NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

NETFLIX, INC., HULU, LLC,
Appellants

v.

DIVX, LLC,
Appellee

2021-1931

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2020-00052.

Decided: June 27, 2022

HARPER BATTS, Sheppard Mullin Richter & Hampton LLP, Menlo Park, CA, argued for appellants. Also represented by JEFFREY LIANG, CHRISTOPHER SCOTT PONDER; MATTHEW G. HALGREN, San Diego, CA.

KENNETH J. WEATHERWAX, Lowenstein & Weatherwax LLP, Santa Monica, CA, argued for appellee. Also represented by PARHAM HENDIFAR, NATHAN NOBU LOWENSTEIN.

Before LOURIE, BRYSON, and HUGHES, *Circuit Judges*.

BRYSON, *Circuit Judge*.

Appellants Netflix, Inc., and Hulu, LLC, (collectively, "petitioners") petitioned for *inter partes* review of U.S. Patent No. 8,139,651 ("the '651 patent"), which is owned by appellee DivX, LLC. The Patent Trial and Appeal Board instituted an *inter partes* review, and in its Final Written Decision, the Board held that none of the challenged claims were unpatentable based on the grounds asserted in the petition. We affirm in part, vacate in part, and remand.

I

A

The '651 patent is directed to "methods of deblocking compressed video." '651 patent, col. 1, ll. 15–16. In general, digital videos consist of a series of frames, each of which contains numerous pixels. *Id.* at col. 1, ll. 17–19. Although digital video files in their native form are typically very large, the file size of a video can be reduced using "compression schemes" that "achieve significant reductions in the amount of digital data required to encode a video sequence." *Id.* at col. 1, ll. 19–24.

Some compression schemes, such as that used by the well-known "MPEG-4" encoding standard, divide each frame of a video into separately encoded blocks of pixels. *Id.* at col. 1, ll. 25–29. When a video frame is reconstructed from the separately encoded blocks, however, "artifacts" that reduce the overall quality of the image can appear at the boundaries between the blocks. *Id.* at col. 1, ll. 29–34. In their opening brief, petitioners illustrate that phenomenon with a photograph made up of a large number of blocks of pixels, each block consisting of a small square with defined edges. *See* Appellants' Br. 5. Those edges are the "artifacts" described in the specification of the '651 patent. The '651 patent discloses that a deblocking filter can be

applied to "smooth out [the] edges" created by the squares in the photograph. *Id.* at 5–6.

Claim 1 is the only independent claim of the '651 patent. It recites:

> 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.

'651 patent, claim 1.

The dispute in this appeal relates to the second method step, which requires "determining the level of detail of the reconstructed video frame." *Id.* The specification discloses the following formula for calculating the level of detail in several of the embodiments of the '651 patent:

$$\sum_i \sum_j |v_{i+1,j} - v_{i,j}|,$$

where i is the number of rows in the region and j is the number of columns in the region. *Id.* at col. 3, ll. 46–57.

That calculation is commonly referred to as the "sum of absolute differences" or "SAD" calculation. *See id.* at col. 8, ll. 61–63. As applied to a particular region having a horizontal block boundary, the SAD calculation would require determining the absolute difference between each pair of vertically adjacent pixels and summing those differences.[1] *Id.* at col. 9, ll. 6–10. What results is a measure that approximates the level of variation among pairs of adjacent pixels within the region of interest.

The SAD calculation is explicitly recited in dependent claims 2 and 4 of the '651 patent. Those claims recite:

> 2. The method of claim 1, wherein the determination of the level of detail of the reconstructed video frame in a region in which the block boundary is located 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.
>
> 4. The method of claim 2, wherein the set of pixels is an 8x8 block that is evenly divided by the horizontal block boundary.

B

The petition for *inter partes* review of the '651 patent raised three grounds of invalidity. First, petitioners asserted that claims 1, 17, and 18 of the '651 patent were anticipated by U.S. Patent No. 6,504,873 ("Vehviläinen") and were therefore unpatentable under 35 U.S.C. § 102. Second, petitioners asserted that claims 1 and 17–19 of the '651 patent would have been obvious in view of Vehviläinen

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[1] The numerical value that corresponds to each pixel typically represents either the "chrominance" or the "luminance" of the pixel. *See* '651 patent, col. 3, line 56; *id.* at col. 4, line 1.

and were therefore unpatentable under 35 U.S.C. § 103. Third, petitioners asserted that claims 1, 2, 4, and 17–19 of the '651 patent would have been obvious in view of the combination of Vehviläinen and U.S. Patent Pub. No. 2004/0076237 ("Kadono") and were therefore unpatentable under section 103.

Like the '651 patent, the Vehviläinen reference discloses methods for deblocking compressed video files. The specification of Vehviläinen teaches that the choice of filter to be applied at a particular block boundary should be "based on the measurement of both edge variance [i.e., variance among a set of pixels closest to the block boundary] and variance inside the block [i.e., variance among a larger region of pixels within the block]. " Vehviläinen, col. 9, ll. 8–10.

Vehviläinen discloses two methods for calculating the variance across a region of pixels. First, Vehviläinen discloses a traditional formula for calculating variance:

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

Id. at col. 10, line 35. In that equation, N refers to the number of pixels in the region, x_i refers to the numerical value of a given pixel in the region, and $\bar{x}$ refers to the mean numerical value of all the pixels in the region. *Id.* at col. 10, ll. 40–43. The variance calculation compares the value of each individual pixel in the region with the average value of all the pixels in the region.

Vehviläinen notes that performing the "[n]ormal variance calculation is an exhausting operation," and therefore as an alternative it discloses the "min-max approximation," which it asserts is a simpler method for estimating the variance. *Id.* at col. 10, ll. 32, 43–45. The min-max approximation is defined by the following equation:

$$\hat{S}_{IN} = x_{\max} - x_{\min}$$

Id. at col. 10, line 47. In that calculation, x_{max} refers to the highest numerical value of all the pixels in the given region, and x_{min} refers to the lowest numerical value of all the pixels in the region. *Id.* at col. 10, ll. 52–55. That version of the variance calculation thus compares only the two pixels in the region that have the largest and smallest numerical values.

Kadono also discloses methods for deblocking compressed video files. In one embodiment, Kadono discloses comparing a series of pixels using "the sum of the absolute values of the difference[s]" between the pixels to determine whether to apply a "deblocking operation," and if so, which deblocking operation to apply. Kadono, ¶¶ 203–07.

In addition to disclosing the use of the SAD calculation, Kadono discloses an "omega threshold," which is a threshold that is used to determine whether a stronger filter can be applied once it is determined that a region is smooth. *Id.* at ¶ 125 ("[I]f the pixel difference is small . . . Ω is therefore preferably set so that a stronger filter . . . is applied based on whether the pixel difference is extremely low (less than Ω) . . . .").

C

In its Institution Decision, the Board construed the claim term "level of detail" to mean "level of variation in visual elements across adjacent pixels"; the Board reaffirmed that construction in its Final Written Decision. *Netflix Inc. v. DivX, LLC*, No. IPR2020-00052, 2021 WL 1582150, at *5 (P.T.A.B. Apr. 22, 2021). In adopting that construction, the Board relied upon a statement in the specification of the '651 patent indicating that that the term "detail" refers to "visual elements of a video frame

that vary significantly across adjacent pixels." *Id.* (quoting '651 patent, col. 1, ll. 55–57).

Applying that construction, the Board found that Vehviläinen did not anticipate claim 1 of the '651 patent because Vehviläinen did not disclose the "determining the level of detail" step of the claim. The Board reasoned that the variance calculation disclosed in Vehviläinen does not determine "the level of variation in visual elements *across adjacent pixels*." *Id.* at *9. In the Board's view, to conclude that Vehviläinen discloses that limitation would "eliminate[] 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*." *Id.*

The Board also found that there was no motivation to combine Vehviläinen with Kadono. The Board noted that "select[ing] a filter based on the differences between adjacent pixels [as in Kadono] rather than variance across the region would have been understood by an ordinarily skilled artisan as changing the basic principle of Vehviläinen's operation." *Id.* at *14. The Board reached that conclusion by relying upon language in the specification of Vehviläinen stating that "adjacent video pixels as such are not filtered in comparison with each other." *Id.* (quoting Vehviläinen, col. 2, ll. 41–45) (emphasis omitted). The Board did not address petitioners' separate argument that the omega threshold disclosed in Kadono could be combined with Vehviläinen. *See* J.A. 129–36.

II

On appeal, petitioners raise three issues: (1) whether the Board properly construed the term "level of detail"; (2) whether substantial evidence supports the Board's finding that Vehviläinen does not disclose the "determining the level of detail" step of claim 1; and (3) whether the Board erred in finding that a skilled artisan would not have been motivated to combine Vehviläinen with Kadono.

We review the Board's claim construction de novo and the Board's factual findings regarding anticipation and motivation to combine for substantial evidence. *See Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 769 (Fed. Cir. 2018).

With regard to the claim construction issue, petitioners argue that the Board applied an unduly narrow construction of the claim term "level of detail." Specifically, petitioners allege that in its analysis of Vehviläinen the Board construed "level of detail" to require calculation of the variation *between* adjacent pixels rather than *across* adjacent pixels. According to petitioners, the Board's construction had the effect of narrowing the method of determining "level of detail" to include only calculations based on the sum of absolute differences in the values between adjacent pixels.

We agree with petitioners that in construing the claim limitation "determining the level of detail . . . across a region in which the block boundary is located" the Board held that the method of claim 1 of the '651 patent required comparison of values between pairs of adjacent pixels. The Board's construction excluded Vehviläinen's calculation method because that method does not directly compare the value of any particular pixel to the value of an adjacent pixel. An examination of the language of claim 1 and the specification of the '651 patent leads us to conclude that claim 1 is not limited in that fashion.

By its terms, claim 1 is quite broad. The language of the claim is not specific as to the methodology to be used in the level-of-detail calculation, nor does it specify what type of filter should be applied based upon the determined level of detail. *See* '651 patent, claim 1. Rather, claim 1 simply provides that the level of detail is calculated "across a region in which the block boundary is located." *Id.*

Principles of claim differentiation indicate that the term "level of detail," as used in claim 1, encompasses more

than just the SAD calculation. The SAD calculation is recited in dependent claim 2 (and, by extension, in several other claims that depend from claim 2), which is strong evidence that claim 1 necessarily encompasses more subject matter than claim 2. *See Littelfuse, Inc. v. Mersen USA EP Corp.*, 29 F.4th 1376, 1380 (Fed. Cir. 2022) ("By definition, an independent claim is broader than a claim that depends from it . . . ."); *Intamin Ltd. v. Magnetar Techs., Corp.*, 483 F.3d 1328, 1335 (Fed. Cir. 2007) ("An independent claim impliedly embraces more subject matter than its narrower dependent claim.").

DivX suggested to the Board that claim differentiation does not apply in this case because there could be other methods for determining the level of variation between pairs of immediately adjacent pixels that do not use the SAD calculation. J.A. 3423. For instance, one might sum the squares of the differences between adjacent pixels or compute the sum of differences without taking the absolute value of those differences (as the SAD calculation requires). *See id.*

Both of those alternative calculation methods would appear to fall within the scope of claim 1 even under the Board's narrow interpretation of the scope of that claim. For that reason, DivX's argument demonstrates that claim differentiation does not fully resolve the claim construction issue. Nevertheless, the difference between claims 1 and 2 provides guidance as to the scope of claim 1 because claim 2 prescribes a specific methodology for determining the level of detail across a region of a video frame, while claim 1 does not.

The specification provides further insight into the meaning of the term "level of detail" as used in claim 1 of the '651 patent. It explains that "detail" refers to "visual elements of a video frame that vary significantly across adjacent pixels." *Id.* at col. 1, ll. 55–57. The specification offers that description in contrast to the term "smooth,"

which refers to "a region of a video frame where the [pixel values] either do not vary or vary gradually across adjacent pixels." *Id.* at col. 1, ll. 53–55.

Nothing in the specification indicates that the term "detail" was intended to require that the level-of-detail calculation involve a direct comparison between the values of immediately adjacent pixels. In light of the reference in claim 1 to determining the level of detail "across a region," the use of the phrase "across adjacent pixels" in the specification is best understood to refer to the degree of variation in pixel values across a region of contiguous pixels (i.e., a region in which each pixel is adjacent to at least one other pixel in the region), rather than being limited to a determination of variation based on direct comparisons of value between adjacent pairs of pixels.

The specification's use of the phrase "vary gradually across adjacent pixels" is instructive in this regard, as it suggests that determining whether a region is "smooth" or "detailed" depends on the degree of variation across a region of contiguous pixels. There is no reason that a system that does not rely on direct comparison of individual adjacent pixels, but instead compares the pixels in the region to some other reference point (e.g., the mean pixel value), would not be at least as capable of determining whether pixel values vary gradually across a region of contiguous pixels as a system that relies on an aggregation of the differences in value between individual adjacent pixels.

In light of the breadth of claim 1 and the discussion of the terms "detail" and "smooth" in the specification, we construe the claim term "level of detail" to mean "level of variation in visual elements across a region of pixels." Because the Board's construction of claim 1 was limited to a method that depended on determining the differences in value between pairs of adjacent pixels, we hold that the Board's interpretation of claim 1 was too narrow. We therefore vacate the Board's ruling on the validity of claim 1 and

remand this case for the Board to consider whether Vehviläinen discloses the "determining the level of detail" step of claim 1 under the proper construction of that step.

III

Petitioners also challenge the Board's finding that a skilled artisan would not have been motivated to combine Vehviläinen with the SAD calculation disclosed in Kadono. We hold that the Board's finding is supported by substantial evidence, and we therefore affirm the Board's decision on that issue.

Petitioners raise several objections to the Board's ruling on the motivation-to-combine issue. First, petitioners argue that the Board violated the Administrative Procedure Act ("APA") by relying on an argument not raised in the briefs. Second, they argue that the Board's finding that applying Kadono's SAD calculation would change the principle of operation of Vehviläinen is unsupported by substantial evidence. Third, they argue that the Board erred in excluding its arguments regarding "SIMD instructions." Fourth, they argue that the Board failed to address the petitioners' argument regarding Kadono's omega threshold.

A

In their APA argument, petitioners object to the Board's statement that using Kadono's SAD calculation would "chang[e] the basic principle of Vehviläinen's operation." *Netflix*, 2021 WL 1582150, at *14. Petitioners argue that the principle-of-operation line of reasoning was raised for the first time in the Board's Final Written Decision, and that they were denied an opportunity to respond to it. *See* Appellants' Br. 52–54.

Petitioners' argument focuses too narrowly on the Board's choice of language, and in particular the Board's use of the phrase "principle of operation." In its Patent Owner Response, DivX argued that there would be no motivation to combine Kadono with Vehviläinen, in part

because "Vehviläinen expressly seeks to avoid even the general type of filtering (low pass filtering) that both the ['651] Patent and Kadono utilize." J.A. 1779. DivX's expert, Dr. Chandrajit Bajaj, echoed that argument in his report, in which he noted that "Vehviläinen's filter application decision process matches its filter application process, and also does not analyze adjacent pixels in comparison with their adjacent pixels." J.A. 2100, ¶ 62. Those arguments are consistent with the Board's reasoning; the only difference is that they do not use the phrase "principle of operation." Accordingly, we reject petitioners' argument that the Board's conclusions represent a new argument to which they were denied an opportunity to respond.

B

Petitioners next argue that the Board's finding that Kadono would change Vehviläinen's principle of operation is unsupported by substantial evidence. Petitioners argue that "the only portion of the evidentiary record that even discusses or references the principle of operation for the 'level of detail'" is the testimony of their expert, Dr. Victor Michael Bove, in which he stated that replacing Vehviläinen's variance calculation with Kadono's SAD calculation "would not have changed the principle of operation for either reference." Appellants' Br. 54–55 (quoting J.A. 1131–32, ¶ 144). The Board, however, found that testimony "unpersuasive" due to "the inconsistencies between Dr. Bove's testimony and the teachings of Vehviläinen." *Netflix*, 2021 WL 1582150, at *15.

More generally, petitioners' argument suffers from the same flaw as their APA argument, which is that it focuses too narrowly on the specific phrase "principle of operation." Dr. Bajaj's report provides support for the Board's finding, as he notes that the filter selection approach in Vehviläinen (which relies on the variance calculation) is "exactly contrary" to the SAD calculation. J.A. 2100–2101, ¶ 62. We therefore hold that the Board's finding that

Kadono's SAD calculation would have changed the principle of operation of Vehviläinen is supported by substantial evidence.

C

Petitioners next argue that the Board improperly deemed their arguments regarding "single instruction multiple data" ("SIMD") instructions to be forfeited. Petitioners argued in their petition that "Kadono teaches performance optimizations to accelerate SAD calculations . . . on SIMD . . . processors." J.A. 128. In petitioners' view, a skilled artisan therefore "would have been motivated to apply Kadono's teaching to improve Vehviläinen[] . . . particularly for use on SIMD computer platforms." *Id.* Petitioners added in their reply brief before the Board that "[t]here are certain SIMD instruction sets that explicitly can calculate [SAD] in parallel on multiple pixels at on[c]e." J.A. 2670.

In its Final Written Decision, the Board held that DivX's arguments regarding SIMD instruction sets were forfeited because they were raised for the first time in reply. *Netflix*, 2021 WL 1582150, at *15 n.11. The Board did not hold that petitioners' arguments regarding SIMD processors in general were forfeited, as those arguments were raised in the petition. *See id.* at *15. We therefore do not agree with petitioners that the Board improperly excluded their specific arguments regarding SIMD *instructions*.

In any event, the Board held that "[e]ven if not forfeited, we are not persuaded that the use of [SIMD] instructions support a motivation to combine given our determination that use of Kadono's SAD calculation would change Vehviläinen's basic principle of operation." *Id.* at *15 n.11. As noted above, the Board's finding regarding Vehviläinen's principle of operation is supported by substantial evidence. In their briefing on appeal, petitioners have offered no reason to believe that the use of SIMD processors or instructions is enough to overcome the fact that

Kadono's SAD calculation method would significantly change the operation of Vehviläinen. *See* Appellants' Br. 61–62 (offering no argument other than that the Board's conclusion relies on the principle-of-operation analysis that petitioners allege was erroneous). Accordingly, the Board did not err in its treatment of petitioners' arguments regarding SIMD instructions.

D

Petitioners' final argument is that the Board failed to consider their alternative argument regarding the omega threshold disclosed in Kadono. In addition to their arguments regarding Kadono's SAD calculation, petitioners argue that Kadono's omega threshold could be used to provide additional filtering in very smooth regions as part of Vehviläinen's filter selection process. Petitioners correctly point out that the Board did not address their omega-threshold argument in its Final Written Decision. *See Netflix*, 2021 WL 1582150, at *14–16. The Board mentioned Kadono's omega threshold argument in its Final Written Decision, but only as part of its summary of petitioners' arguments. *Id.* at *12.

Petitioners' argument regarding Kadono's omega threshold, however, is different on appeal from the argument they raised before the Board. In their opening brief on appeal, petitioners argue that a skilled artisan could apply "Kadono's omega threshold, paired with Kadono's filter, to Vehviläinen Step 80 [of Figure 6] without altering Vehviläinen's other filters or detail calculations." Appellants' Br. 65. That argument is different from the argument petitioners made before the Board, where they argued that the proposed combination of Kadono and Vehviläinen "does not use Kadono's *filters*; it applies Kadono's *selection teachings* ([omega] threshold and SAD)." J.A. 2672. That distinction is important given the Board's reliance on the fact that Vehviläinen's variance calculation is closely tied to its choice of filter. *Netflix*, 2021 WL 1582150, at *14. The

suggestion that Kadono's filter might be used in a way that maintains Vehviläinen's primary principle of operation could change the motivation-to-combine analysis, but that argument was raised for the first time on appeal and is therefore forfeited.

Petitioners' arguments regarding the motivation to combine Kadono with Vehviläinen are unpersuasive. Because the petition challenged claims 2 and 4 only on the ground of obviousness in view of Vehviläinen and Kadono, we uphold the Board's decision rejecting petitioners' argument that those two claims are unpatentable.

IV

In summary, because the Board applied an improperly narrow construction of the term "level of detail" in claim 1 of the '651 patent, we vacate the Board's construction of that term along with its findings regarding whether Vehviläinen discloses the level-of-detail step of claim 1. Because the Board's finding that a skilled artisan would not be motivated to combine Vehviläinen with Kadono is supported by substantial evidence, we affirm the Board's decision as to dependent claims 2 and 4.

On remand, should the Board find that Vehviläinen discloses the level-of-detail step of claim 1 under the proper construction, it should address DivX's remaining arguments for finding that claim 1 is not unpatentable. *See* Appellee's Br. 65–66.

AFFIRMED-IN-PART, VACATED-IN-PART, AND REMANDED

COSTS

No costs.