preponderance of the evidence, that the combination of Vehviläinen and Kadono would have rendered the subject matter of independent claim 1 or its dependent claims 2,

SAD (Pet. Reply 22–23) to be forfeited. *See* 37 C.F.R. § 42.23(b); *see also* *Intelligent Bio-Sys.*, 821 F.3d at 1369 (emphasizing “the requirement that the initial petition identify ‘with particularity’ the ‘evidence that supports the grounds for the challenge to each claim.’”). Even if not forfeited, we are not persuaded that such instructions support a motivation to combine given our determination that use of Kadono’s SAD calculation would change Vehviläinen’s basic principle of operation.

4, and 17–19 obvious to one of ordinary skill in the art at the time of the invention.¹²

IV. PATENT OWNER’S MOTION TO EXCLUDE

Patent Owner filed a Motion to Exclude seeking to exclude Exhibits 1019–1023, and 1026. Paper 72 (PO Mot.). Petitioner filed an opposition (Paper 74 (“Pet Opp.”)) and Patent Owner filed a reply (Paper 78 (“PO Reply”)). Patent Owner, as the moving party, has the burden of proof to establish that it is entitled to the requested relief. 37 C.F.R. §§ 42.20(c), 42.62(a).

A. *Exhibit 1019*

Patent Owner’s objections to Exhibit 1019 are based on Federal Rules of Evidence (“FRE”) 901 (authentication) as well as FRE 801 and 802 (hearsay). Mot. 1, 2. Patent Owner argues that Petitioner has failed to offer evidence that Exhibit 1019 accurately reproduces the Google searches that Petitioner purports were performed. *Id.* at 1 (citing F.R.E. 901(a)). Patent Owner contends that Exhibit 1019 is not a self-authenticating document. *Id.* Patent Owner further argues that the exhibit contains inadmissible hearsay. *Id.* at 2.

Petitioner responds that Exhibit 1019 is rebuttal evidence to Patent Owner’s Exhibit 2053, and that if Patent Owner’s exhibit is admitted into evidence, Exhibit 1019 should also be admitted. Pet. Opp. 1.

¹² Given our determination that Petitioner has failed to establish, by a preponderance of the evidence, an adequate motivation to combine Vehviläinen and Kadono, we need not assess Patent Owner’s objective evidence of non-obviousness.

Patent Owner responds that Exhibit 2053 is evidence of Google searches that Dr. Bajaj performed, and that Petitioner has not moved to exclude it. PO Reply at 1 (citing Ex. 2050 ¶ 29).

Exhibit 1019 appears to include printouts of the results of Google searches conducted for the terms “the art of deblocking” and “the field of deblocking,” without quotation marks. Petitioner, however, offers no evidence to show that the exhibit is in fact a printout of such search results. *See* FRE 901(a) (“To satisfy the requirement of authenticating or identifying an item of evidence, the proponent must produce evidence sufficient to support a finding that the item is what the proponent claims it is.”). We therefore grant Patent Owner’s motion to exclude Exhibit 1019 for lack of authentication.

Petitioner further asks that we take judicial notice of these Google searches and results given that “[t]he facts in Exhibit 1019 are not subject to reasonable dispute because DivX concedes to the propriety of Google searches by submitting its Exhibit 2053.” *Opp.* 2. Given our decision above regarding the level of ordinary skill in the art (*supra* § III.B) and that we do not find recently conducted Google searches to be probative of the level of ordinary skill in the art at the time of the invention, we are not persuaded to grant Petitioner’s request for judicial notice.

B. Exhibit 1020

Patent Owner’s objections to Exhibit 1020 are based on FRE 801 and 802 (hearsay), as well as 403 (relevance). *Mot.* 3–5. Patent Owner also argues that Exhibit 1020 should be excluded as untimely because it is submitted in “support of Petitioner’s *prima facie* case of obviousness to show alleged motivation to combine the reference.” *Id.* at 4.

We need not assess the merits of Patent Owner's objections because, even considering Petitioner's evidence, we have determined that Petitioner has not demonstrated by a preponderance of the evidence that the challenged claims are unpatentable. Accordingly, Patent Owner's objections are dismissed as moot.

C. Exhibits 1021–1023

Patent Owner's objections to Exhibits 1021–1023 are based on FRE 801 and 802 (hearsay), 403 (relevance), and 901 (authentication). Mot. 5–6. Petitioner relies on these exhibits in support of its rebuttal to Mr. Hanson's declaration submitted by Patent Owner to establish secondary considerations. *Id.* at 1.

Under the particular circumstances in this case, we need not assess the merits of Patent Owner's objections. As discussed above, we do not assess Patent Owner's objective evidence of non-obviousness and therefore do not consider Petitioner's rebuttal evidence. Accordingly, Patent Owner's objections to these exhibits are *dismissed* as moot.

D. Exhibit 1026

Patent Owner's objections to Exhibit 1026 are based on FRE 801 and 802 (hearsay) and 403 (relevance). Mot. 7–8. Patent Owner contends that Exhibit 1026 is a declaration made in a different proceeding and is therefore out-of-court testimony in this proceeding. *Id.* at 7. Patent Owner further contends that Petitioner uses the exhibit to prove that no testing would be required for a POSITA to combine various aspects of codecs, thereby relying on it for the truth of the matter asserted therein. *Id.* (citing Pet. Reply 19–20). Patent Owner argues that there are dispositive differences between combination of references here and the combination of references

in the other proceeding that Dr. Bajaj opines on in Exhibit 1026, thereby undermining its probative value, especially when Patent Owner is not allowed to submit rebuttal evidence to it. *Id.* at 7–8.

Petitioner responds that Exhibit 1026 is not used to show that Dr. Bajaj’s prior testimony is correct, it is merely relied upon to show that Dr. Bajaj’s testimony in the current proceeding is contradicted by his sworn testimony in other proceedings before the Board. Opp. 9–10. According to Petitioner, Dr. Bajaj’s testimony here that video encoding is an experimental art and testing is necessary is contradicted by his opinions found in Exhibit 1026. *Id.* at 10 (citing Ex. 1017, 128:16–25, 126:2–6; Ex. 1026, ¶¶ 79, 67–82). Petitioner asserts that Dr. Bajaj himself admitted that the other proceeding challenged a similar patent to the one at issue here. *Id.* at 10–11 (citing Ex. 1017, 172:18–173:7).

Although we agree with Patent Owner that there are differences between the facts presented in the two cases, we are not persuaded that the probative value of the exhibit is outweighed by the risk of confusion or unfair prejudice to Patent Owner. Moreover, because Petitioner offers the exhibit to show a supposed contradiction between Dr. Bajaj’s testimony, we do not consider the statements in Exhibit 1026 for the truth of the matter asserted; instead, we consider it proper impeachment evidence. We therefore deny Patent Owner’s motion to exclude.

A. Conclusion

Patent Owner has satisfied its burden to show that Exhibit 1019 should be excluded but has not satisfied that burden as to Exhibit 1026. Patent Owner’s objections to Exhibits 1020–1023 are dismissed as moot.

Accordingly, Patent Owner's Motion to Exclude is *granted in part, denied in part, and dismissed in part*.

V. PETITIONER'S MOTION TO EXCLUDE

Petitioner filed a Motion to Exclude seeking to exclude Patent Owner's Exhibits 2051, 2054–2069, and 2073–2080. Paper 73 (“Pet Mot.”). Patent Owner filed an opposition (Paper 76 (“PO Opp.”)) and Petitioner filed a reply (Paper 77). Petitioner has the burden of proof to establish that it is entitled to the requested relief. 37 C.F.R. §§ 42.20(c), 42.62(a).

A. Exhibits 2051, 2054–2069

Petitioner's objections to Exhibits 2054–2068 are based on FRE 901(a) (authentication), 801(c) and 802 (hearsay), 701 (improper opinions), and 402 (relevance). Pet. Mot. 2–8. Petitioner objects to portions of Exhibit 2051, which is the declaration of Seth Hanson, based on FRE 701 (improper opinions), 602 (lack of personal knowledge), and because those portions rely on 2054–2068. *Id.* at 12–14. Petitioner objects to Exhibit 2069, which Mr. Hanson relies on in his declaration, based on FRE 901(a) (authentication), 801(c) and 802 (hearsay), and 701 (improper opinions). *Id.* at 14–15. Patent Owner relies on these exhibits to establish secondary considerations.

Under the particular circumstances in this case, we need not assess the merits of Petitioner's objections. As discussed above, we do not consider Patent Owner's evidence of secondary considerations. Accordingly, Petitioner's objections to these exhibits are dismissed as moot.

B. Exhibits 2073–2079

Petitioner's objections to Exhibits 2073–2079 are based on FRE 901(a) (authentication), 801(c) and 802 (hearsay), 701 (improper opinions), and 402 and 403 (relevance). Pet. Mot. 8–12. Petitioner argues that these

webpages are unreliable and Patent Owner has not produced evidence sufficient to support a finding that these exhibits are in fact published articles and not fake or manipulated webpages. *Id.* at 8–9. Petitioner further argues that these exhibits contain out-of-court statements by third parties and that Patent Owner relies on those statements for the truth of the matters asserted therein. *Id.* at 9. Petitioner also argues that Patent Owner uses the exhibits for baseless character attacks, making them precisely the type of irrelevant evidence that courts have excluded because of its tendency to suggest a decision on an improper basis. *Id.* at 10. Petitioner contends that there is no question that Dr. Bove is an expert in the field, and Exhibits 2073–2079 are not related to Dr. Bove’s expertise or the accuracy of his expert opinions. *Id.* (citing Ex. 1017, 102:15–24; PO Resp. 4). Petitioner further contends that none of these exhibits relate to Dr. Bove’s credibility or truthfulness because they are entirely consistent with what Dr. Bove has readily explained. *Id.* at 11 (citing Ex. 1003 ¶ 4; Ex. 2078, 1).

Patent Owner responds that these exhibits were authenticated with a declaration providing evidence of their source, and points to various characteristics of the exhibits that it contends make them self-authenticating. *Id.* at 9–10. Patent Owner further argues that these exhibits are not hearsay because they are not offered for the truth of the matter asserted but to impeach Dr. Bove’s credibility and truthfulness. *Id.* at 10 (citing FRE 608(b)(1)).

We are persuaded that Exhibits 2073–2077 contain inadmissible hearsay and are irrelevant to any of the issues in this proceeding. Patent Owner relies on these exhibits in support of assertions unrelated to

Dr. Bove's testimony, not to impeach Dr. Bove's testimony. *See* PO Resp. 10–11. We therefore grant Petitioner's motion as to these exhibits.

Patent Owner does rely on Exhibits 2078 and 2079 for impeachment purposes arguing that those exhibits contradict certain testimony provided by Dr. Bove. *Id.* at 11 (citing Ex. 2049, 173:11–20; 174:13–19). We find these exhibits authentic and relevant for impeachment of the cited testimony, and consider them for the limited purpose of judging Dr. Bove's credibility. We deny Petitioner's motion as to the use of these exhibits for that limited purpose.

C. Exhibit 2080

Petitioner's objections to Exhibit 2080 are based on FRE 901(a) (authentication), 801(c) and 802 (hearsay), and 701 (improper opinions). Pet. Mot. 14–15. Petitioner argues that there is no evidence that this exhibit was published during the 2004–2005 timeframe or that it is an accurate, unmodified copy of the purported university thesis. *Id.* at 14. Petitioner further argues that the exhibit is offered as hearsay because Patent Owner relies on it for the truth of purported test results and analysis therein to support “unpredictability of various combinations in the field [of deblocking].” *Id.* at 15 (citing Ex. 2050 ¶ 40). Petitioner further argues that the author of the exhibit has not been established as an expert and it should be excluded as containing impermissible opinion testimony. *Id.*

Patent Owner responds that Exhibit 2080 has indicia of reliability regarding its status as an accurate copy of a published university thesis, including the university's logo. PO Opp. 14. Patent Owner further argues Exhibit 2080 is not hearsay because it is not offered for the truth of the discoveries or conclusions reached in the thesis but show an ordinarily

skilled artisan's understanding about unpredictability of combinations of deblocking schemes. *Id.* at 15 (citing Ex. 2050 ¶ 40). Patent Owner also contends that FRE 701 does not apply to this exhibit because it is not testimonial evidence.

We agree with Patent Owner that Exhibit 2080 is not testimonial evidence. Exhibit 2080 is one of the references that Dr. Bajaj relies upon in support of his opinions relating to the state of art and the unpredictability of combining deblocking techniques. *See* Ex. 2050 ¶ 40 (citing also Ex. 1007). Exhibit 2080 is self-authenticating as it bears indicia of reliability regarding its status as a thesis published by Eindhoven University. *See* Ex. 2080 (showing university's logo, publication date, author's name, supervisor's name, and a link to a copy the thesis available on the university's website). Moreover, Petitioner cross-examined Dr. Bajaj about this exhibit. *See* Ex. 1017, 115:2–119:8. FRE 703 allows experts to base their opinions on inadmissible facts or data under certain circumstances and allows for such evidence to be considered by the factfinder if its probative value substantially outweighs their prejudicial effect. We are persuaded to allow Exhibit 2080 for that limited purpose. Petitioner's motion is denied as to Exhibit 2080.

D. Conclusion

Petitioner has satisfied its burden to show that Exhibits 2073–2077 should be excluded, but has not satisfied that burden as to Exhibits 2078–2080. Petitioner's objections to Exhibits 2051 and 2054–2069 are dismissed as moot. Accordingly, Petitioner's Motion to Exclude is *granted in part, denied in part, and dismissed in part.*

VI. PATENT OWNER’S CONSTITUTIONAL CHALLENGE

Patent Owner argues that “[t]he Board is unconstitutionally appointed to decide IPRs,” and “[e]liminating Board tenure protections cannot cure that problem.” PO Resp. 63 (citing *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320 (Fed. Cir. 2019), *cert. granted sub nom. United States v. Arthrex, Inc.*, 2020 WL 6037206 (Oct. 13, 2020)). According to Patent Owner, “[e]ven if a cure were possible without Congressional confirmation or higher agency review, it cannot be done by ‘retroactively’ ‘severing’ long-guarded protections in a long-standing different statute.” *Id.* Patent Owner further argues that “[b]ecause Patent Owner is not before the Board by choice, and no properly-appointed Board panel is available, the appropriate remedy is not severance, but dismissal.” *Id.*

We decline to consider Patent Owner’s constitutional challenge as the issue has been addressed by the Federal Circuit in *Arthrex*, 941 F.3d at 1328.

VII. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has not established by a preponderance of the evidence that claims 1, 2, 4, 17–19 of the ’651 patent are unpatentable.

In summary:

Claim(s)	35 U.S.C. §	References/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 17, 18	102(b)	Vehviläinen		1, 17, 18
1, 17–19	103(a)	Vehviläinen		1, 17–19
1, 2, 4, 17–19	103(a)	Vehviläinen, Kadono		1, 2, 4, 17–19
Overall Outcome				1, 2, 4, 17–19

VIII. ORDER

It is, therefore,

ORDERED that claims 1, 2, 4, and 17–19 of the '651 patent have not been shown to be unpatentable;

FURTHER ORDERED that Petitioner's Motion to Exclude is *granted* with regard to Exhibits 2073–2077, *denied* with regard to Exhibits 2078–2080, and *dismissed* as moot with regard to Exhibits 2051 and 2054–2069;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *granted* with regard to Exhibit 1019, *denied* with regard to Exhibit 1026, and *dismissed* as moot with regard to Exhibits 1020–1023;

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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Patent 8,139,651 B2

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