

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NETFLIX, INC.,
Petitioner,

v.

REALTIME ADAPTIVE STREAMING, LLC,
Patent Owner.

IPR2018-01189
Patent RE46,777 E

Before KEVIN W. CHERRY, GARTH D. BAER, and
NABEEL U. KHAN, *Administrative Patent Judges*.

CHERRY, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

Netflix, Inc.¹ (“Petitioner”) filed a Petition (Paper 4, “Pet.”) to institute an *inter partes* review of claims 1–12 and 14 (the “challenged claims”) of U.S. Reissued Patent No. RE46,777 E (Exhibit 1001, “the ’777 Patent”). Realtime Adaptive Streaming, LLC (“Patent Owner”) filed a Preliminary Response. Paper 17 (“Prelim. Resp.”).

The Petition asserts the following grounds:

35 U.S.C. §	Claims Challenged	References/Basis
103 ²	1–8, 11, 12, 14	Winger, ³ Keesman ⁴
103	9, 10	Winger, Keesman, Sugiyama ⁵

On January 22, 2019, we instituted an *inter partes* review of all claims challenged in the Petition, and on all of the asserted grounds. See Paper 23 (“Dec. on Inst.”), 26.

¹ The Board has granted Amazon.com Inc. and Hulu, LLC’s Joint Motion to Terminate *Inter Partes* Reviews as to Amazon.com, Inc. and Hulu, LLC. Paper 14. Thus, Netflix is the sole remaining Petitioner in this proceeding.

² Because the claims at issue have an effective filing date prior to March 16, 2013, the effective date of the applicable provisions of the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), we apply the pre-AIA versions of 35 U.S.C. §§ 102 and 103 in this Decision.

³ Winger et al., US Patent Application Publication No. 2004/0240556 A1, Dec. 2, 2004 (Ex. 1005, “Winger”).

⁴ Keesman et al., US Patent No. 5,691,770, Nov. 25, 1997 (Ex. 1006, “Keesman”).

⁵ Sugiyama, US Patent No. 5,850,259, Dec. 15, 1998 (Exhibit 1007, “Sugiyama”).

After institution of trial, Patent Owner filed a Patent Owner Response (Paper 31, “PO Resp.”), and Petitioner filed a Reply (Paper 34, “Reply”).

Petitioner supports its arguments with a declaration by James A. Storer, Ph.D., dated June 8, 2019 (Ex. 1003), and a reply declaration by Dr. Storer, dated August 13, 2019 (Ex. 1013). Patent Owner supports its Response with a declaration by Kenneth A. Zeger, Ph.D., dated May 21, 2019 (Ex. 2003). Oral argument was held on October 23, 2019, a transcript of which is included in the record. Paper 41 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. Petitioner bears the burden of proving unpatentability of the challenged claims, and the burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must prove unpatentability by a preponderance of the evidence. *See* 35 U.S.C. § 316(e) (2012); 37 C.F.R. § 42.1(d) (2017). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–12 and 14 of the ’777 Patent are unpatentable. *See* 35 U.S.C. § 316(e).

B. Related Proceedings

The ’777 Patent is a reissue of U.S. Patent No. 8,634,462. Ex. 1001, code (64). The ’777 Patent claims the benefit of PCT No. PCT/EP2008/052824, filed March 10, 2008, and U.S. Provisional Patent Application No. 11/685,566, filed March 13, 2007. *Id.* at code (64), (63).

Petitioner informs us the ’777 Patent is involved in the following litigations:

- *Realtime Adaptive Streaming, LLC v. ARRIS Solutions, Inc.*, No. 1:19-cv-00585 (D. Colo.)
- *Realtime Adaptive Streaming, LLC v. Adobe Systems Inc.*, No. 2:18-cv-09344 (C.D. Cal.)
- *Realtime Adaptive Streaming LLC v. Google LLC et al*, No. 2:18-cv-03629 (C.D. Cal.)
- *Realtime Adaptive Streaming, LLC v. Amazon.com, Inc.*, No. 6:17-cv-00549 (E.D. Tex.)
- *Realtime Adaptive Streaming, LLC v. Cisco Systems, Inc.*, No. 6:17-cv-00591 (E.D. Tex.)
- *Realtime Adaptive Streaming, LLC v. Samsung Elec. Co.*, No. 6:18-cv-00113 (E.D. Tex.)
- *Realtime Adaptive Streaming, LLC v. Haivision Network Video, Inc.*, No. 1:17-cv-1520 (D. Del.)
- *Realtime Adaptive Streaming, LLC v. Haivision Network Video, Inc.*, No. 6:19-cv-0440 (W.D. Tex.)
- *Realtime Adaptive Streaming, LLC v. Netflix, Inc.*, No. 1:17-cv-01692-JFB-SRF (D. Del.)

Pet. 67–68; Paper 37, 2–3.

The '777 Patent is also subject to two other *inter partes* reviews: *Google, LLC v. Realtime Adaptive Streaming, LLC*, IPR2019-01037 and IPR2019-01038.

C. The '777 Patent

The '777 Patent relates generally to coding and decoding involving enhanced quantization for hybrid video coding and data signals. Ex. 1001, 1:14–16, 2:8–10.

The '777 Patent explains that standardized hybrid coding provides coding steps in the time domain and the spatial domain. Ex. 1001, 1:21–22. First, the temporal redundancy of video signals is reduced using a

block-based motion-compensated prediction to establish a prediction error signal. *Id.* at Abstract, 4:12–14. Samples of the prediction error signal are transformed into the frequency domain, resulting in a plurality of coefficients. *Id.* at Abstract, 4:14–18.

Second, the spatial redundancy is reduced by performing quantization on the prediction error signal samples, or on the coefficients representing the samples, to obtain quantized values. Ex. 1001, Abstract, 4:14–18. As seen in Figure 1, reproduced below, quantization converts the coefficients into integers. *See, e.g., id.* at 2:19–20, 3:15–18.

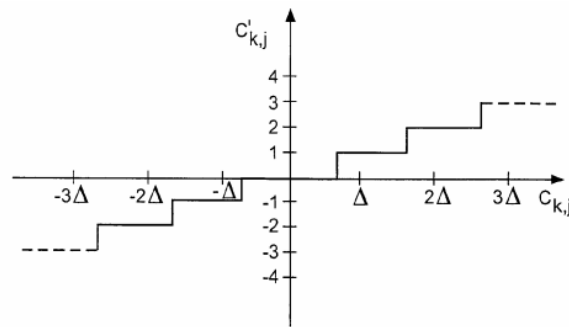


Fig.1

Figure 1 shows each coefficient quantized by a scalar quantizer as known in the art. Ex. 1001, 9:22–24, 2:19–20. By using a discrete set of numbers (i.e., integers), quantization allows fewer numbers to be represented in the encoding scheme and, thus, significantly reduces the required data rate. *Id.* at 4:1–3. However, quantization also increases distortion (and, thus, negatively impacts accuracy) of the resulting video signal. *See id.* at 4:1–3, 4:39–52.

The '777 Patent teaches that the “rate-distortion cost[.]” takes into account the required data rate and the distortion resulting from the quantization. Ex. 1001, 10:17–19 (“[R]ate[-]distortion costs $C_j = D_j + L \cdot R_j$ are calculated R_j is the required rate, D_j the resulting distortion, and L a

Lagrange parameter.”). The resulting rate-distortion cost is used to determine a “quantization efficiency,” wherein a low rate-distortion cost represents a high quantization efficiency. *See id.* at 5:30–34.

Figure 3, reproduced below, illustrates a method that includes calculating a quantization efficiency and using that result to provide enhanced quantization.

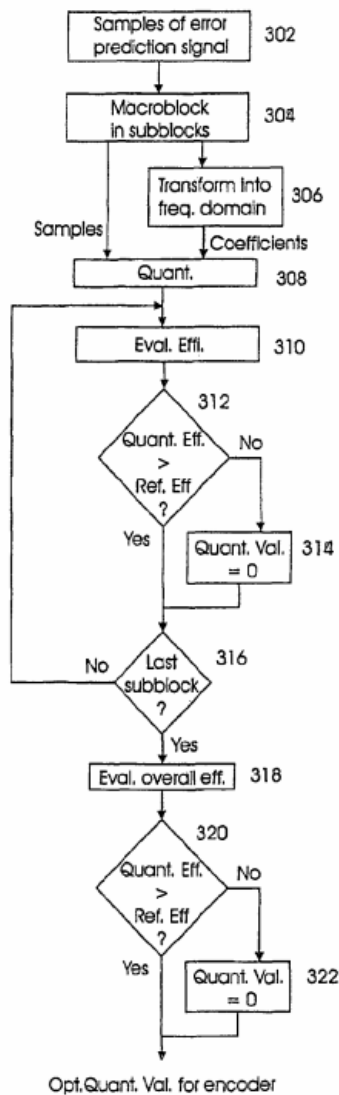


Fig. 3

Figure 3 shows a flow chart illustrating a method of enhanced quantization. Ex. 1001, 9:27–28.

The '777 Patent teaches providing samples of an error prediction signal at step 302. Ex. 1001, 11:21–24. These are given in a macroblock, which is subdivided into subblocks at step 304. *Id.* at 11:24–25. A subblock includes a portion of the picture elements associated with the signal. *Id.* at 5:6–10, 11:21–28. In step 306, each subblock is transformed into the frequency domain, resulting in a plurality of coefficients representing the samples. *Id.* at 11:30–37. In step 308, a first quantization is performed, either on the samples or on the coefficients, to obtain quantized values. *Id.* at 11:38–41.

The '777 Patent teaches the result of this quantization should be “enhanced.” Ex. 1001, 4:37–40, 13:47–50. To achieve this, the '777 Patent calculates a quantization efficiency, using the rate-distortion cost calculation, for the quantized values for a subblock, as in step 310. *Id.* at 11:51–52. The zero efficiency for the subblock (i.e., when all values of the subblock are set to zero) is also calculated in step 310. *Id.* at 11:53–55.

In step 312, the quantization efficiency is compared to the zero efficiency to obtain the best efficiency. Ex. 1001, 11:56–57. If the quantization efficiency is not higher than the zero efficiency, then the quantized values of the subblock are set to zero in step 314. *Id.* at 11:56–59. Otherwise, the quantized values are maintained. *Id.* at 11:59–60.

The process loops back to step 310 until all the subblocks have been checked. Ex. 1001, 11:61–67. When the last subblock is reached in step 316, an overall efficiency is calculated for all subblocks of the macroblock in step 318. *Id.* at 11:66–12:2. The overall efficiency is calculated for all the subblocks based on the results of the efficiency comparisons in step 312, i.e., for each subblock, the best efficiency according to the comparison in

step 312 is added to the best efficiencies of the other subblocks of the macroblock. *Id.* at 12:2–7. Also in step 318, an overall zero efficiency for the macroblock is calculated, whereby all values of the macroblock are set to zero. *Id.* at 12:7–9.

Then, the overall quantization efficiency and the overall zero efficiency are compared in step 320. Ex. 1001, 12:10–11. If the overall zero efficiency is higher, the quantized values of the macroblock are set to zero, as in step 322. *Id.* at 12:11–15. If the overall quantization efficiency is higher, the quantized values of the macroblock are maintained. *Id.* at 12:11–15. After optimization of the quantization for the macroblock, the quantized values are then transmitted to a coder for encoding. *Id.* at 12:18–20.

In this way, the '777 Patent purports to enhance quantization by calculating and comparing efficiencies to determine “whether to set all quantized values (samples or coefficients) to zero or to keep them as they are” to provide “an optimization of the quantization of samples or coefficients respectively which always selects the best out of two solutions with respect to an calculated efficiency.” Ex. 1001, 4:61–67.

D. Illustrative Claim

Of the challenged claims, claims 1 and 11 are independent. Claims 2–10 and 14 depend directly or indirectly from claim 1. Claim 12 depends directly from claim 11.

Claim 1, reproduced below, is illustrative:

1. A method for coding a video signal using hybrid coding, comprising:
reducing temporal redundancy by block based motion compensated prediction in order to establish a prediction error signal;

performing quantization on samples of the prediction error signal or on coefficients resulting from a transformation of the prediction error signal into a frequency domain to obtain quantized values, representing quantized samples or quantized coefficients respectively, wherein the prediction error signal includes a plurality of subblocks each including a plurality of quantized values;

calculating a first quantization efficiency for the quantized values of at least one subblock of the plurality of subblocks;

setting the quantized values of the at least one subblock to all zeroes;

calculating a second quantization efficiency for the at least one subblock while all of the quantized values are zeroes;

selecting which of the first and second quantization efficiencies is a higher efficiency; and

selecting, for further proceeding, the at least one subblock with the quantized values prior to setting the quantized values of the at least one subblock to all zeroes if the first quantization efficiency is higher and selecting the at least one subblock with the quantized values set to zero, for further proceeding, if the second quantization efficiency is higher.

Ex. 1001, 18:45–19:7.

II. LEVEL OF ORDINARY SKILL IN THE ART

Petitioner proposes that a person of ordinary skill:

would have [had] . . . a bachelor's degree in electrical engineering, computer science, or a similar field with at least two years of experience in video coding, video decoding, quantization and quantization analysis or . . . a master's degree in electrical engineering, computer science, or a similar field with a specialization in video coding, video decoding, or quantization. Ex. 1003, ¶60. A person with less education but more relevant practical experience may also meet this standard.

Pet. 13. Patent Owner “does not disagree with Petitioner’s description of the education and technical background of a person of ordinary skill in the art (‘POSA’).” PO Resp. 8. However, Patent Owner also contends that “a POSA would have been trained in evaluating both the costs and the benefits of a particular design choice, and would have evaluated the net effects of these costs and benefits of that design choice before forming a motivation to pursue it.” *Id.* at 8–9. Patent Owner argues that a POSA “would have been deliberative and considered, not impulsive,” and “an individual who would not have weighed both the costs and the benefits of a particular approach before forming a motivation to pursue that approach is not a POSA, regardless of education, experience, or technical knowledge.” *Id.* at 9.

We find that Petitioner’s definition represents the appropriate level of ordinary skill in this art because it is consistent with the problems and solutions in the prior art of record.” *See Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007) (“Factors that may be considered in determining level of ordinary skill in the art include . . . type of problems encountered in the art [and] prior art solutions to those problems”); Ex. 1003 ¶ 60. Patent Owner does not disagree that this represents the appropriate level but attempts to incorporate limitations on how the POSA would act or think. We find Patent Owner’s proposed limitations merely represent an effort to incorporate its arguments regarding the proper legal standard for obviousness into the level of skill in the art. As such, we decline to incorporate Patent Owner’s additional requirements into the definition of the level of skill in the art.

III. CLAIM CONSTRUCTION

In an *inter partes* review based on a petition filed prior to November 13, 2018, claim terms in an unexpired patent are construed according to their broadest reasonable interpretation in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b) (2017)⁶; *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). There is a presumption that claim terms are given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art in the context of the specification. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Nonetheless, if the specification “reveal[s] a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess[,] . . . the inventor’s lexicography governs.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005) (en banc) (citing *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002)). Another exception to the general rule that claims are given their ordinary and customary meaning is “when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Uship Intellectual Props., LLC v. United States*, 714 F.3d 1311, 1313 (Fed. Cir. 2013) (quoting *Thorner v. Sony Comput. Entm’t Am., LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)). Additionally, only terms that are in controversy need to be expressly construed, and these need be

⁶ A recent amendment to this rule does not apply here because the Petition was filed before November 13, 2018. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective Nov. 13, 2018) (now codified at 37 C.F.R. pt. 42 (2019)).

construed only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

Petitioner alleges “means for reducing temporal redundancy” and “control means for . . .” in claim 11 invoke 35 U.S.C. § 112, ¶ 6. Pet. 13–14. Petitioner proposes to construe “means for reducing temporal redundancy” as performing the function of “reducing temporal redundancy” and to include the corresponding structure of “an ‘adder/subtractor’ that adds or subtracts a prediction signal and an input signal.” Pet. 14. Petitioner proposes to construe the function associated with the “control means for . . .” as a five-part function (i.e., “calculating . . .,” “setting . . .,” “calculating . . .,” “selecting . . .,” and “selecting . . .,” and the corresponding structure as including “an encoder that performs the algorithm of FIG. 3 of the ’777 Patent.” *Id.* at 14–15.

Patent Owner has not provided proposed constructions for either term or otherwise contested Petitioner’s constructions.

We have reviewed Petitioner’s proposed constructions for the means-plus-function terms of claim 11 and the Specification, and we agree with Petitioner’s proposed constructions for these terms and adopt them.

We determine that no further express construction of other terms is necessary for purposes of this Decision.

IV. ANALYSIS

Petitioner contends the combination of Winger and Keesman would have rendered the subject matter of claims 1–8, 11, 12, and 14 obvious to one of ordinary skill in the art at the time of the invention. Pet. 21–59. Petitioner further contends that the combination of Winger, Keesman, and

Sugiyama would have rendered the subject matter of claims 9 and 10 obvious to one of ordinary skill in the art at the time of the invention. *Id.* at 60–65.

A. Obviousness

The U.S. Supreme Court set forth the framework for applying the statutory language of 35 U.S.C. § 103 in *Graham v. John Deere Co.*, 383 U.S. 1 (1966):

Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.

Id. at 17–18.⁷

As explained by the Supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398 (2007):

Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit.

Id. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)

(“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning

⁷ Patent Owner does not submit any evidence of secondary considerations.

with some rational underpinning to support the legal conclusion of obviousness.”)).

“Whether an ordinarily skilled artisan would have been motivated to modify the teachings of a reference is a question of fact.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1327 (Fed. Cir. 2016). “[W]here a party argues a skilled artisan would have been motivated to combine references, it must show the artisan ‘would have had a reasonable expectation of success from doing so.’” *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360–61 (Fed. Cir. 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)).

B. Scope and Content of the Prior Art

1. Winger

Winger is related to a method for improving rate-distortion performance of a video compression system through parallel coefficient cancellation in the transform. Ex. 1005 ¶ 1.

Winger explains that the performance is evaluated by measuring the cost versus the benefit of compressing an image. Ex. 1005 ¶ 3. The cost, or rate, generally refers to the number of bits used to code the compressed data (e.g., video). *Id.* The benefit can be measured by the amount of distortion, or how well the decompressed image approximates the original image. *Id.* When the rate is decreased without increasing distortion, the rate-distortion of a compressed video is improved. *Id.*

Winger describes that one technique for improving rate-distortion of encoded video is coefficient cancellation prior to the entropy coding stage in an encoder. Ex. 1005 ¶ 4. Citing the disadvantages of the existing

coefficient cancellation techniques, such as a poor trade-off between implementation complexity and estimation accuracy, Winger purports to provide a solution that improves rate-distortion performance of a video encoder. *Id.* ¶ 7. Specifically, Winger teaches improving rate-distortion performance of a compression system through parallel coefficient cancellation in a transform comprising the steps of (A) determining a block sum of absolute values for each of a plurality of blocks in a macroblock and (B) setting one or more coefficient values of a block to zero in response to a block sum value of said block being less than a first predetermined threshold value. *Id.* ¶ 8.

Winger's video encoder is seen in Figure 2, reproduced below.

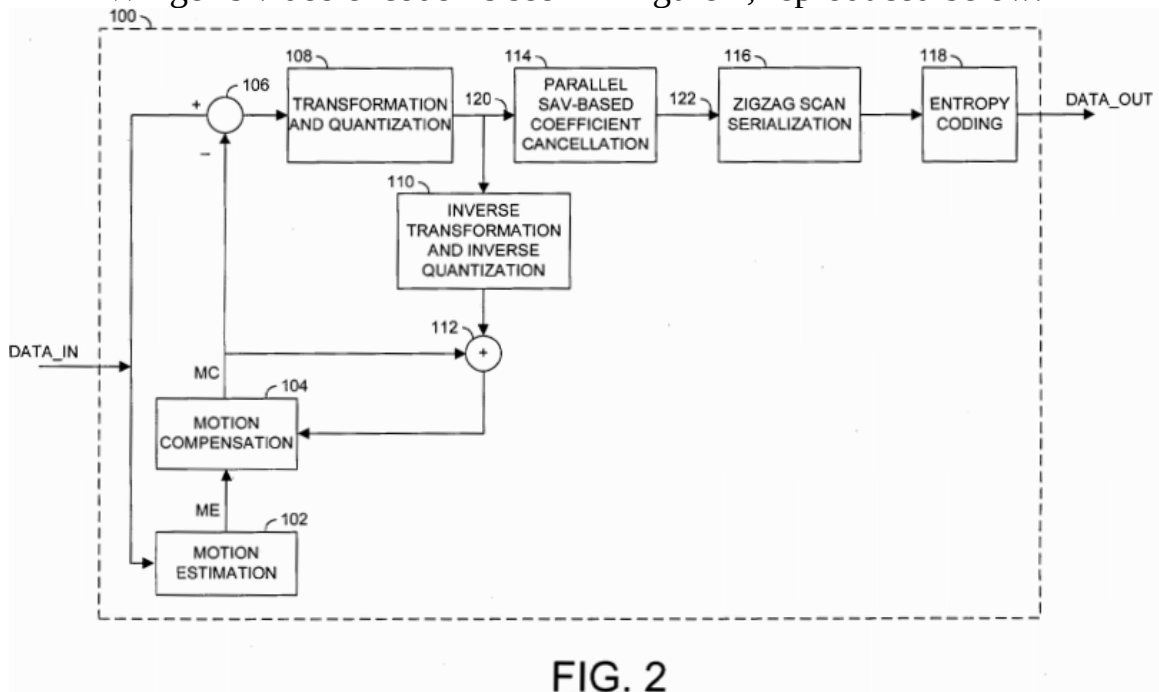


FIG. 2

Figure 2 shows a detailed block diagram of encoder 100 comprising: motion estimation block 102, motion compensation block 104, adder 106, transformation and quantization block 108, inverse transformation and inverse quantization block 110, adder 112, coefficient cancellation block 114, zig-zag scan block 116, and entropy coding block 118. Ex. 1005 ¶ 22.

Winger states blocks 102, 104, 106, 108, 110, 112, 116, and 118 are implemented using conventional techniques known to those of ordinary skill in the art. *Id.*

Block 114 is configured to perform a parallel sum of absolute values (“SAV”) based coefficient cancellation technique, which is illustrated in Figure 5, reproduced below. Ex. 1005 ¶ 23.

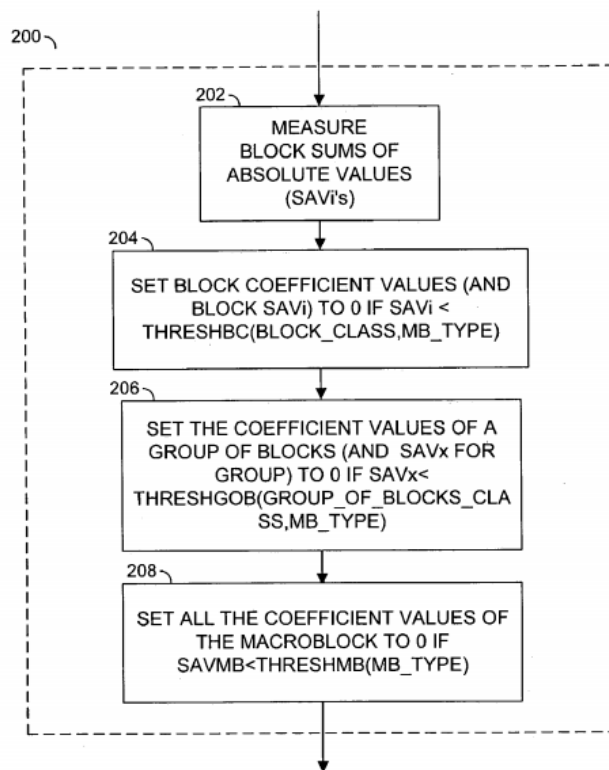


FIG. 5

Figure 5 shows flow diagram 200 illustrating the coefficient cancellation technique of block 114. Ex. 1005 ¶ 23. The technique includes “separate efficient decision mechanisms [that] may operate individually (or independently) on a hierarchy of aggregated measurement values to determine the blocks, groups of blocks, and/or macroblocks that may be set to zero.” *Id.* ¶ 28. Although Winger applies SAV, Winger notes that “the

coefficient cancellation block 114 may be configured to apply other block-based measurements accordingly to meet the design criteria of a particular implementation.” *Id.* ¶ 23.

The coefficient cancellation technique is applied to blocks, groups of blocks, and macroblocks. At each level of the hierarchy (block 204, group of blocks 206, and macroblock 208), Winger teaches using data (e.g., coefficients) from transformation and quantization block 108 to calculate a sum of absolute values for the block or macroblock. Ex. 1005 ¶ 33. When the sums of absolute values measurements are less than predetermined thresholds, the coefficients are set to zero. *Id.* ¶ 34.

2. *Keesman*

Keesman teaches that “picture quality of an MPEG-coded video signal can be improved considerably by modifying selected coefficients after conventional quantization, for example by rendering them zero.” Ex. 1006, Abstract. Keesman further describes that the modification is such that the Lagrangian cost, $D + \lambda R$ (where D is distortion and R is bitrate), is minimal for a given value of a Lagrange multiplier λ . *Id.*

Keesman teaches calculating both the distortion and bitrate for a given quantization process. Ex. 1006, 4:48–6:24. Keesman teaches calculating a Lagrangian cost for quantizing coefficients to various quantization levels until a minimum cost, and corresponding quantization level, is identified. *Id.* at 8:12–52. After identifying the minimum cost through “bitrate-constrained quantization of [discrete cosine transform] coefficients,” Keesman teaches that a “further improvement of the picture quality is obtained by subsequently subjecting the coefficients q_i thus obtained to thresholding.” *Id.* at 8:53–61. The thresholding process involves calculating

a first Lagrangian cost L1 for “each non-zero coefficient q_i .” *Id.* at 8:65–9:3. A second “Lagrangian cost L2 is computed for the case where the value of zero would be enforced on q_i .” *Id.* at 9:3–10. If the first Lagrangian cost is higher, the coefficients are set to zero, whereas if the second Lagrangian cost is higher, the coefficients are maintained. *Id.* at 9:9–13.

3. Sugiyama

Sugiyama is related to “[a] predictive coding apparatus [that] encodes an input video signal.” Ex. 1007, Abstract. During the coding process, the “[a]ctivity of the prediction error signal,” “the maximum value and the number of non-zero values per pixel block of the codes of the fixed length,” or “the maximum value per pixel block and the sum of the maximum values” are detected and “compared with different reference values.” *Id.* at Abstract. When the detected values are less than the reference values, “predetermined codes of zero values are selected per pixel block.” *Id.* The coding apparatus of Sugiyama is “efficient” and “digitizes image information with less amount of data.” *Id.* at 1:8–11. To achieve “high coding efficiency,” the coding apparatus considers “activity of [the] prediction error signal or the number of non-zero values of a quantized signal.” *Id.* at 1:29–33.

Sugiyama teaches various well-known components of encoders. Ex. 1007, 1:8–19, Figs. 1 and 3. These components include a predictor, a prediction subtractor, a discrete cosine transformer (“DCT”), and a quantizer. *Id.* at 2:56–3:2. Well-known controllers, selectors, variable length coders, and buffers are also described. *Id.* at 3:17–21, 3:39–45.

Sugiyama also teaches a decoding apparatus that accepts the codes fed from the predictive coding apparatus. Ex. 1007, 5:16–18. The decoder

includes a variable length decoder, a buffer, an inverse quantizer, an inverse DCT, a predictor, adder, and a video memory. *Id.* at 5:18–33, Fig. 4.

C. Differences Between the Prior Art and the Claims; Motivation to Modify

1. Independent Claim 1

a. Claim Limitations

Petitioner asserts that claim 1 would have been obvious over Winger and Keesman. Petitioner contends that both Winger and Keesman teach (1) “[a] method for coding a video signal using hybrid coding, comprising,”⁸ Pet. 28–29 (citing Ex. 1005, Abstract, ¶¶ 2, 22; Ex. 1003 ¶¶ 148–152; Ex. 1006, 1:14–15, 3:5–8, 3:15–20), (2) “reducing temporal redundancy by block based motion compensated prediction in order to establish a prediction error signal,” *id.* at 29–30 (citing Ex. 1003 ¶¶ 153–155; Ex. 1005, Fig. 2, ¶¶ 17, 22, 24, 27); (3) “performing quantization on samples of the prediction error signal or on coefficients resulting from a transformation of the prediction error signal into a frequency domain to obtain quantized values, representing quantized samples or quantized coefficients respectively, wherein the prediction error signal includes a plurality of subblocks each including a plurality of quantized values,” *id.* at 30–32 (citing Ex. 1003 ¶¶ 156–160; Ex. 1005, Abstract, ¶¶ 4, 22, 24, 28, 29, 33; Ex. 1006, Abstract, 1:6–7, 1:25–27, 3:21–29, 4:6–11); and (4) “setting the quantized values of the at least one subblock to all zeros,” *id.* at 34 (citing Ex. 1003 ¶¶ 165–167; Ex. 1006, 8:59–63, 9:26–35; Ex. 1005 ¶¶ 28, 30). Petitioner relies on the

⁸ We do not determine whether or not the preamble is limiting, but determine that regardless of whether it is, the limitation taught by the combination of Winger and Keesman.

combination of Winger and Keesman⁹ to teach (1) “calculating a first quantization efficiency for the quantized values of at least one subblock of the plurality of subblocks,” Pet. 32–34 (citing Ex. 1003 ¶¶ 161–164; Ex. 1005 ¶¶ 17, 18, 23; Ex. 1006, 1:46–58, 8:65–9:3); (2) “calculating a second quantization efficiency for the at least one subblock while all of the quantized values are zeros,” *id.* at 35–36 (Ex. 1003 ¶¶ 168–171; Ex. 1005 ¶ 30; Ex. 1006, 9:3–9); (3) “selecting which of the first and second quantization efficiencies is a higher efficiency,” *id.* at 36–37 (citing Ex. 1003 ¶¶ 172–175; Ex. 1005 ¶ 30; Ex. 1006, 9:9–13); and (4) “selecting, for further proceeding, the at least one subblock with the quantized values prior to setting the quantized values of the at least one subblock to all zeroes if the first quantization efficiency is higher and selecting the at least one subblock with the quantized values set to zero, for further proceeding, if the second quantization efficiency is higher,” *id.* at 37–39 (Ex. 1003 ¶¶ 176–179; Ex. 1005 ¶¶ 28–30; Ex. 1006, 9:9–13). Patent Owner does not dispute that the combination of Winger and Keesman teaches all of the limitations of claim 1. *See* Tr. 19:16–21. Based on our review of Petitioner’s undisputed arguments and supporting evidence, with which we agree, we find that

⁹ As we explained in our Decision to Institute, Petitioner styles the ground as “Winger and Keesman,” but maps both references to all of the limitations of claim 1 and, at times, appears to contend that Winger and Keesman individually might account for certain limitations that it contends the combination accounts for (*see, e.g.*, Pet. 32–34 (contending the combination accounts for “Element 1[c],” but arguing that Winger alone could be interpreted to account for the limitation)). Given the clear identification of the ground, we declined to interpret this ground as anything other than the combination of Winger and Keesman. Dec. to Inst. 15 n.6. Thus, as we explained in our Decision to Institute, we will not treat the ground as obviousness in view of Winger alone or Keesman alone. *Id.*

Petitioner has shown by a preponderance of the evidence that the combination of Winger and Keesman teaches all the limitations of claim 1.

Patent Owner's arguments focus exclusively on the motivation to combine the references (PO Resp. 11–44), which we consider below.

b. Motivation to Combine

A motivation to combine may be found “explicitly or implicitly in market forces; design incentives; the ‘interrelated teachings of multiple patents’; ‘any need or problem known in the field of endeavor at the time of invention and addressed by the patent’; and the background knowledge, creativity, and common sense of the person of ordinary skill.” *ZUP, LLC v. Nash Mfg., Inc.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018) (quoting *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013)).

Petitioner explains that the prior art contains a method (i.e., Winger's coefficient cancellation technique) that differs from the claims of the '777 Patent merely in that the method recited in the '777 Patent replaces Winger's comparison of a SAV to a threshold value with a comparison of quantization efficiencies. Pet. 27–28 (citing Ex. 1003 ¶¶ 133–135). Petitioner submits that, in the proposed combination, Winger's SAV of the coefficient values would be replaced with the Lagrangian cost of those same coefficient values, as taught by Keesman. *Id.* at 27. In addition, Petitioner explains that the comparison of Winger's SAV with a threshold value would be replaced with the comparison of the Lagrangian cost for the coefficient values and the Lagrangian cost of the zeroed coefficient values. *Id.*

Petitioner argues that it would have been obvious to combine the teachings of Winger and Keesman in the manner proposed. Pet. 21–28. Petitioner submits that both Winger and Keesman teach video coding

techniques that attempt to solve the same problem (i.e., maintaining picture quality while also maintaining an acceptably low bitrate) using similar techniques (i.e., evaluating when setting values of the video signal to zero is beneficial to balancing the rate-distortion costs of a video coding process). *Id.* at 22 (citing Ex. 1003 ¶ 121). Moreover, Petitioner notes that “Winger also taught that ‘other block-based measurements’ may be used ‘to meet the design criteria of a particular implementation.’” *Id.* at 26 (quoting Ex. 1005 ¶ 23) (emphasis omitted). Petitioner argues that “[a]lthough Winger did not specifically state that a quantization efficiency could be directly calculated based on a cost function accounting for rate and distortion, Keesman taught this direct cost-based calculation of quantization efficiency.” *Id.* (citing Ex. 1003 ¶ 128) (emphasis omitted). Petitioner asserts that “a [POSA] would have looked for other example measurements to incorporate into a coefficient cancellation technique and would have considered the teachings of Keesman in this analysis.” *Id.* at 27 (citing Ex. 1003 ¶¶ 129–132) (emphasis omitted).

Petitioner argues that the combination would have only involved implementing a known method in a known device, Pet. 27 (citing Ex. 1003 ¶¶ 133–135), and that “[s]uch a combination would have constituted a ‘simple substitution of one known element for another,’” *id.* (quoting *KSR*, 550 U.S. at 417). Petitioner asserts that the prior art demonstrates that the substituted component (i.e., comparing quantization efficiencies) was well known and understood in the art. *Id.* at 28 (citing Ex. 1003 ¶¶ 133–135). Petitioner contends that “[r]eplacing Winger’s SAV based technique with Keesman’s Lagrangian cost-based technique would have required, at

most, only ordinary creativity,” given Winger’s express suggestion to apply other known techniques. *Id.* (emphasis omitted).

We find that there is ample evidence to support a motivation to combine, and Patent Owner’s arguments and evidence to the contrary do not persuade us otherwise.

Patent Owner begins by arguing that “[a] motivation to combine cannot be established where the combination would result in trade-offs and the petition fails to consider—much less evaluate—the countervailing harms or losses from the proposed trade[-]off.” PO Resp. 11 (citing *Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 (Fed. Cir. 2000)). We disagree with Patent Owner’s suggestion that “[a] motivation to combine cannot be established where the combination would result in trade-offs.” *Id.* Indeed, the law is clear that “just because better alternatives exist in the prior art does not mean that an inferior combination is inapt for obviousness purposes.” *In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012); *see also In re Fulton*, 391 F.3d 1195, 1200 (Fed. Cir. 2004) (“[O]ur case law does not require that a particular combination must be the preferred, or the most desirable, combination described in the prior art in order to provide motivation for the current invention.”); *In re Gurley*, 27 F.3d 551, 552–53 (Fed. Cir. 1994) (“A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use”). Indeed, the Federal Circuit has held that it is error to require that a party challenging a patent prove that a person of ordinary skill would select the combination over other options in the prior art. *See Novartis Pharm. Corp. v. West-Ward Pharm. Int’l Ltd.*, 923 F.3d 1051, 1059 (Fed. Cir. 2019) (“Yet, the district court continued its analysis

and found that West-Ward ‘failed to prove by clear and convincing evidence that a POSA would have been motivated to select everolimus.’ The district court erred in applying this heightened standard. . . . It is thus improper to require West-Ward to prove that a person of ordinary skill would have selected everolimus over other prior art treatment methods.” (internal citation omitted)); *see also Bayer Healthcare Pharm., Inc. v. Watson Pharm., Inc.*, 713 F.3d 1369, 1376 (Fed. Cir. 2013) (“Just because one of several references indicated a preference for using 24/4 or 23/5 dosing regimens in tandem with higher-dose COCs does not mean the same missed-pill rationale could not also motivate applying the shorter pill-free interval to similarly improve other COC preparations.”). Thus, the mere existence of trade-offs does not preclude a finding of obviousness.

Patent Owner’s reliance on *Winner International* to support its contention that Petitioner must show a net benefit to the combination over the prior art is also misplaced. PO Resp. 11–12. As the Federal Circuit recently explained, *Winner International* merely stands for the “longstanding principle that the prior art must be considered for all its teachings, not selectively.” *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1331–32 (Fed. Cir. 2019).

Building on its trade-off argument, Patent Owner, supported by Dr. Zeger, argues that replacing Winger’s SAV approach with Keesman’s Lagrangian calculation would include “numerous disadvantages [and] trade[-]offs,” that a person of ordinary skill would not have been motivated to make the combination, and that Petitioner failed to consider these disadvantages. PO Resp. 14, 19–20 (citing Ex. 2003 ¶¶ 37, 38). Patent Owner further asserts that Winger recognizes these trade-offs. *Id.* at 14–15

(citing Ex. 1005 ¶ 7 (“The disadvantage of the existing coefficient cancellation techniques is primarily that they achieve a poor trade-off between implementation complexity and estimation accuracy.”)). Patent Owner contends that the Lagrangian calculation is one such “existing technique[]” that Winger disparages. *Id.* at 15. Patent Owner argues that we should consider this criticism, even if Winger does not a “teach away” from Keesman.¹⁰ *Id.* at 15–16 (citing *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1070 (Fed. Cir. 2018)).

Here, contrary to Patent Owner’s suggestion, Petitioner and Dr. Storer have considered Winger for all that it teaches. As Petitioner and Dr. Storer note, Winger explicitly teaches that coefficient cancellation may “apply other block-based measurements accordingly to meet the design criteria of a particular implementation.” Ex. 1005 ¶ 23; Ex. 1003 ¶ 128. Dr. Storer acknowledges that Winger touts SAV as offering better performance than other techniques. Ex. 1005 ¶ 7; Ex. 1003 ¶ 125. Indeed, Dr. Storer testifies that “[t]he SAV calculation taught by *Winger* was computationally fast, but

¹⁰ Patent Owner does not appear to contend that Winger teaches away from the combination. *See* PO Resp. 9–44. Yet, even if it did, we do not find that Winger teaches away. A reference “that ‘merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into’ the claimed invention does not teach away.” *Meiresonne v. Google, Inc.*, 849 F.3d 1379, 1382 (Fed. Cir. 2017). We do not understand Winger’s statement “[t]he disadvantage of the existing coefficient cancellation techniques is primarily that they achieve a poor trade-off between implementation complexity and estimation accuracy” to discourage use of “existing coefficient cancelation techniques” in all cases (Ex. 1005 ¶ 7), but merely to express a preference for the technique disclosed in Winger. *See In re Gurley*, 27 F.3d at 553 (noting that if a reference describes a modification as “somewhat inferior,” then the reference does not teach away).

less accurate [than the Lagrangian cost function].” Ex. 1003 ¶ 135. He further explains that “[u]sing a Lagrangian cost calculation was more sophisticated, and, therefore, a [POSA] would logically have used this technique to improve upon the methods and systems taught by *Winger*.” *Id.* Dr. Storer also explained that “the speed of implementation of each [solution] may . . . depend on the computing platform used.” *Id.* ¶ 133.

Dr. Storer’s testimony is detailed, persuasive, consistent, and supported by the other prior art of record, including Chang,¹¹ which is cited by Patent Owner. Chang explains that “[s]ome encoders [use a] rate-distortion cost as a distortion metric during motion estimation” and “rate-distortion cost has a distortion term and a rate term, with a factor (often called a Lagrangian multiplier).” Ex. 2006, 4:36–39. Chang further explains:

Rate-distortion cost usually provides the most accurate assessment of rate-distortion performance of different motion estimation choices, but also has the highest computational complexity, especially if different quantization parameters are evaluated for each different motion estimation choice.

Id. at 4:47–52. Chang teaches, and Patent Owner admits,¹² that “[t]he goals of low complexity and high accuracy are frequently in tension,” and that “[t]he available distortion metrics . . . depend on [the] implementation.” *Id.* at 17:67–18:12. Thus, Patent Owner’s own evidence demonstrates that Lagrangian functions were well known, used in video encoder art, and offer advantages of usually providing the most accurate assessment of

¹¹ US Patent No. 8,494,052 B2, filed Apr. 7, 2006, issued July 23, 2013 (“Chang,” Ex. 2006).

¹² See, e.g., PO Resp. 16 (“[A]lthough the Lagrangian calculation in many cases provides an ‘accurate assessment’ of the rate-distortion costs”).

rate-distortion performance, as Dr. Storer testifies. And, although Patent Owner is correct that Chang notes Lagrangian-type functions have the “highest computational complexity,” Chang also notes, as Dr. Storer testifies, that this can be implementation dependent. *See* Ex. 1003 ¶ 133; Ex. 2006, 17:67–18:12.

Petitioner provides other extensive evidence that corroborates and supports Dr. Storer’s testimony. *See* Reply 17–23; Ex. 1013 ¶¶ 2, 3. In 2003, the prior art recognized that Lagrangian cost function was “the most widely accepted approach in recent standard development . . . due to its effectiveness and simplicity.” Ex. 1017,¹³ 10; Ex. 1013 ¶ 2. Even as early as 1998, the prior art taught the optimization task or rate-distortion “can be elegantly solved using Lagrangian optimization” and that “[t]his technique has gained importance due to its effectiveness, conceptual simplicity, and its ability to effectively evaluate a large number of possible coding choices,” and that it “has emerged as the weapon of choice” for rate-distortion optimization. Ex. 1014,¹⁴ 12, 13, 21. Petitioner also supplied prior art references, including one authored by one of the ’777 Patent’s named inventors (Matthias Narroschke), relating to the state of the art that support Dr. Storer’s testimony that some implementations of Lagrangian calculations

¹³ Citations are to the page numbers in the lower right-hand corner of Ex. 1017 (T. Wiegand, et al., “Rate-Constrained Coder Control and Comparison of Video Coding Standards,” *IEEE Transactions on Circuits & Systems for Video Technology*, Vol. 13, Issue 7 (July 2003)).

¹⁴ Citations are to the page numbers in the lower right hand corner of Ex. 1014 (G. Sullivan and T. Wiegand, “Rate-Distortion Optimization for Video Compression,” *IEEE Signal Processing Magazine*, Vol. 15, Issue 6 (Nov. 1998)).

can be faster. See Ex. 1016,¹⁵ 23 (disclosing “RD-Lagrangian optimisation” among “Major H.264/AVC Encoding Tools” that “improves PSNR (up to 0.35 dB) and bit rate (up to 9% bit savings),” while “complexity increase is less than 40%”); Ex. 1015,¹⁶ Abstract (noting “Lagrangian costs are analyzed” in H.264 after integer transforms, which can “significantly lower” the computational load while achieving “almost the same coding efficiency.”); Ex. 1019,¹⁷ Abstract (disclosing that Lagrangian functions “can achieve computational savings of 19%-67% (depending on the source sequence) with no significant loss of rate-distortion performance.”); Ex. 1013 ¶ 3.

We find the testimony of Patent Owner’s expert, Dr. Zeger, regarding the allegedly discouraging disadvantages of Lagrangian functions entitled to little weight. There are several significant problems with Dr. Zeger’s testimony. First, we find that his testimony that a person of ordinary skill would have been dissuaded from using Lagrangian functions, at least in part, appears to be based on his erroneous understanding of how widespread the use of Lagrangian functions were in the art. See Reply 19–23. At his deposition, Dr. Zeger testified that the complexity of Lagrangian functions

¹⁵ Citations are to the page numbers in the lower right hand corner of Ex. 1016 (J. Ostermann, et al., “Video Coding with H.264/AVC: Tools, Performance, and Complexity,” *IEEE Circuits & Systems Magazine*, Vol. 4, Issue 1 (First Quarter 2004)).

¹⁶ Matthias Narroschke, “Extending the Prediction Error Coder of H.264/AVC by a Vector Quantizer,” Proceedings Society for Optics and Photonics 5960, Visual Communications and Image Processing 2005, 59606M (June 24, 2005) (Ex. 1015).

¹⁷ C. Sampath Kannangara, “Low-Complexity Skip Prediction for H.264 Through Lagrangian Cost Estimation,” *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 16, No. 2 (Feb. 2006) (Ex. 1019).

would dissuade engineers and suggested that their use was limited to academic research and articles in “an IEEE journal.” Ex. 1012, 69:9–70:1, 115:20–117:7, 119:16–120:1. However, this testimony is significantly at odds with the evidence of the state of the art at the time of the invention. As Petitioner explains, Lagrangian functions were widely used in video encoding at the time of the invention. See Reply 19–22. Indeed, the ’777 Patent explains that it takes its Lagrangian parameter from the H.264/AVC¹⁸ standard. Ex. 1001, 10:22–24, 10:49–51, 13:13–16. Moreover, there is significant evidence, which we discussed above with respect to Dr. Storer’s testimony, that Lagrangian functions had widespread use. Ex. 1017, 10; Ex. 1014, 13, 21; Ex. 1013 ¶¶ 2, 3. Dr. Zeger’s testimony fails to account for this widespread acceptance and use in asserting that a person of ordinary skill would be dissuaded from using these functions.

Second, we find that Dr. Zeger’s reliance on Chang to support his testimony that a person of ordinary skill would not select a Lagrangian function is based on either a significant misunderstanding or unfair representation of Chang. See Ex. 2003 ¶¶ 41, 42; PO Resp. 18. Contrary to Dr. Zeger’s testimony, Chang is clear that it did not “deliberately” choose to not use Lagrangian functions. See Reply 17–18; Ex. 2003 ¶ 42 (“Thus, Chang engaged in a cost-benefit analysis, expressly recognized the existence of a Lagrangian cost calculation such as the one taught by Keesman, and deliberately chose a *different* approach.”). Chang is clear that the detailed embodiment, which does not implement Lagrangian functions, is just an “example,” Ex. 2006, 18:20–28, and later states that “[t]he encoder selects (1260) a distortion metric from among multiple available distortion metrics,”

¹⁸ AVC stands for “Advanced Video Coding.” See Ex. 1015, 11 (note 2).

including “one or more rate-distortion cost [(i.e., Lagrangian)] metrics,” *id.* at 25:9–15. Rather than rejecting Lagrangian rate-distortion cost methods, Chang expressly suggests using them. Thus, Dr. Zeger’s reliance on Chang to support his contention that a person of ordinary skill would not have chosen a Lagrangian function is not persuasive.

Finally, Dr. Zeger’s testimony regarding the computational complexity of Lagrangian functions is undermined by Chang’s own reference to the implementation dependency of the different rate-distortion techniques, and the evidence discussed above that shows that implementations of Lagrangian techniques for rate-distortion cost measurement in video coding existed at the time of the invention that could reduce complexity and computational load. *See* Ex. 2006, 17:67–18:12; Ex. 1016, 23; Ex. 1015, Abstract; Ex. 1019, Abstract. Thus, Dr. Zeger’s testimony appears to be based on an oversimplification of the state of the art at the time of the invention, which undermines his testimony. Given the lack of corroboration and inconsistencies with the evidence we do have in the record, we determine that Dr. Zeger’s testimony regarding the motivation to combine is entitled to little weight.

As for Patent Owner’s remaining arguments, Patent Owner attempts to attack each piece of Petitioner’s evidence and argument individually, asserting that each piece of evidence or argument by itself is insufficient to show a motivation to combine. PO Resp. 21–44. However, Petitioner’s analysis does not depend alone on the similarity of Winger and Keesman (*id.* at 21–27), Winger’s suggestion to use other methods (*id.* at 27–37), Keesman’s suggestion that Lagrangian methods could be used for various numbers of coefficients (*id.* at 37–38), or that the combination relies only on

known techniques to improve similar devices (*id.* at 39–43). Instead, Petitioner’s motivation to combine Winger and Keesman relies on the combination of these arguments and evidence. *See* Ex. 1003 ¶¶ 121–135. When taken together, we find that the totality of the evidence demonstrates that a person of ordinary skill would have been motivated to combine Winger and Keesman.

Here, based on Winger’s express teaching encouraging a person of ordinary skill to look to other similar techniques, the fact that both techniques were similar and well known, and the ample evidence in the record—Dr. Storer’s testimony, Chang, and the numerous other state-of-the-art references discussed above—that suggest that it was well known and understood that Lagrangian techniques could be applied in this type of application, we agree with Petitioner that a person of ordinary skill would have been motivated to turn to Keesman’s technique for use with Winger’s method. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1374 (Fed. Cir. 2019) (finding the Board had sufficient evidence for a motivation to combine references where the second reference was “well known,” the techniques taught in the two references “share[d] striking similarities,” and one reference “suggest[ed] that a wide variety of adaptive compression algorithms could be used and encourage[d] a person having ordinary skill in the art to turn to ‘well known’ algorithms such as [the other reference’s]”). Patent Owner’s effort to distinguish *Realtime Data* is not persuasive. PO Resp. 33–37. Although Patent Owner is correct that the Federal Circuit found that no motivation to combine was required for the single-reference obviousness ground, *see* 912 F.3d at 1373, the court went on to find that if such a motivation were required, the Board had properly found it, *id.* at

1374. We find the motivation-to-combine analysis in *Realtime Data* persuasive on the evidence presented here. Indeed, the record here contains additional evidence in the form of Dr. Storer's well-reasoned and well-corroborated testimony (*see* Ex. 1003 ¶¶ 121–135; Ex. 1013 ¶¶ 2, 3), evidence demonstrating how widely used Lagrangian methods were in this field (*see, e.g.*, Ex. 1014, 13, 21; Ex. 1015, Abstract; Ex. 1016, 23; Ex. 1017, 10; Ex. 1019, Abstract), and evidence demonstrating that Lagrangian techniques offered benefits of greater accuracy over other methods (Ex. 2006, 4:47–52; Ex. 1014, 14, 23; Ex. 1017, 10). Accordingly, considering all of the evidence of record, we determine that Petitioner has shown by a preponderance of the evidence that a person of ordinary skill would have been motivated to combine Winger and Keesman in the manner suggested.

c. Summary

In conclusion, we find that Petitioner has shown by a preponderance of the evidence that the combination accounts for the limitations of claim 1, that a person of ordinary skill would have been motivated to combine the teachings of Winger and Keesman in the manner asserted, and that a person of ordinary skill would have had a reasonable expectation of success in doing so. *See* Pet. 21–39; Ex. 1003 ¶¶ 121–181

2. Independent Claim 11

We have reviewed Petitioner's evidence and arguments regarding claim 11, which contend that Winger and Keesman render the claim obvious. We find that Petitioner has shown by a preponderance of the evidence that the combination of Winger and Keesman teaches or suggests the limitations of claim 11. *See* Pet. 55–59. Patent Owner has not provided

a response to these arguments beyond the arguments considered above with respect to claim 1 regarding motivation to combine, which we found unpersuasive above. Thus, we find Petitioner demonstrates that the combination of Winger and Keesman accounts for the limitations of claim 11, and that a person of ordinary skill in the art would have been motivated to combine the references in the manner proposed, and would have had a reasonable expectation of success in doing so. *See id.* at 21–28, 55–59.

3. *Claims 2–8, 12, and 14*

Petitioner argues that dependent claims 2–8, 12, and 14 would have been obvious over Winger and Keesman. Claims 2–8 and 14 depend either directly or indirectly from claim 1 and claim 12 depends directly from claim 11. Petitioner identifies where the combination of Winger and Keesman teaches or suggests the limitations of these dependent claims by providing an analysis of each limitation and a comparison of the limitations to the teachings of Winger and Keesman. *See* Pet. 39–55, 59. Patent Owner does not argue that the combination of Winger and Keesman fails to disclose the additional limitations recited by claims 2–8, 12, and 14. Accordingly, Patent Owner has waived any argument directed to those limitations. *See* Paper 24, 6 (“Patent Owner is cautioned that any arguments for patentability not raised in the response will be deemed waived.”). We reviewed Petitioner’s evidence and argument and adopt it as our own. For the reasons provided in the Petition, Petitioner demonstrates that the combination of Winger and Keesman accounts for the limitations of claims 2–8, 12, and 14 and that a person of ordinary skill in the art would have been motivated to

combine the references in the manner proposed, and would have had a reasonable expectation of success in doing so. *See* Pet. 21–28, 39–55, 59.

4. *Claims 9 and 10*

Petitioner argues claims 9 and 10 are unpatentable over Winger, Keesman, and Sugiyama. Pet. 60–65. Claims 9 and 10 add limitations about decoding the coded video signal. Ex. 1001, 20:4–15. Petitioner relies on Sugiyama for teaching decoding components (i.e., decoding, inverse quantizing, and inverse transforming) that function to decode a video signal. Pet. 60–62. Patent Owner does not dispute that Petitioner’s proposed combination would account for the limitations of claims 9 and 10. Based on our review of Petitioner’s undisputed arguments and supporting evidence, with which we agree, we find that Petitioner has shown by a preponderance of the evidence that Sugiyama teaches the additional limitations of claims 9 and 10. *See* Pet. 63–65.

Petitioner argues a person of ordinary skill in the art would have combined the decoder of Winger and Keesman with Sugiyama’s decoding, inverse quantizing, and inverse transforming components and their functions “to create a fully functioning decoder for use with an encoder.” Pet. 62. According to Petitioner, the combination constitutes a simple substitution of one known element for another. *Id.* Petitioner states,

the method performed by *Winger*’s decoder[] differs from the claims of the ’777 Patent merely in that the method recited in the ’777 Patent replaces *Winger*’s general functions of a decoder with the specific functions of the components of a decoder. Ex. 1003, ¶146. The prior art, however, demonstrates that the substituted component (i.e., decoding, inverse quantizing, inverse transforming) was well known and understood in the art. *Id.* Improving *Winger*’s general decoder

with *Sugiyama*'s specific components of a decoder would have required, at most, only ordinary creativity. *Id.*, ¶147.

Pet. 62–63.

We find Petitioner has “articulated reasoning with some rational underpinning” for combining known elements in the manner required by the claims. *KSR*, 550 U.S. at 418 (quoting *Kahn*, 441 F.3d at 988); see *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016) (“To satisfy its burden of proving obviousness, . . . [t]he petitioner must . . . articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” (citing *KSR*, 550 U.S. at 418)). Patent Owner does not raise any separate arguments regarding this combination aside from those considered above regarding claim 1. See PO Resp. 44. Accordingly, we find that Petitioner has shown by a preponderance of the evidence claims 9 and 10 would have been obvious over the combination of Winger, Keesman, and Sugiyama.

D. Final Conclusion as to Obviousness

For the reasons explained above, Petitioner has demonstrated sufficiently that the combination of Winger and Keesman would have accounted for the subject matter of claims 1–8, 11, 12, and 14 of the ’777 Patent and Winger, Keesman, and Sugiyama would have accounted for the subject matter of claims 9 and 10, that a person of ordinary skill would have had a motivation for making the proposed combinations, and would have had a reasonable expectation of success. Patent Owner did not submit any evidence of objective indicia of non-obviousness.

Weighing the evidence of the disclosure of the references and the reasoning to combine the references, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–8, 11, 12, and 14 of the

'777 Patent are unpatentable as obvious over the combination of Winger and Keesman, and that claims 9 and 10 of the '777 Patent are unpatentable as obvious over the combination of Winger, Keesman, and Sugiyama.

V. CONCLUSION¹⁹

For the foregoing reasons, on this record, Petitioner has established by a preponderance of the evidence that claims 1–12 and 14 of the '777 Patent are unpatentable.

Claims	35 U.S.C. §	References/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–8, 11, 12, 14	103(a)	Winger, Keesman	1–8, 11, 12, 14	
9, 10	103(a)	Winger, Keesman, Sugiyama	9, 10	
Overall Outcome			1–12, 14	

VI. ORDER

Accordingly, it is:

ORDERED that claims 1–12 and 14 of U.S. Patent No. RE46,777 E have been shown to be unpatentable; and

¹⁹ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. See 84 Fed. Reg. 16654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. §§ 42.8(a)(3), (b)(2).

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

IPR2018-01189
Patent RE46,777 E

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