UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,

Petitioner,

v.

ADVANCED CODING TECHNOLOGIES, LLC,

Patent Owner.

Patent No. 8,090,025
Filing Date: April 17, 2007
Issue Date: January 3, 2012

Inventor: Satoru Sakazume
Title: MOVING-PICTURE CODING APPARATUS, METHOD AND PROGRAM, AND MOVING-PICTURE DECODING APPARATUS, METHOD AND PROGRAM

PATENT OWNER'S PRELIMINARY RESPONSE

Case No. IPR2024-00374

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37 C.F.R. § 42.104(3) 16

LIST OF EXHIBITS

Exhibit No.	Description of Document
2001	Fourth Amended Docket Control Order, Dkt. 93, *Advanced Coding Techs. LLC v. LG Elecs. Inc.*, Case No. 2:22-cv-00501-JRG (E.D. Tex. March 11, 2024)
2002	Defendants' Joint Patent L.R. 3-3 Invalidity Contentions and Subject Matter Ineligibility Contentions, *Advanced Coding Techs. LLC v. LG Elecs. Inc.*, Case No. 2:22-cv-00501-JRG (E.D. Tex.), served Feb. 21, 2024
2003	Joint Claim Construction and Prehearing Statement, Dkt. 87, *Advanced Coding Techs. LLC v. Samsung Elecs. Co.*, Case No. 2:22-cv-00499-JRG (E.D. Tex.), filed March 5, 2024
2004	U.S. Patent No. 8,090,025 to Sakazume (the '025 Patent), issued January 3, 2012, with Certificate of Correction, signed and sealed October 4, 2022
2005	"Improvement of DCT-based Compression Algorithms Using Poisson's Equation," Katsu Yamatani and Naoki Saito, Senior Member, IEEE, pp. 1-38, September 12, 2005

I. INTRODUCTION

On January 8, 2024, Samsung Electronics Co., Ltd. ("Petitioner" or "Samsung") submitted a Petition (Paper 2, "Petition" or "Pet.") to institute *inter partes* review ("IPR") of U.S. Patent No. 8,090,025 (Ex. 1001, the "'025 Patent"), challenging Claims 1-10 (the "Challenged Claims"). The Petition asserts that Claims 1-10 are rendered obvious over Al-Mualla, et al., "Video Coding for Mobile Communications: Efficiency, Complexity and Resilience," Elsevier, 2002 ("Ex. 1005" or "Mualla"), S. Shirani, et al., "A Concealment Method for Video Communications in an Error-Prone Environment," in IEEE Journal on Selected Areas in Communications, vol. 18, no. 6, pp. 1122-1128, June 2000 ("Ex. 1006" or "Shirani"), N. Saito, et al., "The Polyharmonic Local Sine Transform: A New Tool for Local Image Analysis and Synthesis without Edge Effect," Applied and Computational Harmonic Analysis, vol. 20, pp. 41-73, January 2006 ("Ex. 1007" or "Saito"), and T. Stockhammer, et al., "H.264/AVC in Wireless Environments," in IEEE Trans. on Circuits and Systems for Video Tech., vol. 13, no. 7, July 2003 ("Ex. 1009" or "Stockhammer"). Pet. at 1. The Board should deny the Petition for at least the reasons described briefly below.

Petitioner fails to show that any combination of Mualla, Shirani, Saito, and Stockhammer discloses at least "the input signal being obtained by multiplexing a coded bitstream obtained by predictive coding, border motion-vector data and post-

quantization data obtained by quantization in the predictive coding," "obtaining a boundary condition of each of a plurality of borders between the rectangular zones and another plurality of rectangular zones adjacent to the rectangular zones," "finding a border, of the reference picture, having a boundary condition that matches the boundary condition, by motion-vector search in the reference picture," "and generating the border motion-vector data that is data on a motion vector from a border of the rectangular zone in the picture to be coded to the border of the reference picture thus found, defining a boundary condition of a border that corresponds to the border motion vector data, from the reference picture based on the border motion-vector data," "and generating an estimated video signal in each rectangular zone in the picture to be coded, that satisfies Poisson's Equation, thus producing the predictive picture," "an entropy decoder to perform entropy decoding to the data thus demultiplexed to generate, at least, motion-vector data, the post-quantization data, the border motion-vector data and parameter data required for constructing a specific syntax structure," "a zone-border motion compensator to define a boundary condition of a border that corresponds to the border motion vector data, from the reference picture based on the border motion-vector data, and generate an estimated video signal in each rectangular zone in the picture to be coded, that satisfies Poisson's Equation, thus producing a first predictive picture," "a motion compensator to specify a corresponding rectangular zone in the reference picture

based on the motion-vector data, thus generating a second predictive picture," "a selector to select either the first predictive picture or the second predictive picture and supply the predictive picture thus selected to the combiner," and "a decoding controller to receive decoding control data for decoding control from the parameter data and control the selector to switch the predictive picture to be supplied to the combiner between the first and second predictive pictures according to the decoding control data," as required by the Challenged Claims.

First, the Petition is deficient because it does not show that the claim limitation of "border motion-vector data" is properly construed. Specifically, Petitioner incorrectly proposes that the "border motion-vector term" is met by Shirani's disclosure of "motion vectors of available neighboring blocks" but Shirani is silent regarding whether the motion vectors of available neighboring blocks are at a border, let alone determining a "best-matched border in the reference picture," as required by a proper construction of "border motion-vector data." Further, Shirani explicitly teaches away from "edge-based methods" as being "computationally more intensive."

Second, Petitioner's proposed combination of Mualla, Shirani, Saito, and Stockhammer cannot disclose the claimed "boundary condition" since "border motion-vector data . . . defin[es] a boundary condition and the combination of Mualla, Shirani, Saito, and Stockhammer does not disclose "border motion-vector

data."

Third, the Petition does not show that the claim limitation of "satisfies Poisson's Equation" is properly construed. Specifically, the Petition is deficient because Saito is directed to using Polyharmonic Local Cosine Transform (PHLCT) as a mathematical solution of Poisson's Equation that runs contrary to the word, "satisfies," which includes "***without mathematically solving*** Poisson's Equation with a huge amount of calculation" and because the Petition fails to describe the source term that is required by one side of Poisson's Equation, whether mathematically solved or conceptually analyzed.

Fourth, the Petition is deficient because its proposed combination does not disclose two different motion compensation models in the same system or demonstrate a motivation to combine references to create a system with two different motion compensation models, and therefore cannot disclose a "***second*** predictive picture" that is the result of a second motion compensation model in the same system as the first motion compensation model.

Fifth, the Petition is also deficient because Petitioner fails to show how any of the cited references, alone or in combination, discloses "a selector to select either the first predictive picture or the second predictive picture." Instead, Petitioner relies on vague citations to various references (Mualla, Girod, and Stockhammer) and illogical leaps to assume that its proposed combination discloses two motion

compensation models that work one at a time depending on a certain amount of error. However, there is no implication about switching from traditional motion compensation to error concealment motion compensation, let alone the required selecting between two predictive pictures that are output from each of the two motion compensation systems. Further, even if switching between normal decoding and error concealment were disclosed, for the same reasons as Stockhammer, if only one motion compensation technique is used (i.e., normal decoding versus error concealment), then there can be no selection between predictive pictures because only one predictive picture is generated from the chosen motion compensation technique. Both motion compensation techniques (i.e., the claimed "zone-border motion compensator" and the claimed "motion compensator") need to be used such that both first and second predictive pictures are available to select from.

Sixth, the Petition is deficient because, to the extent control data that controls the switches of Mualla and Stockhammer exist, control data is only selecting which motion compensation technique to use rather than applying both techniques, such that two predictive pictures can be generated and a selection can be made between the two, as required by the claim language. "a decoding controller to receive decoding control data for decoding control from the parameter data and ***control the selector to switch the predictive picture to be supplied*** to the combiner between the first and second predictive pictures according to the decoding control data."

The Board also has several grounds by which it should exercise its discretion to deny the Petition.

First, the Board should exercise its discretion to deny the Petition in view of Petitioner's failure to address the '025 Patent in its corrected form (including the '025 Patent's Certificate of Correction) pursuant to 35 U.S.C. § 255.

Second, the Board should also exercise its discretion to deny the Petition pursuant to 35 U.S.C. § 325(d) since the '025 Patent's Examiner considered substantially the same art as Saito by the same author (noted as Saito-2005), which was even cited to by Saito in the section relied upon by Petitioner. Moreover, Petitioner is using Saito to present substantially the same argument as Saito-2005 during prosecution with respect to the recited "generat[ing] an estimated video signal in each rectangular zone in the picture to be coded, that satisfies Poisson's Equation, thus producing a first predictive picture."

Third, the Board should further exercise its discretion to deny the Petition under 35 U.S.C. § 314(a) for at least the following reasons: (i) a parallel District Court Litigation (defined below) exists between the same parties or real-parties-in-interest; (ii) the District Court Litigation involves the same subject patent (the '025 Patent) with substantially the same claims; (iii) the District Court's trial will be ***over nine months before*** the projected statutory deadline; (iv) the parties have heavily invested in the District Court Litigation and a trial date is set for October 7, 2024;

and (v) there is no stay of the parallel District Court Litigation.

II. THE ’025 PATENT

The ’025 Patent relates to encoding and decoding video information by using a boundary condition obtained between blocks, or pieces, of the individual images that comprise a video. ’025 Patent, 1:18-22. The ’025 Patent discusses problems with motion compensation known in the prior art at the time. For example, pictures can be divided into blocks but objects inside these blocks do not always stay the same as they move: objects can move more than expected, objects can deform as they move, or objects can disappear or appear between frames. *Id.*, 1:28-54. The ’025 Patent describes an existing solution, which was to use a filter to “adaptively smooth” the data on the border of the blocks to compensate for motion. *Id.*, 1:55-2:26. According to the ’025 Patent, this known “smoothing filter” has disadvantages, including doing too much smoothing, which results in lower texture quality in an image block. *Id.*

Rather than using a smoothing filter on the borders of the blocks, the ’025 Patent discusses a “zone border motion compensator” that estimates a predictive picture based on matching “boundary conditions.” *Id.*, 2:30-67.

The ’025 Patent’s boundary condition is based on border motion-vector data, which is defined in the ’025 Patent:

> [Z]one-border motion-vector data **1407** [] is a difference in spatial position between the border of the block that is the object to be predicted **1403** in the picture to be coded

> **1402** and the best-matched border **1406** in the reference picture **1402**.

'025 Patent, 11:15-19.

The '025 Patent's zone border motion compensation produces a predictive picture maintaining smooth continuity of a video signal. *Id.*, 11:56-12:11. This predictive picture is an estimated signal generated through applying a source model with a boundary condition to Poisson's Equation, where the source model is provided by the system and based on the way local values change in the actual signal, and the boundary condition represents data related to pixels for the estimated signal that are used by the equation to solve for the estimated signal. *Id.*, 11:39-12:3, 14:12-52. Matching both the boundary condition and the source model results in a smooth estimated signal at the boundary that was solved for. *Id.*

The preferred embodiment of the '025 Patent explicitly confirms that the word "satisfies . . ." indicates using ***the concept*** of Poisson's Equation ***analytically***, not necessarily implementing a mathematical algorithm that actually computes Poisson's Equation:

> "Obtained next is an estimated signal in a block to an original signal ***with the concept of Poisson's Equation***."

'025 Patent, 14:12-13 (emphasis added).

> Accordingly, this embodiment implements the source model in generation of an estimated signal in a block ***analytically without mathematically solving*** Poisson's

> Equation with a huge amount of calculation.

Id., 11:66-12:3 (emphasis added).

The ’025 Patent describes that “satisfies Poisson’s Equation” only means that the Laplacian of the estimated video signal ‘u’ may be represented as an expression of ‘*Kj’* with one example being a DCT-series representation of the estimated signal, as below:

> The estimated signal ‘u’ in a block can be expressed as an expression (5) with Neumann’s boundary condition and DCT series representation, which is given by addition of DCT-series expanded components of the estimated signal from each border, as indicated by an expression (6).

$$u(x, y) = u^{(1)}(x, y) + u^{(2)}(x, y) + u^{(3)}(x, y) + u^{(4)}(x, y)$$
$$= \sqrt{\frac{2}{N}} \sum_{k=1}^{N-1} \lambda_k \{(G_k^{(1)} \psi_k(y-1) + G_k^{(2)} \psi_k(y)) \cos \pi k x +$$
$$(G_k^{(3)} \psi_k(x)) \cos \pi k y\} + C,$$

in which C is a constant, and

$$\psi_k(t) = \begin{cases} \frac{t^2}{2} \cdots k = 0 \\ \frac{\cosh \pi k t}{\pi k \sinh \pi k} \cdots k \neq 0 \end{cases} \quad (5)$$

$$u^{(1)}(x, y) := \sqrt{\frac{2}{N}} \left(\frac{G_0^{(1)}}{\sqrt{2}} \frac{(y-1)^2}{2} + \sum_{k=1}^{N-1} G_k^{(1)} \frac{\cosh \pi k (y-1)}{\pi k \sinh \pi k} \cos \pi k x \right) \quad (6)$$

Id., 14:19-45. The ’025 Patent specification then states that such a generation method is “just an example.”

> The zone-border motion compensator 119 in the first embodiment obtains a predictive signal (an estimated

> signal) with u(x, y) according to the expression (5). This predictive signal (estimated signal) generation method is ***just an example***, and hence the present invention is not limited to this generation method. In other words, ***u(x, y) can be obtained by any higher-speed calculation method that satisfies Δuj = Kj***.

'025 Patent, 14:47-53 (emphasis added). In other words, any generation method that results in the representation of the Laplacian of 'u' as an expression of '*Kj,*' a source term based on boundary condition(s), "satisfies" Poisson's Equation instead of mathematically solving Poisson's Equation.

III. THE ALLEGED PRIOR ART

A. Mualla

Mualla is directed to "mobile multimedia communications," which have "many technologically demanding problems [that] need to be solved before real-time mobile video communications can be achieved. When such challenges are resolved, a wealth of advanced services and applications will be available to the mobile user." Ex. 1005, 9. Mualla "concentrates on three main challenges" of "[h]igher coding efficiency," "[r]educed computational complexity," and "[i]mproved error resilience." *Id.*

Mualla describes a "typical video codec," as shown below:

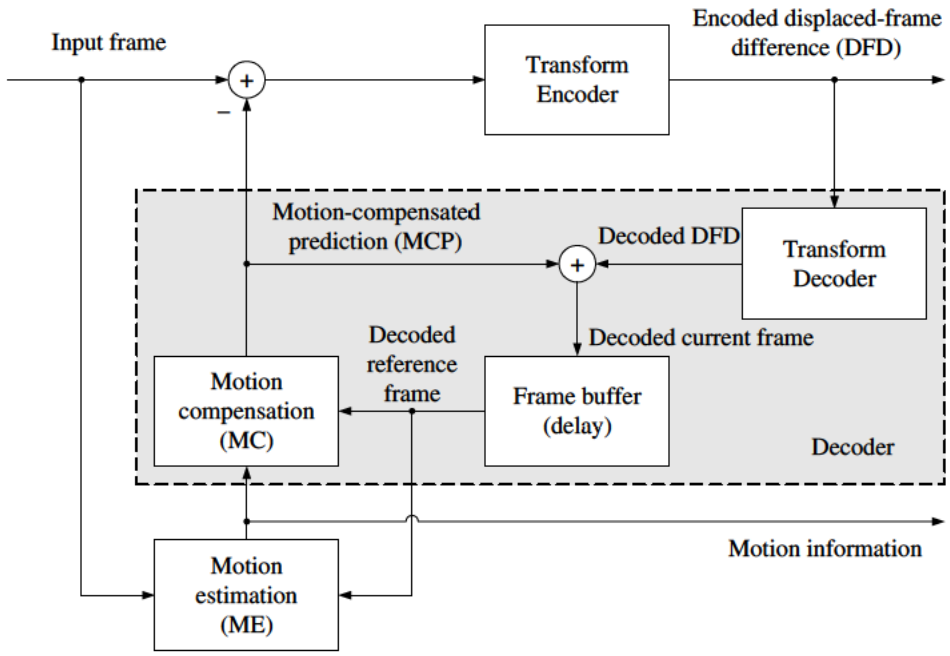

Figure 1.1: Typical video codec

Ex. 1005, Fig. 1.1. Mualla also discloses "motion-compensated error concealment" as a possible adaptation to the "typical video codec," but not as an integration with such a codec. *See Id.*, 27 ("Careful examination of this [typical] codec (as will be detailed in subsequent chapters) reveals that a *motion-based approach* can be adopted to provide suitable solutions for the three challenges of higher coding efficiency, reduced complexity, and error resilience.").

In describing its motion-compensated error concealment, Mualla explains that "[w]hen an error is detected, the decoding process is stopped, the decoder searches for the next synchronization codeword, and decoding is resumed. All macroblocks between the point where the error was detected and the synchronization point are

marked as damaged macroblocks." *Id.*, 265.

B. Shirani

Shirani "propose[s] a two-stage error-concealment method for block-based compressed video which was transmitted in an error-prone environment. In the first stage, we obtain initial estimates of the missing blocks. If the motion vectors associated with the missing blocks are available, motion compensation is used to provide good estimates. Otherwise, a novel algorithm which preserves image continuity is used to estimate the blocks. In the second stage, a maximum *a posteriori* (MAP) estimator, which employs an adaptive Markov random field (MRF) as the image *a priori* model, is used to improve the video reconstruction quality." Ex. 1006, 1.

Shirani discloses "motion vectors of available neighboring blocks" in order to "obtain an initial estimate of [a] missing block that smoothly connects to the rest of the image" by selecting a block that "minimizes the squared sums of border errors." *See id.*, 3.

Shirani describes a system that is different from "edge-based methods" that are "computationally more intensive":

> In [4], each pixel in a damaged block is interpolated from the corresponding pixels in its four neighboring blocks such that the total squared border error is minimized. In [5] and [6], the missing information is interpolated utilizing spatially correlated edge information from a large

> local neighborhood. Note that ***although these edge-based methods are generally more accurate than other approaches, they are computationally more intensive. In [7], a computationally simple, spatial directional interpolation scheme has been proposed***.

Id., 1 (emphasis added).

C. Saito

Saito "introduce[s] a new local sine transform that can completely localize image information both in the space domain and in the spatial frequency domain." Ex. 1007, Abstract.

Part of Saito's disclosure relates to using Polyharmonic Local Cosine Transform (PHLCT) as a mathematical solution of Poisson's Equation, and specifically, explaining that the polyharmonic component is "obtained by solving the elliptic boundary value problem associated with the so-called polyharmonic equation (e.g., Laplace's equation, biharmonic equation, etc.) given the boundary values." *Id.*, Abstract, 4. Saito further explains that "we shall ***solve*** the following Poisson equation with the Neumann boundary condition" and even that "this method of course requires to estimate the first order normal derivative of data at the boundary." *Id.*, 27. Saito's requirement to perform complex mathematics in order to "solve" for Poisson's equation stems from its citation to Saito-2005 (considered during prosecution of the '025 Patent), as shown below:

6.2.2. Use of the Neumann boundary condition

It is possible to use the *Neumann boundary condition* instead of the Dirichlet condition in (3). This will give us the $O(\|k\|^{-4})$ decay rate of the v_j components instead of $O(\|k\|^{-3})$ in the case of the Dirichlet boundary condition. To do so, we need to modify (3); we shall solve the following *Poisson equation* with the Neumann boundary condition:

$$\begin{cases} \Delta u_j = K_j & \text{in } \Omega_j, \\ \frac{\partial u_j}{\partial \nu} = \frac{\partial f_j}{\partial \nu} & \text{on } \partial\Omega_j, \end{cases} \tag{13}$$

where K_j is a constant that needs to be computed as follows:

$$K_j = \frac{1}{|\Omega_j|} \int_{\partial\Omega_j} \frac{\partial f_j}{\partial \nu} \, ds,$$

which is the boundary integral of $\partial f_j / \partial \nu$ normalized by $|\Omega_j|$ (the volume of the domain). This constant K_j is necessary for (13) to have a unique solution (modulo an additive constant); see, e.g., [43, p. 84]. The solution u_j is not just a function having the same normal derivative at the boundary with the original function f_j; one can show that it is *the minimizer of the total squared curvature integral* on the domain Ω_j. Once we get the solution u_j, the residual function $v_j = f_j - u_j$ clearly satisfies $\partial v_j / \partial \nu = 0$ on $\partial\Omega_j$. Assuming that $f_j \in C^2(\bar{\Omega}_j)$, we can show that the residual v_j has at least C^2 smoothness across the block boundary when it is extended by the even reflection. Therefore, if we use the Fourier *cosine* series expansion of v_j we get the coefficients with decay rate $O(\|k\|^{-4})$. See also Theorem A.2 in Appendix A. We naturally call this version of the transform the *polyharmonic local cosine transform* (PHLCT). However, this method of course requires to estimate the first order normal derivative of data at the boundary. We are currently investigating this issue with our collaborator, Katsu Yamatani, and getting encouraging results [44].

[44] K. Yamatani, N. Saito, Improvement of DCT-based compression algorithms using Poisson's equation, Technical report, Department of Mathematics, University of California, Davis, 2005, in preparation.

Ex. 1007, 27, n.44 (annotated).

D. Stockhammer

Stockhammer is a paper [that] provide[s] an overview over the tools which are likely to be used in wireless environments and discusses the most challenging application, wireless conversational services in greater detail" since "high-compression efficiency as well as a network friendly design [] have been major goals of the H.264/AVC standardization effort addressing 'conversational' (i.e., video telephony) and 'nonconversational' (i.e., storage, broadcast, or streaming) applications." Ex. 1009, Abstract. An example of using H.264/AVC in Stockhammer is illustrated below:

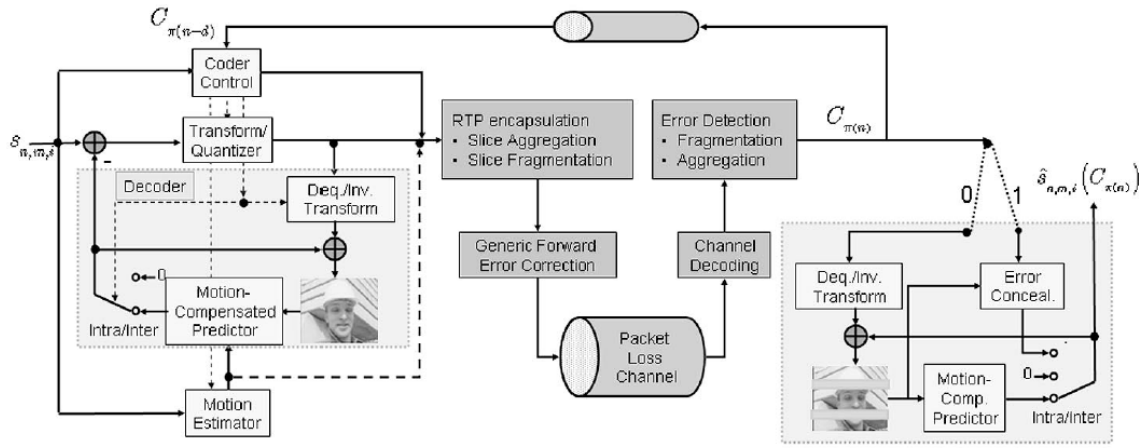

Fig. 6. H.264/AVC in IP-based packet-lossy environment with RTP encapsulation, generic forward error correction, delayed feedback information, and error concealment.

Id., 8. Stockhammer describes that, if the average length of a motion vector component are larger than a pre-defined threshold, only motion-compensated error concealment is used:

> In the motion vector recovery algorithm, the motion activity of the correctly received slices of the current picture is investigated first. If the average length of a motion vector component is smaller than a pre-defined threshold (currently 1/4 pixels), all the lost slices are copied from co-located positions in the reference frame. Otherwise, motion-compensated error concealment is used, and the motion vectors of the lost MBs are predicted.

Id., 9.

IV. CLAIM CONSTRUCTION

Petitioner's assertion that "no formal claim constructions are necessary" in this proceeding (Pet. at 2) contradicts its positions in *Advanced Coding Techs. LLC v. LG Elecs., Inc.*, Case No. 2:22-cv-00501-JRG (E.D. Tex.) (the "District Court

Litigation"). In the District Court Litigation, Petitioner proposed the following constructions:

Claim Term	**Claims**	**Proposed Construction**
"border motion-vector data"	6-8, 10[1]	"data representing the difference in spatial position between a border of the block to be predicted in the picture to be coded and the best-matched border in the reference picture."

Ex. 2003, at 2. The Petition does not assume that the plain and ordinary meaning of these terms is as limited as the parties' agreed upon constructions, and the Petition's analysis of the claim limitations containing these terms against the cited references does not indicate that those references disclose at least "border motion-vector data" under Petitioner's proposed constructions in the District Court Litigation.

If Petitioner believed that any claim terms required construction, it had a duty to identify "how the challenged claim is to be construed" in its Petition. 37 C.F.R. § 42.104(3); *see also* Patent Trial and Appeal Board Consolidated Trial Practice Guide, November 2019, at 48 ("The Board, in its claim construction determinations, will consider statements regarding claim construction made by patent owners and by a petitioner filed in other proceedings, if the statements are timely made of record.")

[1] Claims 6-8 and 10 are at issue in the District Court Litigation. However, the term "border motion-vector data" implicates Claims 1, 3-4, and 6-10 in this proceeding.

(citations omitted). Instead, Petitioner chose to apply the plain and ordinary meaning in this proceeding while agreeing to narrower constructions in the District Court Litigation. The parties' agreed upon constructions in the District Court Litigation should be applied in this proceeding.

For the purposes of this Preliminary Response, Patent Owner notes that since both Patent Owner and Petitioner agreed to the constructions of the above term in the District Court Litigation, it is highly likely that the District Court will enter the agreed construction. Patent Trial and Appeal Board Consolidated Trial Practice Guide, at 47 (citations omitted) ("Parties should submit a prior claim construction determination by a federal court or the ITC in an AIA proceeding as soon as that determination becomes available. Preferably, the prior claim construction determination should be submitted with the petition, preliminary response, or response, along with explanations. Submission of a prior claim construction determination is mandatory under 37 C.F.R. § 42.51(b), if it is 'relevant information that is inconsistent with a position advanced by the party during the proceeding.'").

A. "border motion-vector data": "data representing the difference in spatial position between a border of the block to be predicted in the picture to be coded and the best-matched border in the reference picture"

Border motion-vector data cannot be given its plain and ordinary meaning, as Petitioner suggests, because there is explicit lexicography for this term in the '025

Patent. *See CCS Fitness, Inc. v. Brunswick Corp.,* 288 F.3d 1359, 1366 (Fed. Cir. 2002) (holding that to act as its own lexicographer, a patentee must "clearly set forth a definition of the disputed claim term" other than its plain and ordinary meaning). The proposed construction is taken verbatim from the '025 Patent:

> [Z]one-border motion-vector data **1407** [] is a difference in spatial position between the border of the block that is the object to be predicted **1403** in the picture to be coded **1402** and the best-matched border **1406** in the reference picture **1402**.

'025 Patent, 11:15-19. As noted above, Petitioner agreed that this was the proper construction of "border motion-vector data" based on the '025 Patent's definition of the term.

B. "Satisfies Poisson's Equation" is Not the Same as "Solving Poisson's Equation"

While Patent Owner submits that a formal construction is not required on "satisfies Poisson's Equation," Petitioner is implicitly construing the term "satisfies Poisson's Equation" and does so incorrectly. Based on explicit embodiments in the '025 Patent specification, which describes that "satisfies Poisson's Equation" is applying the analytical concept of Poisson's Equation, the Petition's position that there must be a mathematical solution to Poisson's Equation is incorrect.

Petitioner is proposing an implied construction of these terms that is directly contrary to the embodiment in the specification. Constructions that read out the

preferred embodiment are "rarely, if ever, correct and would require highly persuasive evidentiary support." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996). Here, Petitioner's implied constructions exclude the preferred embodiment. For example, the preferred embodiment of the '025 Patent explicitly confirms that the word "satisfies . . ." indicates using ***the concept*** of Poisson's Equation ***analytically***, not necessarily implementing a mathematical algorithm that actually computes Poisson's Equation:

> "Obtained next is an estimated signal in a block to an original signal ***with the concept of Poisson's Equation***."

'025 Patent, 14:12-13 (emphasis added).

> Accordingly, this embodiment implements the source model in generation of an estimated signal in a block ***analytically without mathematically solving*** Poisson's Equation with a huge amount of calculation.

Id., 11:66-12:3 (emphasis added).

The '025 Patent describes that "satisfies Poisson's Equation" only means that the Laplacian of the estimated video signal 'u' may be represented as an expression of '*Kj'* with one example being a DCT-series representation of the estimated signal, as below:

> The estimated signal 'u' in a block can be expressed as an expression (5) with Neumann's boundary condition and DCT series representation, which is given by addition of DCT-series expanded components of the estimated signal from each border, as indicated by an expression (6).

$$u(x, y) = u^{(1)}(x, y) + u^{(2)}(x, y) + u^{(3)}(x, y) + u^{(4)}(x, y)$$
$$= \sqrt{\frac{2}{N}} \sum_{k=1}^{N-1} \lambda_k \{(G_k^{(1)}\psi_k(y-1) + G_k^{(2)}\psi_k(y))\cos\pi kx +$$
$$(G_k^{(3)}\psi_k(x))\cos\pi ky\} + C,$$

in which C is a constant, and

$$\psi_k(t) = \begin{cases} \frac{t^2}{2} \cdots k = 0 \\ \frac{\cosh\pi kt}{\pi k \sinh\pi k} \cdots k \neq 0 \end{cases} \quad (5)$$

$$u^{(1)}(x, y) := \sqrt{\frac{2}{N}} \left(\frac{G_0^{(1)}}{\sqrt{2}} \frac{(y-1)^2}{2} + \sum_{k=1}^{N-1} G_k^{(1)} \frac{\cosh\pi k(y-1)}{\pi k \sinh \pi k} \cos\pi kx \right) \quad (6)$$

Id., 14:19-45. The '025 Patent specification then states that such a generation method is "just an example."

> The zone-border motion compensator 119 in the first embodiment obtains a predictive signal (an estimated signal) with u(x, y) according to the expression (5). This predictive signal (estimated signal) generation method is ***just an example***, and hence the present invention is not limited to this generation method. In other words, ***u(x, y) can be obtained by any higher-speed calculation method that satisfies Δuj = Kj***.

Id., 14:47-53 (emphasis added). In other words, any generation method that results in the representation of the Laplacian of 'u' as an expression of '*Kj,*' a source term based on boundary condition(s), "satisfies" Poisson's Equation instead of mathematically solving Poisson's Equation.

V. LEVEL OF ORDINARY SKILL IN THE ART

For the purposes of this Preliminary Response only, Patent Owner utilizes Petitioner's proposed level of skill in the art: "at least a bachelor's degree in computer science, computer engineering, electrical engineering, or a related field, and [] at least two years of industry experience in digital video processing, or a related field. Additional graduate education could substitute for professional experience, and *vice versa*." Pet. at 3 (citations omitted).

VI. THE BOARD SHOULD DISCRETIONARILY DENY THE PETITION FOR FAILURE TO ADDRESS THE '025 PATENT IN ITS CORRECTED FORM PURSUANT TO 35 U.S.C. § 255

Petitioner improperly failed to file the '025 Patent as an exhibit with its associated Certificate of Correction, dated October 4, 2022. Ex. 2004, at 42; 35 U.S.C. § 255 ("[T]he Director may, upon payment of the required fee, issue a certificate of correction, if the correction does not involve such changes in the patent as would constitute new matter or would require re-examination. ***Such patent, together with the certificate, shall have the same effect and operation in law on the trial of actions for causes thereafter arising as if the same had been originally issued in such corrected form***.") (emphasis added).

35 U.S.C. § 255's "trial of actions for causes thereafter arising" means that a certificate of correction applies in an AIA trial, like this proceeding, when the certificate of correction issues before the filing of a petition. The IPR statutory

cause—which the PTAB can hear under the public-rights doctrine[2]—arises upon the earlier of the filing of a petition or the Patent Owner serving the Petitioner, Petitioner's real-party-in-interest, or Petitioner's privy with a complaint alleging infringement. Because the pertinent "cause" (both in the related District Court Litigation and in the PTAB) arose after the '025 Patent's Certificate of Correction issued, the certificate has the "same effect and operation in law" as if the '025 Patent were always corrected. As such, the Petition is facially deficient with respect to at least Claims 3, 8, and 10, whose claim terms were corrected by the Certificate of Correction and are not being afforded "the same effect and operation in law" as is requisite. Ex. 2004, at 42. Being afforded the "same effect and operation and law" has a common-sense policy objective of ensuring the same version of a patent (and its claims) apply in parallel proceedings in district courts and at the PTAB, which is being circumvented by Petitioner here.

Therefore, the Petition should be denied in the Board's discretion in view of Petitioner's failure to address the '025 Patent in its corrected form pursuant to 35

[2] *Oil States Energy Servs., LLC v. Greene's Energy Grp., LLC*, 138 S. Ct. 1365, 1373 (2018) clarifying that an inter partes review "falls squarely within the public-rights doctrine" because it involves the "reconsideration of the Government's decision to grant a public franchise").

U.S.C. § 255.

VII. THE PETITION SHOULD BE DENIED IN THE BOARD'S DISCRETION IN VIEW OF SUBSTANTIALLY THE SAME PRIOR ART AND THE SAME ARGUMENTS PREVIOUSLY PRESENTED TO THE OFFICE DURING PROSECUTION

"In determining whether to institute or order a proceeding under this chapter, chapter 30, or chapter 31, the Director may take into account whether, and reject the petition or request because, ***the same or substantially the same prior art or arguments previously were presented to the Office***." 35 U.S.C. § 325(d) (emphasis added); *Unified Pats. Inc. v. John L. Berman*, IPR2016-01571, Paper 10 (P.T.A.B. Dec. 14, 2016) (denying institution where the prior art cited in the petition was used in combination by the PTO in attempting to reject the underlying application); *Funai Elec. Co. v. Gold Charm Ltd.*, IPR2015-01491, Paper 18 (P.T.A.B. Feb. 18, 2016) (denying institution because the same prior art asserted in the petition was considered by the Examiner during prosecution against those claims); *Neil Ziegman, N.P.Z., Inc. v. Carlis G. Stephens*, IPR2015-01860, Paper 11 (P.T.A.B. Feb. 24, 2016) (exercising its discretion under § 325(d) to deny institution on the basis that the petition presented substantially the same or similar art or arguments as those previously presented during prosecution of the patent).

Petitioner's Grounds 1A and 1B are based on combinations involving substantially the same prior art as Saito (Ex. 1007) and similar arguments, which

were previously considered by the Office during prosecution of the ’025 Patent. As a result, Grounds 1A and 1B of the Petition ought to be denied in the discretion of the Board.

In particular, during prosecution of the ’025 Patent, the Examiner considered and cited to Non-patent document “Improvement of DCT-based Compression Algorithms Using Poisson’s Equation,” Katsu Yamatani and Naoki Saito, Senior Member, IEEE, pp. 1-36, September 12, 2005 (“Saito-2005”) as shown below:

Receipt date: 09/13/2007

Form PTO-1449 U.S. DEPARTMENT OF COMMERCE
(Rev. 8-83) PATENT AND TRADEMARK OFFICE

INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

OIPE SEP 13 2007 PATENT & TRADEMARK OFFICE

Sheet 1 of 1

11787623 - GAU: 2431

APPLICATION NO.	DOCKET NO.
11/787,623	KYO.P0066
FILING DATE: April 17, 2007	
FIRST NAMED APPLICANT: Satoru Sakazume	ART UNIT

U.S. PATENT DOCUMENTS

*Examiner Initial		Document Number	Date	Name	Class	Subclass

FOREIGN PATENT DOCUMENTS

		Document Number	Date	Country	Class	Subclass
	1	WO 03/003749	1/9/2003	PCT	7	32

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

	2	Non-patent document "Improvement of DCT-based Compression Algorithms Using Poisson's Equation," Katsu Yamatani and Naoki Saito, Senior Member, IEEE, pp.1-36, September 12, 2005

EXAMINER /Syed Zia/ DATE CONSIDERED 09/10/2011

*EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.Z./

Ex. 1002, 57 (annotated). Examiner's "Reasons for Allowance" noted that it carefully examined Saito-2005 and found that it, along with other references, was sufficiently distinguished from several claim limitations of the '025 Patent:

> Thus, the cited prior art does not explicitly teach or suggest a moving-picture coding apparatus comprising:
>
> a predictive encoder to produce and encode a residual picture that is a residual signal between a picture to be coded that is an input moving-picture video signal to be

subjected to coding and a predictive picture produced from a reference picture that is a local decoded video signal for each of a plurality of rectangular zones, each composed of a specific number of pixels, into which a video area of the moving-picture video signal is divided;

a zone-border motion estimator to obtain a boundary condition of each of a plurality of borders between the rectangular zones and another plurality of rectangular zones adjacent to the rectangular zones, find a border, of the reference picture, having a boundary condition that matches the boundary condition, by motion-vector search in the reference picture, and generate border motion-vector data that is data on a motion vector from a border of the rectangular zone in the picture to be coded to the border of the reference picture thus found; and

a zone-border motion compensator to define a boundary condition of a border that corresponds to the border motion vector data, from the reference picture based on the border motion-vector data, and ***generate an estimated video signal in each rectangular zone in the picture to be coded, that satisfies Poisson's Equation, thus producing a first predictive picture,***

…

The examiner has found that the prior art of record does not appear to teach or suggest or render obvious the claimed limitations in combination with the specific added limitations as recited in independent claims and subsequent dependent claims. The prior art of record fails to teach or suggest a system and method as mentioned above.

An updated search did not reveal any prior art that would anticipate or make obvious the currently claimed invention.

Ex. 1002, 49-51 (emphasis added).

Notably, Petitioner's reliance on Saito (Ex. 1007) in this proceeding stems from Saito's precise citation to Saito-2005 on page 27, Footnote 44, reproduced below:

6.2.2. Use of the Neumann boundary condition

It is possible to use the *Neumann boundary condition* instead of the Dirichlet condition in (3). This will give us the $O(\|k\|^{-4})$ decay rate of the v_j components instead of $O(\|k\|^{-3})$ in the case of the Dirichlet boundary condition. To do so, we need to modify (3); we shall solve the following *Poisson equation* with the Neumann boundary condition:

$$\begin{cases} \Delta u_j = K_j & \text{in } \Omega_j, \\ \frac{\partial u_j}{\partial \nu} = \frac{\partial f_j}{\partial \nu} & \text{on } \partial\Omega_j, \end{cases} \tag{13}$$

where K_j is a constant that needs to be computed as follows:

$$K_j = \frac{1}{|\Omega_j|} \int_{\partial\Omega_j} \frac{\partial f_j}{\partial \nu} \, ds,$$

which is the boundary integral of $\partial f_j / \partial \nu$ normalized by $|\Omega_j|$ (the volume of the domain). This constant K_j is necessary for (13) to have a unique solution (modulo an additive constant); see, e.g., [43, p. 84]. The solution u_j is not just a function having the same normal derivative at the boundary with the original function f_j; one can show that it is *the minimizer of the total squared curvature integral* on the domain Ω_j. Once we get the solution u_j, the residual function $v_j = f_j - u_j$ clearly satisfies $\partial v_j / \partial \nu = 0$ on $\partial\Omega_j$. Assuming that $f_j \in C^2(\bar{\Omega}_j)$, we can show that the residual v_j has at least C^2 smoothness across the block boundary when it is extended by the even reflection. Therefore, if we use the Fourier *cosine* series expansion of v_j we get the coefficients with decay rate $O(\|k\|^{-4})$. See also Theorem A.2 in Appendix A.

We naturally call this version of the transform the *polyharmonic local cosine transform* (PHLCT). However, this method of course requires to estimate the first order normal derivative of data at the boundary. We are currently investigating this issue with our collaborator, Katsu Yamatani, and getting encouraging results [44].

[44] K. Yamatani, N. Saito, Improvement of DCT-based compression algorithms using Poisson's equation, Technical report, Department of Mathematics, University of California, Davis, 2005, in preparation.

Saito, 27, n.44 (annotated). *See* Pet. at 73-74 ("using Saito's technique for solving Poisson's equation with known boundary conditions"; "Saito's image approximation techniques based on solving Poisson's equation would have . . . achieve[d] similar goals of image approximation"; "Saito's Polyharmonic Local Cosine Transform (PHLCT) is an enhancement of a Polyharmonic Local Sine Transform (PHLST) technique for image approximation"; "[t]he PHLCT variation

of PHLST approximates an image between two boundaries by 'solv[ing] the . . . Poisson equation with the Neumann boundary condition"; "PHLCT would have been capable of approximating the image between these boundary conditions"; "Saito's techniques represent a natural improvement of image approximation techniques, at least because they can achieve a faster 'decay rate' for the error signal at the boundaries of blocks") (citing Ex. 1007, 27).

Petitioner even admits that "Saito's process of PHLCT is described by the '025 patent itself, and the '025 patent cites a subsequent publication by Dr. Naoki Saito that explains the PHLCT method." Pet. at 74-75. Such an admission indicates that the relevant portion of Saito's disclosure of the PHLCT is substantially similar to the disclosure of Saito-2005 (i.e., what Petitioner calls "a subsequent publication by Dr. Naoki Saito that explains the PHLCT method," which was considered by the Patent Office during prosecution without a doubt.

The Board should find that Examiner's consideration of Saito-2005 precludes the Petition from being granted institution since Saito is substantially the same art as Saito-2005 and being presented for substantially the same argument with respect to Petitioner's reliance on Saito cites to the recited "generat[ing] an estimated video signal in each rectangular zone in the picture to be coded, that satisfies Poisson's Equation, thus producing a first predictive picture."

VIII. PETITIONER HAS NOT DEMONSTRATED A REASONABLE LIKELIHOOD OF SUCCESS FOR THE GROUNDS ADVANCED IN THE PETITION, AND THE PETITION SHOULD BE DENIED

The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) so-called secondary considerations where in evidence. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966); *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537 (Fed. Cir. 1983).

The Board has held that a failure to identify the differences between the claimed subject matter and the prior art is fatal to an obviousness challenge. *See, Apple, Inc. v. Contentguard Holdings, Inc.*, IPR2015-00355, Decision Denying Institution of *Inter Partes* Review, Paper 9 at 9-10 (P.T.A.B. June 26, 2015) (denying institution for failure to identify the differences between the claimed subject matter and the prior art).

In arriving at an obviousness determination, the Board must sufficiently explain and support the conclusions that the prior art references disclose all the

elements recited in the Challenged Claims and a relevant, skilled artisan not only could have made, but would have been motivated to combine all the prior art references in the way the patent claims and reasonably expected success. *Pers. Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017). That is, even if all the claim elements are found across a number of references, an obviousness determination must consider whether a person of ordinary skill in the art would have the motivation to combine those references. *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1368 (Fed. Cir. 2016); *Los Angeles Biomedical Rsch. Inst. at Harbor-UCLA Med. Ctr. v. Eli Lilly & Co.*, 849 F.3d 1049, 1067 (Fed. Cir. 2017) (vacating and remanding an obviousness determination, in part, because the Board did not make factual finding as to whether there was an apparent reason to combine all three prior art references to achieve the claimed invention and whether a person of skill in the art would have had a reasonable expectation of success from such a combination). This combinability determination, as supported by an articulated motivation to combine, requires a plausible rationale as to why those prior art references would have worked together. *Broadcom Corp. v. Emulex Corp.*, 732 F.3d 1325, 1335 (Fed. Cir. 2013). Absent some articulated rationale, a "common sense" finding is no different than the conclusory statement "would have been obvious." *In re Van Os*, 844 F.3d 1359, 1361 (Fed. Cir. 2017). Of additional importance, "knowledge of a problem and motivation to solve it are entirely different

from motivation to combine particular references. . . ." *Innogenetics, N.V. v. Abbott Lab'ys.*, 512 F.3d 1363, 1373 (Fed. Cir. 2008).

A. Claim 6 Is Not Obvious Over Any Combination of Mualla, Shirani, Saito, and Stockhammer

1. The Petition Does Not Show that Any Combination of Mualla, Shirani, Saito, and Stockhammer Discloses "*border motion-vector data,*" as Required by Claim Elements [6.2] and [6.8]

Claim 6 of the '025 Patent requires "border motion-vector data."

As noted above, Petitioner failed to propose a construction for this term, despite agreeing to construe this term as "data representing the difference in spatial position between a border of the block to be predicted in the picture to be coded and the best-matched border in the reference picture" in the District Court Litigation. *See supra* Section IV. Instead, Petitioner merely proposes that the "border motion-vector term" term is met by Shirani's disclosure of "motion vectors of available neighboring blocks." Pet. at 59-60 (citing Ex. 1006, 3). However, Shirani is silent regarding whether the motion vectors of available neighboring blocks are at a border, let alone determining a "best-matched border in the reference picture." Petitioner also states, without any quotes to Shirani that "[t]hese motion vectors of neighboring blocks are used to obtain an estimate of pixels ***at each border*** of the missing block." Pet. at 60. Even if Shirani disclosed this (it does not), estimates of pixels at the borders of a missing block are not border motion-vector data because there is no

indication that Shirani's estimated pixels are on a border and estimates of pixels are not motion-vector data or "data representing the difference in spatial position between a border of the block to be predicted in the picture to be coded and the best-matched border in the reference picture."

As the Petition implicitly admits, the only mention of "borders" in Shirani relates to trying "[t]o obtain an initial estimate of [a] missing block that smoothly connects to the rest of the image" by selecting a block that "minimizes the squared sums of border errors." *See* Ex. 1006, 3 ("To obtain an initial estimate of the missing block that smoothly connects to the rest of the image, a block from the above four blocks that minimizes the squared sums of border errors, between the estimated block and its adjacent above and left blocks, is selected.").

First, determining whether the squared sums of border errors are minimized contradicts the meaning of border motion-vector data, as the claim requires, because it bases its choice of estimated block based on multiple border data instead of calculating "data representing the differences . . . between a border of the block to be predicted . . . and the best-matched border in the reference picture." In other words, the proper construction of "border motion-vector data" requires a more granular and accurate border-by-border differential data. This disclosure in Shirani is the same prior art system described in the '025 Patent, where, similarly, "an optimum block is selected in motion estimation." '025 Patent, 2:11-26. The '025 Patent describes

that this prior art system has the disadvantage that there "may be several blocks having the same quality as that block," (i.e., the same quality of minimizing the "squared sums of border errors"):

> Smoothing is followed by orthogonal transform, quantization and entropy coding to a residual video frame produced by subtraction between a reference picture and a moving-picture frame to be coded. Smoothing is applied to a predictive picture produced by motion compensation after an optimum block is selected in motion estimation, thus such a block may not always be optimum after this procedure. There may be several blocks having the same quality as that block in the predictive picture after smoothing. Thus, it requires a larger amount of computation for obtaining more appropriate motion-vector data under consideration of the code amount of motion-vector data and orthogonal-transform coefficients data after quantization, because of repeated operations of motion estimation, motion compensation and smoothing procedures for obtaining optimum motion-vector data.

Id. Therefore, the '025 Patent explains that prior art systems like Shirani are not ideal because "it requires a larger amount of computation" to "obtain[] optimum motion-vector data."

Elsewhere in its disclosure, Shirani explicitly teaches away from "edge-based methods" as being "computationally more intensive":

> In [4], each pixel in a damaged block is interpolated from the corresponding pixels in its four neighboring blocks such that the total squared border error is minimized. In [5] and [6], the missing information is interpolated utilizing spatially correlated edge information from a large local neighborhood. Note that ***although these edge-based***

> ***methods are generally more accurate than other approaches, they are computationally more intensive. In [7], a computationally simple, spatial directional interpolation scheme has been proposed***.

Ex. 1006, 1 (emphasis added). Shirani's teaching away from edge-based (*i.e.*, border-based) methods indicates that the '025 Patent's border motion-vector data that focused on a more accurate border-by-border analysis, as described above, was novel since it resulted in ***less*** computation instead of more.

Because of this deficiency, institution should be denied.

2. The Petition Does Not Show that Any Combination of Mualla, Shirani, Saito, and Stockhammer Discloses "*obtaining a boundary condition of each of a plurality of borders between the rectangular zones and another plurality of rectangular zones adjacent to the rectangular zones, finding a border, of the reference picture, having a boundary condition that matches the boundary condition, by motion-vector search in the reference picture, and generating the border motion-vector data that is data on a motion vector from a border of the rectangular zone in the picture to be coded to the border of the reference picture thus found, defining a boundary condition of a border that corresponds to the border motion vector data, from the reference picture based on the border motion vector data*" and "*zone-border motion compensator to define a boundary condition of a border that corresponds to the border motion vector data, from the reference picture based on the border motion-vector data*," as Required by Claim Elements [6.4]-[6.6] and [6.11]

Claim 6 of the '025 Patent requires "obtaining a boundary condition of each of a plurality of borders between the rectangular zones and another plurality of

rectangular zones adjacent to the rectangular zones, finding a border, of the reference picture, having a boundary condition that matches the boundary condition, by motion-vector search in the reference picture, and generating the border motion-vector data that is data on a motion vector from a border of the rectangular zone in the picture to be coded to the border of the reference picture thus found, defining a boundary condition of a border that corresponds to the border motion vector data, from the reference picture based on the border motion vector data."

The Petition is deficient because the combination of Mualla, Shirani, Saito, and Stockhammer does not disclose the claimed "boundary condition." The claim language is clear that "border motion-vector data . . . defin[es] a boundary condition of a border that corresponds to the border motion vector data" and "a boundary condition of a border [] corresponds to the border motion vector data." '025 Patent, Claim 6. Therefore, if the combination of Mualla, Shirani, Saito, and Stockhammer does not disclose "border motion-vector data," it cannot also disclose the required "boundary condition." As noted in Section VI.A.1 above, the Petition does not show that the combination of Mualla, Shirani, Saito, and Stockhammer discloses "border motion-vector data." Therefore, the Petition also cannot show that the combination discloses "obtaining a ***boundary condition*** of each of a plurality of borders between the rectangular zones and another plurality of rectangular zones adjacent to the rectangular zones, finding a border, of the reference picture, having a ***boundary***

condition that matches the boundary condition, by motion-vector search in the reference picture, and ***generating the border motion-vector data that is data on a motion vector from a border of the rectangular zone in the picture to be coded to the border of the reference picture thus found, defining a boundary condition of a border that corresponds to the border motion vector data, from the reference picture based on the border motion vector data***."

Because of this deficiency, institution should be denied.

3. The Petition Does Not Show that Any Combination of Mualla, Shirani, Saito, and Stockhammer Discloses "*generating an estimated video signal in each rectangular zone in the picture to be coded, that satisfies Poisson's Equation, thus producing the predictive picture*," as Required by Claim Elements [6.7] and [6.11]

Claim 6 of the '025 Patent requires "generating an estimated video signal in each rectangular zone in the picture to be coded, that satisfies Poisson's Equation, thus producing the predictive picture."

First, the Petition is deficient because it construes "satisfies Poisson's Equation" incorrectly. *See supra* Section IV.B. The Petition does not show that this claim limitation, properly construed, is obvious over the combination of Mualla, Shirani, Saito, and Stockhammer, as alleged in Ground 1. More specifically, the Petition is deficient because Saito is directed to using Polyharmonic Local Cosine Transform (PHLCT) as a mathematical solution of Poisson's Equation that runs

contrary to the word, "satisfies." As Petitioner admits, Saito explains that the "polyharmonic component is 'obtained by ***solving*** the elliptic boundary value problem associated with the so-called polyharmonic equation (e.g., Laplace's equation, biharmonic equation, etc.) given the boundary values.'" Pet. at 73 (citing Ex. 1007, Abstract, 4). Petitioner's cited portions of Saito state that "we shall ***solve*** the following Poisson equation with the Neumann boundary condition" and even that "this method of course requires to estimate the first order normal derivative of data at the boundary." Ex. 1007, 27. Saito's requirement to perform complex mathematics in order to "solve" for Poisson's equation is antithetical to the meaning of the word "satisfies." *See supra* Section IV.B (citing '025 Patent ("generation of an estimated signal in a block analytically ***without mathematically solving*** Poisson's Equation with a huge amount of calculation.")).

Second, the Petition is deficient because the Petition is silent regarding one whole side of Poisson's Equation noted in the '025 Patent as the source term, K:

> Obtained next is an estimated signal in a block to an original signal ***with the concept of Poisson's Equation***. Poisson's Equation gives an expression (4) between a source term Kj and Δuj that is Laplacian of an estimated signal "u" in a block Qj to be processed.
>
> $$\Delta uj = Kj \qquad (4)$$
>
> The estimated signal 'u' in a block can be expressed as an expression (5) with Neumann's boundary condition and DCT series representation, which is given by addition of

> DCT-series expanded components of the estimated signal from each border, as indicated by an expression (6).

$$u(x, y) = u^{(1)}(x, y) + u^{(2)}(x, y) + u^{(3)}(x, y) + u^{(4)}(x, y)$$
$$= \sqrt{\frac{2}{N}} \sum_{k=1}^{N-1} \lambda_k \{(G_k^{(1)} \psi_k(y-1) + G_k^{(2)} \psi_k(y)) \cos \pi k x +$$
$$(G_k^{(3)} \psi_k(x)) \cos \pi k y\} + C,$$

in which C is a constant, and

$$\psi_k(t) = \begin{cases} \frac{t^2}{2} \cdots k = 0 \\ \frac{\cosh \pi k t}{\pi k \sinh \pi k} \cdots k \neq 0 \end{cases} \quad (5)$$

$$u^{(1)}(x, y) := \sqrt{\frac{2}{N}} \left(\frac{G_0^{(1)}}{\sqrt{2}} \frac{(y-1)^2}{2} + \sum_{k=1}^{N-1} G_k^{(1)} \frac{\cosh \pi k (y-1)}{\pi k \sinh \pi k} \cos \pi k x \right) \quad (6)$$

'025 Patent, 14:12-45 (emphasis added). As shown above, a source model is necessary to determine the estimated signal and it is preferable to use a source model that is "the closest to the original signal under the boundary conditions":

> It is preferable to employ a source model enabling estimation of a signal the closest to the original signal under the boundary conditions. A quadratic function is a typical example of the source model for a one-dimensional signal, such as shown in FIG. 17. The present invention is, however, not limited to this model, a lower-order function such as a liner [sic] function or a higher-order function such as a cubic function and a quartic function are available.

Id., 11:59-66. Whether mathematically solved or not, Poisson's Equation requires a boundary condition and a source model or source term, such that the estimated signal can be generated. But the Petition is silent with respect to the source model.

Because of this deficiency, institution should be denied.

4. The Petition Does Not Show that Any Combination of Mualla, Shirani, Saito, and Stockhammer Discloses "*a selector to select either the first predictive picture or the second predictive picture and supply the predictive picture thus selected to the combiner*," as Required by Claim Elements [6.14]

Claim 6 of the '025 Patent requires "a motion compensator to specify a corresponding rectangular zone in the reference picture based on the motion vector data, thus generating a second predictive picture."

The Petition is deficient because Petitioner fails to explain how the system of Mualla supports a "second predictive picture." While it is true that Mualla describes a "typical video codec" (Pet. at 92 (citing to Ex. 1005, Fig. 1.1)), it does not show utilizing two different motion compensation models in the same system (i.e., both the recited "zone-border motion compensator" of Claim [6.11] and "motion compensator" of Claim [6.14]). To the extent that Mualla discloses different types of motion compensation (*e.g.*, "motion-compensated error concealment"), it does so as possible adaptations to the "typical video codec," not as an integration with such a codec. *See* Ex. 1005, 27 ("Careful examination of this [typical] codec (as will be detailed in subsequent chapters) reveals that a *motion-based approach* can be adopted to provide suitable solutions for the three challenges of higher coding efficiency, reduced complexity, and error resilience."). The Petition does not

disclose a reference with two different motion compensation models in the same system or demonstrate a motivation to combine references to create a system with two different motion compensation models. Therefore, the Petition cannot disclose a "***second*** predictive picture."

Because of this deficiency, institution should be denied.

5. The Petition Does Not Show that Any Combination of Mualla, Shirani, Saito, and Stockhammer Discloses "*a selector to select either the first predictive picture or the second predictive picture and supply the predictive picture thus selected to the combiner*," as Required by Claim Elements [6.15]

Claim 6 of the '025 Patent requires "a selector to select either the first predictive picture or the second predictive picture and supply the predictive picture thus selected to the combiner."

The Petition is deficient because, as noted in Section VIII.A.4 above, the Petition does not show that the combination of Mualla, Shirani, Saito, and Stockhammer discloses "a motion compensator to specify a corresponding rectangular zone in the reference picture based on the motion vector data, thus generating ***a second predictive picture***." Therefore, the Petition also cannot show that that the combination discloses "a selector to select either the first predictive picture or ***the second predictive picture*** and supply the predictive picture thus selected to the combiner."

The Petition is also deficient because Petitioner fails to show how any of the cited references disclose "a selector to select either the first predictive picture or the second predictive picture." Instead, Petitioner relies on vague citations to various references and illogical leaps to reach this claim limitation. Each of these citations is taken in turn below.

First, Petitioner argues that "a POSITA would have recognized and found obvious that tradition [sic] motion compensation [] would execute until an error was detected by the decoder in the bitstream, at which point the error concealment techniques of the Mualla-Shirani-Saito combination would be used to generate replacement motion vector and video data." Pet. at 93-94 (citing Ex. 1005, 265[3]). However, the cited portion of Mualla only mentions that "[w]hen an error is detected, the decoding process is stopped, the decoder searches for the next synchronization codeword, and decoding is resumed. All macroblocks between the point where the error was detected and the synchronization point are marked as damaged

[3] Petitioner's expert is cited for this proposition as well but Petitioner's expert only recites the same sentence as the Petition with no further detail as to how a POSITA would have used the cited portion of Mualla to infer switching from traditional motion compensation to the error concealment technique of Mualla. *See* Ex. 1003, ¶ 202.

macroblocks." Ex. 1005, 265. There is no implication about switching from traditional motion compensation to error concealment motion compensation, let alone the required selecting between two predictive pictures that are output from each of the two motion compensation systems. As noted in Section VIII.4, none of the references disclose the possibility of multiple motion compensation systems working simultaneously. *See supra* Section VIII.4.

Second, Petitioner cites to a portion of Girod (Ex. 1008) for also showing that off-the-shelf video decoders would not be adequate for error-free transmission. But Girod is not one of the cited references in Petitioner's Ground 1A and 1B and should be disregarded. Nevertheless, even if Girod were considered, the cited portion of Girod does not describe utilizing two motion compensation systems or selecting between two predictive pictures that are output from each of the two motion compensation systems. Girod merely states that "[s]pecial provisions for error detection, resynchronization, and concealment are required" since "an erroneous bit stream cannot be gracefully decoded by an 'off-the-shelf' video decoder build [sic] for error-free transmission." Ex. 1008, 4. Petitioner's expert also does not describe what those "special provisions" might be or how this portion indicates any switch or selector. *See* Ex. 1003, ¶ 203.

Third, Petitioner points to a sole FIG. 6 of Stockhammer without any other citation to allegedly show a "selector" to "switch between traditional motion

compensation and error concealment." Pet. at 94-95. But the switch shown in FIG. 6 of Stockhammer is described as choosing between two motion compensation methods that cannot work simultaneously. As Stockhammer describes, if the average length of a motion vector component are larger than a pre-defined threshold, ***only*** motion-compensated error concealment is used:

> In the motion vector recovery algorithm, the motion activity of the correctly received slices of the current picture is investigated first. If the average length of a motion vector component is smaller than a pre-defined threshold (currently 1/4 pixels), all the lost slices are copied from co-located positions in the reference frame. Otherwise, motion-compensated error concealment is used, and the motion vectors of the lost MBs are predicted.

Ex. 1009, 9. If only one motion compensation technique is used, then there can be no selection between predictive pictures because only one predictive picture is generated.

Fourth, Petitioner goes back to Mualla to allegedly show a "selector" to control inter or intra coding with no citation and no further explanation as to why a selector to control inter or intra coding would be relevant to choosing between two predictive pictures generated with different motion compensation techniques. Pet. at 95. Petitioner then cites to its expert for the proposition that "using a selector to switch between normal decoding and error concealment 'would have been a natural extension of techniques disclosed within Mualla.'" *Id.* (citing Ex. 1003, ¶ 204.

However, the sole citation to Petitioner's expert declaration itself has the very same remark in quotation marks but missing a citation, as shown below:

> 204. Moreover, Mualla uses a "***selector***" to control inter or intra coding. SAMSUNG-1005, 72, FIG. 3.1. Using a selector to switch between normal decoding and error concealment "would have been a natural extension of techniques disclosed within Mualla."

Ex. 1003, ¶ 204. It is thus unclear where the quotation came from and how a POSITA would have found switching between normal decoding and error concealment to be "a natural extension of techniques disclosed within Mualla." Further, even if switching between normal decoding and error concealment were disclosed, for the same reasons as Stockhammer, if only one motion compensation technique is used (i.e., normal decoding versus error concealment), then there can be no selection between predictive pictures because only one predictive picture is generated from the chosen motion compensation technique. Both motion compensation techniques (i.e., the claimed "zone-border motion compensator" and the claimed "motion compensator") need to be used such that both first and second predictive pictures are available to select from.

Because of this deficiency, institution should be denied.

6. The Petition Does Not Show that Any Combination of Mualla, Shirani, Saito, and Stockhammer Discloses "*a decoding controller to receive decoding control data for decoding control from the parameter data and control the selector to switch the predictive picture to be supplied to the combiner between the first and second predictive pictures according to the decoding control data*," as Required by Claim Elements [6.16]

Claim 6 of the '025 Patent requires "a decoding controller to receive decoding control data for decoding control from the parameter data and control the selector to switch the predictive picture to be supplied to the combiner between the first and second predictive pictures according to the decoding control data."

As noted in Section VIII.A.5 above, the Petition does not show that the combination of Mualla, Shirani, Saito, and Stockhammer discloses "***a selector to select either the first predictive picture or the second predictive picture*** and supply the predictive picture thus selected to the combiner." Therefore, the Petition also cannot show that that the combination discloses "a decoding controller to receive decoding control data for decoding control from the parameter data and ***control the selector to switch the predictive picture to be supplied*** to the combiner between the first and second predictive pictures according to the decoding control data."

Specifically, to the extent control data that controls the switches of Mualla and Stockhammer exist, this control data is only selecting which motion compensation technique to use rather than applying both techniques. such that two

predictive pictures can be generated and a selection can be made between the two, as required by the claim language.

Because of this deficiency, institution should be denied.

B. Claims 1-5 and 7-10 Are Not Obvious Over Any Combination of Mualla, Shirani, Saito, and Stockhammer

The Petition relies on its arguments for Claim 6 to render obvious Claims 1-2, 4-5, and 7-10. Pet. at 100-101, 106. Therefore, for at least the same reasons as described for Claim 6, the Petition fails to show how Claims 1-2, 4-5, and 7-10 are rendered obvious over any combination of Mualla, Shirani, Saito, and Stockhammer.

The Petition completely fails to address Claim 3, let alone whether Claim 3 is rendered obvious over any prior art. *See generally* Pet. at 50-106.

IX. THE PETITION SHOULD BE DENIED IN THE DISCRETION OF THE DIRECTOR UNDER 35 U.S.C. § 314(a)

Based on Petitioner's reasons regarding § 314(a), the Board should exercise its discretion to deny this Petition.

The circumstances of the parallel District Court Litigation, *Advanced Coding Techs. LLC v. LG Elecs. Inc.*, Case No. 2:22-cv-00501-JRG (E.D. Tex.) necessitate denial of the Petition under the Board's precedent, as every factor considered in relation to efficiency, fairness, and the merits supports denial. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11, at 6 (P.T.A.B. Mar. 20, 2020) (precedential) (considering (a) "whether the petitioner and the defendant in the parallel proceeding

are the same party"; (b) "overlap between issues raised in the petition and in the parallel proceeding" (c) "proximity of the court's trial date to the Board's projected statutory deadline for a final written decision"; (d) "investment in the parallel proceeding by the court and the parties"; (e) "whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted"; and (f) "other circumstances that impact the Board's exercise of discretion, including the merits.").

As set forth below, these factors collectively demonstrate that efficiency and integrity of the AIA are best served by denying review. First, the Petitioner is the Defendant in the parallel proceeding. *See infra* Section IX.A. Second, the asserted claims in the District Court Litigation are all at issue in the Petition. *See infra* Section IX.B. Third, trial in the District Court Litigation is set for October 7, 2024, over nine months prior to the projected statutory deadline for a Final Written Decision of this Petition in July, 2025. *See infra* Section IX.C. Fourth, the parties (and Patent Owner in particular) have invested significant resources on developing legal and factual issues of validity and infringement in the District Court Litigation and will have invested substantially more resources before any decision on this Petition. *See infra* Section IX.D. Fifth, the Court has already denied a stay pending this Petition. *See infra* Section IX.E. Finally, no other factors favor institution. *See infra* Section IX.F.

Accordingly, the Board should exercise its discretion under § 314(a) and deny the Petition because institution of this proceeding would not be consistent with the

objective of the AIA to "provide an effective and efficient alternative to district court litigation." *NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8, at 20 (P.T.A.B. Sept. 12, 2018) (quoting *Gen. Plastic Indus. Co. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19, at 16–17 (P.T.A.B. Sept. 6, 2017) (precedential)).

A. The Parallel District Court Litigation and the Petition Involve the Same Parties

As Petitioner notes, there exists a parallel District Court Litigation between the same parties regarding the same subject patent (the '025 Patent). Pet. at 109. Petitioner is a party to the District Court Litigation captioned as *Advanced Coding Techs. LLC v. LG Elecs. Inc.*, Case No. 2:22-cv-00501-JRG (E.D. Tex.). Accordingly, this factor weighs in favor of discretionary denial.

B. The District Court Litigation Involves Substantially the Same Claims

All of the asserted claims of the '025 Patent in the District Court Litigation are at issue in this Petition. "In at least these ways, the parallel proceedings would duplicate effort. This is an inefficient use of Board, party, and judicial resources and raises the possibility of conflicting decisions." *Cisco Sys., Inc. v. Ramot at Tel Aviv Univ. Ltd.*, IPR2020-00122, Paper 15 at 10 (P.T.A.B. May 15, 2020). Accordingly, this fact weighs in favor of discretionary denial.

C. Proximity of the District Court's Trial Date

The proximity of the District Court Litigation's trial date to the Board's projected statutory deadline for a Final Written Decision strongly weighs in favor of discretionary denial.

The parties' trial is scheduled for October 7, 2024. Ex. 2001 (Fourth Amended Docket Control Order, Dkt. 93, *Advanced Coding Techs. LLC v. LG Elecs. Inc.*, Case No. 2:22-cv-00501-JRG (E.D. Tex. April 2, 2024)). Pursuant to 35 U.S.C. §§ 314(b)(1) and 316(a)(11), the projected statutory deadline for a Final Written Decision of this Petition is July 23, 2025.[4] As the District Court's trial will be ***over nine months before*** the projected statutory deadline, this factor weighs strongly in favor of denying institution. *See Supercell Oy v. Gree, Inc.*, IPR2020-00513, Paper 11 at 10-12 (P.T.A.B. June 24, 2020) (denying institution where the jury trial was scheduled to conclude approximately ten months before the statutory deadline); *Edward LifeSciences Corp. v. Evalve, Inc.*, IPR2019-01479, Paper 7, at 6-13

[4] The statutory deadline for institution is July 23, 2024, "three months after receiving a preliminary response to the petition under section 313." *See* 35 U.S.C. § 314(b)(1). If instituted, the statutory deadline for Final Written Decision is July 23, 2025, "not later than 1 year after the date on which the Director notices the institution of a review."

(P.T.A.B. Feb. 26, 2020) (denying institution where jury trial would conclude more than nine months before a final decision would be due); *Samsung Elecs. Am., Inc. v. Uniloc 2017 LLC*, IPR2019-01218, Paper 7, at 7-10 (P.T.A.B. Jan. 7, 2020) (denying institution where jury selection was scheduled for approximately six months before trial in the Board proceeding would conclude); *Next Caller Inc. v. TrustID, Inc.*, IPR2019-00961, -00962, Paper 10, at 8-16 (P.T.A.B. Oct. 16, 2019) (denying institution where trial was scheduled to conclude "several months," before a final decision would be due); *Cisco Sys., Inc.*, IPR2020-00122, Paper 15 at 8 ("Because the trial date is substantially earlier than the projected statutory deadline for the Board's final decision, this factor weighs in favor of discretionary denial.").

Petitioner does not contest that the proximity of the trial favors denial of institution. Thus, this factor also weighs in favor of discretionary denial.

D. Significant Investment and Petitioner's Delay in Filing the Petition

The parties' investment in the parallel proceeding weighs in favor of discretionary denial. In the District Court Litigation, the Court has already entered five Docket Control Orders (Dkts. 46, 76, 84, 89, 93), Discovery Order (Dkt. 47), Protective Order (Dkts. 50, 64), and E-Discovery Order (Dkt. 57). Discovery is also well under way. The parties have already exchanged infringement contentions pursuant to P.R. 3-1 and invalidity contentions pursuant to P.R. 3-3, and claim

construction briefing is almost complete. Ex. 2001. A trial date is also set for October 7, 2024, which is less than six months away. *Id.* Thus, the parties' and Court's substantial investment in this proceeding weighs in favor of denial of institution under this factor.

E. No Stay of the Parallel District Court Litigation

There is no stay of the parallel District Court Litigation and, in fact, a motion for a stay by Petitioner has already been denied. *See* Dkt. 102, *Advanced Coding Techs. LLC v. LG Elecs. Inc.*, Case No. 2:22-cv-00501-JRG (E.D. Tex. April 11, 2024). Even if the Petition were instituted and Petitioner filed another motion to stay the District Court Litigation, prejudice, tactical disadvantage to Advanced Coding Technologies LLC, the late stage of the litigation, and the lack of potential simplification would weigh strongly against such a motion. *See Lennon Image Techs., LLC v. Macy's Retail Holdings, Inc.*, 2:13-CV-00235-JRG, 2014 WL 4652117, at *1 (E.D. Tex. Sept. 18, 2014). The statutory deadline for institution (on July 23, 2024) is not until after the related district court litigation claim construction hearing is completed (on May 16, 2024)[5]. Ex. 2001; *see Intell. Ventures II v. FedEx*

[5] The Court updated the parties that the Claim Construction Hearing would be postponed from May 14, 2024, as noted in the Court's Docket Control Order to May 16, 2024.

Corp., No. 2:16-cv-00980-JRG, Dkt. 141 at 5 (E.D. Tex. Oct. 24, 2017) ("The Court agrees that the Parties have already invested substantial effort and resources during discovery and in preparing claim construction briefing. . . . These circumstances weigh against staying this case").

Moreover, a stay would not decrease the burden on the Court and the parties since any instituted IPR would only cover 2 out of at least 27 combinations of obviousness that Petitioner has raised in the District Court Litigation, and do not include Petitioner's challenges under § 101, § 102, or § 112. *See generally* Ex. 2002, at 15-22, 52-55, 103-137, 253-263, and 293-299. *Intell. Ventures II*, No. 2:16-cv-00980-JRG, Dkt. 141 at 3-4 ("[T]he instituted IPRs only cover a narrow slice of the invalidity arguments Defendants have raised in this case. For example, Defendants have argued that the '715 Patent is invalid under § 102 with respect to at least eight references . . . under § 103 with respect to at least twenty-six combinations . . . under § 112 [], and under § 101.").

Accordingly, it would be unlikely for the Court to hold that a stay would streamline the litigation and this factor supports denial of institution.

F. Other Factors Favor Discretionary Denial

Petitioner does not present a strong case on the merits, further supporting denial of institution. *See supra* Section VI. Petitioner also does not identify any other factors which weigh against discretionary denial. Pet. at 74-76.

Thus, when viewing the factors together, the Petition should be denied in the Director's discretion under 35 U.S.C. § 314(a).

X. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board deny institution of the Petition in its entirety.

Respectfully submitted,

Dated: April 23, 2024 By: /*Peter Lambrianakos* /

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CERTIFICATE OF WORD COUNT

The undersigned hereby certifies that the portions of the above-captioned PATENT OWNER'S PRELIMINARY RESPONSE specified in 37 C.F.R. § 42.24 has 10,713 words in compliance with the 14,000 word limit set forth in 37 C.F.R. § 42.24. This word count was prepared using Microsoft Word for Office 365.

Respectfully submitted,

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CERTIFICATE OF SERVICE

A copy of the foregoing Patent Owner's Preliminary Response and Exhibits 2001 through 2005 have been served on Petitioner's counsel of record as follows:

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