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Paper 7
Entered: January 19, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS, LLC,
Petitioner,

v.

DIGIMEDIA TECH, LLC,
Patent Owner.

IPR2022-01182
Patent 6,473,532 B1

Before GEORGIANNA W. BRADEN, JOHN A. HUDALLA, and MICHAEL T. CYGAN, *Administrative Patent Judges*.

HUDALLA, *Administrative Patent Judge*.

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

Unified Patents, LLC ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 6 and 16 ("the challenged claims") of U.S. Patent No. 6,473,532 B1 (Ex. 1001, "the '532 patent"). Petitioner filed a Declaration of Lina J. Karam, Ph.D. (Ex. 1002) with its

Petition. DigiMedia Tech, LLC ("Patent Owner") did not file a preliminary response.

We have authority to determine whether to institute an *inter partes* review. *See* 35 U.S.C. § 314; 37 C.F.R. § 42.4(a). Under 35 U.S.C. § 314(a), we may not authorize an *inter partes* review unless the information in the petition "shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." For the reasons that follow, we institute an *inter partes* review as to claims 6 and 16 of the '532 patent on the patentability challenge presented.

I. BACKGROUND

A. Real Parties-in-Interest

Petitioner identifies Unified Patents, LLC, as the real party-in-interest. Pet. 72. Patent Owner identifies DigiMedia Tech, LLC, and Brainbox Innovations, LLC, as real parties-in-interest. Paper 3, 1.

B. Related Proceedings

The parties identify the following proceedings related to the '532 patent (Pet. 73; Paper 3, 1):

DigiMedia Tech, LLC v. ViacomCBS, Inc., No. 1:21-cv-01831 (S.D.N.Y. filed Mar. 2, 2021);

DigiMedia Tech, LLC v. Lenovo US Inc., No. 1:21-cv-00227 (D. Del. filed Feb. 18, 2021); and

DigiMedia Tech, LLC v. Panasonic Corp., No. 1:20-cv-04995 (N.D. Ga. filed Dec. 9, 2020).

C. The '532 patent

The '532 patent is directed to "syntactic encoding of images for later compression by standard compression techniques." Ex. 1001, 1:6–9. The invention of the '532 patent

> separates the details of a frame into two different types, those that can only be detected (for which only one bit will suffice to describe each of their pixels) and those which can be distinguished (for which at least three bits are needed to describe the intensity of each of their pixels).

Id. at 5:28–33.

Figure 3 of the '532 patent is reproduced below.

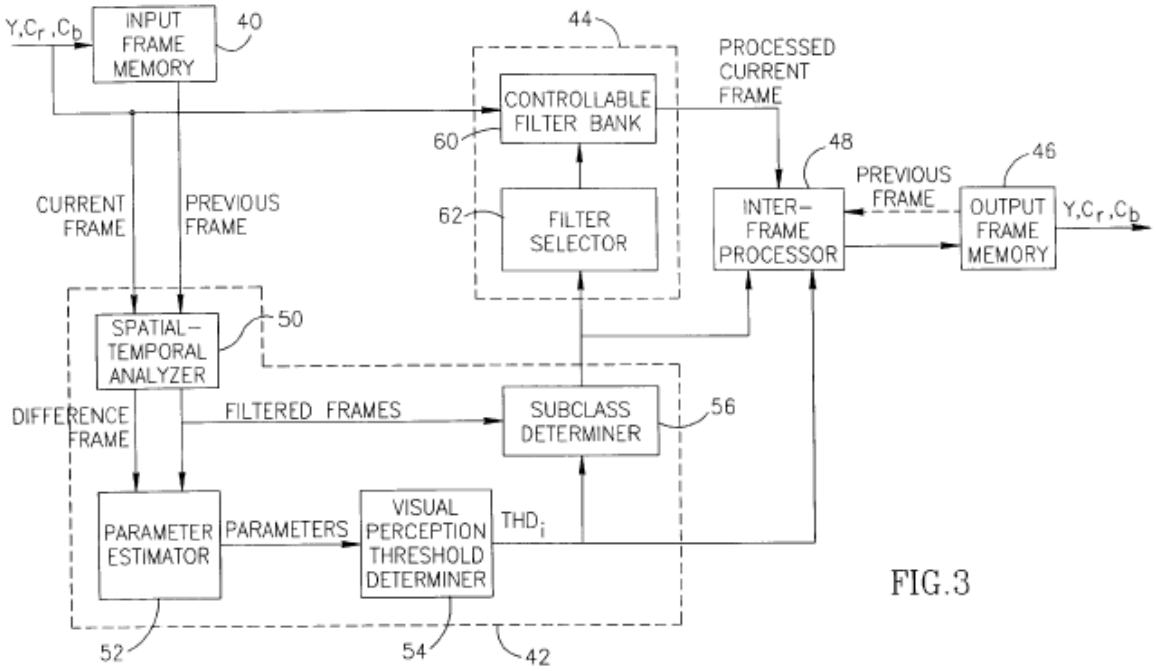

FIG.3

Figure 3 is a block diagram illustration of a visual lossless syntactic encoder. Ex. 1001, 4:36–37. The encoder comprises input frame memory 40, frame analyzer 42, intra-frame processor 44, output frame memory 46, and inter-frame processor 48. *Id.* at 5:67–6:3. Frame analyzer 42 comprises spatial-temporal analyzer 50, parameter estimator 52, visual perception threshold determiner 54, and subclass determiner 56. *Id.* at 6:22–24.

Frame analyzer 42 analyzes each frame to separate it into subclasses, which define areas where pixels cannot be distinguished from one another. *Id.* at 6:3–5. Spatial-temporal analyzer 50 generates a plurality of filtered frames from the current frame, each filtered through a different high pass filter (HPF), where each high pass filter retains a different range of frequencies. Ex. 1001, 6:30–34. Parameter estimator 52 takes the current frame and the filtered and difference frames and generates a set of parameters that describe the information content of the current frame. *Id.* at 7:10–13. Visual perception threshold determiner 54 determines the visual perception threshold THD_i per pixel. *Id.* at 8:27–32. Subclass determiner 56 "compares each pixel i of each high pass filtered frame HPF-X to its associated threshold THD_i to determine whether or not that pixel is significantly present in each filtered frame."[1] *Id.* at 8:34–41. Subclass determiner 56 then defines the subclass to which the pixel belongs. *Id.* at 8:41–42.

Intra-frame processor 44 spatially filters each pixel of the frame according to its subclass. Ex. 1001, 6:5–8. Inter-frame processor 48 provides temporal filtering (i.e., inter-frame filtering) and updates output frame memory 46 with the elements of the current frame that are different than those of the previous frame. *Id.* at 6:8–12.

The application that led to the '532 patent was filed on March 14, 2000, and claims priority to an Israel patent application that was filed on January 23, 2000 (i.e., the earliest possible effective filing date). Ex. 1001,

[1] The '532 patent states that "'significantly present' is defined by the threshold level and by the 'detail dimension' (i.e. the size of the object or detail in the image of which the pixel forms a part)." Ex. 1001, 8:34–41.

codes (22), (30). We apply the January 23, 2000, date for qualifying the asserted references as prior art.

D. Illustrative Claim

Of the challenged claims, claim 6 is independent. Claims 16 depends from claim 6. Claim 6 is illustrative of the challenged claims and recites:

> 6. A method of visual lossless encoding of frames of a video signal, the method comprising steps of:
>
> spatially and temporally separating and analyzing details of said frames;
>
> estimating parameters of said details;
>
> defining a visual perception threshold for each of said details in accordance with said estimated detail parameters;
>
> classifying said frame picture details into subclasses in accordance with said visual perception thresholds and said detail parameters; and
>
> transforming each said frame detail in accordance with its associate subclass.

Ex. 1001, 12:50–63.

E. Prior Art of Record

Petitioner relies on the following prior art:

> U.S. Patent No. 6,366,705 B1, filed Jan. 28, 1999, issued Apr. 2, 2002 (Ex. 1005, "Chiu"); and
>
> U.S. Patent No. 7,006,568 B1, PCT filed May 26, 2000, issued Feb. 28, 2006 (Ex. 1006, "Gu").

F. The Asserted Challenge to Patentability

Petitioner asserts that claims 6 and 16 of the '532 patent are unpatentable based on the following challenge (Pet. 1):

Claims Challenged	35 U.S.C. §	References
6, 16	103(a)[2]	Chiu, Gu

II. ANALYSIS

We now consider Petitioner's asserted challenge to determine whether Petitioner has met the "reasonable likelihood" standard for institution under 35 U.S.C. § 314(a).

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter 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. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations.[3] *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We also recognize that prior art references must be "considered together with the knowledge of one of ordinary skill in the pertinent art." *In re*

[2] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103. Because the '532 patent was filed before March 16, 2013 (the effective date of the relevant amendments), the pre-AIA versions of §§ 102 and 103 apply.

[3] The present record does not include any evidence of objective indicia of nonobviousness.

Paulsen, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

"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); *see also* 37 C.F.R. § 42.104(b) (specific requirements for a patentability challenge). Except in limited circumstances not present here, this burden of persuasion does not shift to the patent owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). Petitioner's burden of persuasion is particularly relevant here given that Patent Owner was not required to file a preliminary response. *See* 37 C.F.R. § 42.107(a).

B. Level of Ordinary Skill in the Art

Citing testimony from Dr. Karam, Petitioner contends a person of ordinary skill in the art "would have had a Bachelor's Degree in Computer Science, Computer Engineering, or Electrical Engineering, and two or more years of experience working with image processing or visual perception based video coding." Pet. 10 (citing Ex. 1002 ¶¶ 36–37). For purposes of this Decision, we adopt Petitioner's definition of the level of ordinary skill in the art without the qualifier "or more," which introduces ambiguity. On the present record, we are satisfied that this definition comports with the level of skill necessary to understand and implement the teachings of the '532 patent and the asserted prior art.

C. Claim Interpretation

> In an *inter partes* review, we construe each claim
>
> using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b), including construing the claim in accordance with 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). Accordingly, our claim construction standard is the same as that of a district court. *See id.* Under the standard applied by district courts, claim terms are generally given their plain and ordinary meaning, as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). "There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Petitioner does not address the interpretation of the challenged claims. For purposes of this Decision, we determine that no aspects of the challenged claims require explicit construction. *See, e.g.*, *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) ("The Board is required to construe 'only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.'" (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Alleged Obviousness in View of Chiu and Gu

Petitioner contends the subject matter of claims 6 and 16 would have been obvious over the combination of Chiu and Gu. Pet. 11–68. Patent Owner does not dispute Petitioner's contentions at this time.

1. Chiu (Ex. 1005)

Chiu is a U.S. patent directed to "perceptual-based video signal coding techniques resulting in reduced complexity of video coders implementing same." Ex. 1005, 1:15–18. Figure 2 of Chiu is reproduced below.

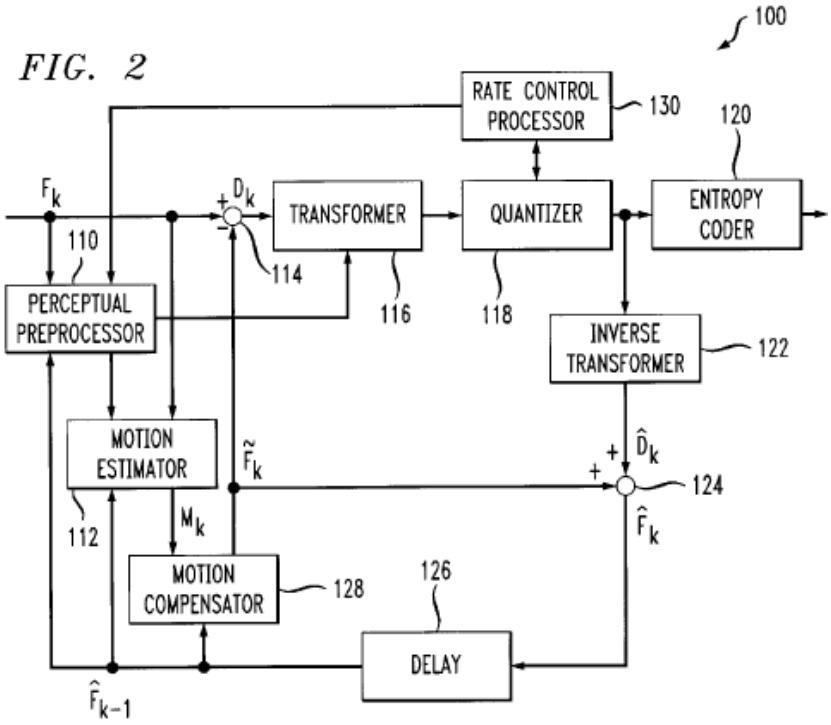

Figure 2 is a block diagram of video encoder 100. *Id.* at 5:32–33, 7:53–55. Video encoder 100 includes perceptual preprocessor 110, motion estimator 112, and signal subtractor 114 coupled to the input of encoder 100. *Id.* at 7:63–67. Motion estimator 112 is also coupled to perceptual preprocessor 110. *Id.* at 7:67–8:1. Encoder 100 also includes

transformer 116 (e.g., a discrete cosine transform (DCT) generator) coupled to perceptual preprocessor 110 and signal subtractor 114, quantizer 118 coupled to transformer 116, and entropy encoder 120 coupled to quantizer 118 and the output of encoder 100. *Id.* at 8:1–6. Inverse transformer 122 (e.g., an inverse DCT generator) is coupled between quantizer 118 and entropy encoder 120. *Id.* at 8:6–9. Encoder 100 also includes signal combiner 124 coupled to inverse transformer 122, delay 126 coupled to signal combiner 124 and perceptual preprocessor 110, and motion compensator 128 coupled to delay 126, signal subtractor 114, signal combiner 124, and motion estimator 112. *Id.* at 8:9–14. Encoder 100 additionally includes rate control processor 130 coupled to quantizer 118. *Id.* at 8:14–16.

Perceptual preprocessor 110 accounts for the insensitivity of the human visual system (HVS) to mild changes in pixel intensity by segmenting video into regions according to perceptibility of picture changes. Ex. 1005, 4:25–29, 8:27–31. Based on the segmentation, encoder 100 can determine which macroblocks require motion estimation. *Id.* at 8:32–33. The procedure for removing perceptual redundancy in the pixel domain is known as "bush-hogging." *Id.* at 7:24–26.

The encoding method disclosed in Chiu compares elements of a portion of a first video image (e.g., pixels of a macroblock of a current frame) with elements of a portion of a second video image (e.g., corresponding pixels of a macroblock of a previous frame) to generate respective intensity difference values. Ex. 1005, 4:40–45. The intensity difference values are compared to a visually perceptible threshold value, which may be a function of a "just-noticeable-distortion (JND)" value and a

quantization parameter associated with the bit rate of the encoding process. *Id.* at 4:50–54, 10:30–36. This is accomplished using a δ-function test performed on every pixel, which results in a "1" when the intensity difference value is above the threshold value and a "0" otherwise. *Id.* at 4:46–50, 9:6–10, 10:23–36. The method then performs further processing on sub-blocks within a macroblock to determine whether surviving pixels (those pixels having a δ-function test result of "1") are connected or isolated. *Id.* at 11:1–6. This is accomplished by summing the surviving pixels in the sub-block and comparing the sum to a decision value. *Id.* at 4:54–58, 11:10–25. The macroblock may or may not be motion compensated based on the comparison results for the constituent sub-blocks. *Id.* at 4:58–65, 11:15–30.

Petitioner contends that Chiu qualifies as prior art under 35 U.S.C. § 102(e) based on its filing date. Pet. 11. On the present record, we have no evidence of an invention date other than the earliest possible effective filing date of the challenged claims. For purposes of this Decision, we determine that Chiu qualifies as prior art under 35 U.S.C. § 102(e) because Chiu's filing date of January 28, 1999, is before the earliest possible effective filing date of the challenged claims, which is January 23, 2000. Ex. 1001, code (30); Ex. 1005, code (22).

2. Gu (Ex. 1006)

Gu is a U.S. patent directed to "compressing data with a human perceptual model." Ex. 1006, 1:22–24. Gu notes the competing needs in the art to compress video signals and "to maintain the subjective visual quality of an image, arguably, the ultimate objective of video transmission systems."

Id. at 1:35–39. In light of these needs, Gu states that "performance metrics that take the psycho visual properties of the human visual system (HVS) into account are needed." *Id.* at 1:39–42.

Gu states that "[d]istortion sensitivity profiles of human perception are driven as functions of frequency, brightness, texture, and temporal parameters." *Id.* at 5:40–42. Gu further states that the concept of just-noticeable-distortion (JND) has been successfully applied to perceptual coding of video signals in order to remove redundancy due to spatial and temporal correlation and the irrelevancy of perceptually insignificant components from video signals. *Id.* at 7:1–6.

Gu discloses a method of generating a JND model. *Id.* at 9:65–66; Fig. 7. The model includes, *inter alia*, parameters f_1 representing the error visibility threshold due to texture masking, f_2 representing the visibility threshold due to average background luminance, and f_3 representing the error visibility threshold due to motion. *Id.* at 10:10–12, 11:44.

Petitioner contends that Gu qualifies as prior art under 35 U.S.C. § 102(e) based on its priority claim to an earlier provisional application. Pet. 12–13. Petitioner contends that the "[p]rovisional application provides written description and enablement support for at least claim 1 of *Gu*." *Id.* at 12. In support of this contention, Petitioner provides a mapping of Gu's claim 1 to the provisional application. *Id.* at 12–25 (citing, *inter alia*, Ex. 1002 ¶¶ 41–57).

On the present record, we have no evidence of an invention date other than the earliest possible effective filing date of the challenged claims. For purposes of this Decision, we determine that Gu qualifies as prior art under 35 U.S.C. § 102(e) because the May 27, 1999, filing date of the provisional

application to which Gu claims priority is before the earliest possible effective filing date of the challenged claims, which is January 23, 2000. Ex. 1001, code (30); Ex. 1006, code (60).

3. Claim 6

The preamble of claim 6 recites "[a] method of visual lossless encoding of frames of a video signal." Ex. 1001, 12:50–51. Petitioner cites Chiu's perceptual preprocessor in a video encoder that can improve the computational complexity and compression ratio without loss of perceived picture quality. Pet. 27–28 (citing Ex. 1005, 4:22–37, 6:64–66, 8:17–22, 13:9–12). Petitioner also cites evidence that Chiu's encoding system encodes frames of video. *Id.* at 28 (citing Ex. 1005, 10:19–21). Petitioner does not address whether the preamble is limiting. Because Petitioner shows sufficiently for purposes of institution that Chiu teaches the preamble (*see, e.g.*, Ex. 1005, 4:22–37, 6:64–66, 8:17–22, 10:19–21, 13:9–12), we need not determine whether the preamble is limiting. *See Realtime Data*, 912 F.3d at 1375.

Claim 6 further recites "spatially and temporally separating and analyzing details of said frames." Ex. 1001, 12:53–54. Petitioner contends Chiu's perceptual preprocessing method "uses a visually perceptible threshold value to analyze the degree of visual perception of the details, where the threshold is modeled based on a just-noticeable-distortion (JND) value." Pet. 28–29 (citing Ex. 1002 ¶¶ 73–75; Ex. 1005, 12:25–38). In particular, Petitioner cites Chiu's teaching of a δ-function test performed on every pixel based on a visually perceptible threshold value $T = T_o + C * QP$,

where T_o is the JND, QP is the quantization parameter, and C is a constant.[4] *Id.* at 29–31 & n.4 (citing Ex. 1005, 6:64–66, 7:19–22, 10:17–11:50, Fig. 4). Citing testimony from Dr. Karam, Petitioner contends that an ordinarily skilled artisan would have understood that the JND value T_o is used to measure whether a pixel is perceived by a human eye, and that perceivable pixels correspond to the recited "details." *Id.* at 31–32 (citing Ex. 1002 ¶¶ 73–75).

For "spatially and temporally separating and analyzing details," Petitioner cites Gu's teaching of "generating a spatial-temporal JND profile for a set of two frames consisting of a current frame and a previous frame." Pet. 32 (internal quotation and alteration omitted) (citing Ex. 1006, 9:54–59). According to Petitioner, Gu's system "divides and describes pixels based on the local characteristics of the neighborhood associated with each pixel using spatial texture characteristics due to local luminance changes, spatial average background luminance, and temporal characteristics due to intensity changes between frames." *Id.* (citing Ex. 1002 ¶¶ 41–64, 76–93; Ex. 1006, 9:50–11:55); *see also id.* at 32–40 (Petitioner's in-depth analysis of Gu's system for this limitation, including generation of a JND model).

Petitioner notes that Chiu describes the JND value T_o, but does not expressly provide details about how to calculate the JND value. Pet. 40. Thus, Petitioner contends an ordinarily skilled artisan "would have found it obvious to improve *Chiu* with *Gu*'s JND generation method to calculate the JND used in *Chiu*'s threshold value to improve the performance of *Chiu's*

[4] Because there is an apparent typo in the formula for T from equation (9) of Chiu, we use the formula for T from Figure 4 of Chiu. *See* Pet. 31 n.4 (citing Ex. 1002 ¶ 74).

video encoding method." *Id.* (citing Ex. 1002 ¶¶ 58–64,[5] 71–93). Petitioner notes the two references' common teachings on video encoding that takes human visual perception into account. *Id.* at 40–42 (citing, *inter alia*, Ex. 1002 ¶¶ 58–64, 87–93). Petitioner further notes that both references use the JND model to study the visual perceptibility and visual redundancy of details in a video. *Id.* at 42–43 (citing, *inter alia*, Ex. 1002 ¶¶ 90–91). Petitioner also contends that combining Chiu and Gu would have yielded a predictable result because both references disclose similar JNDs. *Id.* at 43–45 (citing, *inter alia*, Ex. 1002 ¶¶ 92–93).

Based on the present record, Petitioner has shown sufficiently that perceivable pixels, which are determined using Chiu's δ-function test based on a visually perceptible threshold value *T*, teach the recited "details." *See, e.g.*, Ex. 1002 ¶¶ 73–75; Ex. 1005, 10:17–11:50, Fig. 4. Petitioner also shows sufficiently that the JND value T_o is used to determine the visually perceptible threshold value *T*, and that the JND value in the combined Chiu–Gu system is calculated according to Gu's spatial-temporal JND model. *See, e.g.*, Ex. 1002 ¶¶ 41–64, 76–93; Ex. 1005, 6:64–66, 7:19–22, 10:17–11:50; Ex. 1006, 9:50–11:55. Furthermore, given that Chiu does not state expressly how to calculate a JND, we are persuaded preliminarily that an ordinarily skilled artisan would have implemented Gu's JND generation method as part of Chiu's threshold value calculation to improve the performance of Chiu's video encoding method. *See, e.g.*, Ex. 1002 ¶¶ 58–64, 71–93. Petitioner

[5] In two instances on page 40 of the Petition, Petitioner mistakenly cites this range of paragraphs as "58-54," but the context makes clear Petitioner intended to cite to paragraphs 58–64.

also establishes sufficiently that an ordinarily skilled artisan would have expected success in making the combination. *See, e.g.*, *id.* ¶¶ 92–93.

Claim 6 further recites "estimating parameters of said details." Ex. 1001, 12:55. Petitioner contends "*Gu*'s JND generation includes the estimation of parameters." Pet. 45 (citing Ex. 1002 ¶¶ 94–99). Specifically, Petitioner contends that "[t]he calculations involved in *Gu*'s JND generation demonstrate spatial and temporal separation and analysis, [and] the resulting values teach the estimation of parameters." *Id.* at 46 (citing Ex. 1006, 10:3–16, 11:29–36). Petitioner cites Gu's teachings about parameters f_1, f_2, and f_3, which Petitioner describes as follows:

- f_1: error visibility threshold due to texture masking;
- f_2: error visibility threshold due to average background luminance;
- f_3: error visibility threshold due to motion or temporal masking.

Id. at 46–48 (citing, *inter alia*, Ex. 1002 ¶¶ 94–99, 116–117; Ex. 1006, 5:45–46, 5:61–63, 6:8–12, 10:3–11:55).

Based on the present record, Petitioner shows sufficiently that Gu teaches estimating parameters f_1, f_2, and f_3 to describe the content of a frame. *See, e.g.*, Ex. 1002 ¶¶ 94–99, 116–117; Ex. 1006, 5:45–46, 5:61–63, 6:8–12, 10:3–11:55.

Claim 6 further recites "defining a visual perception threshold for each of said details in accordance with said estimated detail parameters." Ex. 1001, 12:56–58. Petitioner cites Chiu's teachings of "a visual perception threshold for each of said details in accordance with a JND value." Pet. 48–49 (citing Ex. 1005, 7:38–52, 10:17–38). Petitioner also cites Gu's teaching of generating a JND value using the parameters f_1, f_2,

and f_3. *Id.* at 49 (citing Ex. 1006, 10:3–11:55). Petitioner contends an ordinarily skilled artisan "would have been motivated to combine the teachings of *Chiu* and *Gu*, to use f_1, f_2, and f_3 to generate the JND as taught in *Gu*" and "would have found obvious, in accordance with the proposed combination, to further use in *Chiu's* method to generate *Chiu*'s visual perception threshold." *Id.* (citing Ex. 1002 ¶¶ 58–64, 71–93, 100–104). As such, Petitioner contends that an ordinarily skilled artisan would have understood the resulting visual perception threshold to be defined by Gu's estimated detail parameters f_1, f_2, and f_3. *Id.* at 50 (citing Ex. 1002 ¶¶ 100–104). Petitioner additionally contends that "both *Gu*'s JND and *Chiu*'s threshold are computed on a per pixel basis, [so] they are both consistently calculated for each detail." *Id.* at 51 (citing Ex. 1002 ¶ 104; Ex. 1005, 7:14–52; Ex. 1006, 10:3–11:55).

Based on the present record, Petitioner shows sufficiently that the combined Chiu–Gu system uses parameters f_1, f_2, and f_3 to generate the JND value T_o, which in turn is used to calculate a visually perceptible threshold value T. *See, e.g.*, Ex. 1002 ¶¶ 100–104; Ex. 1005, 7:38–52, 10:17–38; Ex. 1006, 10:3–11:55.

Claim 6 further recites "classifying said frame picture details into subclasses in accordance with said visual perception thresholds and said detail parameters." Ex. 1001, 12:59–61. Petitioner cites Chiu's teaching of performing a δ-function test for each pixel of a difference frame (which is calculated using the pixel values of the current frame and the previously reconstructed picture) and comparing the result to the visually perceptible threshold value T. Pet. 54–55 (citing, *inter alia*, Ex. 1005, 9:19–21, Fig. 4). Petitioner also cites its proposed modification of Chiu to implement Gu's

JND and estimated detail parameters f_1, f_2, and f_3 in the δ-function test. *Id.* at 51, 54–55 (citing, *inter alia*, Ex. 1006, 9:50–11:55).

Petitioner notes Chiu's Figure 4 process of determining whether to encode particular macroblocks based on the results of the δ-function test for pixels within the macroblock. Pet. 55 (citing Ex. 1005, 11:1–4). Petitioner additionally notes how Chiu's Figure 4 process accounts for surviving pixels—those pixels that are above the δ-function test's visually perceptible threshold—by determining whether such pixels are connected or isolated. *Id.* (citing Ex. 1005, 11:4–6). This is accomplished by considering the δ-function test results for sub-blocks of a macroblock. *Id.* at 55–57 (citing Ex. 1005, 11:9–38, Fig. 4). According to Petitioner, an ordinarily skilled artisan would have understood that, "if all the sub-blocks in a particular macroblock likely have connected surviving pixels (i.e., details), the surviving pixels (i.e., details) in the macroblock likely form large, connected details . . . ; otherwise, the surviving pixels (i.e., details) in the macroblock are small, random details." *Id.* at 58 (citing Ex. 1002 ¶¶ 105–114; Ex. 1005, 11:15–25, 12:7–11). As such, Petitioner contends the combined Chiu–Gu system classifies details into two subclasses: small, random details and large, connected details. *Id.* at 58–59 (citing Ex. 1002 ¶¶ 105–114).

Based on the present record, Petitioner shows sufficiently that the combined Chiu–Gu system identifies frame details by comparing pixel values in a difference frame to a visually perceptible threshold value *T* that is defined based on detail parameters f_1, f_2, and f_3. *See, e.g.*, Ex. 1005, 9:19–21, 11:1–6; 11:9–38, Fig. 4; Ex. 1006, 9:50–11:55. Petitioner also shows sufficiently that the combined system classifies details into small, random

details and large, connected details (i.e., "subclasses"). *See, e.g.*, Ex. 1002 ¶¶ 105–114; Ex. 1005, 11:4–6, 11:9–38, 12:7–11.[6]

Claim 6 further recites "transforming each said frame detail in accordance with its associate subclass." Ex. 1001, 12:62–63. Petitioner cites Chiu's teaching that macroblocks with large, connected details are motion compensated, whereas macroblocks with small, random details are skipped for motion compensation. Pet. 64 (citing Ex. 1005, 11:33–36). Petitioner also cites Chiu's teachings of implementing motion compensation by transforming a macroblock. *Id.* at 65 (citing Ex. 1005, 1:53–57, 3:7–19). Petitioner additionally cites Chiu's Figure 2 and contends that "motion compensated macroblocks are sent to the transformer 116 for transformation, while the skipped macroblocks are made equal to the corresponding macroblocks on the previously reconstructed picture $\hat{F}_{k-1}$, which are inverse transformed by inverse transformer 122." *Id.* at 65–66 (citing Ex. 1002 ¶¶ 121–124; Ex. 1005, Fig. 2). Thus, Petitioner contends that Chiu teaches transforming subclasses of details as follows:

> • Small, random details: skipped, use previously reconstructed picture $\hat{F}_{k-1}$ obtained by inverse transform;
>
> • Large, connected details: motion compensated, transform current macroblock.

Id. at 66 (citing Ex. 1002 ¶ 124; Ex. 1005, 1:53–57, 3:7–19, 11:15–12:6, Fig. 2).

[6] Petitioner also offers an analysis for this claim limitation "[t]o the extent that claim 6 requires 'parameters' to be separately used to classify details in combination with the thresholds." Pet. 59–64. We do not consider the analysis at this juncture because we find Petitioner's primary analysis sufficient for institution.

Based on the present record, we are persuaded that Chiu teaches that macroblocks with large, connected details (i.e., one subclass) are motion compensated using a transform, while macroblocks with small, random details (i.e., another subclass) are not motion compensated such that a previously reconstructed picture is obtained by inverse transform and used. *See, e.g.*, Ex. 1002 ¶¶ 121–124; Ex. 1005, 3:7–8, 11:15–12:6.

Petitioner has shown sufficiently that the combination of Chiu and Gu teaches all limitations of claim 6. Petitioner also has put forth sufficient reasons for combining these references with a reasonable expectation of success. Based on the present record, we determine that Petitioner has established a reasonable likelihood that it would prevail in showing that the subject matter of claim 6 would have been obvious over the combination of Chiu and Gu.

4. Claim 16

Claim 16 depends from claim 6 and recites "[t]he method according to claim 6, and wherein said intensity is a luminance value." Ex. 1001, 16:31–32. We have determined already that Petitioner has established a reasonable likelihood of success that it would prevail in showing claim 6 would have been obvious over the combination of Chiu and Gu, and we will be instituting review on both challenged claims presented in the Petition. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348 (2018) (holding that the Board may not institute review on fewer than all claims challenged in the petition); 37 C.F.R. § 42.108(a) ("When instituting *inter partes* review, the Board will authorize the review to proceed on all of the challenged claims and on all

grounds of unpatentability asserted for each claim."). Nevertheless, we include the following discussion regarding Petitioner's analysis of claim 16.

Petitioner states that "said intensity" in claim 16 lacks antecedent basis in claim 6. Pet. 66–67. Notwithstanding, Petitioner asks us to consider the patentability of claim 16 in accordance with the holding in *Fitbit, Inc. v. Valencell, Inc.*, 964 F.3d 1112, 1119–20 (Fed. Cir. 2020). As such, Petitioner puts forth obviousness contentions "to the extent 'intensity' refers to the intensity of 'details' recited in claim 6." *Id.* at 67 (citing Ex. 1001, 5:28–33, 13:1–31).

We encourage the parties to further address the construction of "said intensity" during the course of trial, with a particular focus on how any such construction is supported in the Specification and claims of the '532 patent. We also note that Patent Owner may file a motion to amend under 35 U.S.C. § 316(d) as a means of correcting any perceived violation of the requirements in 35 U.S.C. § 112.

III. CONCLUSION

After considering the evidence and arguments presented in the current record, we determine that Petitioner has demonstrated a reasonable likelihood that it would prevail with respect to at least one of the claims challenged in the Petition. Accordingly, we institute an *inter partes* review on both challenged claims and the patentability challenge presented in the Petition. At this stage of the proceeding, we have not made a final determination as to the patentability of the challenged claims.

IV. ORDER

Accordingly, it is

ORDERED that pursuant to 35 U.S.C. § 314, *inter partes* review is instituted as to claims 6 and 16 of the '532 patent with respect to the patentability challenge presented in the Petition; and

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

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