UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SNAP INC. and HISENSE USA CORPORATION,

Petitioners

v.

NOKIA CORPORATION and NOKIA TECHNOLOGIES OY,

Patent Owner.

IPR2025-01440
U.S. Patent No. 7,532,808

PATENT OWNER'S PRELIMINARY RESPONSE

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2001	Order On Defendants' Unopposed Motion For a Stay Pending ITC Proceeding and Extension of Time to Respond to Complaint in *Nokia Technologies Oy v. Hisense Co. Ltd. et al.*, Case No. 1:25-cv-01871-TWT (N.D.G.A.), dated June 5, 2025	**X**
2002	Order No. 23 - Amended Adopted Procedural Schedule in Investigation No. 337-TA-1448, dated September 30, 2025	**X**
2003	Northern District of Georgia Local Patent Rules	**X**
2004	Original Complaint in *Nokia Technologies Oy v. ASUSTeK Computer Inc. et al.*, Case No. 2-25-cv-03053 (C.D. Cal.), dated April 7, 2025	**X**
2005	Original Complaint in *Nokia Technologies Oy v. Acer Inc. et al.*, Case No. 1-25-cv-00523 (W.D. Tex.), dated April 7, 2025	**X**
2006	Order Granting Defendants' Unopposed Motion to Stay Pending United States International Trade Commission ("ITC") Proceedings in *Nokia Technologies Oy v. ASUSTeK Computer Inc. et al.*, Case No. 2-25-cv-03053 (C.D. Cal.), dated July 31, 2025	**X**
2007	Order Granting Unopposed Motion to Stay in *Nokia Technologies Oy v. Acer Inc. et al.*, Case No. 1-25-cv-00523 (W.D. Tex.), dated June 13, 2025	**X**
2008	Central District of California Time to Milestones	**X**
2009	Western District of Texas Time to Milestones	**X**
2010	Original Complaint in *Nokia Technologies Oy v. Paramount Skydance Corporation et al.*, Case No. 1-25-cv-01054 (D. Del.), dated August 21, 2025	**X**
2011	Original Complaint in *Nokia Technologies Oy v. Warner Bros. Entertainment Inc. et al.*, Case No. 1-25-cv-01337 (D. Del.), dated Nov. 1, 2025	**X**
2012	District of Delaware Default Standard for Discovery	**X**
2013	Public Version of Initial Determination on Violation of Section 337 and Recommended Determination on Remedy and Bond in Investigation No. 337-TA-1379, dated January 29, 2025	**X**

2014	Respondents Final Invalidity Contentions in Investigation No. 337-TA-1379, dated April 8, 2024	**X**
2015	Exhibit A-2 Claim Chart Regarding U. S. Patent No. 7,532,808, in Investigation No. 337-TA-1379	**X**
2016	Exhibit A-9 Claim Chart Regarding U. S. Patent No. 7,532,808, in Investigation No. 337-TA-1379	**X**
2017	Exhibit A-10 Claim Chart Regarding U. S. Patent No. 7,532,808, in Investigation No. 337-TA-1379	**X**
2018	Exhibit A-11 Claim Chart Regarding U. S. Patent No. 7,532,808, in Investigation No. 337-TA-1379	**X**
2019	Original Complaint in *Nokia Technologies Oy v. Hisense Co. Ltd. et al.*, Case No. 1:25-cv-01871-TWT (N.D.G.A.), dated April 7, 2025	**X**
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2026	ISO/IEC 1172-2, First edition, RX-0540, August 1, 1993	
2027	ITU-T Recommendation H.262, Transmission of Non-Telephone Signals, MPEG2 (07/95)	
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I. INTRODUCTION

U.S. Patent No. 7,532,808 (the "'808 Patent") defines a new "skip" mode for encoding and decoding blocks of pixels. The inventor of the '808 Patent was part of the "Joint Video Team" (JVT) that developed the H.264 Standard. Conventional skip mode served a limited "copying" function, efficient, for example, in situations where portions of video frames remained stationary over time. One assumption the JVT made was the then-existing skip mode would be the most probable mode and should be the cheapest mode to signal in terms of bitrate overhead. Ex. 1001, 12:18–19.

However, the inventor of the '808 Patent recognized a problem with this assumption: "compression efficiency [was] seriously degraded" for video sequences containing certain types of regional and global motions (e.g., panning or zooming) because these motions could only be addressed by higher overhead coding modes. Ex. 1001, 12:43–48. These higher overhead modes involved using and transmitting motion vectors to describe from where in reference frames a given block of pixels should be predicted (a category of techniques called "motion compensated prediction"). *See* Ex. 1001, Table 3 (listing the then-available coding modes).[1]

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[1] These coding modes, as a POSITA would know, could result in various values (zero or non-zero) of motion vectors depending on the specifics of a given video. Ex. 2021, ¶ 43.

The inventor rejected existing proposals for addressing regional and global motions as too complex and requiring additional information in bitstreams. Ex. 1001, 12:47–14:5. The inventor realized he could redefine skip coding mode to (A) retain the benefits of conventional skip mode while also (B) addressing regional and global motions. Ex. 1001, 14:6–10. A POSITA would recognize the inventor's aspirations were counterintuitive: A block of pixels can only have one coding mode. Ex. 2021, ¶ 64. An encoder must signal each coding mode with unique signaling so a decoder knows which coding mode to use for a given block of pixels. Ex. 2021, ¶ 64. Nonetheless, the inventor sought to create a coding mode that adequately addressed both active and non-active scenarios. Ex. 2021, ¶ 76.

The inventor retained the benefits of conventional skip mode while minimizing the cost associated with addressing regional and global motions through a paradigm shift in the way coding modes are defined. Specifically, the inventor developed a "local" approach whereby both encoders and decoders consider the presence (or absence) of motion around a skip-coded block to determine *how* to interpret the new skip coding mode. All evidence known to Patent Owner shows the '808 Patent's provisional application is the first time in video coding history that someone developed a coding mode that allows for two distinct processes (active vs. non-active) for the same coding mode, based on analysis of motion in previously coded blocks at both the encoder and decoder. The beauty of this approach is the

information required to represent the motion of previously coded blocks—and thus determine *how* to interpret the new skip mode—is already present in any bitstream. Therefore, no additional information is required to represent non-active and active scenarios around blocks of pixels *using the lowest cost coding mode signaling.* In this way, the inventor maximized a key value of video coding: exploiting redundancies to minimize the information required to represent video. Additionally, by using existing signaling for conventional skip mode, the inventor avoided any significant restructuring of bitstream syntax (which had already been agreed upon by the JVT prior to the invention).

The inventor proposed the new skip coding mode to the JVT. The JVT adopted the contribution, which was incorporated into the H.264 Standard. *See* Ex. 2023; *see also* Ex. 2024, 9. The co-chairs of the JVT would go on to praise the new coding mode. Ex. 2025, 2. The inventor expressly defined his new "skip coding mode." The parties agree on the relevant part of this lexicography:

> a coding mode in which a zero (non-active) motion vector or a non-zero (active) motion vector is associated with each skip mode macroblock, depending on the characteristics of the motion in image segments surrounding the macroblock in question.

Ex. 1001, 17:45–52, 14:23–32.

"Non-active" and "active" have specific meanings to a POSITA distinct from the mathematical truth that any vector will necessarily be zero or non-zero valued. "Non-active" refers to a scenario in which any associated motion vector will necessarily be zero. A non-active scenario in the redefined skip mode results in a functionality like conventional skip mode. Ex. 2021, ¶ 41. "Active" refers to a scenario in which any associated motion vector is predicted and is not necessarily, and in most cases will not be, zero. Ex. 2021, ¶ 41; *see also* Ex. 1001, 14:38–42. The redefined skip coding mode can address regional and global motions vis-à-vis the possibility of an "active" classification. *E.g.*, Ex. 1001, 14:48-51, 15:7-14. The '808 Patent provides various embodiments for video coding devices to distinguish non-active scenarios from active ones. *E.g.*, Ex. 1001, 20:6–25, 19:28–51. Figure 8 (corresponding to Figure 3 of the provisional) depicts the notion of distinguishing active from non-active scenarios.

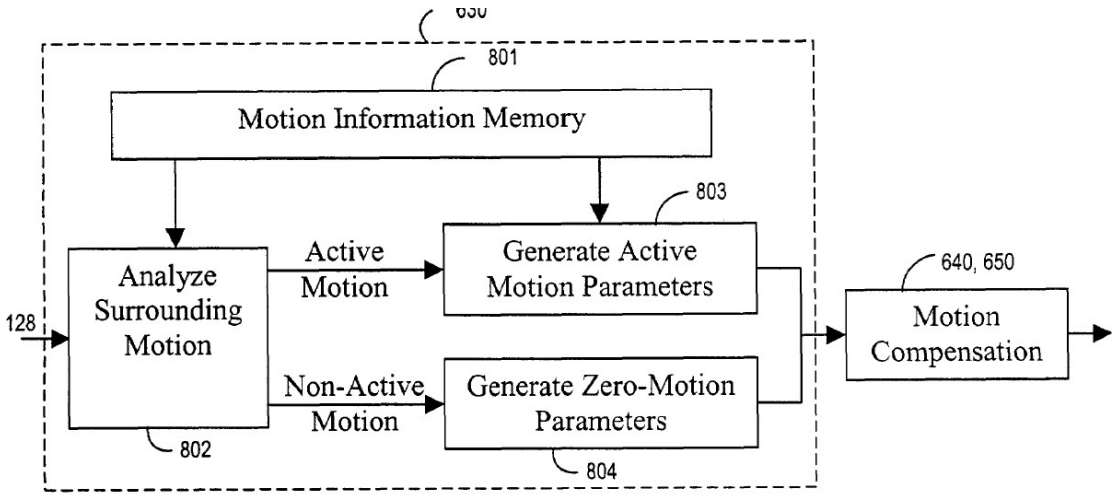

FIG. 8

For Ground 1 (Karczewicz), Petitioners contend a POSITA would combine an alleged "mode" that predicts motion vector fields with an alleged "mode" that does not predict motion vector fields. The idea behind Petitioners' argument seems to be that not using a prediction field is akin to conventional skip mode whereas using a prediction field is akin to the '808 Patent's "active" scenario. Recall an image segment can only be assigned one coding mode. Pointing to multiple, different "modes" does not yield the '808 Patent's skip coding mode that requires a single mode defined by a determination of non-active versus active scenarios "depending on the characteristics of the motion in image segments surrounding the macroblock in question." Rather, in Karczewicz which "mode" is used is a function of distinct signaling in the bitstream.

Putting aside that pointing to two separate "modes" in Karczewicz does not disclose the '808 Patent's skip coding mode (even if these two "modes" were somehow combined into one mode, though Petitioners do not explain how), the law requires both a motivation to combine and reasonable expectation of success. Petitioners provide neither. The "modes" in Karczewicz that Petitioners identify are signaled in mutually exclusive ways. Pet., 16–17 (explaining Karczewicz's coding "modes," and which two Petitioners argue satisfy "skip coding mode"); Pet., 19 n. 9 (explaining that "another bit" signals which "mode" is used). Petitioners provide no evidence for how the signaling for these "modes" could or would be combined with

any chance of success. Moreover, the "modes" themselves are mutually exclusive. *See* Ex. 2021, ¶¶ 105–107. One cannot both use a prediction field and not use a prediction field. Petitioners provide no details on what a combined "mode" would look like and no explanation for how a device would determine whether to use a prediction field or not for any given block assigned to a hypothetical combined mode.

Moreover, Petitioners' alleged motivation to combine misses the point. Petitioners merely point to benefits of predicting information from neighboring blocks and claim that the combination would be more efficient. Pet., 12–13, 19. This is not an inventive aspect of the '808 Patent. Ex. 2021, ¶ 82. Petitioners do not provide a motivation for why a POSITA—who already has the benefit of Karczewicz's "modes" that predict information from neighboring blocks—would modify one of those "modes" to incorporate the functionality of a different "mode" that Karczewicz also already has.

For Ground 2 (MPEG-1 and H.263), Petitioners graft H.263's median motion vector prediction functionality onto MPEG-1's B-picture skip mode. This proposal neither reflects how a POSITA would have understood these disparate systems nor yields the single, redefined skip coding mode the '808 Patent claims.

Petitioners' alleged motivations to combine these two functionalities misunderstand the purposes of the '808 Patent. Petitioners suggest a solution to a

completely different problem, take distinct functionalities from the prior art out of context, and claim such functionalities for the combination. Further, Petitioners rely on hindsight to fabricate motivations of a POSITA to arrive at any such combination. These motivations are unconvincing, and they ignore the fact that the drafters of H.263 made the conscious choice to abandon the B-pictures (and the B-picture skip mode) of MPEG-1 and shift course entirely with H.263. Given that H.263 was a conscious departure from MPEG-1, a POSITA would not have found it obvious to retrofit MPEG-1 with an H.263 functionality, especially considering that the two combined functionalities apply to completely different data structures.

Even taking the combination for granted, Petitioners fail to explain how such a combination satisfies the agreed-upon construction of "skip coding mode," which requires the possibility of both "non-active" and "active" scenarios. Indeed, the combination only ever operates in the "active" scenario, as the combination only ever carries out the active median calculation explicitly contemplated by some embodiments of the '808 Patent. Petitioners make no attempt to disguise this fact, instead arguing that when such a median calculation happens to result in a zero, the combination happens to be operating in the "non-active" scenario. This ignores the inventor's lexicography of "skip coding mode" and defeats the purpose of the claims. Because the combination never operates in a non-active scenario, where the

redefined skip mode acts like conventional skip mode, it does not render obvious the claims of the ’808 Patent.

II. BACKGROUND

A. Technical Background

Digital videos consist of pictures or frames. Video coding systems typically divide each frame into smaller units called slices and blocks, where a slice consists of a sequence of blocks. Ex. 2021, ¶ 44. Blocks are composed of NxM grids of pixels, with pixels representing variations in brightness (luminance) and color (chrominance). One example is a “macroblock,” comprising a 16x16 pixel block for luminance. In Figure 9, each box within the frame represents the luminance component of a macroblock that can be individually predicted using a motion vector, which describes the movement of that specific block compared to a reference frame. Ex. 2021, ¶ 52.

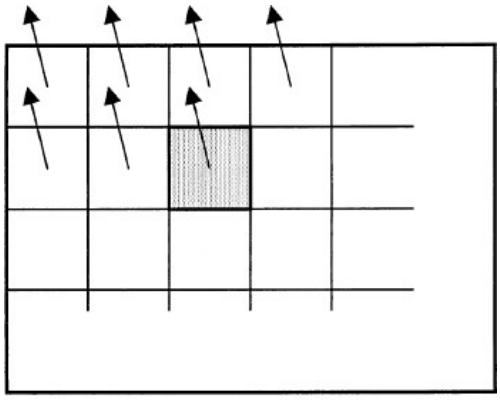

FIG. 9

Ex. 1001, Figure 9. Modern high-definition displays, such as 4K, can contain over 8 million pixels per frame, posing significant challenges for video transmission. Each of these pixels can have a wide range of brightness and color values. This means each video frame contains a staggering amount of information. Ex. 2021, ¶ 44. To reduce the amount of data needed to transmit, store, and playback video, techniques have been developed to compress and decompress video information efficiently. Ex. 2021, ¶ 44. Many of these techniques aim to exploit redundancies in video sequences to achieve efficient compression. Two types of redundancies in video sequences are temporal (similarities between consecutive frames) and spatial (similarities within a single frame). One way to leverage redundancy is to rely on previously decoded information instead of retransmitting the same information for new frames or blocks. Ex. 2021, ¶ 45. Motion compensated prediction refers to a category of techniques for predicting the content of a block of pixels using a corresponding region in a reference frame.[2] Ex. 2021, ¶ 46. Motion vectors are used to identify such

[2] Motion compensated prediction exploits the fact that consecutive frames in a video sequence often contain similar content with only slight changes due to movement and can significantly reduce the amount of data needed to represent each new frame. Ex. 2021, ¶¶ 45, 50.

corresponding regions in reference frames.[3] Ex. 2021, ¶ 51. The values of predicted blocks may not be exact matches to the intended block of pixels for display. In such cases, depending on how a given block is coded, residual information or prediction error can be included in a bitstream to enable the decoder to reconstruct an intended block of pixels using a combination of both the predicted block and the prediction error. Ex. 2021, ¶ 45–46. Frames that use reference frames for prediction are known as "Inter-coded" or "P-frames" (predicted frames).

Motion vector prediction is a process by which motion vectors themselves are predicted from previously determined motion vectors (typically from neighboring blocks). Ex. 2021, ¶ 50. In Joint Model 1,[4] discussed extensively in the '808 Patent, one way to predict motion vectors was to determine the median of the motion vectors of three neighboring image segments. Ex. 2021, n. 1.

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[3] Motion vectors convey both (1) direction and (2) magnitude, typically in two dimensions. Motion vectors are expressed by two directional components (horizontal or vertical components). For example, Figure 9 of the '808 Patent depicts multiple non-zero vectors with the same direction and magnitude. Ex. 2021, ¶ 52.

[4] Joint Model 1 (or JM1) is a draft of the H.264 Standard improved by the '808 Patent. The patent's goal was to provide an improved coding mode building from existing coding modes of JM1. Ex. 2021, ¶ 55.

A block coding mode refers to an understood set of instructions for decoding a block of pixels signaled in a bitstream by an encoder. The '808 Patent lists the coding modes that existed in Joint Model 1 in Table 3. Ex. 2021, ¶ 55; *see also* Ex. 1001, 12:26–38. The decision as to which coding mode to apply to a given macroblock is made through a process called motion estimation. Coding modes instruct decoders, guiding the interpretation and reconstruction of encoded data for each macroblock. The encoder's selection process can be driven by efficiency considerations,[5] evaluating multiple modes and comparing their outcomes to determine the most suitable option. Ex. 2021, ¶ 58. The chosen mode is assigned to the block of pixels, and appropriate signaling is included in a bitstream. Coding proceeds in raster scan order, proceeding from the top left, across, and down. Ex. 2025, 6. This allows blocks above and to the left to serve as references for providing possible candidate motion vectors for motion vector prediction, while those to the right and below are unavailable. Ex. 2021, ¶ 46.

A bitstream will indicate a coding mode for each respective macroblock, along with any necessary additional information such as motion vectors and prediction

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[5] Encoders are not specified by video decoding standards. Various encoding implementations may have different priorities in terms of quality, compression, and computational complexity. *See generally* Ex. 2025.

error. This information allows decoders to accurately reconstruct the original video content. However, where a skip mode is used (whether conventional or redefined), prediction error information and motion vector data are omitted or "skipped." Ex. 2021, ¶ 68. Conventional skip mode was used to copy a block of pixels directly from the same location. No motion vector was needed to convey information about displacement from a reference frame. *See id.*

B. The '808 Patent's Solution

The '808 Patent describes the various coding modes available in JM1 (see Table 3). JM1's SKIP mode omitted residual information and directly copied macroblocks from reference frames without displacement. Initially, the SKIP mode was assigned the lowest bit cost codeword, under the assumption the SKIP mode would be the most frequently used. However, the inventor noticed a significant problem: the SKIP mode was rarely utilized in scenes involving panning, zooming, or similar motions. This inefficiency in coding greatly impacted overall compression performance for video sequences with such motion. Ex. 2021, ¶ 56.

The inventor of the '808 Patent considered existing attempts to solve the problem of global and regional motions (such as panning or zooming). Specifically, the inventor considered global motion vector coding (GMVC) and global motion compensation (GMC). These methods aimed to improve coding efficiency by accounting for large-scale motion affecting an entire frame. The inventor recognized

that GMVC and GMC were suboptimal solutions for several reasons. Ex. 2021, ¶ 71. First, GMVC and GMC required additional information to be included in the bitstream, which reduced any compression benefits. Ex. 1001, 13:58–14:10. Second, these techniques were complex and increased computational demands on coding devices. Ex. 1001, 13:58–14:10.

To avoid inefficiencies and complexities that limited the effectiveness of GMVC and GMC approaches, the inventor had the idea to take a more local approach to global or regional motions. This led the inventor to redefine JM1's SKIP mode. Specifically, the inventor's redefined JM1's SKIP coding mode preserved SKIP's most basic function (in essence copying) in its "non-active" motion scenario but also provided a way for the new skip coding mode to recognize and address "active" scenarios involving uniform motion with predicted motion vectors. The '808 Patent's redefined skip coding mode adapts to active and non-active motion scenarios. Ex. 2021, ¶ 76.

The redefined skip coding mode of the '808 Patent was developed during the H.264 standardization effort. One embodiment introduced by the inventor in the '808 Patent is the "conditional analysis" embodiment. The "conditional analysis" embodiment examines whether stationary characteristics exist in image segments surrounding a macroblock in question to determine "active" versus "non-active" motion. Ex. 1001, 20:12–25. This embodiment corresponds to a contribution the

inventor made to the H.264 standard called JVT-C027. Ex. 2023. The inventor's contribution was adopted. Ex. 2024, 9; Ex. 2021, ¶ 83.

III. CLAIM CONSTRUCTION

For the purposes of this IPR, Petitioners construe "skip coding mode" as "a coding mode in which a zero (non-active) motion vector or a non-zero (active) motion vector is associated with each skip mode macroblock, depending on the characteristics of the motion in image segments surrounding the macroblock in question." Pet., 11. This is in line with the inventor's lexicography and previous constructions of the term. *See* Ex. 1001, 17:45-52; *Amazon.com, Inc. v. Nokia Techs. Oy*, IPR2024-00847, Paper 11, 18-19 (Dec. 11, 2024); *Amazon.com, Inc. v. Nokia Techs. Oy*, IPR2024-00848, Paper 11, 19 (Dec. 11, 2024); *In the Matter of Certain Video Capable Electronic Devices, Including Computers, Streaming Devices, Televisions, Cameras, And Components and Modules Thereof*, Investigation No. 337-TA-1379 (U.S.I.T.C.), Construing Claim Term [Corrected], at 15 (Apr. 16, 2024). Patent Owner agrees with this construction.

IV. ALLEGED PRIOR ART

A. Ground 1 – Karczewicz

Petitioners' Ground 1 relies on International Patent Publication No. WO 01/11891 A1 ("Karczewicz") (Ex. 1006). Karczewicz is titled "Apparatus and method for compressing a motion vector field" and names Marta Karczewicz, Jani

Lainema, and Bogdan-Paul Dobrin as inventors. It bears mentioning that Jani Lainema is the inventor of the ’808 Patent.

Karczewicz discloses an apparatus and method for encoding and decoding using affine motion vector field coding and prediction. Ex. 1006, 1:7–8; Ex. 2021, ¶ 87. Karczewicz teaches different methods for coding and predicting motion vector fields with affine motion modeling options that consist of (a) a prediction field describing how to predict a motion vector; (b) a refinement field that may enhance a prediction; and/or (c) a zero-motion vector field. Ex. 1006, 2:9–10, 15:2– 5, 17:8–18, 31:22–25, 32:14–25.

A motion vector field is a three-dimensional spatial representation of motion projected onto a two-dimensional image. Karczewicz describes affine motion vector fields as a special class of motion modeling that uses “motion coefficients” to weight six basis functions known to both the encoder and decoder. Karczewicz further describes an “MCI” (motion coefficient indicator) that indicates whether these coefficients are included in a bitstream. Ex. 1006, 37:5–8. The basis functions relate to forms of motion (like translation, rotation, and skewing). Ex. 1006, 14:2–5. Affine motion modeling is a distinct approach from video coding schemes based solely on translational models (such as H.263 and later JM1). Ex. 1006, 10:7–11. Karczewicz provides techniques for signaling in a bitstream to instruct decoders on whether or how to predict affine motion vector field coefficients (e.g., the encoder expressly

signals coefficients or informs the decoder the neighboring image segments from which to predict or copy coefficients). Ex. 1006, 25:17–19.

B. Ground 2 – MPEG-1 in combination with H.263

1. MPEG-1

MPEG-1 is a video coding standard published in 1993 developed by MPEG, which is part of ISO/IEC.[6] Ex. 1007. "MPEG" refers to the same "Moving Picture Experts Group" discussed in the '808 Patent. *See* Ex. 1001, 10:27-31; Ex. 1007.

MPEG-1 identifies two types of skip modes. In MPEG-1 P-picture skip mode, a skipped macroblock always has a motion vector "equal to zero." In other words, in MPEG-1 P-picture skip mode, the macroblock is always copied from a reference frame without motion. Ex. 2021, ¶ 113. In MPEG-1 B-picture skip mode, a macroblock carries the macroblock type from the prior macroblock. *Id.* In other words, an MPEG-1 B-picture skip mode macroblock will have the macroblock type and motion vectors copied from the previous macroblock. *Id*. MPEG-1 P-picture skip mode applies to P-pictures, while MPEG-1 B-picture skip mode applies to B-pictures.

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[6] ISO refers to the International Organization for Standardization. IEC refers to the International Electrotechnical Commission.

2. H.263

H.263 is a video coding standard first published in 1996, which was developed by the ITUT VCEG.[7] "VCEG" refers to the same "Video Coding Experts Group" discussed in the '808 Patent. *See* Ex. 1001, 10:27-31; Ex. 1009.

H.263 specifies motion compensation, where a macroblock's motion vector is determined at the decoder by "adding predictors to the vector differences indicated by MVD." Ex. 1009, 44. To create the predictors, H.263 takes the median of candidate predictors, which use the motion vector data of the blocks to the left, above, and above right. Ex. 1009, 44–45. This median is added to the motion vector differences indicated by MVD, whose signaling is shown in Table 14. Ex. 1009, 44.

On the other end, an encoder can implement motion compensated prediction for an H.263-compliant bitstream by first performing median prediction to determine the predictor. The encoder then subtracts the horizontal and vertical components of the predictor from the actual motion vector, resulting in motion vector differences, which are indicated by MVD. The MVD is then included in the bitstream.

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[7] ITU-T refers to the International Telecommunication Union Telecommunication Standardization Sector.

V. ARGUMENT

As a threshold matter, the Petition ostensibly assumes two different scopes of the term "skip coding mode" for purposes of its first and second grounds. For Ground 1, the Petition seems to acknowledge that any "skip coding mode" as defined in the '808 Patent must involve separate processes for "non-active" and "active" scenarios. This appears to be why Petitioners argued that a POSITA would combine two coding options in Karczewicz that (1) predict a motion vector field (ostensibly corresponding to "active") and (2) not predict a motion vector field (ostensibly corresponding to "non-active").

With Ground 2, "skip coding mode" was interpreted much more broadly. The Petition did not give meaning to the "active" and "non-active" language in the '808 Patent's lexicography. Rather, Petitioners assumed that "skip coding mode" was satisfied by a coding mode that sometimes results in zero-valued motion vectors and sometimes results in non-zero-valued motion vectors.

Petitioners are mistaken on both fronts. First, as to Karczewicz, a POSITA would not have combined two mutually exclusive modes of operation in a logically impossible way. Petitioners provide no explanation how a POSITA could have accomplished this, such as explaining the modifications necessary for video coding devices to distinguish these mutually exclusive options. Moreover, Petitioners fail to demonstrate a POSITA's reasonable expectation of success.

Second, as to MPEG-1 in combination with H.263, Petitioners fail to explain why or how it would be obvious to combine the two. Furthermore, MPEG-1 in combination with H.263 does not satisfy the construction of "skip coding mode" agreed upon by the parties.

A. Ground 1 – Karczewicz

Petitioners have not established, by a preponderance of evidence, that the challenged claims are unpatentable under Ground 1.

1. Karczewicz does not disclose coding modes

Petitioners' argument is flawed because it relies on Karczewicz's disclosure that "there are several different ways in which a given segment can be coded," Ex. 1006, 17:1–2, to be understood as different coding modes. Pet., 15. Karczewicz involves ways of signaling affine motion vector field coefficients and does not teach coding modes. This is distinct from coding modes as disclosed in the '808 Patent. Ex. 2021, ¶ 89.

Petitioners' assertion of five different "coding modes" in Karczewicz is misleading, as none of these alleged modes align with the '808 Patent's singular "skip coding mode." Pet., 16–17. Karczewicz primarily focuses on affine motion vector fields for segment coding, rather than defining a comprehensive set of coding modes. Ex. 1006, 2:9–10, 15:2–5, 32:14–25. Specifically, Karczewicz describes either sending motion vector field information or predicting motion vector field information

and offering offset information to correct the predicted motion vector field values. Whether the '808 Patent's "skip coding mode" could result in motion vectors potentially similar in value to Karczewicz's motion vectors is inapposite.[8]

Indeed, contrary to Petitioners' assertions, Pet., 15 n. 7, Karczewicz's narrowly focused design does not disclose the broader "coding mode" as claimed by the '808 Patent. As the '808 Patent specification makes clear, the "coding mode" of the claims is based on the coding modes used in Joint Model Number 1 of the JVT codec. *See* Ex. 1001, 14:16–18 ("[T]he present invention is based on a redefinition of the skip mode concept used in JM1 of the JVT codec."). Furthermore, JM1 of the JVT codec envisions coding modes that apply to *all* macroblocks that utilize motion compensated prediction. *See, e.g.,* Ex. 1001, 10:45–48 ("[A]ccording to JM1, motion compensated prediction of INTER coded macroblocks is performed in manner that differs from [generic video encoders as] previously described. More specifically, *each of the macroblocks is assigned a 'coding mode'* …") (emphasis added). Thus,

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[8] The '808 Patent's skip mode will result in similarly valued motion vectors only if one ignores the fact Karczewicz is about three-dimensional affine motion modeling (distinct from the translational approaches of H.263 and H.264) or otherwise assumes zero-valued motion and ignores an entire dimension of Karczewicz's representations. Ex. 2021, ¶ 87.

given Karczewicz's focus on segment coding using affine motion vector fields—and not the more general motion compensated prediction—Karczewicz does not disclose the requisite "coding mode."

2. Karczewicz fails to teach a single coding mode that meets the inventor's lexicography

Even assuming Karczewicz discloses coding modes, it fails to disclose a single coding mode that meets the '808 Patent's skip coding mode. The challenged claims describe both (1) processes of predicting and (2) generating motion vectors in a redefined skip coding mode. Karczewicz does not provide any coding mode as such, much less a skip coding mode that considers motion characteristics of surrounding image segments to determine whether to interpret skip coding mode as "active" and "non-active" for purposes of deciding how to generate a skip mode motion vector. Ex. 2021 ¶¶ 87–89.

Petitioners allege Karczewicz assigns a "skip coding mode" to a first segment of a first frame of a sequence (i.e., limitation 10[a]) in instances where the first segment is either encoded using a zero-motion vector or with a non-zero motion vector associated with a neighboring block. Pet., 17–18. Petitioners admit that these zero-motion vectors and non-zero motion vectors are from separate alleged "coding modes" in Karczewicz but argue that a POSITA would understand that the "two modes together correspond to the '808 Patent's 'modified' 'skip coding,' which

groups these two independent functionalities and 'redefines' them as the 'skip coding mode.'" Pet., 17–18; Ex. 2021, ¶ 98.

Petitioners' argument conflates the results of the challenged claims (i.e., zero or non-zero-valued motion vectors) with the processes that led to those motion vectors. This trivializes both the challenged claims and the field of video coding. The novel aspects of the challenged claims are not particular values of motion vectors. Ex. 2021, ¶ 98.

Even ignoring that Karczewicz is about affine motion field models and not "coding modes," Petitioners' arguments ignore the teachings of Karczewicz. Karczewicz teaches explicit signaling for motion coefficients and motion vector field predictions: An encoder expressly signals affine motion coefficients and/or expressly tells the decoder from where to predict or copy a motion vector field. *See, e.g.*, Ex. 1006, 26:13–24.

By contrast, the challenged claims involve a skip coding mode that considers surrounding motion to determine whether to treat the skip coding mode as active (and then generate a predicted motion vector) or non-active (and then associate a zero-motion vector) to best predict a given image block from a reference frame. Petitioners offer no explanation—other than claiming that such a signal already exists—for how it would even be possible to modify Karczewicz to signal such a coding mode. *See infra* Section V(A)(5); Ex. 2021, ¶ 98.

Moreover, the ’808 Patent states in claim 10 that “no further motion vector information for the first segment is coded in the encoded bitstream” after the initial skip mode indication. Ex. 1001, cl. 10; see also Ex. 1001, cls. 11, 15, 21, 44, 47–49, 51–53. This is not the case in Karczewicz at least because Karczewicz requires an MCI bit to indicate the presence or absence of motion coefficients. Ex. 2021, ¶ 92.

Petitioners argue that the “no further motion vector information” limitation—labeled 10[d] by Petitioners—is met by Karczewicz firstly because the bit indicating the use of a prediction field (and the information identifying surrounding segments used to calculate the prediction field) is not motion vector information. Pet., 29. This is incorrect at least because Karczewicz requires an MCI bit to indicate the presence or absence of motion coefficients. Ex. 2021, ¶ 101. They then claim that prediction error residuals are not motion vector information. Pet., 29 n. 12. This is incorrect—motion vector prediction residuals are motion vector information. Motion vector prediction residuals are motion vector offset values used to adjust predicted motion vectors to refine the final selected motion vector for a block. Petitioners finally argue that if such residuals are motion vector information, that, sometimes, prediction error will be zero, and that when prediction error is zero, it would have been obvious to create another bit that specifies those all-zero motion vectors. Pet., 36–38. Ignoring the obviousness of such a hypothetical bit, Petitioners are incorrect that 10[d] is

satisfied because when there *is* prediction error, there is further additional motion vector information. Ex. 2021, n. 2.

Petitioners further argue the construction of skip coding mode does not require "consider[ation of] surrounding motion to determine whether to treat the skip coding mode as active … or non-active … ." Pet., 23 (quotation omitted). They then claim that Karczewicz discloses such a mode. Pet., 21–24.

Petitioners are incorrect first because the agreed-upon definition and the inventor's lexicography of "skip coding mode" unambiguously requires consideration of surrounding motion in determining the type of motion vector to associate with each macroblock. The parties agree that skip coding mode is "a coding mode in which a zero (non-active) motion vector or a non-zero (active) motion vector is associated with each skip mode macroblock, depending on the characteristics of the motion in image segments surrounding the macroblock in question." Under this construction, whether a non-active or active motion vector is used for a macroblock "depend[s] on the characteristics of the motion in image segments surrounding the macroblock." That the decision to choose a non-active or active motion vector "depends" on the surrounding motion means that surrounding motion must be "consider[ed] … to determine whether to treat the skip coding mode [as active or non-active]." Petitioners do not attempt to explain *why* this application

of the construction is incorrect,[9] nor do Petitioners provide an alternate explanation of how the agreed-upon construction could be understood. This is because the uncontested construction of "skip coding mode" clearly contemplates that whether a non-active or active motion vector is chosen requires consideration of surrounding motion. Ex. 2021, ¶ 98.

Petitioners next explain in some detail how an *encoder* in Karczewicz "considers the *characteristics of motion in image segments surrounding the macroblock in question* compared to the motion characteristics of the macroblock in question when determining an efficient way for coding the macroblock in question." Pet., 21–24.

Assuming here that Karczewicz is not about affine motion field models and instead discusses coding modes, Petitioners miss the point. An *encoder* determining whether the macroblock will have a coding mode with a zero motion vector or a different coding mode with a non-zero motion vector was well known in the art. *See, e.g.,* Ex. 1001, 10:40–12:47 (explaining then-extant coding modes). Indeed, the scheme Petitioners set out generally describes the prior art the invention of the '808 Patent sought to improve upon. *See id.* The invention of the '808 Patent as claimed

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[9] Petitioners' Ground 2 arguments, which Petitioners reference in Ground 1, do not address this issue. *See* Pet., 23 (Ground 1); Pet., 61–62 (Ground 2).

brings what would have been two coding modes—one using a non-active motion vector and one using an active motion vector—into one coding mode, reducing bitstream requirements. *See supra*, § II.B. Petitioners here merely allege two different coding modes, asking the Board to find that the presence of both constitutes the one required by the ’808 Patent.

3. Karczewicz teaches away from the ’808 Patent by explicitly signaling a motion model and a motion coefficient indication

The disclosures in Karczewicz teach away from the ’808 Patent. Karczewicz’s system requires signaling a motion model and a motion coefficient indication (MCI) bit in the bitstream. As discussed, the ’808 Patent is focused on improving coding efficiency using a redefined skip coding mode. Skip coded macroblocks focus on reducing the bitstream as much as possible while maintaining an adequate fidelity in decoded video. Petitioners argue that the Karczewicz’s MCI bit indicates a skip coding mode because Karczewicz can signal an all-zero pattern of motion coefficients by the MCI bit alone. *See* Pet., 18. This is incorrect if Petitioners allege this functionality in Karczewicz is related to the ’808 Patent. First, Petitioners ignore that “motion coefficient indication (MCI)” is about a refinement field for affine motion model coefficients. Karczewicz teaches that a “motion vector field is formed of a prediction motion vector field and a refinement motion vector field.” Ex. 1006, 12:22–23. MCI in Karczewicz is about whether refinement or additional information is added to the affine motion coefficients. The challenged claims are unrelated to

this process, as skip coding modes automatically skip both motion vector data (which would include any residual information added to motion vectors, which is loosely akin to Karczewicz's refinement field) and prediction error (i.e., residual information added to a prediction of a block of image data that was made based on some motion vector, or affine motion field as is the case in Karczewicz). Ex. 2021, ¶¶ 91–92; Ex. 2021, ¶¶ 100–101.

The MCI is not a coding mode or an indication of a coding mode but a separate bit in the bitstream that signals the presence (or absence) of coefficients to represent Karczewicz's refinement motion vector field. If the "coding mode" that Petitioners contend would be obvious for a POSITA to create by combining different teachings of Karczewicz was really a "coding mode," then the value of MCI would automatically be set to 0 by virtue of the alleged assignment of "skip coding mode," and it would not be necessary to set MCI to 0. This reinforces the fact Karczewicz teaches away from the '808 Patent's skip coding mode, where no additional information is sent in the bitstream. Ex. 2009, ¶ 102. Moreover, Petitioners' argument is inconsistent with a POSITA's understanding of a "skip coded macroblock" as a skip coded macroblock has no possibility for information other than the fact that it is skipped. Ex. 2021, ¶¶ 101–102.

4. Petitioners fail to identify what modifications would be performed to make its alleged combination of two "coding modes" possible

The Petition fails to explain what modifications would be needed to make this alleged combination of two "coding modes" possible.[10] Karczewicz discloses an MCI bit that is set to zero when no refinement motion coefficients are included with a block of data. The MCI bit instructs the decoder whether to expect enhancement information related to a predicted affine motion field. Ex. 1006, 37:5–13. The MCI bit does not indicate how a predicted block has been coded in the bitstream. Ex. 1006, 37:5–13. For example, the MCI bit says nothing about whether a block is represented by a motion prediction field. Ex. 1006, 17:8–18, 31:22–25; Ex. 1003, ¶¶ 86–90. Karczewicz describes separate signaling in the bitstream for these coding options so a decoder can distinguish when, e.g., a block is represented by a prediction field from, e.g., when a block is assigned a zero-motion vector field. *See, e.g.*, Ex. 1006, Figure 2 (signaling both prediction motion vector field and refinement motion vector field information). Separate from any MCI bit, Karczewicz

[10] The only modification Petitioners mention is no modification at all—retaining the MCI bit as the signal for skip coding mode and "redefining the mode." Petitioners do not explain what "redefining the mode" would entail. Pet., 19.

expressly instructs a decoder how a predicted block has been coded. Ex. 1006, 17:23–25; Ex. 2021, ¶¶ 101–103.

Karczewicz's MCI bit can be set to zero (indicating no refinement information in a bitstream) in two situations. The first is where a segment is coded using a zero-motion vector field—a copy from the reference frame. Ex. 1006, 31:22–24; *see also* Pet., 17. In this situation, an encoder sends a zero-motion vector field for a segment. The second is where a segment is encoded with just a prediction field—where the segment is represented in terms of the motion field of one or more of its previously coded neighbors. Ex. 1006, 17:8–14, 31:22–24; *see also* Pet., 17. Here, an encoder instructs a decoder to form a predicted motion vector field for a segment. The encoder "provide[s] information about the neighboring segment(s) used in the prediction." Ex. 1006, 17:23–25. In each case, an encoder sets the MCI bit to zero to indicate no refinement information is present in the bitstream and then, if a segment is represented as a prediction field, separately instructs the decoder how the segment has been coded. Ex. 2021, ¶ 105. Without these instructions, a video coding device would not know whether to use a prediction field or a zero-motion vector field for a given block in lieu of a prediction. Ex. 2021, ¶¶ 102–103.

A device cannot both use a prediction field and not use a prediction field. This is an irreconcilable contradiction. Karczewicz must signal these two options separately. A POSITA would understand that the MCI bit relates only to the presence

of motion vector refinement information and is irrelevant to the so-called "coding mode" being used. In this sense, and ignoring Karczewicz's other deficiencies, the MCI flag is an additional indication in the bitstream that the '808 Patent avoids.

5. Petitioners fail to show a motivation to combine and a reasonable expectation of success in combining two of Karczewicz's mutually exclusive modes of operation

"An obvious determination requires finding that a person of ordinary skill in the art would have been motivated to combine or modify the teachings in the prior art and would have had a reasonable expectation of success in doing so." *Regents of Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1291 (Fed. Cir. 2018). Petitioners fail to show a plausible motivation to modify Karczewicz as alleged.

A POSITA is "a person of ordinary creativity, not an automaton." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007). However, like all people, a POSITA is bound by the law of noncontradiction. *See id.* (referring to a POSITA's common sense). As stated, a video coder cannot both ***use*** a prediction field and ***not use*** a prediction field for a given block. These are mutually exclusive propositions and cannot be a single "coding mode" without additional modification. A coherent encoding or decoding process must include a means to determine whether to use a prediction field or not for a given block. *See* Ex. 1006, 17:4–8 (coding option information must be sent in an "unambiguous way").

Petitioners' assertion that it would have been obvious to a POSITA to combine Karczewicz's coding options with (1) a prediction field and (2) an all zero motion vector field together is implausible. *See* Pet., 19. To potentially do so with Karczewicz as a starting point, a POSITA would need to reject the teachings of Karczewicz as to how its coding options are signaled. The POSITA would need to develop a mode that considers surrounding motion to classify active versus non-active processes for purposes motion vector association even though Karczewicz says nothing about this. Then the POSITA would need to develop a signaling mechanism for the '808 Patent's skip coding mode, which again is not provided by Karczewicz.[11] The POSITA would need to modify Karczewicz's encoder and decoder to understand the new signaling mechanism. Ex. 2021, ¶ 90. Karczewicz would not motivate a POSITA to arrive at this unconfirmed, unspecified solution. Ex. 2021, ¶¶ 105–107. Petitioners fail to articulate a plausible basis for why a POSITA would be motivated to make all these changes to Karczewicz. Karczewicz's MCI bit does not avoid this deficiency. The MCI bit indicates whether refinement is included in the bitstream, not whether or how a block is predicted.

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[11] Ex. 1001, Table 3 provides the macroblock coding modes of JM1. JM1 did not exist at the time of Karczewicz.

Petitioners argue that Karczewicz's "coding modes" are not mutually exclusive because it is the MCI bit that indicates the skip coding mode, while it is another bit that signals whether a prediction is used. Pet., 19 n. 9. Thus, in Petitioners' view, that "another bit" is not signaling a coding mode—otherwise, such coding modes *would* be mutually exclusive. But in the next sentence, Petitioners claim there is motivation to combine "the two coding modes." *Id.* Petitioners thus argue in the same paragraph that the two "coding modes" are *not* coding modes, are *not* mutually exclusive, that it is the MCI bit that signals the coding mode, and that such "coding modes" *are* coding modes and *are* mutually exclusive. *See id.* Petitioners' contradictions run throughout its response. Petitioners' argue "Karczewicz teaches five different modes for coding a segment," referring to the "another bit" described above. *Pet.,* 11–18. Petitioners argue that despite these separate "coding modes," "a POSITA would have understood the functionality of these two modes together corresponds to the '808 Patent's modified skip coding mode." Pet., 18 (cleaned up). Importantly, Petitioners never support the argument that the "two modes together" that "correspond[] to … skip coding mode" is actually a coding mode. Instead, Petitioners argue only that (1) each of the five "coding modes" is a separate coding mode and that (2) the two "coding modes" combined constitute the "skip coding mode."

Petitioners' inconsistencies and need to bend definitions expose the fact that, assuming Karczewicz actually does disclose coding modes, it is not the MCI bit that signals such coding modes. This is because the MCI bit does not indicate how a predicted block has been coded in the bitstream. Ex. 1006, 37:5–13. Instead, the MCI bit only signals whether refinement is needed for affine motion coefficients—i.e., it only signals whether a refinement motion vector field will be applied. Ex. 2021, ¶ 92.

6. Petitioners' argument regarding rate distortion in Karczewicz is misguided

Petitioners additionally allege "a POSITA would have understood the decision to code a second segment with [zero motion vector] or predicted non-zero motion vector … depends on the motion characteristics in the surrounding segment(s), consistent with the meaning of *skip coding mode*." Pet., 21. This is because, according to Petitioners, "Karczewicz determines the efficient coding mode by balancing distortion due to coding the second segment with reference to a neighboring segment against the amount of data required to transmit the second segment's motion vector information." Pet., 21; see also Ex. 1006, 15:15–20. However, the considerations suggested by Karczewicz for how to determine what motion vector fields to use in coding a segment is irrelevant to whether Karczewicz teaches any "coding modes" at all, particularly the '808 Patent's skip coding mode. Ex. 2021, ¶ 103.

Additionally, Petitioners' argument regarding balancing distortion is both a conflation fallacy and, in any event, exclusive to encoders. First, the conflation fallacy is that Petitioners conflate an encoder's process for deciding what coding options to use, which considers and compares all available coding options, with the process specified within the '808 Patent's redefined skip coding mode that—for a macroblock that has been coded with this mode—considers surrounding motion to determine how to interpret the skip coding mode. During motion estimation, an encoder will in essence try out various coding options to determine which options work best. Ex. 2021, ¶¶ 60–62. This is not to be confused with what occurs within the context of using or trying a particular coding mode. Karczewicz's encoder's consideration of available coding options does not take place within the context of a single coding mode and does not consider motion surrounding a skip coded macroblock to determine how to interpret a skip coding (or any other) mode.

Petitioners draw this point out for the decoding claims, arguing that because Karczewicz's *encoder* provides a bit indicating whether a prediction motion vector field is used, the "predicted non-zero motion vector" is "based at least in part on the motion of a second segment neighboring the first segment." Pet., 42–43. Petitioners tellingly do not argue that this consideration of the second segment occurs at the decoder, which is what the decoding claims require. Furthermore, Petitioners miss the fact that the "assign[ed] … motion vector" of 16[b] cannot be assigned by the

encoder, but is instead the "assigned motion vector *for the skip coding mode*, … one of the zero motion vector and the predicted non-zero motion vector." Ex. 1001, 26:14–22 (emphasis added). That is to say, the "assigned motion vector" must be the motion vector "associated with each skip code macroblock" as discussed in the skip coding mode construction. Thus, even if the presence of Karczewicz's encoder's indicator is "based at least in part on the motion information of a second segment," it is not the proper motion vector as claimed.

Petitioners' argument fails for the decoding claims for yet more reasons. Decoders are not capable of performing rate distortion optimization. This is because (1) the decoder does not choose how to code a block. Rather, a decoder merely interprets a block as it is signaled in the bitstream. And (2) a decoder does not have the necessary information to perform rate distortion optimization. Rate distortion optimization requires knowing what the uncompressed or RAW block is to determine the distortion of the block caused by predictive coding options versus the bitrate used to signal the block in the bitstream. A decoder never has access to uncompressed or RAW data. Thus, Petitioners fail to identify any teachings in Karczewicz of a "skip coding mode" that would automatically assign a zero motion vector or trigger the calculation of a predicted motion vector from neighboring blocks, based on the nature of motion in surrounding image segments. Therefore,

Karczewicz fails to teach at least limitation 10[a]. Ex. 2021, ¶ 103, ¶ 109; Ex. 2021 ¶ 93.

Petitioners' arguments that Karczewicz teaches limitations 10[b]-[d] likewise fail. Pet., 25–31. Karczewicz fails to teach at least elements 10[a]-[d] and 16[a]-[c] because it does not teach any coding mode that would automatically trigger the functionalities required to meet these claim limitations. Petitioners have failed to show by a preponderance of evidence that the challenged claims are unpatentable based on this Ground.

7. Dependent claims 44, 47–48, 58–59

Dependent claims 44, 47–48, and 58–59 all include a derivation step to predict a non-zero motion vector. Petitioners interpret the derivation step to mean that the "skip coding mode" is assigned. *See, e.g.*, Pet., 33–34 (indicating that limitation 44[b] is "after the 'skip coding mode' is assigned" which correlates the deriving step in limitation 44[a] to mean assigning a skip coding mode). Petitioners' interpretation is incorrect, as Petitioners conflate the assigning and deriving steps. Petitioners thus fail to meet their burden for these dependent claims, too. Ex. 2021, ¶ 108.

The '808 Patent distinguishes between distinct steps in its process: "assigning a skip coding mode," as in claims 10 and 16, assigning either a zero or non-zero motion vector, and "deriving the predicted non-zero motion vector," as in claims 44, 47–48, 58–59 (in the event of active motion). The initial "assigning" step involves

determining whether a segment should use the skip mode with a zero motion vector (non-active) or predicted motion vector (active). Ex. 1001, cl. 10, cl. 16. This is distinct from the "deriving" step, which calculates or estimates what a predicted motion vector should be. Ex. 2021, ¶ 109.

B. Ground 2 – MPEG-1 in combination with H.263

Petitioners' Ground 2 relies on modifying MPEG-1's coding of skipped macroblocks in B-pictures to use H.263's median prediction technique, which bases the motion vector of the macroblock at issue on the three surrounding macroblocks. Pet., 53. Petitioners have not established, by a preponderance of evidence, that the challenged claims are unpatentable under Ground 2.

1. Petitioners offer no evidence of motivation to combine, as required by the law

Petitioners do not offer evidence of motivation to combine H.263's median prediction technique with MPEG-1, which is required. ("It does not suffice to meet the motivation to combine requirement to recognize that two alternative arrangements … were both known in the art). Indeed, obviousness requires that a skilled artisan "*would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention"—it is not enough to show the skilled artisan *could have made* such modifications. *See id.* at 886–87 (citations omitted) (emphasis in original).

Here, Petitioners' arguments consist of either noting that H.263 and MPEG-1 existed as part of the prior art and that a POSITA *could have* made the combination,[12] or of arguing that a POSITA would have been motivated to make such a combination because it would have improved the accuracy of MPEG-1's skipped macroblock prediction and allowed for the use of skipped macroblocks more broadly. *See* Pet., 53–55.

Even taking Petitioners' story at face value, it omits one key fact—it fails to explain how a POSITA would have implemented H.263's median prediction in MPEG-1. Petitioners' conclusory statement that such a combination requires "no more than a simple substitution of one element … for another" merely explains that two alternative arrangements were known in the art and asks the reader to imagine putting them together. Pet., 55. Petitioners importantly fail to explain why a POSITA would have been motivated to make this "simple substitution" or how a POSITA would have done so. This failure to explain is by itself fatal.

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[12] E.g., "Doing so would have amounted to no more than a simple substitution of one known element … for another. … It also would have been use of a known technique … to improve a similar method … in the same way …." Pet., 55.

2. A POSITA would not be motivated to combine MPEG-1 and H.263

Petitioners' alleged motivations for a POSITA to combine MPEG-1 and H.263 are unavailing. First, Petitioners argue that "[u]sing H.263's median prediction technique … in MPEG-1[] … would have improved the accuracy of MPEG-1's skipped macroblock prediction because it uses three data points as compared to MPEG-1's single data point." Pet., 55. Petitioners provide no support for this argument, beyond postulating that using three points would "result[] in a better picture by reducing noise and preserving discontinuities." *Id.*

Ignoring that these arguments are unsupported and overlook MVD, Petitioners neglect the fact that the primary benefit of the '808 Patent's invention is not "reducing noise and preserving discontinuities." Instead, the '808 Patent is directed to, among other things, providing a less demanding solution for coding global motion while also significantly expanding the use cases for the cheap-to-signal skip mode, beyond just copying of the prior frame. The fact that Petitioners' claimed motivation for a POSITA to combine the two pieces of prior art is unrelated to the problem solved by the invention of the '808 Patent not only shows why such a combination would not have been obvious, it also provides additional perspective as to why Petitioners' combination is distinct from the '808 Patent's invention as claimed. *See* Ex. 2021, ¶ 71–73.

Petitioners also claim a POSITA would have been motivated to combine the two technologies because H.263's median prediction technique would have made skipped macroblocks available in more scenarios in MPEG-1's B-picture skip mode, because a skipped macroblock could follow an intra-coded macroblock "as taught by H.263's first special case rule." Pet., 55. Petitioners are incorrect, as H.263's first special case rule is related to motion vector prediction, not skip coding. Indeed, H.263's first special case rule provides no instruction for how to use a skip coded macroblock immediately after an intra-coded macroblock. Because this alleged motivation to combine is unrelated to Petitioners' alteration to MPEG-1, it is no motivation at all. Ex. 1009, 56–57.

Finally, Petitioners tell a story of advancing computing power. They note that median techniques were known in the art throughout the timeline of MPEG-1, H.263, and the invention date for the '808 Patent. *See* Pet., 53. The median coding technique was not adopted in MPEG-1's skip coding mode, according to Petitioners, because such a technique is more computationally intensive than copying a single element. *See id.* Conveniently, the benefits of using median prediction happened to overcome their dwindling costs (because of the trend of increased computing power) in the eyes of a POSITA *just around the time of the date of the invention* of the '808 Patent, according to Petitioners. *See id.,* 47–48.

Petitioners' story is wholly unsupported and could apply to any time period after MPEG-1. Petitioners provide no explanation for why a POSITA would have found it obvious to port over median prediction to MPEG-1 specifically around the time of H.263's creation or the date of invention of the '808 Patent, as compared to, say, when MPEG-1 was created. The fact is, Petitioners' story relies on faith (1) that the reason MPEG-1 didn't use median prediction in its skip mode was because of computational costs *and* (2) that the time when computational costs began to not outweigh the alleged benefit of median prediction happened to occur right when Petitioners allege. Petitioners do not support either of these points.

In fact, Petitioners' story is incorrect—the hypothetical POSITA was not running a cost-benefit analysis over time to decide when it became worth using median prediction in skip coding. Rather, H.263 was consciously drafted not to use MPEG-1's B-picture skip coding mode. Instead, H.263 uses PB frames, which are coded together. Ex. 1009, 15. In a PB frame, the B-picture is predicted from the previous decoded P-picture and the P-picture currently being decoded. *Id.* In this design, the motion vector used for skip macroblocks in the B-pictures of the PB frames is the motion vector that is sent with the PB frame. *See* Ex. 1009, 81–83. In essence, the H.263 drafters, who knew about both median prediction and MPEG-1's skip mode, chose not to combine the two functionalities. If it were obvious to do so, the H.263 drafters would have included B-pictures in the standard, and would have

used median prediction in skip mode on such B-pictures. These drafters did not find it obvious, and Petitioners' arguments otherwise contradict the actions of the unbiased expert drafters of the H.263 standard. Ex. 2021, ¶ 120–130. This is why, in a previous proceeding in front of the International Trade Commission, the ALJ found that "the evidence supports that one of skill considering H.263 … would not 'even consider it plausible to make such a substitution [into MPEG-1].'" *In the Matter of Certain Video Capable Electronic Devices, Including Computers, Streaming Devices, Televisions, Cameras, And Components and Modules Thereof*, Investigation No. 337-TA-1379 (U.S.I.T.C.), Initial Determination on Violation of Section 337 and Recommendation Determination on Remedy and Bond, at 58 (Jan. 29, 2025) (quoting expert testimony).

3. H.263's motion compensated prediction includes "further motion vector information" in its MVD and therefore does not meet claim limitation 10[d]

Petitioners' combination of MPEG-1 and H.263 overlooks a core aspect of H.263's motion compensated prediction. Petitioners mention, but then disregard, the key role MVD (motion vector data) plays in motion compensated prediction in H.263. MVD qualifies as "further motion vector information" that is "coded in the encoded bitstream," meaning H.263's motion compensated prediction does not teach the claims of the '808 Patent. Ex. 1001, 25:25–27.

Contrary to the central narrative advanced in Ground 2 of the Petition, H.263's motion compensated prediction does not merely use the median of surrounding macroblocks to calculate motion vectors. Rather, medians (termed "predictors" in the standard) are added to motion vector differences to arrive at the motion vector for a macroblock. Ex. 1009, 44. These motion vector differences, indicated by MVD, are transmitted in the bitstream from encoder to decoder. Petitioners give a nod to this fact, Pet., 50, but then disregard the role MVD plays in H.263's motion compensated prediction for the rest of the Petition. Petitioners do not explain how a POSITA would modify H.263 to disregard MVD to only use motion vector predictors—or why a POSITA would be motivated to do so—nor do they explain how such a modified process could end up in MPEG-1. And, as explained below, MVD does not meet limitation 10[d] of the '808 Patent. Thus, a combination of H.263's motion compensated prediction and MPEG-1 would not practice the claims of the '808 Patent. Ex. 2021, ¶ 126–129.

MVD is always sent in the bitstream for macroblocks using median prediction, and it always contains some value. This means that whenever median prediction is used in H.263, MVD always constitutes "further motion vector information." H.263 specifies that "MVD is included for *all* INTER macroblocks …" Ex. 1009, 38 (emphasis added). H.263 further explains that motion compensated prediction only happens with inter-picture predicted macroblocks. *See id.*, 11. This,

alongside the fact that H.263's motion compensation description states that "[t]he macroblock vector is obtained by adding [median vector] predictors to the vector differences indicated by MVD," shows that MVD is always included alongside median prediction. *See* Ex. 2021, ¶ 126; Ex. 1009, 44.

Furthermore, MVD always contains some value. MVD indicates vector differences, consisting of a variable length codeword for the horizontal component and a variable length codeword for the vertical component. Ex. 1009, 38, 44. Codewords are described by Table 14:

Table 14/H.263 – VLC table for MVD

Index	Vector	Differences	Bit number	Codes
0	–16	16	13	0000 0000 0010 1
1	–15.5	16.5	13	0000 0000 0011 1
2	–15	17	12	0000 0000 0101
3	–14.5	17.5	12	0000 0000 0111
4	–14	18	12	0000 0000 1001
5	–13.5	18.5	12	0000 0000 1011
6	–13	19	12	0000 0000 1101
7	–12.5	19.5	12	0000 0000 1111
8	–12	20	11	0000 0001 001
9	–11.5	20.5	11	0000 0001 011
10	–11	21	11	0000 0001 101
11	–10.5	21.5	11	0000 0001 111
12	–10	22	11	0000 0010 001
13	–9.5	22.5	11	0000 0010 011
14	–9	23	11	0000 0010 101
15	–8.5	23.5	11	0000 0010 111
16	–8	24	11	0000 0011 001
17	–7.5	24.5	11	0000 0011 011
18	–7	25	11	0000 0011 101
19	–6.5	25.5	11	0000 0011 111
20	–6	26	11	0000 0100 001
21	–5.5	26.5	11	0000 0100 011
22	–5	27	10	0000 0100 11
23	–4.5	27.5	10	0000 0101 01
24	–4	28	10	0000 0101 11
25	–3.5	28.5	8	0000 0111
26	–3	29	8	0000 1001
27	–2.5	29.5	8	0000 1011
28	–2	30	7	0000 111
29	–1.5	30.5	5	0001 1
30	–1	31	4	0011
31	–0.5	31.5	3	011
32	0		1	1
33	0.5	–31.5	3	010
34	1	–31	4	0010
35	1.5	–30.5	5	0001 0
36	2	–30	7	0000 110
37	2.5	–29.5	8	0000 1010
38	3	–29	8	0000 1000
39	3.5	–28.5	8	0000 0110
40	4	–28	10	0000 0101 10
41	4.5	–27.5	10	0000 0101 00
42	5	–27	10	0000 0100 10
43	5.5	–26.5	11	0000 0100 010
44	6	–26	11	0000 0100 000
45	6.5	–25.5	11	0000 0011 110

Ex. 1009, 38–39. As Dr. Orchard explains, the "Vector" column shows the values of the horizontal and vertical components to be encoded, and the "Codes" column shows how those values are represented in the bitstream. Ex. 2021, ¶ 127. Table 14 shows that all possible component values of MVD are represented by a codeword. That is to say, there is no component value that does not include a corresponding codeword. This means that MVD's horizontal and vertical vector differences always include some representation in the bitstream, and thus MVD always represents "motion vector information." Ex. 2021, ¶¶ 126–128. Because MVD is always included in the bitstream for macroblocks that use median prediction, MVD always constitutes "further motion vector information" in Petitioners' combination.

Additionally, Petitioners do not explain how H.263's motion compensated prediction could be modified to operate without MVD to use only motion vector predictors. They do not explain how this modified motion compensated prediction could be modified for use within MPEG-1. Finally, Petitioners do not explain why a POSITA would be motivated (1) to modify H.263 to not use motion vector differences and (2) to use this modified motion compensated prediction in MPEG-1's skip mode, given H.263's median prediction relates to motion compensated prediction where MPEG-1's B-picture skip mode relates to skip mode. This, alongside other modifications Petitioners wave away, shows that it would not be

obvious to combine H.263 and MPEG-1 in the specific manner suggested by Petitioners.

4. Combining MPEG-1 and H.263 does not change the functionality of H.263's median prediction in a meaningful way when considered in light of the construction of skip coding mode

Petitioners argue that using H.263's median prediction technique in place of MPEG-1's skipped macroblock functionality satisfies the construction of "skip coding mode" agreed upon by the parties. What Petitioners fail to explain is that this combination does not meaningfully alter the function of H.263's median prediction technique, apart from putting it in a different video coding standard. For example, for limitation 10[a], Petitioners claim that the combination includes a skip mode because MPEG-1 discloses a skip mode. Pet., 58. Petitioners then ask the Board to disregard the entirety of how MPEG-1's skip mode works, and replace that functionality with H.263's median prediction technique. Pet., 58–63. Specifically, when arguing that the combination satisfies the construction of "skip mode"—which in Petitioners' view only requires the possibility of a zero or nonzero motion vector result—Petitioners look only to H.263's median prediction technique. *See* Pet., 58–60.

Petitioners never explain how porting H.263's median prediction technique over to MPEG-1 changes how the H.263 technique works. It appears that, rather than H.263's median prediction technique being meaningfully changed such that it

embodies "a coding mode in which a zero (non-active) motion vector or a non-zero (active) motion vector is associated with each skip mode macroblock, depending on the characteristics of the motion in image segments surrounding the macroblock in question," the median prediction technique stays exactly the same, but gives Petitioners the ability to use MPEG-1's "skipped macroblock" label.

This is important, because H.263's median prediction technique alone is clearly not a skip coding mode. H.263's median prediction technique is used in combination with motion vector differential signaling and residual information. *See* Ex. 1009 at 44-45, 56; Ex. 2021, ¶ 128. Instead, it takes the median of three surrounding blocks and motion vector differences to determine a motion vector to associate with the current frame. Petitioners' application of H.263 to MPEG-1 thus removes MPEG-1's skip coding functionality in its entirety and replaces it with something different. Petitioners' attempt to retain the "skip mode" terminology associated with MPEG-1 is misleading, because Petitioners' combination entirely replaces the "skip mode" functionality.

5. MPEG-1 in combination with H.263's median prediction functionality does not include a "skip mode" as defined by the parties and the inventor's lexicography

Petitioners' argument that their combination includes a "skip mode" as defined by the '808 Patent is unavailing, because Petitioners' combination only includes the "active motion vector" functionality of the '808 Patent's redefined skip

mode. This "active motion vector" functionality is embodied by the median prediction technique of H.263. Indeed, Petitioners *only* argument that their combination allows for a non-active motion vector is that, when their active motion vector functionality—the median prediction technique—results in a zero, that happenstance qualifies as a non-active motion vector. Pet., 59–60 ("MPEG-1's Skip mode for B-pictures [combined with H.263] would have resulted in … a 'zero (non-active) motion vector,' e.g., in the case where the median of [the surrounding motion vectors used in the median calculation] is zero…"); *see also id.* at 61–62, 64–65, 70–73, 75–76, 81. Petitioners do not make any argument that their combination does anything other than finding the median to determine motion vectors. Petitioners do not provide any interpretation of what meaning, if any, "non-active" and "active" have in the agreed-upon construction of "skip coding mode." Such a median calculation does not satisfy the dual-functionality, non-active versus active motion vector distinction claimed by the patent.

Instead of reading out such terminology in the inventor's lexicography, Patent Owner contends that the phrases "zero (non-active) motion vector" and "non-zero (active) motion vector" convey to a POSITA that the redefined skip coding mode provides a choice for whether to generate a motion vector through an active process or a non-active process. The non-active process always results in a zero-valued motion vector. Ex. 1001, 14:23-28 (under the redefined skip mode, "a macroblock

assigned to skip mode is either associated with a zero (non-active) motion vector, *in which case it is treated in the same way as a conventional skip mode macroblock and copied directly from the reference frame*" or a nonzero motion vector) (emphasis added). The active process will not always (and most often, will not[13]) result in a zero-valued motion vector and can rely on, for example, a median of surrounding macroblocks. *Id.*, 19:64-20:5. The choice of active or non-active made by the redefined skip coding mode depends "on the characteristics of the motion in image segments surrounding the macroblock in question." Ex. 2021, ¶ 132.

Petitioners conflate the *choice* between the two types of motion vectors—a zero non-active and a non-zero active—with the *observation* that a median calculation of surrounding motion vectors will sometimes give a result that is zero, and sometimes give a result that is non-zero. Figure 8 of the '808 Patent clarifies this distinction:

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[13] In H.263, the conditions for obtaining a value of zero for both horizontal and vertical predictors—i.e., having both median calculations result in zeroes—are rather specific. For a horizontal or vertical predictor to be a zero, one candidate predictor must be zero, one must be zero or negative, and one must be zero or positive.

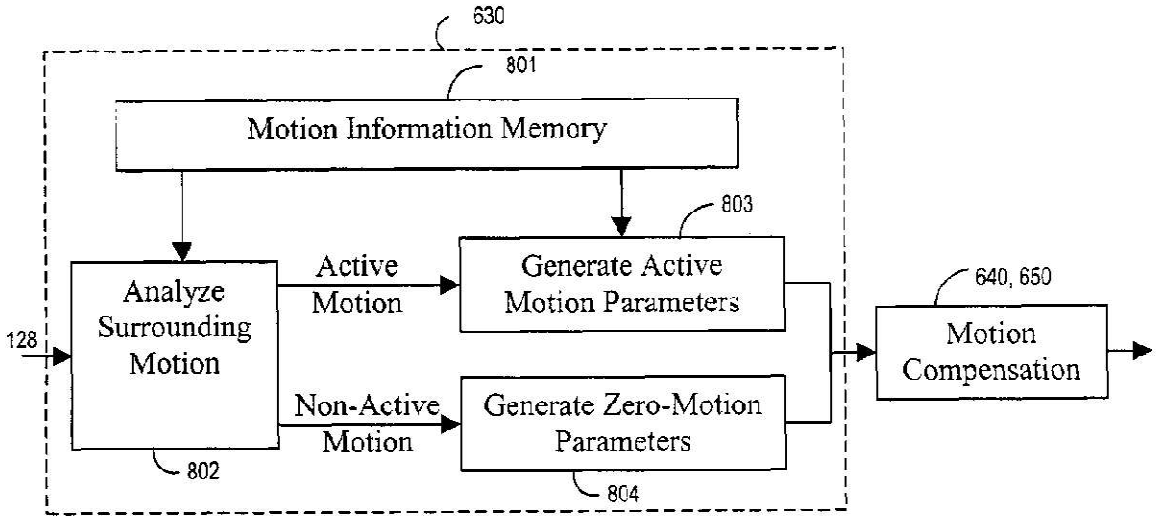

FIG. 8

Ex. 1001, Fig. 8. Petitioners' combination carries out only block 803—the "Generate Active Motion Parameters" step—without the "Analyze Surrounding Motion" step of block 128 or the categorizations as active or non-active motion. *See* Ex. 2021, ¶ 132–134.

In other words, Petitioners argue that an active motion generation process (such as a median motion vector prediction) by itself, without any "non-active" component or choice, satisfies the construction of "skip coding mode." This reads out the "a zero (non-active) motion vector or a non-zero (active) motion vector is associated with each skip mode macroblock, depending on" language of the agreed-upon construction. *Id.*

Petitioners do address this argument, insofar as it refers to Fig. 8 of the '808 Patent. Pet., 61–63. However, in their argument, Petitioners do not articulate any

interpretation of the "a zero (non-active) motion vector or a non-zero (active) motion vector is associated with each skip mode macroblock, depending on…" language of the construction. More specifically, they provide no explanation of the meaning of the phrases "non-active" and "active"—instead, Petitioners refer only to the results of the median calculation being zero or non-zero, to categorize such results as "non-active" or "active." *See id.*

Furthermore, in Petitioners' discussion of Figure 8, Petitioners point out that Figure 8 is not part of the skip coding mode construction. Pet., 61–62. This is true. While Figure 8 uses the phrases "active" and "non-active," it is not in the construction. However, the words "a zero (non-active) motion vector or a non-zero (active) motion vector is associated with each skip mode macroblock, depending on…" are. Petitioners fail to explain what these words mean from the perspective of a POSITA. Patent Owner explains throughout this response what such terms mean; Figure 8 merely provides a clear picture of what is explained extensively in the specification itself. Ex. 2021, ¶ 132–134.

Petitioners further argue that "PO's argument appears to try to import limitations from the specification based on disclosures related to, e.g., motion analysis performed by motion analysis block 802 in the '808 Patent's Figure 8." Pet., 62. Ignoring the fact that Patent Owner had not made such an argument (or any argument, for that matter) in this proceeding at the time of the Petition, the existence

or absence of "analysis" as a limitation does not affect the agreed-upon construction. Ex. 2021, ¶ 133. This principle holds as well to Petitioners' mention of "automatically generating" a zero motion vector. Pet., 61–62.

Finally, Dr. Saber points in his declaration to an alternative embodiment in which "the surrounding motion analysis block is removed and active motion parameter generation block is activated for all the skip mode macroblocks." Ex. 1003, ¶ 205 (citing Ex. 1001, 24:42–45). Such an embodiment is inapposite to the agreed-upon construction. "It is not necessary that each claim read on every embodiment." *Baran v. Med. Device Techs., Inc.*, 616 F.3d 1309, 1316 (Fed. Cir. 2010). Federal Circuit precedent is "replete with examples of subject matter that is included in the specification, but is not claimed." *TIP Sys., LLC v. Phillips & Brooks/Gladwin, Inc.*, 529 F.3d 1364, 1373 (Fed. Cir. 2008) (citations omitted); s*ee also SIMO Holdings Inc. v. Hong Kong uCloudlink Network Tech. Ltd.*, 983 F.3d 1367, 1380 (Fed. Cir. 2021) (a claim construction may "leave[] out some alternative embodiments… while capturing one embodiment expressly described").

Thus, at least because MPEG-1 in combination with H.263 does not meet the agreed-upon construction of "skip coding mode," Petitioners fail to meet their burden as to all Challenged Claims for Ground 2.

VI. CONCLUSION

For any or all of the above-described reasons, Patent Owner respectfully requests that the Board deny institution.

Dated: December 11, 2025

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CERTIFICATION 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 11,054 words, in compliance with the 14,000 word limit set forth in 37 C.F.R. §42.24(b)(1). This word count was prepared using Microsoft Word 2010.

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CERTIFICATION OF SERVICE

The undersigned hereby certifies that a copy of this **PATENT OWNER'S PRELIMINARY RESPONSE** pursuant to 37 C.F.R. § 42.10(b) has been served on Petitioners via email on the following counsel of record for Petitioners:

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