

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AMAZON.COM, INC. and AMAZON.COM SERVICES LLC,
Petitioner,

v.

NOKIA TECHNOLOGIES OY,
Patent Owner.

IPR2024-00921
Patent 8,077,991

Before SCOTT B. HOWARD, STEVEN M. AMUNDSON, and
JASON M. REPKO, *Administrative Patent Judges*.

HOWARD, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background and Summary*

Amazon.com, Inc. and Amazon.com Services LLC (collectively, “Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 1–3, 5–15, 17–21, and 39 (“the challenged claims”) of U.S. Patent No. 8,077,991 (Ex. 1001, “the ’991 patent”). Nokia Technologies Oy (“Patent Owner”) filed a Preliminary Response (Paper 8, “Prelim. Resp.”).

We have authority, acting on the designation of the Director, to determine whether to institute an *inter partes* review under 35 U.S.C. § 314 (2024) and 37 C.F.R. § 42.4(a) (2024). *Inter partes* review may not be instituted unless “the information presented in the petition filed under section 311 and any response filed under section 313 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.” 35 U.S.C. § 314(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.” 37 C.F.R. § 42.108(a).

For the reasons set forth below, upon considering the briefing and the evidence of record, we determine that the information presented in the Petition establishes a reasonable likelihood that Petitioner will prevail with respect to at least one of the challenged claims. Accordingly, we institute *inter partes* review on all of the challenged claims based on all of the grounds identified in the Petition.

B. *Real Parties in Interest*

Petitioner identifies Amazon.com, Inc. and Amazon.com Services, LLC as the real parties in interest. Pet. 83.

Patent Owner identifies itself as the real party in interest. Paper 5, 2 (Patent Owner’s Mandatory Notices).

C. Related Matters

The parties identify *Nokia Corporation v. Amazon.com, Inc.*, 1-23-cv-01232 (D. Del.); *Nokia Technologies Oy v. HP, Inc.*, 1-23-cv-01237 (D. Del.); and *In re Certain Video Capable Electronic Devices, Including Computers, Streaming Devices, Televisions, and Components and Modules Thereof*, Inv. No. 337-TA-1038 (ITC) as related matters. Pet. 83; Paper 5, 2. Patent Owner also identifies *Nokia Technologies Oy v. Amazon.com Inc.*, 1-23-cv-01236 (D. Del.) as a “proceeding[] involving” the ’991 patent. Paper 5, 2.

Concurrently with the filing of the Petition, Petitioner submitted another petition for *inter partes* review of the ’991 patent: IPR2024-00920. Petitioner filed a document ranking the petitions in the instant case and IPR2024-00920 and explaining the material differences between the petitions. *See* Paper 4 (Statement Regarding Multiple Petitions (“Ranking”)).

D. The ’991 Patent

The ’991 patent is titled “Spatially Enhanced Transform Coding” and “relates to the coding and decoding of digital video material,” and, more particularly, “to prediction error coding in both frequency and spatial domains.” Ex. 1001, code (54), 1:6–9. The embodiments of the ’991 patent “represent[] the prediction error signal as a weighted sum of different basis functions of a selected transform and quantized spatial samples,” and “the prediction error signal for a single image block is constructed using both transform basis functions and spatial samples,” allowing “for the utilization of those selected transform basis functions that give good overall representation of the image block with minimal amount of transform coefficients.” *Id.* at 2:58–3:5.

Figure 4 of the '991 patent is reproduced below.

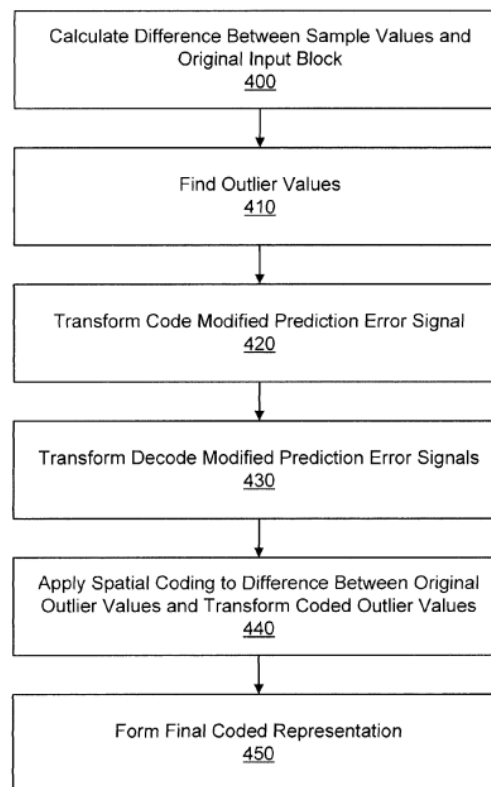


FIG. 4

Figure 4 “is a flow chart showing one encoder algorithm which may be used in . . . the present invention.” Ex. 1001, 5:24–26. Specifically, Figure 4 illustrates calculating “the difference between sample values of a predicted block and an original input block” at 400, finding outlier values at 410, transform coding “the modified prediction error signal . . . with the outlier values being substituted by interpolated representations of those values” at 420, transform decoding “the modified prediction error signals . . . back to the spatial domain” at 430, applying “spatial coding . . . to the difference between the original outlier values and the transform decoded outlier values” at 440, and forming “the final coded

representation of the prediction error signal . . . by joining the transform coded data and the spatial coded data” at 450. *Id.* at 5:28–49.

Figure 5 of the '991 patent is reproduced below.

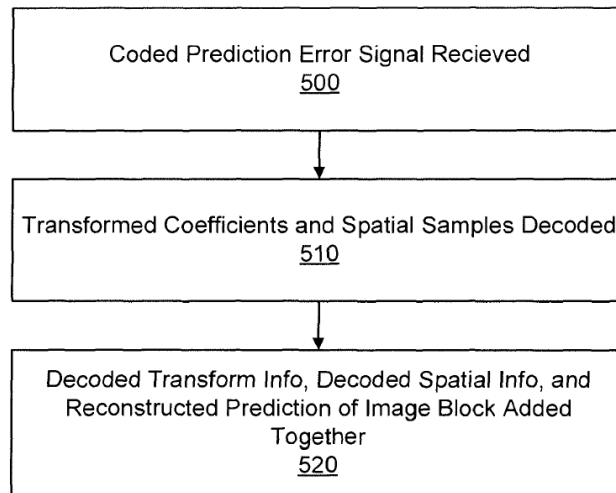


Figure 5 “shows a decoding process according to various embodiments of the present invention.” Ex. 1001, 6:47–48.

At 500 in FIG. 5, a video decoder receives a coded prediction error signal which comprises both transformed coefficients and spatial samples. At 510, both the transformed coefficients and the spatial samples are decoded. At 520, the decoded transform information, the decoded spatial information and reconstructed prediction of the image block are added together to form decoded representation of the image block.

Id. at 6:48–55.

E. Illustrative Claims

Claims 1, 13, and 39 are independent claims, reproduced below, and are illustrative of the subject matter of the challenged claims.

1. [1pre] A method, comprising:

[1a] calculating, by a processor, a difference signal representing differences between sample values of a predicted block of data and values for an original input block;

[1b] performing, by a processor, transform coding to the difference signal, thereby creating a first representation of a first component of the difference signal;

[1c] performing, by a processor, spatial coding to the difference signal, thereby creating a second representation of a [second]¹ component of the difference signal;

[1d] joining, by a processor, the first and second representations to form a coded prediction error signal; and

[1e] at least one of transmitting or storing the coded prediction error signal.

13. [13pre] An apparatus, comprising:

[13a] a processor; and a memory unit communicatively connected to a controller and comprising:

[13b] computer code for performing transform coding to the difference signal, thereby creating a first representation of a first component of the difference signal;

[13c] computer code for performing spatial coding to the difference signal, thereby creating a second representation of a first component of the difference signal; and

[13d] computer code for joining the first and second representations.

39. [39pre] A method, comprising:

[39a] calculating, by a processor, a difference signal representing differences between sample values of a predicted block of data and values for an original input block;

[39b] substituting, by a processor, outlier values in the difference signal with non-outlier values to create a modified prediction error signal;

[39c] performing, by a processor, one of transform coding and spatial coding to the modified prediction error signal, creating one of a transform coded data and spatial coded data

¹ See Section II.C.2, *infra*.

[39d] performing, by a processor, an inverse of the one of transform coding and spatial coding;

[39e] applying, by a processor, the other of transform coding and spatial coding to a residual from the inverse transform or spatial decoding, creating the other of transform coded data and spatial coded data;

[39f] joining, by a processor, the transform coded data and the spatial coded data to form a coded prediction error signal; and

[39g] at least one of transmitting or storing the coded prediction error signal.

Ex. 1001, 8:47–61, 9:26–37, 11:10–12:14; *see also* Pet. 85, 88–89 (adding limitation designations).

F. Prior Art and Asserted Grounds

Petitioner asserts that the challenged claims would have been unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §²	Reference(s)/Basis
1, 5, 6, 8–13, 17, 18, 20, 21	103(a)	Koga ³
2, 3, 7–9, 12–15, 17–21, 39	103(a)	Koga, Lin ⁴
8, 9, 20, 21	103(a)	Koga, Narroschke ⁵
8, 9, 20, 21	103(a)	Koga, Lin, Narroschke

² The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. §§ 102 and 103 that became effective on March 16, 2013. Because the application that issued as the ’991 patent was filed on April 10, 2008 (Ex. 1001, code (22)), prior to the AIA effective date, we apply the pre-AIA version of the statute.

³ US 4,723,161, issued Feb. 2, 1988 (Ex. 1004).

⁴ US 2006/0268990 A1, published Nov. 30, 2006 (Ex. 1005).

⁵ US 2011/0038410 A1, published Feb. 17, 2011 (Ex. 1006).

Paper 10 (Petitioner’s Identification of Grounds and Arguments in the Petition).⁶

Petitioner also relies on the testimony of Charles D. Creusere, Ph.D. (Ex. 1003). Patent Owner relies on the testimony of Michael Orchard, Ph.D. (Ex. 2001).

II. ANALYSIS

A. *Legal Standards*

In *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1 (1966), the Supreme Court set out a framework for assessing obviousness under 35 U.S.C. § 103 that requires consideration of four factors: (1) the “level of ordinary skill in the pertinent art,” (2) the “scope and content of the prior art,” (3) the “differences between the prior art and the claims at issue,” and (4) if in evidence, “secondary considerations” of non-obviousness such as “commercial success, long-felt but unsolved needs, failure of others, etc.” *Id.* at 17–18. “While the sequence of these questions might be reordered in any particular case,” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 407 (2007), the U.S. Court of Appeals for the Federal Circuit has repeatedly emphasized that “it is error to reach a conclusion of obviousness until all those factors are considered,” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1328 (Fed. Cir. 2016). Because Patent Owner does not address objective evidence of non-obviousness, we focus solely on the first three *Graham* factors.

B. *Level of Ordinary Skill in the Art*

The level of ordinary skill in the pertinent art at the time of the invention is a factor in how we construe patent claims. *See Phillips v. AWH Corp.*, 415 F.3d

⁶ Petitioner’s identification of the grounds and claims in the Petition (Pet. 19) contained errors (Ex. 3001). With our authorization, Petitioner revised those identifications and identified on what pages the arguments for specific claims could be found. Paper 10.

1303, 1312–13 (Fed. Cir. 2005) (en banc). It is also one of the factors we consider when determining whether a patent claim would have been obvious over the prior art. *See Graham*, 383 U.S. at 17–18.

Factors pertinent to a determination of the level of ordinary skill in the art include “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Envtl. Designs, Ltd. v. Union Oil Co. of Cal.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). “Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case.” *Id.*

Petitioner argues that a person having ordinary skill in the art “would have had a (1) bachelor’s degree in electrical engineering, computer engineering, computer science, or a comparable field of study, and (2) approximately two to three years of practical experience with video and/or image processing or coding.” Pet. 25–26 (citing Ex. 1003 ¶¶ 60–63). Petitioner further argues that “[a]dditional experience can substitute for the level of education, and vice-versa.” *Id.* at 26 (citing Ex. 1003 ¶¶ 60–63). Petitioner also identifies knowledge that a person having ordinary skill in the art would have. *Id.* (citing Ex. 1003 ¶ 64).

Patent Owner states that it “has applied Petitioner’s [person having ordinary skill in the art] for the sake of this Response.” Prelim. Resp. 21.

Because Petitioner’s proposed level of ordinary skill in the art is consistent with the field of the invention of the ’991 patent and not disputed by Patent Owner, we adopt Petitioner’s formulation of the person having ordinary skill in the art.⁷

C. Claim Construction

We apply the same claim construction standard used in the federal courts, in other words, the claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C. § 282(b), which is articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b). Under the *Phillips* standard, the “words of a claim ‘are generally given their ordinary and customary meaning,’” which is “the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1312–13.

Petitioner proposes explicit constructions of “spatial samples,” “spatial coding,” “difference signal” (claims 1 and 39), “the difference signal” (claims 13 and 14), “outlier values,” the second recitation of “a first component,” and “the non-outlier values used to replace the outlier values.” Pet. 22–30. Patent Owner agrees with some of Petitioner’s proposed constructions. Prelim. Resp. 21–27. We address the construction of several limitations below.

⁷ If Patent Owner disagrees with this formulation of the level of skill in the art, it must raise that disagreement in its Response. If a different level of skill would affect the outcome in this case, the parties must brief that issue as well. The failure of Patent Owner to describe how a different level of skill in the art is determinative will be a forfeiture of that argument. If there is a dispute regarding the level of ordinary skill in the art, then the parties are also encouraged to submit evidence, other than conclusory expert testimony, that supports their position. *See* 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”).

1. Spatial Coding

Petitioner argues that “spatial coding” means “coding in the spatial domain.” Pet. 28. According to Petitioner, the specification of the ’991 patent “describes spatial coding as the coding (e.g., quantizing and entropy coding) of pixel values in the spatial domain ‘without transform,’ but without limiting it to a particular algorithm or technique.” *Id.* (citing Ex. 1001, 5:6–23, Fig. 4).

“Patent Owner does not contest Petitioner’s construction for the sake of this [Patent Owner Preliminary Response], but reserves the right to challenge this construction in the event of institution.” Prelim. Resp. 21.

Accordingly, for purposes of this Decision, we adopt Petitioner’s undisputed construction.

2. The Second Recitation of “A First Component”

With regard to the second recitation of “a first component,” we agree with the parties that this was an obvious drafting error and the phrase should be construed to mean a second component. *See Novo Indus., L.P. v. Micro Molds Corp.*, 350 F.3d 1348 (Fed. Cir. 2003).

3. “The Difference Signal” (Claims 13 and 14).

Petitioner argues that claims 13 and 14 “contain a drafting error that recites ‘the difference signal,’ without antecedent basis.” Pet. 29. According to Petitioner, a person having ordinary skill in the art “would have understood ‘the difference signal’ in these claims to mean ‘a difference signal representing differences between sample values of a predicted block of data and values for an original input block’ as recited in limitation [1a] of claim 1.” *Id.*

For purposes of its Preliminary Response, Patent Owner “agree[d] with Petitioner’s construction of ‘the difference signal’ in Claims 13 and 14.” Prelim. Resp. 24.

Accordingly, for purposes of this Decision, we adopt Petitioner’s undisputed construction.

4. Remaining Terms

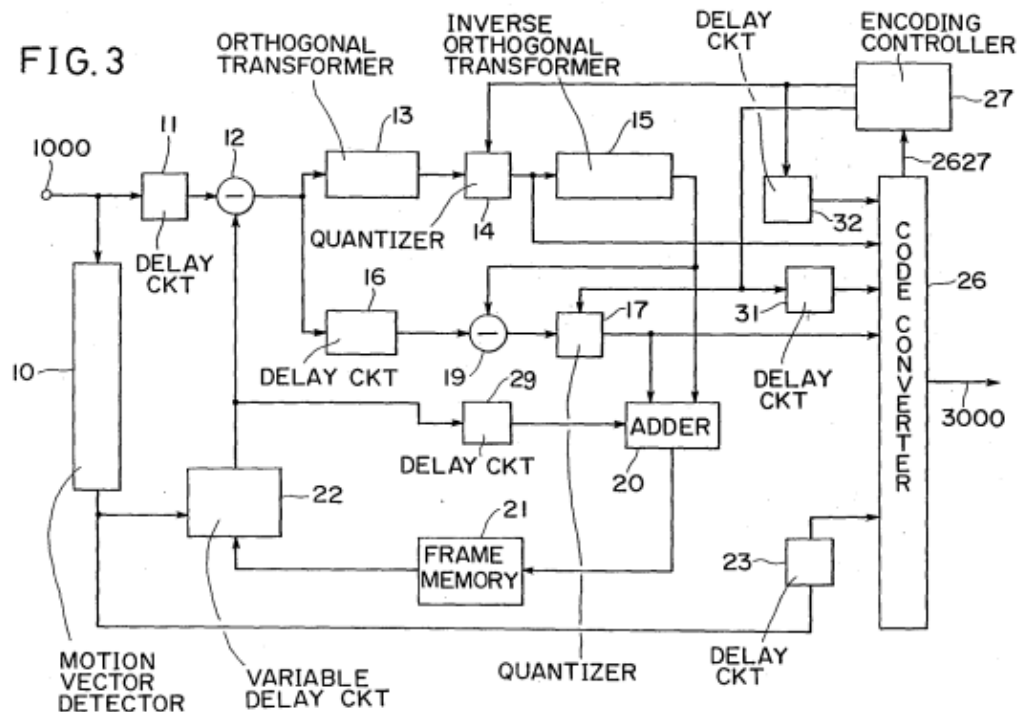
With the exception of terms explicitly construed above, for purposes of this Decision we need not expressly construe any claim terms. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (noting that “we need only construe terms ‘that are in controversy, and 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. Obviousness over Koga

1. Overview of Koga

Koga is titled “Method and Arrangement of Coding Digital Image Signals Utilizing Interframe Correlation” and is directed to “maintaining high data compression as well as high resulting images” by orthogonally transforming and subjecting “a motion compensated interframe prediction error” to quantization, with “the quantized error signal undergo[ing] inverse orthogonal transformation,” and quantizing “a difference between the inversely orthogonally transformationed error signal and the original prediction error signal” in “order to compensate for distortions caused by the quantization.” Ex. 1004, codes (54), (57). Koga allows “the influence or contribution of the orthogonal transformation [to] be controlled continuously” by “selecting the quantization characteristics.” *Id.*, code (57).

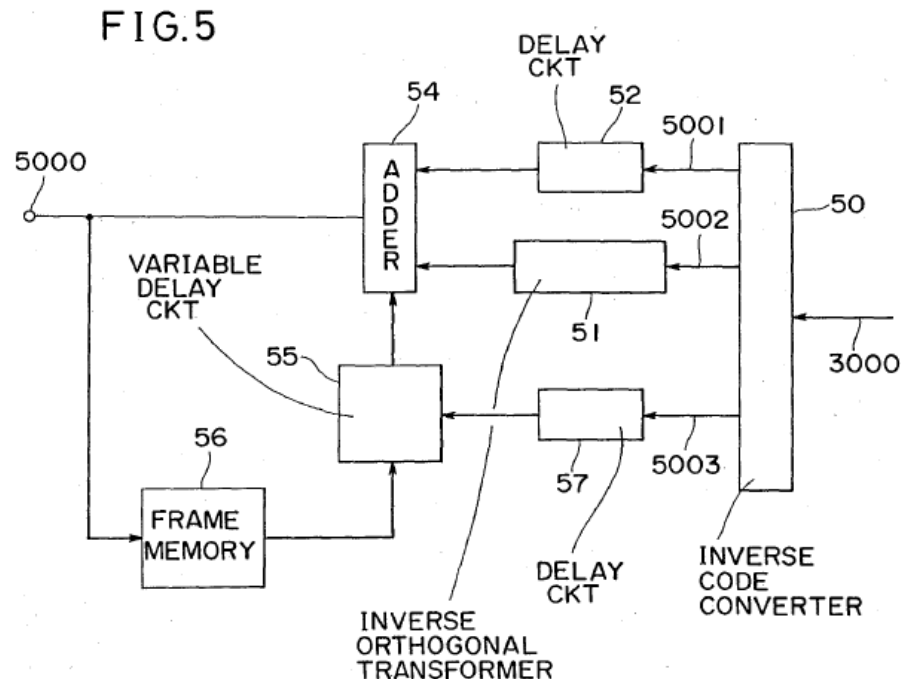
Koga Figure 3 is reproduced on the next page and shows a block diagram of an encoder.



Koga Figure 3, reproduced above, illustrates an encoder including “motion vector detector 10, delay circuits 11, 16, 23, 29, 31 and 32, subtracters 12 and 19, an orthogonal transformer 13, quantizers 14 and 17, an inverse orthogonal transformer 15,” and “a frame memory 21, a memory delay circuit 22, a code converter 26, and an encoding controller 27.” *Id.* at 4:34–41. Detector 102 can “detect the magnitude of velocity and direction . . . of an object” and then apply “the motion vectors detected to the variable delay circuit 22 and the delay circuit 23.” *Id.* at 4:44–49. “The variable delay circuit 22 is supplied with a locally decoded signal from the frame memory 21, and provides same with a delay according to the motion vector received, and then applies the output . . . to the subtracter 12 and the delay circuit 29.” *Id.* at 4:49–54. “The delay circuit 11 provides . . . a delay corresponding to the time period required to detect the motion vector at the detector 10, and applies the output . . . to the subtracter 12,” which “determines the difference between the two signals applied thereto, and outputs prediction error

signals which are applied to the delay circuit 16.” *Id.* at 4:57–64. Then, “[t]he output of the subtracter 12 undergoes orthogonal transformation . . . at the orthogonal transformer 13 on a block by block basis,” and “[t]he output of the orthogonal transformer 13 is then quantized at the quantizer 14, and thereafter fed to the inverse orthogonal transformer 15 and the code converter 26.” *Id.* at 4:64–5:7. The “delay circuit 16 serves to delay the prediction error signal applied thereto by a time duration which the orthogonal transformer 13 requires to process the incoming prediction error signal,” and the “subtracter 19 derives the difference between the outputs of the delay circuit 16 and the inverse orthogonal transformer 15.” *Id.* at 5:10–16. “The output of the subtracter 19 is quantized at the quantizer 17 which applies its output to the code converter 26 and to the adder 20,” and the “delay circuit 29 provides the prediction error signal, which is applied from the variable delay circuit 22, with a delay corresponding to the time period which the blocks 13 and 15 require to process the incoming signals and to generate the outputs.” *Id.* at 5:16–24.

Koga Figure 5 is reproduced on the next page and shows a block diagram of a decoder.



Koga Figure 5 illustrates a decoder including “an inverse code converter 50, two delay circuits 52 and 57, an inverse orthogonal transformer 51, an adder 54, a variable delay circuit 55, and a frame memory 56.” Ex. 1004, 6:27–33.

Transmission line 3000 feeds into inverse code converter 50, and outputs of the decoder are sent via lines 5001, 5002, and 5003. *Id.* Fig. 5, 6:34–7:19.

The block 51 inversely orthogonally transforms the decoded signal applied over the line 5002, wherein there is no problem if a signal to be fed to the de[la]y ci[r]cuit 52 is present in the signal fed to the transformer 51. Similarly, if the signal applied to the delay circuit 52 over the line 5001 includes a correctly decoded signal, then proper decoding operation is ensured. The input to the delay circuit 52 is delayed by a time which the inverse orthogonal transformer 51 requires for the operation thereof. The delay circuit 57 provides the decoded motion vector with the same delay as the delay circuit 52. The variable delay cir[c]uit 55 is supplied with the delayed motion vector and the output of the frame memory 56, and produces a prediction signal using the delay vector. The prediction signal is applied to the adder 54. The adder 54 further receives the outputs of the blocks 51 and 52d, and decodes the image signal which is applied

to an out[p]ut terminal and also to the frame memory 56. The frame memory 56 is sized to store one frame signal and outputs the preceding frame signal to the variable delay circuit 55. The variable delay circuit is arranged i[n] a similar manner as its counterpart provided in the encoder shown in FIG. 3.

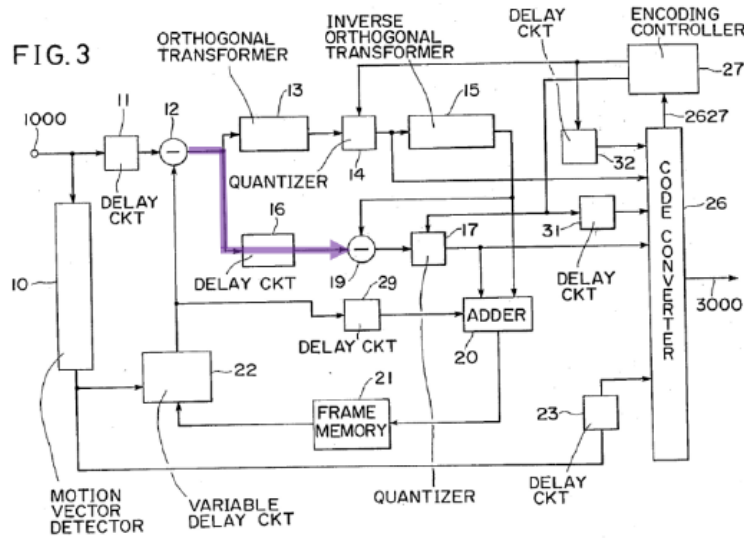
Id. at 7:20–43.

2. *Analysis of Claims 1, 5, 6, 8–13, 17, 18, 20, and 21*

Limitation 1a recites “calculating, by a processor, a difference signal representing differences between sample values of a predicted block of data and values for an original input block.” Ex. 1001, 8:48–50. Limitation 1c recites “performing, by a processor, spatial coding to the difference signal, thereby creating a second representation of a [second] component of the difference signal.” Ex. 1001, 8:54–56. Petitioner argues that Koga teaches limitations 1a and 1c. *See* Pet. 31–36, 39–43. However, based on the current record, we question the sufficiency of Petitioner’s argument that Koga performs spatial coding to the difference signal identified in its analysis of limitation 1a.

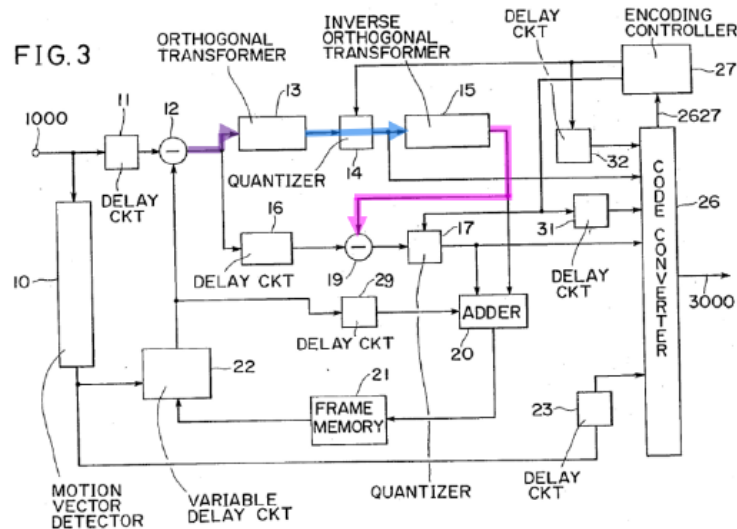
Specifically, Petitioner argues that Koga calculates the recited difference signal at subtracter 12. Pet. 31, 34. According to Petitioner, a person having ordinary skill in the art would have understood that the output of subtracter 12 (sometimes called the prediction error signal) is “the difference between an original frame of video (or a subunit of a frame of video, such as a block) and the corresponding predicted frame of video (or predicted block).” *Id.* at 31; *see also* Ex. 1004, 4:61–64 (“The subtracter 12 determines the difference between the two signals applied thereto, and outputs prediction error signals which are applied to the delay circuit 16.”).

An annotated version of Koga Figure 3 (Pet. 40), reproduced below, shows the difference signal generated by subtracter 12 going to delay circuit 16 and then as one input to subtracter 19.



Koga Figure 3 “shows in block diagram form an encoder.” Ex. 1004, 3:18–19. A purple line shows an output from subtracter 12 (the difference signal) passing through delay circuit 16 and being an input to subtracter 19. Ex. 1003 ¶ 111.

Petitioner further argues that the second input to subtracter 19 is a reconstructed prediction error. Pet. 40. This reconstructed prediction error is shown in an annotated version of Koga Figure 3 (Pet. 41), reproduced on the next page.



Koga Figure 3 “shows in block diagram form an encoder.” Ex. 1004, 3:18–19. A purple line has been added showing the path from subtracter 12 to orthogonal transformer 13. Ex. 1003 ¶ 112. A blue line has been added showing the output of orthogonal transformer 13 through quantizer 14 to inverse orthogonal transformer 15. *Id.* The output of inverse orthogonal transformer 15, a magenta line, is the second input to subtracter 19. *Id.* A person having ordinary skill in the art would have understood that the second input to subtracter 19 is a reconstructed approximation of the prediction error signal. *Id.* A person having ordinary skill in the art would also have understood that the inverse operation of inverse orthogonal transformer 15 would transform the quantized transform coefficients back to the spatial domain. *Id.* ¶ 113; *see also* Ex. 1005 ¶ 88.

Petitioner further argues that subtracter 19 is used to generate spatial samples, which are also referred to as the residual of the prediction error. Pet. 39, 41–42. According to Petitioner, the spatial samples undergo spatial coding by being quantized and then entropy coded:

Koga teaches performing . . . spatial coding to the difference signal. For example, Figure 3 discloses the spatial coding of *spatial samples produced at subtracter 19*. The spatial samples produced at

subtractor 19 are quantized at quantizer 17 and then entropy coded at the code converter 26 without transformation. *They are spatial coded because they are processed as-is: coded (quantized and entropy coded) in the spatial domain.*

Id. at 39 (citations omitted) (emphasis in original deleted, emphases added); *see also id.* at 41–42.

Based on the current record, we question the sufficiency of Petitioner’s argument. Koga quantizes and then entropy codes the residual of the prediction error (the output of subtracter 19). *See* Ex. 1004, Fig. 3; Ex. 1003 ¶¶ 114–115. And, according to the agreed-upon claim construction, such quantization and entropy coding can be a type of spatial coding. *See* Section II.C.1, *supra*. However, claim 1 requires “performing, by a processor, spatial coding *to the difference signal.*” Ex. 1001, 8:51–56 (emphasis added). Although the difference signal (the output of subtracter 12) is one of the inputs to subtracter 19, it is not the same of the output of subtracter 19, which Petitioner maps to the spatial samples that are spatially coded. *See* Ex. 1004, Fig. 3; *see also* Ex. 1003¶ 110. Accordingly, the spatial coding is not performed on the claimed “difference signal.” *See* Ex. 2001 ¶¶ 79–80. This is consistent with Petitioner’s own description of the output of subtracter 19 as different from the difference signal outputted from subtracter 12:

A [person having ordinary skill in the art] would have understood the foregoing thereby creat[es] a second representation of a second component of the difference signal, *because the encoded residual of the prediction error is the difference between the prediction error signal from subtracter 12 and the reconstructed prediction error signal from inverse orthogonal transformer 15.* [Ex. 1003] ¶ 114. Thus, it represents the component of the prediction error signal that was lost during transform coding—a second component that is not the first component transform coded as explained for limitation [1b].

Pet. 42–43 (original emphasis omitted, emphasis added) (footnote omitted)

Accordingly, based on the current record, we question the sufficiency of Petitioner’s arguments regarding claims 1 and dependent claims 5, 6, 8–12, which depend, directly or indirectly, from claim 1. Additionally, because Petitioner relies on its arguments for claim 1 for claim 13 (specifically, its arguments for limitation 1c to show that limitation 13c would have been obvious over Koga), for the same reasons, based on the current record, we question the sufficiency of Petitioner’s arguments regarding claims 13 and dependent claims 17, 18, 20, and 21, which depend from claim 13.⁸ *See* Pet. 46.

E. Obviousness over Koga and Lin

1. Overview of Lin

Lin is directed to a “video encoder” with an “adaptive quantization module [that] quantizes a block according to a quantization method adaptively determined based upon a block classification assigned by the region detection module.” Ex. 1005, code (57).

Figure 5 of Lin is reproduced on the next page.

⁸ Although claim 13 does not have a limitation which is substantially the same as limitation 1a, the undisputed construction of “the difference signal” for claim 13 incorporates the language of limitation 1a. *Compare* Ex. 1001, 8:48–50, with Section II.C.3

FIG. 5

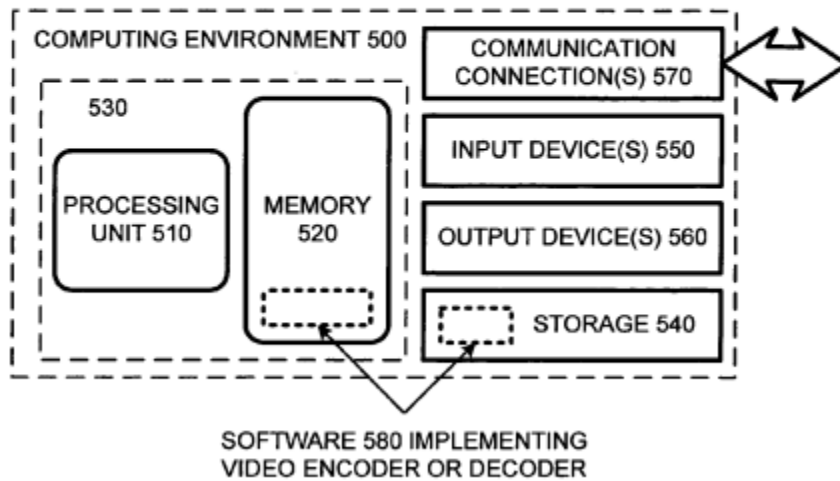


Figure 5 depicts a block diagram “of a suitable computing environment” for the described embodiments in Lin. Ex. 1005 ¶ 40. Figure 5 illustrates a “computing environment 500” that “includes at least one processing unit 510 and memory 520,” which “stores software 580 implementing a video encoder (with adaptive encoding options according to a perceptual model) or decoder.” *Id.* ¶ 52.

2. Analysis of Claims 2, 3, 7–9, and 12

Petitioner argues that claims 2, 3, 7–9, and 12 would have been obvious in view of the combination of Koga and Lin. *See* Paper 10, 2. Each of those claims depends, directly or indirectly, from claim 1. Ex. 1001; *see also* Paper 10, 4. Accordingly, we begin our analysis with independent claim 1.

Petitioner does not argue that Lin teaches any of the limitations recited in claim 1. *See* Paper 10, 4. Instead, Petitioner relies solely on Koga for the limitations recited in claim 1. Accordingly, for the reasons discussed above in Section II.D.2, we question the sufficiency of Petitioner’s arguments regarding

claim 1 and dependent claims 2, 3, 7–9, and 12, which depend, directly or indirectly, from claim 1.

3. Analysis of Claims 13–15 and 17–21

With respect to independent claim 13, Petitioner relies on Lin for “its computing environment includ[ing] a ‘processing unit,’ and ‘memory’ and ‘storage’ that each ‘stores instructions for the software 580 implementing the video encoder or decoder.’” Pet. 47; *see also id.* at 47–53. According to Petitioner, “[a person having ordinary skill in the art] would have been motivated to implement Koga’s codec using a processor and controller with memory communicatively connected thereto, and further including computer code for processing video data.” *Id.* at 48. In other words, in this combination, Petitioner relies only on Koga for “calculating . . . a difference signal” and “performing . . . spatial coding on the difference signal” as recited in claim 1. Accordingly, for the same reasons as discussed in Section II.D.2, we question the sufficiency of the argument that independent claim 13, along with dependent claims 14, 15, and 17–21, which depend, directly or indirectly, from claim 13, would have been obvious in view of Koga and Lin.

4. Analysis of Claim 39

a) Limitation 39pre: The Preamble

The preamble of claim 39 recites “[a] method.” Ex. 1001, 11:10. Petitioner argues that Koga teaches the preamble. *See* Pet. 67 (citing Pet. 31–36). For the reasons set forth below, based on the current record, we are sufficiently persuaded by Petitioner’s argument and evidence that Koga teaches the preamble,⁹

⁹ Because Petitioner has sufficiently shown that the prior art discloses the preamble, we need not determine at this time whether the preamble is limiting. *See Nidec*, 868 F.3d at 1017.

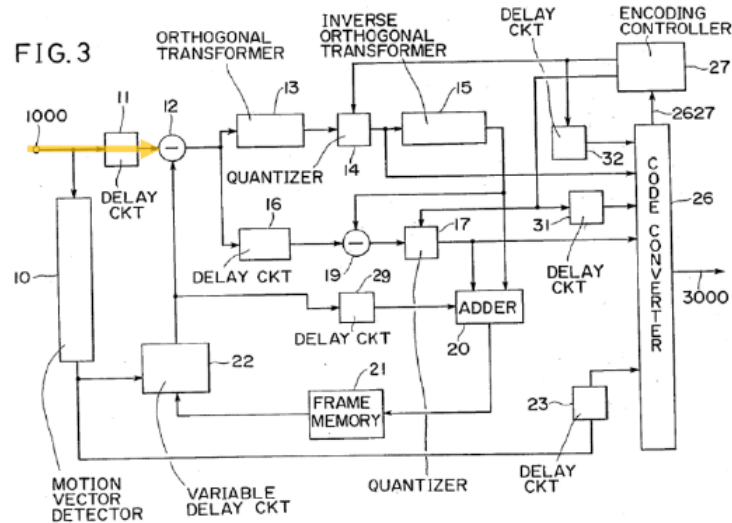
Koga is titled a “[*m*]ethod and arrangement of coding digital image signals.” Ex. 1004, code (54) (emphasis added); *see also id.* at 2:45–48 (“Therefore, an object of this invention is to provide a *method* of encoding digitized image signals using correlation between consecutive (sic) frames for data compression or redundancy reduction.” (emphasis added)).

Patent Owner does not address the preamble. *See* Prelim. Resp.

b) Limitation 39a: Calculating a Difference Signal

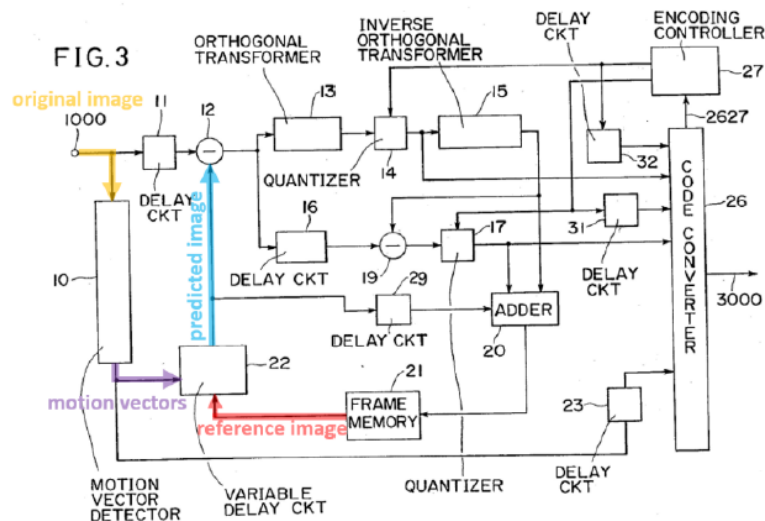
Limitation 39 recites “calculating, by a processor, a difference signal representing differences between sample values of a predicted block of data and values for an original input block.” Ex. 1001, 11:11–13. Petitioner argues that Koga teaches limitation 39a. *See* Pet. 67 (citing Pet. 31–36). For the reasons set forth below, based on the current record, we are sufficiently persuaded by Petitioner’s argument and evidence that Koga teaches limitation 39a.

A person having ordinary skill in the art “would have known that, in hybrid video coding, prediction error refers to the difference between an original frame of video (or a subunit of a frame of video, such as a block) and the corresponding predicted frame of video (or a predicted block).” Ex. 1003 ¶ 93; *see also id.* ¶¶ 93–94 (explaining same). A person having ordinary skill in the art would also have understood that the output of Koga’s subtracter 12 is the prediction error signal. *Id.* ¶ 95. Specifically, the first input to subtracter 12 is the original image signal. *Id.* ¶ 96; Ex. 1004 Fig. 3, 4:57–61. This is illustrated in the annotated version of Koga Figure 3 (Ex. 1003 ¶ 96), reproduced on the next page.



Koga Figure 3 “shows in block diagram form an encoder.” Ex. 1004, 3:18–19. The line from input terminal 1000 to delay circuit 11 and subtracter 12 has been identified with a yellow line. Ex. 1003 ¶ 96; *see also* Ex. 1004, 4:34–61 (identifying elements).

The second input to subtracter 12 is a predicted image, as shown in the annotated version of Figure 3 (Ex. 1003 ¶ 97), reproduced below.



Koga Figure 3 “shows in block diagram form an encoder.” Ex. 1004, 3:18–19. A yellow line shows the signal from input terminal 1000 to motion vector detector

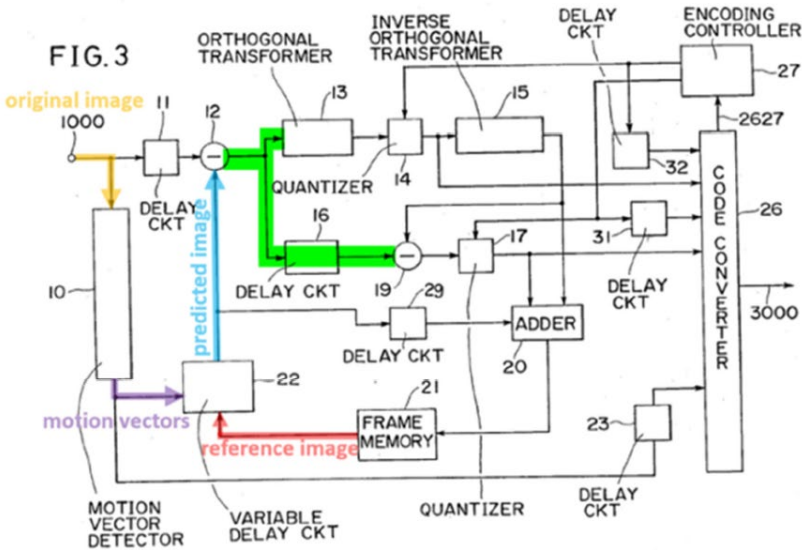
10. Ex. 1003 ¶ 97; Ex. 1004, 4:42–44, Fig. 3. A purple line labeled “motion vectors” is drawn from motion vector detector 10 to variable delay circuit 22. Ex. 1003 ¶ 97; Ex. 1004, 4:44–49, Fig. 3. Additionally, a red line labeled “reference image” shows that a reference image is transmitted from frame memory 21 to variable delay circuit 22. Ex. 1003 ¶¶ 97–99; Ex. 1004, 4:42–54, Fig. 3. Finally, a blue line labeled “predicted image” shows a predicted image being sent by variable delay circuit 22 to subtracter 12. Ex. 1003 ¶ 97; Ex. 1004, 4:49–54, Fig. 3.

A person having ordinary skill in the art would have understood that because the output of subtracter 12 is the difference between the original input (first input from input terminal 1000) and the predicted image (second input from variable delay circuit 22), it is a prediction error signal. Ex. 1003 ¶ 99; *see also* Ex. 1004, 4:61–64 (“The subtracter 12 determines the difference between the two signals applied thereto, and *outputs prediction error signals . . .*” (emphasis added)). In other words, the output is “a difference signal representing differences between sample values of a predicted block of data and values for an original input block” as recited in claim 1. *See* Ex. 1003 ¶¶ 92–93, 99.

Additionally, Koga teaches that this is performed by a processor. *See* Ex. 1004, 3:7–19 (describing Koga Figure 3 as showing “blocks, circuits or circuit elements”); Ex. 1003 ¶¶ 100–102, 191.

Although Patent Owner does not separately challenge limitation 39a, Patent Owner disputes Petitioner’s argument regarding limitation 1a, an argument which Petitioner relies upon to show limitation 39a is taught by the prior art. To provide guidance, we address those arguments.

Patent Owner provides an annotated version of Koga Figure 3 (Prelim. Resp. 29), reproduced on the next page.



Koga Figure 3 “shows in block diagram form an encoder.” Ex. 1004, 3:18–19.

Patent Owner annotated Koga Figure 3 above to include all of the annotations from both of Petitioner’s versions shown above. In addition, this figure shows the output of subtracter 12 (a green line) going to both delay circuit 16 and orthogonal transformer 13. Prelim. Resp. 29. According to Patent Owner, “Petitioner mischaracterizes the path of this signal as it relates to spatial coding ultimately pointing to a distinct signal as satisfying this same claim element.” *Id.*

Patent Owner’s argument is inapposite. Patent Owner does not dispute Petitioner’s characterization of the output of subtracter 12 as a difference signal. Prelim. Resp. 28–29. Instead, Patent Owner disputes what happens to that difference signal during the rest of the processing. *Id.* However, that eventual processing path has no bearing on whether the output of subtracter 12 is “a difference signal representing differences between sample values of a predicted block of data and values for an original input block” as recited in claim 39.

c) *Limitation 39b: Substituting Outlier Values*

Limitation 39b recites “substituting, by a processor, outlier values in the difference signal with non-outlier values to create a modified prediction error

signal.” Ex. 1001, 11:14–16. Petitioner argues that the combination of Koga and Lin teaches limitation 39b. *See* Pet. 67 (citing Pet. 53–57). For the reasons set forth below, based on the current record, we are sufficiently persuaded by Petitioner’s argument and evidence that the combination of Koga and Lin teaches limitation 39b.

Lin teaches that “[a] median filter tends to smooth residual information (removing isolated noise values) while at the same time preserving useful detail (such as edges) in the residual information.” Ex. 1005 ¶ 122. According to Lin, “[t]he smoothing adds redundancy, which makes subsequent lossless compression more efficient.” *Id.*

A person having ordinary skill in the art would have applied Lin’s median filter to Koga’s prediction error (the output of subtracter 12, as discussed above in Section II.E.4.b) to create a modified prediction error signal before performing additional coding, such as the transform coding at orthogonal transformer 13. Ex. 1003 ¶ 152. Applying Lin’s median filter to Koga’s prediction error would create a modified prediction error signal in which the data has been smoothed out. *Id.* ¶ 150.

Based on the current record, a person having ordinary skill in the art would have made that combination. Lin specifically states that its teaching can be used with other codecs besides the example shown in Lin’s figures. Ex. 1005 ¶ 50. Accordingly, a person having ordinary skill in the art working with Koga’s system would have looked to Lin to improve the efficiency of Koga’s encoding techniques. Ex. 1003 ¶ 154; *see also* Ex. 1005 ¶ 122 (stating that the median filter adds redundancy and improves efficiency). This is especially true given the age of Koga, which was filed in 1986, and the improvements that occurred between the mid-1980s and the relevant invention date of the mid-2000s. *Compare* Ex. 1004,

code 22 (Koga filing date of Mar. 19, 1986), *with* Ex. 1001, codes (22 and 60) ('991 filing date of Apr. 10, 2008 and provisional filing date of Apr. 12, 2007). Additionally, a person having ordinary skill in the art would have been able to combine the relevant teachings with a reasonable certainty of success. Ex. 1003 ¶¶ 140–141, 157–158.

Additionally, Koga teaches that this is performed by a processor. *See* Ex. 1004, 3:7–19 (describing Koga Figure 3 as showing “blocks, circuits or circuit elements”); Ex. 1003 ¶¶ 100–102.

Patent Owner argues that Petitioner has not sufficiently shown that a person having ordinary skill in the art “would have been motivated to combine Lin’s median filtering with Koga’s approach to prediction error coding.” Prelim. Resp. 34–35 (citing Ex. 2001 ¶ 82).

First, Patent Owner argues that “Petitioner’s first argument relies on the fact that Lin suggests combining its teachings with other video coding methods and the fact that Koga teaches a hybrid-video coding method.” Prelim. Resp. 35 (citing Pet. 55). According to Patent Owner, “this broad suggestion relied upon by Petitioner would provide a motivation to combine Lin with virtually all video codecs, as all modern codecs are hybrid codecs.” *Id.*

We do not agree with Patent Owner’s argument. Specifically, Petitioner’s argument is consistent with the law on obviousness. As the Supreme Court held in *KSR*, “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” 550 U.S. at 417. Accordingly, there is nothing improper with arguing that a person having ordinary skill in the art would apply the teaching from a reference with all other similar references in the field. *See id.* at 416 (“The

combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”), 417 (“If a person of ordinary skill in the art can implement a predictable variation, § 103 likely bars its patentability.”).

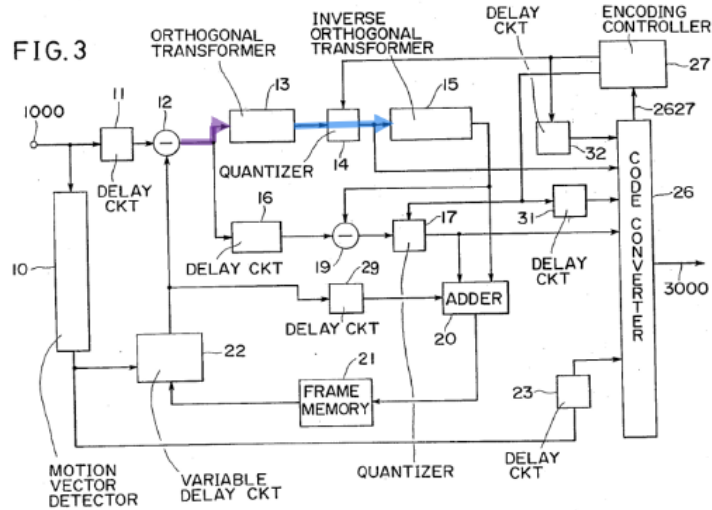
Second, Patent Owner argues that a person having ordinary skill in the art would not have looked to improve the efficiency of Koga’s coding technique. Prelim. Resp. 35–37. Specifically, Patent Owner argues that “Koga is not directed to improving the efficiency of video coding, but rather to providing a method to smoothly transition from transform to spatial coding of the prediction error.” *Id.* at 36 (citing Ex. 1004, 3:59–66). Patent Owner further argues that “Lin suggests a coding model where the median filter is only applied under certain conditions.” *Id.* (citing Ex. 2001 ¶ 84). According to Patent Owner, “[t]hese different purposes and structures would not lead a [person having ordinary skill in the art] to combine Lin and Koga.” *Id.* (citing Ex. 2001 ¶ 84). Patent Owner further argues that “because Koga already includes a solution for when the prediction error signal is not well correlated,” there was no need to modify Koga. *Id.* at 36–37.

We do not agree with Patent Owner’s argument. As we stated above, “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *KSR*, 550 U.S. at 417. Accordingly, there is nothing wrong with arguing that a person having ordinary skill in the art would apply the teaching from a reference with all other similar references in the field. *See id.* at 416–17. Nor does it matter that Koga may focus on a different coding issue or propose alternative solutions.

d) Limitation 39c: Performing One of Transform Coding or Spatial Coding

Limitation 39c recites “performing, by a processor, one of transform coding and spatial coding to the modified prediction error signal, creating one of a transform coded data and spatial coded data.” Ex. 1001, 12:1–4. Petitioner argues that Koga, as modified by Lin, teaches limitation 39c. *See* Pet. 68 (citing Pet. 36–39, 57–58). For the reasons set forth below, based on the current record, we are sufficiently persuaded by Petitioner’s argument and evidence that Koga, as modified by Lin, teaches limitation 39c. Specifically, as discussed below, the Koga, as modified by Lin, teaches transform coding.

As discussed in the previous section, the output from subtracter 12 is the prediction error signal. *See* Section II.E.4.b. When combined with Lin’s median filter, the difference signal is processed by a median filter to create the modified prediction error signal. *See* Section II.E.4.c. A person having ordinary skill in the art would understand that adding Lin’s median filter to Koga results in the modified prediction error signal being orthogonally transformed at orthogonal transformer 13, quantized at quantizer 14, and then entropy coded by the code converter 26. Ex. 1004, Figs. 3–4, 4:64–5:7; Ex. 1003 ¶¶ 104, 159–160. This is illustrated in an annotated version of Koga Figure 3 (Ex. 1003 ¶ 105), reproduced on the next page.



Koga Figure 3 “shows in block diagram form an encoder.” Ex. 1004, 3:18–19. A purple line has been added showing the path from subtracter 12 to orthogonal transformer 13. Ex. 1003 ¶ 105. A blue line has been added showing the output of orthogonal transformer 13 through quantizer 14. *Id.* Lin’s median filter (not shown) would have been placed between subtracter 12 and orthogonal transformer 13. *See* Section II.E.4.c.

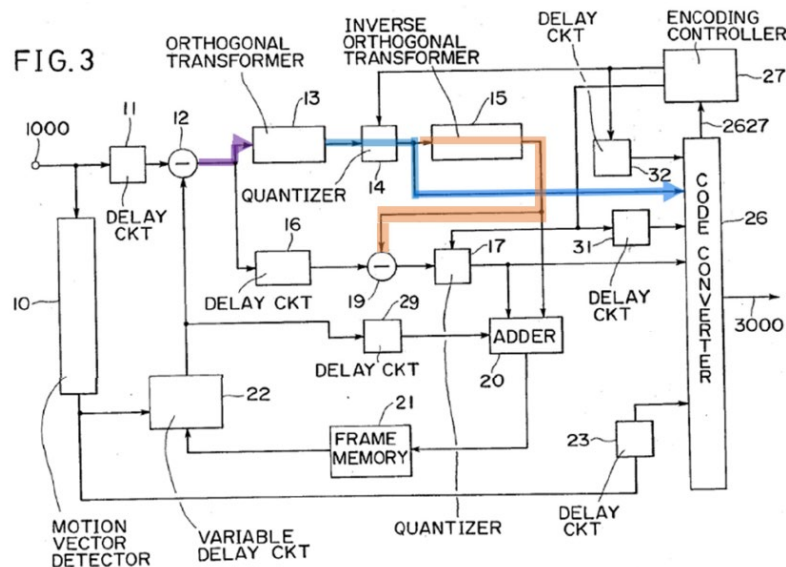
A person having ordinary skill in the art would have understood that Koga describes that the modified prediction error signal is orthogonally transformed at orthogonal transformer 13 using a Hadamard or discrete cosine transform and then quantized. Ex. 1004, 4:64–5:7; Ex. 1003 ¶¶ 105, 152. The output of orthogonal transformer 13 is encoded transform coefficients, which is a type of transform encoded data. Ex. 1003 ¶¶ 107, 193.

Additionally, Koga teaches that this is performed by a processor. *See* Ex. 1004, 3:7–19 (describing Koga Figure 3 as showing “blocks, circuits or circuit elements”); Ex. 1003 ¶¶ 100–102, 108.

Although Patent Owner does not separately challenged limitation 39c, Patent Owner disputes Petitioner's argument regarding limitation 1b, an argument which

Petitioner relies upon to show limitation 39c is taught by the prior art. To provide guidance, we address those arguments.

Specifically, Patent Owner argues that the Petition does not address the other outputs of quantizer 14. *See* Prelim. Resp. 30–31. As part of its argument, Patent Owner relies on an annotated version of Koga Figure 3 (Prelim. Resp. 30), reproduced below.



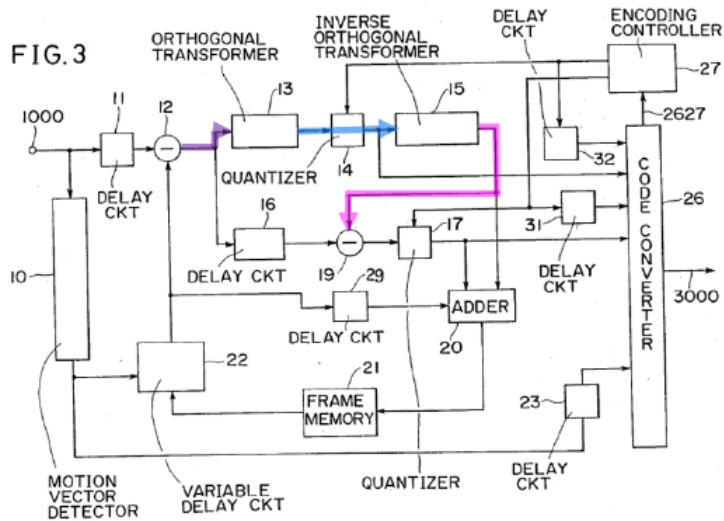
Koga Figure 3 “shows in block diagram form an encoder.” Ex. 1004, 3:18–19. Similar to the version reproduced by Petitioner, Patent Owner’s annotated version above includes a purple line from subtracter 12 to orthogonal transformer 13 and a blue line from orthogonal transformer 13 through quantizer 14 to coder converter 26. Prelim. Resp. 30. Patent Owner’s version also includes an orange line extending on a different path from quantizer 14 through inverse orthogonal transformer 15 to subtracter 19. *Id.* According to Patent Owner, “[s]ubtractor 19’s inputs are the original prediction error signal and the first representation of the difference signal.” *Id.* at 31. Patent Owner argues that Petitioner “fails to address how the subtraction of the prediction error signal and the first representation result in the original prediction error signal being spatially coded.” *Id.*

Patent Owner’s argument is inapposite. Patent Owner does not dispute Petitioner’s argument that Koga’s orthogonal transformer 13 causes the modified prediction error signal to be transformed as recited in claim 39. *See* Prelim. Resp. 30–31. Instead, Patent Owner disputes what happens to that during the rest of the processing. *Id.* However, that eventual processing path has no bearing on whether Koga’s processor performs “transform coding . . . to the modified prediction error signal” as recited in claim 39.

e) Limitation 39d: Inverse Coding

Limitation 39d recites “performing, by a processor, an inverse of the one of transform coding and spatial coding.” Ex. 1001, 12:5–6. Petitioner argues that Koga, as modified by Lin, teaches limitation 39d. *See* Pet. 68–69. For the reasons set forth below, based on the current record, we are sufficiently persuaded by Petitioner’s argument and evidence that Koga, as modified by Lin, teaches limitation 39d.

As discussed above in the previous section, the output from orthogonal transformer 13 is transform coded data. *See* Section II.E.4.d. An annotated version of Koga Figure 3 (Ex. 1003 ¶ 194) reproduced on the next page, shows a path of the transform coded data.



Koga Figure 3 “shows in block diagram form an encoder.” Ex. 1004, 3:18–19. A purple line shows that difference signal/modified prediction error signal extending from subtracter 12 to orthogonal transformer 13 (Lin’s median filter is not shown between subtracter 12 and orthogonal transformer 13). Ex. 1003 ¶ 194. The coded transform coefficients/transform coded data is shown in a blue line extending from orthogonal transformer 13 through quantizer 14 to inverse orthogonal transformer 15. *Id.* The output of inverse orthogonal transformer 15 (magenta) extends from inverse orthogonal transformer 15 to subtracter 19. *Id.* A person having ordinary skill in the art would have understood that inverse orthogonal transformer 15 performs inverse transform coding. *Id.* ¶¶ 113, 195.

Additionally, Koga teaches that this is performed by a processor. *See* Ex. 1004, 3:7–19 (describing Koga Figure 3 as showing “blocks, circuits or circuit elements”); Ex. 1003 ¶¶ 100–102, 194.

Patent Owner does not address this limitation. *See* Prelim. Resp.

f) *Limitation 39e: Applying the Other of Transform Coding and Spatial Coding*

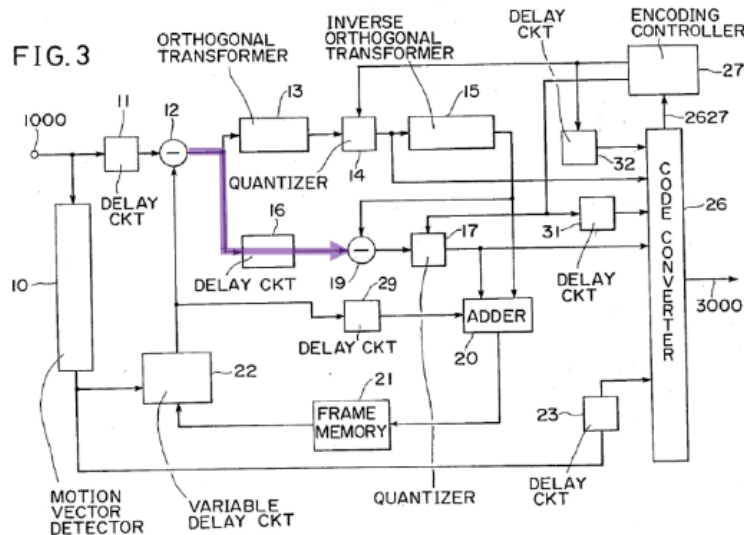
Limitation 39e recites “applying, by a processor, the other of transform coding and spatial coding to a residual from the inverse transform or spatial

decoding, creating the other of transform coded data and spatial coded data.”

Ex. 1001, 12:7–10. Petitioner argues that Koga, as modified by Lin, teaches limitation 39e. *See* Pet. 68 (citing Pet. 39–43). For the reasons set forth below, based on the current record, we are sufficiently persuaded by Petitioner’s argument and evidence that Koga, as modified by Lin, teaches limitation 39e. Specifically, as discussed below, Koga, as modified by Lin, teaches spatial coding (the other coding).

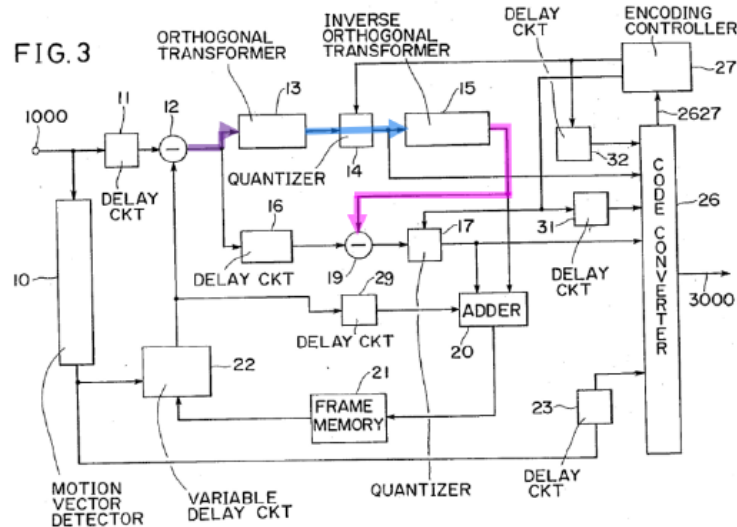
Koga teaches subtracter 19 has two inputs. Ex. 1003, Fig. 3; Ex. 1003 ¶¶ 111–112.

An annotated version of Koga Figure 3 (Ex. 1003 ¶ 111), reproduced below, shows that a first input to subtracter 19 is the modified prediction error signal from subtracter 12, as modified by Lin’s median filter. *See* Section II.E.4.c; Ex. 1003 ¶¶ 112–113.



Koga Figure 3 “shows in block diagram form an encoder.” Ex. 1004, 3:18–19. A purple line shows an output from subtracter 12 (the modified prediction error signal from Lin’s median filter, not shown) passing through delay circuit 16 and being an input to subtracter 19. Ex. 1003 ¶¶ 111, 192–193.

An annotated version of Koga Figure 3 (Ex. 1003 ¶ 112), reproduced below, shows a second input to subtracter 19.



Koga Figure 3 “shows in block diagram form an encoder.” Ex. 1004, 3:18–19. A purple line has been added showing the path from subtracter 12 to orthogonal transformer 13. Ex. 1003 ¶ 112. A blue line has been added showing the output of orthogonal transformer 13 through quantizer 14 to inverse orthogonal transformer 15. *Id.* The output of inverse orthogonal transformer 15, a magenta line, is the second input to subtracter 19. *Id.* A person having ordinary skill in the art would have understood that the inverse operation of inverse orthogonal transformer 15 would transform the quantized transform coefficients back to the spatial domain. *Id.* ¶¶ 113, 195; see also Ex. 1005 ¶ 88.

Subtractor 19 determines the residual of the inverse transform coding, which is the difference between the modified prediction error signal (the first input) and the inverse transform coding (the second input). Ex. 1003 ¶¶ 114, 192–195; Ex. 1004, Fig. 3, 5:14–16. The residual is then quantized (quantizer 17) and entropy coded (code converter 26), which a person having ordinary skill in the art

would understand to be spatial coding. Ex. 1003 ¶¶ 110, 115, 192–195; Ex. 1004, Fig. 3, 5:16–19.

Additionally, Koga teaches that this is performed by a processor. *See* Ex. 1004, 3:7–19 (describing Koga Figure 3 as showing “blocks, circuits or circuit elements”); Ex. 1003 ¶¶ 100–102, 117.

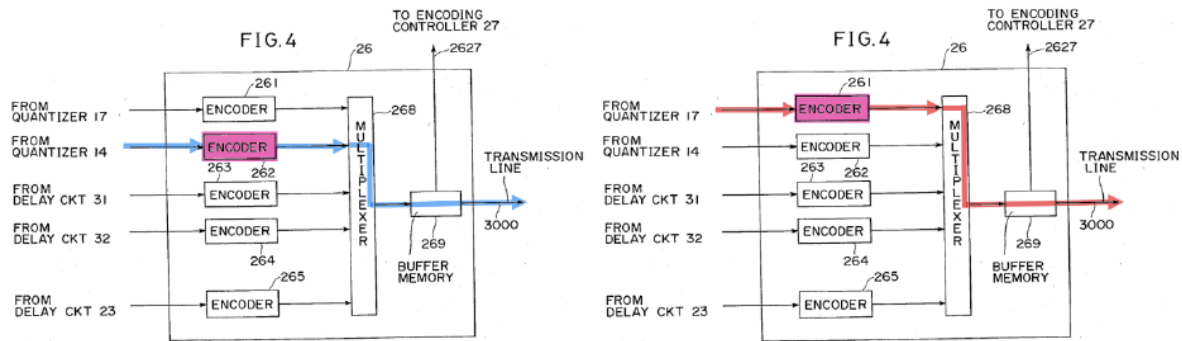
Although Patent Owner does not separately challenged limitation 39e, Patent Owner disputes the Petitioner’s argument regarding limitation 1c, an argument which Petitioner relies upon to show limitation 39e is taught by the prior art. To provide guidance, we address those arguments when applied to the language of limitation 39e.

Patent Owner’s argument regarding limitation 1c focuses on the requirement that a processor perform “spatial coding to the difference signal.” Prelim. Resp. 31–33. Because limitation 39e does not have a corresponding requirement, Patent Owner’s argument is inapposite.

g) Limitation 39f: Joining Transform Coded Data and Spatial Coded Data

Limitation 39f recites “joining, by a processor, the transform coded data and the spatial coded data to form a coded prediction error signal.” Ex. 1001, 12:11–12. Petitioner argues that Koga, as modified by Lin, teaches limitation 39f. *See* Pet. 69 (citing Pet. 43–44). For the reasons set forth below, based on the current record, we are sufficiently persuaded by Petitioner’s argument and evidence that Koga, as modified by Lin, teaches limitation 39f.

Two different annotated versions of Koga Figure 4 side-by-side (Ex. 1003 ¶ 119) are reproduced on the next page.



Koga Figure 4 shows the details of code converter 26. Ex. 1004, 5:60–61. The inputs of code converter 26 are from quantizer 17, quantizer 14, delay circuit 31, delay circuit 32, and delay circuit 23, each of which is coupled to an encoder. *Id.* at 5:41–44, 5:61–68, Fig. 4. In the annotated version of Figure 4 on the left, the output from quantizer 14 (the transform coded data) is shown by a blue line passing through encoder 262 (purple), multiplexer 268, buffer memory 269, and transmission line 3000. Ex. 1003 ¶¶ 119, 192–193, 196. In the annotated version of Figure 4 on the right, the output from quantizer 17 is shown by a red line passing through encoder 261 (purple) (where it is now spatial coded data (*see* Section II.E.4.f)), multiplexer 268, buffer memory 269, and transmission line 3000. *Id.*

The transform coded data and the spatial coded data are joined with other inputs. Ex. 1004, 6:15–22, Fig. 4; Ex. 1003 ¶¶ 120, 192–193, 196. Because the encoded output comprises the full prediction error signal, a person having ordinary skill in the art would have understood the joined transform coded data and spatial coded data to form a coded prediction error signal. Ex. 1003 ¶¶ 121, 196.

Additionally, Koga teaches that this is performed by a processor. *See* Ex. 1004, 3:7–19 (describing Koga Figure 3 as showing “blocks, circuits or circuit elements”); Ex. 1003 ¶¶ 100–102, 122.

Patent Owner does not address this limitation. *See* Prelim. Resp.

h) Limitation 39g

Limitation 39g recites “at least one of transmitting or storing the coded prediction error signal.” Ex. 1001, 12:13–14. Petitioner argues that Koga, as modified by Lin, teaches limitation 39g. *See* Pet. 69 (citing Pet. 45–46). For the reasons set forth below, based on the current record, we are sufficiently persuaded by Petitioner’s argument and evidence that Koga, as modified by Lin, teaches both aspects of limitation 39g.

Koga teaches that the prediction error signal is transmitted along transmission line 3000 from code converter 26 to inverse code converter 50. Ex. 1003 ¶¶ 124, 196; Ex. 1004, 6:15–26, Figs. 3–6. Koga also teaches storing the prediction error signal. Ex. 1003 ¶¶ 125, 196; Ex. 1004, 6:15–26.

Patent Owner does not address this limitation. *See* Prelim. Resp.

i) Conclusion Regarding Claim 39

Based on the current record, there is a reasonable likelihood that Petitioner will prevail in demonstrating that claim 39 would have been obvious over the combination of Koga and Lin.

F. Obviousness over (1) Koga and Narroschke and (2) Koga, Lin, and Narroschke

1. Overview of Narroschke

Narroschke “relates to a method for coding a video signal using hybrid coding.” Ex. 1006, code (57). Narroschke “establish[es] a prediction error signal” and “decid[es] whether to transform the prediction error signal into the frequency domain, or to maintain the prediction error signal in the spatial domain for encoding.” *Id.*

2. Analysis of Claims 8, 9, 20, and 21

Because Petitioner demonstrates a reasonable likelihood of success in proving that at least one claim of the ’991 patent is unpatentable, we institute on all

grounds and all claims raised in the Petition. *See* 37 C.F.R. § 42.108(a).

Therefore, at this stage of the proceeding, it is not necessary for us to provide an assessment of every challenge raised by Petitioner, especially, as in this case, when Patent Owner does not provide a response to those claims. Patent Owner does not separately address Petitioner’s arguments regarding claims 8, 9, 20, and 21. Those challenges, in our view, are best left for trial after full development of the record. However, we note that because we question the sufficiency of the evidence regarding claims 1 and 13, from which claims 8, 9, 20, and 21 depend, we similarly question the sufficiency of the evidence regarding claims 8, 9, 20, and 21.

III. BACK-UP COUNSEL

Our rules require that “[i]f a party is represented by counsel, the party must designate a lead counsel and at least one back-up counsel who can conduct business on behalf of the lead counsel.” 37 C.F.R. § 42.10(a). Although Patent Owner purported to identify two back-up counsel in its Mandatory Notices and Power of Attorney, the back-up counsel are not authorized to practice before the PTAB. *See* Paper 5; Paper 6 (Power of Attorney). Within five (5) business days, counsel shall either (1) file a motion for admission *pro hac vice* for at least one of the attorneys identified as back-up counsel, (2) file updated notices and a power of attorney identifying a back-up counsel and, if necessary, move for the admission of that attorney *pro hac vice*, or (3) file a motion establishing good cause to proceed without back-up counsel. *See* 37 C.F.R. §42.10.¹⁰

¹⁰ Counsel is reminded that 37 C.F.R. § 42.10 was amended on October 24, 2024. *See* Expanding Opportunities to Appear Before the Patent Trial and Appeal Board, 89 Fed. Reg. 82,172 (Oct. 24, 2024).

IV. CONCLUSION

Following § 314, because the totality of the information presented at this stage shows there is a reasonable likelihood that Petitioner would prevail with respect to at least one of the claims challenged in the Petition, we institute on all grounds raised and all claims challenged in the Petition.

Our factual findings, conclusions of law, and determinations at this stage of the proceeding are preliminary, and based on the evidentiary record developed thus far. This is not a final decision as to the patentability of claims for which *inter partes* review is instituted. Our final decision will be based on the record as fully developed during trial.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review is instituted for the challenged claims of the '991 patent on the unpatentability grounds asserted in the Petition as clarified in Paper 10;

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

FURTHER ORDERD that Patent Owner shall properly designate back-up counsel within five (5) business days.

IPR2024-00921
Patent 8,077,991

FOR PETITIONER:

Harper Batts
Chris Ponder
Jeffrey Liang
SHEPPARD, MULLIN, RICHTER & HAMPTON LLP
hbatts@sheppardmullin.com
cponder@sheppardmullin.com
jliang@sheppardmullin.com

FOR PATENT OWNER:

Scott W. Hejny
MCKOOL SMITH P.C.
shejny@McKoolSmith.com