

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS LLC,
Petitioner,

v.

VELOS MEDIA, LLC,
Patent Owner.

IPR2020-00352
Patent 9,414,066 B2

Before CHARLES J. BOUDREAU, MONICA S. ULLAGADDI, and
AARON W. MOORE, *Administrative Patent Judges*.

Opinion for the Board filed by *Administrative Patent Judge* ULLAGADDI.

Opinion Concurring filed by *Administrative Patent Judge* MOORE.

ULLAGADDI, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)
Granting Petitioner's Motion for Protective Order
Granting Petitioner's Motion to Seal
37 C.F.R. § 42.54(a)

I. INTRODUCTION

Unified Patents, LLC (“Petitioner”) requested an *inter partes* review of claims 1, 2, 5, 11, and 20 (“the challenged claims”) of U.S. Patent No. 9,414,066 B2 (Ex. 1001, “the ’066 patent”). Paper 3 (“Petition” or “Pet.”). Velos Media, LLC (“Patent Owner”) filed a Preliminary Response. Paper 8 (“Prelim. Resp.”).

We instituted an *inter partes* review of each of the challenged claims on all grounds set forth in the Petition. Paper 9 (“Institution Decision” or “Inst. Dec.”). Patent Owner filed a Patent Owner Response (Paper 15, “PO Resp.”) and Petitioner filed a Petitioner Reply (Paper 20, “Pet. Reply”). Patent Owner thereafter filed a Sur-reply (Paper 24, “PO Sur-reply”).

Petitioner filed a Motion for Protective Order (Paper 13) and a Motion to Seal Patent Owner’s Response, Petitioner’s Reply, and related exhibits (Paper 23). We decide these Motions in this Decision.

Patent Owner filed a contingent Motion to Amend, with a request for preliminary guidance. Paper 16 (“MTA”). Petitioner filed an Opposition to Patent Owner’s Motion to Amend. Paper 19 (“Pet. Opp. MTA”). We provided our Preliminary Guidance as to Patent Owner’s Motion to Amend. Paper 22. Patent Owner filed a Reply to Petitioner’s Opposition to Patent Owner’s Motion to Amend. Paper 25 (“PO Reply MTA”). Petitioner thereafter filed a Sur-reply. Paper 29 (“Pet. Sur-reply MTA”). As we conclude that Petitioner has not shown unpatentability of any of the challenged claims by a preponderance of the evidence, we do not reach and need not decide Patent Owner’s Motion to Amend.

Oral arguments were heard on March 30, 2021 and a transcript has been entered into the record. Paper 37 (“Tr.”).

Petitioner has the burden of proving unpatentability of the challenged claims by a preponderance of the evidence. 35 U.S.C. § 316(e) (2018). Having reviewed the parties' arguments and supporting evidence, for the reasons discussed below, we find that Petitioner has not demonstrated by a preponderance of the evidence that any of the challenged claims are unpatentable.

II. BACKGROUND

A. *Related Proceedings*

Neither Petitioner nor Patent Owner identifies related proceedings involving the '066 Patent. Pet. 1; Paper 6, 2.

B. *The '066 Patent (Ex. 1001)*

The '066 patent issued on August 9, 2016, and claims priority as early as January 14, 2011. Ex. 1001, codes (45), (60). The '066 patent concerns a method of reducing blocking artifacts associated with consecutive pixels spanning a boundary between neighboring blocks in an image. *Id.* at code (57). Figure 1a of the '066 patent is reproduced below.

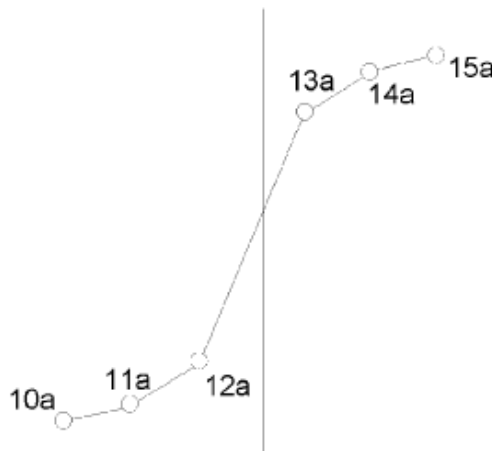


Figure 1a

Figure 1a of the '066 patent illustrates pixel values in two neighboring blocks with a natural edge occurring at a vertical block boundary.

Figure 1a illustrates pixel values 10a, 11a, 12a of a first block and 13a, 14a, 15a of a neighboring block in which the pixel values represent a natural edge at a vertical block boundary. *Id.* at 10:4–7. A large difference between the pixel values spanning the block boundary is considered to be representative of a natural edge instead of a blocking artifact. *Id.* at 10:10–12. Figure 1b of the '066 patent is reproduced below.

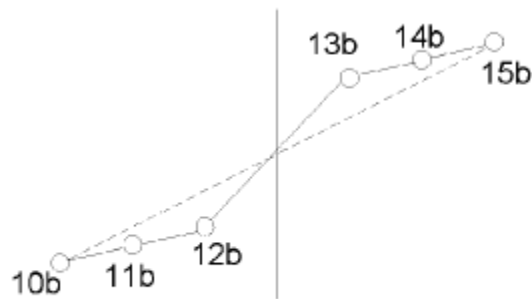


Figure 1b

Figure 1b of the '066 patent illustrates pixel values in two neighboring blocks with a blocking artifact occurring at a vertical block boundary.

Figure 1b illustrates pixel values 10b, 11b, 12b of a first block and 13b, 14b, 15b of a neighboring block in which the difference between pixel values of neighboring blocks is considerably smaller than the difference depicted in Figure 1a. According to the '066 patent, this smaller difference is likely due to quantization and/or the prediction method employed in the coding process. *Id.* at 10:13–18. The '066 patent discloses that, when a blocking artifact is identified, a filtering process is performed and an approximation according to Figure 1b's dotted line results. *Id.* at 10:23–28.

Figure 4 of the '066 patent is reproduced below.

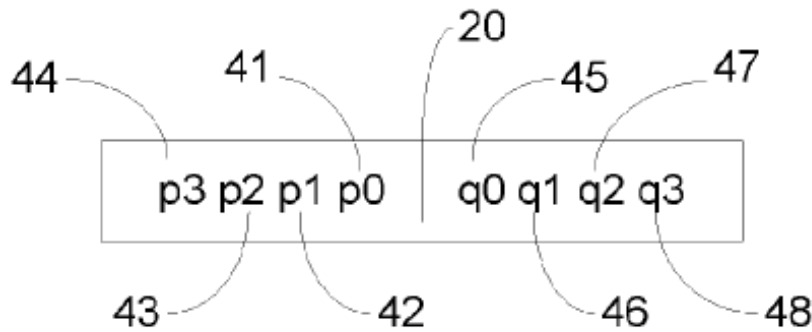


Figure 4 of the '066 patent depicts two neighboring blocks of pixels.

Figure 4 illustrates a first block that includes pixels p0, p1, p2, and p3, and a neighboring block that includes pixels q0, q1, q2, and q3. *Id.* at 11:56–61. The '066 patent discloses that a first offset is calculated based on p0 and p1 of the first block and q0 and q1 of the neighboring block. *Id.* at 11:62–65. The '066 patent also discloses conditionally filtering by modifying two pixels on either side of the block boundary depending on the calculated first offset. *Id.* at 14:36–37. The '066 patent discloses an exemplary algorithm for implementing the process, which is reproduced below.

```
first offset = (9*(q0-p0)-3*(q1-p1))/16
if ( abs[first offset] < thr1 )
{
    p0' = p0 + first offset
    q0' = q0 - first offset
    second offset = (p0+p2-2*p1+2*first offset)/4;
    p1' = p1 + second offset
    third offset = (q0+q2-2*q1-2*first offset)/4;
    q1' = q1 + third offset
}
```

The '066 patent discloses an algorithm that calculates an offset, compares the offset to a threshold, and conditionally applies filtering based on the comparison.

The '066 patent discloses filtering when pixel values resemble a step and not filtering when pixel values resemble a ramp. *See* Ex. 1001, 15:14–32. The '066 patent states:

[A] ramp can be described as linearly increasing or decreasing pixel values, e.g. 10, 20, 30, 40. When calculating the first offset for these pixel values, i.e. $p_1=10$, $p_0=20$, $q_0=30$, $q_1=40$, the first offset will be zero. Correspondingly, a step can be described as a step increase or decrease in pixel values, e.g. 10, 10, 20, 20. When calculating the first offset for these pixel values, i.e. $p_1=10$, $p_0=10$, $q_0=20$, $q_1=20$, the first offset will be 3.75 if first offset $= (9 \times (q_0 - p_0) - 3 \times (q_1 - p_1)) / 16$ or 4 if first offset $= (9 \times (q_0 - p_0) - 3 \times (q_1 - p_1) + 8) > 4$. The modified pixel values will then be 10, 13.75, 16.25, 30 or 10, 14, 16, 20, respectively, and thereby a smoothing of the step is achieved. The first offset is also zero for a flat line, i.e. if the pixel values are equal, $p_0=p_1=q_0=q_1$.

Id. at 15:20–32. The '066 patent discloses that the first offset is calculated according to the following equation:

$$\text{first offset} = (9 \times (q_0 - p_0) - 3 \times (q_1 - p_1)) / 16 \quad (1)$$

Id. at 14:46.

C. Challenged Claims

Challenged claims 1 and 20 are independent and challenged claims 2, 5, and 11 depend directly from claim 1. Independent claim 1 is reproduced below.

1. A method of reducing blocking artifacts associated with consecutive pixels of a block boundary of a digital image, the method comprising:
selecting at least two consecutive pixels from a first block and at least two consecutive pixels from a neighboring block, the blocks being located on opposite sides of a block boundary and next to the block boundary, and the pixels forming a line of pixels that is perpendicular to the block boundary;

calculating a first offset as a function of pixel values for each of the at least two consecutive pixels from the first block and the at least two consecutive pixels of the neighboring block;
comparing the first offset to a first threshold value; and
modifying the respective pixel values of two consecutive pixels from the first block and the respective pixel values of two consecutive pixels from the second block, by applying filtering on said pixels, in the event that $\text{abs}[\text{first offset}] < \text{first threshold}$, or by applying no filtering at all on any of said pixels, in the event that $\text{abs}[\text{first offset}] \geq \text{first threshold}$.

Ex. 1001, 20:34–54.

D. Evidence

Reference or Declaration	Date	Exhibit No.
U.S. Patent No. 6,028,967 (“Kim”)	Issued Feb. 22, 2000	1003
Kim et al., “A Deblocking Filter with Two Separate Modes in Block-Based Video Coding,” IEEE Transactions On Circuits and Systems for Video Technology (“KimIEEE”)	Published Feb. 1999	1004
U.S. Publication No. 2006/0008038 A1 (“Song”)	Published Jan. 12, 2006	1005
Applicant-Admitted Prior Art (AAPA)		1001
Declaration of Dr. Sylvia Hall-Ellis (“Hall-Ellis Declaration”)		1017

E. Proposed Grounds of Unpatentability

Petitioner advances the following challenges supported by the declaration of Dr. Lina J. Karam (Ex. 1002). Pet. 5.

Claim(s) Challenged	35 U.S.C. § ¹	Reference(s)/Basis
1, 11	102(b), (e)	Kim

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), amended 35 U.S.C. §§ 102, 103, effective

Claim(s) Challenged	35 U.S.C. § ¹	Reference(s)/Basis
1, 11	103(a)	Kim
20	103(a)	Kim, Song
1, 2, 5, 11	103(a)	KimIEEE
1, 2, 5, 11	103(a)	AAPA, KimIEEE

III. ANALYSIS

A. *Level of Ordinary Skill in the Art*

Petitioner asserts that “[a] person of ordinary skill in the art (‘POSA’) at the time of filing the earliest provisional application for the ’066 Patent (Jan. 14, 2011) would have had at least the equivalent of a Bachelor’s degree in electrical engineering, computer engineering, or a related subject and two or more years of experience in the field of video coding.” Pet. 19–20 (citing Ex. 1002 ¶ 57). Petitioner further asserts that “[l]ess work experience may be compensated by a higher level of education, such as a Master’s Degree.” *Id.* at 20.

Patent Owner does not contest the level of ordinary skill in the art. *See generally* PO Resp.

Our findings and conclusions do not turn on selecting a particular definition for the level of ordinary skill in the art. We determine, on the complete record, that the level of ordinary skill proposed by Petitioner is consistent with the ’066 patent and the asserted prior art. As such, we adopt Petitioner’s proposal.

B. *Claim Construction*

We apply the same claim construction standard used by Article III federal courts and the ITC, both of which follow *Phillips v. AWH Corp.*,

March 16, 2013. Because the application from which the ’066 patent issued was filed before this date, the pre-AIA version of § 102 and §103 applies.

415 F.3d 1303 (Fed. Cir. 2005) (en banc), and its progeny. 37 C.F.R. § 42.100(b) (2019). Accordingly, we construe each challenged claim of the '066 patent to generally have “the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.*

“first offset”

Independent claim 1 recites, *inter alia*, “calculating a first offset as a function of pixel values for each of the at least two consecutive pixels from the first block and the at least two consecutive pixels of the neighboring block” and “comparing the first offset to a first threshold value.”

Independent claim 20 recites similar features.

Patent Owner contends that “the proper construction of ‘offset’ is ‘a value that is added to, or subtracted from, a pixel value when filtering’” as it initially contended in its Preliminary Response. PO Resp. 16; *see* Prelim. Resp. 14. In our Institution Decision, we rejected Patent Owner’s proposed construction and preliminarily concluded that “Petitioner’s position is consistent with the plain and ordinary meaning of offset—a value that conveys the amount or distance by which something is out of line.” Inst. Dec. 11. Petitioner does not explicitly propose a construction for “first offset” (*see generally* Pet.) and did not dispute our preliminary conclusion as to the claimed “first offset” (*see* Pet. Reply 1 (“The term ‘first offset’ should be accorded its plain and ordinary meaning, which the Board correctly identified . . .”)).

Based on our review of the complete record developed at trial, we need not construe “first offset” or any other claim term to resolve the dispute between the parties, and therefore, do not expressly define any claim term. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d

1013, 1017 (Fed. Cir. 2017) (explaining that construction is needed only for terms that are in dispute, and only as necessary to resolve the controversy). Nor do we maintain in this Decision our preliminary construction of “first offset.”

C. Principles of Law

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

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros., Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987).

“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”)). The 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) (citing *Tech. Licensing Corp. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in an *inter partes* review). Furthermore, 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).

Thus, to prevail in an *inter partes* review, Petitioner must explain how the prior art discloses the subject matter of the challenged claims or how the proposed combinations of prior art would have rendered the challenged claims unpatentable. We analyze the challenges presented in the Petition in accordance with the above-stated principles.

D. Anticipation and Obviousness over Kim Alone

Petitioner contends that claims 1 and 11 are unpatentable as obvious under 35 U.S.C. § 103 over Kim. Pet. 22–39. Petitioner also contends that these claims are unpatentable as anticipated under 35 U.S.C. § 102 by Kim. *Id.* For the reasons that follow, we are not persuaded that the evidence supports Petitioner’s arguments. Thus, we are not persuaded Petitioner establishes by a preponderance of the evidence unpatentability of claims 1 and 11 as anticipated by or obvious over Kim. As Petitioner makes no meaningful distinction between its obviousness and anticipation challenges, we address both challenges together.

1. Overview of Kim

Kim concerns a method of reducing blocking artifacts in a moving picture. Ex. 1003, code (57). Figure 1 of Kim is reproduced below.

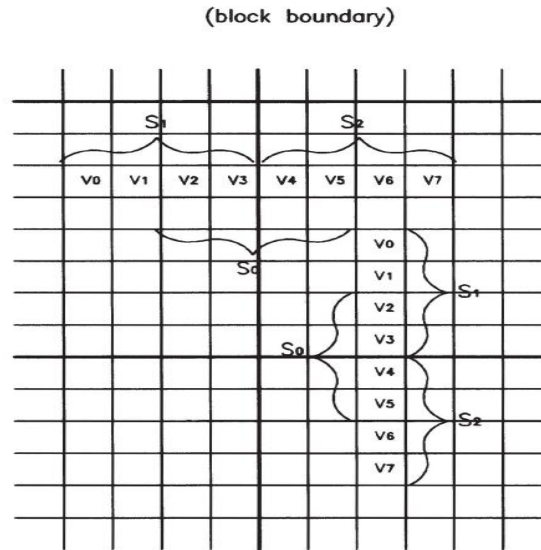


Figure 1 of Kim illustrates horizontal and vertical block boundaries. *Id.* at 2:66–67.

Figure 1 of Kim illustrates an image formed with S_0 , S_1 , and S_2 located around a block boundary—Figure 1 depicts one vertical and one horizontal boundary. *Id.* at 3:13–15. S_0 is located across the block boundary and is directly influenced by a blocking artifact. *Id.* at 3:31–33. Kim discloses that the blocking artifact can be removed from S_0 by replacing the frequency component in S_0 with the frequency components of S_1 and S_2 . *Id.* at 3:34–37. Kim discloses using a discrete cosine transform (DCT) as a frequency analysis tool. *Id.* at 3:46–47.

Kim specifically discloses using a “4-point DCT kernel basis [that] has symmetric and anti-symmetric properties around the center of 4 points.” *Id.* at 3:50–52. “[A] factor directly affecting the block discontinuity is not the symmetric component but the anti-symmetric component.” *Id.* at 3:57–59. Accordingly, “[t]he magnitude of $a_{3,0}$ in a frequency domain is thus adjusted based on the anti-symmetric component” *Id.* at 3:59–61. “[P]roper adjustment of $a_{3,0}$ is directly related to the reduction of block discontinuity in the spatial domain.” *Id.* at 3:62–63.

2. *Analysis of Independent Claim 1*

“A method of reducing blocking artifacts associated with consecutive pixels of a block boundary of a digital image, the method comprising:”

Petitioner contends that, to the extent the preamble is limiting, Kim discloses “an MPEG-4 video coding method that reduces a blocking artifact in a real-time moving picture using a frequency property around boundaries between blocks.” Pet. 28–29 (quoting Ex. 1003, 2:32–35) (citing Ex. 1003, 4:38–39, 5:40–41). Petitioner points to Kim’s Figure 1, reproduced above, as “depict[ing] a line of pixels S_0 in relation to horizon[t]al and vertical block boundaries of a digital image.” *Id.* (citing Ex. 1003, 3:11–15) (emphasis omitted). According to Petitioner, “[i]n *Kim* the line of pixels S_0 ‘is located across a block boundary’ and thus ‘is directly influenced by the blocking artifact.’” *Id.* (citing Ex. 1003, 3:17–19) (emphasis omitted). Petitioner asserts that Kim’s “line of pixels S_0 contains two consecutive pixels from a first block, v_2 and v_3 , and two consecutive pixels from a neighboring block, v_4 and v_5 .” *Id.* (emphasis omitted).

“selecting at least two consecutive pixels from a first block and at least two consecutive pixels from a neighboring block, the blocks being located on opposite sides of a block boundary and next to the block boundary, and the pixels forming a line of pixels that is perpendicular to the block boundary”

As discussed above with respect to the preamble, Kim’s Figure 1 shows a line of pixels S_0 that spans a block boundary and includes consecutive pixels v_2 and v_3 from a first block and consecutive pixels v_4 and v_5 from a second, neighboring block. *Id.* at 29–30. As discussed in detail below, Petitioner takes the position that pixel values are selected to calculate the claimed “first offset.” *See infra* Eq. (3).

“calculating a first offset as a function of pixel values for each of the at least two consecutive pixels from the first block and the at least two consecutive pixels of the neighboring block”

“comparing the first offset to a first threshold value”

“modifying the respective pixel values of two consecutive pixels from the first block and the respective pixel values of two consecutive pixels from the second block, by applying filtering on said pixels, in the event that $\text{abs}[\text{first offset}] < \text{first threshold}$, or by applying no filtering at all on any of said pixels, in the event that $\text{abs}[\text{first offset}] \geq \text{first threshold}$ ”

According to Petitioner, “Kim’s DCT coefficient $a_{3,0}$ and the ’066 Patent’s ‘first offset’ describe a ‘discontinuity’ or ‘difference’ in pixel values across the block boundary.” Pet. 33. Petitioner asserts that Kim discloses “calculating the DCT coefficient $a_{3,0}$ (first offset) as a function of pixel values v_2 , v_3 , v_4 , and v_5 as follows:”

$$a_{3,0} = ([c_1 - c_2 \ c_2 - c_1] * [v_2 \ v_3 \ v_4 \ v_5]^T) / c_3 \quad (2)$$

Id. (citing Ex. 1003, 4:28–32). Petitioner further asserts that Kim’s DCT coefficient $a_{3,0}$ can be rewritten as follows:

$$a_{3,0} = (c_2 \times (v_4 - v_3) - c_1 \times (v_5 - v_2)) / c_3 \quad (3)$$

Id. Petitioner asserts that, like the ’066 patent, “Kim explains that c_1 and c_2 are preferably approximated by integers and c_3 is preferably approximated to a multiple of two.” *Id.* (citing Ex. 1003, 4:24–27). Petitioner compares the format of Equation 3 with Equation 1 (*supra* § II.B) disclosed in the ’066 patent. *Id.* at 33–34; Ex. 1001, 14:26, 12:21. Petitioner contends that Kim’s $a_{3,0}$ is calculated as a function of pixel values, v_2 and v_3 , of two consecutive pixels, p_0 and p_1 from the first block, and pixel values, v_4 and v_5 , of two

consecutive pixels, q_0 and q_1 , of the neighboring block. Pet. 34; *see id.* (citing Ex. 1002 ¶¶ 91–98).

According to Petitioner, “*Kim* discloses modifying pixel values of two consecutive pixels from the first block (v_2 and v_3) and pixel values of two consecutive pixels of the second block (v_4 and v_5), as follows:”

$$v'_3 = v_3 - d_{[1]} \quad (4)$$

$$v'_4 = v_4 + d_{[1]} \quad (5)$$

$$v'_2 = v_2 - d_2 \quad (6)$$

$$v'_5 = v_5 + d_2 \quad (7)$$

where d_1 and d_2 are determined based on Equations 8 and 9, as set forth below. Pet. 35–36 (citing Ex. 1003, 4:50–59) (emphasis omitted).

Petitioner contends “*Kim* discloses comparing the DCT coefficient $a_{3,0}$ (first offset) to a quantization parameter QP (first threshold) using the following equations:”

$$d_1 = \left(\frac{3(v_3 - v_4)}{8}\right) \times (\delta(|\alpha_{3,0}| < QP)) \quad (8)$$

$$d_2 = \left(\frac{3(v_3 - v_4)}{16}\right) \times (\delta(|\alpha_{3,0}| < QP)) \quad (9)$$

Id. at 34 (citing Ex. 1003, 4:60–65). Petitioner asserts that “[t]he function $\delta(|\alpha_{3,0}| < QP)$ compares the absolute value of $a_{3,0}$ (first offset) to QP , *i.e.*, ‘the quantization parameter of the macroblock where v_4 belongs.’” *Id.* (citing Ex. 1003, 4:21–23); *compare id.*, with Ex. 1001, 14:29–35 (“the first threshold is determined on the basis of quantization parameter values assigned to the respective block”). Petitioner also contends that, “[w]hen the absolute value of $a_{3,0}$ (first offset) is less than QP , then $\delta(|\alpha_{3,0}| < QP) = 1$,” “[o]therwise, $\delta(|\alpha_{3,0}| < QP) = 0$.” Pet. 34–35; *see id.* at 35 (citing Ex. 1002 ¶¶ 99–102).

Petitioner further contends that

When $|a_{3,0}| < QP$ is true, then $\delta(|a_{3,0}| < QP) = 1$, and d_1 and d_2 are nonzero. Consequently, equations (4)-(7) apply filtering to the pixels v_2 , v_3 , v_4 , and v_5 such that “[t]he blocking artifact...is reduced.” *Id.*, 4:66-67. That is, the values of the pixels of the first block are modified by an amount $-d_1$ or $-d_2$ (e.g., the pixel values are decreased if d_1/d_2 are positive) and the values of the pixels of the neighboring block are modified by a corresponding amount with the opposite sign, $+d_1$ or $+d_2$ (e.g., the pixel values are increased if d_1/d_2 are positive). This reduces the difference between the pixel values on opposite sides of the block boundary (i.e., their modified values are closer together than the unmodified values) and thus filters the blocking artifact.

On the other hand, when $|a_{3,0}| \geq QP$ is true, then $\delta(|a_{3,0}| < QP) = 0$, and d_1 and d_2 are zero. Equations (4)–(7) result into $v_2'=v_2$, $v_3'=v_3$, $v_4'=v_4$, and $v_5'=v_5$ Consequently, equations (4)-(7) of Kim, which suggest that no pixel values have been modified, apply no filtering at all on any of pixels v_2 , v_3 , v_4 , and v_5 because the pixel values are not changed when $|a_{3,0}| \geq QP$.

Pet. 36–37 (citing Ex. 1002 ¶ 69).

Patent Owner’s Contentions

According to Patent Owner, “[n]either Kim nor Petitioner explains how the $\delta(|a_{3,0}| < QP)$ function operates.” PO Resp. 37 (emphasis omitted). Patent Owner contends that “Dr. Karam’s allegations concerning the operation of $\delta(|a_{3,0}| < QP)$ are likewise unsupported.” *Id.* at 38 (citing Ex. 1002 ¶¶ 67–69). Patent Owner argues that “other disclosure from *Kim undermines* Petitioner’s theory regarding $\delta(|a_{3,0}| < QP)$ *Kim* states that ‘the $|a_{3,0}| < QP$ condition also prevents over-smoothing when the blocking artifact is not very serious.’” *Id.* at 39 (citing Ex. 1003, 4:16–19). Patent Owner contends “[t]his passage implies that *Kim does not* filter (i.e., ‘prevents oversmoothing’) when $|a_{3,0}| < QP$ (i.e., when the discontinuity

measure is small, ‘not very serious’),” and further “implies that $\delta(|a_{3,0}| < QP)$ is equal to 0 when $|a_{3,0}| < QP$ so that the ‘d’ offsets become 0 and the original pixel values are not modified (i.e., because ‘the blocking artifact is not very serious’).” *Id.* at 39–40. As such, Patent Owner argues that the manner in which Kim’s filtering actually operates “is the exact opposite of Petitioner’s theory.” *Id.* at 40 (citing Ex. 2008 ¶ 118).

Patent Owner further contends

The Board criticized [Patent Owner’s] reliance on this disclosure because it relates to *Kim*’s default mode embodiment, rather than *Kim*’s [] DC mode embodiment which is relied upon by Petitioner. Respectfully, the Board’s criticism is unwarranted because this is the **only disclosure** in *Kim* that can be used to interpret the $\delta(|a_{3,0}| < QP)$ function. If one tosses aside this disclosure, there is literally nothing left from *Kim* that provides any hint as to how the $\delta(|a_{3,0}| < QP)$ function operates. Moreover, a POSA reading *Kim* would have no reason to think that the $\delta(|a_{3,0}| < QP)$ function operates in a first manner for *Kim*’s default mode embodiment, and functions in a second manner for *Kim*’s DC mode embodiment. Certainly, nothing in *Kim* suggests that the $\delta(|a_{3,0}| < QP)$ function operates in two distinct and opposite manners.

Id. at 40 (citing Inst. Dec. 21; Ex. 2008 ¶ 119).

Patent Owner asserts that “*Kim*’s suggestion that $\delta(|a_{3,0}| < QP)$ may function in a manner directly opposite to Petitioner’s interpretation is supported by other known delta functions (e.g., the ‘unit impulse’ function)” where “ $\delta(n)$ is equal to 1 when the parameter $n=0$; and (ii) the $\delta(n)$ function is equal to 0 when the parameter $n \neq 0$” *Id.* at 41 (citing Ex. 2002, 10). Patent Owner also argues that a “POSA might guess that *Kim*’s $\delta(n)$ function refers to one of the other well-known delta operators in engineering and signal processing, such as the Dirac delta $\delta(x)$ or the Kronecker delta δ_{ij} , each of which functions in a manner contrary to Petitioner’s theory.” *Id.* at

42 n.2. Patent Owner presents evidence that, in teaching a college course, Dr. Karam used a textbook that defines $\delta(n)$ as the unit-impulse function and alternatively, as the Kronecker delta function. PO Resp. 43 (citing Ex. 2005; Ex. 2006, 44; Ex. 2008 ¶¶ 123–125).

Petitioner's Reply

Petitioner responds that “a POSITA [person of ordinary skill in the art] would understand that a ***small discontinuity measure*** indicates a likely ***blocking artifact***, whereas a ***large discontinuity measure*** indicates a likely image feature and a comparatively ***small (not very severe) blocking artifact***.” Reply 7 (citing Ex. 1006, 185). According to Petitioner,

A POSITA would correctly interpret Kim’s reference to “over-smoothing” to mean that *the “delta” function switches off filtering when the discontinuity measure is large and switches on filtering when the discontinuity measure is small—i.e., the same conditions recited by limitation 1[d].* The contrary interpretation of Kim that PO urges, where small discontinuities at block edges are not filtered simply because they are small, is illogical and would undermine the purpose of a deblocking filter, which is to remove these small but visually perceptible artifacts. [Patent Owner’s] expert concurs with Petitioner.

Reply 7 (citing Ex. 1021 ¶ 18; Ex. 1006, 185; Ex. 1023, 60:1–18, 61:5–22; Ex. 1021 ¶ 19) (emphasis added).

Discussion

We determine that Patent Owner has the better position. Kim does not specify what is meant by the phrase “blocking artifact [that] is not very serious,” but does describe preventing over-smoothing with respect to Kim’s default embodiment. Although Petitioner relies on Kim’s DC offset mode embodiment for its challenges, we are persuaded by Patent Owner’s arguments that we should not discount Kim’s only disclosure “that can be used to interpret the $\delta(|a_{3,0}| < QP)$ function” and that “a POSA reading Kim

would have no reason to think that the $\delta(|a_{3,0}| < QP)$ function operates in a first manner for *Kim*'s default mode embodiment, and functions in a second manner for *Kim*'s DC mode embodiment.” PO Resp. 40 (citing Inst. Dec. 21; Ex. 2008 ¶ 119); see Ex. 1003, 4:16–18.

We understand Petitioner's position as attempting to show how *Kim*'s delta function, $\delta(x)$, works by characterizing how *Kim*'s technique might have operated. “H.264 and MPEG-4 Video Compression” is a textbook authored by Dr. Richardson (Ex. 1006, “the Richardson textbook”) and states that

The effect of the filter decision is to “switch off” the filter when there is a significant change (gradient) across the block boundary in the original image. When QP is small, anything other than a very small gradient across the boundary is likely to be due to image features (rather than blocking effects) that should be preserved and so the thresholds α and β are low.

Ex. 1006, 185. The Richardson textbook explains filtering, but not how *Kim*'s delta function, $\delta(x)$, works. *Id.* As such, we do not consider the Richardson textbook to provide evidentiary support for Petitioner's contention of how *Kim*'s delta function, $\delta(x)$, operates and the complete record does not contain argument or evidence to support a finding that *Kim* operates as Dr. Richardson describes.

As to Petitioner's contention that “a small discontinuity measure indicates a likely blocking artifact, whereas a large discontinuity measure indicates a likely image feature and a comparatively small (not very severe) blocking artifact” (Pet. Reply 7 (citing Ex. 1006, 185) (emphases omitted)), the complete record does not provide adequate support. Indeed, we find no persuasive evidence in the record that an ordinarily skilled artisan would have considered a likely image feature to be a blocking artifact at all.

We consider Patent Owner’s evidence regarding a known signal processing delta function called “the unit-impulse function,” where “ $\delta(n)$ is equal to 1 when the parameter $n=0$; and (ii) the $\delta(n)$ function is equal to 0 when the parameter $n \neq 0$. . . ,” to be more persuasive of how Kim’s delta function, $\delta(x)$ was likely intended to work. PO Resp. 41 (citing Ex. 2002, 10). We are not persuaded, however, that the ordinarily skilled artisan would have “guessed” that Kim’s delta function, $\delta(x)$, refers to the Kronecker delta function, δ_{ij} , because the latter takes two arguments, and the former takes only one. *Id.* at 42 n.2.

We disagree with Petitioner that “a POSITA would not rely on PO’s examples of known ‘delta’ functions to interpret *Kim*’s ‘delta’ function. . . .” and that such reliance would be “inconsistent[] with the teachings of *Kim* itself.” Pet. Reply 8. Petitioner attempts to distinguish Kim’s delta function from the unit-impulse function on the basis that “the input to *Kim*’s ‘delta’ function is a Boolean relational expression (inequality) that evaluates to ‘true’ or ‘false,’” whereas “the input to the ‘unit impulse’ function is an integer value ‘n.’” *Id.* at 8–19 (citing Ex. 1003, 4:15–18, 4:60–65; PO Resp. 41; Ex. 1021 ¶ 20). Petitioner does not dispute that a person of ordinary skill in the art would have known that a computer processes a Boolean value of true as a “1” and a Boolean value of false as a “0,” and we agree with Patent Owner that such a person “might well infer that [Kim’s delta] function refers to . . . the unit impulse Function” such that it evaluates to 0 if $|a_{3,0}| < QP$ and to 1 if $|a_{3,0}| \geq QP$, “in an opposite way to Petitioner’s interpretation of Kim.” See Tr. 13:13–19; PO Resp. 41–42.

We also find it unlikely that Kim would disclose a delta function, $\delta(x)$, that operates differently from the known $\delta(x)$ function without presenting an explicit and explanatory disclosure. Other than competing

expert declarations, the only evidence of record that sheds light on the meaning of the delta function, $\delta(x)$, favors Patent Owner's position.

Petitioner infers how Kim might work, and then assumes the delta function, $\delta(x)$, works a certain way to conform to that inference, while Patent Owner offers direct evidence of what delta function, $\delta(x)$, meant in this context. Kim does not disclose that it worked in the way Petitioner infers and moreover, Petitioner's assumption is counter to how known delta functions operated.

For the foregoing reasons, we conclude that Petitioner has not established by a preponderance of the evidence that independent claim 1 is unpatentable, as anticipated by or obvious over Kim.

3. *Analysis of Dependent Claim 11 and Independent Claim 20*

Claim 11 depends from claim 1 and further recites, "wherein said digital image is a video frame." Independent claim 20 recites, *inter alia*, "[a] non-transitory computer-readable medium comprising stored thereupon a computer program for reducing blocking artifacts associated with consecutive pixels of a block boundary of a digital image, the computer program comprising computer program instructions." Independent claim 20 also recites limitations similar to those set forth in independent claim 1.

For substantially the same reasons discussed above in Section III.D.2, we conclude that Petitioner has not established by a preponderance of the evidence that these claims are unpatentable, as anticipated or obvious, over Kim.

E. *Obviousness over KimIEEE Alone*

Petitioner contends that claims 1, 2, 5, and 11 are unpatentable as obvious over KimIEEE under 35 U.S.C. § 103. Pet. 45–68. For the reasons

that follow, we are not persuaded that the evidence supports Petitioner's arguments. Thus, Petitioner does not establish by a preponderance of the evidence unpatentability of claims 1, 2, 5, and 11 as obvious over KimIEEE.

1. *KimIEEE*

KimIEEE concerns filtering to remove blocking artifacts in video coding schemes. Ex. 1004, 156. Because the human visual system is more sensitive to blocking artifacts in flat regions than in complex regions, KimIEEE discloses a deblocking filter with two separate modes. *Id.* at 156–157. In a smooth region mode “with small dc-like offset, strong smoothing is applied inside the block as well as on the block boundary.” *Id.* at 156. In a default mode for complex regions, “a sophisticated smoothing operation is applied to reduce blocking artifacts without introducing undesirable blur by using the frequency information around the block boundary.” *Id.* Figure 2 of KimIEEE, reproduced below, is a process flow diagram specifying the two modes of the deblocking filtering.

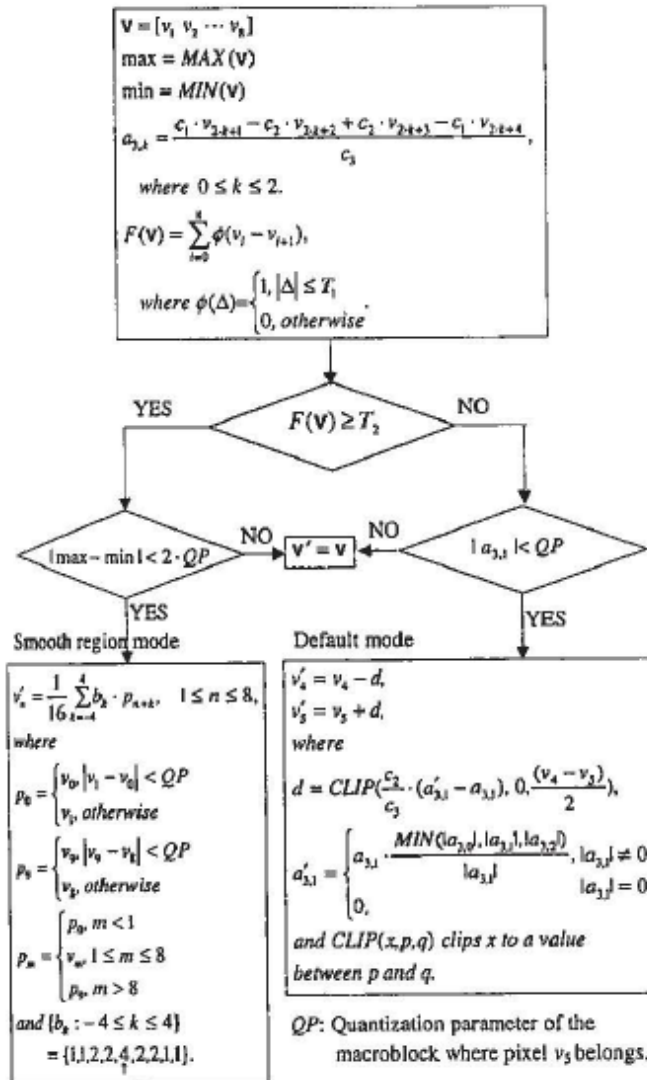


Figure 2 of KimEEE depicts the smooth region mode and default mode.

2. Analysis of Independent Claim 1

“A method of reducing blocking artifacts associated with consecutive pixels of a block boundary of a digital image, the method comprising:”

According to Petitioner, KimIEEE discloses “a method to remove blocking artifacts in low bit-rate block-based video coding.” Pet. 55 (quoting Ex. 1004, 156). In Figure 1, KimIEEE illustrates “consecutive

pixels with pixel values v_0 through v_9 that may be used for filtering on either a vertical boundary/edge or a horizontal boundary/edge.” *Id.*

“selecting at least two consecutive pixels from a first block and at least two consecutive pixels from a neighboring block, the blocks being located on opposite sides of a block boundary and next to the block boundary, and the pixels forming a line of pixels that is perpendicular to the block boundary”

According to Petitioner, “*KimIEEE* notes that the line of pixels S_1 ‘is located across the block boundary.’” *Id.* at 56 (citing Ex. 1004, 158) (emphasis omitted). Petitioner asserts that “[t]he line of pixels S_1 contains two consecutive pixels from a first block, v_3 and v_4 , and two consecutive pixels from a neighboring block, v_5 and v_6 ,” which “form a line of pixels that is perpendicular to the block boundary.” *Id.* at 56–57 (emphasis omitted). Petitioner further asserts that the first block and neighboring block are on either side of the block boundary. *Id.* at 57.

“calculating a first offset as a function of pixel values for each of the at least two consecutive pixels from the first block and the at least two consecutive pixels of the neighboring block”

Petitioner cites *KimIEEE*’s DCT coefficient $a_{3,1}$ as teaching the “first offset.” According to Petitioner, “both *KimIEEE*’s DCT coefficient $a_{3,1}$ and the ’066 Patent’s ‘first offset’ describe a ‘discontinuity’ or ‘difference’ in pixel values across the block boundary.” *Id.* at 58; *see* Ex. 1004, 158. *KimIEEE* discloses calculating the DCT coefficients (including $a_{3,1}$ by substituting 1 for k) as follows:

$$a_{3,k} = (c_1 \cdot v_{2k+1} - c_2 \cdot v_{2k+2} + c_2 \cdot v_{2k+3} - c_1 \cdot v_{2k+4})/c_3 \quad (10)$$

$$a_{3,1} = (c_1 \cdot v_3 - c_2 \cdot v_4 + c_2 \cdot v_5 - c_1 \cdot v_6)/c_3$$

Pet. 58. This equation, in turn, reduces to

$$a_{3,1} = (c_2 \times (v_5 - v_4) - c_1 \times (v_6 - v_3))/c_3 \quad (11)$$

Id. Petitioner asserts that “ v_3 , v_4 , v_5 , and v_6 denote pixel values for each of the two consecutive pixels from the first block (v_3 and v_4) and the two consecutive pixels of the neighboring block (v_5 and v_6).” *Id.* at 58–59 (emphasis omitted). Petitioner compares the reduced form of KimIEEE’s equation, Equation 11, with the equation for the first offset set forth in the ’066 patent. *Id.* at 59 (citing Ex. 1002 ¶¶ 106–115); *see supra* § III.B, Eq. (1).

“comparing the first offset to a first threshold value”

Petitioner contends that KimIEEE “discloses comparing the DCT coefficient $a_{3,1}$ (first offset) to the quantization parameter QP (first threshold)” Pet. 59–60 (citing Ex. 1004, Fig. 2; Ex. 1002 ¶¶ 116–118). Petitioner quotes a portion of KimIEEE that discloses “[i]f the magnitude of $a_{3,1}$ is greater than a certain value (which is related to the quantization parameter), however, the filter is not applied to preserve the image details.” *Id.* at 59 (quoting Ex. 1004, 158).

“modifying the respective pixel values of two consecutive pixels from the first block and the respective pixel values of two consecutive pixels from the second block, by applying filtering on said pixels, in the event that $\text{abs}[\text{first offset}] < \text{first threshold}$, or by applying no filtering at all on any of said pixels, in the event that $\text{abs}[\text{first offset}] \geq \text{first threshold}$ ”

According to Petitioner, “KimIEEE discloses, in Figure 2, that, if $|a_{3,1}| < \text{QP}$ is true (“YES” arrow), pixel value v_4 from the first block and pixel value v_5 from the neighboring block are modified as follows:”

$$v'_4 = v_4 - d \quad (12)$$

$$v'_5 = v_3 + d \quad (13)$$

Pet. 60 (emphasis omitted). Petitioner asserts that

[T]he value of pixel v_4 of the first block is modified by an amount $-d$ (e.g., the pixel value is decreased if d is positive) and the value of pixel v_5 of the neighboring block is modified by a corresponding amount with opposite sign, $+d$ (e.g., the pixel value is increased if d is positive). This reduces the difference between the pixel values on opposite sides of the block boundary (i.e., their modified values are closer together than the unmodified values) and thus filters the blocking artifact.

Otherwise, if $|a_{3,1}| < QP$ is false (“NO” arrow), the pixel values are not modified (i.e., $v'=v$).

Id. at 60–61 (citing Ex. 1004, Fig. 2, 158 (“If the magnitude of $a_{3,1}$ is greater than a certain value (which is related to the quantization parameter), however, the filter is not applied to preserve the image details”)) (emphasis omitted).

Although Petitioner argues that KimIEEE’s default mode “modifies the pixel value of one pixel from the first block (v_4) and the pixel value of one pixel from the neighboring block (v_5) when $|a_{3,1}| < QP$ is true,” it acknowledges that KimIEEE’s default mode does not “modify the pixel values of two consecutive pixels from the first block and the pixel values of two consecutive pixels from the neighboring block, as claimed.” *Id.* at 61 (emphasis omitted). Petitioner contends “a POSA would have been motivated to modify two or more consecutive pixels on each side of the block boundary (i.e., ‘a few pixels’) in the ‘default mode’ and would have had a reasonable expectation of success in doing so.” *Id.* at 61; *see id.* at 62 (quoting Ex. 1004, 157 (“smoothing of a few pixels around the block boundary is enough to achieve a desired deblocking effect”)) (emphasis omitted)).

Rationale for Modifying KimIEEE

According to Petitioner, “[a] POSA would have understood that, in this context, a ‘few’ means more than a pair of pixels directly along the block boundary,” and KimIEEE “by no means restricts filtering to a single pixel on each side of the block boundary.” *Id.* at 62 (citing Ex. 1002 ¶ 83; Ex. 1004, 157 (Figure 2)) (emphasis omitted). Petitioner supports its modification of KimIEEE by pointing to Kim, which shares co-inventors in common with the authors of KimIEEE, and which Petitioner argues discloses “modifying two consecutive pixels on each side of the block boundary” in “a similar deblocking filtering scheme (notwithstanding the different equations).” *Id.* at 62–63. Petitioner further supports its position by looking to the ’066 patent itself, asserting that “it was known to modify two consecutive pixels on each side of the block boundary when applying filtering in contexts similar to *KimIEEE*[E]’s ‘default mode,’” and that applying two formulas from the ’066 patent “to two consecutive pixels from each block in *KimIEEE*’s ‘default mode’ would have yielded expected results in accordance with the mathematical expressions provided.” *Id.* at 63–64 (citing Ex. 1001, 3:44–55).

Petitioner still further contends that KimIEEE “discloses formulas for modifying at least two consecutive pixels on each side of the block boundary (see EX1004, Figure 2, box labeled ‘smooth region mode’).” *Id.* at 64. Petitioner argues that even though “*KimIEEE* cautions that applying too strong of a filter can introduce ‘undesired blur,’” it “does not teach away from modifying more than one pixel on each side of the block boundary in the ‘default mode’” because “this undesired blur is mitigated by ‘sophisticated smoothing operation’ in the ‘default mode’ and not by

restricting filtering to only one pixel on each side of the block boundary.”
Id. at 65 (citing Ex. 1004, 156–57); *see id.* at 63 (citing Ex. 1002 ¶¶ 84, 85).

Petitioner’s Declarant, Dr. Karam, testifies, with respect to the “sophisticated smoothing operation,” that “*KimIEEE* teaches that a check is performed *in the ‘smooth region mode’* ‘[t]o prevent real edges in the filtering region from smoothing,’ thereby mitigating excessive blurring effects associated with filtering two or more pixels on each side of the block boundary.” Ex. 1002 ¶ 84 (quoting Ex. 1004, 157) (citing Ex. 1004, 157) (emphasis added). The cited portion of *KimIEEE* discloses that, “[t]o prevent real edges in the filtering region from smoothing, however, filtering is *not* performed when the difference between the maximum value and the minimum value of *v* is larger than a certain value, 2QP.” Ex. 1004, 157–58.

Patent Owner’s Contentions

Patent Owner argues that the sentence in *KimIEEE* regarding “a few pixels” upon which Petitioner relies for its modification was “taken out of context by Petitioner,” and Patent Owner quotes a passage from *KimIEEE* with that sentence underlined, which we reproduce below. PO Resp. 50.

First, the [human visual system] HVS is more sensitive to blocking artifacts in flat regions than in complex regions. Therefore, a strong smoothing filter is required on those regions. In complex regions, however, smoothing of a few pixels around the block boundary is enough to achieve a desired deblocking effect. Second, smoothing operations tend to introduce more undesirable blur in complex regions than in flat regions. Hence, adaptive smoothing to preserve image details is desirable in complex regions. Third, because of motion compensation, blocking artifacts are propagated, and the propagated artifacts are more visible in flat regions than in complex regions. **Therefore, smoothing in flat regions must cover the inside of a block as well as block boundaries.** From the observations above, it is found that the use of two separate filters depending on local

image characteristics is preferable for effective deblocking. ***The filter for flat regions should provide a strong smoothing effect inside a block as well as on block boundaries. . . . On the other hand, the filter for complex regions is required to work only on block boundaries.***

Id. at 50–51 (quoting Ex. 1004, 157).

Patent Owner further argues that “*KimIEEE*’s detailed description of its ‘smooth region mode’ states that ‘[i]n this mode, we apply a nine-tab smoothing filter (see Fig. 2) inside the block as well as on the block boundaries,’” whereas “[c]onversely, *KimIEEE*’s detailed description of its ‘default mode’ states that ‘[i]n this mode, we smooth the two block boundary pixels v4 and v5 only.’” *Id.* at 52 (quoting Ex. 1004, 157, 158) (emphasis omitted) (citing Ex. 2008 ¶ 148). According to Patent Owner, “*KimIEEE* emphasizes that its two-mode system preserves ‘edge details’ and ‘removes noticeable blocking artifacts without degrading details,’” and *KimIEEE* “explain[s] that these purported improvements in image quality (i.e., preventing blur) stem from modifying only two pixels at the border when operating in ‘default mode.’” *Id.* at 53 (citing Ex. 1004, 157, 159; Ex. 2008 ¶ 149). Patent Owner explains that “*KimIEEE* warns against over-smoothing pixel values for complex regions because such smoothing may be interpreted by the HVS [Human Visual System] as undesirable blur,” and “[w]hen operating in default mode, *KimIEEE* clearly and unmistakably teaches smoothing ‘the two block boundary pixels v4 and v5 **only**.’” PO Resp. 54–55 (quoting Ex. 1004, 158 (emphasis added)) (citing Ex. 1004, 157; Ex. 2008 ¶ 152).

According to Patent Owner, “Petitioner’s proposal to modify *KimIEEE*’s default mode applicable to complex regions by looking to *Kim*’s DC offset mode applicable to smooth regions is nonsensical.” *Id.* at 55–56.

Patent Owner argues that, “a POSA considering *KimIEEE*’s default mode applicable to complex regions would be repelled from looking to *Kim*’s DC offset mode because it applies to smooth regions” and “the entire point of *KimIEEE* is to filter complex regions and smooth regions differently.” *Id.* at 56. Patent Owner asserts that “[e]xtending *KimIEEE*’s default mode to filter four pixels across each boundary, rather than two pixels, could result in a doubling of computational complexity for every filter operation in the default mode,” which is “contrary to *KimIEEE*’s stated goal.” PO Resp. 53 (citing Ex. 2008 ¶ 150).

Petitioner responds that “*KimIEEE* chose to limit filtering to one pixel in view of these tradeoffs; however, this does not establish that a different number of pixels would not have been obvious.” Pet. Reply 10 (citing Ex. 1023, 88:23–91; Ex. 1021 ¶ 26; *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994); *Dunbar v. Myers*, 94 U.S. 187, 195 (1876)). Petitioner further argues that “[c]ases addressing this classic ‘two vs. one’ distinction have overwhelmingly found that the mere difference in quantity does not yield a patentable invention absent a new or unexpected result.” *Id.* at 11 (citing *Peters v. Hanson*, 129 U.S. 541, 550 (1889); *Tyco Healthcare Grp. LP v. Ethicon Endo-Surgery, Inc.*, 774 F.3d 968, 979 (Fed. Cir. 2014); *B/E Aerospace, Inc. v. C&D Zodiac, Inc.*, 962 F.3d 1373, 1380 (Fed. Cir. 2020)). Petitioner goes on to argue that Patent Owner “identifies no such new or unexpected result” and that the “tradeoffs between filtering one, two, or more pixels at a block boundary were well-understood.” *Id.* (citing Ex. 1006, 184; Ex. 1021 ¶ 28). According to Petitioner, “a POSITA would not conclude that *KimIEEE*’s deblocking filter *could not, or should not*, be modified in response to changes in these parameters.” *Id.* (citing Ex. 1021 ¶ 29) (emphasis added). Petitioner further asserts that a “POSITA would

extrapolate *KimIEEE*'s teaching that filtering one pixel on each side of the block boundary avoided 'undesirable blur' in one experimental context to determine the equivalent number of filtered pixels (which may be more than one) sufficient to avoid 'undesirable blur' in a different video coding contexts." Pet. Reply 13 (citing *KSR*, 550 U.S. at 418; Ex. 1021 ¶ 30).

Discussion

Petitioner's challenge, and in particular its reasons for modifying *KimIEEE*, do not explain *why* a POSITA *would have* smoothed four instead of two block boundary pixels v4 and v5—particularly in light of *KimIEEE*'s disclosure that, in the default mode, "the filter for complex regions is required to work only on block boundaries," and "smooth the two block boundary pixels v4 and v5 *only*" to prevent undesirable blur. Ex. 1004, 157–58 (emphasis added). Petitioner's argument that adding an extra pixel is just a "classic 'two vs. one' distinction" does not explain what tradeoffs the POSITA might have considered, and specifically, what benefit would be obtained in exchange for the undesirable blur that would result from smoothing more than two block boundary pixels. See Pet. Reply 11. Petitioner's argument that Patent Owner "identifies no such new or unexpected result" is unavailing as Petitioner bears the burden of persuasion. *Dynamic Drinkware*, 800 F.3d 1375 at 1378. Merely because courts may have found that "the mere difference in quantity does not yield a patentable invention," (see Pet. Reply 11) does not absolve Petitioner of the burden to provide an actual reason, supported by sufficient rational underpinning, for its proposed modification of *KimIEEE*.

Petitioner's argument that a "POSITA would extrapolate . . . to determine the equivalent number of filtered pixels (which may be more than one) sufficient to avoid 'undesirable blur' in a different video coding

contexts.” Pet. Reply 13 (citing *KSR*, 550 U.S. at 418; Ex. 1021 ¶ 30). But Petitioner does not set forth any different video coding contexts which might prove its contention true. Nor does Petitioner explain what benefit might be obtained by filtering four pixels instead of two—in light of the increased complexity (see PO Resp. 53)—for any particular, different video context.

In support of Petitioner’s contentions, Dr. Karam testifies that

[*First*,] a POSITA would recognize that, whether one chooses to filter two pixels or four pixels at the block boundary in complex regions, both choices improve computational efficiency relative to the nine-tap filter (which modifies eight pixels) used in smooth regions. This is particularly the case because smooth regions are much more frequent than complex regions in natural images.

...

[*Second*,] PO acknowledges that KimIEEE not only considered the possibility of filtering more than one pixel on each side of the block boundary, but it disclosed the expected results and tradeoffs of doing so. POR, 51 (citing KimIEEE’s teachings that filtering more than one pixel on each side of the block boundary yields a “strong smoothing effect” but may introduce “undesirable blur”).

...

[*Third*,] . . . the tradeoffs between filtering one, two, or more pixels at a block boundary were well-understood at the time of the invention. See, e.g., EX1006, 184 (PO’s expert Dr. Richardson describing filtering operations that can affect one, two, or three pixels on either side of the boundary depending on the desired filter strength).

...

[*Fourth*,] . . . a POSITA would appreciate that the impact of modifying a given pixel on the human visual system depends on the specific video coding context. For example, in video coding systems with larger block sizes or higher display resolutions, more pixels must be modified to achieve the same visual impact.

Ex. 1021 ¶¶ 24, 26, 28, 30 (citing Ex. 1006, 184).

First, Dr. Karam’s testimony addresses a difference in computational efficiency between filtering in smooth regions (i.e., in smooth region mode) as compared with filtering in complex regions (i.e., in default region mode). It does not, however, compare the difference in computational efficiency between filtering two pixels at the block boundary and filtering four pixels at the block boundary *with respect to KimIEEE’s default region mode*—computational complexity is clearly increased by filtering extra pixels. Ex. 1023, 71:14–16 (Dr. Richardson explaining that, with “more taps in a digital filter . . . computational complexity [] increase[s]”).

Second, as to Dr. Karam’s testimony about the tradeoff between a “strong smoothing effect” and “undesirable blur,” the record does not support the finding that a strong smoothing effect, in and of itself, is a benefit if it produces an undesirable blur. Stated differently, if the strong smoothing effect results in undesirable blur, then smoothing extra pixels to increase the filter strength is not a benefit that is shown to outweigh its computational complexity.

Third, the cited portion of Dr. Richardson’s textbook does not address what benefits there are in light of the tradeoffs of undesirable blur and increased computational complexity of filtering extra pixels. See Ex. 1006, 184–85 (“The ‘strength’ of the filter (the amount of filtering) depends on the current quantiser, the coding modes of neighbouring blocks and the gradient of image samples across the boundary.”).

Fourth, Dr. Karam’s testimony as to the “impact of modifying a given pixel on the human visual system” being dependent “on the specific video coding context” is not sufficiently supported by evidence. See Ex. 1021 ¶ 30. Nor is Dr. Karam’s testimony that “in video coding systems with larger block sizes or higher display resolutions, more pixels must be

modified to achieve the same visual impact.” *Id.* Furthermore, these two points presented by Dr. Karam’s Reply Declaration do not fall under the umbrella of Petitioner’s initial position as set forth in the Petition.

Petitioner’s challenge does not address why the proposed modification would be made in KimIEEE’s default mode, which is specifically designed for complex boundary regions instead of the smooth region mode, in which KimIEEE discloses smoothing multiple pixels on each side of the block boundary, particularly in light of KimIEEE’s disclosure that the “strong smoothing effect” is applied to flat, *not complex*, regions. *See* Ex. 1004, 157.

Having considered the complete record developed at trial, Petitioner fails to persuade us that the ordinarily skilled artisan would have modified KimIEEE’s default mode to filter more than two consecutive pixels as required in claim 1.

3. *Dependent Claims 2, 5, and 11*

As claims 2, 5, and 11 depend from independent claim 1, we conclude Petitioner does not establish, by a preponderance of the evidence, that these claims are unpatentable as obvious, over KimIEEE for the reasons discussed above in Section III.E.2.

F. Obviousness over AAPA and KimIEEE

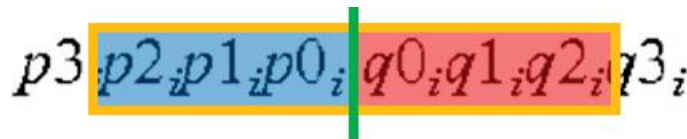
Petitioner contends that claims 1, 2, 5, and 11 are unpatentable as obvious over AAPA and KimIEEE under 35 U.S.C. § 103. Pet. 69–78. Petitioner contends that claims 1, 2, 5, and 11 are unpatentable as obvious over KimIEEE under 35 U.S.C. § 103. Pet. 45–68. For the reasons that follow, we are not persuaded that the evidence supports Petitioner’s arguments. Thus, Petitioner does not establish by a preponderance of the evidence unpatentability of claims 1, 2, 5, and 11 as obvious over KimIEEE.

1. *Analysis of Independent Claim 1*

Petitioner relies on AAPA to teach the preamble, “selecting,” and “calculating” limitations, as well as part of the “modifying” limitation. Petitioner relies on KimIEEE to teach the “comparing” limitation and part of the “modifying” limitation. With respect to the modifying limitation, Petitioner contends KimIEEE teaches making the determination as to whether to “apply[] filtering on said pixels, in the event that abs[first offset]<first threshold,” or “apply[] no filtering at all on any of said pixels, in the event that abs[first offset]>=first threshold.”

“A method of reducing blocking artifacts associated with consecutive pixels of a block boundary of a digital image, the method comprising:”

Petitioner contends AAPA discloses “filtering the border between two blocks with a vertical block boundary” as depicted in Petitioner’s annotated version of a block boundary and consecutive pixels, reproduced below. Pet. 70.



Petitioner’s annotated version of a diagram showing pixels spanning a block boundary from the ’066 patent.

Id. (citing Ex. 1001, 3:10–12).

Petitioner contends “[t]he consecutive pixel values correspond to consecutive pixels around the vertical boundary.” *Id.* at 71 (quoting Ex. 1001, 3:9–16).

“selecting at least two consecutive pixels from a first block and at least two consecutive pixels from a neighboring block, the blocks being located on opposite sides of a block boundary and next to the

block boundary, and the pixels forming a line of pixels that is perpendicular to the block boundary”

Petitioner contends that “AAPA discloses performing either a weak filtering or a strong filtering during which at least pixel values $p1_i$, $p0_i$, $q0_i$, and $q1_i$ are filtered.” *Id.* at 72 (citing Ex. 1001, 3:43–4:1). According to Petitioner, “[p]ixel values $p1_i$ and $p0_i$ correspond to two consecutive pixels from a first block, and pixel values $q0_i$, and $q1_i$ correspond to two consecutive pixels from a neighboring block,” and “[t]he four pixels form a line that is perpendicular to the vertical block boundary.” *Id.*

“calculating a first offset as a function of pixel values for each of the at least two consecutive pixels from the first block and the at least two consecutive pixels of the neighboring block”

Petitioner contends that “AAPA discloses that the weak filtering computes an offset as follows:”

$$\text{offset} = \text{Clip}(-t_c, t_c, (13 \times (q0_i - p0_i) + 4 \times (q1_i - p1_i) - 5 \times (q2_i - p2_i) + 16) \gg 5) \quad (14)$$

Id.

“comparing the first offset to a first threshold value”

Petitioner acknowledges that AAPA does not teach this limitation, but relies on KimIEEE for this teaching. *Id.* at 73. Specifically, Petitioner relies on its showing for the challenge applying KimIEEE alone to teach the “comparing” limitation.

Petitioner contends that “*KimIEEE*’s quantization parameter QP corresponds to the ’066 Patent’s first threshold” and that KimIEEE “discloses comparing the DCT coefficient $a_{3,1}$ (first offset) to a quantization parameter QP (first threshold).” *Id.* at 59 (citing Ex. 1004, Fig. 2; Ex. 1002 ¶¶ 116–118). Petitioner quotes a portion of KimIEEE that discloses “[i]f the

magnitude of $a_{3,1}$ is greater than a certain value (which is related to the quantization parameter), however, the filter is not applied to preserve the image details.” *Id.* (quoting Ex. 1004, 158); *compare id.*, with Ex. 1001, 14:29–35 (“the first threshold is determined on the basis of quantization parameter values assigned to the respective block”).

According to Petitioner, AAPA and KimIEEE concern the same field of endeavor as the claims of the ’066 patent because “both are directed to filtering blocking artifacts.” Pet. 73. Petitioner also contends that the ordinarily skilled artisan “could have” combined AAPA and KimIEEE “using known and routine software programming and editing to adjust AAPA’s deblocking filter,” and that the combination would have been “readily predictable” because it constitutes a “simple substitution of one known element (not comparing the offset to a threshold in AAPA) for another (comparing the offset to a threshold as taught by KimIEEE) to obtain predictable results (preservation of image details).” *Id.* at 74–75. Petitioner contends, in particular, that “a POSA would have been motivated to modify AAPA to incorporate KimIEEE’s comparison of the offset to a threshold to preserve image details” and “avoid filtering natural features of the image.” *Id.* at 73–75 (citing Ex. 1002 ¶¶ 87, 88). Dr. Karam’s testimony substantially mirrors the arguments in the Petition.

“modifying the respective pixel values of two consecutive pixels from the first block and the respective pixel values of two consecutive pixels from the second block, by applying filtering on said pixels, in the event that $\text{abs}[\text{first offset}] < \text{first threshold}$, or by applying no filtering at all on any

of said pixels, in the event that $\text{abs}[\text{first offset}] \geq \text{first threshold}$ ”

According to Petitioner, “AAPA discloses modifying the two pixels closest to and on each side of a block boundary as follows:”

$$p0_i = \text{Clip}_{0-255}(p0_i + \text{offset}) \quad (15)$$

$$q0_i = \text{Clip}_{0-255}(q0_i - \text{offset}) \quad (16)$$

$$p1_i = \text{Clip}_{0-255}(p1_i + \text{offset}/2) \quad (17)$$

$$q1_i = \text{Clip}_{0-255}(q1_i - \text{offset}/2) \quad (18)$$

Pet. 75–76 (citing Ex. 1001, 3:44–55, 3:59).

Having considered the complete record developed at trial, and for the same reasons discussed above in Section III.E.2, Petitioner fails to persuade us that the ordinarily skilled artisan would have modified KimIEEE’s default mode to filter more than two consecutive pixels as required in claim 1.

More particularly, and as explained in our Institution Decision, we are not persuaded that “the benefit of preserving image detail, as taught by KimIEEE, would be obtained if multiple pixels were smoothed in a *complex* region, in contravention of the teachings of KimIEEE.” Inst. Dec. 38.

2. *Analysis of Dependent Claims 2, 5, and 11*

As claims 2, 5, and 11 depend from independent claim 1, we conclude Petitioner does not establish that these claims are unpatentable as obvious, by a preponderance of the evidence, over AAPA and KimIEEE for the reasons discussed above in Section III.F.1.

G. Motion For Protective Order And Motion To Seal

On September 8, 2020, Petitioner filed a Motion for Protective Order, requesting entry of the Board’s default Protective Order² (Ex. 1019). Paper 13. Petitioner asserts that Patent Owner and Petitioner “have agreed that the default Protective Order will govern the agreed-to voluntary discovery that Petitioner will produce.” *Id.* at 1. Petitioner requests entry of the default Protective Order to seek protection for any material disclosed in connection with this proceeding that may reveal Petitioner’s confidential financial and business information. *See id.* at 2. After consideration of the Motion for Protective Order, we grant Petitioner’s request.

On January 11, 2021, Petitioner filed a Motion to Seal, seeking to seal the Patent Owner Response (Paper 15), the Petitioner Reply (Paper 20), and Exhibits 2152, 2158, 2102, 2103, 2109, 2111, 2113, 2114, 2122, 2127, 2132, 2167–2173, 2151, 2163, 2164, 2161, and 2138. Paper 23 (“Mot. Seal”). Along with its motion, Petitioner filed redacted versions of the Patent Owner Response (Ex. 1036, “Redacted Response”), the Petitioner Reply (Ex. 1037, “Redacted Reply”), and redacted versions of the exhibits identified above, as summarized in the table below. Petitioner indicates that Patent Owner does not oppose. Mot. Seal 6.

Paper or Exhibits to be Sealed	Corresponding Redacted Exhibits
<i>Membership Agreement and Subscription Form</i>	
Exhibit 2152: Member Agreement and Subscription Form	None

² Patent Trial and Appeal Board Consolidated Trial Practice Guide 117-22 (App. B) (Nov. 2019), available at <https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf> (“CTPG”).

Paper or Exhibits to be Sealed	Corresponding Redacted Exhibits
<i>Communications</i>	
Exhibit 2158: Mass Email Titled “Unified Files IPR Against US 9,338,449 Owned by Velos Media LLC”	Ex. 1041
Exhibit 2102: 9/4/17 Email from Kevin Jakel with Attachments	Ex. 1042
Exhibit 2103: 9/14/17 Email from Shawn Ambwani with Attachments	Ex. 1043
Exhibit 2109: 11/24/17 Email from Shawn Ambwani with Attachments	Ex. 1044
Exhibit 2111: 12/3/17 Email from Kevin Jakel with Attachments	Ex. 1045
Exhibit 2113: 1/18/18 Email from Shawn Ambwani with Attachments	Ex. 1046
Exhibit 2114: 1/19/18 Email from Shawn Ambwani with Attachments	Ex. 1047
Exhibit 2122: 2/3/18 Email from Shawn Ambwani with Attachments	Ex. 1048
Exhibit 2127: 2/9/18 Email from Shawn Ambwani with Attachments	Ex. 1049
Exhibit 2132: 1/2/18 Email from Shawn Ambwani with Attachments	Ex. 1050
Exhibits 2167–2173: Membership Reports	Exs. 1053–1059
<i>Interrogatory Responses and Testimony of Kevin Jakel</i>	
Exhibit 2151: Petitioner’s Supplemental Second Voluntary Interrogatory Responses	Ex. 1038
Exhibit 2161: Transcript of First Deposition of Kevin Jakel	Ex. 1039
Exhibit 2138: Transcript of Second Deposition of Kevin Jakel	Ex. 1040
Exhibit 2163: Petitioner’s Updated Voluntary Interrogatory Responses	Ex. 1051
Exhibit 2164: 9/15/20 Email from Brian Lambson to Chris Granaghan	Ex. 1052
<i>Patent Owner Response and Petitioner Reply</i>	
Paper 15: Patent Owner Response	Ex. 1036
Paper 20: Petitioner Reply	Ex. 1037

1. *Principles Of Law*

A motion to seal may only be granted on a showing of good cause. 37 C.F.R. § 42.54(a). In general, the Board’s “rules aim to strike a balance between the public’s interest in maintaining a complete and understandable file history and the parties’ interest in protecting truly sensitive information.” CTPG at 19. The rules identify confidential information as “trade secret or other confidential research, development, or commercial information.” *Id.* (citing 37 C.F.R. § 42.54). Applying the rules, the Board has required that

a movant to seal must demonstrate adequately that (1) the information sought to be sealed is truly confidential, (2) a concrete harm would result upon public disclosure, (3) there exists a genuine need to rely in the trial on the specific information sought to be sealed, and (4), on balance, an interest in maintaining confidentiality outweighs the strong public interest in having an open record.

Argentum Pharm. LLC v. Alcon Research, Ltd., IPR2017-01053, Paper 27 at 4 (PTAB Jan. 19, 2018) (informative); *see also Corning Optical Commc’ns RF, LLC, v. PPC Broadband, Inc.*, IPR2014-00440, Paper 46 at 2 (PTAB April 6, 2015) (“Material is not confidential business information simply because it relates to an activity of a business.”).

2. *Petitioner’s Arguments*

Petitioner argues that the exhibits set forth above were “produced subject to the agreed-to Protective Order.” Mot. Seal 2. According to Petitioner, each exhibit “include[s] statements that contain confidential, sensitive commercial information, including closely held information related to Unified’s core business.” *Id.* Petitioner notes that the “Patent Owner Response (Paper 15) and the Petitioner Reply (Paper 20) each reference and cite to confidential information included in the [exhibits] listed above.” *Id.*

at 2–3. Aside from the Membership Agreement and Subscription Form (Ex. 2152) that Petitioner seeks to seal in its entirety, Petitioner provides redacted versions for each exhibit sought to be sealed. *Id.* at 4, ii–iii. Petitioner contends that “the balance overwhelmingly favors protecting Unified’s highly confidential information,” because “[t]he information Unified seeks to protect has nothing to do with patentability, but rather involves Unified’s status as the real party in interest.” Mot. Seal 6. Petitioner argues that, accordingly, the public interest in having access to the exhibits is minimal, “while the public interest is well-served in keeping such business information readily available and exchangeable between parties based on voluntary discovery, without the fear of incidental public exposure of confidential business information.” *Id.* at 7. Petitioner further argues that “[i]dentical or similar confidential information held by Unified has been sealed by the Board in prior cases.” *Id.* (citing *Unified Patents, Inc. v. Uniloc 2017 LLC*, IPR2017-02148, Papers 84, 90 (PTAB May 23, 2019 & June 5, 2019) (granting Unified’s Motions to Seal)). Petitioner also seeks to seal the Patent Owner Response and Petitioner Reply because portions therein reference confidential information.

3. *Analysis*

For the reasons that follow, we grant Petitioner’s requests.

Membership Agreement and Subscription Form (Ex. 2152)

Exhibit 2152 is an executed, contractual agreement between two parties outlining the terms of service and fees.

Email Communications (Exs. 2158, 2102, 2103, 2109, 2111, 2113, 2114, 2127, 2132, 2167–2173)

Exhibit 2158 is a mass email regarding Unified’s filing of an *inter partes* review (IPR) with respect to U.S. 9,338,449 assigned to Patent

Owner. Exhibit 1041 is a redacted version of the mass email which redacts the email addresses of the parties to which it was sent.

Exhibits 2102, 2103, 2109, 2111, 2113, 2114, 2127, and 2132 are emails from Unified leadership attaching slide decks concerning Unified's Patent Pool Validation Program. Redacted versions are presented in Exhibits 1042 through 1050 in which the email recipient's information is redacted. Other redactions generally relate to the specifics of Unified's patent strategy with respect to particular "zones" and pools, as well as patent analytics.

Exhibits 1067 through 1073 are membership reports presented to members of a particular zone specifying zone activities, patent analytics, post-grant challenge analytics, and spending estimates. Exhibits 1053 through 1059 generally redact member names, timelines, spending estimates, settlement information, and other particulars of zone activity.

Interrogatory Responses (Exs. 2151, 2163), Testimony Of Kevin Jakel (Exs. 2138, 2161), And Email Between Counsel (Ex. 2164)

Ex. 1038 redacts, in general, the members of a particular zone, as set forth in the voluntary interrogatory responses of Ex. 2151. Ex. 1039 redacts information generally related to operating details, operating expenses, ownership, payments, memberships, etc. from Mr. Jakel's testimony in Exhibit 2161. Ex. 1040 redacts information generally related to membership, information generally related to procedure for creating slide decks on patent pools, and the substance of the slide decks from Mr. Jakel's testimony in Ex. 2138.

Exhibit 1051 redacts zone membership from the voluntary interrogatory responses in Ex. 2163. And Exhibit 1052 redacts membership information from an email between counsels for the parties in Ex. 2164.

Patent Owner's Response (Paper 15) and Petitioner's Reply (Paper 20)

The Redacted PO Response (Ex. 1036) redacts portions of the Patent Owner Response relating to a real party in interest issue. The Redacted Petitioner Reply (Ex. 1037) redacts portions of the Petitioner Reply responding to Patent Owner's arguments about a real party in interest issue.

Discussion

Upon review of the papers and exhibits sought to be sealed and the corresponding redacted exhibits, we are persuaded, by Petitioner, that each exhibit "include[s] statements that contain confidential, sensitive commercial information, including closely held information related to Unified's core business." Mot. Seal 2. We are further persuaded that "[t]he information Unified seeks to protect has nothing to do with patentability, but rather involves Unified's status as the real party in interest" based on our review of the corresponding redacted exhibits. *Id.* at 6.

We find persuasive Petitioner's concerns that disclosing the redacted information could harm Petitioner by enabling others to replicate its business, and that unsealing such information would have an adverse effect on future voluntary discovery. We are persuaded that Petitioner has shown good cause for maintaining this information under seal. Consequently, we grant Petitioner's motion to seal this information.

H. Constitutionality Arguments

Patent Owner argues that the "Board lacks the authority to issue a Final Written Decision because the Administrative Patent Judges ('APJs') have not been constitutionally appointed." PO Resp. 65 (citing *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320 (Fed. Cir. 2019), *cert. granted sub nom. United States v. Arthrex, Inc.*, 2020 WL 6037206 (Oct. 13, 2020)); *see also id.* at n.4 (acknowledging that "the Board does not have the power to

decide this issue,” but “mak[ing] the argument here to preserve the issue for the Federal Circuit”). According to Patent Owner, in *Arthrex*, “the Federal Circuit held that APJs are principal officers of the United States,” and that “[b]ecause APJs are not appointed by the President and confirmed by the Senate, the Federal Circuit held that ‘Title 5’s removal protections cannot be constitutionally applied to APJs,’ and therefore severed those restrictions from the statute.” *Id.* at 65 (citing *Arthrex*, 941 F.3d at 1337).

We decline to address Patent Owner’s arguments because the Federal Circuit has already addressed this issue in *Arthrex*. See *Arthrex*, 941 F.3d at 1337.

I. Real Party In Interest

Patent Owner contends that the Petition fails to name all real parties in interest (“RPIs”) as required by 35 U.S.C. § 312(a)(2). PO Resp. 66–70. Section 312(a)(2) requires that the “petition identif[y] all real parties in interest.” This provision serves important notice functions to patent owners, to identify whether the petitioner is barred from bringing an IPR due to an RPI that is time-barred or otherwise estopped, and to the Board, to identify conflicts of interests that are not readily apparent from the identity of the petitioner. See *NOF Corp. v. Nektar Therapeutics*, IPR2019-01397, Paper 24 at 6 (PTAB Feb. 10, 2020) (citing Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,759 (Aug. 14, 2012); CTPG 12 (Nov. 2019)). Accordingly, petitioners must comply with these requirements in good faith. See 37 C.F.R. §42.11(a) (duty of good faith and candor in proceedings). Whether a non-party is a RPI is a “highly fact-dependent question” and must be considered on a case-by-case basis. *Ventex Co. v. Columbia Sportswear N. Am., Inc.*, IPR2017-00651, Paper 148 at 6 (PTAB Jan. 24, 2019) (Paper

148) (precedential) (citing Office Trial Practice Guide, 77 Fed. Reg. 48,756, 48,759 (Aug. 14, 2012)).

Petitioner identifies Unified Patents, Inc. (“Unified”) as the sole RPI in this proceeding. Pet. 1. Patent Owner, relying primarily on the Federal Circuit’s decision in *Applications in Internet Time, LLC v. RPX Corp.*, 897 F.3d 1336, 1351 (Fed. Cir. 2018), contends that Petitioner also should have also named eleven other companies (“Unnamed RPIs”) as RPIs. PO Resp. 66–67. Patent Owner contends that because the Unnamed RPIs were paying members of Unified during the present proceeding, and remain members, the Unnamed RPIs have a preexisting, established relationship with Unified. *Id.* at 67–68. Patent Owner acknowledges, however, that “[i]t is unclear when [one of the Unnamed RPIs] joined Unified’s Video Codec Zone.” *Id.* at 67 n.5. Patent Owner more particularly contends that “[t]he Unnamed RPIs are also clear beneficiaries of this IPR because they paid Unified to file this IPR.” *Id.* at 68.

On this record, we determine that we need not address whether the Unnamed RPIs were improperly excluded because, “even if [they] were, it would not create a time bar or estoppel under 35 U.S.C. § 315.” *SharkNinja Operating LLC v. iRobot Corp.*, IPR2020-00734, Paper 11 at 32 (Oct. 6, 2020) (precedential) (“*SharkNinja*”). Like in *SharkNinja*, the Unnamed RPIs here are currently members of Unified. Unlike in *SharkNinja*, however, neither Petitioner nor any of the Unnamed RPIs were sued. Pet. Reply 16 (asserting that “[n]o Unified member is an RPI, especially because . . . to the best of Unified’s knowledge, none has been sued or threatened with suit by Velos,” and that thus, “there are no . . . time-bar issues”). Petitioner also asserts that none of the Unnamed RPIs have challenged the ’066 patent. *Id.* (asserting that “[n]o Unified member is an

RPI, especially because . . . no Unified member has filed its own patent challenge to the '066 patent” and that thus, “there are no estoppel . . . issues”). Accordingly, we determine that neither issues of time bar nor issues of estoppel are implicated.

Under the Board’s precedential decision in *Lumentum Holdings, Inc. v. Capella Photonics, Inc.*, the Board’s jurisdiction to consider a petition does not require a “correct” identification of all RPIs in a petition. IPR2015-00739, Paper 38 at 6 (PTAB Mar. 4, 2016) (precedential); *see also Blue Coat Sys., Inc. v. Finjan, Inc.*, IPR2016- 01444, Paper 11 at 10 (PTAB July 18, 2017) (“Evidence [of failure to identify all RPIs] is, at best, suggestive of an issue that is not jurisdictional.”). The Federal Circuit has held that § 312(a)(2) is not jurisdictional. *See Mayne Pharma Int’l Pty. Ltd. v. Merck Sharp & Dohme Corp.*, 927 F.3d 1232, 1240 (Fed. Cir. 2019) (“[I]f a petition fails to identify all real parties in interest under § 312(a)(2), the Director can, and does, allow the petitioner to add a real party in interest.”) (quoting *Wi-Fi One, LLC v. Broadcom Corp.*, 878 F.3d 1364, 1374 n.9 (Fed. Cir. 2018) (en banc)).

In the present proceeding, there is no allegation that Petitioner’s exclusion of the Unnamed RPIs should result in termination of the proceeding or denial of institution of review for any reason other than for the alleged failure of a procedural requirement that can be corrected pursuant to Board precedent. Additionally, there is no allegation or evidence that any of the Unnamed RPIs is barred or estopped from this proceeding, or that Petitioner purposefully omitted any of the Unnamed RPIs to gain some advantage.

IV. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has not established by a preponderance of the evidence that claims 1, 2, 5, 11, and 20 of the '066 patent are unpatentable.

In summary:

Claim(s)	35 U.S.C. §	References/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 11	102(b), (e)	Kim		1, 11
1, 11	103(a)	Kim		1, 11
20	103(a)	Kim, Song		20
1, 2, 5, 11	103(a)	KimIEEE		1, 2, 5, 11
1, 2, 5, 11	103(a)	AAPA, KimIEEE		1, 2, 5, 11
Overall Outcome				1, 2, 5, 11, 20

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 2, 5, 11, and 20 of the '066 patent have not been shown to be unpatentable;

FURTHER ORDERED that Petitioner's Motion for Protective Order (Paper 13) is *granted*, and that the default Protective Order (Ex. 1019; CTPG App. B) is placed into effect;

FURTHER ORDERED that Petitioner's Motion to Seal the Patent Owner Response (Paper 15), the Petitioner Reply (Paper 20), and Exhibits 2102, 2103, 2109, 2111, 2113, 2114, 2122, 2127, 2132, 2138, 2151, 2152,

2158, 2161, 2163, 2164, 2167, 2168, 2169, 2170, 2171, 2172, and 2173 is
granted;

FURTHER ORDERED that this matter shall be governed by the
default Protective Order set forth in Appendix B of the CTPG, and
Petitioner's confidential information shall be considered designated
"PROTECTIVE ORDER MATERIAL" under that Order;

FURTHER ORDERED that Exhibits 2102, 2103, 2109, 2111, 2113,
2114, 2122, 2127, 2132, 2138, 2151, 2152, 2158, 2161, 2163, 2164, 2167,
2168, 2169, 2170, 2171, 2172, and 2173, as well as Papers 15 and 20, are to
be kept under seal; and

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

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS LLC,
Petitioner,

v.

VELOS MEDIA, LLC,
Patent Owner.

IPR2020-00352
Patent 9,414,066 B2

Before CHARLES J. BOUDREAU, MONICA S. ULLAGADDI, and
AARON W. MOORE, *Administrative Patent Judges*.

MOORE, *Administrative Patent Judge*, concurring.

I concur in the determination that Petitioner has not shown claims 1, 2, 5, 11, and 20 of the '066 patent unpatentable. I write separately to express a difference in opinion regarding some of the technical analysis.

In Section III.D.2, describing the analysis of Kim alone, the panel decision disagrees that the “ordinarily skilled artisan would have considered a likely image feature to be a blocking artifact at all.” I don’t believe that responds to the point Petitioner is trying to make. Instead, I understand Petitioner’s argument to be that, because a small discontinuity reflects an artifact and a large discontinuity reflects a feature, Kim’s $\delta(x)$ would operate

to turn the filtering off for a large discontinuity and on for a small discontinuity. *See* Pet. Reply 7. I find this argument unpersuasive because, even if it is true that a small discontinuity reflects an artifact and a large one a feature, I find that insufficient to show that Kim necessarily works as Petitioner argues, particularly in light of the other evidence of how $\delta(x)$ operates.

In Section II.E.2, describing the analysis of KimIEEE alone, the panel decision faults Petitioner for not “explain[ing] what benefit might be obtained by filtering four pixels instead of two—in light of the increased complexity (*see* PO Resp. 53)—for any particular, different video context.” In my view, it is not a matter of explaining the benefit of using four pixels instead of two, because this is simply a matter of balancing smoothness against loss of detail. Nor do I agree that “complexity” is a problem, given that four pixels are used in the smooth mode. Instead, I would find insufficient support for the modification because Petitioner does not adequately explain why one would use four pixels in a mode that uses two pixels for the specific purpose of retaining detail in complex regions. KimIEEE explains that the four pixel “strong smoothing effect” is applied to flat, not complex, regions. *See* Ex. 1004, 157. For similar reasons, I would find the cited portion of Dr. Richardson’s textbook regarding different filter strengths insufficient to explain why one would modify a filter, like KimIEEE’s default mode, that is specifically designed to use just two pixels to best deal with complex regions.

IPR2020-00352
Patent 9,414,066 B2

FOR PETITIONER:

David Cavanaugh
Brian J. Lambson
Jonathan P. Knight
WILMER CUTLER PICKERING HALE AND DORR LLP
david.cavanaugh@wilmerhale.com
brian.lambson@wilmerhale.com
jonathan.knight@wilmerhale.com

Ashraf Fawzy
Roshan Mansinghani
UNIFIED PATENTS, LLC
afawzy@unifiedpatents.com
roshan@unifiedpatents.com

FOR PATENT OWNER:

Brent Bumgardner
Barry Bumgardner
Brian Herrmann
Christopher G. Granaghan
NELSON BUMGARDNER ALBRITTON P.C.
brent@nbafirm.com
barry@nbafirm.com
brian@nbafirm.com
chris@nbafirm.com