UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

NOKIA TECHNOLOGIES OY,
Patent Owner

Case: IPR2024-00847
U.S. Patent No. 7,532,808

PATENT OWNER'S PRELIMINARY RESPONSE

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(November 2019) (citing 37 C.F.R. §§ 42.100(b), 42.200(b), 42.300(b)) 29

TABLE OF EXHIBITS

Exhibit	Description
2001	R. Mitch Verboncoeur Biography
2002	Declaration of R. Mitch Verboncoeur in support of motion for *pro hac vice* admission
2003	U.S. Patent No. 5,701,164 to Kato
2004	U.S. Patent No. 5,442,400 to Sun *et al.*
2005	U.S. Patent No. 7,200,275 to Srinivasan et al.
2006	U.S. Patent No. 6,683,987 to Sugahara
2007	*In the Matter of Certain Video Capable Electronic Devices, Including Computers, Streaming Devices, Televisions, Cameras, and Components and Modules Thereof*, Inv. No. 337-TA-1379, Order No. 38: Construing Claim Term [Corrected] (April 16, 2024)
2008	*In the Matter of Certain Video Capable Electronic Devices, Including Computers, Streaming Devices, Televisions, Cameras, and Components and Modules Thereof*, Inv. No. 337-TA-1379, Respondents' Joint Pre-Hearing Brief (June 28, 2024)
2009	Declaration of Dr. Michael Orchard
2010	CV of Dr. Michael Orchard

I. INTRODUCTION

Petitioner advances two grounds in the Petition. Both were raised and then dropped before the evidentiary hearing in the co-pending International Trade Commission Investigation 337-TA-1379. Both fail on the merits.

As a threshold matter, the parties agree that a proper construction of the term "skip coding mode" in the challenged claims requires at least "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" based on the inventor's lexicography.[1] In other words, this construction requires a skip coding modem with an analysis of motion surrounding a given image block to determine whether to generate an active or non-active motion vector.[2] Neither of the Petition's two Grounds provide any coding mode that resembles this. For both Grounds, the

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[1] The ITC ALJ in 337-TA-1379 adopted this construction verbatim. (Ex. 2007.) In its Petition, Petitioner seeks to add an additional requirement related to "residual information" that the ITC ALJ has already rejected. (*Id.*) Petitioner's Grounds fail under either construction.

[2] Ex. 2008 at 48 ("[T]he asserted claims require analyzing 'surrounding' motion. As discussed above, this is consistent with the provisional, the claims of the provisional, and the specification of the '808 patent.")

Petition confuses the existence of some *result* (e.g., a zero-valued or non-zero valued motion vector) with the *process* that caused that result.

Petitioner's first Ground is based on Karczewicz (Ex. 1006). Karczewicz is largely focused on something entirely different from the '808 Patent's redefined skip coding mode. Karczewicz is focused on representing affine motion vector fields. In Karczewicz, the affine motion model refers to six basis functions are weighted with coefficients to represent various types of three-dimensional motion (e.g., rotation or translation). Karczewicz is concerned with how best to code these coefficients. Some of Karczewicz's techniques involve an encoder expressly signaling affine motion fields to a decoder. Others involve an encoder telling a decoder a nearby location in an image frame from which to predict an affine motion field. Karczewicz also discloses "refinement" data, which is offset data that is applied to predicted affine motion fields such that a decoder gets intended values of the coefficients of the basis functions. The essence of Petitioner's Karczewicz Ground is that sometimes Karczewicz can signal zero-values for its affine motion basis function coefficients, and sometimes Karczewicz can signal non-zero coefficient values. Even putting aside the fact Karczewicz's affine motion model has nothing to do with the '808 Patent (and is indeed incompatible with the draft of the H.264 Standard the '808 Patent's inventions improved), Karczewicz simply does not disclose a coding mode

for a macroblock in which a zero (non-active) or predicted non-zero (active) motion vector is associated with a given macroblock depending on an analysis of surrounding motion. Rather, Karczewicz's encoder either signals certain affine motion coefficient values or instructs a decoder how to determine those values.

Petitioner's second Ground is based on Frojdh (Ex. 1007). Unlike Karczewicz, Frojdh touches on the same general subject matter as the '808 Patent. However, Frojdh teaches away from the '808 Patent. Frojdh is concerned with representing "global motion" in image frames in a video sequence through "global motion compensation" (GMC) techniques. The '808 Patent discusses but rejects these techniques. Frojdh proposes using a flag in a slice header to indicate whether GMC techniques are turned on. (A slice is a collection of image blocks.) When the GMC flag is on, signaling that would otherwise indicate a "COPY" mode[3] is reinterpreted as an "implicit global motion compensation mode" (IGMC), which can predict motion vectors to be used in motion compensated prediction from nearby image segments. When the GMC flag is off, IGMC mode is not possible, and COPY signaling will always be interpreted as COPY. In other words, Frojdh discloses two distinct coding modes (the selection between which depends on whether the GMC

[3] Conventional COPY mode instructs a decoder to copy a block of pixels directly from the same location of a reference frame.

slice flag is on or off). Petitioner's Frojdh Ground has several shortcomings. First, once again, the Petition confuses *results* for *process* and argues that IGMC mode may sometimes result in a zero or non-zero motion vector. But that is beside the point, and the Petition makes no showing that IGMC discloses the surrounding motion analysis required by the '808 Patent's redefined skip coding mode. Second, the Petition alternatively argues that Frojdh discloses "a coding mode (e.g., global motion compensation (GMC)) comprised of both the IGMC mode and COPY (aka SKIP)," Pet. at 43, but this misunderstands Frojdh. GMC is not a macroblock coding mode. GMC applies to slices. Moreover, COPY mode is not possible when the GMC slice flag is on. In other words, Frodjh expressly teaches that COPY cannot be turned on simultaneously with GMC or IGMC. A POSITA would understand this. Third, Frojdh is not prior art to the '808 Patent. Petitioner relies on paragraph [0056] of Frojdh, but this paragraph has no support in the Frojdh provisional.

None of the grounds establish a reasonable likelihood that the challenged claims are unpatentable. Institution should be denied.

II. BACKGROUND

A. Technical Background

Video playback involves the rapid display of successive still images which creates the illusion of motion. In video coding, each image can be broken up into

smaller segments for coding, typically referred to as blocks. Blocks can vary in size and are made up of an NxM grid of pixels. Pixels are the smallest addressable unit in video coding that can vary in both brightness and color. Modern displays with high definition resolutions, such as 4K, include over 8 million pixels in one frame. Due to the massive pixel count in high resolution video, sending full size images with individual pixel values for each pixel would take an enormous amount of bandwidth that modern internet infrastructure isn't able to support. Because of this, video coding is necessary to encode, or compress, and decode, or decompress video files for transmission. Video coding utilizes a variety of techniques to code video files that allow for reduced file sizes while maintaining image quality. (Ex. 2009, ¶ 40.)

One main key to compression in video coding is the exploitation of redundancies in the video. The two main types of redundancies are temporal and spatial. Temporal redundancy refers to redundancies between frames and is associated with Inter coding. Spatial redundancy refers to redundancies within a given frame and is associated with Inter coding. Video coders take advantage of these redundancies by transmitting information referencing previously decoded information rather than retransmitting that same information for a new frame or block. One method of video coding that relies on temporal redundancy is called

motion compensated prediction. In motion compensated prediction an encoder codes and transmits a motion vector to the decoder. The decoder receives the motion vector and uses the motion vector to generate a "prediction" by copying the pixel values of a block from a previously decoded reference frame. The block to be copied is located by the decoder by following the motion vector provided by the encoder. However, motion compensated prediction is not always a perfect match and can introduce errors in the decoding process. To address these errors, video encoders also provide prediction error. The prediction error represents values that are to be added to a predicted block to create an output block that more accurately represents the original input image. Prediction error is typically referred to as a prediction error signal or residual information. (Ex. 2009, ¶¶ 41-42.)

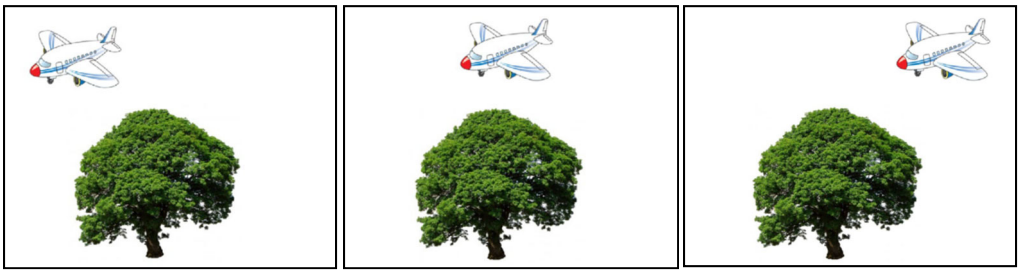
The '808 Patent relates to a specific category of motion compensated prediction techniques for coded video sequences.

1. Video Coding and Motion Compensation Generally

The main focus of video coding is to reduce the size of video files for storage, playback, and transmission, while maintaining picture fidelity. As discussed above, this is achieved through efficiently coding redundant information in a video sequence. Smaller video size provides benefits to users who watch, store, or send

videos and is particularly advantageous for streaming video over wireless networks. (Ex. 2009, ¶ 43.)

As one example of temporal redundancy, an object may move across a frame while the background is kept still. In the example below, this can be seen by the airplane flying over the tree. This example demonstrates how redundant information, such as the pixel values for the white background and the tree can simply be copied over to the next frame with no degradation in image quality. The plane itself can also be copied to the next frame but will require a motion vector to tell the decoder where the information should be copied from in the previous frame. There can also be other types of temporal redundancy, such as when a camera is panning or zooming across a still image. While the entire frame is moving, much of the information will be identical to the information of the previous frame. (Ex. 2009, ¶¶ 44-45.)



Motion compensated prediction exploits temporal redundancy by reusing the image contents from previously decoded frames to predict the contents of a current frame. This relies on the encoder providing motion information to the decoder that

instructs the decoder of where to look in the previously decoded frames to pull the image information. (Ex. 2009, ¶ 46.)

A previously decoded frame can be labeled a "reference frame" (or "reference picture") and can serve as a reference for pixel information for a predicted frame. As an example, the motion of objects or regions can be tracked between the reference frame and the current frame using motion vectors.[4] Frames that use a reference frame for prediction are known as "Inter-coded" or "P-frames"). The use of motion compensated prediction and reference frames allows for the efficient coding of motion in video. (Ex. 2009, ¶ 47.)

Video coding systems typically break a frame up into smaller units called blocks. One such example is a "macroblock" which is a 16x16 group of pixels within the frame. In Figure 9, pictured below, each box within the frame represents a macroblock that can be individually predicted using a motion vector. (Ex. 2009, ¶ 49.)

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[4] Motion vectors, as a type of vector, convey both (1) direction and (2) magnitude on a two-dimensional axis. Motion Vectors are typically expressed by two directional components (*e.g.*, horizontal or vertical components). As an example, Figure 9 of the '808 Patent depicts multiple non-zero vectors with the same direction and magnitude.

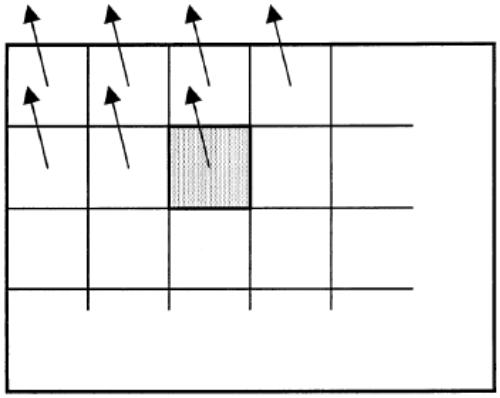

FIG. 9

’808 Patent, Figure 9 (Ex. 1001)

Video coding systems that utilize the macroblock structure code frames on a macroblock-by-macroblock basis. Each macroblock can be assigned its own “coding mode” by an encoder that provides instructions to the decoder for how to decode the macroblock. Encoders choose between available coding modes based on the most efficient coding mode for a given macroblock, typically by comparing the outcome of multiple coding modes and picking the best fit. The ’808 Patent describes the various coding modes available in JM1 of the Joint Video Team (JVT) code. JM1 was an early draft of the H.264 video decoding standard developed by the JVT. The JVT was a joint effort to improve video coding by the Motion Pictures Expert Group (MPEG) and the Video Coding Experts Group (VCEG). Jani Lainema, the inventor of the ’808 Patent was part of the JVT. The coding modes of JM1 are shown in the table below. (Ex. 2009, ¶¶ 50-51.)

TABLE 3

Macroblock Coding Modes of JM1

Codeword Index	Mode	UVLC Ccodeword
—	SKIP	Run-Length Coded
0	16 × 16	1
1	16 × 8	001
2	8 × 16	011
3	8 × 8	00001
4	8 × 4	00011
5	4 × 8	01001
6	4 × 4	01011

’808 Patent, Table 3 (Ex.1001)

The term “UVLC Codeword” in Table 3 stands for “Universal Variable Length Codes.” These UVLC Codewords represent different data elements in a video bitstream and provide an indication of the coding mode for a given macroblock to the decoder. These codewords were organized such that the lowest bit cost codeword was assigned to the perceived most common coding mode. JM1 believed that the most common coding mode would be the SKIP coding mode. As the ’808 Patent points out, this was not the case. The non-skip coding modes of JM1 also included additional residual information for prediction error. A POSITA would understand that the SKIP mode of JM1 was called “SKIP” because it skipped this residual information, as it was not necessary for SKIP coded macroblocks. This is because SKIP coded macroblocks are copied directly from the reference frame with no motion vector information and no residual information. (Ex. 2009, ¶¶ 52-53.)

The decision as to which coding mode will be applied to a given macroblock is made by the encoder using a process called motion estimation. An encoder

performs motion estimation for a given macroblock by testing different coding modes and selecting the mode that will provide the most efficient decoding. Because there are multiple coding modes that an encoder can assign, a decoder must know which coding mode is assigned to a given macroblock in order to correctly decode the macroblock. This requires the encoder to include an indication of the coding mode for each macroblock coded in a frame. (Ex. 2009, ¶ 54.)

Along with the indication of a coding mode, the encoder may need to send other information for the decoder to correctly decode a macroblock. This additional information can include motion vector information and prediction error information. Prediction error information is necessary when motion compensated prediction does not adequately predict the image content from a reference frame and needs the pixel information to be corrected. A POSITA would understand that prediction error information is skipped for SKIP coded macroblocks. (Ex. 2009, ¶ 55.)

2. Skip Coding Modes in Video Coding

Skip coding modes were traditionally used in video coding to indicate that the image contents for a macroblock should be copied from the same location of the reference frame. This was advantageous in scenarios where the image contents exhibited no motion across frames. Because skip coding modes required no additional information to be sent to the decoder, they offered considerable

compression benefits. A POSITA would have understood that JM1's skip coding mode, as discussed in the '808 Patent, does not include any prediction error or residual information. (Ex. 1005, p. 37 (JM1 Subclause 3.4.1).) The lack of this residual information is evident through the name of the mode, "skip." (Ex. 2009, ¶ 56.)

However, the SKIP mode of JM1 was not without its drawbacks. Because SKIP mode was only able to directly copy a macroblock from a previous frame, it was unable to be used to exploit redundancies in frames with specific types of motion, such as panning or zooming. When these types of motion were present across frames, skip mode could not be assigned to these macroblocks and other coding modes with higher overhead were required. This resulted in efficiency loss in compression and larger video file sizes. This drawback highlights the issue of JM1 assuming that SKIP would be the most commonly used coding mode. (Ex. 2009, ¶ 57.)

B. The '808 Patent

The '808 Patent describes two prior art attempts to address the problem of efficiently coding motion such as panning or zooming. Both attempts had shortcomings that the '808 Patent was able to overcome. These attempts were known as (a) "global motion compensation" (or "GMC," such as that used in H.263+) and

(b) "Global Motion Vector Coding" ("GMVC"). (Ex. 1001, 12:48-58.) The '808 Patent describes how each of these attempts to handle motions such as panning and zooming resulted in additional complexity. Both approaches required encoders to include additional motion vector information in the bitstream that modeled the motion of the entire frame. In GMC, the decoder would receive motion vector information for the given frame and warp the reference frame according to the motion vectors. In GMVC, the decoder would receive a motion vector for each corner of the frame and interpolate the appropriate motion vector for a given macroblock within the frame. The JVT was considering a proposal involving GMVC (VCEG-O20) at the time of the '808 Patent. (Ex. 1001, 13:31-33; *see also* Ex. 2009, ¶ 58.)

Both GMC and GMVC required computationally complex motion estimation operations to be performed by the encoders and decoders with more information included in encoded bitstreams. (Ex. 1001, 13:67-14:5 ("Although the related technique of global motion vector coding is computationally less demanding than global motion compensation, it does involve a certain increase in encoder complexity and additional information must be still transmitted in the video bit-stream to enable correct decoding of the video data."); *see generally id.*, 12:59-14:6.)

The inventor of the ’808 Patent recognized these limitations proposed a solution by defining a new type of skip coding mode (or the redefined skip coding mode). As described below in the context of the claim term, “skip coding mode,” the ’808 Patent sought to provide improved coding efficiency with only a negligible increase in complexity “based on a redefinition of the skip mode concept used in JM1 of the JVT codec.” (Ex. 1001, 14:6-18.) The ’808 Patent provides the following definition of the redefined skip coding mode:

> According to the invention, the coding modes used by encoder 600 correspond to those provided by JM1 of the JVT codec (shown in Table 3 [above]), with the exception that the SKIP mode is redefined to allow representation of global and regional motion. More specifically, the SKIP mode is modified in such a way that 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. In the following this type of motion vector will be referred to as a “skip mode motion vector”.

(*Id.*, 17:43-53; *see also* Ex. 2009, ¶ 59.)

Unlike prior art skip coding modes, the ’808 Patent’s redefined skip coding mode can adapt to both active and non-active motion scenarios. The redefined skip mode relies on an analysis of the motion characteristics of previously coded image segments surrounding for a given macroblock to determine whether active or non-active motion exists. A motion vector is then generated differently based on the

classification of active or non-active. (*Id.*, 14:52-64.) This process is depicted in Figure 8 below.

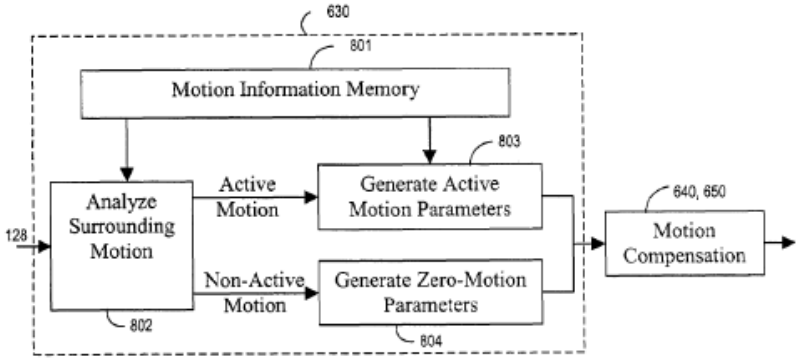

FIG. 8

'808 Patent, Figure 8 (Ex.1001)

The '808 Patent's redefined skip coding mode's ability to adapt to surrounding motion without any additional information required in the bitstream reduces the amount of information needed to address motions, such as when video frames have both non-active and active areas where there is camera or object movement. (*See, e.g.*, *id.*; *see also id.*, 14:14-22.)

The '808 Patent explains that—just like in prior art skip coding modes—prediction error and residual information are skipped as part of the redefined skip coding mode: "[A]ccording to the invention, no additional information must be sent to the decoder in order to model global or regional motion." (*Id.*, 14:62-64.) The '808 Patent explains the following:

> Depending on the coding mode, the compressed video data included in the bit-stream for an INTER-coded macroblock may comprise a

> combination of VLC encoded prediction error information for each block, motion vector information for the macroblock (or sub-blocks) and encoded control information including an indication of the coding mode used to encode the macroblock in question. If a macroblock is encoded in skip mode, no prediction error or motion vector information relating to the macroblock is included in the bit-stream.

(*Id.*, 20:43-55.) In other words, additional information such as "prediction error information for each block" (residual information) and "motion vector information" are included for INTER-coding modes *other than* the skip coding mode. For skip mode, "no prediction error or motion vector information relating to the macroblock is included in the bit-stream." (*Id.*)

Encoding and decoding for "skip mode macroblocks" in the '808 Patent requires analyzing surrounding motion to assign non-active (zero) or active (non-zero) motion vectors. If, after motion estimation operations (Ex. 1001, 18:28-33), an encoder decides the '808 Patent's redefined skip coding mode is the most efficient coding mode available, the encoder will include an indication of skip coding mode in an encoded bitstream. A decoder receives an indication of skip coding mode and uses a "motion compensated prediction block" to analyze and classify the "motion of previously decoded macroblocks and/or sub-blocks in a predefined region surrounding the macroblock to be decoded in a manner exactly corresponding to that used in encoder 600." (*Id.*, 21:40-46.) This duplication of "analysis and classification of motion in the surrounding region" for skip coding mode "means that according to

the invention, no additional information must be sent to the decoder in order to model global or regional motion." (*Id.*, 19:15-20.) The '808 Patent also describes that the determination between "active motion" and "non-active" motion is made "by analysing and classifying the motion of macroblocks to be coded using a predetermined analysis scheme" and informs the decision "to generate a zero valued skip mode motion vector or a non-zero valued skip mode motion vector" (*Id.*, 18:34-61.) One embodiment of the '808 Patent describes conditions under which surrounding motion may be classified as "non-active motion":

> In this embodiment the classification to the "non-active motion" category takes place if either or both of the two conditions below are true, otherwise the motion is classified as "active motion":
>
> Condition 1: The macroblock immediately above or the macroblock immediately to the left of the macroblock under consideration is not available (that is, is out of the picture or belongs to a different slice).
>
> Condition 2: The macroblock or block immediately above, or the macroblock or block immediately to the left that are used in motion vector prediction for the 16x16 INTER mode has a zero motion vector and uses the latest picture as reference in motion compensation.

(*Id.*, 20:12-25.)[5]

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[5] This embodiment corresponds to a contribution the inventor made to the H.264 video decoding standard called JVT-C027. The inventor's contribution was adopted, and today millions upon millions of video bitstreams include the redefined skip coding mode that can address both active and non-active scenarios.

A key benefit of the ’808 Patent’s redefined skip coding mode is that it obtains the significant compression savings of earlier skip coding modes even in active motion scenarios. (*See, e.g.*, Ex. 1001, 14:62-64.) That is, “according to the invention, no additional information must be sent to the decoder in order to model global or regional motion.” (Ex. 1001, 14:62-64, 15:11-14; *see also id.*, 15:66-67, 19:17-20, 20:53-55 (“If a macroblock is encoded in skip mode, no prediction error or motion vector information relating to the macroblock is included in the bit-stream.”).) The ’808 Patent explains this point further:

> It should be appreciated that by modifying the skip mode concept in the manner proposed by the invention and performing surrounding motion analysis in the decoder, it is possible to take account of global or region motion in a video sequence without requiring explicit information about such motion to be provided in video bit-stream.

(Ex. 1001, 21:57-62.) Another key benefit was the “a minimal amount of modification [] required to incorporate the method according to the invention into existing video coding systems that employ the concept of skip mode macroblocks.” (Ex. 1001, 15:11-14.)

C. The ’808 Patent’s Prosecution History

The ’808 Patent claims priority to a provisional application filed in March 2002. The ’808 Patent (App. No. 10/390,549 (now Patent No. 7,532,808), Ex 1002) during prosecution was subject to a couple of Office Actions and responses before

being allowed. According, Patent Owner addresses the file history of the ’808 Patent below.

1. Application No. 10/390,549 (the “’549 Application”)

The original claims of the ’549 Application were rejected over a combination of U.S. Pat. No. 5,701,164 (“Kato”, Ex. 2003) and U.S. Pat. No. 5,442,400 (“Sun” et al., Ex. 2004). (Ex. 1002, 97.) The Examiner wrote that Kato teaches “a video encoder arranged to encode a digital video sequence using motion compensated prediction, said digital video sequence comprising a number of frames” (*Id.* (Original Claim 12)),[6] “a decoder for decoding the encoded signal by using motion in the frames of the encoded signal” (*Id*., 98 (Original Claim 19)), and the additional limitations of claims 12 and 19, except “Kato fails to specifically teach a skip mode.” (*Id.*) Sun, “teaches an encoder apparatus for encoding the frames of a signal that including a skip mode and a decoder for decoding the encoded signal.” (*Id.*) Thus, the Examiner stated, “[i]t would have been obvious to one of ordinary skill in the art to modify Kato with Sun by using the teaching of Sun for including a skip mode in encoding the signal thereby reducing processing in encoding the signal.” (*Id.*) Patent

[6] “Method claims 1-11 correspond to apparatus claims 12-18. Therefore method claims 1-11 are rejected by the same reason as applied to the apparatus claims 12-18.” (Ex. 1002, 100.)

Owner responded by amending the claims and explaining that "*Sun* is different from the claimed invention at least two aspects: 1) *Sun* does not disclose assigning a predicted non-zero motion vector for the skip mode; and 2) *Sun* does not disclose assigning the vector based on the motion information of a neighboring segment." (*Id.*, 146; emphasis in original.)[7]

In the subsequent Final Rejection, the Examiner stated that the Patent Owner's arguments are moot in view of new grounds of rejection. (*Id.*, 177.) The new grounds of rejection was the combination of U.S. Pat. No. 7,200,275 ("Srinivasan" et al., Ex. 2005) and U.S. Pat. No. 6,683,987 ("Sugahara", Ex. 2006). (Ex. 1002, 158.) The Examiner indicated that "[i]t would have been obvious to one of ordinary [skill] in the art to modify Srinivasan with Sugahara by using a detecting means as taught by Sugahara with the encoding and decoding device of Srinivasan [for a] defined [] skip segment based on the neighboring segments thereby accurately encoding or decoding video data." (*Id.*, 159.) In response, Patent Owner explained that "*Srinivasan* is not available as a prior art reference" since the passages, related to skip mode, cited by the Examiner are disclosed in Srinivasan's second provisional

[7] "The SKIP mode, as disclosed in *Sun*, is the same SKIP mode as used in JM1 of the JVT codec (p. 14, lines 19-29; p. 15, lines 14-25 of the specification)." (Ex. 1002, 145.)

application that has a filing date after the ’808 Patent’s provisional application. (*Id.*, 184.) Therefore, Srinivasan in view of Sugahara fails to render the claims as obvious.

Following these remarks, the Examiner sent Patent Owner an Ex Parte Quayle Action allowing the claims except for minor formal matters, which Patent Owner addressed in a subsequent amendment to the claims. (*Id.*, 187-190.)

2. Prior Art Cited in Prosecution

The chart below summarizes the art of record during the prosecution of the ’808 Patent.

Reference	Inventors / Authors	’808 FH
ITU-T Recommendation H.263 “H.263” (Ex. 1009)	International Telecommunication Union Telecommunication Standardization Sector (ITU-T) Video Coding Experts Group (VCEG)	¥[8]
U.S. Pat. No. 5,701,164 “Kato” (Ex. 2003)	Motiki Kato	¥‡
U.S. Pat. No. 7,200,275 “Srinivasan” (Ex. 2005)	Sridhar Srinivasan, Pohsiang Hsu	†‡
U.S. Pat. No. 6,683,987 “Sugahara” (Ex. 2006)	Takayuki Sugahara	†‡

[8] Key: † Cited by examiner ‡ Discussed in office actions ¥ Cited by applicant or disclosed in specification

Reference	Inventors / Authors	’808 FH
U.S. Pat. No. 5,442,400 “Sun” (Ex. 2004)	Huifang Sun, Joel W. Zdepski, Kamil M. Uz	¥‡

a) H.263 (Ex. 1009)

H.263 was cited by Patent Owner in the Background of the Invention section in the ’549 Application. (Ex. 1002, 35.) The substance of H.263 will be addressed below in connection with the art raised in the Petition.

b) Kato (Ex. 2003)

Kato was cited by Patent Owner to the Examiner during the prosecution of the ’549 Application (Ex. 1002, 90 (Information Disclosure Statement).) and was raised in the Non-Final Office Action by the Examiner and used, in combination with Sun, as part of an obviousness rejection (*Id.*, 97). Kato teaches techniques for encoding and decoding motion vector differences. Motion vector differences refer to information encoded into video bitstreams that represents a difference between a predicted motion vector (for use in motion compensated prediction) and the intended value of the motion vector. (Ex. 2003, 1:10-22.) The idea is that it takes less data to send the difference between the prediction and intended value rather than the entire motion vector itself. (Smaller numbers require less data to send.)

c) Srinivasan (Ex. 2005)

Srinivasan was cited by the Examiner in the Final Office Action and used, in combination with Sugahara, as part of an obviousness rejection. (Ex. 1002, 158.) Srinivasan teaches multiple skip coding modes (including "normal," "row-skip," and "column-skip" modes. (Ex. 2005, Abstract.) As Patent Owner explained during prosecution, Srinivasan is not prior art to the '808 Patent because any relevant subject matter is found in its second provisional, which was filed after the '808 Patent's provisional (and after the inventor submitted his contribution to the H.264 decoding standard).[9]

d) Sugahara (Ex. 2006)

Sugahara was cited by the Examiner in the Final Office Action and used, in combination with Srinivasan, as part of an obviousness rejection. (Ex. 1002, 158.) Sugahara teaches techniques for signaling conventional skip mode for bi-predictive pictures (B-pictures) and predictive pictures (P-pictures), causing each such picture that will be decoded by an MPEG decoder to be an exact copy of the corresponding reference picture. (Ex. 2006, Abstract.)

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[9] Srinivasan's second provisional was filed after the inventor submitted his JVT-C027 contribution to the JVT, who was working on the H.264 decoding standard. (Ex. 1002, 183-184.) As stated, the inventor's contribution was adopted into the H.264 standard at the same meeting for which it was submitted.

e) Sun (Ex. 2004)

Sun was cited by Patent Owner to the Examiner during the prosecution of the ’549 Application (Ex. 1002, 90 (Information Disclosure Statement)) and was raised in the Non-Final Office Action by the Examiner, being used in combination with Kato as part of an obviousness rejection (Ex. 1002, 97). Sun teaches a MPEG-like signal format that permits skipping the encoding of certain macroblocks. (Ex. 2004, 8:52-53.) Sun’s skip process is a conventional one. For the macroblocks that are skipped, Sun discloses that the decoder copies them from the previous picture into the current picture. (*Id.*, 8:53-55.) Macroblock skipping may be achieved by coding the motion vectors with zero values and the Discrete Cosine Transform coefficients with all zero values. (*Id.*, 8:55-60.)

D. The Asserted Prior Art

1. Karczewicz (Ex. 1006)

Karczewicz (Intl. Pat. Pub. No. WO 01/11891) is a published patent application titled “Apparatus and method for compressing a motion vector field” and names Marta Karczewicz, Jani Lainema, and Bogdan-Paul Dobrin as inventors. Jani Lainema is also the inventor of the ’808 Patent.

Karczewicz discloses an apparatus, and an associated method, for encoding and decoding a video sequence using affine motion vector field coding and prediction. (Ex. 1006, 1:7-8.) Karczewicz teaches different methods for coding and

predicting motion vector fields with affine motion modeling. (*Id.*, 2:9-10, 15:2-5, 32:14-25.) A motion vector field is a three-dimensional space representation of motion projected onto an 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. The six basis functions relate to forms of motion (such as rotation and skewing). Affine motion modeling is a distinct approach from video coding schemes based on translational models (such as H.263 and later JM1 of the JVT codec, which became H.264). (*Id.*, 10:7-11.) Karczewicz provides techniques for encoders to use 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. 2009 at ¶ 61).

2. Frojdh (Ex. 1007)

Frojdh (U.S. Patent App. Pub. No. 2003/0123738) is a published patent application titled "Global Motion Compensation for Video Pictures" and names Per Frojdh, Rickard Sjoberg, and Torbjorn Einarsson as inventors.

Frojdh discloses a method for compression of video signal data which employs global motion compensation (GMC). (Ex. 1007, [0002].) As a part of the

method, macroblocks are grouped into slices, and GMC information is transmitted with encoded slices. (*Id.*) Frojdh teaches that GMC is enabled at the slice level. That is, if an encoder indicates GMC for a given slice of macroblocks, that indication applies to all of the macroblocks within the slice. When the GMC slice flag is on, Frojdh teaches that a mode called Implicit Global Motion Compensation ("IGMC") can be used that reinterprets COPY mode (aka conventional skip mode) as an inter prediction mode without any transform coded residual information or any explicitly signaled motion vector information. (*Id.*, [0022].) (Ex. 2009, ¶ 70.)

Frojdh (U.S. Patent App. Pub. No. 2003/0123738) is dated after the '808 Patent's March 15, 2002, priority date. Frojdh has a provisional application dated November 30, 2009. However, additional subject matter was added to the Frojdh application after the Frojdh provisional (and after Nokia's contribution was adopted into the H.264 standard), including at least the subject matter in paragraph [0056] of Frojdh. (Ex. 2009, ¶ 71.)

3. H.263 (Ex. 1009)

H.263 is a video decoding standard that is titled "Video coding for low bit rate communication." (Ex. 1009.) H.263 teaches a coding method that is used to compress the moving picture portion of audio-visual services at low bit rates. (*Id.*, 1.) The basic configuration of the video source coding algorithm is a combination of

inter-picture prediction, to utilize temporal redundancy, and transform coding of the remaining signal to reduce spatial redundancy. (*Id.*, 2.) The source coder is capable of handling multiple standardized video source formats, and the decoder includes motion compensation features, which allows the coder to optionally use this technique. (*Id.*, 2, 7.) Within the framework of this motion compensation method, additional supplemental information may also be included in the bitstream to improve display quality and support external applications. (*Id.*, 3.)

E. POSITA

Patent Owner has applied Petitioner's POSITA for the sake of this Response. (Pet., 11.) This Response does not depend on this skill level. PO reserves the right to argue in favor of different level of skill should trial be instituted.

F. Claim Construction

Petitioner takes the position that the claims should be construed "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." (Pet., 11-12; 37 C.F.R. § 42.100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).) However, Petitioner also raises the claim construction of "skip coding mode" that was disputed during the co-pending ITC investigation, 337-TA-1379. (Pet., 12; *see also* Ex. 2007.) Petitioner's framing of the claim

construction dispute omits nuance. In the 1379 Investigation, Patent Owner and the ITC Staff proposed a construction of "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" based on the inventor's lexicography. (Ex. 2007, 6.) Petitioner advanced the same construction but appended "and residual information can be provided for each skip mode macroblock" to the end of its proposed construction. (*Id.*) The reason Petitioner did this was to advance a non-infringement position: like other skip coding modes, H.264's skip mode *skips* the coding of residual information. Therefore, Petitioner sought to argue, H.264's skip mode *cannot* provide residual information and thus does not infringe the claims of the '808 Patent. (*See id.*, 10.)

The Administrative Law Judge ("ALJ") rejected Petitioner's arguments, including statements made through a declaration provided by Dr. Joseph Havlicek. (*See, e.g.*, *id.*, 9-10.) The ALJ found that the '808 Patent's specification "makes clear that JM1 is the starting point and that the skip coding mode of the invention is a redefinition of the skip coding mode of JM1." (*Id.*, 7.) Ultimately, the ALJ "conclude[d] that the specification provides an express definition of 'skip coding mode,' supporting the construction proposed by Nokia and the Staff." (*Id.*, 10.)

Petitioner's entire first ground is based on its own claim interpretation (*i.e.*, the "skip coding mode" requires the capability of including residual information) even though the ALJ rejected Petitioner's construction and ruled in favor of Nokia and the ITC Staff. (*Id.*) Importantly, claim construction rules require that "[a]ny prior claim construction determination concerning a term of the claim in a civil action, or a proceeding before the International Trade Commission, that is timely made of record in the … proceeding will be considered." (Patent Trial and Appeal Board Consolidated Trial Practice Guide ("CTPG"), 47 (November 2019) (citing 37 C.F.R. §§ 42.100(b), 42.200(b), 42.300(b)); *id.* ("Under this provision, the Board will consider any prior claim construction determination in a civil action or ITC proceeding if a federal court or the ITC has previously construed a term of the involved claim using the same standard, and the claim construction determination has been timely made of record in the IPR, PGR, or CBM proceeding.").)

Petitioner and Patent Owner agree that any construction of "skip coding mode" should include "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." However, this Response does not depend on whether Patent Owner or Petitioner's construction is correct. No matter which construction

is chosen, as further explained below, no cited reference anticipates or renders obvious the Challenged Claims. Patent Owner addresses the differences in the Petitioner's advanced construction and the ALJ's Order rejecting that construction only to give additional context of the ALJ's decision. Patent Owner reserves the right to further address this position should trial be instituted.

G. Claim Listing

For the sake of this analysis, PO will use Petitioner's limitation labels provided in the petition's listing of Challenged Claims. (Pet., v-ix.)

III. ARGUMENT

A. Petitioner Has Not Established A Reasonable Likelihood That The Challenged Claims Are Unpatentable In Light Of Ground 1.

Petitioner's reliance on Karczewicz to prove its first invalidity ground against the '808 Patent fails. Petitioner's argument is fatally 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., 17.) Karczewicz involves ways of signaling affine motion vector field coefficients and does not teach coding modes. This is entirely distinct from the coding modes discussed in the '808 Patent. (Ex. 2009, ¶ 70.)

According to the Petitioner, there are five different "coding modes" that Karczewicz teaches. (Pet., 18-19.) Out of the five coding modes, however, none of

the alleged "coding modes" disclose the "skip coding mode" of the '808 Patent. In fact, Karczewicz itself does not offer these "coding modes" as fully specifying how a segment of a video frame is to be coded. Instead, Karczewicz offers information with respect to affine motion vector fields used in the coding of those segments. (Ex. 1006, 2:9-10, 15:2-5, 32:14-25.) Karczewicz describes either sending motion vector information or predicting motion vector information through analysis of surrounding motion vector fields and offering offset information to correct the predicted motion vector values. Whether the '808 Patent's "skip coding mode" could *result in* motion vectors potentially similar to motion vectors in Karczewicz is inapposite.[10] The challenged claims describe processes of predicting and generating motion vectors in a redefined skip coding mode. This is of course different from simply pointing to zero-valued motion vectors and ignoring the processes that led to them. Karczewicz does not provide any coding mode as such, much less a redefined skip coding mode that uses an analysis of the motion characteristics of surrounding image segments to determine whether the skip coding mode is to be interpreted as "active" and "non-

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

active" for purposes of deciding how to generate a skip mode motion vector. (Ex. 2009, ¶¶ 61-63.)

Petitioner further indicates that "Karczewicz does not discuss what happens if a prediction error of zero is calculated[,]" but that a "POSITA would have found it obvious … to not send prediction error if the prediction error was calculated to be zero." (Pet., 20.) However, if the encoder did not send anything, the decoder would read the next bits that were sent (intended to represent some other variable) as an encoding of the prediction error, and the decoding would fail. Petitioner then goes on and alleges that Karczewicz assigns a "skip coding mode" to a first segment of a first frame of a sequence (*i.e.*, limitation 1[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., 21-22.) Petitioner admits that these two functionalities, zero motion vectors and non-zero motion vectors, are actually from separate alleged "coding modes", but 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.'" (*Id.*, 22.) First, Petitioner's 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 the fact that particular values of motion vectors can be used.[11] (Ex. 2009, ¶ 64.)

Even ignoring that Karczewicz is about affine motion field coefficients and not "coding modes," Petitioner's arguments ignore the teachings of Karczewicz. The idea in Karczewicz is that an encoder either expressly signals affine motion coefficients or expressly tells the decoder from where to predict or copy those coefficients. (*See, e.g.*, Ex. 1006, 26:13-24 ("[I]n one implementation, the prediction motion vector field is obtained by extrapolating the affine motion vector field of a neighboring, e.g., adjacent, segment inside the area covered by the current segment. As the current segment can have several neighboring segments, usually signaling information is provided to the decoder in order to specify which segment shall be used.").) By contrast, the challenged claims involve a skip coding mode with surrounding motion analysis to determine whether to treat the skip coding mode as active (and then generate a predicted non-zero motion vector) or non-active (and then generate a zero motion vector) to best predict a given image block from a

[11] The novelty lies in much more efficient ways of communicating information about active and non-active scenarios within image frames using a single redefined skip coding mode. The '808 Patent's redefined skip coding mode allows for the representation of global and regional motion as well as areas of no motion with the same coding mode that is much less expensive and complex to implement than alternatives. (Ex. 1001, 11:1-18.)

reference frame. Petitioner offers no explanation for how it would even be possible to modify Karczewicz to signal such a coding mode. To do so, a POSITA would have to (a) know the '808 Patent's redefinition of skip mode; (b) reject every teaching of Karczewicz and modify Karczewicz to use a translation motion model as opposed to an affine motion model in which motion coefficients are used to express motion; (c) copy and paste the '808 Patent's redefinition of skip mode into Karczewicz; (d) conjure up some signaling mechanism for the '808 Patent's skip coding mode (perhaps by copying Table 3 of the '808 Patent into Karczewicz as well)[12]; and (e) modifying Karczewicz's encoder and decoder to understand the new signaling mechanism. (Ex. 2009, ¶ 65.)

Petitioner also argues that "Karczewicz teaches efficiently coding segments, and one way it does this is by using a motion coefficient indication (MCI) bit to indicate all-zero refinement field coefficients, rather than coding the zeros themselves." (Pet., 20.) This is incorrect to the extent Petitioner alleges this functionality in Karczewicz is related to the '808 Patent. First, Petitioner ignores "motion coefficient indication (MCI)," as its name suggests," is about a refinement field for affine motion model coefficients. Karczewicz teaches that a "motion vector

[12] Table 3 provides the macroblock coding modes of JM1. Of course, JM1 did not exist at the time of Karczewicz.

field is formed of a prediction motion vector field and a refinement motion vector field." (Ex. 1006, 12:22-23.) In other words, MCI in Karczewicz is about whether "residual" 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 residual motion vector data (i.e., residual information added to motion vectors, which is loosely akin to "Karczewicz's" refinement field) and residual 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. 2009, ¶¶ 66-67.)

The MCI is not a coding mode or a flag of a coding mode, but a separate bit in the bitstream that signals presence of coefficients in the bitstream to represent Karczewicz's refinement motion vector field. If the "coding mode" that Petitioner contends 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. Therefore, Petitioner's arguments reinforce the fact that Karczewicz actually teaches away from triggering those functionalities automatically through the assignment of a "coding mode." (Ex. 2009, ¶ 67.)

Petitioner additionally asserts that "a POSITA would have understood the decision to code a second segment with [zero motion vector] or [potential non-zero motion vector] depends on the motion characteristics in the neighboring segment(s), as consistent with all proposed constructions of 'skip coding mode[]'. (Pet., 23-24.) This is because, according to Petitioner, "Karczewicz teaches determining 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 against the amount of data required to transmit the second segment's motion vector information." (*Id.*, 24; *see also* Ex. 1006, 15:15-20.) However, the considerations suggested by Karczewicz for how to exercise discretion on what motion vector fields to use in coding a segment is irrelevant to the question of whether Karczewicz teaches any "coding modes" at all, and the '808 Patent's "skip coding mode" in particular. Thus, Petitioner has failed to identify any teachings in Karczewicz of a "skip coding mode" that would automatically trigger zero motion vectors or non-zero motion vectors. Therefore, Karczewicz fails to teach at least limitation 1[a]. (Ex. 2009, ¶ 68.)

Petitioner's arguments to support that Karczewicz teaches limitations 1[b]-[d] are moot and do not need to be specifically addressed. (Pet., 24-26.) As explained above, Karczewicz does not disclose or render obvious assigning a skip coding mode

to a first segment, so it is not possible that it could meet the additional constraints of these limitations for a skip coding mode that was never assigned to the first segment. Accordingly, Karczewicz fails to teach at least elements 1[a]-[d] and 7[a]-[c] because it does not teach any coding mode that would automatically trigger the functionalities require to meet these claim limitations, and the Petitioner has failed to show a reasonable likelihood that the Challenged Claims are unpatentable based on this Ground.

B. Petitioner Has Not Established A Reasonable Likelihood That The Challenged Claims Are Unpatentable In Light Of Grounds 2A And 2B.

1. Petitioner's Ground 2A and 2B arguments fail because Frojdh is not entitled to the priority date of the provisional application, at least because it fails to disclose the subject matter relied upon for prior art in Frojdh.

Frojdh is a U.S. Patent Publication that was published on July 3, 2003, after the priority date of the '808 Patent.[13] Frojdh also claims priority to a provisional application,[14] but it is not entitled to that priority date as prior art for the reasons explained below. (Ex. 2009, ¶ 71.)

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[13] The priority date of the '808 patent is March 15, 2002.
[14] The priority date of the Frojdh provisional application is November 30, 2009.

With respect to IGMC, Petitioner provides a table (Pet., 39) of each paragraph of Frojdh that Petitioner claims to rely on, and the asserted disclosure in the Frojdh provisional. One such paragraph is ¶ [0056]. Below is a table that compares paragraph 56 with Petitioner's claimed support:

[0056] of Frojdh (Ex. 1007)	§ 6 of Frojdh Provisional cited by Petitioner (Ex. 1008)
As a further feature of the IGMC embodiment, a bitstream representing a coded image block can include a syntactic element which may be interpreted to indicate wither the IGMC mode or the COPY mode. A switch between the IGMC and COPY modes may be signalled implicitly, by means of other code elements. Alternatively, this switch may be signalled explicitly by a code word.	6: SOLUTION "The following is a list of implementation examples on how Global Motion Compensation (GMC) can be signaled: 1. Whether or not GMC should be used is signaled for each slice together with global motion information (vectors)." "The above examples can be combined with the different macroblock modes to take advantage of global motion compensation. Some, but not all, mode may use the (interpolated) global motion vectors. The following is a list of possible modes: 12. When GMC is enabled, a macroblock COPY mode signals that the encoder shall copy the macroblock from the (global) motion compensated reference picture. Hence, the displacements or motion vectors are given by the (interpolated) global motion vectors. No coefficients are coded."

[0056] of Frojdh (Ex. 1007)	§ 6 of Frojdh Provisional cited by Petitioner (Ex. 1008)
	"15. When GMC is enabled, no explicit global motion vector is sent. We refer to this as Implicit Global Motion Compensation (IGMC), where the macroblock COPY mode is reinterpreted an inter MB mode without coefficients. Just as for inter MB modes, the motion vectors for this mode are defined by the prediction from neighboring blocks. This mode can be used for macroblocks with only one motion vector (16x16 block)."

As is evident, this "further feature" of the IGMC embodiment described in paragraph [0056] that is related to implicitly signaled switching between COPY and IGMC modes is not disclosed in the cited portions of § 6, nor anywhere else, in the Frojdh provisional. (Ex. 1008.) None of the cited portions of the Frojdh provisional teach, show, or otherwise disclose an element in the bitstream that would indicate either IGMC or COPY mode, implicitly, or by means of other code elements, and not by a code word. (Ex. 2009, ¶ 72.)

Petitioner identifies paragraph [0056] of Frojdh in Petitioner's analysis of limitation 1[d]. (Pet., 48-49.) Accordingly, Frojdh fails to teach at least element 1[d].

2. Petitioner's Ground 2A and 2B arguments fail because Frojdh does not teach using an analysis of the motion characteristics in image segments surrounding a skip mode macroblock to determine whether to associate an active or non-active motion vector for the macroblock in question.

While the '808 Patent and Frojdh consider modifications to conventional skip mode processing, the two propose entirely different mechanisms. As shown in Figure 8 below, the '808 Patent explicitly defines a new skip mode that involves choosing between non-active motion vectors (akin to conventional skip mode) and active motion vectors, coupled with a choice mechanism based on an analysis of motion characteristics in surrounding image segments. (*See* Ex. 1001, 18:28-30, 18:62-19:10.) In other words, the '808 Patent has one skip coding mode that uses surrounding motion analysis to determine how to generate motion vectors (depending on an active versus non-active classification). (*See* Ex. 2008, 48 ("[D]uring claim construction, Nokia recognized the asserted claims require analyzing 'surrounding' motion. … [T]his is consistent with the provisional, the claims of the provisional, and the specification of the '808 patent.") (Respondents' Joint Pre-Hearing Brief).) (Ex. 2009, ¶ 73.)

Frojdh, by contrast, has two different coding modes (COPY and IGMC) and teaches explicit signaling in the slice header to distinguish between those two coding modes. When the GMC slice flag is on, a decoder knows that signaling

conventionally used to indicate "COPY" mode indicates IGMC mode. When the GMC slice flag is off, a decoder will interpret the signaling used to indicate COPY mode as indicating COPY mode. No surrounding motion analysis is done in Frojdh. Rather, Frojdh takes an explicit signaling approach that requires additional data in the bitstream to implement. In fact, Frojdh requires this explicit signaling approach because Frojdh's encoder must tell a decoder whether to expect global motion vectors (that may be used when the GMC flag is on). (Ex. 1007, [0024] ("Usefully, GMC information contained by respective slices of the frame comprises global motion vectors respectively referenced to the video frame."); *see also* Ex. 2009, ¶ 74.)

The only disclosures of Frojdh that suggest anything different than considering IGMC mode as a different mode from COPY mode, are found in paragraph [0056] of Frojdh, and mirrored in various elements among the claims. Though, as explained in Section III(B)(2), paragraph [0056] of Frojdh and all Frojdh claim elements related to the content of paragraph [0056] are not supported in the Frojdh provisional application that Petitioner relies on for identifying Frojdh as prior

art to the '808 Patent.[15] Despite this, Patent Owner will still address Petitioner's arguments. (Ex. 2009, ¶ 75.)

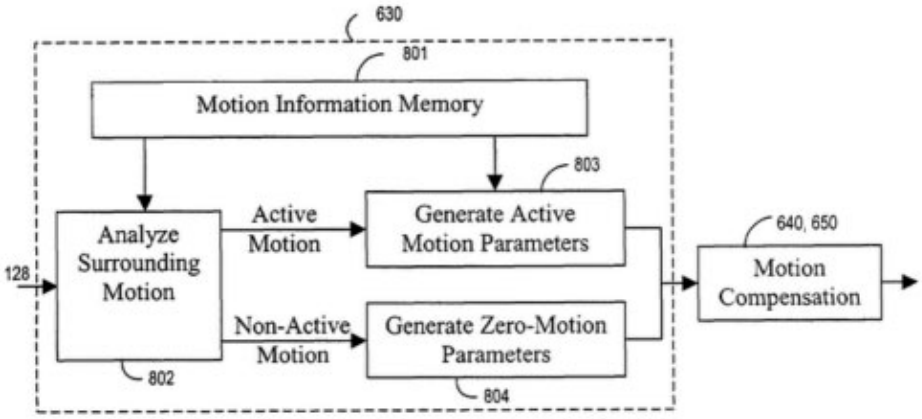

FIG. 8

'808 Patent, Figure 8 (Ex. 1001)

First, Petitioner contends that the IGMC mode constitutes a skip coding mode as defined by the Patent Owner's construction because it associates either a non-zero (active) motion vector with each skip mode macroblock, or it associates a zero (non-active) motion vector whenever the predicted motion vector is equal to zero. (Pet., 39-40.) Petitioner further asserts that not all macroblocks need to be motion compensated, in COPY (*aka* SKIP) mode "the motion vector is always zero" (Pet., 40; Ex. 1007, [0022]; Ex. 1008, 12-13) and "in IGMC mode the motion vector for a block is *predicted* from the neighboring blocks' motion vectors" so it may be zero

[15] As stated, these portions of the Frojdh application were only added after Nokia's skip mode contribution was adopted into the H.264 standard.

(Pet., 41-42 (emphasis added); Ex. 1007, [0022], [0055]; Ex. 1008, 6, 12-13). (Ex. 2009, ¶ 76.)

Unlike Frojdh, the '808 Patent teaches that a non-active motion vector is one that is *not predicted*, but is instead automatically generated to have zero-valued motion parameters in response to an classification of non-active motion after surrounding motion analysis. The fact that a predicted motion vector, in Frojdh, might happen to equal zero does not make the predicted motion vector a non-active motion vector that was generated after the surrounding motion analysis described in the '808 Patent's lexicography of "skip coding mode." Again, Petitioner conflates *results* with (claimed) *process*. A POSITA would not understand a predicted motion vector that happens to equal zero to qualify as a zero (non-active) motion vector. As disclosed in Frojdh, IGMC mode always uses motion vector predictions. Consequently, if one had to apply the '808 Patent's terminology to Frojdh, all motion vectors predicted in IGMC are akin to "active" motion vectors. IGMC always performs this way regardless of the characteristics of motion in any image segments surrounding a macroblock in question. The assignment of IGMC mode fails to disclose or render obvious the "skip coding mode" of the '808 Patent. Thus, assigning the IGMC mode defined in Frojdh to each skip mode macroblock does not disclose or render obvious limitations 1[a]-[d] and 7[a]-[c]. (Ex. 2009, ¶ 76.)

Next, Petitioner alleges that Frojdh teaches or suggests assigning the skip coding mode, such as IGMC mode, or GMC with IGMC and COPY, to a first segment of a first frame of a sequence (*i.e.*, the rest of limitation 1[a]). (Pet., 44-45.) Petitioner is incorrect for at least three reasons. First, "GMC" is not a coding mode for macroblocks or image segments, and "GMC with IGMC and COPY" is not possible. This can be illustrated with reference to Frojdh Figure 9 ("a schematic diagram representing proposed global motion compensation in H.26L on picture and macroblock levels"). (Ex. 1007, Figure 9; *see also* Ex. 2009, ¶ 77.)

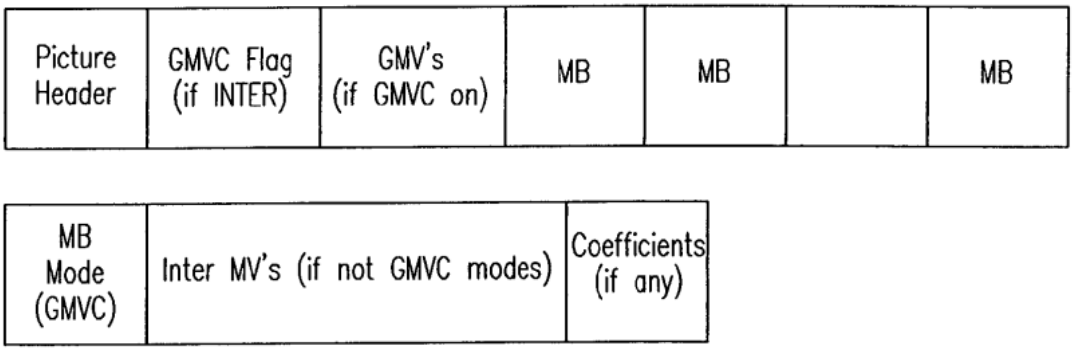

FIG. 9

The GMC flag (referred to as GMVC flag in Figure 9, perhaps erroneously) is signaled at a higher layer than the macroblock or "MB") syntax (marked with "MB"). The "MB Mode" is then signaled separately for each macroblock. (*See* Ex. 1007, [0022] (describing IGMC as a "more useful MB mode than COPY mode" in "many coding scenarios").) If GMC is on, COPY cannot be signaled. (*Id.*, [0055].) By contrast, if GMC is off, then an encoder cannot signal IGMC. (*Id.*, [0055].) Thus,

Petitioner is incorrect that "GMC with IGMC and COPY" is a possibility in Frojdh. (Ex. 2009, ¶ 78.)

Second, GMC as defined in Frojdh is signaled at the slice level. Even if there is nothing to prevent the "first segment" of this element from representing an entire slice, several later limitations cannot be met with a slice as the "first segment." For example, limitation 1[b] will require that a single motion vector (either zero or predicted non-zero) be associated with the first segment. Frojdh does not teach assigning motion vectors to slices. (Ex. 2009, ¶ 79.)

But limitation 1[d] is even more problematic for Petitioner's proposed interpretation. Limitation 1[d] will require that an indication of skip coding mode be included in the bitstream (*i.e.*, indication of GMC according Petitioner's interpretation) (Pet., 44), wherein no further motion vector information vector information for the first segment is coded in the encoded bitstream. This requirement directly conflicts with Frojdh's definition of GMC mode:

> The method comprises … applying a signal to each encoded slice to indicate whether global motion compensation (GMC) is used in reconstructing its corresponding original slice, and if so, including GMC information with the encoded slice. (Ex. 1007, [0024])

and

> … the GMC information contained in a given encoded slice comprises or represents a set of encoded global motion (GM) vectors. (*Id.*, [0025].)

Thus, the GMC mode in Frojdh requires including additional motion information with the "first segment" slice, while Petitioner's attempt to interpret the assignment of GMC mode as an assignment of a skip coding mode to a "first segment" does not allow including any additional motion information with the first segment. (Pet., 44-45; *see also* Ex. 2009, ¶ 79.)

While not directly relevant to the claim limitations, Petitioner raises in their 1[b] argument that "Frojdh further discloses how COPY mode (and the associated [zero motion vector]) 'is the cheapest mode to signal. In fact, run-length coding is used to signal a number of copied (skipped) macroblocks with one codeword.'" (Pet., 46 (citing Ex. 1007, [0047]; Ex 1008, 8-9).) However, Frojdh already teaches that when in GMC mode, the COPY signaling would be reinterpreted as IGMC, so the signaling cost for COPY and IGMC must be identical (they use the same signal). Given Frojdh's observation that "[t]his (IGMC) mode can be used as a tool in many coding scenarios which require a more useful MB mode than COPY mode, in order to minimize the total number of bits needed for motion vectors" (Ex. 1007, [0022]), coupled with the fact that COPY mode is no cheaper of a mode to signal than IGMC, a POSITA would not find it obvious to alter the teachings of Frojdh to provide access to both skip modes under GMC. Indeed, Petitioner provides no rationale for how a POSITA could modify Frojdh to distinguish between COPY and IGMC modes when

a GMC slice is on (or off), even assuming it would somehow be possible to simultaneously use both modes. (And ignoring that this still would not disclose the surrounding motion analysis of the '808 Patent's redefined skip coding mode.) (Ex. 2009, ¶ 80.)

Moreover, any such unexplained modification would defeat the purpose and teachings of Frojdh. The idea behind Frojdh is to represent large motions in frames by applying global motion compensation techniques to entire slices of macroblocks. This is why Frojdh signals a GMC flag at the slice level. Petitioner's notion that a POSITA would use COPY (which assumes no motion whatsoever) in a GMC slice scenario contradicts the teachings of Frodjh. In Frojdh, GMC indicates the presence of global motion. COPY would indicate the opposite. Petitioner's arguments to support that Frojdh teaches limitations 1[b]-[d] are moot and do not need to be specifically addressed further. (Pet., 45-49.) As explained above, Frojdh does not disclose or render obvious assigning a skip coding mode to a first segment, so it is not possible that it could meet the additional constraints of these limitations for a skip coding mode that was never assigned to the first segment. Accordingly, Frojdh fails to teach at least elements 1[a]-[d] and 7[a]-[c]. (Ex. 2009, ¶ 80.)

3. Petitioner's Ground 2B argument fails because it is directed to a dependent claim.

In addition to Frojdh, Petitioner's Ground 2B further relies on H.263. Ground 2B only relates to dependent claims 6, 9, 24-25, 32, 36, and 43 and accordingly fails for the same reasons as Ground 2A. Therefore, Ground 2B rises and falls with Ground 2A. *See In re Fine*, 837 F.2d 1071, 1076 (Fed. Cir. 1988) (indicating that "[d]ependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious.").

IV. CONCLUSION

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

Dated: September 16, 2024

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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 have 9,769 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.

Dated: September 16, 2024

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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 Petitioner via email on the following counsel of record for Petitioner:

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