PUBLIC VERSION

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Paper 42
Entered: May 14, 2020

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.*

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

PUBLIC VERSION

I. INTRODUCTION

Netflix Inc. ("Netflix) and Hulu, LLC, ("Hulu") (collectively "Petitioner") requested an *inter partes* review of claims 1, 2, 4, and 17–19 (the "challenged claims") of U.S. Patent No. 8,139,651 B2 (Ex. 1001, "the '651 patent"). Paper 1 ("Petition" or "Pet."). DivX, LLC ("Patent Owner") filed a Preliminary Response. Paper 13 ("Prelim. Resp."). With prior authorization, Petitioner filed a Reply to Patent Owner's Preliminary Response (Paper 17, "PR Reply") limited to addressing whether we should exercise our discretion to deny the Petition under 35 U.S.C. § 314(a), and Patent Owner filed a Sur-reply in response (Paper 20, "PR Sur-reply").[1]

Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted unless it is determined that there is a reasonable likelihood that the petitioner would prevail with respect to *at least one* of the claims challenged in the petition. Based on the information presented in the Petition and the supporting evidence, we are persuaded that there is a reasonable likelihood that Petitioner would prevail with respect to at least one of the challenged claims. Accordingly, we institute an *inter partes* review of claims 1, 2, 4, and 17–19 on the grounds set forth in the Petition.

Our factual findings and conclusions at this stage of the proceeding are based on the evidentiary record developed thus far. This is not a final decision as to patentability of the challenged claims. Any final decision will be based on the full trial record, including any response to the Petition timely filed by Patent Owner.

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[1] The Preliminary Response, Reply, and Sur-reply were filed under seal. Paper 13; Paper 17; Paper 20. The parties provide redacted versions of each paper in the record. Paper 24; Paper 18; Paper 26.

II. BACKGROUND

A. Related Proceedings

The ’651 patent is asserted in *DivX, LLC v. Netflix, Inc.*, Case No. 2:19-cv-01602 (C.D. Cal.), and *DivX, LLC v. Hulu, LLC*, Case No. 2:19-cv-01606 (C.D. Cal.). Pet. 87; Paper 5, 1. Unified Patents Inc. (“Unified”) has also filed an *inter partes* review petition relating to the ’651 patent (the “Unified IPR”), and we have instituted trial in that proceeding. IPR2019-01379, Paper 17 (Institution Decision).

B. The ’651 Patent (Ex. 1001)

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 issued on March 20, 2012. *Id.* at code (45).

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,” resulting in “artifacts at block boundaries when an encoded video frame is reconstructed.”[2] *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.

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[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.

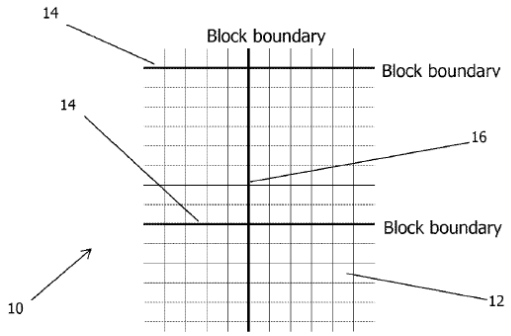

FIG. 1

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.

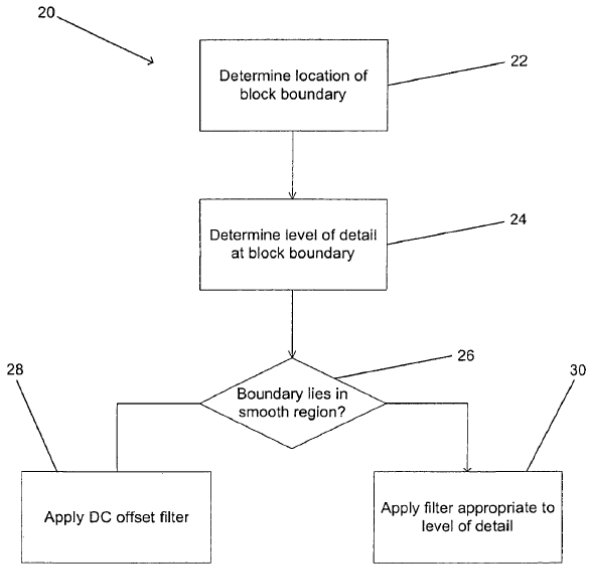

FIG. 2

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.

C. 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.

D. The Asserted Ground

Petitioner challenges claims 1, 2, 4, and 17–19 as follows, relying on the declaration testimony of Dr. Victor Michael Bove, Jr. (Ex. 1003). Pet. 9, 19–86.

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 5
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

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]

III. DISCRETIONARY DENIAL UNDER 35. U.S.C. § 314(a)

Patent Owner argues that the Petition should be denied under 35 U.S.C. § 314(a) in light of the *inter partes* review instituted with respect to the '651 Patent: *United Patents Inc. v. DivX, LLC*, IPR-2019-01379, Paper 17 (PTAB Feb 10, 2020). Prelim. Resp. 3–20; PR Sur-reply 1–7.

Institution of an *inter partes* review may be denied as a matter of discretion. *See Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016) ("[T]he agency's decision to deny a petition is a matter committed to the Patent Office's discretion."). In *General Plastic Industrial Co. v. Canon Kabushiki Kaisha*, the Board set forth seven non-exhaustive factors considered when assessing whether to exercise discretion to deny institution of a follow-on petition under § 314(a). IPR2016-01357, Paper 19 at 16 (PTAB Sept. 6, 2017) (precedential as to Section II.B.4.i). These factors are:

> 1. whether the same petitioner previously filed a petition directed to the same claims of the same patent;

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[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").

> 2. whether at the time of filing of the first petition the petitioner knew of the prior art asserted in the second petition or should have known of it;
>
> 3. whether at the time of filing of the second petition the petitioner already received the patent owner's preliminary response to the first petition or received the Board's decision on whether to institute review in the first petition;
>
> 4. the length of time that elapsed between the time the petitioner learned of the prior art asserted in the second petition and the filing of the second petition;
>
> 5. whether the petitioner provides adequate explanation for the time elapsed between the filings of multiple petitions directed to the same claims of the same patent;
>
> 6. the finite resources of the Board; and
>
> 7. the requirement under 35 U.S.C. § 316(a)(11) to issue a final determination not later than 1 year after the date on which the Director notices institution of review.

General Plastic, Paper 19 at 15–16 (citing *NVIDIA Corp. v. Samsung Elec. Co.*, IPR2016-00134, Paper 9 at 6–7 (PTAB May 4, 2016)). We address each factor below.

A. Factor 1: Previously Filed Petitions Against the Same Claims

Under *General Plastic*, we first assess "whether the same petitioner previously filed a petition directed to the same claims of the same patent." *General Plastic*, Paper 19 at 15–16. In *Valve Corp. v. Electronic Scripting Products, Inc.*, the Board expanded the scope of this factor, holding that "our application of the *General Plastic* factors is not limited solely to instances when multiple petitions are filed by the same petitioner." IPR2019-00062, Paper 11 at 9 (PTAB Apr. 2, 2019) (precedential). Where, as here,

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 7
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

"different petitioners challenge the same patent, we consider any relationship between those petitioners." *Id*.

1. Relationship Between Petitioner and Unified

Patent Owner argues that Netflix and Hulu are members of Unified and have paid Unified for subscription to particular technology zones. Prelim. Resp. 7 (citing Exs. 2032, 2033). Patent Owner alleges that "[i]n return, time and again, soon after a patent has been asserted against Hulu and/or Netflix, Unified has filed a petition against that patent, followed closely by a second petition by Hulu and/or Netflix against the same patent." *Id.* at 7–8 (citing Ex. 2005). Patent Owner asserts that it served complaints against Netflix and Hulu for patent infringement in March 2019, Netflix renewed its subscription to Unified's "Video Codec Zone" on June 1, 2019 by paying a significant amount in subscription fees, and Unified filed its *inter partes* review ("IPR") on the '651 patent less than two months later. *Id.* at 7 (citing Ex. 2002, 2003, 2004, 2033). Patent Owner therefore contends that the two separate petitions by Petitioner and Unified are in fact "coordinated multiple petitions," and that this *General Plastic* factor should weigh strongly against institution. *Id.* at 13–16.

Patent Owner further argues that "the relationship between the petitioners in the two cases is even more significant" than the one found in *Valve* because "petitioners in the two *Valve* petitions at least had independent interests in challenging the patent," as they were co-defendants accused of infringement of the same patent. *Id.* at 15. Here, Patent Owner contends, Unified has no independent interest in challenging the patent, and should be viewed as indistinguishable from Petitioner for purposes of its parallel petition. *Id.*

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 8
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

Petitioner responds that they, Hulu and Netflix, are entirely distinct entities from Unified, and "have no control over the Unified petition, did not participate or provide input into the Unified petition, and had no knowledge of the petition until after it was filed." PR Reply. 2. Petitioner agrees that Netflix and Hulu are Unified members but Petitioner points out that Unified has numerous members, and their agreement with Unified REDACTED [redacted] *Id.* at 3 (emphasis omitted) (citing Ex. 1012, 5). Petitioner further contends that Netflix and Hulu have no "shared products, offering, management, or ownership" with Unified, and "provide different offerings" from Unified. *Id.* at 4. Unified, Petitioner argues, "acts independently of its members" and "has filed over 180 IPRs over the last seven years, including 43 IPRs in 2019 alone." *Id.* at 5.

The circumstances in the present case are distinguishable from those in *Valve* and other Board decisions that Patent Owner relies on. *See* Prelim. Resp. 4. In *Valve*, the two petitioners were codefendants in a single patent infringement proceeding and the challenged patent had been asserted against both because one petitioner had licensed the allegedly infringing technology from the other petitioner. *Valve*, Paper 11 at 9–10. The first petitioner, HTC, made accused devices that incorporated technology licensed from the second petitioner, Valve, who had also provided HTC with technical assistance during the development of the accused devices. *Id.* at 10. Consequently, the panel in *Valve* found a "significant relationship" between the petitioners that favored denying institution. *Id.*

Likewise, in *PayPal, Inc. v. IOENGINE, LLC*, the Board found a sufficiently significant relationship between petitioners Ingenico Inc. ("Ingenico") and PayPal, Inc. ("PayPal") where Ingenico had supplied products accused of infringement by the patent owner to PayPal under an indemnification agreement and had filed a declaratory judgment action in district court seeking a declaration that Ingenico and PayPal did not infringe the challenged patent. IPR2019-00884, Paper 22, at 11 (PTAB Oct. 3, 2019).[6]

Here, there is no business relationship involving the accused products or technology between Unified and Petitioner. Netflix and Hulu are members of Unified and their agreement with Unified requires Unified REDACTED [redacted][7] Ex. 1012, REDACTED. As

[6] In *Fresenius Kabi USA, LLC v. Amgen Inc*., the two petitioners sought "to facilitate joint consideration [of the two petitions] by the Board," and were *willing* to coordinate the two challenges. IPR2019-00971, Paper 13 at 7 (PTAB Oct. 16, 2019). Other cases cited by Patent Owner (Prelim. Resp. 4) involved the same petitioner filing multiple petitions and are inapplicable to our consideration of *General Plastic* factor one. *See Volkswagen Grp. of Am., Inc. v. Carucel Invs., LP*, IPR2019-01106, Paper 8 (PTAB Dec. 2, 2019); *Apple Inc. v. Zomm, LLC*, IPR2019-01030, Paper 8 (PTAB Nov. 14, 2019).

[7] Patent Owner refers to these micro-pools as technology zones and asserts that Netflix has subscribed to the "Video Codec" micro-pool that includes the '651 patent. Prelim. Resp. 7 (citing Ex. 2033, 2004). Petitioner does not dispute these facts. *See generally* Reply.

Petitioner points out, however, the micro-pool membership gives Unified REDACTED [redacted]. *Id.* REDACTED [redacted]. REDACTED [redacted] *Id.* Although we agree with Patent Owner that Unified is incentivized by its subscription fees to challenge patents asserted against its members and has challenged at least eight patents asserted against Petitioner in the past, that alone does not create the type of "significant relationship" that was found in *Valve* to favor denying institution.[8] And while Unified undoubtedly has interests in reducing patent litigation against its members, those interests, unlike the interests of a licensor of accused technology, are not *closely* aligned with Petitioner's interests with respect to accused products and asserted patents. *Cf. Netflix, Inc. v. Uniloc 2017 LLC*, IPR2020-00041, Paper 10 at 12 (PTAB Mar. 25, 2020) (finding this factor to weigh against exercising discretion to deny institution where the only relationship between the two petitioners was litigation-based). Unified's relevant micro-pool or technology zone, which determines the actions that Unified takes to support its subscribers, is broadly defined such that the technology in the "video codec" micro-pool does not necessarily implicate the same technology as the deblocking filter invention claimed in the '651 patent. Moreover, only one of the two

[8] *See, e.g.*, *Mercedes-Benz USA, LLC v. Carucel Investments, L.P.*, IPR2019-01404, Paper 12 at 12–13 (PTAB Jan. 22, 2020) (finding petitioner's membership in Unified did not amount to a relationship that justifies discretionary denial in light of other *General Plastic* factors); *Apple, Inc. v. Uniloc 2017 LLC*, IPR2019-01667, Paper 7 at 7–8 (PTAB Apr. 21, 2020).

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 11
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

petitioners here, Netflix, subscribes to the video codec micro-pool. Ex. 2032, 2033.

2. Overlapping Claims Between the Two Petitions

General Plastic factor one also involves consideration of any overlap in the claims challenged between the two petitions. *Valve*, Paper 11 at 10; *General Plastic*, Paper 19 at 16. In *Valve*, the two petitioners at issue had filed separate petitions that each challenged the *same* claims of the same patent. *Id*. Here, Petitioner argues that the two petitions "are not directed to the same set of claims: the Unified petition challenges claims 1 and 17, whereas the instant petition challenges claims 1, 2, 4, and 17-19." PR Reply 5. Patent Owner responds that that small difference is not substantial enough to favor institution. Prelim. Resp. 16 (citing *PayPal*, Paper 22 at 11).

In *PayPal*, the Board found the existence of *five* non-overlapping claims as compared to *23* overlapping claims between the two petitions not to be substantial enough to tip the first factor to favor instituting trial. *PayPal*, Paper 22 at 11. Because none of the non-overlapping claims were being asserted against the second petitioner in the district court proceedings, the Board discerned no prejudice to that petitioner from a discretionary denial. *Id.*

Here, in contrast, Petitioner challenges four claims in addition to the two claims overlapping with the earlier petition, and three of those four are claims that Patent Owner has asserted against Petitioner in the infringement proceeding. *See, e.g.*, *DivX, LLC v. Netflix, Inc.*, No. 2:19-cv-01602, Dkt. 94, at 3 (C.D. Cal. Mar. 13, 2020) (listing claims 1, 2, and 17–19 of the '651 patent as asserted by DivX against Netflix).

3. Factor One Conclusion

In sum, the present case involves different petitioners, challenging different sets of claims of the ’651 Patent, who have not been shown to have the type of significant relationship relevant to the present case as was found in *Valve*. Thus, we determine that the first *General Plastic* factor does not support denial of the Petition.

B. Factor 2: Knowledge of the Prior Art

We next evaluate “whether at the time of filing of the first petition the petitioner knew of the prior art asserted in the second petition or should have known of it.” *Gen. Plastic*, IPR2016-01357, Paper 19 at 16. The concern in *General Plastic* was whether the petitioner, in filing a second petition, relied on prior art that it should have asserted in the first petition because it knew, or should have known, about that prior art when filing the first petition. *See id.* at 20–21. The scope of this factor also was expanded in *Valve*, where the panel found that the second petitioner “knew or should have known” of certain prior art asserted in its petition around the time the first petition was filed because one reference “was one of the two references relied upon” by the first petitioner, and other references were “attributable” to prior art asserted by the first petitioner. *Valve*, IPR2019-00062, Paper 11 at 11. In other words, although the second petitioner in *Valve* did not file the first petition, its knowledge of the prior art asserted in that first petition at about the time the first petition was filed weighed in favor of denying the second petition based on the same art or closely related art. *See id*.

Here, the present Petition relies on *entirely different prior art* compared to the Unified petition. Patent Owner argues that because both of Petitioner’s references are published U.S. patents, a diligent search would

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 13
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

have revealed those references at the time of the filing of Unified's petition. Prelim. Resp. 17. Because Petitioner's asserted art is unrelated to the references in the Unified IPR, and it is unclear that the art could have been found with reasonable diligence, Patent Owner's argument that Petitioner should have known of the art at the time Unified filed its petition is of limited relevance under *Valve*. Patent Owner further alleges that Petitioner knew of the prior art asserted in the present case because Unified provides its members exclusive access to searchable databases of prior art. *Id.* at 18 (citing Ex. 2006). There is nothing in the record, however, to suggest that the asserted references can in fact be found in Unified's databases and Patent Owner's allegation is unsupported by evidence of record. Consequently, we determine the second *General Plastic* factor does not weigh in favor of denying the Petition.

C. Factor 3: Prior Preliminary Response or Institution Decision

Next, we consider "whether at the time of filing of the second petition the petitioner already received the patent owner's preliminary response to the first petition or received the Board's decision on whether to institute review in the first petition." *Gen. Plastic*, IPR2016-01357, Paper 19 at 16. This factor is "directed to Petitioner's potential benefit from receiving and having the opportunity to study Patent Owner's Preliminary Response . . . prior to its filing of follow-on petitions." *Id.* at 17.

There is no dispute that the Petition was filed before the preliminary response was filed, or the institution decision was issued, in the Unified IPR. Consequently, we agree with Petitioner that the third *General Plastic* factor weighs against denying the Petition. *See* PR Reply 5–6.

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 14
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

D. Factors 4 & 5: Delay in Filing Petition

We next examine "the length of time that elapsed between the time the petitioner learned of the prior art asserted in the second petition and the filing of the second petition" (factor 4), and "whether the petitioner provides adequate explanation for the time elapsed between the filings of multiple petitions directed to the same claims of the same patent" (factor 5). *Gen. Plastic*, IPR2016-01357, Paper 19 at 16. In other words, we assess whether Petitioner unreasonably delayed filing the Petition in light of when it became aware of the prior art it would assert, and in light of the filing date of another petition challenging "the same claims of the same patent." *See id*.

The Petition was filed on October 18, 2019. Paper 4, 1. As discussed above, the record before us does not support Patent Owner's contention that Petitioner was aware, or should have been aware, of all but one of the prior art references asserted in the Petition as of July 2019. *See* Prelim. Resp. 20. Petitioner argues that the Petition was filed well within the one-year time frame from the date of service of the complaint in the district court litigation and less than three months after Unified's petition. PR Reply 7. Petitioner further points out that instead of filing separate petitions, Netflix and Hulu chose to file a single combined petition for the '651 patent. *Id.* Given that this petition was filed within three months of Unified's petition, we are not persuaded that the delay was unreasonable considering the additional claims challenged and grounds asserted in this petition. *Cf. Valve*, IPR2019-00062, Paper 11 at 14 (holding that a delay of *five* months after the filing of a prior petition weighed in favor of a discretionary denial of the later petition). Thus, we determine the fourth and fifth *General Plastic* factors do not weigh in favor of denying the Petition.

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 15
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

E. Factors 6 & 7: Board Resources and Statutory Deadlines

Finally, we consider "the finite resources of the Board" (factor 6), and "the requirement under 35 U.S.C. § 316(a)(11) to issue a final determination not later than 1 year after the date on which the Director notices institution of review" (factor 7). *Gen. Plastic*, IPR2016-01357, Paper 19 at 16. "The sixth and seventh factors are efficiency considerations." *Valve*, IPR2019-00062, Paper 11 at 15. "In general, having multiple petitions challenging the same patent, especially when not filed at or around the same time as in this case, is inefficient and tends to waste resources." *Id*.

Petitioner argues that if the Board denies institution, the prior art grounds asserted in the Petition "will have to be considered by two separate juries" in the district court cases against Hulu and Netflix, "which is markedly less efficient." PR Reply 6. Patent Owner responds that a final written decision in this IPR may not issue in time to preclude a jury trial on validity in each district court case. PR Sur-reply. 6.

Unlike *Valve*, Netflix and Hulu joined to file only the present petition and filed no other petitions against the '651 patent. Also, unlike *Valve*, Netflix and Hulu did not unduly delay filing their joint petition until after an *inter partes* review was instituted on the Unified IPR. Moreover, trial in district court is presently scheduled for April 27, 2021, *around the same time as* the statutory deadline for issuing a final written decision in this proceeding.

Having two petitions challenging the '651 patent, not filed at the same time, is indeed inefficient, and given that the Unified IPR was instituted a few months ago, coordination of the two cases would be difficult. The two petitions, however, challenge different sets of claims based on different prior

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 16
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

art, with the instant Petition challenging some claims asserted against Petitioner that are not challenged in the Unified IPR. We therefore determine that the sixth and seventh *General Plastic* factors also do not weigh in favor of denying the Petition.

F. Conclusion Regarding § 314(a)

As explained above, we determine that none of the *General Plastic* factors weigh in favor of denying the Petition. Consequently, we conclude that the facts and circumstances here do not warrant denial of the Petition under the discretion provided under § 314(a).

IV. 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 shifts to Patent Owner. *See 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. *See 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

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 17
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

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 analysis "need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007); *accord In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007). However, 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

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 18
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

combined the prior art references. *In re NuVasive*, 842 F.3d 1376, 1382 (Fed. Cir. 2016).

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 to establish a reasonable likelihood of prevailing 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 contends 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). Patent Owner does not propose any particular skill level in response. *See generally* Prelim. Resp.

We determine, on the current record, that the level of ordinary skill proposed by Petitioner is consistent with the ’651 patent and the asserted prior art. We adopt that level in deciding whether to institute trial, except that we delete the qualifier “at least” to eliminate vagueness as to the amount of practical experience. The qualifier expands the range indefinitely without

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 19
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

an upper bound, and thus precludes a meaningful indication of the level of ordinary skill in the art. We will make a final determination as to the level of ordinary skill in the art, however, based on the full trial record.

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); 83 Fed. Reg. 51,340, 51,340–41, 51,343 (Oct. 11, 2018). 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.

Petitioner proposes constructions for two claim terms: "determining the level of detail" and "pixels on either side of the block boundary." Pet. 14–17. Patent Owner proposes construction for the "level of detail" term. Prelim. Resp. 22–23. For purposes of this Decision, we determine that only the "level of detail" term requires construction.

1. "level of detail"

Claim 1 recites, *inter alia*, "determining the level of detail of the reconstructed video frame across a region in which the block boundary is located." Ex. 1001, 13:12–14. Petitioner proposes construing the term "determining the level of detail" as at least including "determining the level of detail based on the level of variation across pixels." Pet. 15 (citing Ex. 1003 ¶ 81; Ex. 1001, 1:45–62, 10:13–26). According to Petitioner, some of the dependent claims further require this "determining" step to comprise calculations based on the sum of absolute differences ("SAD") between

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 20
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

pixels, and a person of ordinary skill in the art would have understood that such calculations look to the differences, i.e., variation, across pixels. *Id.* (citing Ex. 1001, Claim 2, 3:47–6:8; Ex. 1003 ¶ 81).

Patent Owner disagrees with Petitioner's proposed construction and contends that "level of detail" should be construed as "level of change of visual elements across adjacent pixels" because the disclosed embodiments "all assess change of visual elements across adjacent pixels, for example by taking the sum of the absolute difference for adjacent pixels." Prelim. Resp. 16–17 (citing Ex. 1001, 3:41–42, 4:32–33). According to Patent Owner, the specification expressly defines the claimed "detail" as "typically used to describe visual elements of a video frame that vary significantly across adjacent pixels." *Id.* at 16 (quoting Ex. 1001, 1:55–57).

We must determine the meaning of "level of detail" in the '651 patent by looking to the "intrinsic evidence of record, i.e., the patent itself, including the claims, the specification and, if in evidence, the prosecution history." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996) (explaining that the specification "is the single best guide to the meaning of a disputed term"). The specification explains that "detail" refers to visual elements that vary significantly across adjacent pixels, providing examples such as chrominance or luminance values. Ex. 1001, 1:55–57, 2:5–7, 3:56–57, 4:1–2. The specification further supports that the calculation of the variation is done for *adjacent* pixels. *See e.g.*, *id.* at 3:34–36, 3:41–42, 4:32–33. As Petitioner points out, dependent claim 2 also recites determining "the sum of the absolute difference of at least some of the pixels within a set of pixels *surrounding* the block boundary." *Id.* at 13:25–27 (emphasis added). The written description of the '651 patent

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 21
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

therefore supports construing the term "level of detail" as "level of variation in visual elements across adjacent pixels," as Patent Owner proposes, and we adopt this construction at this stage of the proceeding. We invite the parties to address the construction of this limitation further at trial.

2. Remaining Claim Terms

We have given all remaining claim terms their ordinary and customary meaning, and determine that it is not necessary to explicitly construe any other term or phrase. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy.'")).

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.

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 22
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

Figure 5A of Vehviläinen is reproduced below.

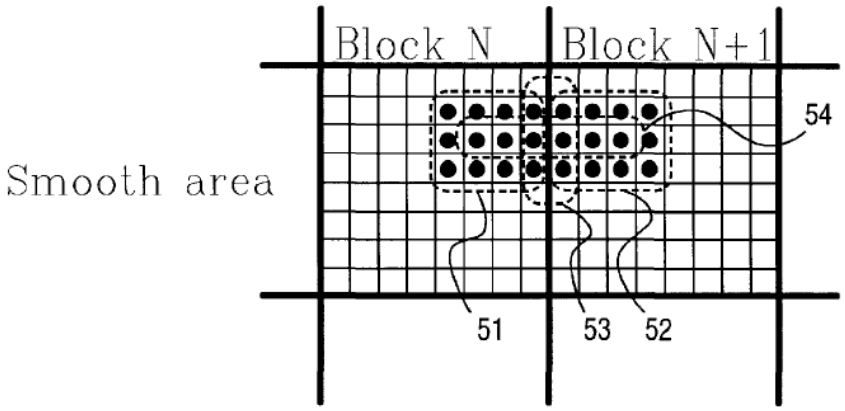

Figure 5A

Figure 5A, above, illustrates a pixel area that is used for calculation of picture activity within an area of the video frame. *Id.* at 4:12–13. Vehviläinen discloses calculating variance across a region using a method called min-max approximation, defined by the equation:

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

using the difference between the largest and smallest pixel value within a given set of pixels. *Id.* at 10:44–55. 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.

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 23
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

Figure 6 of Vehviläinen is reproduced below.

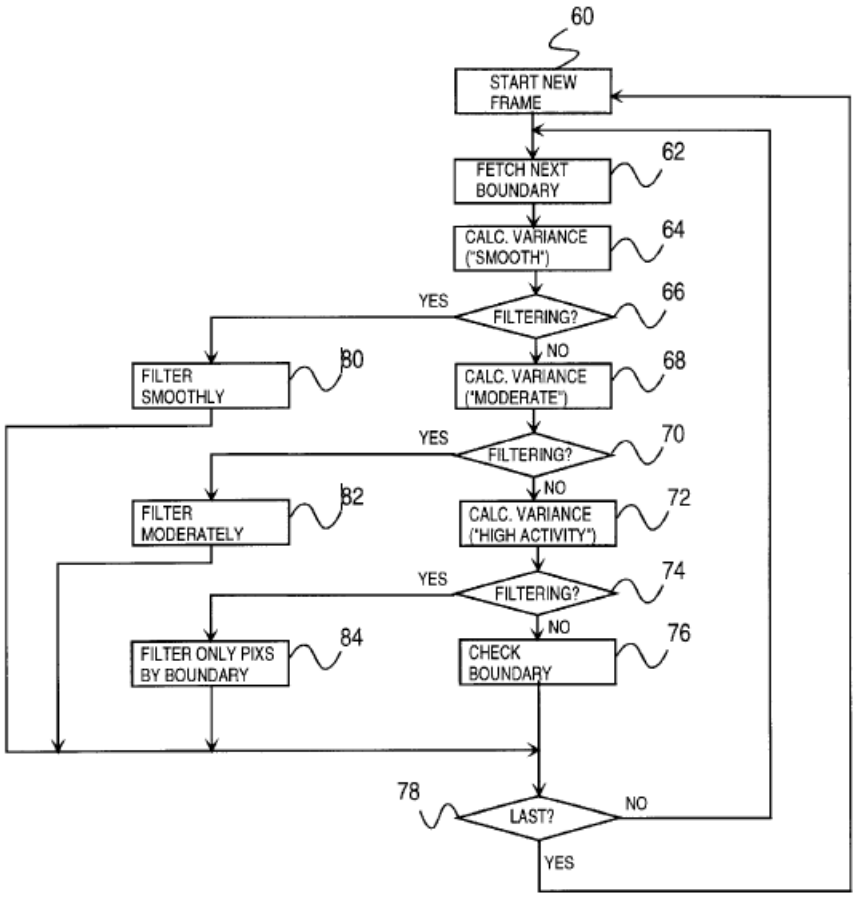

Figure 6

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:

$$IF \begin{bmatrix} activity_{IN} < activity_{EDGE} + MQUANT \\ AND \\ activity_{IN} < THRESHOLD_{IN} \end{bmatrix} = TRUE$$

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.

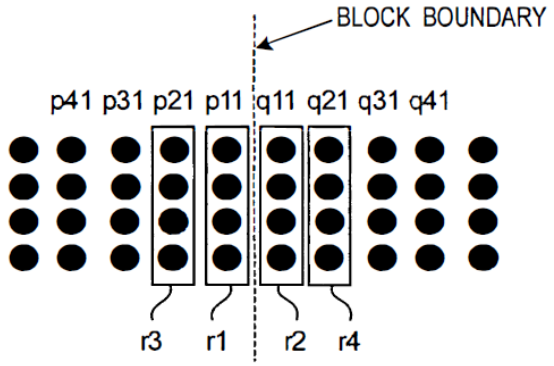

Figure 19, above, illustrates groups of four pixels r1 and r2 that Kadono's process compares to determine the level of deblocking to be applied to the pixels on either side of the block boundary. *Id.*

Figure 6 of Kadono is reproduced below.

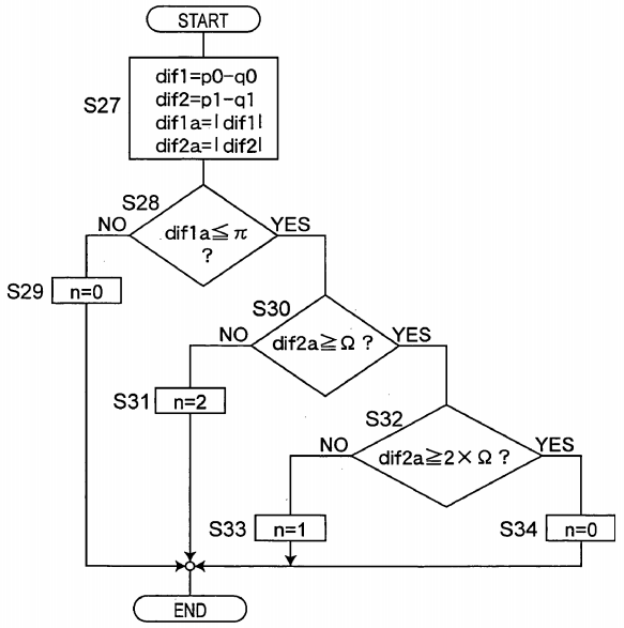

Figure 6, above, is a flowchart showing how the level of filtering to be applied to pixels is determined based on a comparison of the difference between pixel values on either side of a block boundary to a threshold value, Ω, according to one of Kadono's embodiments. *Id.* ¶¶ 120–129, Figs. 6, 8(b).

E. Obviousness over Vehviläinen

Petitioner contends that claims 1 and 17–19 are unpatentable under 35 U.S.C. § 103 as obvious over Vehviläinen. Pet. 19–52. Petitioner argues that Vehviläinen renders the claims obvious with teachings regarding, for example, particular details for calculating the level of detail and reducing the number of branches in its algorithm, which Dr. Bove testifies would have been obvious to an ordinarily skilled artisan. *Id.* at 19 (citing Ex. 1003 ¶ 99). For the reasons that follow, we are persuaded that the evidence, including Dr. Bove's testimony, sufficiently supports Petitioner's arguments

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 26
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

and therefore establishes a reasonable likelihood that Petitioner would prevail with respect to this ground at this stage of the proceeding.

1. Independent Claim 1

a) "A method of deblocking a reconstructed video frame, comprising:"

Petitioner contends that the preamble of claim 1 would have been obvious in view of Vehviläinen. Pet. 19–52. Petitioner asserts that Vehviläinen teaches a method for deblocking a video frame to reduce the blocking effect in reconstructed video frames. Pet. 29 (citing Ex. 1004, 1:36–44, 4:33–36, 4:37–55, 5:27–30; Ex. 1003 ¶¶ 109–110). Patent Owner does not specifically respond to these arguments.[9] *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that the information presented sufficiently supports, for purposes of institution, Petitioner's assertions relating to the preamble of claim 1.[10]

b) "identifying a boundary between two blocks of the reconstructed video frame"

Petitioner contends that Vehviläinen teaches this claim limitation because Vehviläinen describes two video blocks with a boundary in between. Pet. 30–31 (citing Ex. 1004, 2:63–3:6, 3:28–36, Figs. 3A–3F, 4, 5A; Ex. 1003 ¶ 111). Petitioner further assets that Vehviläinen addresses artifacts where "the boundaries between the different video blocks after

[9] Regardless of Patent Owner's response, the burden of persuasion remains with the Petitioner. *See Dynamic Drinkware*, 800 F.3d at 1378 (discussing the burdens of proof in *inter partes* review).
[10] At this stage of the proceeding, we do not decide whether the preamble of claim 1 is limiting.

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 27
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

decoding appear visible impairing the quality of the video signal presented." *Id.* at 32–33 (citing Ex. 1004, 1:36–44; Ex. 1003 ¶ 112).

Patent Owner does not specifically respond to these arguments. *See generally* Prelim. Resp. Based on our review of the current record, we determine that the information presented supports sufficiently, for purposes of institution, Petitioner's assertions as to this limitation.

> *c) "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;"*

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). Petitioner reproduces an annotated version of Vehviläinen's Figure 5A (*id.* at 34), as shown below.

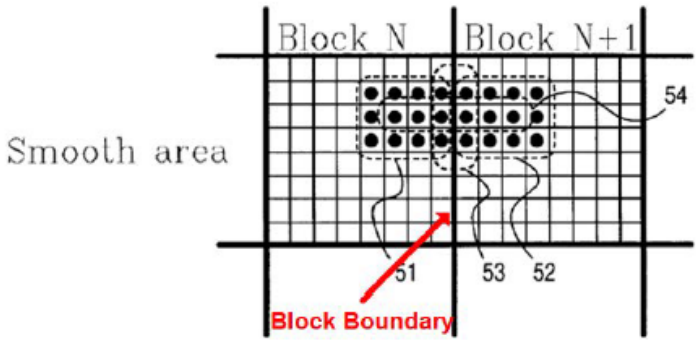

Figure 5A
(Annotations added)

Petitioner's annotated Figure 5A of Vehviläinen, above, show an 8 x 3 pixel area 54, comprising *two* adjacent regions 51 and 52 on either side of a

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 28
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

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.*

(1) Determining the level of detail of the reconstructed video frame across a region in which the block boundary is located

Petitioner asserts that Vehviläinen teaches a "min-max approximation" of pixel variance, which takes the difference between the largest and smallest pixel values in each area, i.e., first the left side of the block boundary, labelled 51, then the right side of the block boundary, labelled 52, and then averages the two variance calculations into a single variance value, $activity_{IN}$, for the area. *See* Pet. 33–34 (citing Ex. 1004, 11:29–46, 11:56–12:10, Fig. 5A; Ex. 1003 ¶ 115) (discussing also the numerical examples provided by Vehviläinen for each of those calculations). Petitioner further asserts that Vehviläinen's method calculates variance at the boundary, $activity_{EDGE}$, with the six pixels immediately adjacent to the block boundary, labelled (53). *Id.* According to Petitioner, as shown in equation 2, the variance parameter, $activity_{IN}$, is then used in comparison to the $activity_{EDGE}$ and MQUANT values, as well as in comparison to $THRESHOLD_{IN}$, to determine whether to apply a smooth filter. *Id.* at 35–36. 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

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 29
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

in Figure 5A) by taking an average of the variance calculations in the region. Pet. 36 (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 (quoting Ex. 1003 ¶ 120) (listing exemplary pseudocode from Dr. Bove).

Patent Owner responds that "Vehvilainen utilizes a statistical 'variance' calculation (dubbed '$activity_{IN}$') to determine whether or not to apply a particular filter to a particular region, precisely so that it will not analyze pixels with reference to their adjacent pixels, as the [c]laim requires." Prelim. Resp. 24 (citing Ex. 1004, 9:51–67). Patent Owner argues that Vehviläinen's "min-max approximation" method "simply takes the difference between the highest value pixel and the lowest value pixel in a region of six to twelve pixels," and "has nothing to do with the level of change of visual elements across adjacent pixels." *Id.* at 25–26 (citing Ex. 1004, 10:32–55).[11]

[11] Patent Owner further argues that Vehviläinen's "normal variance calculation" method "performed according to equation 3" fails to disclose

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 30
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

We are not persuaded, at this juncture, that Vehviläinen fails to teach or suggest determining the level of detail under our preliminary construction of the term "level of detail." With reference to Figure 5A, Vehviläinen discloses separate "variance calculation" for the 12 pixels on the left side of the block boundary, labelled 51, and the 12 pixels on the right side of the block boundary, labelled 52. Ex. 1004, 11:29–38. The variance is calculated by comparing *each* of the 12 video pixels. *Id.* at 11:33–35. Patent Owner's argument that Vehviläinen's variance calculation has nothing to do with the level of change of visual elements across adjacent pixels does not sufficiently explain why a person of ordinary skill in the art would not have understood the min-max approximation method as teaching or suggesting variance calculation across all of the pixels in a given area. Patent Owner does not dispute, for example, that the marked pixels within areas labelled 51 and 52 are not adjacent to each other or adjacent to the block boundary.[12] To the extent Patent Owner argues that the calculation of the level of detail is limited to the specific equation disclosed in the '651 patent specification (Prelim. Resp. 25 (citing Ex. 1001, 3:50)), we decline to limit the claim in that manner.

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the claimed "determining the level of detail" limitation because it compares the value of each pixel to the *average* value of all pixels in the region and not to other pixels in the region. Prelim. Resp. 25 (citing Ex. 1004, 10:35, 10:43). We do not address that argument because Petitioner does not rely on that method as teaching the determining step. *See* Pet. 33–39.

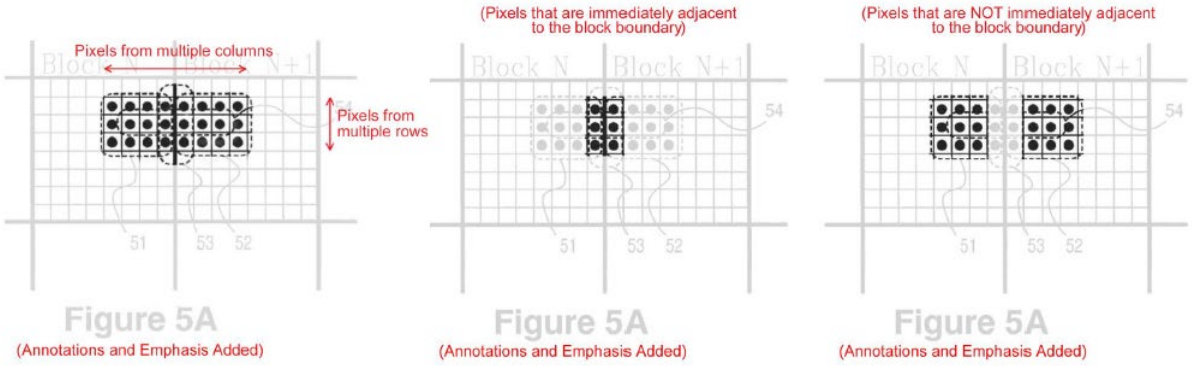
[12] Notably, while the group of pixels in area 51 over which variance is calculated extends across four columns in Figure 5A, Vehviläinen also discloses using the same method with just two columns of pixels for high-activity regions. Ex. 1004, 11:56–12:3, Fig. 5C; Pet. 36 (citing Ex. 1003 ¶ 115).

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 31
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

Moreover, claim 1 requires "*determining the level of detail* of the reconstructed video frame *across a region* in which the block boundary is located." Ex. 1001, 13:12–14 (emphasis added). As discussed below (*infra* Section IV.E.1.c.2), Petitioner identifies the pixels marked in Figure 5A, i.e., the combined region of areas labelled 51 and 52, as the claimed region. Pet. 39–40. For the purposes of this decision, we determine that Petitioner has presented sufficient information, including the supporting testimony of Dr. Bove, to show that a person of ordinary skill in the art would have found it obvious to apply Vehviläinen's teaching of the variance calculations to determine the level of detail across the *entire* region *containing all marked pixels* in Figure 5A, i.e., not just the two separate areas on either side of the block boundary. *Id.* at 35–36 (citing Ex. 1003 ¶ 116).

(2) Vehviläinen's disclosure of the claimed "region"

Petitioner argues that the pixels marked in Figure 5A and 5C of Vehviläinen teach the claimed region, including pixels from multiple rows and multiple columns of the reconstructed video frame. *Id.* at 39–43 (citing Ex. 1004, Figs. 5A, 5C; Ex. 1003 ¶¶ 122–125). Petitioner illustrates the proposed region by annotating Figure 5A (*id.* at 40, 41), reproduced below.



Petitioner's annotated Figure 5A of Vehviläinen, above, shows Petitioner's various annotations showing a region comprising (1) pixels from multiple

columns and multiple rows, (2) pixels that are immediately adjacent to the block boundary, and (3) pixels that are not immediately adjacent to the block boundary. *Id.* at 41 (citing Ex. 1004, Fig. 5A; Ex. 1003 ¶ 123). Petitioner therefore asserts that Vehviläinen teaches the region recited in claim 1. *Id.* at 41. Patent Owner does not specifically respond to these arguments. *See generally* Prelim. Resp. Based on our review of the current record, we determine that the information presented supports sufficiently, for purposes of institution, Petitioner's assertions as to this limitation under Petitioner's obviousness ground.

d) "selecting a filter to apply to predetermined pixels on either side of the block boundary based upon the determined level of detail."

Petitioner contends Vehviläinen teaches this limitation because it discloses "selecting a filter (the smooth filter) to apply to predetermined pixels on either side of the block boundary based on the level of detail ($activity_{IN}$)." Pet. 43 (citing Ex. 1004, Fig. 6; Ex. 1003 ¶ 126). Petitioner contends that in steps 66 and 80 of Figure 6, "Vehviläinen selects the smooth filter based on the determined level of detail by comparing $activity_{IN}$ to thresholds in Equation (2), and if the comparison is true, the smooth filter is selected (Step 80)." *Id.* at 44 (citing 1004, 9:51–10:9, 11:29–12:10; Ex. 1003 ¶ 127). Petitioner asserts that the "smooth filter is applied to predetermined pixels on both sides of the block boundary—the predetermined set of '6 pixels (ref. 54 in FIG. 5A).'" *Id.* at 45 (citing Ex. 1004, 11:46–50, Fig. 4; Ex. 1003 ¶ 128); *see also id.* at 46 (discussing how the moderate and high-activity filter is selected and applied).

Patent Owner does not specifically respond to these arguments. *See generally* Prelim. Resp. Based on our review of the current record, we

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 33
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

determine that the information presented supports sufficiently, for purposes of institution, Petitioner's assertions as to this limitation.

2. Dependent Claims 17–19

Petitioner alleges that claim 17 also would have been obvious in view of Vehviläinen. *See* Pet. 47–48 (citing Ex. 1004, 9:54–67; Ex. 1003 ¶ 132). In part, Petitioner argues that Vehviläinen teaches the additional limitation recited in claim 17 because it describes comparing the determined level of detail ($activity_{IN}$) to two different thresholds in equation (2), and either of those two threshold comparisons satisfies the requirement of claim 17. *Id.* (citing Ex. 1003 ¶ 132). Petitioner contends that the evaluation of equation (2) is used in decisions 66, 70, and 74 of the flowchart shown in Vehviläinen's Figure 6 to select a filter. *Id.* at 48 (citing Ex. 1003 ¶ 132).

Next, Petitioner alleges that claim 18 also would have been obvious in view of Vehviläinen. *See* Pet. 48–49 (citing Ex.1003 ¶ 134). Petitioner contends that Vehviläinen teaches the additional limitations of claim 18 because one of the threshold comparisons in Vehviläinen is done against ($activity_{EDGE}$ + MQUANT), where MQUANT is a quantization factor that is adjusted at the encoder used to encode the video blocks. *Id.* at 48 (citing Ex. 1004, 5:56–6:23; Ex.1003 ¶ 134). According to Petitioner, the above threshold varies directly and linearly with MQUANT and therefore varies depending on the quantizer used to encode the blocks at the block boundary as recited in claim 18. *Id.* at 49 (citing Ex. 1003 ¶ 134).

Petitioner also alleges that claim 19 would have been obvious in view of Vehviläinen. *See* Pet. 49–52 (citing Ex. 1004, 8:15–22, 9:54–67, Figs. 5A–5C; Ex. 1003 ¶¶ 137–139). In part, Petitioner argues that Vehviläinen teaches the limitations recited in claim 19 because Vehviläinen discloses

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 34
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

selecting a filter to apply to predetermined pixels when the level of detail, $activity_{IN}$, exceeds the threshold ($activity_{EDGE}$ + MQUANT). *Id.* at 49 (citing Ex. 1003 ¶ 137). Petitioner further argues that Vehviläinen teaches that the selection of a filter comprises determining the $activity_{IN}$ in the region of the pixels being filtered, i.e., the marked pixels in Figure 5A. *Id.* at 51–52 (citing Ex. 1003 ¶ 139, and also referring to Petitioner's discussion related to claim 1, *supra* Section IV.E.1.c.1).

Patent Owner does not raise any additional argument directed specifically to claims 17–19. *See generally* Prelim. Resp. Based on our review of the current record, we determine that the information presented supports sufficiently, for purposes of institution, Petitioner's assertions as to these three dependent claim.

3. Secondary Considerations

Patent Owner also presents arguments and evidence of objective indicia, or secondary considerations, of nonobviousness that we consider below.

Secondary considerations may include long-felt but unsolved need, failure of others, unexpected results, commercial success, copying, licensing, industry praise, and expert skepticism. *Mintz v. Dietz & Watson, Inc.*, 679 F.3d 1372, 1379 (Fed. Cir. 2012). "[O]bjective indicia may often be the most probative and cogent evidence of nonobviousness in the record," and "help turn back the clock and place the claims in the context that led to their invention." *Id.* at 1378 (quotation omitted). Evidence of secondary considerations "must always when present be considered en route to a determination of obviousness." *Transocean Offshore Deepwater Drilling,*

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 35
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

Inc. v. Maersk Drilling USA, Inc., 699 F.3d 1340, 1349 (Fed. Cir. 2012) (quotation omitted).

Secondary considerations are "only relevant to the obviousness inquiry 'if there is a nexus between the claimed invention and the [objective indicia of nonobviousness].'" *In re Affinity Labs of Tex., LLC*, 856 F.3d 883, 901 (Fed. Cir. 2017) (quoting *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1312 (Fed. Cir. 2006)); *see also ClassCo, Inc., v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016). As the Federal Circuit recently explained, "a patentee is entitled to a rebuttable presumption of nexus between the asserted evidence of secondary considerations and a patent claim if the patentee shows that the asserted evidence is tied to a specific product and that the product '*is* the invention disclosed and claimed.'" *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (quoting *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988)). That is, presuming nexus is appropriate "when the patentee shows that the asserted objective evidence is tied to a specific product and that product 'embodies the claimed features, and is coextensive with them.'" *Id.* (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018)). On the other hand, the patentee is not entitled to a presumption of nexus if the patented invention is only a component of a commercially successful machine or process. *Id.* (reaffirming the importance of the "coextensiveness" requirement).

Applying *Fox Factory*, the Board uses a two-step analysis in evaluating nexus between the claimed invention and the evidence of secondary considerations. *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 33 at 33 (PTAB Jan. 24, 2020) (designated precedential

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 36
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

Apr. 14, 2020). We first consider whether the patent owner has demonstrated "that its products are coextensive (or nearly coextensive) with the challenged claims," resulting in a rebuttable presumption of nexus. *Id.* at 33. If not, that "does not end the inquiry into secondary considerations"; "the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the 'direct result of the unique characteristics of the claimed invention.'" *Id.* (quoting *Fox Factory*, 944 F.3d at 1373–75). The patent owner may do so by demonstrating that the secondary considerations result from some aspect of the claim (not already in the prior art) or the claimed combination as a whole. *Id.* (citing *In re Kao*, 639 F.3d 1057, 1068–69 (Fed. Cir. 2011); *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1331 (Fed. Cir. 2016)).

Once the patent owner has presented a *prima facie* case of nexus, the burden of coming forward with evidence in rebuttal shifts to the challenger to adduce evidence to show that the commercial success was due to extraneous factors other than the patented invention. *Demaco*, 851 F.2d at 1392–93.

a) Commercial Success and Industry Praise

Patent Owner asserts that the '651 patent's invention "was implemented in the DivX codec/software versions following the invention, which touted the 'improved deblocking' as one of the highlights of the new versions." Prelim. Resp. 36 (citing Ex. 2022, 23). Patent Owner contends that the discussion of the "DivX codec deblocking scheme" closely mirrors the discussion in the '651 patent's specification and claim 1. *Id.* (citing Ex. 2022, 30–32; Ex. 1001, 1:25–3:20; 13:8–22).

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 37
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

Patent Owner further contends that "[a]fter the improved codec was launched, DivX's software licensing revenues grew to form a great part of its revenue." *Id*. at 37 (citing Ex. 2027, 42–43) (Form 10-K SEC filing by DivX, Inc. for 2007, stating that by the end of 2007, "over 100 million DivX Certified hardware devices have been shipped worldwide"). Patent Owner argues that "[b]y 2014, millions of devices licensed to use DivX's renowned video codec had shipped worldwide from multiple major consumer electronics brands." *Id*. at 37 (citing Ex. 2025, 2). Patent Owner contends that in 2014, the DivX 10 codec software was the recipient of the "Best of CES" award for the "Best Ultra HD Codec" for Professional and Consumer use by Ultra HDTV Magazine. *Id.* at 39 (citing Ex. 2023, 3; Ex. 2024). Patent Owner also quotes claimed praise from a vice president of LG Electronics ("LG"): "Consumers around the world know that when they see the DivX logo on an LG product, they can rest assured that their digital video files will play flawlessly." *Id.* at 37–38 (quoting Ex. 2029). Patent Owner further points to "a 2006 comparison of codec performance by 50 experts" as showing that "the DivX deblocking scheme did indeed enable superior results to the MPEG-4 standard's deblocking scheme." *Id.* at 50–51 (citing Ex. 2030, 15, 16, 20, 31). Patent Owner argues that the video industry recognized that the '651 patent's deblocking scheme resulted in successfully improving the quality of compressed video playback over the prior art. *Id.* at 40.

For purposes of deciding whether to institute trial, we determine that Patent Owner's cited evidence and arguments based on that evidence are insufficient to establish a nexus between the argued commercial success and the merits of the claimed invention. Patent Owner does not provide an

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 38
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

analysis demonstrating that any of the actual software products it relies on are coextensive (or nearly coextensive) with the challenged claims. *See* Prelim. Resp. 28–29. Instead, Patent Owner argues the claimed invention was implemented in the DivX codec/software versions following the invention based on a comparison of one of the software's June 2005 functional specification with claim 1 and the '651 patent specification. Prelim. Resp. 36 (comparing Ex. 2022, 30–32 with Ex. 1001, 1:25–3:20, 13:7–22). Although we agree that cited discussion in the software functional specification relates to aspects of the deblocking filter claimed in the '651 patent, that functional specification corresponds to the DivX Video-Decoder, at its *then-current release*, "*DivX 6*." Ex. 2022, 25. The evidence of claimed praise and commercial success that Patent Owner offers is from a much later point in time and fails to tie the specific DivX video decoder's release 6—or even the DivX video-decoder itself—to any of the products mentioned in the cited evidence, e.g., DivX 10 software, DivX HEVC, DivX 4K, DivX Certified hardware, or products with DivX logo. *See, e.g.*, Exs. 2023, 2025, 2027, 2029. For example, according to Patent Owner's cited article, the "Best of CES" award for the "Best Ultra HD Codec" was awarded to *DivX 10* software, and the reasons for the award stated in the article include being "the first software to feature HEVC video creation, playback and streaming up to 4K Ultra High Definition." Ex. 2023, 3. We, therefore, decline to find that a presumption of nexus exists. *Lectrosonics*, Paper 33, at 33; *Fox Factory*, 944 F.3d at 1374 ("Although we do not require the patentee to prove perfect correspondence to meet the coextensiveness requirement, what we do require is that the patentee demonstrate that the product is essentially the claimed invention.").

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 39
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

Next, under *Lectrosonics*, we evaluate the evidence offered by Patent Owner to determine if it is directed to some aspect of the challenged claims. Patent Owner fails to point to anything in the evidence submitted as being directed towards deblocking filters or any other specific aspect of the invention claimed in the ’651 patent, and we cannot discern any. Generally, “[t]here is no nexus unless the evidence presented is reasonably commensurate with the scope of the claims.” *ClassCo, Inc*., 838 F.3d at 1220 (citations and quotations omitted). Although the deblocking technology may have been implemented in an earlier release of the DivX codec, the evidence and argument offered by Patent Owner thus far does not support sufficiently a finding of a nexus between the patent invention and the commercial success and praise. *See Lectrosonics*, Paper 33, at 35.

We also are unpersuaded by Patent Owner’s assertion that the “MSU Subjective Comparison of Modern Video Codecs” (Ex. 2030) demonstrates that the deblocking scheme claimed in the ’651 patent was an improvement over prior art deblocking schemes such as the one used by an “open-source version of the MPEG-4 standard, known as XviD.” Prelim. Resp. 38–39. On one hand, Patent Owner states that “the open-source MPEG-4 standard codec ‘deblocking was *disabled* by default’” during the study and “the reason for XviD’s ‘last place’ performance, below that of DivX, was ‘the *lack of deblocking*,’” while on the other hand, asserting that “the DivX deblocking scheme did indeed enable superior results to the MPEG-4 standard’s deblocking scheme.” *Id.* at 39 (emphases added). If indeed the MPEG-4 codec’s deblocking feature was disabled during the study, Patent Owner’s assertion that the ’651 patent was an improvement over MPEG-4 blocking scheme is not supported by the evidence offered by Patent Owner.

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 40
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

b) Licensing

Patent Owner further contends that "[a]fter the improved codec was launched, DivX's software licensing revenues grew to form a great part of its revenue" and by 2009, 92% of DivX's revenue resulted from technology licensing. *Id*. at 37 (citing Ex. 2027 (DivX, Inc., Annual Report (Form 10-K) (Mar. 17, 2008)), 42–43; Ex. 2028 (DivX, Inc., Annual Report (Form 10-K) (Mar. 15, 2010)), 53). Patent Owner argues that "globally known manufacturers such as LG and Broadcom licensed the DivX codec in 2015." *Id.* (citing Exs. 2025, 2026 (Yahoo News articles relating to certain LG and Broadcom licenses)). Patent Owner adds that "[t]he licensors of the DivX MPEG-4 codec implementation, including LG, recognized the performance difference" between the open-source MPEG-4 standard and DivX's enhanced version. *Id.* at 39 (citing Exs. 2025, 2026, 2029). Patent Owner asserts that Petitioner's contention that "companies like LG paid millions of dollars of licensing fees for years for nothing more than 'obvious' enhancements to existing techniques freely available in open source products" should be rejected. *Id.* at 40.

For purposes of deciding whether to institute trial, we determine that Patent Owner does not identify or explain any nexus between the challenged claims and the licensing activity. The articles submitted by Patent Owner merely mention LG's license to the DivX HEVC solution and Broadcom's license to the DivX Consumer Electronics ("CE") Software Development Kit ("SDK"). *See* Ex. 2025, 1; Ex. 2026, 1. Patent Owner has not provided the license agreements or any other underlying evidence regarding the circumstances of, or driving forces behind, the license agreements. The mere existence of a license, without more specific information about the

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 41
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

circumstances surrounding the license, is not a good indicator of nonobviousness. *See EWP Corp. v Reliance Universal Inc.*, 755 F.2d 898, 907–08 (Fed. Cir. 1985). Statements by LG's Vice President relating to the playback of digital video files also do not support that the LG license is tethered in any way to DivX's deblocking technology. *See* Ex. 2029. The current record therefore does not indicate whether these licenses arose out of recognition and acceptance of the claimed subject matter or for some other reason.

For the reasons stated above, on this record, Patent Owner's evidence of secondary considerations is entitled to little weight in the obviousness analysis at this stage of the proceeding.

4. Preliminary Determination as to Claims 1 and 17–19

"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 record presently before us, including Patent Owner's evidence of secondary considerations, Petitioner demonstrates a reasonable likelihood of showing that Vehviläinen would have rendered the subject matter of claims 1 and 17–19 obvious to one of ordinary skill in the art at the time of the invention.

F. Anticipation Based on Vehviläinen

Petitioner contends that claims 1, 17, and 18 are anticipated by Vehviläinen. Pet. 19–52. Petitioner argues that Vehviläinen discloses all limitations of the challenged claims, arranged in the same manner as the challenged claims. *Id.* at 19 (citing Ex. 1003 ¶ 99).

As discussed above (*supra* Section IV.E.1.c.1), we determine that, for the purposes of institution, Vehviläinen discloses determining the level of detail across *two separate regions* on each side of the block boundary, and at least teaches or suggests "determining the level of detail of the reconstructed video frame *across a region* in which the block boundary is located" as recited in claim 1. We question, however, whether the evidence presented as to this limitation supports Petitioner's assertion as to anticipation of claim 1. *See Net MoneyIN*, 545 F.3d at 1369–71. Accordingly, on the current record, we determine that Petitioner has not shown a reasonable likelihood of prevailing in establishing that Vehviläinen anticipates independent claim 1 and dependent claims 17 and 18 of the '651 patent.

G. 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. 21–46. For the reasons that follow, we are persuaded that the evidence, including Dr. Bove's testimony, sufficiently supports Petitioner's arguments and therefore establishes a reasonable likelihood of prevailing with respect to this ground at this stage of the proceeding.

1. Motivation to Combine Vehviläinen and Kadono

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 two teachings from Kadono: (a) Kadono's calculation of pixel variation using the sum of absolute differences or SAD, and (b) Kadono's teaching of applying different strength filters depending on a threshold Ω. Pet. 52 (citing Ex. 1003 ¶ 141). Petitioner argues that Vehviläinen and

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 43
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

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 use threshold comparisons to select a filter 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, 125, 142, 205, 206, Fig. 19; Ex. 1003 ¶ 141). Petitioner argues that given the similarities between the two references, a person of ordinary skill in the art would have recognized the compatibility between and combined the teachings of Vehviläinen and Kadono. *Id.* at 53–54. Relying on Dr. Bove's testimony, Petitioner asserts that "[i]t was common in the art of video processing to combine various filtering techniques, and a [person of ordinary skill in the art] 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).

a) Kadono's teaching of sum of absolute differences

Petitioner argues that a person of ordinary skill in the art would have found it obvious to apply Kadono's SAD 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. *Id.* (citing Ex. 1004, 10:44–55; Ex. 1005 ¶¶ 205, 206, Fig. 19; Ex. 1003 ¶ 144). Petitioner

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 44
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

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 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).

Patent Owner responds that there is no evidence to show that substituting Vehviläinen's variance calculation with Kadono's SAD calculation would produce superior results in the context of Vehviläinen's method, or that SAD was in fact superior to Vehviläinen's variance calculation. Prelim. Resp. 28. Patent Owner asserts that Vehviläinen "intentionally avoids filtering 'adjacent video pixels . . . in comparison with each other,' and instead adjusts them only 'in comparison to the reference line' of all pixels." *Id.* at 29 (quoting Ex. 1004, 2:41–45). Patent Owner reasons that because SAD is a method that analyzes difference of adjacent pixels, combining Kadono with Vehviläinen would degrade Vehviläinen's operations. *Id.* at 29. According to Patent Owner, Vehviläinen's filtering

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 45
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

method is based on a reference line that connects the first and last points of the filtered region *irrespective of any relative change of adjacent pixels*, and therefore Vehviläinen's method does not need an analysis of relative change of adjacent pixels. *Id.* at 29–30 (citing Ex. 1004 2:41–45, 8:29–62, 9:51–67, 10:32–43, Fig. 4).

Patent Owner further argues that a person of ordinary skill in the art would not have been motivated by the availability of SIMD processors to modify Vehviläinen with Kadono's SAD calculation because the benefit of using such processors would have been equally applicable to Vehviläinen's variance calculation, and the technology has been known since 1975. *Id.* at 32–34 (citing Ex. 2015, 597; Ex. 2016, 17, 64; Ex. 2017, 2; Ex. 2018, 1; Ex. 2019, 7). Likewise, Patent Owner argues, SAD calculation methods and their use in video compression, as well as their implementation on SIMD processors were well known in the art. *Id.* 53 (citing Ex. 2020, 57–58). Patent Owner contends that even though SAD calculations were widely known at the time, Vehviläinen did not utilize them because Vehviläinen's filtering analysis is not based on an analysis of adjacent pixels. *Id.* at 34–35 (citing Ex. 2004, 2:41–45).

Based on our review of the current record, we determine that the information presented supports Petitioner's assertions as to *one of the two reasons* offered by Petitioner to combine the two references. "Whether an ordinarily skilled artisan would have been motivated to modify the teachings of a reference is a question of fact." *WBIP*, 829 F.3d at 1327 (citations omitted). "[W]here a party argues a skilled artisan would have been motivated to combine references, it must show the artisan 'would have had a reasonable expectation of success from doing so.'" *Arctic Cat*, 876 F.3d at

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 46
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

1360–61 (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)).

As to the first reason, based on the current record, we are persuaded by Petitioner's contention that a person of ordinary skill in the art implementing the teachings of Vehviläinen would have been motivated to consider Kadano's SAD calculations because that technique had been widely-used for calculating the level of detail (which Patent Owner does not dispute) and had been established as an accurate and effective method for analyzing pixel variation. Pet. 55 (citing Ex. 1009 ¶¶ 55–65, Ex. 1003 ¶ 145). Vehviläinen recognizes a "normal variance calculation" technique known in the art but offers a simpler method to calculate variance. Ex. 1004, 10:32–55. Vehviläinen therefore at least suggests some flexibility in the technique used to determine variance over a region, and we accept, for the purposes of institution, Dr. Bove's testimony relating to the practice in the art of video encoding to use different settings and tweaks to optimize visual quality and performance. Ex. 1003 ¶ 143. At this early stage, we also agree with Petitioner and its expert that an ordinarily skilled artisan would have had a reasonable expectation of success given the similarities in the teachings and systems. Pet 55–56 (citing Ex. 1003 ¶ 146).

Based on the current record, we are not persuaded by Patent Owner's arguments that Petitioner's proposed modification of Vehviläinen to use SAD calculation is contrary to Vehviläinen's express teachings and would degrade Vehviläinen's operation. Vehviläinen's discussion regarding its use of a reference line for its *filtering* process (Ex. 1004, 2:41–45), that Patent Owner relies on, does not suggest that Vehviläinen disparages variance calculations across adjacent pixels. *See* Ex. 1004, 8:29–9:7 (discussing, with

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 47
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

reference to Fig. 4, Vehviläinen's filtering method "in case the decision to use the 'smooth' filtering mode *has been made*," i.e., after the variance calculation step (emphasis added)). As discussed above (*supra* Section IV.E.1.c.1), Vehviläinen's min-max approximation method teaches variance calculation across pixels that are adjacent to each other and adjacent to the block boundary. We are therefore unpersuaded that the SAD calculation method taught by Kadono is contrary to the express teachings of Vehviläinen, as Patent Owner contends.

As to Petitioner's second reason for combining the two references, Dr. Bove testifies that "[b]y 2004, SIMD capabilities were common in digital signal processors ('DSP') and various processors from Intel," and an ordinarily skilled artisan "would have been motivated to apply Kadono's teachings to improve Vehviläinen's adaptive deblocking techniques, particularly for use on SIMD computer platforms." Ex. 1003, ¶ 145; Pet. 55. As Patent Owner points out, however, Petitioner and its expert fail to explain why the existence of processors with SIMD instruction sets, which appear to have been known before Vehviläinen, would have provided a reason to combine Kadono with Vehviläinen rather than simply using such processors with Vehviläinen. Prelim. Resp. 32–35. Therefore, on the present record, we are not persuaded that Petitioner has set forth sufficient rational underpinning for this reason.

For purposes of deciding whether to institute trial, we determine Petitioner provides an adequate reason for one of ordinary skill in the art to have modified Vehviläinen's method with the Kadono's SAD teaching in the manner asserted by Petitioner. *See KSR*, 550 U.S. at 420 ("any need or problem known in the field of endeavor at the time of invention and

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 48
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

addressed by the patent can provide a reason for combining the elements in the manner claimed").

b) Kadono's teaching of a threshold

Petitioner contends that a person of ordinary skill of art would have been motivated and found it obvious to apply Kadono's teaching of using a Ω threshold for filter selection to Vehviläinen's process for filtering smooth areas, i.e., at step 80 of the flowchart shown in Vehviläinen's Figure 6 (reproduced above). *See* Pet. 55–58 (citing Ex. 1004, Fig. 6; Ex. 1005 ¶ 125; Ex. 1003 ¶ 148). With reference to Figure 6 of Vehviläinen, Petitioner argues that Vehviläinen allows increasing the number of selection branches to make the system more adaptive to the nature of the blocking effect, and an ordinarily skilled artisan would have been motivated to add an additional branch inside step 80 so as to make an additional comparison (from Kadono) using the already-calculated variance value. Pet. 58–59 (citing Ex. 1004, 8:15–22). Petitioner contends that the combination would have provided additional refinement for the strength of the filter selected for smooth regions, making the filter more adaptive at removing blocking artifacts by providing stronger removal of likely blocking artifacts while reducing the filtering performed on actual edges in smooth regions, thereby improving visual quality of the deblocked video. *Id.* at 59 (citing Ex. 1003 ¶ 149). Petitioner also contends that the combination of teachings would have been well within the level of skill for an ordinarily skilled artisan, with a reasonable expectation of success. *Id.* at 60–62 (citing Ex. 1003 ¶¶ 151, 152).

Patent Owner does not specifically respond to these arguments. *See generally* Prelim. Resp. For purposes of deciding whether to institute trial,

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 49
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

we determine Petitioner provides an adequate reason for one of ordinary skill in the art to have modified Vehviläinen's method with Kadono's Ω threshold teachings in the manner asserted by Petitioner.

This is not a final determination, however, which will be made after the record is fully developed at trial.

2. Independent Claim 1

a) "A method of deblocking a reconstructed video frame, comprising:"

Petitioner contends that the preamble of claim 1 would have been obvious in view of Vehviläinen and Kadono. Pet. 63–70. Petitioner relies in part on its challenge to independent claim 1 based on Vehviläinen alone.[13] Petitioner asserts that Kadono also teaches a method for deblocking a reconstructed video frame. Pet. 63 (citing Ex. 1005, ¶¶ 1, 7, 42; Ex. 1003 ¶ 154). Patent Owner does not specifically respond to these arguments. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that the information presented sufficiently supports, for purposes of institution, Petitioner's assertions relating to the preamble of claim 1.

b) "identifying a boundary between two blocks of the reconstructed video frame"

Petitioner contends that in addition to Vehviläinen, Kadono also teaches this claim limitation because Kadono depicts a block boundary in Figure 19. Pet. 63 (citing Ex. 1005, Fig. 19; Ex. 1003 ¶ 155).

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[13] We have addressed Petitioner's arguments relating to the Vehviläinen grounds above (*supra* Sections IV.E.1 and IV.F), and do not repeat them here.

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 50
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

Patent Owner does not specifically respond to these arguments. *See generally* Prelim. Resp. Based on our review of the current record, we determine that the information presented supports sufficiently, for purposes of institution, Petitioner's assertions as to this limitation.

> *c) "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;"*

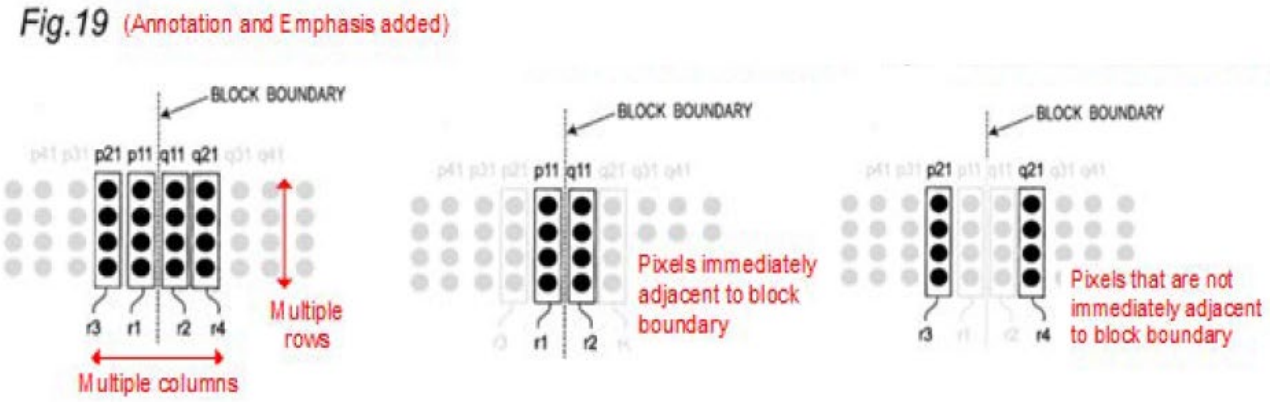
Petitioner contends that Kadono teaches calculating a sum of absolute differences between pixels to determine "whether to apply deblocking to an area on both sides of a block boundary, and the deblocking operation itself." Pet. at 64 (citing Ex. 1005, ¶ 2039; Ex. 1003 ¶ 156) (referring to Petitioner's discussion relating to motivation to combine the two references, *supra* Section IV.G.1). 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.*

Alternatively, Petitioner 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). Petitioner further argues that for this second comparison, an ordinarily skilled artisan could have also used the area marked by pixel groups r1, r2, r3, and r4 in Figure 19 of Kadono

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 51
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

instead of the region shown in Figure 5A of Vehviläinen. *Id.* (citing Ex. 1005, Fig. 19; Ex. 1003 ¶ 157).

With regard to the claimed region, Petitioner reproduces annotated versions of Kadono's Figure 19 (*id.* at 66, 67), as shown below.



Petitioner's annotated Figure 19 of Kadono, above, illustrates Petitioner's various annotations showing an 4 x 4 pixel region, comprising *four* adjacent column regions r3, r1, r2, and r4, with columns r1 and r2 immediately adjacent on either side of a vertical block boundary, and columns r3 and r4 not immediately adjacent to the block boundary. *Id.* at 66–67.

Aside from the arguments discussed above with regard to the motivation to combine Vehviläinen and Kadono (*see infra* Section IV.G.1), Patent Owner does not specifically respond to these arguments. *See generally* Prelim. Resp. Based on our review of the current record, we determine that the information presented supports sufficiently, for purposes of institution, Petitioner's assertions as to this limitation.

d) "selecting a filter to apply to predetermined pixels on either side of the block boundary based upon the determined level of detail."

Petitioner contends that in addition to Vehviläinen's teaching, the combination of Vehviläinen and Kadono provides an additional, independent

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 52
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

basis for rendering this limitation obvious. *Id.* at 68 (citing Ex. 1003 ¶ 160). Petitioner argues that a person of ordinary skill in the art would have been motivated to apply Kadono's Ω threshold comparison to Vehviläinen's process for filtering smooth areas in step 80 of Figure 6 of Vehviläinen. *Id.* at 68–69 (citing Ex. 1004, Fig. 5; Ex. 1005 ¶ 125; Ex. 1003 ¶ 160).

Alternatively, Petitioner argues, an ordinarily skilled artisan would have found it obvious to use Kadono's SAD calculations to determine a level of detail and use it in comparison to Kadono's Ω threshold to select a filter. *Id.* at 68–69 (citing Ex. 1005 ¶¶ 125, 205; Ex. 1003 ¶ 162). According to Petitioner, the selected filter is applied to the area labelled 54 of Vehviläinen's Figure 5, which includes pixels on both sides of the block boundary. *Id.* at 70 (citing Ex. 1003 ¶ 163).

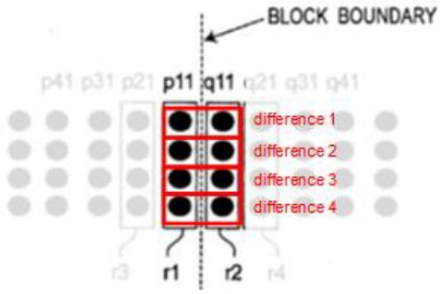
Patent Owner does not specifically respond to Petitioner's arguments as to this limitation. *See generally* Prelim. Resp. Based on our review of the current record, we determine that the information presented supports sufficiently, for purposes of institution, Petitioner's assertions as to this limitation.

3. Dependent Claims 2, 4

Petitioner alleges that claim 2 also would have been obvious in view of Vehviläinen and Kadono. *See* Pet. 71–76. In part, Petitioner argues that Kadono teaches the additional limitation recited in claim 2 because it describes calculating a sum of absolute differences to determine "whether to apply deblocking to an area on both sides of a block boundary, and the deblocking operation itself." *Id.* at 71 (citing Ex. 1005 ¶¶ 203, 205; Ex. 1003 ¶ 166). Petitioner reproduces an annotated version of Kadono's Figure 19 (*id.* at 72), as shown below.

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 53
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

Fig.19 (Annotation and Emphasis added)



Petitioner's annotated Figure 19 of Kadono, above, illustrates Petitioner's annotations showing four pixel pairs that form column regions r1 and r2 immediately adjacent on either side of a vertical block boundary, where the difference in pixel value is calculated for each pair. *Id*. at 71–72 (citing Ex. 1005 ¶¶ 204, 206; Ex. 1003 ¶166). Petitioner further argues that a person of ordinary skill in the art would have found it obvious to apply Kadono's SAD teachings to Vehviläinen Figure 5A, by grouping the columns into pixel groups, as taught by Kadono. *Id*. at 71–73 (citing Ex. 1005 ¶¶ 203–207; Ex. 1003 ¶¶ 165–167). Petitioner illustrates the proposed region in an annotated version of Vehviläinen's Figure 5A (*id.* at 74), reproduced below.

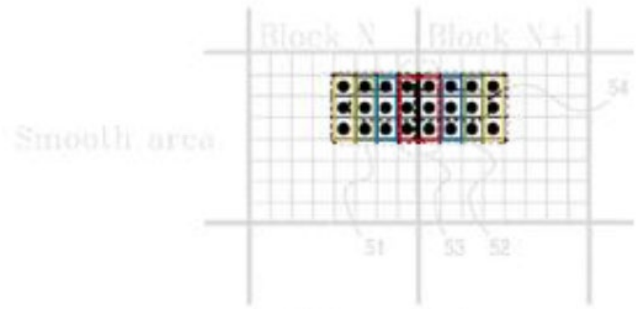


Figure 5A
(Annotation and Emphasis added)

Petitioner's annotated Figure 5A of Vehviläinen, above, illustrates Petitioner's highlighting in red of the area labelled 53, where Petitioner proposes an ordinarily skilled artisan would have applied Kadono's SAD

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 54
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

calculation as taught between columns r1 and r2 of Kadono's Figure 19. *Id.* at 74 (citing Ex. 1003 ¶ 167). Petitioner asserts that Kadono teaches either adding or averaging the representative differences, and a person of ordinary skill in the art would have been motivated to apply Kadono's SAD teachings as a measure of variance inside the smooth, moderate, or high activity areas disclosed in Vehviläinen. *Id.* at 74–75 (citing Ex. 1005 ¶ 206; Ex. 1003 ¶ 167).

Next, Petitioner alleges that claim 4 also would have been obvious in view of Vehviläinen and Kadono. *Id.* at 76–81 (citing Ex.1003 ¶¶ 170–173). In part, Petitioner contends Vehviläinen and Kadono both teach a video block consisting of 8 x 8 video pixels. *Id.* at 77–79 (citing Ex. 1004, 5:49–51; Ex. 1005, ¶ 74; Ex. 1003 ¶ 171). Petitioner further contends that Vehviläinen and Kadono teach that the set of pixels is evenly divided by the block boundary. *Id.* at 79–80 (citing Ex. 1004, Figs. 5A–5C; Ex. 1005, Fig. 19; Ex. 1003 ¶ 172). Petitioner also argues that Vehviläinen and Kadono teach applying their methods to horizontal block boundaries. *Id.* at 80 (citing Ex. 1004, 7:12–16; Ex. 1005 ¶ 207; Ex. 1003 ¶ 173).

Patent Owner does not raise any additional argument directed specifically to claims 2 and 4. *See generally* Prelim. Resp. Based on our review of the current record, we determine that the information presented supports sufficiently, for purposes of institution, Petitioner's assertions as to these two dependent claims.

4. Dependent Claims 17–19

Petitioner alleges that claim 17 would have been obvious in view of Vehviläinen and Kadono. *See* Pet. 81 (Ex. 1003 ¶ 175). Petitioner relies on

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 55
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

its challenge to independent claim 1 to teach the additional limitation of dependent claim 17.

Next, Petitioner alleges that claim 18 also would have been obvious in view of Vehviläinen and Kadono. *Id.* at 81–83 (citing Ex.1003 ¶¶ 177–179). Petitioner argues that Kadono additionally teaches that the threshold Ω varies depending on the quantization parameter "QP," and an ordinarily skilled artisan would have understood QP to be analogous to the MQUANT parameter disclosed in Vehviläinen when Kadano's teachings are implemented in Vehviläinen's operation. *Id.* at 82–83 (citing Ex. 1004, 9:26–28; Ex. 1005, ¶ 125, Fig. 19; Ex. 1003 ¶¶ 178, 179).

Petitioner also alleges that claim 19 would have been obvious in view of Vehviläinen and Kadono. *Id.* at 84–86 (citing Ex. 1004, Fig. 5A; Ex. 1005, ¶ 129, Figs. 6, 19; Ex. 1003 ¶¶ 181–184). In part, Petitioner argues that Kadono expressly teaches checking whether pixel differences exceed the threshold Ω, and it would have been obvious to one of ordinary skill in the art to use Vehviläinen's calculation for pixel variation, $activity_{IN}$, in comparison with threshold Ω to select a filter. *Id.* at 84, 85 (citing Ex. 1003 ¶ 183). Petitioner further contends that the combination "teaches that the selection of a filter comprises determining the detail ($activity_{IN}$, or alternatively the sum of representative differences) of the image in the region of the pixels being filtered (the pixels marked by dots in Vehviläinen Figure 5A, or alternatively, the marked pixels in Kadono Figure 19)." *Id.* at 85–86 (citing Ex. 1003 ¶ 184).

Patent Owner does not raise any additional argument directed specifically to claims 17–19. *See generally* Prelim. Resp. Based on our review of the current record, we determine that the information presented

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 56
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

supports sufficiently, for purposes of institution, Petitioner's assertions as to these three dependent claim.

5. Secondary Considerations

For the reasons stated above (*supra* Section IV.E.3), on this record, Patent Owner's evidence of objective indicia of nonobviousness is entitled to little weight in the obviousness analysis at this stage of the proceeding.

6. Preliminary Determination as to Claims 1, 2, 4, and 17–19

On the present record, including Patent Owner's evidence of objective indicia of nonobviousness, Petitioner demonstrates a reasonable likelihood of showing that the combination of Vehviläinen and Kadono would have rendered the subject matter of claims 1, 2, 4, and 17–19 obvious to one of ordinary skill in the art at the time of the invention.

V. CONCLUSION

After considering the evidence and arguments presented in the Petition and Preliminary Response, we determine that the information presented shows a reasonable likelihood that Petitioner would prevail in establishing that at least one of the challenged claims of the '651 patent is unpatentable on the grounds asserted in the Petition. Thus, we institute an *inter partes* review as set forth in the Order below. Trial shall commence on the entry date of this Decision.

VI. ORDER

It is, therefore,

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of the '651 patent is hereby instituted on the challenge to claims 1, 17, and 18 under 35 U.S.C. § 102 as unpatentable over Vehviläinen;

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 57
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of the ’651 patent is hereby instituted on the challenge to claims 1 and 17–19 under 35 U.S.C. § 103 as unpatentable over Vehviläinen;

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of the ’651 patent is hereby instituted on the challenge to claims 1, 2, 4, and 17–19 under 35 U.S.C. § 103 as unpatentable over Vehviläinen and Kadono; and

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

Piranha Media Distribution, LLC, Exhibit 2013
Page 2013 - 58
IPR2024-01252, Hulu, LLC v. Piranha Media Distribution, LLC

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