

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS INC.,
Petitioner,

v.

DIVX, LLC,
Patent Owner.

IPR2019-01379
Patent 8,139,651 B2

Before BART A. GERSTENBLITH, MONICA S. ULLAGADDI, and
IFTIKHAR AHMED, *Administrative Patent Judges*.

AHMED, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
Denying Petitioner's Motion to Exclude
Dismissing Patent Owner's Motion to Exclude
35 U.S.C. § 318(a)

I. INTRODUCTION

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

Petitioner has the burden of proving unpatentability of the challenged claims by a preponderance of the evidence. 35 U.S.C. § 316(e) (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 claims 1 and 17 are unpatentable. Additionally, we deny Petitioner’s motion to exclude evidence (Paper 41) and dismiss Patent Owner’s motion to exclude evidence (Paper 42).

II. BACKGROUND

A. Procedural History

Unified Patents Inc.¹ (“Petitioner”) filed a Petition for an *inter partes* review of claims 1 and 17 of the ’651 patent. Paper 1 (“Pet.”). In view of the preliminary record, we concluded that Petitioner satisfied the burden, under 35 U.S.C. § 314(a), to show that there was a reasonable likelihood that Petitioner would prevail with respect to at least one of the challenged claims. Accordingly, we instituted an *inter partes* review of all the challenged claims, on the single asserted ground. Paper 17 (“Inst. Dec.”).

After institution, DivX, LLC (“Patent Owner”) filed a Response. Paper 31 (“PO Resp.”). Petitioner filed a Reply. Paper 35 (“Pet. Reply”). Patent Owner filed a Sur-reply. Paper 40 (“Sur-reply”). On November 5,

¹ Petitioner informed the Board that Unified Patents Inc. changed its name to Unified Patents, LLC. Paper 16, 1.

2020, we held an oral hearing, the transcript of which is of record. Paper 51 (“Tr.”).

B. Related Proceedings

The ’651 patent is asserted in *DivX, LLC v. Netflix, Inc.*, No. 2:19-cv-01602 (C.D. Cal.), and *DivX, LLC v. Hulu, LLC*, No. 2:19-cv-01606 (C.D. Cal.). Pet. 1; Paper 6, 1. Netflix, Inc. and Hulu, LLC also filed an *inter partes* review petition relating to the ’651 patent (in IPR2020-00052), which has been instituted and is pending final resolution.

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

² The MPEG-4 standard was developed by the Motion Picture Experts Group. Ex. 1001, 1:35–36.

Figure 1 of the '651 patent is reproduced below.

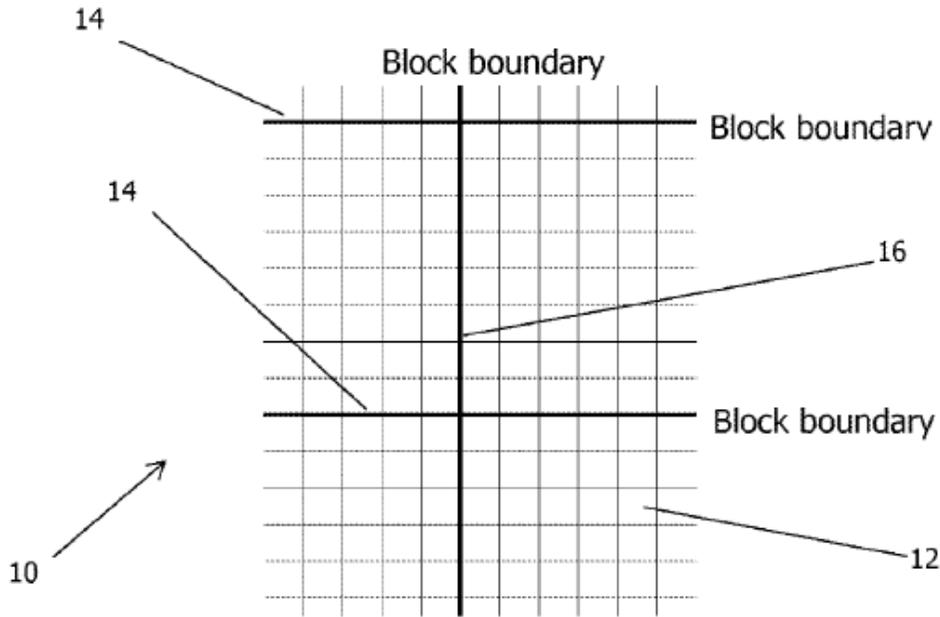


FIG. 1

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.

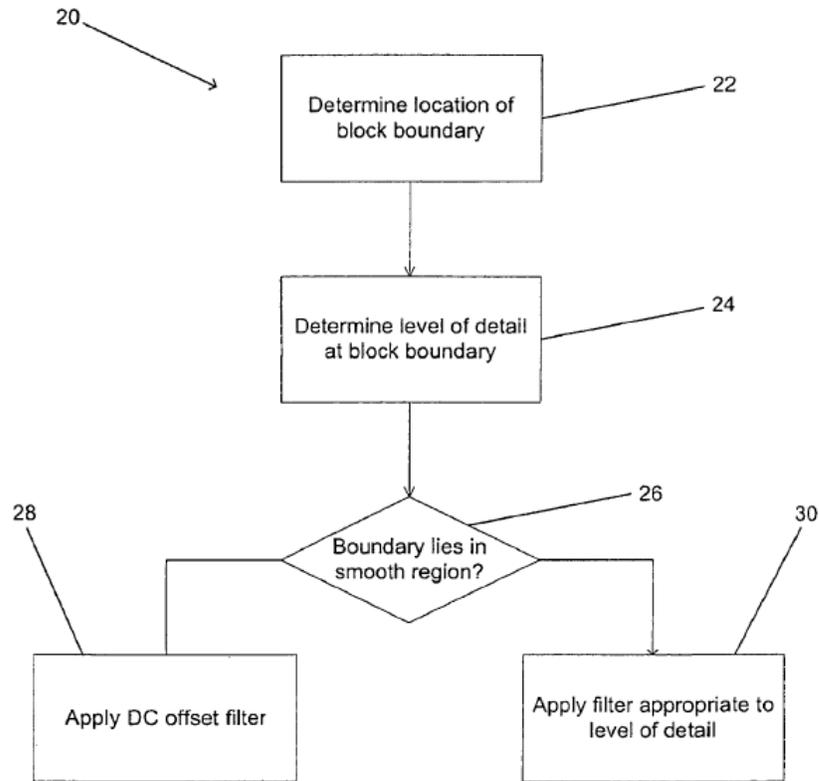


FIG. 2

Figure 2, above, is a flow diagram illustrating the steps for applying a deblocking filter, i.e., “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 (28), (30), an appropriate filter to pixels adjacent the boundary depending on a determination (26) of whether the boundary lies in a smooth region or in a region with a higher level of detail. *Id.* at 8:20–31. A deblocking filter can be applied to pixel chrominance and/or to pixel luminance. *Id.* at 8:34–37.

D. Challenged Claims

Challenged claim 1 is an independent claim, and claim 17 depends from claim 1. Claims 1 and 17 are 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 (emphasis added).

17. The method of claim 1, wherein selecting a filter to apply to predetermined pixels on either side of the block boundary based upon the determination of the level of detail comprises comparing the determined level of detail to a threshold.

Id. at 15:21–25.

E. Prior Art and Instituted Grounds of Unpatentability

Petitioner relies on the following references in the asserted ground.

Pet. 3–4.

Reference ³	Publication Date	Exhibit
“A Deblocking Filter with Two Separate Modes in Block-Based Video Coding” by Sung Deuk Kim et al. (“Kim”)	March 5, 1999	1003
“Adaptive MLP Post-Processing for Block-Based Coded Images” by Y.L. Huang et al. (“Huang”)	December 10, 2000	1004

We instituted trial based on the following ground of unpatentability:

Claims Challenged	35 U.S.C. § ⁴	Reference(s)/Basis
1, 17	103(a)	Kim, Huang

Inst. Dec. 36; Pet. 11.

³ Petitioner contends that Kim and Huang are each prior art to the ’651 patent under 35 U.S.C. § 102(b). Pet. 3–11. In support of its assertion as to the public availability of those references, Petitioner relies on the declaration testimony of Mr. James L. Mullins (Ex. 1008), the Dean of Libraries Emeritus at Purdue University. According to Mr. Mullins, Kim was accessible to the public at least by February 25, 1999, and Huang was accessible to the public no later than December 10, 2000. Ex. 1008 ¶¶ 57, 80. Patent Owner does not contest the prior art status of those references. *See generally* PO Resp. We determine that Kim and Huang were publicly available at least one year prior to the earliest filing date of the ’651 patent, and therefore, are prior art to the ’651 patent under § 102(b).

⁴ 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).

In support of its patentability challenges, Petitioner relies on the declaration testimony of Dr. Lina J. Karam. *See* Ex. 1005 (“Karam Decl.”). Patent Owner relies on a declaration from Dr. Chandrajit Bajaj. Ex. 2044 (“Bajaj Decl.”).

III. ANALYSIS

A. *Principles of Law*

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

As set forth in 35 U.S.C. § 103(a),

[a] patent may not be obtained . . . if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

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

To prevail in its challenges to Patent Owner’s claims, Petitioner must demonstrate by a preponderance of the evidence⁵ that the claims are unpatentable. 35 U.S.C. § 316(e) (2018); 37 C.F.R. § 42.1(d) (2019).

B. Level of Ordinary Skill in the Art

We review Petitioner’s asserted obviousness ground 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 a bachelor’s degree in electrical engineering, computer engineering, computer science, or a related subject, and two to three years of work experience in image and/or video processing.” Pet. 15–16 (citing Ex. 1005 ¶ 42). Patent Owner neither comments on that proposal, nor proposes an alternative level of ordinary skill in the art. *See generally* PO Resp.

⁵ The burden of showing something by a preponderance of the evidence requires the trier of fact to believe that the existence of a fact is more probable than its nonexistence. *Concrete Pipe & Prods. of Cal., Inc. v. Constr. Laborers Pension Tr. for S. Cal.*, 508 U.S. 602, 622 (1993).

Because Petitioner’s proposed definition is consistent with the cited prior art, we apply it for purposes of this Decision. In our view, moreover, the prior art itself demonstrates the level of skill in the art at the time of the invention. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (explaining that prior art itself can reflect an appropriate level of skill in the art at the time of the invention).

C. Claim Construction

We construe each challenged claim of the ’651 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.” 37 C.F.R. § 42.100(b) (2019). That is, we apply the same claim construction standard used to construe claims in civil actions under 35 U.S.C. § 282(b) by Article III federal courts which follow *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and its progeny. *Id.*

Petitioner submits that no claim term requires construction beyond the plain and ordinary meaning. Pet. 19.

Patent Owner submits that, in its institution decision in IPR2020-00052, which also involves the ’651 patent, the Board construed the term “level of detail” as “level of change of visual elements across adjacent pixels,” and that the same construction should apply here. PO Resp. 58–60 (citing IPR2020-00052, Paper 42). Petitioner does not propose a construction for that term, but argues that “the combined Kim and Huang teachings would determine the level of detail for adjacent pixels under Patent Owner’s ‘adjacent pixels’ construction.” Pet. Reply 5–11. Because our ultimate decision does not rest on the construction of that claim term, we do not construe the term in this proceeding. *See Vivid Techs., Inc. v. Am.*

Sci. & Eng'g, Inc., 200 F.3d 795, 803 (Fed. Cir. 1999) (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”); *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (applying *Vivid Techs.* in the context of an *inter partes* review). As part of our obviousness analysis, we address additional claim construction arguments regarding the “determining” limitation. *See infra* § III.E.1.a.

D. Overview of the Asserted Prior Art

1. Kim (Ex. 1003)

Kim relates to “a method to remove blocking artifacts in low bit-rate block-based video coding” by “one-dimensional filtering operations [that] are performed across the block boundary along the horizontal and vertical directions, respectively.” Ex. 1003, 1. Kim’s “algorithm has two separate filtering modes, which are selected by pixel behavior around the block boundary.” *Id.*

Figure 1 of Kim is reproduced below.

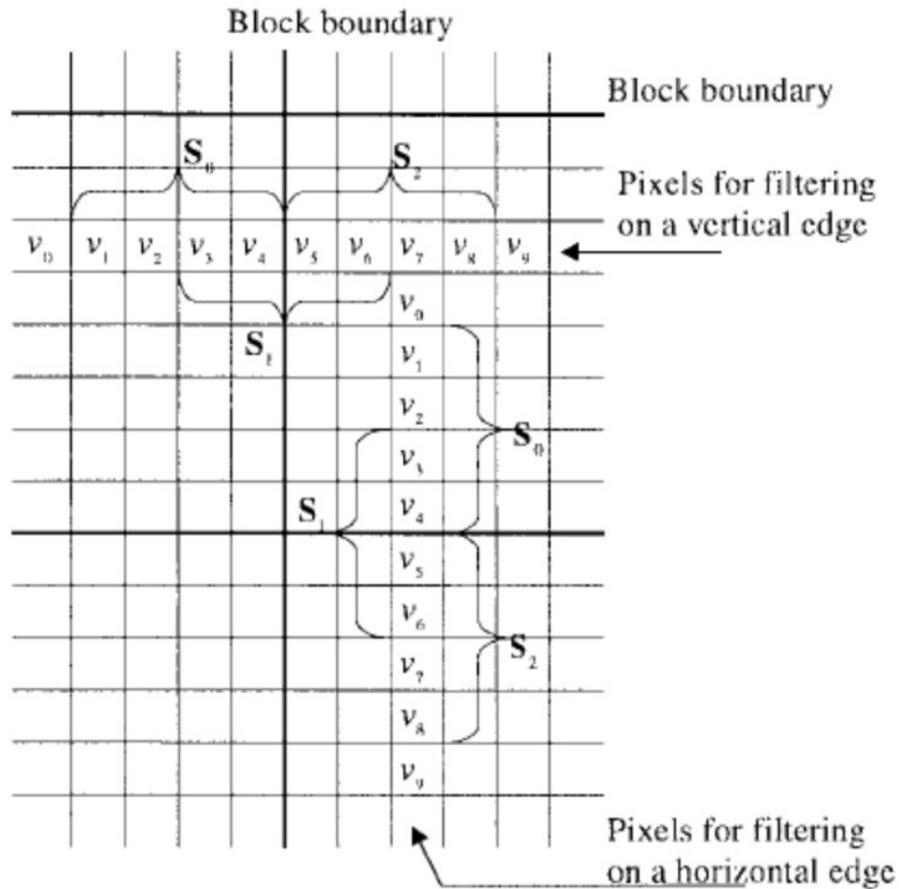
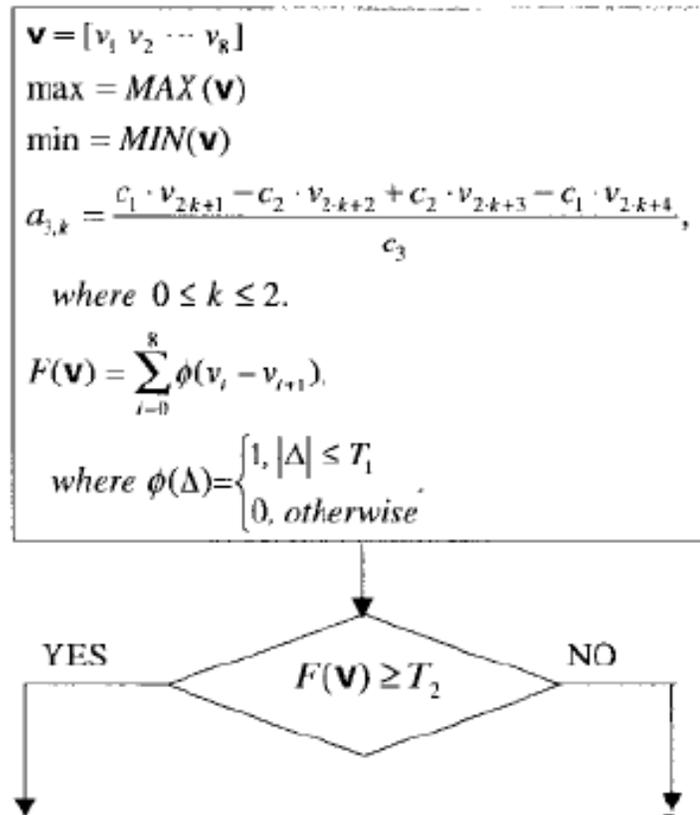


Fig. 1. 8 x 8 block boundaries.

Figure 1, above, illustrates the vertical and horizontal block boundaries of an 8 x 8 block of pixels along which Kim's filtering is performed. *Id.* The algorithm disclosed in Kim examines "local image characteristics" in the region to select between the "smooth region mode," for flat regions, and the "default mode," for complex regions of the reconstructed image. *Id.* at 2.

A portion of Figure 2 of Kim is reproduced below.



The portion of Figure 2 reproduced above illustrates the deblocking scheme discussed in Kim, specifically, the step that Kim refers to as “mode decision,” which determines the filter to be used for the region. *Id.* Kim discloses that flatness for a region around a given block boundary may be determined using the measurement $F(v)$ based on pixel values v_0 through v_8 , using the mathematical expression shown in Figure 2. *Id.* Kim further discloses that threshold T_2 may then be used to decide whether that region is flat or complex. *Id.* If $F(v)$ has a value greater than T_2 , indicating a flat region, the region v , comprising pixels v_1 through v_8 on either side of the block boundary, is assigned to the smooth region mode of filtering. *Id.* If,

however, $F(v)$ has a value less than T_2 , indicating a complex region, the region v is assigned to the default mode, and “accurate and adaptive filtering” is applied. *Id.*

Figures 5(a) and 5(d) are reproduced below.



(a)

(d)

Figures 5(a) and 5(d), above, illustrate the results of the deblocking method disclosed by Kim; compared to panel (a), a visible reduction in blocking artifacts is shown in panel (d), following application of the method. *Id.* at 4.

2. Huang (Ex. 1004)

Huang relates to an “adaptive post-processing algorithm . . . to reduce the blocking artefacts of block-based coded images by using neural network techniques in the spatial domain.” Ex. 1004, 1. The algorithm disclosed in Huang uses “grey levels and edge information from the neighbouring pixels surrounding the current processing pixel” as inputs to a “variance-based classification scheme.” *Id.* at 2. The classification scheme separately determines variance in grey level and edge information for each pixel, and

based on those determinations, classifies that single pixel into one of four cases and applies an appropriate filter to that pixel. *Id.*

Huang calculates grey-level variance σ_g based on “a neighbourhood of size $(2N + 1) \times (2M + 1)$ about the current processing pixel x_{ij} ,” using the formula reproduced below:

$$\sigma_g = \frac{1}{(2N + 1)(2M + 1)} \sum_{n=-N}^N \sum_{m=-M}^M [x_{(i+n)(j+m)} - \bar{x}_{ij}]^2 \quad (1)$$

Id. Huang also calculates edge variance σ_e for the same pixel based on “edge images” that it generates for the reproduced image. *Id.* at 2, 6, Fig. 5.

Once the two variance values are calculated, Huang’s classification scheme based on variance thresholds T_g and T_e for grey-level image and edge image is as follows:

- class 0 (pixel in smooth region without edges): if $\sigma_g \leq T_g$ and $\sigma_e \leq T_e$
- class 1 (pixel in smooth region with edges): if $\sigma_g \leq T_g$ and $\sigma_e > T_e$
- class 2 (pixel in detailed region without edges): if $\sigma_g > T_g$ and $\sigma_e \leq T_e$
- class 3 (pixel in detailed region with edges): if $\sigma_g > T_g$ and $\sigma_e > T_e$

Id. at 2. Huang further discloses that the window size used for calculating variance for a pixel depends on the detail found across the reconstructed image and suggests a “small filtering window size,” either (3×3) or (5×5) pixels, for smooth regions, and a “larger window size” of (7×7) pixels for more detailed regions. *Id.* at 3, 5.

E. Obviousness over Kim and Huang

Petitioner contends that claims 1 and 17 are unpatentable under 35 U.S.C. § 103 as obvious over Kim and Huang. Pet. 21–46. For the

reasons that follow, we are not persuaded that the evidence, including Dr. Karam's testimony, demonstrates that Petitioner has established by a preponderance of the evidence that claims 1 and 17 are unpatentable under § 103(a) as obvious over Kim and Huang.

1. Independent Claim 1

Patent Owner argues that Petitioner's combination of Kim and Huang fails to teach or suggest the "determining the level of detail" limitation of independent claim 1. PO Resp. 21–63. We, therefore, begin our discussion with the parties' arguments on this limitation.

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

Petitioner contends that Kim discloses, or at least renders obvious, this claim limitation. Pet. 24–36. Alternatively, Petitioner argues that Kim, when combined with the teachings of Huang, teaches the claimed region, and therefore renders this claim limitation obvious. *Id.* at 36–39. Petitioner further argues that a person of ordinary skill in the art would have been motivated to combine the teachings of Kim and Huang for multiple reasons and would have had a reasonable expectation of success in combining those teachings. *Id.* at 39–42.

(1) Petitioner's reliance on Kim alone as teaching this limitation

Petitioner contends that Kim's measurement of the flatness of the region teaches determining the level of detail of the reconstructed video

frame. Pet. 24–25 (citing Ex. 1003, 2). Petitioner asserts that a person of ordinary skill in the art “would have understood that the ‘characteristics,’ including ‘flatness,’ of a region (i.e., an area of pixels) . . . teach the *level of detail* of the region.” *Id.* at 25 (citing Ex. 1005 ¶ 70). Petitioner further contends that Kim teaches making that determination “across a region in which the block boundary is located” because its algorithm measures flatness $F(v)$ using the array of pixels v_1 through v_8 shown in Figure 1. *Id.* at 26–28 (citing Ex. 1003, Figs. 1, 2; Ex. 1005 ¶¶ 71–73).

Petitioner provides an annotated version of Kim’s Figure 1 (Pet. 28), reproduced below.

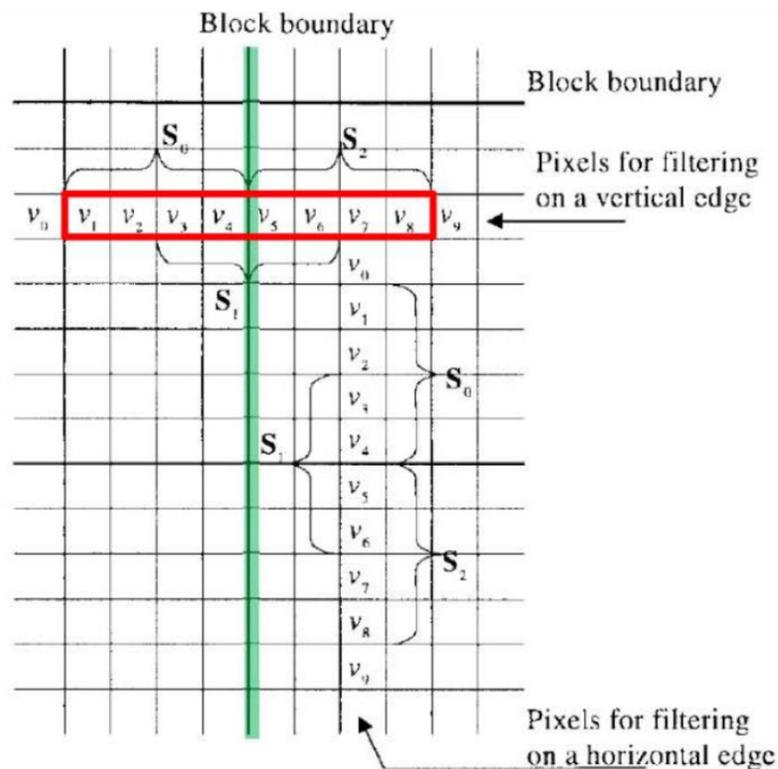


Fig. 1. 8×8 block boundaries.

Kim (EX1003), Figure 1 (annotated)

Figure 1 of Kim, above, illustrates Petitioner’s annotations of an array of pixels v_1 through v_8 , outlined by the red box, across which Kim determines

flatness for the vertical block boundary, highlighted in green. Pet. 27–28 (citing Ex. 1005 ¶¶ 71–74).

With respect to the claimed “region,” Petitioner argues that the “region” disclosed in Kim meets the claim limitation because “a block boundary itself cannot be defined based on a region having a single row or single column,” and a person of ordinary skill in the art would have recognized that Kim performs determining the level of detail across a region with multiple rows and multiple columns, for example, a block of 8 pixels by 8 pixels. Pet. 29–34 (citing Ex. 1005 ¶¶ 77–85). For support, Petitioner points out that “the MPEG-4 standard (incorporated by reference by the ’651 Patent . . .) defines a block as 8 pixels by 8 pixels,” and “the boundary of a block that is 8 pixels tall must itself be 8 pixels in length.” *Id.* at 34 (citing Ex. 1001, 1:38–40; Ex. 1005 ¶ 80). Petitioner illustrates the proposed region in an annotated version of Kim’s Figure 1 (*id.* at 35), reproduced below.

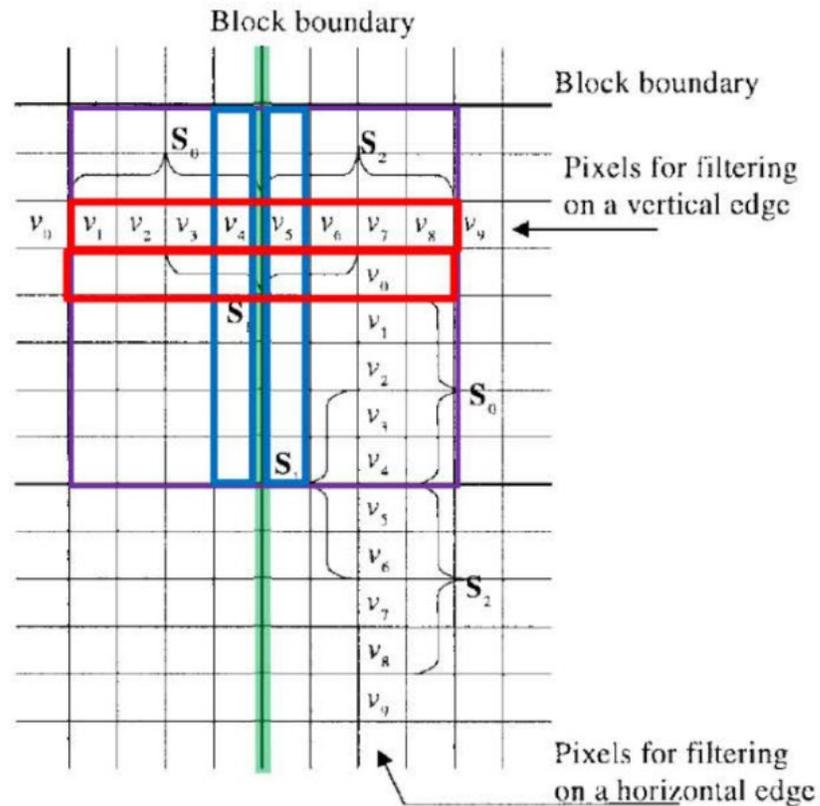


Fig. 1. 8×8 block boundaries.

Kim (EX1003), Figure 1 (annotated)

Figure 1 of Kim, above, illustrates Petitioner’s annotations showing an 8×8 pixel region, highlighted in purple, comprising *two* columns highlighted in blue, *two* rows highlighted in red across a vertical boundary highlighted in green, and including pixels v_4 and v_5 in one of the highlighted rows immediately adjacent to two sides of the vertical block boundary as well as pixel v_3 not immediately adjacent to the same boundary. Pet. 34–35 (citing Ex. 1005 ¶¶ 85–87).

Petitioner also argues that it is apparent from a visual inspection of Kim’s Figures 5(a) and 5(d) that “Kim teaches deblocking the entirety of a region surrounding a block boundary, and not simply deblocking a given

single row or single column.” *Id.* at 30–32 (citing Ex. 1003, 4, Figs. 5(a), 5(d); Ex. 1005 ¶¶ 83–84).

Patent Owner responds that “Kim performs ‘one-dimensional filtering operations,’ analyzing pixels in a single row or column at a time,” and “calculates a ‘flatness’ value based on ten neighboring pixels in one row (v_0 – v_9), five on one side and five on the other side of the block boundary.” PO Resp. 10–11 (citing Ex. 1003, Abstract, 2, Fig. 1; Ex. 2044 ¶¶ 44–45). According to Patent Owner, Kim repeats the same process for each row along a vertical block boundary and each column along a horizontal block boundary, analyzing and filtering each row and column *independently*. *Id.* at 11 (citing Ex. 2044 ¶ 46).

Patent Owner asserts that “Kim is actually *the same art* the [’651 patent] expressly distinguished from the invention” and that the claimed invention is an enhanced “new deblocking scheme” derived from that MPEG-4 deblocking scheme. *Id.* at 12 (citing Ex. 2002, 2). Unlike the prior art row-by-row or column-by-column determination of the level of detail, Patent Owner argues, the claimed invention uses a block-based filter mode decision, which determines which filter mode to choose by analyzing a region comprising multiple rows and multiple columns as opposed to a single row or column. *Id.* at 12–16 (comparing Ex. 2002, Fig. 1, with Ex. 1003, Fig. 1) (citing Ex. 2006, 34; Ex. 2043, 111:20–112:1; Ex. 2044 ¶¶ 50–51).

Patent Owner argues that “Kim never identifies Petitioner’s ‘purple box’ area as a region for any purpose, and instead identifies at least *sixteen distinct levels of detail* for distinct sub-parts of that area—one for each row and each column, but never across the area as a whole.” *Id.* at 16–18 (citing

Pet. 29; Ex. 2043, 208:4–12; Ex. 2044 ¶¶ 53–55). According to Patent Owner, the “*double* summation in the Patent specification, contrasted with the *single* summation in Kim, vividly depicts the difference between the two-dimensional calculation of a level of detail in the Patent and the contrasting ‘one-dimensional filtering operatio[n]’ taught in Kim.” *Id.* at 18–19 (citing Ex. 1001, 5:14; Ex. 1003, 2 (alteration in original)).

On the complete record, we are not persuaded by Petitioner’s argument that an ordinarily skilled artisan would have recognized that Kim teaches determining the level of detail across a region that includes pixels from *multiple* rows and *multiple* columns of the reconstructed video frame. Kim plainly defines the region to be examined as a single row or column, stating:

To select a proper mode between the smooth region mode and the default mode, local image characteristics in the *region* are to be examined. In the proposed scheme, we examine the flatness of the *region* by using the following measurement:

$$F(v) = \sum_{i=0}^8 \Phi(v_i - v_{i+1})$$

Ex. 1003, 2 (emphasis added); *see also id.* at Fig. 1 (showing that pixels v_0 to v_8 form a single row or column). Kim’s “mode decision” is based on flatness measurement $F(v)$ that only includes information for pixels v_0 to v_8 from a *single* row or column, and not across a region including multiple rows or columns. *Id.* at 2. Petitioner has not pointed to any other measurement in Kim that relates to the level of detail across multiple rows and multiple columns. The fact that the MPEG-4 standard defines a block as 8 pixels by 8 pixels or that Figures 5(a) and 5(d) of Kim suggest that Kim’s deblocking operation covers the entirety of a region surrounding a block

boundary does not change the manner in which Kim operates, i.e., on row-by-row or column-by-column basis. *See* Ex. 1003, 1 (“In each mode, proper *one-dimensional* filtering operations are performed across the block boundary along the horizontal and vertical directions, respectively”; “The proposed filter performs *one-dimensional* filtering along the boundaries of an 8x8 block (see Fig. 1).” (Emphases added)).

In its Reply, Petitioner argues, for the first time, that this claim limitation includes two distinct parts, the first relating to determining the level of detail “across a region in which the block boundary is located,” and a separate second part that defines the two-dimensional aspects of the region as including “pixels from multiple rows and multiple columns.” Pet. Reply 19. Petitioner argues that under its plain and ordinary meaning, claim 1 does not require determining the level of detail across multiple rows and multiple columns of the region. *Id.* Petitioner contends that requiring the region to include multiple rows and columns improperly imports an unrecited feature into claim 1. *Id.* at 20 (citing *GE Lighting Sols., LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014)).

Under Petitioner’s interpretation of this limitation, “[w]hile the region is subsequently defined as including multiple rows and multiple columns, there is no express requirement in the claim that the level of detail be determined across multiple rows and multiple columns of the region.” *Id.* at 21. Reading the determining limitation as two disparate portions, Petitioner contends that Kim discloses the entire limitation because (1) Kim discloses determining the level of detail of the reconstructed video frame across a region (a row or column) in which the block boundary is located, i.e., the first part of the limitation, and (2) it *separately* discloses a region that

includes pixels from multiple rows and columns, i.e., the second part of the limitation. *Id.* at 22–24.

Patent Owner responds that Petitioner’s claim interpretation, requiring merely the existence of a two-dimensional region, renders the limitation superfluous. Sur-reply 19–20. Patent Owner further argues that because Petitioner has failed to include any evidence in support of its “re-construction of the claim in its Reply,” our interpretation of the claim limitation at institution should be confirmed. *Id.* at 20–21.

We agree with Patent Owner that the Petition does not detail Petitioner’s newly proposed interpretation of this claim limitation. *See* Pet. 29–36 (arguing only that a person of ordinary skill in the art would have recognized that Kim determines the level of detail for a region comprising an 8 x 8 block of pixels of a reconstructed video frame). On the contrary, the Petition argued:

[T]he prior art cited in this Petition teaches and suggests *exactly what is claimed* and what allegedly distinguished the claims from Kim II: determining the *level of detail of a region that includes pixels from multiple rows and multiple columns* that encompass pixels immediately adjacent to at least two sides of the block boundary, and selecting a filter to apply.”

Pet. 18 (emphasis added).⁶

Under these circumstances, we consider Petitioner’s new argument waived. *See* 37 C.F.R. § 42.23(b); *see also* *Intelligent Bio-Sys.*, 821 F.3d at 1369 (“It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify ‘with particularity’

⁶ Petitioner refers to a different prior art reference, U.S. Patent No. 6,983,079, cited by the examiner during the prosecution of the ’651 patent, as Kim II.

the ‘evidence that supports the grounds for the challenge to each claim.’”) (citing 35 U.S.C. § 312(a)(3)).

Even if not waived, Petitioner’s claim construction disregards Federal Circuit precedent regarding antecedent basis and renders superfluous the second portion of the claim limitation at issue. Claim 1 plainly recites “determining the level of detail . . . across *a region*,” “wherein *the region* includes pixels from multiple rows and multiple columns.” Ex. 1001, 13:11–15. Reading the first occurrence of the term “region” as a region that does not include multiple rows and multiple columns ignores the antecedent basis for “the region” recited later in the claim and fails to give effect to the claim language “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.” See *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1356–57 (Fed. Cir. 1999) (“the term ‘a discharge rate’ in clause [b] is referring to the same rate as the term ‘the discharge rate’ in clause [d],” and such a construction also “avoids any lack of antecedent basis problem for the occurrence of ‘the discharge rate’ in clause [d]”); *Haemonetics Corp. v. Baxter Healthcare Corp.*, 607 F.3d 776, 782 (Fed. Cir. 2010) (holding that construing the term “the centrifugal unit” differently than “a centrifugal unit” ignores the antecedent basis for “the centrifugal unit” and renders part of the claim superfluous). Petitioner cites no support, either in the law or in the ’651 patent specification, for its unusual construction. We, therefore, disagree with Petitioner that claim 1 does not require determining the level of detail across multiple rows and multiple columns of the region.

Based on foregoing, we determine that Petitioner has not established, by a preponderance of the evidence, that Kim alone teaches or suggests this claim limitation.

(2) *Petitioner's reliance on the combination of Kim and Huang as teaching this limitation*

Alternatively, Petitioner argues that Kim combined with Huang teaches the claimed region, and, therefore, the claim limitation. Pet. 36. Petitioner contends that in Huang, a “variance-based classification scheme is used to select the neural network filters adaptively,” and “grey levels and edge information from the neighbouring pixels surrounding the current processing pixel are employed as the input of the classifier.” *Id.* (citing Ex. 1004, 2, 3) (emphasis omitted). Petitioner asserts that “to determine which deblocking filter to apply to a pixel being processed, Huang describes considering pixels surrounding the pixel being processed and selecting an appropriate filter.” *Id.* at 36–37 (citing Ex. 1005 ¶¶ 88–90). Petitioner further asserts that Huang describes considering a neighborhood of size $(2N + 1) \times (2M + 1)$ about the current processing pixel x_{ij} , and explains that its proposed algorithm can use a small filtering window size (3 x 3 or 5 x 5) or a larger window size (7 x 7). *Id.* at 37 (citing Ex. 1004, 3, 5). Petitioner argues that Huang therefore “discloses a window surrounding a given reference pixel that is at least as small as 3 rows x 3 columns, or as large as 7 rows x 7 columns, or multiple rows and multiple columns as recited.” *Id.* (citing Ex. 1005 ¶ 91).

Petitioner illustrates the proposed region with an annotated Figure 1 of Kim (*id.* at 38), reproduced below.

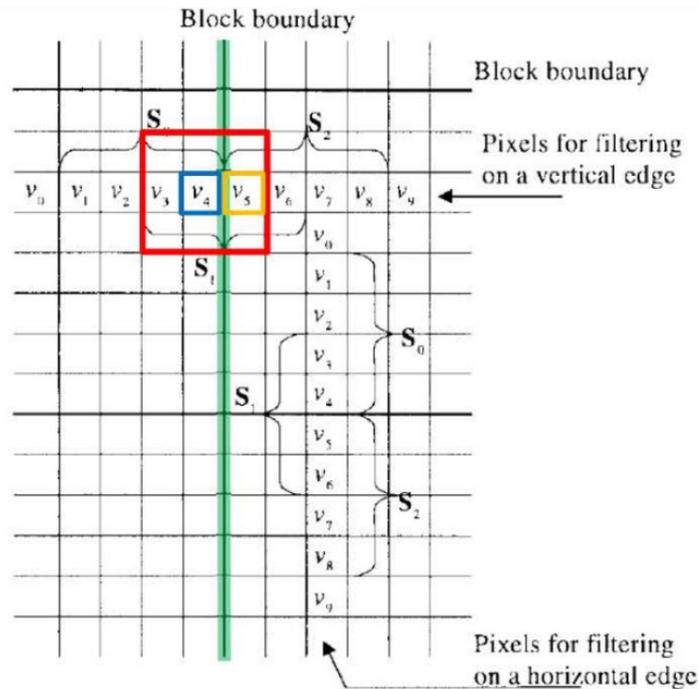


Fig. 1. 8×8 block boundaries.

Kim (EX1003), Figure 1 (annotated)

Petitioner's annotated Figure 1 of Kim, shows Petitioner's proposed 3×3 window in red, which includes pixels v_4 and v_5 , shown in blue and yellow, immediately adjacent to the vertical block boundary, shown in green, and pixel v_3 not adjacent to the same boundary. *Id.* at 37–39 (citing Ex. 1004, 3, 5; Ex. 1005 ¶¶ 92–94). Petitioner therefore asserts that the combination of Kim and Huang teaches the region recited in claim 1. *Id.* at 39.

As discussed below, we determine that Petitioner fails to articulate an adequate motivation to combine Kim and Huang to arrive at the claimed invention.

(3) Petitioner's arguments as to the motivation to combine Kim and Huang

Petitioner argues that one of ordinary skill in the art would have been motivated to combine Kim and Huang: (1) to provide better image quality; (2) to reduce blocking effects for block-based image coding without any increase in the bit rates; and (3) because Kim and Huang are analogous art to each other. Pet. 39–41. We address each of these theories advanced by Petitioner in turn, along with its arguments in the Reply.

(a) The combination allegedly would provide better image quality

Petitioner argues that a person of ordinary skill in the art would have been motivated to incorporate Huang's teachings as a possible substitution of Kim's filtering to achieve better image quality. Pet. 39. Petitioner contends that Huang describes that its "proposed algorithm obtains better image quality and better visual quality in detailed areas of the reconstructed image" as compared to prior algorithms. *Id.* (citing Ex. 1004, 8). Petitioner argues that an ordinarily skilled artisan implementing the teachings of Kim would have been motivated to consider the teachings of Huang, recognizing "better image quality" as a common goal between Kim and Huang. *Id.* (citing Ex. 1003, 1, 5; Ex. 1005 ¶ 96).

Petitioner argues that a person of ordinary skill in the art would have had a reasonable expectation of success in combining the teachings of Kim and Huang because such person would have recognized the filter determination of Huang as a potential replacement for the filter determination of Kim. Pet. 40 (citing Ex. 1005 ¶ 97). "Instead of determining the level of flatness for the region and selecting a filter, as taught by Kim," Petitioner argues, an ordinarily skilled artisan "would have

been motivated to *incorporate Huang’s teachings* of classifying a pixel and selecting a filter according to the local variances in the neighborhood of the grey-level image and edge image.” *Id.* (citing Ex. 1004, 2; Ex. 1005 ¶ 97) (emphasis added). Petitioner also argues that a person of ordinary skill in the art would have recognized that Huang’s calculation could be used *instead of, or in addition to*, Kim’s flatness examination of the region surrounding the block boundary. *Id.* at 41 (citing Ex. 1005 ¶¶ 98–99).

Petitioner contends that such a replacement would have been well within the level of skill in the art because it was common to consider others’ research and incorporate aspects of proposed algorithms, either to validate others’ research or to build upon their research and develop additional algorithms and techniques. *Id.* at 41 (citing Ex. 1005 ¶ 98). As an example, Petitioner argues, a person of ordinary skill in the art would have considered a combined algorithm that performed filtering determinations according to Kim’s teachings and that performed filtering determinations according to Huang’s teachings, and compared the result of the two filtering schemes to identify which algorithm achieved better deblocking. *Id.* (citing Ex. 1003, 4; Ex. 1004, 6; Ex. 1005 ¶ 99).

Patent Owner argues that Petitioner’s claimed motivation for substituting Huang’s variance-based classification scheme for Kim’s flatness determination step simply because Huang’s system by itself achieves “better image quality” demonstrates nothing more than a generic desire to build something better, and is insufficient, without more, to meet Petitioner’s burden. PO Resp. 25–26 (citing *ActiveVideo Networks, Inc. v. Verizon Commc’ns, Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012)). Moreover, Patent Owner argues that the Petition fails to present any evidence that the alleged

superiority of Huang is attributable to the particular features that Petitioner relies on. *Id.* at 27 (citing *Hulu LLC v. Sound View Innovations LLC*, IPR2018-00582, Paper 34 at 20–21 (PTAB Aug. 5, 2019) (informative)). Specifically, Patent Owner contends that Petitioner fails to prove that “Huang offers ‘better image quality’ than Kim, or that Huang’s purported ‘better image quality’ is attributable to its ‘determining’ step and not to its filtering step or the particular combination of determining and filtering steps,” or that the proposed Kim-Huang combination would have actually achieved better image quality as proposed by Petitioner. *Id.* (citing Ex. 2044 ¶ 65).

Further, Patent Owner argues that there is no evidence that Huang is better than Kim. *Id.* at 28. Patent Owner argues that in fact, Kim, unmodified, provides superior performance compared to Huang in deblocking low-bitrate reconstructed videos, and therefore negates the proposed motivation for a person of ordinary skill in the art to replace a portion of Kim with a portion of Huang. *Id.* (citing Ex. 2044 ¶ 66).

Patent Owner further argues that Kim is directed to a scheme for real-time deblocking of reconstructed *video* and teaches that then-existing deblocking schemes directed at *still images* such as JPEG were not suitable for video deblocking. *Id.* (citing Ex. 1003, 1; Ex. 2044 ¶ 67). Patent Owner asserts that Kim explains that edge-based schemes are unsuitable for low-bitrate video decoding because unlike a single still image, a video sequence consists of a set of image frames, making it difficult to create a good edge map in real time, resulting in improper inaccurate edge detection or undesirable blur. *Id.* at 29 (citing Ex. 1003, 1; Ex. 2044 ¶ 68). Patent Owner argues that that incompatibility was well known in the art around the

time the '651 patent application was filed. *Id.* at 29–30 (citing Ex. 2034, 45–49, 79; Ex. 2044 ¶ 70). Given Huang's necessary reliance on creating an edge map of an image before classifying pixels for edge variance, Patent Owner argues, Huang is unsuitable for real-time deblocking of video, and a person of ordinary skill in the art would not have believed that Huang would, in fact, perform better than Kim for Kim's video deblocking application. *Id.* at 30 (citing Ex. 1004, 2; Ex. 2044 ¶ 71).

Patent Owner contends Huang's claim of better image quality is in comparison to other filtering methods designed for still images, not those designed for video. PO Resp. 31 (citing Ex. 1004, 8). Patent Owner notes that Huang never compares its algorithm to any video-deblocking systems like Kim, but instead only to older techniques used for still images like the Ramamurthi algorithm. *Id.* (citing Ex. 1004, 4 (Tables 2, 3), 11) (referring to Ramamurthi et al., *Nonlinear space-variant postprocessing of block coded images*, IEEE Trans. on Acoustics Speech and Signal Process, 34, (5), pp. 1258–67 (1986)). Patent Owner therefore argues Huang is useful only for still images, not video. *Id.* (citing Ex. 2043, 175:25–176:3; Ex. 2044 ¶ 72).

Patent Owner argues that even if Huang performed better than Kim, Petitioner does not show the better performance is because of Huang's classification scheme. *Id.* at 33–35 (citing Ex. 2044 ¶¶ 75–76). Patent Owner further argues Huang itself claims that its novel aspect is its filtering algorithm, not the classification scheme that Petitioner relies on. *Id.* at 34 (citing Ex. 1004, 2; Ex. 2043, 221:5–9).

Lastly, Patent Owner argues that Petitioner fails to show Huang's classification scheme would be expected to improve, rather than worsen, Kim's results. *Id.* at 35–58 (citing Ex. 2044 ¶¶ 79–117). Among other

things, Patent Owner argues that (1) the proposed combination would gut Huang's classification scheme by eliminating its use of edge information to make it compatible with Kim's filtering step (*id.* at 39–45); (2) Petitioner fails to show that Huang's classification scheme would be expected to reduce, rather than exacerbate, artifacts in the proposed combination (*id.* at 46–55); and (3) Petitioner fails to show that Huang's classification scheme would not reduce performance if combined with Kim (*id.* at 55–58).

On consideration of the full record, we agree with Patent Owner that Petitioner's reasoning to combine the references is inadequate.⁷ Petitioner's stated motivation to implement Huang's classification method in Kim's video frame deblocking method is premised on the "better image quality" achieved with Huang's algorithm. Pet. 39–40. Yet Patent Owner puts forth evidence, consistent with the teachings of the references themselves, that an

⁷ In the Institution Decision, we determined, based on the preliminary record, including Dr. Karam's testimony that Petitioner had demonstrated that a person of ordinary skill in the art would have been motivated to combine Huang's determination step in Kim's algorithm in the manner proposed by Petitioner. *See* Inst. Dec. 24–28. As discussed below, Patent Owner persuasively demonstrated during trial, with supporting evidence, including Dr. Bajaj's testimony, that a person of ordinary skill in the art would not have considered Petitioner's proposed modifications to Kim's method to result in Petitioner's purported benefits, or that any claimed benefits would be attributable to Huang's variance determination step. On the full record, we now determine that Petitioner has not met its burden of proving, by a preponderance of the evidence, a rationale to combine the teachings of Huang with Kim in the manner proposed. *See Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016) (affirming the Board's findings regarding the lack of a sufficient motivation to combine and stating that the "Board is free to change its view of the merits after further development of the record, and should do so if convinced its initial inclinations were wrong").

ordinarily skilled artisan would not have understood Huang's classification scheme to provide better image quality than Kim's mode decision.

At the outset, Petitioner and Dr. Karam fail to account for the fact that Kim is directed to a deblocking filter for block-based *video* coding while Huang is focused on reducing blocking effects in *still images*. Ex. 1003, 1 (“This paper presents a method to remove blocking artifacts in low bit-rate block-based video coding.”); Ex. 1004, 10 (“In this paper, we propose an efficient post-processing algorithm that employs neural network techniques for block-based image coding.”). Consequently, Petitioner and Dr. Karam fail to address Kim's express statements relating to deblocking schemes for still images, such as Huang's, that rely on edge information:

In contrast, a smoothing scheme based on edge information . . . may be easier to adapt to video coding. However, unlike a single still image, a video sequence consists of a set of image frames having various features, so it is hard to find a proper threshold value for each frame to make a good edge map in real time. Therefore, this scheme *may suffer from inaccurate edge detection*, which misinterprets blocking artifacts as edges or incurs undesirable blur.

Ex. 1003, 1 (emphasis added). Consistent with Kim's express teaching, Dr. Bajaj testifies that a person of ordinary skill in the art would have been aware that the art taught disadvantages of using edge-based approaches, like those disclosed in Huang, for real time deblocking of video, as in Kim. Ex. 2044 ¶ 70 (citing Ex. 2034, 45–49, 79).

We agree with Patent Owner that, in light of the express teachings of Kim and Dr. Bajaj's testimony, an ordinarily skilled artisan would not have expected Huang's classification method to provide better image quality than Kim's own filter mode determination for Kim's deblocking method. PO Resp. 31; Ex. 2044 ¶ 72. When read in context, Huang's claim of better

image quality that Petitioner relies on is in comparison to other algorithms for filtering still images, not video frames:

Fig. 4a is a *JPEG decompressed image* encoded at 0.32 bits per pixel. The reconstructed images for Fig. 4a using the LPF, Ramamurthi and the proposed algorithm are shown in Figs. 4b-d, respectively. . . . It . . . can be easily seen that our proposed algorithm obtains better image quality and better visual quality in detailed areas of the reconstructed image.

Ex. 1004, 8 (emphasis added); *see also id.* at 7 (“Simulation results of *JPEG coded images*”), 1 (“Comparison results between the proposed algorithm and other algorithms are made with several *Joint Photographic Experts Group* and vector quantisation decompressed images.”) (emphasis added); *see also* Ex. 2044 ¶ 73 (testifying that Huang only tests five standard JPEG still images, not images that are part of a video).

Petitioner and Dr. Karam fail to explain why a person of ordinary skill in the art would have understood Huang’s statements as applying to video deblocking methods such as Kim. *See generally* Pet. Reply; Ex. 2044 ¶ 96. Indeed, Dr. Karam acknowledges during cross-examination that she has no opinion on whether a person of ordinary skill in the art would have understood Huang as providing superior filtering than Kim. Ex. 2043, 173:14–20 (“My question is: In 2004, would a person of ordinary skill in the arts have an opinion or understanding as to whether Huang would provide superior filtering or whether Kim would provide superior filtering? . . . [A.] I cannot really say”). In fact, Dr. Karam’s only explanation, on cross-examination, for Huang’s method allegedly being better than Kim’s is that Huang was published *after* Kim. *Id.* at 174:7–18. We, therefore, determine that Dr. Karam’s conclusory testimony—that an ordinarily skilled artisan implementing the teachings of Kim would have been motivated to consider

the teachings of Huang as providing better image quality—is inadequate to support an obviousness determination. *See TQ Delta, LLC v. CISCO Sys., Inc.*, 942 F.3d 1352, 1362 (Fed. Cir. 2019) (reversing the Board’s finding of motivation to combine where the expert testimony relied upon failed to identify any evidence that linked statements in the prior art to the expert’s conclusions); *see also InTouch Techs., Inc. v. VGO Commc’ns, Inc.*, 751 F.3d 1327, 1353–54 (Fed. Cir. 2014) (reversing district court’s judgment of invalidity because the expert testimony “failed to provide any meaningful explanation for why one of ordinary skill in the art would be motivated to combine these references at the time of this invention”); *DSS Tech. Mgmt., Inc. v. Apple Inc.*, 885 F.3d 1367, 1377 (Fed. Cir. 2018) (finding expert testimony inadequate where it failed to provide a reasoned analysis as to why a person of ordinary skill in the art would have made the proposed modification).

Moreover, Petitioner offers no reason why a person of ordinary skill in the art would attribute the deblocking improvement in Huang to Huang’s variance classification step. The statement from Huang that Petitioner and Dr. Karam rely on states that “*our proposed algorithm* obtains better image quality,” but the proposed algorithm includes more than just the classification step. *See* Ex. 1004, 1 (“A new adaptive post-processing algorithm is proposed to reduce the blocking artefacts of block-based coded images *by using neural network techniques* in the spatial domain.”) (emphases added). Dr. Bajaj testifies, consistent with Huang’s statements, that Huang’s “contribution to the art is primarily due to its ‘novel’ data trained non-linear filter algorithm, and not the classification scheme that the

Petition proposes to substitute into Kim.” Ex. 2044 ¶ 75 (citing Ex. 1004, 2).

In its Reply, Petitioner responds that Patent Owner’s argument that Huang is not better than Kim is flawed because obviousness “does not depend on whether the combination of prior art references results in the ‘best’ or optimal configuration.” Pet. Reply 14 (citing *Novartis Pharm. Corp. v. West-Ward Pharm. Int’l Ltd.*, 923 F.3d 1051, 1059 (Fed. Cir. 2019); *In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012); *In re Gurley*, 27 F.3d 551, 552–53 (Fed. Cir. 1994)). Petitioner’s argument misses the point. Petitioner chose to argue that a person of ordinary skill in the art implementing the teachings of Kim would have been motivated to consider Huang to obtain “better image quality” (Pet. 39), and therefore retains the burden to prove the same. *See Magnum Oil*, 829 F.3d at 1375 (stating that the petitioner bears the burden to prove unpatentable the challenged claims); *see also* 35 U.S.C. § 312(a)(3); 37 C.F.R. § 42.104(b)(5). Had Petitioner not contended that combining Huang results in better image quality than Kim alone, we would not have needed to consider whether the combination results in “better image quality.”

Petitioner also argues, in its Reply, that it is irrelevant that Huang is directed to still images instead of video signals as a person of ordinary skill in the art would have recognized the advantages of utilizing Huang’s defined region in Kim’s processing of video signals *because Huang discloses that all the pixels in the defined region are analyzed*, and an appropriate filter is selected based on that analysis. Pet. Reply 15 (citing Pet. 36–37; Ex. 1005 ¶¶ 88–90); *see also id.* (arguing that the Petition provides sufficient motivation and evidence showing that Huang’s technique would produce

better results and that Huang determines the level of detail for *each pixel* in the defined region) (citing Pet. 37–39 Ex. 1005 ¶¶ 91–94).

At the outset, that argument does not appear on the cited pages of the Petition and is therefore an untimely new argument presented in the Reply. See Pet. 36–31 (describing only Huang’s operation). As discussed above, we need not consider new arguments raised belatedly in a reply. See *Intelligent Bio-Systems, Inc.*, 821 F.3d at 1369; see also *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 775 (Fed. Cir. 2018).

Even if we were to consider that argument, it still would be unavailing. There is no persuasive evidence to support Petitioner’s argument; the portions of Dr. Karam’s declaration cited in the Reply merely describe how Huang operates. Ex. 1005 ¶¶ 88–90. It is well established that “arguments of counsel cannot take the place of evidence lacking in the record.” *Estee Lauder Inc. v. L’Oreal, S.A.*, 129 F.3d 588, 595 (Fed. Cir. 1997); see also *In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974) (unsupported attorney argument in a brief cannot take the place of evidence).

In its Reply, Petitioner also asserts that Patent Owner’s arguments are really those of “bodily incorporation” (citing PO Resp. 25–58), and that Petitioner did not need to address whether Huang would or would not improve Kim’s video filtering method. Pet. Reply 17–19 (citing *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373 (Fed. Cir. 2016); *Mouttet*, 686 F.3d at 1332). Petitioner, once again, misinterprets its burden. Although proof of physical or bodily incorporation is not required, a satisfactory explanation of “*how* the combination of the . . . references [is] supposed to work” is necessary to support “a conclusion that a relevant skilled artisan would have been motivated to make the

combination and reasonably expect success in doing so.” *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017); *see also Trivascular*, 812 F.3d at 1068 (finding no error where the Board required petitioner to explain how a person of ordinary skill in the art would have implemented petitioner’s proposed substitution); *Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359–60 (Fed. Cir. 2020) (affirming Board’s determination that claims were not shown to be obvious because the petitioner had not demonstrated that an ordinarily skilled artisan would have been motivated to combine the references).

Here too, Petitioner chose to argue the proposed modification of Kim’s method to use Huang’s variance classification would produce better results, and it is incumbent on Petitioner to show that an ordinarily skilled artisan would have had reason to make that modification and would have reasonably expected success in doing so. Aside from arguing that a person of ordinary skill in the art “would have recognized that Huang’s calculation could be used to classify a pixel *instead of, or in addition to*, Kim’s flatness examination of the region surrounding the block boundary,” the Petition offers no explanation as to how or why an ordinarily skilled artisan would have made such a substitution, particularly in light of the fact that Kim itself teaches disadvantages of using methods similar to Huang’s. Pet. 41. As in *Trivascular*, the evidence demonstrates that a person of ordinary skill in the art would not have understood Petitioner’s proposed substitution as resulting in the benefit that Petitioner claims, and that Huang and Kim’s classification steps are not so simply interchangeable. 812 F.3d at 1068.

For example, the Petition fails to address the fact that Kim uses four classes and Huang uses two classes in their respective classification

schemes, and a person of ordinary skill in the art would not have understood that one could easily be replaced with the other. *See* PO Resp. 38–45 (citing Ex. 1005 ¶¶ 86–99) (showing that conflating Huang’s classifications into two, i.e., the simplest possible way to combine with Kim, would result in “reduction in the accuracy of the deblocking and loss of detail in the filtered image” in comparison to *either* Huang’s or Kim’s unmodified deblocking methods).

Likewise, Petitioner fails to explain how Huang’s pixel-based classification would have been applied to select a filter for an entire region, as performed in Kim. *See* PO Resp. 46–55 (citing Ex. 1005 ¶¶ 101–110); *see also id.* at 48 (Patent Owner annotates Figure 1 of Kim illustrating the mismatch between Kim’s and Huang’s determining and filtering steps). As Patent Owner correctly points out, Petitioner offers no explanation on how Kim’s modified “determining” step would determine a level of detail of the reconstructed video frame across a region, in the manner claimed. *Id.* at 47 (questioning whether the determination is based on a single calculation or multiple ones).

Patent Owner also persuasively demonstrates that Huang’s classification method is computation intensive and, as shown by Huang’s own experimental results data, relatively slow by at least two orders of magnitude, and thus does not align with Kim’s goal of an efficient deblocking filter for video. PO Resp. 56–57 (citing Ex. 2039; Ex. 1005 ¶¶ 112–117).

Rather than requiring Petitioner to demonstrate “bodily incorporation,” Patent Owner’s arguments and evidence show that an ordinarily skilled artisan would not have expected to achieve Petitioner’s

stated rationale in combining the references' teachings in the way Petitioner proposes. *See Arctic Cat Inc. v. Polaris Indus., Inc.*, 795 F. App'x. 827, 833 (Fed. Cir. 2019) ("The Board must weigh the benefits and drawbacks of the modification against each other, to determine whether there would be a motivation to combine.") (citing *Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000)); *Hulu LLC*, IPR2018-00582, Paper 34 at 20–21 (considering Patent Owner's evidence undermining Petitioner's proposed rationale to conclude that Petitioner had not adequately shown why it would have been a good idea to modify the references as proposed).

Petitioner faults Dr. Bajaj's simulation for evaluating Huang's modified technique and Kim's technique separately. Pet. Reply 18 (citing PO Resp. 43–44; Ex. 2044 ¶¶ 94–99; Ex. 1023, 57:17–58:8). Petitioner argues that Dr. Bajaj's "analysis is of little probative value, for it entirely fails to address what might result from the combination." *Id.*

Petitioner's argument, however, improperly attempts to shift the burden to Patent Owner. "In an *inter partes* review, the burden of persuasion is on the petitioner to prove 'unpatentability by a preponderance of the evidence,' 35 U.S.C. § 316(e), and that burden never shifts to the patentees." *Dynamic Drinkware*, 800 F.3d at 1378. Even in the context of the burden of production, "no burden shifts from the patent challenger to the patentee . . . where the only issues to be considered are . . . whether there would have been a motivation to combine the prior art, and whether that combination would render the patented claims obvious." *Magnum Oil Tools*, 829 F.3d at 1376.

Moreover, we understand Dr. Bajaj's experiments as intended to demonstrate the impact of the modification to Huang—proposed by

Dr. Karam at her deposition—to make it compatible with Kim’s method. PO Resp. 40–41 (citing Ex. 2043, 188:23–189:3, 190:5–22); Ex. 2044 ¶¶ 86–100. Dr. Bajaj explains that based on the simulations he conducted, there is no reason to undertake a simulation with Huang combined with Kim. *See* Ex. 1023, 56:4–57:4 (stating that it “becomes very evident and clear that the combination of Huang and Kim is foolhardy at best”).

We also agree with Patent Owner that Petitioner fails to show that an ordinarily skilled artisan would have been motivated to utilize *both* Kim’s and Huang’s determination steps *in parallel* where Petitioner has failed to show that a person of ordinary skill in the art would have been motivated to *replace* Kim’s filter mode determination with Huang’s variance classification step. Sur-reply 9–11, 15. Petitioner and Dr. Karam offer no persuasive evidence to show that a person of ordinary skill in the art would have believed that utilizing both methods in parallel would result in an improved system. *See* Pet. 40–41 (arguing that a person of ordinary skill in the art would have recognized that Huang’s calculation could be used to classify a pixel *instead of, or in addition to*, Kim’s flatness examination of the region surrounding the block boundary) (citing Ex. 1005 ¶ 98).

Petitioner argues that a person of ordinary skill in the art “would have considered a combined algorithm which performed filtering determinations according to Kim’s teachings and which performed filtering determinations according to Huang’s teachings, and compared the result of the two filtering schemes to identify which algorithm achieved better deblocking.” *Id.* at 41. For support, Petitioner points out that both Kim and Huang disclose comparisons with other deblocking schemes, indicating to a person of ordinary skill in the art that incorporating and comparing the teachings of

others' works was common prior to the '651 patent's priority date. *Id.* (citing Ex. 1003, 4; Ex. 1004, 6; Ex. 1005 ¶ 99).

The comparisons in the prior art that Petitioner relies on, however, are comparisons to other post-processing methods for reducing blocking effects *in their entirety*, not in the piecemeal manner that Petitioner proposes, where portions of one method are combined with and compared to portions of other methods. *See* Ex. 1003, 4 (comparing “the proposed algorithm with other existing postprocessing methods”); Ex. 1004, 6 (comparing Huang’s algorithm using a 3 x 3 filter window with the Ramamurthi post-processing algorithm). As Petitioner acknowledges, “obviousness requires the additional showing that a person of ordinary skill . . . would have selected and combined those prior art elements *in the normal course of research and development* to yield the claimed invention.” *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011) (affirming a summary judgment of nonobviousness) (citing *KSR*, 550 U.S. at 418) (emphasis added); Pet. Reply 16. There is no basis for us to conclude that Petitioner’s proposed piecemeal comparison would have been part of the *normal* course of research and development at the time of the '651 patent.

For the above reasons, we find that Petitioner has not established that a person of ordinary skill in the art would have been motivated to combine Kim with Huang with the expectation that the combination would provide better image quality.

(b) The combination allegedly would reduce blocking effects without any increase in the bit rates

Next, Petitioner argues that a person of ordinary skill in the art would have been motivated to combine the teachings of Kim and Huang because

Huang’s proposed algorithm effectively reduces blocking effects for block-based image coding, without any increase in the bit rates—a teaching that a person of ordinary skill in the art would have recognized as an additional advantage consistent with Kim’s goals. Pet. 40 (citing Ex. 1003, 5; Ex. 1004, 10; Ex. 1005 ¶ 97). Patent Owner argues that Petitioner’s assertion is unsupported by evidence or specific argument. PO Resp. 24 (citing Pet. 39–40). Patent Owner contends that Kim, just like Huang, performs deblocking without increasing the bitrate. Sur-reply 12. In fact, Patent Owner contends, in Petitioner’s proposed combined system that runs both Kim’s and Huang’s determining steps in parallel, any bitrate advantage Huang might have had would disappear, because the combined system would also implement the entirety of Kim. *Id.*

We agree with Patent Owner. As Huang explains, prior art “algorithms can be divided into two classes, the blocking effect reduction *algorithms with side information* and the *post-processing algorithms* for decompressed images.” Ex. 1004, 1 (emphases added). In the first class of algorithms, “the bit rates for the encoded images increase, and the compression procedure of the existing standards has to be modified.” *Id.* On the other hand, “blocking effect reduction methods using post-processing techniques are more desirable because only the compressed image is required, and *there is no need to modify the existing standards.*” *Id.* (emphasis added). A person of ordinary skill would therefore have understood *all* post-processing methods, including that of Kim, to provide the same benefit of being able to reduce blocking effects without the need for increased bit rates. *See* Ex. 1003, 1, 4. Therefore, we find that Petitioner has not established that a person of ordinary skill in the art would have been

motivated to combine Kim with Huang with the expectation that the combination would provide a benefit related to image bit rate.

(c) Kim and Huang both relate to deblocking reconstructed video images

Lastly, Petitioner argues that a person of ordinary skill in the art would have been motivated to combine the teachings of Kim and Huang because Kim and Huang are analogous art to each other, and they both relate to deblocking reconstructed video images. Pet. 39 (citing Ex. 1005 ¶ 95).

Patent Owner counters that the mere fact that references are directed to the same art or same techniques or address the same technical issues and disclose closely related subject matters cannot be a motivation to combine. PO Resp. 25 n.7 (citing *Microsoft Corp. v. Enfish, LLC*, 662 F. App'x. 981, 990 (Fed. Cir. 2016); *Heart Failure Techs. v. Cardiokinetix, Inc.*, IPR2013-00183, Paper 12 at 9 (PTAB July 31, 2013)).

We agree with Patent Owner that Petitioner cannot show a motivation to combine Kim and Huang based solely on the fact that those references relate to deblocking reconstructed video images. Although the extent to which references belong to the same or related fields of technology is one of the factors that precedent requires us to consider, that alone is not enough for Petitioner to meet its burden of presenting a sufficient rationale to support an obviousness conclusion. *See Securus Techs., Inc. v. Glob. Tel*Link Corp.*, 701 F. App'x. 971, 977 (Fed. Cir. 2017) (explaining that “[s]uch short-cut logic would lead to the conclusion that any and all combinations of elements known in this broad field would automatically be obvious, without the need for any further analysis”); *see also Comcast Cable Commc’ms, LLC v. Promptu Sys. Corp.*, No. 2019-1947, 2021 WL 21810, at *2 (Fed. Cir.

Jan. 4, 2021) (affirming a Board determination that petitioner had failed to prove a motivation to combine where petitioner merely alleged that the references came from the same field of study and addressed the same problem).

Based on the evidence in the entire trial record, we find that Petitioner has not established that a person of ordinary skill in the art, weighing the putative benefits of the proposed modification of Kim with Huang's classification method against the drawbacks of the modification, would have been motivated to combine the teachings of the references as proposed by Petitioner. We, therefore, find that Petitioner fails to articulate an adequate motivation to combine Kim and Huang to arrive at the claimed invention.

b) Remaining Limitations of Claim 1

Petitioner sets forth argument and evidence as to how the combination of Kim and Huang meets or satisfies the remaining limitations of claim 1. Pet. 21–24, 42–44. Patent Owner does not specifically respond to Petitioner's argument and evidence. *See generally* PO Resp. We find any arguments directed to those limitations waived. *See* Paper 18 at 7. For the reasons set forth in the Petition, we find that the combination of Kim and Huang teaches or suggests the remaining limitations of claim 1.

2. Claim 17

Petitioner sets forth argument and evidence as to how the combination of Kim and Huang meets or satisfies the additional limitation of claim 17. Pet. 44–46. Patent Owner does not specifically respond to Petitioner's argument and evidence. *See generally* PO Resp. We find any arguments directed to claim 17 waived. *See* Paper 18 at 7. For the reasons set forth in

the Petition, we find that the combination of Kim and Huang teaches or suggests the additional limitation of claim 17.

3. *Objective Indicia of Nonobviousness*

Given our determination that Petitioner has failed to establish, by a preponderance of the evidence, an adequate motivation to combine Kim and Huang, we need not assess objective evidence of non-obviousness. *See, e.g., Hamilton Beach Brands, Inc. v. f'real Foods, LLC*, 908 F.3d 1328, 1343 (Fed. Cir. 2018) (holding, in affirming a Board decision determining that petitioner had not shown unpatentability, that “objective indicia of nonobviousness” “need not [be] addressed” because the court “affirmed the Board’s findings regarding the failure of the prior art to teach or suggest all [claim] limitations”). However, we evaluate Patent Owner’s arguments and evidence of objective indicia of nonobviousness for completeness.

Objective indicia of nonobviousness (also referred to as 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). Objective indicia 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), *cert. denied*, 141 S. Ct. 373 (2020) (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. *Lectrosanics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 33 at 33 (PTAB Jan. 24, 2020) (precedential). 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).

Once a 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 showing that the objective indicia was due to extraneous factors other than the patented invention. *Demaco*, 851 F.2d at 1392–93.

Patent Owner argues there is evidence of a long standing need as well as industry praise for the claimed invention. PO Resp. 63–67. We determine that Patent Owner has failed to establish a nexus between the claimed invention and the submitted evidence.

Patent Owner contends that the claimed invention “satisfied a longstanding need for better, more efficient deblocking in Internet-shared video,” and “its deblocking scheme was praised at the time as superior to prior schemes, including that of MPEG-4, for, e.g., the invention’s improved ability to reduce blocking artifacts without losing video frame details.” PO Resp. 63. Patent Owner argues that the provisional application incorporated by reference into the ’651 patent describes the deblocking scheme implemented in the codec’s ‘DivX6’ release, and DivX6 codec’s deblocking practices claims 1 and 17. *Id.* at 64 (citing Ex. 2043; Ex. 2002). Patent Owner contends that a member of the team that developed that DivX6 commercial implementation of the invention, Mr. Seth Hanson, testifies that interested users had, for years, criticized available deblocking in Internet-shared and other low-bitrate, high compression video, and sought better deblocking. *Id.* at 63–65 (citing Ex. 2043; Ex. 2045⁸ (Hanson Declaration) ¶¶ 4–15, 17–30). Patent Owner further argues that “DivX6 ‘was very popular with the public, receiving a very large number of downloads and

⁸ Petitioner seeks to exclude Patent Owner’s Exhibits 2018–2030, 2032–2033, and 2038, as well as portions of the Declarations of Seth Hanson (Ex. 2045) and Dr. Bajaj (Ex. 2044) that rely on those exhibits. As discussed below, we deny Petitioner’s motion and consider Patent Owner’s evidence in determining whether Patent Owner has met its burden of demonstrating a nexus between the submitted evidence of objective indicia and the claimed invention. *See infra* § V.

making a big splash on the message boards,’ and many users specifically ‘praised the deblocking as superior to other deblocking filtering schemes available in other codecs.’” *Id.* at 65 (quoting Ex. 2045 ¶¶ 44–46). Patent Owner further argues that “users conducting ‘thorough’ tests of the DivX6’s capabilities praised the new deblocker as objectively and subjectively better, and ‘manag[ing] to postprocess the video without losing too much details’ and ‘to actually reduce blocks while keeping the details and colors.’” *Id.* (quoting Ex. 2045 ¶¶ 46–48; citing Ex. 2044 ¶ 128). According to Patent Owner, that praise and recognition is directed precisely at the deblocking scheme introduced in DivX 6.0, which directly corresponds to the claims. *Id.* at 66 (citing Ex. 2044 ¶ 132). Patent Owner, therefore, argues “[t]here is a strong nexus between the objective indicia of nonobviousness and claims 1 and 17 of the ’651 patent.” *Id.* (quoting Ex. 2044 ¶ 126).

Petitioner responds that Patent Owner has failed to establish a nexus between the evidence and the challenged claims. Pet. Reply 25. Petitioner contends that the “new DivX deblocking scheme” that Patent Owner relies on includes two distinct aspects: (1) the filter mode decision; and (2) the default mode filter, but claim 1 of the ’651 patent covers only the filter mode decision, not the steps of using a deblocking filter or performing the act of deblocking. *Id.* (citing Ex. 2016, 30). Those aspects, Petitioner argues, are covered by a related patent, U.S. Patent No. 7,729,426 (Ex. 1024, “the ’426 patent”), which claims a deblocking filter corresponding to the “New Default Mode Filter” in the DivX 6 Functional Specification. *Id.* (citing Ex. 1024, 13:5–16, 14:1–12 (claims 1 and 5); Ex. 2016, 32–33 (§ 20.2.2)). Petitioner argues that “where secondary considerations evidence is attributable to *multiple patents*, there can be *no presumption* that a product’s

success is due only to one patent.” *Id.* at 26 (quoting *Therasense, Inc. v. Becton, Dickinson and Co.*, 593 F.3d 1289, 1299 (Fed. Cir. 2010)).

Petitioner points out that Patent Owner’s arguments and evidence broadly focus on the “deblocking scheme,” not specifically the filter mode decision covered by the challenged claims, and that Patent Owner’s two declarants never compare the DivX 6.0 Functional Specification to the version of the DivX codec that may have been made available to the public and received praise. *Id.* at 27–28 (citing Ex. 2045 ¶¶ 41, 43). Because Patent Owner’s evidence generally references deblocking, Petitioner argues, any “praise” for deblocking has no nexus to the challenged claims. *Id.* at 29. Petitioner further contends that other contemporaneous evidence, e.g., a press release by DivX, shows that the codec’s deblocking features were not considered an important improvement. *Id.* (citing Ex. 1046).

a) Patent Owner Has Not Established that It Is Entitled to a Presumption of Nexus

We determine that Patent Owner has not demonstrated a nexus between the evidence presented and claims 1 or 17. Patent Owner’s arguments and evidence are directed broadly to the deblocking scheme and not specifically to the deblocking aspects covered by the challenged claims. As Petitioner points out, the DivX 6.0 Functional Specification makes clear that improvements to deblocking in that version relate to two distinct aspects:

The new DivX codec deblocking scheme is derived from the MPEG-4 deblocking scheme with some enhancements for better video quality (objective and subjective) and better run-time performance. The differences focus in two parts:

1. A new filter mode decision (i.e., the block-based filter mode decision

2. A new default mode filter. The DC offset mode filter remains the same.

Ex. 2016, 30. The Functional Specification explains that the second-listed enhancement comprises “a simple 3-tap low pass filter,” applied to pixels adjacent to the block boundary. *Id.* (explaining that that is an improvement over the prior algorithm requiring complex calculations such as 4-tap filtering, clipping, etc.). *Id.* at 33. That 3-tap filter is claimed in the related ’426 patent;⁹ for example, claim 1 of the ’426 patent recites a deblocking filter, comprising a 3-tap filter. Ex. 1024, 13:5–16.

Patent Owner is not entitled to a presumption of nexus where the relevant product embodies at least two patented inventions, and the burden remains on Patent Owner to show that the claimed secondary considerations were due to the invention claimed in the patent at issue here. *See Therasense, Inc.*, 593 F.3d at 1299. Applying *Therasense*, the Federal Circuit recently explained that allowing a presumption in such a situation would not be “consistent with *Demaco*’s explanation that nexus cannot be presumed where, for example, ‘the patented invention is only a component of a commercially successful machine or process.’” *See Fox Factory*, 944 F.3d at 1377 (citing *Demaco*, 851 F.2d at 1392) (rejecting a patent owner’s “attempt to reduce the coextensiveness requirement to an inquiry into whether the patent claims broadly cover the product that is the subject of the evidence of secondary considerations”).

As in *Fox Factory*, the ’651 patent is a continuation of the ’426 patent, but the two patents do not cover the same invention. *See id.*

⁹ The ’426 patent is a parent of the ’651 patent and was filed on September 20, 2005. Ex. 1001, code (63).

(rejecting the argument that a presumption should exist where the two patents at issue are related). In particular, these patents cover different aspects of the DivX codec deblocking scheme described in the Functional Specification. Nor are the enhancements to the default mode filter, claimed in the '426 patent, an insignificant additional feature given that the patentee sought to protect those aspects in the '426 patent almost five years before filing the '651 patent. Because the same evidence of secondary considerations cannot be presumed to be attributable to two different features, Patent Owner retains the burden of proving the degree to which the evidence tied to “the deblocking scheme” is attributable to the invention recited in the challenged claims. *Fox Factory*, 944 F.3d at 1378 (citing *Therasense*, 593 F.3d at 1299; *WMS Gaming, Inc. v. Int'l. Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999)); *see also Lectrosonics*, Paper 33 at 34–35. We are not persuaded that Patent Owner has met its burden here.

Patent Owner’s argument that it was Petitioner’s burden to show “either that the filter was the basis of the praise or that the claimed deblocking method was not” (Sur-reply 23) is misplaced. *See Fox Factory*, 944 F.3d at 1377 (explaining that a presumption may be appropriate where “the claims of each of the patents covered essentially the same invention”) (citing *PPC Broadband, Inc. v. Corning Optical Commc’ns RF, LLC*, 815 F.3d 734, 747 (Fed. Cir. 2016)); Sur-reply 22–24. Here, claims 1 and 17 do not cover essentially the same invention as that claimed in the '426 patent, but instead cover different aspects of the deblocking scheme. *See Demaco*, 851 F.2d at 1392–93 (explaining that Petitioner bears the burden of showing that the objective indicia was due to factors other than the patented invention only after a patent owner has presented a *prima facie* case of nexus).

b) *Patent Owner Has Failed to Establish Nexus Separate from the Presumption*

In its Sur-reply,¹⁰ Patent Owner argues that the asserted objective evidence is directed solely at the determining step (as recited in the challenged claims), not the actual filter (as claimed in the '462 patent), because, according to Patent Owner, that evidence is connected to the codec's deblocking performance for low bitrate video, not high bitrate video. Sur-reply 24 (PO Resp. 65–67; Ex. 2045 ¶¶ 16–20, 27–28, 37). Patent Owner contends that improvements in quality and performance “at relatively low bitrate” are attributable to the challenged claims while the new filter mode yielded improvements “at relatively high bitrates.” *Id.* at 24–25 (citing Ex. 2002, 3–4). We find that argument flawed because there is no basis in the record to separate low bitrate video from high bitrate video such that evidence of objective indicia may be tied to one and not the other. Moreover, we are not persuaded that any alleged performance improvements can be separated on the basis of bitrate alone. *See, e.g.*, Ex. 2002, 3 (stating that both aspects of the new codec resulted in “better run-time performance”); Ex. 2016, 32, 34 (noting that both parts of the codec provide improvements to luminance). We, therefore, do not agree with Patent

¹⁰ In its Response, Patent Owner makes no attempt to show that the submitted evidence is related to the unique characteristics of the claimed invention (*see* PO Resp. 63–67), arguing merely that a presumption of nexus exists because “[t]his praise and recognition is directed precisely at the deblocking scheme introduced in DivX 6.0 which directly corresponds to the claims.” *Id.* at 66 (citing Ex. 2044 ¶ 132). Patent Owner also makes no attempt to link the purported evidence of long felt need to the claimed invention, arguing only that the evidence more generally shows that “[u]sers complained that available *deblocking* . . . was both insufficient and inefficient.” *Id.* at 65 (emphasis added).

Owner that it has met its burden to establish a nexus between the merits of the claimed invention and the submitted evidence relating to long-felt need and industry praise. Absent a nexus, we determine that Patent Owner's evidence of objective indicia does not weigh in favor of nonobviousness.

4. Conclusion on Obviousness of Claims 1 and 17

“Once all relevant facts are found, the ultimate legal determination [of obviousness] involves the weighing of the fact findings to conclude whether the claimed combination would have been obvious to an ordinary artisan.” *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1361 (Fed. Cir. 2017). On balance, considering the full record before us, we determine that Petitioner has not established, by a preponderance of the evidence, that the combination of Kim and Huang would have rendered the subject matter of claims 1 and 17 obvious to one of ordinary skill in the art at the time of the invention.

IV. PATENT OWNER'S MOTION TO EXCLUDE

Patent Owner filed a Motion to Exclude seeking to exclude portions of Dr. Karam's declaration (Ex. 1005 ¶¶ 77–100). Paper 42. Petitioner relies on these portions for demonstrating that the combination of Kim and Huang teaches or suggests the “determining” limitation of claim 1.

Under the particular circumstances in this case, we need not assess the merits of Patent Owner's Motion to Exclude. As discussed above, even considering Petitioner's evidence, we have determined that Petitioner has not demonstrated by a preponderance of the evidence that claims 1 and 17 of the '651 patent are unpatentable. Accordingly, Patent Owner's Motion to Exclude is *dismissed* as moot.

V. PETITIONER'S MOTION TO EXCLUDE

Petitioner filed a Motion to Exclude seeking to exclude Patent Owner's Exhibits 2018–2030, 2032–2033, and 2036–2038, as well as any portions of the record (including portions of Exhibits 2044 and 2045) relying on these exhibits. Paper 41 (“Mot.”). Petitioner notes that Patent Owner relies on Exhibits 2036 and 2037 in its non-obviousness analysis and that Patent Owner relies on the remaining exhibits to support its arguments regarding objective indicia of nonobviousness. *Id.* at 1. Petitioner argues that Exhibits 2018–2030 and 2032–2033 contain inadmissible hearsay, and that Exhibits 2036–2038 lack relevance to this proceeding. *Id.* Petitioner, as the “moving party,” “has the burden of proof to establish that it is entitled to the requested relief.” 37 C.F.R. § 42.20.

A. Exhibits 2018–2030 and 2032–2033

Petitioner states that Exhibits 2018–2030 and 2032–2033 are each Internet forum posts by unnamed individuals on the “Doom9” forum that Patent Owner relies on in support of its “praise” and “contemporary appreciation” arguments. Mot. 3–4 (citing PO Resp. 64–65; Ex. 2045 ¶¶ 17–25, 27–48) (noting also that the Patent Owner relies on the Hanson Declaration (Ex. 2045), which in turn cites to each of these exhibits). Petitioner argues that an individual's mere favorable comments about a company's products remain hearsay when offered for the truth of the matter asserted. *Id.* at 4 (citing *Ingenico Inc. v. Ioengine, LLC*, IPR2019-00416, Paper 60 at 81–82 (PTAB July 13, 2020); *Sonos, Inc. v. D&M Holdings Inc.*, No. 14-1330-WCB, slip op. at 6 (D. Del. Dec. 8, 2017) (Ex. 2046)). Petitioner argues that these exhibits “represent the personal opinions of the

unnamed individuals who posted on the Doom9 forum, and do not purport to represent the views of the industry.” *Id.* at 5.

Patent Owner acknowledges that “[t]hese exhibits constitute various threads of public forum posts by members of an online forum, offering opinions and comments” on the DivX 6 codec, but argues those statements are not used as hearsay because they are not offered for the truth of the matter asserted. Paper 45 (“Opp.”) at 3. Instead, Patent Owner argues, Mr. Hanson, who also has personal knowledge of facts concerning the claimed public praise for the DivX 6 codec, uses these statements to support his testimony regarding that praise, i.e., to show that such statements were made. *Id.* at 4–5. Patent Owner argues that the Board has routinely admitted public statements praising an invention as evidence that praise existed. *Id.* at 5–6 (citing *Cisco Sys., Inc. v. Centripetal Networks, Inc.*, IPR2018-01760, Paper 41 at 50–51 (PTAB May 18, 2020); *Quanergy Sys., Inc. v. Velodyne Lidar, Inc.*, IPR2018-00256, Paper 63 at 39–40 (PTAB May 23, 2019); *Fox Factory, Inc. v. SRAM, LLC*, IPR2017-01440, Paper 62 at 80 (PTAB Dec. 6, 2018); *Medtronic, Inc. v. NuVasive, Inc.*, IPR2014-00075, Paper 49 at 37 (PTAB Apr. 5, 2015); *Microsoft Corp. v. FG SRC LLC*, IPR2018-01605, Paper 72 at 15 (PTAB Apr. 9, 2020)).

We agree with Patent Owner that these exhibits represent expressions of opinion of unnamed users that Patent Owner relies on to show contemporaneous praise existed. These exhibits are cited in the Hanson Declaration only as evidence of industry praise, i.e., to support testimony based on his personal knowledge. *See* Ex. 2045 ¶ 51. And although Mr. Hanson quotes statements from these exhibits in his declaration, their relevance lies in that they allegedly reflect praise for DivX’s deblocking

method. For example, the statement by user “temperance”—that Petitioner objects to as being relied on for the truth of the matter asserted (Paper 46, 1–2)—is offered to show that “[t]here was plenty of healthy debate on the boards about the quality of the new version of the codec,” and “many commenters specifically praised the deblocking.” *See* Ex. 2045 ¶ 46. Moreover, it is clear that these are merely *opinions* of online users, not factual assertions. *See id.* (quoting temperance: “*IMHO*, DivX 6 deblocking is better (for metrics and eyes) than xvid’s”) (emphasis added); *see Sonos*, slip op. at 7 (separating admissible expressions of opinions that constitute praise from bare factual assertions). Other statements that Petitioner objects to (Paper 46, 2) are similarly opinions of online users, not factual assertions that Patent Owner relies upon for the truth of the matter stated therein. We are therefore not persuaded that Exhibits 2018–2030 and 2032–2033 contain inadmissible hearsay.¹¹ *See Cisco Sys.*, Paper 41 at 50–51 (allowing exhibits cited only as evidence of industry praise); *Quanergy Sys., Inc. v. Velodyne Lidar, Inc.*, IPR2018-00255, 2020 WL 2595492, at *2 (PTAB May 21, 2020) (citing *Asetek Danmark A/S v. CMI USA, Inc.*, 13-CV-00457-JST, 2014 WL 12644295, at *2 (N.D. Cal. Nov. 19, 2014)).

B. Exhibits 2036–2038

Petitioner argues that Exhibits 2036–2038 lack relevance to any challenged claim because they refer to video coding techniques that were

¹¹ We also are not persuaded by Petitioner’s argument (Paper 46, 3–4) that evidence of industry praise cannot include an individual’s favorable view of a product but instead should be limited to evidence of industry awards. *See, e.g., Apple Inc. v. Int’l Trade Comm’n*, 725 F.3d 1356, 1366 (Fed. Cir. 2013) (listing as evidence of industry praise statements by an AT&T executive praising the patented product as “the best device I have ever seen”).

developed many years after the priority date of the '651 patent. Mot. 6–7. Petitioner further argues that Mr. Hanson relies on Exhibit 2038 to show that DivX 5 used the same deblocking as MPEG-4, but that discussion has no relevance to any of the challenged claims, which Patent Owner alleges practice Release 6.0. *Id.* at 7.

Patent Owner responds that Exhibits 2036 and 2037 are cited for the proposition that standard-setting bodies rely on competitive testing of deblocking schemes. Opp. at 14. Patent Owner argues Exhibit 2038 discusses both versions 5 and 6 of the DivX codec, and that both versions are relevant to this proceeding.

Although the timing of these exhibits diminishes the persuasive weight they might otherwise be accorded, we determine that they meet the threshold for relevance nonetheless, and we discern no risk of unfair prejudice, confusion, or waste of time. Exhibits 2036 and 2037 are cited to support the proposition that testing may be used to identify the better deblocking scheme, and are consistent with other evidence of record. *See, e.g.*, 1003, 1004, 2034. Exhibit 2038 is relied on by Mr. Hanson as background information on the state of art at the time of the '651 patent invention (*see* Ex. 2045 ¶ 21), consistent with other evidence. *See, e.g.*, Ex. 2035.

C. Exhibits 2044 and 2045

Petitioner argues that portions of Exhibits 2044 and 2045 relying on Exhibits 2018–2030, 2032–2033, and 2036–2038 should be excluded because that evidence is inadmissible. Mot 3. However, Petitioner fails to support its argument that we must exclude paragraphs of Dr. Bajaj's declaration that cite to Exhibits 2036 and 2037 with any citation to legal or

other authority. *Cf.* Fed. R. Evid. 703 (allowing experts to base opinions on inadmissible facts or data under certain circumstances). Because we decline to exclude Exhibits 2018–2030, 2032–2033, and 2036–2038, we also do not exclude portions of Exhibits 2044 and 2045 that rely on those exhibits.

D. Conclusion

Petitioner has not satisfied its burden to show that Exhibits 2018–2030, 2032–2033, 2036–2038, 2044, and 2045 should be excluded. Accordingly, Petitioner’s Motion to Exclude is *denied*.

VI. PETITIONER’S OBJECTIONS TO PATENT OWNER’S
DEMONSTRATIVES

Petitioner filed Objections to Patent Owner’s Demonstratives (Paper 50), objecting to demonstrative slide 30 as containing new arguments that were not previously presented by Patent Owner. Petitioner argues that slide 30 contains illustrations and argument that cannot be found in Patent Owner’s prior papers or exhibits, including those identified by Patent Owner as supporting the demonstrative. *See* Paper 50, 1–2 (citing Ex. 2044 ¶ 125; PO Resp. 62). We agree with Petitioner that Patent Owner’s demonstrative slide 30 presents improper new arguments that have not been previously made. *See* Paper 43, 3 (“The parties may only rely upon evidence that has been previously submitted in the proceeding and may only present arguments that have been previously made in the submitted papers. No new evidence or arguments may be presented at the hearing.”) (citing *St. Jude Med., Cardiology Div., Inc. v. Bd. of Regents of the Univ. of Mich.*, IPR2013-00041, Paper 65 at 2–5 (PTAB Jan. 27, 2014)). We, therefore, sustain Petitioner’s objection.

We note, however, that demonstratives are not evidence. *See* Paper 43, 4 (demonstrative exhibits presented in this case are not evidence”); Consolidated Trial Practice Guide 84, available at <https://www.uspto.gov/TrialPracticeGuideConsolidated> (“Demonstrative exhibits used at the final hearing are aids to oral argument and not evidence.”). In this Final Written Decision, we rely solely on the arguments properly presented in the parties’ briefs and the evidence of record, not on the demonstratives.

VII. CONCLUSION

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

In summary:

Claim(s)	35 U.S.C. §	References/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 17	103(a)	Kim, Huang		1, 17

VIII. ORDER

It is, therefore,

ORDERED that claims 1 and 17 of the ’651 patent have not been shown to be unpatentable;

FURTHER ORDERED that Petitioner’s Motion to Exclude is *denied*;

FURTHER ORDERED that Patent Owner’s Motion to Exclude is *dismissed*;

FURTHER ORDERED that Petitioner’s objection to Patent Owner’s demonstrative slide 30 is *sustained*; and

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

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