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Paper 10
Date: September 24, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

NOKIA TECHNOLOGIES OY,
Patent Owner.

IPR2024-00691
Patent 8,050,321 B2

Before GREGG I. ANDERSON, STEVEN M. AMUNDSON, and JASON M. REPKO, *Administrative Patent Judges*.

AMUNDSON, *Administrative Patent Judge*.

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

I. INTRODUCTION

Amazon.com, Inc. and Amazon.com Services LLC (collectively "Petitioner") filed a Petition requesting an *inter partes* review of claims 8–11 in U.S. Patent No. 8,050,321 B2 (Ex. 1001, "the '321 patent") under 35 U.S.C. §§ 311–319. Paper 1 ("Pet."). Nokia Technologies Oy ("Patent Owner") filed a Preliminary Response. Paper 7 ("Prelim. Resp.").

Under 37 C.F.R. § 42.4(a), we have authority to determine whether to institute an *inter partes* review. We may institute an *inter partes* review only if "the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a) (2018). The "reasonable likelihood" standard is "a higher standard than mere notice pleading" but "lower than the 'preponderance' standard to prevail in a final written decision." *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (PTAB Dec. 20, 2019) (precedential).

Based on the current record and for the reasons explained below, Petitioner has shown that there is a reasonable likelihood that it would prevail with respect to at least one of the challenged claims. Thus, we institute an *inter partes* review of claims 8–11 in the '321 patent on all challenges included in the Petition.

II. BACKGROUND

A. Real Parties in Interest

Petitioner identifies the following entities as the real parties in interest: Amazon.com, Inc. and Amazon.com Services LLC. Pet. 76. Patent

Owner identifies itself as the sole real party in interest. Paper 5, 2. The parties do not raise any issue about real parties in interest.

B. Related Matters

Petitioner and Patent Owner identify the following civil actions as related matters:

- *Nokia Corp. et al. v. Amazon.com, Inc.*, 1:23-cv-01232 (D. Del. filed Oct. 27, 2023);
- *Nokia Technologies Oy v. Amazon.com, Inc. et al.*, 1:23-cv-01236 (D. Del. filed Oct. 31, 2023);
- *Nokia Technologies Oy v. HP Inc.*, 1:23-cv-01237 (D. Del. filed Oct. 31, 2023); and
- *Certain Video Capable Electronic Devices, Including Computers, Streaming Devices, Televisions, and Components and Modules Thereof*, Inv. No. 337-TA-1380 (Int'l Trade Comm'n filed Oct. 31, 2023).

Pet. 76–77; Paper 5, 2.

C. The '321 Patent (Exhibit 1001)

The '321 patent, titled "Grouping of Image Frames in Video Coding," issued on November 1, 2011, from an application filed on January 25, 2006. Ex. 1001, codes (22), (45), (54). The patent identifies that application as a continuation of an application filed on November 29, 2002. *Id.* at 1:6–7, code (63). The patent states that the invention "relates to the grouping of multimedia files, particularly video files and particularly in connection with streaming," i.e., the "simultaneous sending and playback of data." *Id.* at 1:13–20.

The '321 patent explains that video files "comprise a great number of still image frames" displayed "rapidly in succession," e.g., from 15 to 30 frames per second. Ex. 1001, 1:55–57. To "reduce the amount of data in

video files, the image data can be compressed into a smaller form by reducing the amount of redundant information in the image frames." *Id.* at 2:5–7.

Conventional methods for reducing the amount of data in video files include motion-compensated temporal prediction where "the contents of some (typically most) of the image frames in a video sequence are predicted from other frames in the sequence by tracking changes in specific objects or areas in successive image frames." Ex. 1001, 2:18–23. Motion-compensated temporal prediction employs different types of compressed image frames, including the following:

(1) I-frames (Intra-frames) where the image information "has not been determined using motion-compensated temporal prediction";

(2) P-frames (Predicted or Inter-frames) where the image information "is determined using one I-frame and possibly one or more previously coded P-frames"; and

(3) B-frames (Bi-directional predicted frames) where the image information is predicted from earlier and later "anchor frames" (either an I-frame and a P-frame as the "anchor frames" or two P-frames as the "anchor frames").

Id. at 2:23–31, 2:42–48.

An I-frame "typically initiates a video sequence" defined as a group of pictures (GOP). Ex. 1001, 2:34–35. The "next I-frame begins" a new GOP. *Id.* at 2:37–38. The image information in the new GOP cannot "be determined on the basis of the frames of the previous GOP" because GOPs "are not temporally overlapping." *Id.* at 2:38–41. Each GOP "can be decoded separately." *Id.* at 2:41–42.

The ’321 patent explains that a “problem in the numbering of image frames arises when the user wishes to start browsing a video file in the middle of a video sequence.” Ex. 1001, 11:11–13. In particular, when the user resumes browsing a video file from “a random point after previous browsing, discontinuity typically occurs in the image numbering.” *Id.* at 11:20–22. As a result, the “decoder typically interprets this as unintentional loss of image frames and unnecessarily tries to reconstruct the image frames suspected as lost.” *Id.* at 11:22–25.

The ’321 patent endeavors to address that problem by defining an “initiation image” in an “independently decodable” GOP that is “activated at the random point of the video file, and the number of the initiation image is set at zero.” Ex. 1001, 11:26–30. This “independently decodable” GOP preferably uses an I-frame as the “initiation image” or first image frame. *Id.* at 11:30–33, 11:37–40. Consequently, “when activated at a random point,” the decoder preferably sets the “identifier” of the “initiation image” or first image frame at zero. *Id.* at 11:37–40; *see id.* at 4:42–45. The “initiation image” or first image frame may include “a separate flag added to the header field of a slice of the image frame.” *Id.* at 11:43–46; *see id.* at 4:39–41.

The ’321 patent explains that “the idea of the present invention is to determine an initiation picture in an independently decodable group of pictures, whereby in the decoding phase any picture prior to said initiation picture is defined as unusable for reference.” Ex. 1001, 4:31–35. Thus, “after decoding the initiation picture, all following pictures of the independently decodable sequence can be decoded without prediction from any picture decoded prior to said initiation picture.” *Id.* at 4:35–38; *see id.* at code (57).

D. The Challenged Claims

Petitioner challenges the following claims in the ’321 patent:

- independent claim 8 for a “method for decoding a compressed video sequence”;
- claim 9 that depends directly from claim 8;
- independent claim 10 for a “video decoder”; and
- independent claim 11 for a “computer program product, stored on a non-transitory computer readable medium and executable in a data processing device, for decoding a compressed video sequence.”

Pet. 1–2, 10–74.

Claim 8 exemplifies the challenged claims and reads as follows (with bracketed letters added for reference purposes):[1]

> 8. [pre] A method for decoding a compressed video sequence, the method comprising:
>
> [a] decoding from the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence, wherein all motion-compensated temporal prediction references of the independent sequence refer only to image frames within said independent sequence;
>
> [b] starting the decoding of the video sequence from said first image frame of the independent sequence, whereby the video sequence is decoded without prediction from any image frame decoded prior to said first image frame;
>
> [c] decoding identifier values for image frames according to a numbering scheme; and
>
> [d] resetting the identifier value for the indicated first image frame of the independent sequence.

[1] We use the same reference letters that Petitioner uses to identify the claim language. *See* Pet. iv (Listing of Challenged Claims).

Ex. 1001, 23:49–24:10.

E. The Asserted References

For its challenges, Petitioner relies on the following references:

Name	Reference	Exhibit
MPEG-1	ISO/IEC 11172-2 Information technology - Coding of Moving Pictures and Associated Audio for Digital Storage Media at Up to About 1,5 Mbit/s - Part 2: Video (1st ed. August 1993)[2]	1005
Kim	US 6,912,351 B1, issued June 28, 2005 (based on an application filed October 19, 1998)	1006
Yagasaki	US 5,786,858, issued July 28, 1998 (based on an application filed October 7, 1996)	1015

Pet. 1–2, 10–74.

Petitioner asserts that:

(1) MPEG-1 and Yagasaki qualify as prior art "at least under § 102(b)"; and

(2) Kim qualifies as prior art "at least under § 102(e)."

Pet. 2; *see* 35 U.S.C. § 102(b), (e) (2006).[3]

At this stage of the proceeding, Patent Owner does not dispute that each reference qualifies as prior art. *See, e.g.*, Prelim. Resp. 7–16, 23–37.

[2] The acronym "ISO" stands for "International Organization for Standardization." Ex. 1005, 11. The acronym "IEC" stands for "International Electrotechnical Commission." *Id.*

[3] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 102 and § 103 effective March 16, 2013. Because the filing date of the challenged claims predates the AIA's amendments to § 102 and § 103, this decision refers to the pre-AIA versions of § 102 and § 103.

F. The Asserted Challenges to Patentability

Petitioner asserts the following challenges to patentability:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
8, 10, 11	103(a)	MPEG-1
9	103(a)	MPEG-1, Yagasaki
8, 10, 11	103(a)	Kim

Pet. 1–2, 10–74.

G. Testimonial Evidence

To support its challenges, Petitioner relies on the declaration of Joseph P. Havlicek, Ph.D. (Exhibit 1003). Dr. Havlicek states that he was "retained by Amazon.com, Inc., as an independent expert consultant in this inter partes review ('IPR') proceeding." Ex. 1003 ¶ 1. Dr. Havlicek explains that he received "a Bachelor of Science Degree in electrical engineering with minors in mathematics and computer science from Virginia Tech in 1986," "a Master of Science degree in electrical engineering from Virginia Tech in 1988," and "a Ph.D. in Electrical and Computer Engineering from the University of Texas at Austin in 1996." *Id.* ¶ 8.

Further, Petitioner relies on the declaration of June Ann Munford (Exhibit 1031) to establish the authenticity and public accessibility of MPEG-1 before the '321 patent's effective filing date.

To support its positions, Patent Owner relies on the declaration of Iain E. Richardson, Ph.D. (Exhibit 2001). Dr. Richardson states that he was "retained on behalf of Nokia Technologies OY and asked to provide opinions in respect of Inter Partes Review (IPR) proceeding." Ex. 2001 ¶ 1. Dr. Richardson explains that he received "a Master of Engineering (M.Eng.) degree in Electronic and Electrical Engineering from Heriot-Watt University

in Edinburgh, Scotland in 1990" and "a Doctor of Philosophy (Ph.D.) degree in Video Compression from Robert Gordon University in Aberdeen, Scotland in 1999." *Id.* ¶ 7.

III. PATENTABILITY ANALYSIS

A. Legal Principles: Obviousness

A patent may not be obtained "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a) (2006). An obviousness analysis involves underlying factual inquiries including (1) the scope and content of the prior art; (2) differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) where in evidence, objective indicia of nonobviousness, such as commercial success, long-felt but unsolved needs, and failure of others.[4] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18, 35–36 (1966); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1047–48 (Fed. Cir. 2016) (en banc). When evaluating a combination of references, an obviousness analysis should address "whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

We analyze the obviousness issues according to these principles.

B. Level of Ordinary Skill in the Art

Factors pertinent to determining the level of ordinary skill in the art include (1) the educational level of the inventor; (2) the type of problems

[4] The parties do not address objective indicia of nonobviousness. *See, e.g.*, Pet. 10–74; Prelim. Resp. 23–37.

encountered in the art; (3) prior-art solutions to those problems; (4) the rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the educational level of workers active in the field. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983). Not all factors may exist in every case, and one or more of these or other factors may predominate in a particular case. *Id.* These factors are not exhaustive, but merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). Moreover, the prior art itself may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Petitioner asserts that a person of ordinary skill in the art at the time of the alleged invention would have had "a (1) Bachelor's degree in electrical engineering, computer engineering, computer science, or a comparable field of study such as physics, and (2) approximately two to three years of practical experience with video encoding/decoding." Pet. 9. Petitioner also asserts that "[a]dditional experience can substitute for the level of education, and vice-versa." *Id.* Dr. Havlicek's testimony supports Petitioner's assertions. *See* Ex. 1003 ¶¶ 18–20.

Patent Owner asserts that the Preliminary Response "does not depend on the level of ordinary skill in the art." Prelim. Resp. 17. For purposes of the Preliminary Response, Patent Owner applied Petitioner's description of an ordinarily skilled artisan. *Id.*

Based on the current record and for purposes of this decision, we accept Petitioner's description of an ordinarily skilled artisan because it comports with the technology and claims of the '321 patent as well as the asserted references. *See* Ex. 1003 ¶ 20.

C. Claim Construction

We construe claim terms "using the same claim construction standard" that district courts use to construe claim terms in civil actions under 35 U.S.C. § 282(b). *See* 37 C.F.R. § 42.100(b) (2024). Under that standard, claim terms "are given their ordinary and customary meaning, which is the meaning the term would have to a person of ordinary skill in the art at the time of the invention." *Power Integrations, Inc. v. Fairchild Semiconductor Int'l, Inc.*, 904 F.3d 965, 971 (Fed. Cir. 2018) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc)). The meaning of claim terms may be determined by "look[ing] principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Petitioner contends that "no constructions are necessary to resolve any disputes identified" in the Petition. Pet. 9. Hence, Petitioner "has not proposed any terms for construction." *Id.*

Patent Owner "identifies no claims for construction at this juncture based on Petitioner's representation that it has not sought to construe any claim terms." Prelim. Resp. 17 (citing Pet. 9).

"[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy." *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *see Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Based on the current record, we determine that no claim

term requires an explicit construction to decide whether Petitioner satisfies the "reasonable likelihood" standard for instituting trial.

D. Alleged Obviousness over MPEG-1: Claims 8, 10, and 11

Petitioner contends that claims 8, 10, and 11 are unpatentable under § 103(a) as obvious over MPEG-1. *See* Pet. 1–2, 14–38. Patent Owner disputes Petitioner's contentions. *See* Prelim. Resp. 7–14, 23–31.

Below, we provide an overview of MPEG-1. Then, we consider the obviousness issues. For the reasons explained below, Petitioner establishes sufficiently for purposes of institution that MPEG-1 teaches the subject matter in claims 8, 10, and 11.

1. OVERVIEW OF MPEG-1 (EXHIBIT 1005)

MPEG-1 is an international standard that "specifies a coded representation that can be used for compressing video sequences to bitrates around 1,5 Mbit/s," such that video may be "manipulated as a form of computer data" and "transmitted and received over existing and future networks." Ex. 1005, 11–12;[5] *see* Ex. 1003 ¶ 57. MPEG-1 was developed by the Moving Pictures Expert Group "in response to the growing need for a common format for representing compressed video on various digital storage media such as CDs, DATs, Winchester disks and optical drives." Ex. 1005, 12, 68; *see* Ex. 1003 ¶ 59.

MPEG-1 seeks to "balance a high picture quality and compression ratio with the requirement to make random access to the coded bitstream." Ex. 1005, 12. Random access "implies the existence of access points in the

[5] For Exhibit 1013 (MPEG-1), we cite to the page numbers that Petitioner applied to the exhibit rather than the page numbers that appear in the publication.

bitstream," i.e., "segments of information that are identifiable and can be decoded without reference to other segments of data." *Id.* at 17.

To balance these competing objectives, MPEG-1 defines "three main picture types" as follows:

- I-picture (intra-coded picture): "A picture coded using information only from itself," i.e., without "reference to any other pictures";
- P-picture (predictive-coded picture): "A picture that is coded using motion compensated prediction from the past reference picture," i.e., a previous I-picture or a previous P-picture; and
- B-picture (bidirectionally predictive-coded picture): "A picture that is coded using motion compensated prediction from a past and/or future reference picture," i.e., a previous or future I-picture or a previous or future P-picture.

Ex. 1005, 20, 23, 25, 71; *see id.* at 13. Each picture "corresponds to a single frame of motion video, or to a movie frame." *Id.* at 71.

I-pictures "provide access points to the coded sequence where decoding can begin" and "are coded with only a moderate compression ratio." Ex. 1005, 13. Typically, "an I-picture may occur every half a second, to give reasonably fast random access." *Id.* at 71. P-pictures "are coded more efficiently using motion compensated prediction from a past intra or predictive coded picture" and "are generally used as a reference for further prediction." *Id.* at 13. B-pictures "provide the highest degree of compression but require both past and future reference pictures for motion compensation." *Id.* B-pictures "are never used as references for prediction." *Id.*

MPEG-1 "does not specify an encoding process." Ex. 1005, 14. Instead, MPEG-1 "specifies the syntax and semantics of the bitstream and the signal processing in the decoder." *Id.* at 14, 16.

MPEG-1 explains that "because of the picture dependencies, the bitstream order, i.e. the order in which pictures are transmitted, stored, or retrieved is not the display order, but rather the order which the decoder requires them to decode the bitstream." Ex. 1005, 71. Hence, an encoder may reorder pictures so that the pictures arrive at the decoder in proper decoding order, e.g., because a B-picture "can only be decoded after the subsequent reference picture" (either an I-picture or a P-picture) has been decoded. *Id.* at 14–15.

MPEG-1 also explains that a bitstream "is arranged in layers corresponding to a hierarchical structure" including at least one group of pictures (GOP) in the top layer. Ex. 1005, 71. MPEG-1 defines a GOP as a "series of one or more coded pictures" (1) "contiguous in display order" and (2) "intended to assist random access into the sequence." *Id.* at 23, 32, 84. A GOP "is a random access point." *Id.* at 71.

Each GOP has certain properties and:

- "consists of a header and some number of pictures";
- "must contain" at least one I-picture (with the smallest GOP consisting of a single I-picture);
- "must start" with an I-picture in decoding order (bitstream order), followed by "any number" of I-pictures, P-pictures, or B-pictures;
- "must begin" with an I-picture or a B-picture in display order; and
- "must end" with an I-picture or a P-picture in display order.

Ex. 1005, 71, 84; *see id.* at 85.

MPEG-1 defines a closed GOP as a "group of pictures [that] has been encoded without motion vectors pointing to the previous group of pictures." Ex. 1005, 43. Thus, a closed GOP "can be decoded without using decoded pictures of the previous group for motion compensation." *Id.* at 86.

Each GOP has a header containing "time and editing information." Ex. 1005, 71; *see id.* at 37. More particularly, a GOP header includes, among other things, (1) a group_start_code identifying "the beginning of a group of pictures" and (2) a closed_gop flag specifying whether the GOP is open or closed, i.e., set to 0 for an open GOP and set to 1 for a closed GOP. *Id.* at 43, 86; *see id.* at 37.

Each picture "begins with a picture header" containing "time, picture type, and coding information." Ex. 1005, 71, 87; *see id.* at 38. A picture header's time information includes a picture's Temporal Reference (temporal_reference), i.e., "a ten-bit number which can be used to define the order in which the pictures must be displayed." *Id.* at 87; *see id.* at 38, 44, 120.

Each picture includes "one or more slices." Ex. 1005, 71; *see id.* at 90. Each slice has a header containing "position and quantizer scale information." *Id.* at 72; *see id.* at 39, 91. Each slice includes "one or more macroblocks." *Id.* at 72; *see id.* at 26, 90. "A macroblock is the basic unit for motion compensation and quantizer scale changes." *Id.* at 72; *see id.* at 24.

The first picture in display order in each GOP "must have" a Temporal Reference of 0, and other Temporal References are "assigned (in sequence) to the [other] pictures in display order," i.e., "incremented by one

for each picture in the group." Ex. 1005, 44, 87. "If there are more than 1024 pictures in a group, then the Temporal Reference is reset to zero and then increments anew." *Id.* at 87. Also, "[f]or the earliest picture (in display order) in each group of pictures, the temporal_reference is reset to zero." *Id.* at 44.

MPEG-1's Figures D.18(a) and D.18(b) (reproduced below) depict examples of closed GOPs in display order:

I	B	B	P	B	B	P	B	B	P	B	B	P
0	1	2	3	4	5	6	7	8	9	10	11	12

(a) closed group

B	B	I	B	B	P	B	B	P	B	B	P	B	B	P
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

(b) open or closed group

Figure D.18 -- Example groups of pictures in display order

Figure D.18(a) illustrates a "typical example" of a closed GOP including one I-picture, eight B-pictures, and four P-pictures in display order, i.e., with Temporal References in numerical order from 0 to 12. Ex. 1005, 86. Figure D.18(b) illustrates a "less typical example" of a closed GOP including one I-picture, ten B-pictures, and four P-pictures in display order, i.e., with Temporal References in numerical order from 0 to 14. *Id.* In Figure D.18(b)'s example where B-pictures precede the first I-picture, the B-pictures "must use backward motion compensation only," i.e., based only on the first I-picture with a Temporal Reference of 2. *Id.*

2. INDEPENDENT CLAIM 8

(a) <u>Preamble 8pre</u>

Claim 8 recites "[a] method for decoding a compressed video sequence." Ex. 1001, 23:49–50.

Petitioner contends that MPEG-1 teaches claim 8's preamble because MPEG-1 discloses (1) a "coded video bitstream" corresponding to the claimed "compressed video sequence" and (2) a "method for decoding" the "coded video bitstream." Pet. 18–19 (citing Ex. 1005, 12, 14, 16, 21–22, 68–69, 120–22).

At this stage of the proceeding, Patent Owner makes no arguments specific to claim 8's preamble. *See, e.g.*, Prelim. Resp. 7–14, 23–31. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

Generally, a preamble does not limit a claim. *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). We need not decide whether claim 8's preamble limits the claim because, based on the current record and for the reasons stated by Petitioner and supported by Dr. Havlicek's testimony, Petitioner establishes sufficiently that MPEG-1 teaches claim 8's preamble. *See* Pet. 18–19; Ex. 1003 ¶¶ 80–83.

(b) <u>Limitation 8a</u>

Claim 8 recites "decoding from the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence, wherein all motion-compensated temporal prediction references of the independent sequence refer only to image frames within said independent sequence." Ex. 1001, 23:51–24:2 (limitation 8a).

Petitioner contends that MPEG-1 teaches limitation 8a for several related reasons. *See* Pet. 19–24. Initially, Petitioner addresses how MPEG-1 teaches "an independent sequence, wherein all motion-compensated

temporal prediction references of the independent sequence refer only to image frames within said independent sequence." *Id.* at 19–21. Next, Petitioner addresses how MPEG-1 teaches "an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence." *Id.* at 21–24. Then, Petitioner addresses how MPEG-1 teaches "decoding from the video sequence" the claimed "indication." *Id.* at 22–24.

(i) "An Independent Sequence"

a. Petitioner's Contentions

Petitioner contends that MPEG-1 teaches the claimed "independent sequence, wherein all motion-compensated temporal prediction references of the independent sequence refer only to image frames within said independent sequence" because MPEG-1 discloses a closed group of pictures (GOP). Pet. 20–21 (citing Ex. 1003 ¶¶ 85–87; Ex. 1005, 23, 25, 32, 43, 84); *see id.* at 14–18. Specifically, Petitioner asserts that MPEG-1 defines a closed GOP as a "group of pictures [that] has been encoded without motion vectors pointing to the previous group of pictures." *Id.* at 20 (alteration by Petitioner) (quoting Ex. 1005, 43). Petitioner asserts that a closed GOP "must start" with an I-picture in decoding order. *Id.* at 17 (quoting Ex. 1005, 84); *see id.* at 14. Petitioner asserts that a closed GOP "must end" with an I-picture or a P-picture in display order. *Id.* at 20–21 (quoting Ex. 1005, 84); *see id.* at 14–15.

For the I-picture or P-picture ending a closed GOP, Petitioner explains that a closed GOP "cannot depend on pictures from a subsequent group of pictures for motion compensation" because (1) I-pictures "are coded without reference to any other pictures," (2) P-pictures "are coded using motion

compensation from a previous" I-picture or P-picture, and (3) no B-picture in a closed GOP may reference a picture beyond the last I-picture or P-picture since a B-picture must reference the "nearest adjacent" I-picture or P-picture in display order. *Id.* at 14–15, 20–21 (emphasis omitted) (quoting Ex. 1005, 26, 71).

As support, Petitioner quotes MPEG-1's disclosures that:

(1) an I-picture is "[a] picture coded using information only from itself";

(2) a P-picture is "[a] picture that is coded using motion compensation prediction from the past reference picture";

(3) "[t]he order of the pictures in the coded stream is the order in which the decoder processes them in normal playback"; and

(4) "[t]he last coded picture, in display order, of a group of pictures is either an I-Picture or a P-Picture."

Pet. 20–21 (alterations by Petitioner) (quoting Ex. 1005, 23, 25, 32).

Also, Petitioner cites MPEG-1's Figure D.18(a) as depicting an "exemplary closed GOP." Pet. 16–17. Figure D.18(a) is reproduced below:

I	B	B	P	B	B	P	B	B	P	B	B	P
0	1	2	3	4	5	6	7	8	9	10	11	12

(a) closed group

Figure D.18(a) illustrates a "typical example" of a closed GOP including one I-picture, eight B-pictures, and four P-pictures in display order, i.e., with Temporal References in numerical order from 0 to 12. Ex. 1005, 86.

Petitioner contends that a "key feature" of this "exemplary closed GOP" is that "a single I-picture must be the first picture of the GOP in both decoding order and display order." Pet. 17. Petitioner explains that:

(1) the first picture in decoding order of any GOP must be an I-picture;

(2) the first picture in display order of any GOP must be an I-picture or a B-picture; and

(3) this "exemplary closed GOP" specifies that "any B-pictures preceding the first I-picture have been omitted."

Id. (citing Ex. 1005, 84). According to Petitioner, every closed GOP with an I-picture as the first picture in display order has a Temporal Reference of 0 for the first I-picture. *Id.* (citing Ex. 1003 ¶ 78).

As another example of a GOP with this "key feature," Petitioner provides an excerpt from MPEG-1's Figure D.19 as reproduced below (Pet. 18):

Example (a) in display order	I	B	P	B	P
	0	1	2	3	4
Example (a) in decoding order	I	P	B	P	B
	0	2	1	4	3

This excerpt from Figure D.19 includes Example (a) from the figure with a group of five pictures (one I-picture, two B-pictures, and two P-pictures). Ex. 1005, 87. This excerpt shows in the upper part the five pictures in display order and in the lower part the five pictures in decoding order. *Id.*

In the upper part of this excerpt, Example (a)'s group of five pictures constitutes the following pictures in display order: (1) an I-picture with a Temporal Reference of 0; (2) a B-picture with a Temporal Reference of 1; (3) a P-picture with a Temporal Reference of 2; (4) a B-picture with a Temporal Reference of 3; and (5) a P-picture with a Temporal Reference of 4. Ex. 1005, 87. In the lower part of this excerpt, Example (a)'s group of five pictures constitutes the following pictures in decoding order: (1) an

I-picture with a Temporal Reference of 0; (2) a P-picture with a Temporal Reference of 2; (3) a B-picture with a Temporal Reference of 1; (4) a P-picture with a Temporal Reference of 4; and (5) a B-picture with a Temporal Reference of 3. *Id.*

b. Patent Owner's Contentions

Patent Owner disputes Petitioner's characterization of MPEG-1's Figure D.18(a) as depicting an "exemplary closed GOP." *See* Prelim. Resp. 11–14. Patent Owner calls this a False Exemplar. *See id.* at 11–14, 29, 31. Patent Owner asserts that MPEG-1's Figure D.18(b) depicts an example of an "open or closed" GOP with B-pictures as the "first coded pictures" in the GOP. *Id.* at 13 (emphasis omitted). Figure D.18(b) is reproduced below:

B	B	I	B	B	P	B	B	P	B	B	P	B	B	P
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

(b) open or closed group

Figure D.18(b) illustrates a "less typical example" of a closed GOP including one I-picture, ten B-pictures, and four P-pictures in display order, i.e., with Temporal References in numerical order from 0 to 14. Ex. 1005, 86.

Further, Patent Owner asserts that the group of pictures in Figure D.18(a)'s example includes "only one I-frame" and MPEG-1 provides other examples with "more than one I-frame." Prelim. Resp. 13; *see id.* at 13–14.

c. Analysis

Based on the current record, Petitioner establishes sufficiently that MPEG-1 teaches the claimed "independent sequence, wherein all motion-compensated temporal prediction references of the independent sequence refer only to image frames within said independent sequence"

because MPEG-1 discloses a closed GOP. Ex. 1005, 23, 26, 43, 84–86; *see* Ex. 1003 ¶¶ 70–72, 74, 76, 78, 85–87; Pet. 14–15, 20–21. MPEG-1 defines a GOP as a "series of one or more coded pictures" (1) "contiguous in display order" and (2) "intended to assist random access into the sequence." Ex. 1005, 23, 32, 84; *see* Ex. 1003 ¶¶ 70–71. MPEG-1 defines a closed GOP as a "group of pictures [that] has been encoded without motion vectors pointing to the previous group of pictures." Ex. 1005, 43; *see* Ex. 1003 ¶¶ 74, 86. Thus, a closed GOP "can be decoded without using decoded pictures of the previous group for motion compensation." Ex. 1005, 86; *see* Ex. 1003 ¶¶ 74, 86.

According to MPEG-1, a closed GOP:

(1) "must contain" at least one I-picture;

(2) "must start" with an I-picture in decoding order (bitstream order); and

(3) "must end" with an I-picture or a P-picture in display order.

Ex. 1005, 84; *see* Ex. 1003 ¶¶ 71, 76, 78, 86. Because a closed GOP "must end" with an I-picture or a P-picture in display order, the closed GOP does not depend on pictures from a subsequent group of pictures for motion compensation. Ex. 1003 ¶¶ 72, 74, 86. And by definition, a closed GOP does not depend on pictures from a previous group of pictures for motion compensation. Ex. 1005, 43, 86; *see* Ex. 1003 ¶¶ 74, 86.

Although Patent Owner disputes Petitioner's characterization of MPEG-1's Figure D.18(a) as depicting an "exemplary closed GOP," Patent Owner does not dispute that MPEG-1 discloses a closed GOP. *See* Prelim. Resp. 7–14, 23–29. Patent Owner also does not dispute that a closed GOP

does not depend on pictures from a previous or subsequent group of pictures for motion compensation. *Id.*

As for Patent Owner's assertion that the group of pictures in Figure D.18(a)'s example includes "only one I-frame" and MPEG-1 provides other examples with "more than one I-frame," MPEG-1 discloses that a closed GOP may include multiple I-pictures. *See* Ex. 1005, 32, 43, 84–85; Prelim. Resp. 13–14.

(ii) "An Indication of at Least One Image Frame, Which Is the First Image Frame, in Decoding Order, of an Independent Sequence"

a. Petitioner's Contentions

Petitioner advances two alternative theories why MPEG-1 teaches the claimed "indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence." *See* Pet. 21–24 (citing Ex. 1003 ¶¶ 88–98, 105–106; Ex. 1005, 43, 85–86, 120). First, Petitioner identifies a closed_gop flag as the claimed "indication." *Id.* at 21–23. Second, Petitioner identifies a Temporal Reference of 0 as the claimed "indication." *Id.* at 23–24.

Regarding a closed_gop flag, Petitioner asserts that a group of pictures includes a GOP header that "precedes the first picture in the GOP in decoding order." Pet. 22. Petitioner asserts that a GOP header contains (1) a group_start_code identifying "the beginning of a group of pictures" and (2) a closed_gop flag specifying whether the GOP is open or closed. *Id.*

Additionally, Petitioner contends that when the closed_gop flag specifies that the GOP is closed, the closed_gop flag corresponds to the claimed "indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence" because:

(1) a GOP header precedes the first image frame in the GOP in decoding order;

(2) the GOP header contains the closed_gop flag specifying that the GOP is closed;

(3) the closed_gop flag in the GOP header is decoded before the first image frame in the closed GOP is decoded;

(4) the closed_gop flag indicates that the closed GOP is an "independent sequence"; and

(5) the closed_gop flag also indicates that "the next image frame decoded is the first image frame in decoding order" of the "independent sequence," i.e., of the closed GOP.

Pet. 22–23.

Regarding a Temporal Reference of 0, Petitioner asserts that Figure D.18(a)'s "exemplary closed GOP" is "encoded without B-pictures preceding the first I-picture in display order." Pet. 23. Petitioner further asserts that the first picture "in decoding order" in that "exemplary closed GOP" will always be an I-picture with a Temporal Reference of 0 because that I-picture is also the first picture "in display order" with a Temporal Reference of 0. *Id.* Therefore, according to Petitioner, the Temporal Reference of 0 for that "exemplary closed GOP" corresponds to the claimed "indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence." *Id.*

b. <u>Patent Owner's Contentions</u>

Patent Owner disputes that a closed_gop flag and a Temporal Reference of 0 correspond to the claimed "indication of at least one image frame, which is the first image frame, in decoding order, of an independent

sequence." *See, e.g.*, Prelim. Resp. 23–29 (citing Ex. 1001, 4:31–38, 9:54–10:23; Ex. 1005, 16, 37, 85, 87; Ex. 2001 ¶¶ 78–96).

Regarding a closed_gop flag, Patent Owner asserts that a closed_gop flag "is only an indication of whether or not the group of pictures is open or closed" and does not "indicate an I-frame" or "identify an I-frame." Prelim. Resp. 24; *see id.* at 10. Patent Owner also asserts that (1) a closed GOP may include multiple I-frames and (2) a closed_gop flag "cannot indicate which of the multiple I-frames" in a closed GOP with multiple I-frames is the "first image frame, in decoding order, of an independent sequence." *Id.* at 14; *see id.* at 25–26.

Additionally, Patent Owner asserts that a closed_gop flag is "at its own structural level" in a coded video bitstream and "not related to any particular frame." Prelim. Resp. 24. Patent Owner explains that:

> (1) a coded video bitstream according to MPEG-1 includes six syntax layers, including a group-of-pictures layer and a picture layer;
>
> (2) the syntax elements in the picture layer "apply to a specific picture";
>
> (3) the syntax elements in the group-of-pictures layer "apply to an entire GOP"; and
>
> (4) a closed_gop flag is a syntax element in the group-of-pictures layer that when decoded does not provide "an indication about any particular coded frame."

Id. at 24–25 (emphasis omitted) (citing Ex. 1005, 16; Ex. 2001 ¶¶ 81–82).

Regarding a Temporal Reference of 0, Patent Owner asserts that Petitioner "relies on coincidence rather than any indication of something" by citing Figure D.18(a)'s example with an I-picture as the first picture in display order having a Temporal Reference of 0. Prelim. Resp. 27; *see id.*

at 12, 29. Patent Owner asserts that Figure D.18(b)'s example includes a B-picture as the first picture in display order with a Temporal Reference of 0. *Id.* at 28. According to Patent Owner, a Temporal Reference of 0 in Figure D.18(b)'s example "does not indicate 'the first image frame, in decoding order' of the GOP, let alone of an independent sequence." *Id.*

Further, Patent Owner asserts that MPEG-1's Figure D.19 includes Examples (a), (b), and (c) and "only Example (a) has the property that the picture with Temporal Reference 0 happens to be an I-picture." Prelim. Resp. 28. Patent Owner asserts that Figure D.19's Examples (b) and (c) "start with a B-picture in display order, so that the first I-picture in decoding order ('coded order') has a Temporal Reference of 2 or 1 respectively." *Id.* According to Patent Owner, MPEG-1's disclosures that the display order and the decoding order "may at times incidentally coincide with one another" do not "rise to the level of a rule." *Id.* at 29 (citing Ex. 2001 ¶ 95).

Additionally, Patent Owner asserts that the Temporal Reference resets to 0 after reaching 1023 in a large GOP. Prelim. Resp. 29 (citing Ex. 1005, 87 (Fig. D.20); Ex. 2001 ¶ 93). Therefore, according to Patent Owner, a Temporal Reference of 0 cannot correspond to the claimed "indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence." *Id.* (citing Ex. 2001 ¶ 94).

c. <u>Analysis</u>

Based on the current record, Petitioner establishes sufficiently that MPEG-1 teaches the claimed "indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence." *See* Pet. 21–24; Ex. 1003 ¶¶ 88–98. As Petitioner contends, when the closed_gop flag specifies that the GOP is closed, the closed_gop flag

corresponds to the claimed "indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence" because:

(1) a GOP header precedes the first image frame in the GOP in decoding order;

(2) the GOP header contains the closed_gop flag specifying that the GOP is closed;

(3) the closed_gop flag in the GOP header is decoded before the first image frame in the closed GOP is decoded;

(4) the closed_gop flag indicates that the closed GOP is an "independent sequence"; and

(5) the closed_gop flag also indicates that "the next image frame decoded is the first image frame in decoding order" of the "independent sequence," i.e., of the closed GOP.

See Ex. 1003 ¶¶ 89–94; Pet. 22–23.

As for Patent Owner's assertion that a closed_gop flag does not "indicate an I-frame" or "identify an I-frame," limitation 8a does not require the claimed "indication" to "indicate an I-frame" or "identify an I-frame." Ex. 1001, 23:51–24:2; *see* Prelim. Resp. 24.

As for Patent Owner's assertion that a closed_gop flag "cannot indicate which of the multiple I-frames" in a closed GOP with multiple I-frames is the "first image frame, in decoding order, of an independent sequence," a closed_gop flag still satisfies limitation 8a because the closed_gop flag indicates that "the next image frame decoded is the first image frame in decoding order" of the "independent sequence," i.e., of the closed GOP. *See* Ex. 1003 ¶¶ 92–93; Prelim. Resp. 13–14. Limitation 8a does not require that the claimed "indication" identify a particular image

frame from among multiple image frames by specifying a frame number. Ex. 1001, 23:51–24:2. Nor does limitation 8a require that the claimed "indication" serve only one purpose. *Id.*

As for Patent Owner's assertion that a closed_gop flag is "at its own structural level" in a coded video bitstream and "not related to any particular frame," a closed_gop flag still satisfies limitation 8a for the reasons discussed above in the immediately preceding paragraph. *See* Ex. 1003 ¶¶ 92–93; Prelim. Resp. 24.

Regarding a Temporal Reference of 0, Petitioner identifies in MPEG-1 at least one example of a closed GOP with an I-picture as the first picture in display order where that first I-picture has by definition a Temporal Reference of 0. *See* Pet. 16–18, 23–24. In a closed GOP with an I-picture as the first picture in display order where that first I-picture has by definition a Temporal Reference of 0, that Temporal Reference of 0 in that closed GOP indicates the first image frame not only "in display order" but also "in decoding order." *See* Ex. 1003 ¶¶ 76–79, 95–97. Thus, that Temporal Reference of 0 in that closed GOP corresponds to the claimed "indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence." *Id.* ¶¶ 95–97.

As for Patent Owner's assertion that Petitioner "relies on coincidence rather than any indication of something" by citing Figure D.18(a)'s example with an I-picture as the first picture in display order having a Temporal Reference of 0, a prior-art reference "must be considered for everything it *teaches* by way of technology." *See EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985) (emphasis in original); Prelim. Resp. 27. For the reasons explained in the immediately preceding paragraph, in a

closed GOP with an I-picture as the first picture in display order where that first I-picture has by definition a Temporal Reference of 0, that Temporal Reference of 0 in that closed GOP corresponds to the claimed "indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence." Ex. 1003 ¶¶ 95–97.

As for Patent Owner's assertion that the Temporal Reference resets to 0 after reaching 1023 in a large GOP, an initial Temporal Reference of 0 may correspond to the claimed "indication" even if a subsequent Temporal Reference of 0 does not correspond to the claimed "indication." *See* Ex. 1003 ¶¶ 76–79, 95–97; Prelim. Resp. 29.

(iii) "Decoding from the Video Sequence" the Claimed "Indication"

Petitioner contends that MPEG-1 teaches "decoding from the video sequence" the claimed "indication" because MPEG-1 discloses that:

(1) "the decoder will decode the group of pictures header, including the closed_gop and broken_link information" and then "decode the first picture header in the group of pictures"; and

(2) the decoder will decode the Temporal Reference in the first picture header in the group of pictures.

Pet. 22–24 (quoting Ex. 1005, 120) (citing Ex. 1003 ¶¶ 95–96, 105–106).

At this stage of the proceeding, Patent Owner does not address Petitioner's contentions concerning "decoding from the video sequence" the claimed "indication." *See, e.g.*, Prelim. Resp. 7–14, 23–31.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Havlicek's testimony, Petitioner establishes sufficiently that MPEG-1 teaches "decoding from the video sequence" the claimed "indication." *See* Pet. 22–24; Ex. 1003 ¶¶ 91, 94, 96, 105–106.

(iv) Summary for Limitation 8a

Based on the current record and for the reasons discussed above, Petitioner establishes sufficiently that MPEG-1 teaches limitation 8a. *See* Pet. 14–24; Ex. 1003 ¶¶ 70–79, 84–98, 105–106; *supra* §§ III.D.2(b)(i).c, III.D.2(b)(ii).c, III.D.2(b)(iii).

(c) Limitation 8b

Claim 1 recites "starting the decoding of the video sequence from said first image frame of the independent sequence, whereby the video sequence is decoded without prediction from any image frame decoded prior to said first image frame." Ex. 1001, 24:3–6 (limitation 8b).

(i) Petitioner's Contentions

Petitioner contends that MPEG-1 teaches limitation 8b for two related reasons. *See* Pet. 24–25 (citing Ex. 1003 ¶¶ 99–102; Ex. 1005, 32, 43, 86, 120). First, Petitioner asserts that MPEG-1 teaches "starting the decoding of the video sequence from said first image frame of the independent sequence" according to limitation 8b because MPEG-1 discloses that:

> (1) a closed GOP (like any GOP) "begins with a group of pictures start code"; and
>
> (2) "[i]f playback begins from a random point in the bitstream, the decoder should discard all the bits until it finds . . . a group of pictures start code."

Id. (alterations by Petitioner) (quoting Ex. 1005, 120). Petitioner asserts that an ordinarily skilled artisan would have understood these disclosures to teach "starting the decoding of the video sequence from the first picture of the closed GOP ('independent sequence') because a closed GOP is 'a series

of one or more coded pictures.'" *Id.* at 25 (quoting Ex. 1005, 32) (citing Ex. 1003 ¶ 100).

Second, Petitioner asserts that MPEG-1 teaches "whereby the video sequence is decoded without prediction from any image frame decoded prior to said first image frame" according to limitation 8b because MPEG-1 discloses that "closed GOPs are 'decoded without using decoded pictures of the previous group for motion compensation.'" Pet. 25 (quoting Ex. 1005, 86).

(ii) Patent Owner's Contentions

Patent Owner disputes that MPEG-1 teaches limitation 8b. Prelim. Resp. 29–30; *see id.* at 23–29. Specifically, Patent Owner asserts that MPEG-1 does not teach "starting the decoding of the video sequence from said first image frame of the independent sequence" according to limitation 8b because MPEG-1 does not teach "an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence" according to limitation 8a. *Id.* at 29–30 (citing Ex. 2001 ¶¶ 97–98).

(iii) Analysis

Based on the current record, Petitioner establishes sufficiently that MPEG-1 teaches limitation 8b. *See* Pet. 24–25; Ex. 1003 ¶¶ 99–102. Specifically, MPEG-1 teaches "starting the decoding of the video sequence from said first image frame of the independent sequence" according to limitation 8b because MPEG-1 discloses that:

(1) a GOP header precedes the first image frame in the GOP in decoding order;

(2) the GOP header includes a group_start_code identifying "the beginning of a group of pictures"; and

(3) "[i]f playback begins from a random point in the bitstream, the decoder should discard all the bits until it finds . . . a group of pictures start code," i.e., a group_start_code identifying "the beginning of a group of pictures."

Ex. 1005, 43, 85, 120; *see* Ex. 1003 ¶¶ 89, 91, 100. Based on the current record, an ordinarily skilled artisan would have understood these disclosures to teach "starting the decoding of the video sequence from the first picture of the closed GOP," i.e., the claimed "independent sequence." Ex. 1003 ¶ 100.

Additionally, MPEG-1 teaches "whereby the video sequence is decoded without prediction from any image frame decoded prior to said first image frame" according to limitation 8b because MPEG-1 discloses that closed GOPs are "decoded without using decoded pictures of the previous group for motion compensation." Ex. 1005, 86; *see* Ex. 1003 ¶¶ 74, 86, 101.

Patent Owner disputes that MPEG-1 teaches limitation 8b for the reasons Patent Owner disputes that MPEG-1 teaches limitation 8a. *See* Prelim. Resp. 29–30. Based on the current record and for the reasons discussed above for limitation 8a, we consider Patent Owner's arguments regarding limitation 8a unavailing. *See supra* §§ III.D.2(b)(i).c, III.D.2(b)(ii).c.

Thus, based on the current record and for the reasons discussed above, Petitioner establishes sufficiently that MPEG-1 teaches limitation 8b. *See* Pet. 24–25; Ex. 1003 ¶¶ 99–102.

(d) <u>Limitation 8c</u>

Claim 8 recites "decoding identifier values for image frames according to a numbering scheme." Ex. 1001, 24:7–8 (limitation 8c).

Petitioner contends that MPEG-1 teaches limitation 8c because MPEG-1 discloses that:

(1) each picture in a GOP has a picture header that precedes the picture in decoding order;

(2) a picture header includes a picture's Temporal Reference (temporal_reference), i.e., "a ten-bit number which can be used to define the order in which the pictures must be displayed";

(3) the Temporal References for the pictures in a GOP follow a numbering scheme where a Temporal Reference of 0 is assigned to the first picture in the group and subsequent Temporal References are "incremented by one for each picture in the group";

(4) the Temporal Reference in the picture header is decoded when the picture is decoded; and

(5) the decoded pictures are "displayed in the order defined by" their respective Temporal References.

Pet. 26–27 (quoting Ex. 1005, 87, 120); *see id.* at 15–16 (quoting Ex. 1005, 44, 87). Petitioner maps the Temporal References for the pictures in a GOP to the claimed "identifier values for image frames." *Id.* at 26; *see id.* at 28.

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 8c. *See, e.g.*, Prelim. Resp. 7–14, 23–31.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Havlicek's testimony, Petitioner establishes sufficiently that MPEG-1 teaches limitation 8c. *See* Pet. 25–27; Ex. 1003 ¶¶ 103–107.

(e) Limitation 8d

Claim 1 recites "resetting the identifier value for the indicated first image frame of the independent sequence." Ex. 1001, 24:9–10 (limitation 8d).

(i) Petitioner's Contentions

Petitioner contends that MPEG-1 teaches limitation 8d because MPEG-1 discloses that:

(1) the first picture in display order in any GOP "must have" a Temporal Reference of 0;

(2) for a closed GOP with an I-picture as the first picture in display order, the Temporal Reference starts at 0 and then increments by one for each subsequent picture in display order; and

(3) "[f]or the earliest picture (in display order) in each group of pictures, the temporal-reference is reset to zero."

Pet. 27–28 (quoting Ex. 1005, 44, 87) (citing Ex. 1003 ¶ 109).

Also, Petitioner cites MPEG-1's Figure D.18(a) as depicting an "exemplary closed GOP" that begins with an I-picture "in both decoding and display order." Pet. 27; *see id.* at 16–17. Petitioner asserts that an ordinarily skilled artisan would have understood that "when an MPEG-1 decoder decodes the next exemplary closed GOP, the Temporal Reference for the first picture in decoding order of that exemplary closed GOP would be reset to zero, as that picture would be the first picture in display order for that next GOP." *Id.* at 28 (citing Ex. 1003 ¶ 109).

(ii) Patent Owner's Contentions

Patent Owner disputes that MPEG-1 teaches limitation 8d. Prelim. Resp. 30–31. Specifically, Patent Owner asserts that for "Petitioner to make its argument, it has to show that the Temporal Reference must be set to zero

for the indicated first image frame of the independent sequence." *Id.* at 31. Patent Owner also asserts that "MPEG-1 does not require that an I-frame always have a temporal reference of zero, and as a result there can be no 'resetting' of an identifier value." *Id.* (citing Ex. 1005, 86 (Fig. D.18(b)); Ex. 2001 ¶ 101).

Further, Patent Owner asserts that Figure D.18(a)'s example "excludes the case where there are multiple I-frames in a closed GOP." Prelim. Resp. 31. Patent Owner asserts that where there are multiple I-frames in a closed GOP, "it could be that an I-frame after the first one (if that first one also coincidentally was the first frame in display order), would be the first I-frame to be decoded, but it would not have a Temporal Reference of zero, and thus there would not be a 'reset.'" *Id.*

(iii) Analysis

Based on the current record, Petitioner establishes sufficiently that MPEG-1 teaches limitation 8d. *See* Pet. 27–28; Ex. 1003 ¶¶ 108–110. According to MPEG-1, the first picture in display order in each GOP "must have" a Temporal Reference of 0, and other Temporal References are "assigned (in sequence) to the [other] pictures in display order," i.e., "incremented by one for each picture in the group." Ex. 1005, 44, 87; *see* Ex. 1003 ¶¶ 75, 78, 106, 109. Also, "[f]or the earliest picture (in display order) in each group of pictures, the temporal_reference is reset to zero." Ex. 1005, 44; *see* Ex. 1003 ¶ 109.

Thus, for a closed GOP with an I-picture as the first picture in display order, the first I-picture has by definition a Temporal Reference of 0, and the Temporal Reference then increments by one for each subsequent picture in display order. Ex. 1005, 44, 87; *see* Ex. 1003 ¶¶ 75, 78, 106, 109. And the

Temporal Reference is "reset to zero" for the next closed GOP with an I-picture as the first picture in display order. Ex. 1005, 44; *see* Ex. 1003 ¶¶ 109–110.

As for Patent Owner's assertion that "MPEG-1 does not require that an I-frame always have a temporal reference of zero," Petitioner identifies in MPEG-1 at least one example of a closed GOP with an I-picture as the first picture in display order where that first I-picture has by definition a Temporal Reference of 0. *See* Pet. 16–18, 23–24, 27–28; Prelim. Resp. 31. That example and the other MPEG-1 disclosures cited by Petitioner teach limitation 8d. *See* Pet. 16–18, 23–24, 27–28; Ex. 1003 ¶¶ 76–79, 95–97, 108–110. A "prior art product that sometimes, but not always, embodies a claimed method nonetheless teaches that aspect of the invention." *Hewlett-Packard Co. v. Mustek Sys., Inc.*, 340 F.3d 1314, 1326 (Fed. Cir. 2003).

As for Patent Owner's argument that a closed GOP with an I-picture as the first picture in display order may include other I-pictures having Temporal References other than 0 that would not be "reset," limitation 8d does not require "resetting" more than one "identifier value." Ex. 1001, 24:9–10; *see* Prelim. Resp. 31.

Thus, based on the current record and for the reasons discussed above, Petitioner establishes sufficiently that MPEG-1 teaches limitation 8d. *See* Pet. 27–28; Ex. 1003 ¶¶ 108–110.

(f) <u>Preliminary Conclusion About Obviousness/Nonobviousness</u>

As discussed above, Petitioner's analysis addresses how MPEG-1 teaches claim 8's subject matter. *See supra* §§ III.D.2(a)–(e). Hence, Petitioner demonstrates a reasonable likelihood of proving that claim 8 is unpatentable under § 103(a) as obvious over MPEG-1.

3. Independent Claims 10 and 11

Claim 10 recites a "video decoder" in its preamble and includes limitations similar to claim 8. *Compare* Ex. 1001, 23:49–24:10 (claim 8), *with id.* at 24:13–32 (claim 10). Claim 11 recites a "computer program product, stored on a non-transitory computer readable medium and executable in a data processing device, for decoding a compressed video sequence" in its preamble and includes limitations similar to claim 8. *Compare id.* at 23:49–24:10 (claim 8), *with id.* at 24:33–53 (claim 11).

Petitioner identifies disclosures in MPEG-1 corresponding to claim 10's preamble and claim 11's preamble. Pet. 29–36. Additionally, Petitioner contends that MPEG-1 teaches claim 10's limitations and claim 11's limitations for the reasons that MPEG-1 teaches claim 8's limitations. *See id.* at 32–33, 36–38. Dr. Havlicek's testimony supports Petitioner's contentions. *See* Ex. 1003 ¶¶ 112–138.

At this stage of the proceeding, Patent Owner does not address claim 10's preamble or claim 11's preamble. *See, e.g.*, Prelim. Resp. 23–31. Patent Owner contends that MPEG-1 does not teach claim 10's limitations and claim 11's limitations for the reasons that MPEG-1 does not teach claim 8's limitations. *See id.* at 7–14, 23–31.

Based on the current record and for (1) the reasons stated by Petitioner and supported by Dr. Havlicek's testimony and (2) the reasons discussed above for claim 8, Petitioner establishes sufficiently that MPEG-1 teaches claim 10's subject matter and claim 11's subject matter. *See* Pet. 29–38; Ex. 1003 ¶¶ 112–138; *supra* §§ III.D.2(a)–(e). Hence, Petitioner demonstrates a reasonable likelihood of proving that claims 10 and 11 are unpatentable under § 103(a) as obvious over MPEG-1.

E. Alleged Obviousness over MPEG-1 and Yagasaki: Claim 9

Petitioner contends that claim 9 is unpatentable under § 103(a) as obvious over MPEG-1 and Yagasaki. *See* Pet. 1–2, 66–74. Patent Owner disputes Petitioner's contentions. *See* Prelim. Resp. 37.

Above, we provided an overview of MPEG-1. *See supra* § III.D.1. Below, we provide an overview of Yagasaki. Then, we consider the obviousness issues. For the reasons explained below, Petitioner establishes sufficiently for purposes of institution that the combined disclosures in MPEG-1 and Yagasaki teach claim 9's subject matter.

1. OVERVIEW OF YAGASAKI (EXHIBIT 1015)

Yagasaki is a U.S. patent titled "Method of Encoding Image Signal, Apparatus for Encoding Image Signal, Method of Decoding Image Signal, Apparatus for Decoding Image Signal, and Image Signal Recording Medium," filed on October 7, 1996, and issued on July 28, 1998. Ex. 1015, codes (19), (22), (45), (54). Yagasaki states that the invention "relates to an encoding method, a decoding method, an encoding apparatus, a decoding apparatus, a recording medium, and a recording, reproducing, and decoding apparatus which are suitable for data compression of moving images." *Id.* at 1:18–22; *see id.* at code (57).

Yagasaki discusses encoding and decoding video signals as proposed by the Moving Pictures Expert Group (MPEG), including using I-pictures, P-pictures, and B-pictures for a video sequence "divided into a frame group (GOP)." *See, e.g.*, Ex. 1015, 1:37–2:28, 4:14–15, Fig. 26. Yagasaki explains that because P-pictures and B-pictures "cannot be decoded in the absence of decoded images of past and/or future frames, it may not be possible to select a frame freely and reproduce it at a high speed." *Id.*

at 2:12–15. Yagasaki also explains that using only I-pictures instead of P-pictures and B-pictures "is almost impossible to carry out because too much time is required to read the data and to make track jumps." *Id.* at 2:26–28. Yagasaki endeavors to address that deficiency by providing "a moving image decoding apparatus capable of reproducing a moving image smoothly at a high speed, in both forward and reverse directions, without increasing the decoding speed." *Id.* at 2:29–33; *see id.* at 2:37–45, code (57).

Yagasaki states that the "basic coding process in the present invention is the same as the encoding process in MPEG." Ex. 1015, 7:5–6. But Yagasaki modifies the encoding process in MPEG by adding a flag "indicative of whether there is an intra-frame coded macroblock to be decoded within any particular slice upon reproduction at a high speed in both forward and reverse directions" and "indicative of the structure of such a macroblock if it exists." *Id.* at 10:1–5; *see id.* at 6:44–50, 9:55–57, 14:30–34.

The flag distinguishes three types of slices as follows: (1) slices consisting entirely of intra-frame coded macroblocks; (2) slices containing some intra-frame coded macroblocks; and (3) other slices. Ex. 1015, 10:19–29; *see id.* at 2:41–45, 10:12–15, code (57). Thus, "it is possible to divide slices such that all macroblocks in a slice are intra-frame coding macroblocks or of other two types." *Id.* at 8:53–55. The flag "representing a structure of a slice is added to a header of the slice." *Id.* at 9:59–61; *see id.* at 7:1–4.

By adding a flag that distinguishes three types of slices, "the intra-frame coded macroblocks can be extracted using only the flag information

in the slice header, without decoding the entire bit stream." Ex. 1015, 10:66–11:2.

2. Differences Between the Claimed Invention and the Prior Art

Claim 9 depends directly from claim 8 and specifies that "the indication is a separate flag included in the header of a slice." Ex. 1001, 24:11–12.

Petitioner contends that Yagasaki teaches claim 9's limitation because Yagasaki discloses:

(1) images formed from multiple slices;

(2) slices having headers and including one or more macroblocks;

(3) adding a flag "representing a structure of a slice" to a slice header;

(4) decoding a slice header including the flag added to the slice header;

(5) the flag added to the slice header is "indicative of whether there is an intra-frame coded macroblock to be decoded within any particular slice upon reproduction at a high speed in both forward and reverse directions" and "indicative of the structure of such a macroblock if it exists";

(6) slices "entirely composed of intra-frame coded macroblocks" and other types of slices; and

(7) the flag added to the slice header may identify when the slice is "entirely composed of intra-frame coded macroblocks."

Pet. 68–71 (quoting Ex. 1015, 9:60–61, 10:1–5, 10:14–15).

Further, Petitioner asserts that an ordinarily skilled artisan would have recognized that a frame "entirely composed of intra-frame coded

macroblocks" functions as the "beginning of an independent sequence." Pet. 70–71 (citing Ex. 1003 ¶¶ 207–209; Ex. 1015, 2:7–9). Petitioner also asserts that an ordinarily skilled artisan "would have found it obvious to place flags marking intra-coding status in slice headers," including the slice header for a "fully intra-coded frame" at the "beginning of an independent sequence." *Id.* at 71 (citing Ex. 1003 ¶ 210).

Patent Owner disputes that the combined disclosures in MPEG-1 and Yagasaki teach claim 9's subject matter because MPEG-1 "fails to teach or suggest" each limitation in claim 8. Prelim. Resp. 37. Patent Owner does not address Yagasaki's disclosures or whether Yagasaki teaches claim 9's limitation. *Id.*

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Havlicek's testimony, Petitioner establishes sufficiently that Yagasaki teaches claim 9's limitation. *See* Pet. 68–71; Ex. 1003 ¶¶ 204–210.

3. Alleged Reason to Combine the Teachings of the References

Petitioner identifies a reason that would have prompted an ordinarily skilled artisan to combine Yagasaki's teachings with MPEG-1's teachings in the way Petitioner proposes, e.g., to permit "efficient decoding" by "using separate flags in slice headers." *See* Pet. 72–74. Further, Petitioner asserts that an ordinarily skilled artisan would have had a "reasonable expectation of success" in combining the teachings of the references. *Id.* at 73. Dr. Havlicek's testimony supports Petitioner's position. *See* Ex. 1003 ¶¶ 212–218.

For instance, Dr. Havlicek testifies that "[f]or 'high-speed reproduction' during decoding, Yagasaki describes outputting only slices containing intra-frame coded macroblocks to a buffer while discarding others." Ex. 1003 ¶ 214. Dr. Havlicek also testifies that an ordinarily skilled artisan would have recognized that "an indication of the intra-coding status for slices, as taught by Yagasaki, allows for efficient decoding" by "using separate flags in the slice headers." *Id.*

At this stage of the proceeding, Patent Owner makes no arguments against combining Yagasaki's teachings with MPEG-1's teachings. *See, e.g.*, Prelim. Resp. 37.

Based on the current record, Petitioner establishes sufficiently that an ordinarily skilled artisan would have had a reason to combine Yagasaki's teachings with MPEG-1's teachings in the way Petitioner proposes. *See* Pet. 72–74; Ex. 1003 ¶¶ 212–218. Based on the current record, Petitioner also establishes sufficiently that an ordinarily skilled artisan would have had a reasonable expectation of success in combining the teachings of the references. *See* Pet. 73; Ex. 1003 ¶ 217.

4. PRELIMINARY CONCLUSION ABOUT OBVIOUSNESS/NONOBVIOUSNESS

As discussed above, Petitioner's analysis addresses how the combined disclosures in MPEG-1 and Yagasaki teach claim 9's subject matter. *See supra* §§ III.D.2(a)–(e), III.E.2. Additionally, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine Yagasaki's teachings with MPEG-1's teachings in the way Petitioner proposes and would have had a reasonable expectation of success. *See supra* § III.E.3. Hence, Petitioner demonstrates a reasonable

likelihood of proving that claim 9 is unpatentable under § 103(a) as obvious over MPEG-1 and Yagasaki.

F. Alleged Obviousness over Kim: Claims 8, 10, and 11

Petitioner contends that claims 8, 10, and 11 are unpatentable under § 103(a) as obvious over Kim. *See* Pet. 1–2, 38–66. Patent Owner disputes Petitioner's contentions. *See* Prelim. Resp. 14–16, 31–37.

Below, we provide an overview of Kim. Then, we consider the obviousness issues. For the reasons explained below, Petitioner establishes sufficiently for purposes of institution that Kim teaches the subject matter in claims 8, 10, and 11.

1. OVERVIEW OF THE KIM (EXHIBIT 1006)

Kim is a U.S. patent titled "Method and Device for Condensed Image Recording and Reproduction," filed on October 19, 1998, and issued on June 28, 2005. Ex. 1006, codes (12), (22), (45), (54). Kim states that the invention "relates to a Time Lapse recording and reproducing method for optical disks, and more particularly, to a device and method for recording and reproducing video data on and from an optical disk using a Time Lapse recording/reproduction process." *Id.* at 1:8–12; *see id.* at code (57). A recording/reproduction device according to the invention "intermittently records compressed image data on an optical disc and reproduces the recorded image data with a high operation speed." *Id.* at 2:58–61.

For recording/reproduction, Kim discloses two kinds of compressed image data as follows: (1) "I-picture frame data" that "carries the entire image information of a frame" and (2) "P-picture frame data" according to the Moving Picture Experts Group (MPEG) encoded based on "the moving

vector and the position value of the corresponding (or previous) I-frame." *See, e.g.*, Ex. 1006, 3:60–61, 4:19, 4:28–33, 6:4–8, 6:55–58 (claim 3).

Kim discloses a method for "recording data on a recording medium" including the following steps:

(1) "storing, in a memory, image data in frame units";

(2) "comparing a stored image frame with a subsequent image frame following the stored image frame"; and

(3) "recording, on a recording medium, the subsequent image frame based on a result of the comparison."

Ex. 1006, 2:10–16, code (57); *see id.* at 2:41–43, 3:33–4:35, Fig. 3.

Kim discloses a method for "reproducing data recorded on a recording medium" including the following steps:

(1) "receiving a channel selection signal";

(2) "reproducing image data recorded on a recording medium based on the channel selection signal";

(3) "determining whether the image data corresponds to predictive-picture (P-picture) data"; and

(4) "generating a full screen image signal based on the image data if the image data does not correspond to P-picture data, or generating a full screen image signal based on intra-picture (I-picture) data corresponding to the image data if the image data corresponds to P-picture data."

Ex. 1006, 2:17–27, code (57); *see id.* at 2:44–47, 5:8–6:8, Fig. 4.

Kim explains that each picture in a bitstream for recording/ reproduction includes two addresses: (1) a current physical address (CAD) for the picture and (2) an I-picture reference address (IAD) "indicating the address of the corresponding (or previous) I-frame." Ex. 1006, 4:48–52, 4:61–65. For an I-picture, the IAD is "zero or absent." *Id.* at 4:65–5:1.

Kim's Figure 5A (reproduced below) illustrates the "logical structure" of an example bitstream "generated and transmitted" to a recording/ reproducing unit:

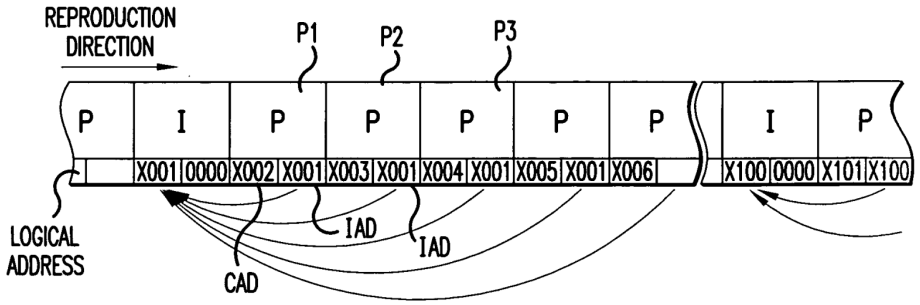

FIG.5A

Figure 5A shows a bitstream from a single camera (channel) with multiple I-pictures and multiple P-pictures and includes:

- the label "logical address" with a line identifying the CAD and the IAD for each picture;
- a first I-picture with a CAD of X001 and an IAD of 0000;
- after the first I-picture, P-picture P1 with a CAD of X002, an IAD of X001, and an arrow from the IAD of X001 to the first I-picture's CAD of X001;
- after P-picture P1, P-picture P2 with a CAD of X003, an IAD of X001, and an arrow from the IAD of X001 to the first I-picture's CAD of X001;
- after P-picture P2, P-picture P3 with a CAD of X004, an IAD of X001, and an arrow from the IAD of X001 to the first I-picture's CAD of X001;
- a second I-picture with a CAD of X100 and an IAD of 0000; and
- after the second I-picture, a P-picture with a CAD of X101, an IAD of X100, and an arrow from the IAD of X100 to the second I-picture's CAD of X100.

Ex. 1006, 4:46–52, Fig. 5A.

Kim's Figure 5B (reproduced below) illustrates the "logical structure" of another example bitstream "generated and transmitted" to a recording/ reproducing unit:

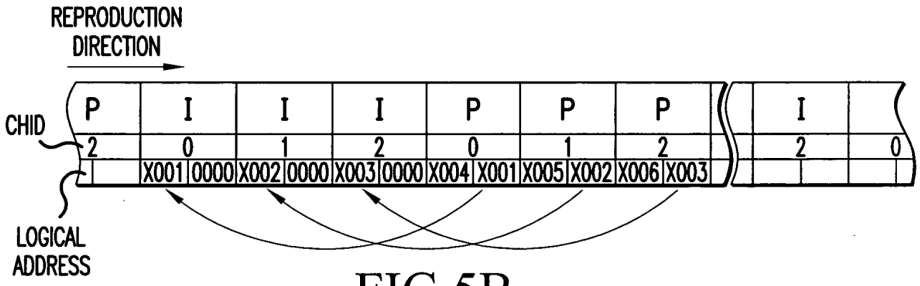

FIG.5B

Figure 5B shows a bitstream from multiple cameras (channels) with multiple pictures for each camera (channel) and includes:

- the label "CHID" with a line identifying the camera (channel) ID code for each picture, i.e., 0, 1, or 2;
- the label "logical address" with a line identifying the CAD and the IAD for each picture;
- a first I-picture with a CHIP of 0, a CAD of X001, and an IAD of 0000;
- after the first I-picture, a second I-picture with a CHIP of 1, a CAD of X002, an IAD of 0000;
- after the second I-picture, a third I-picture with a CHIP of 2, a CAD of X003, an IAD of 0000;
- after the third I-picture, a first P-picture with a CHIP of 0, a CAD of X004, an IAD of X001, and an arrow from the IAD of X001 to the first I-picture's CAD of X001;
- after the first P-picture, a second P-picture with a CHIP of 1, a CAD of X005, an IAD of X002, and an arrow from the IAD of X002 to the second I-picture's CAD of X002; and
- after the second P-picture, a third P-picture with a CHIP of 2, a CAD of X006, an IAD of X003, and an arrow

> from the IAD of X003 to the third I-picture's CAD of X003.

Ex. 1006, 4:52–58, Fig. 5B.

Kim's Figure 6 (reproduced below) depicts in more detail the structure of the bitstreams shown in Figures 5A and 5B:

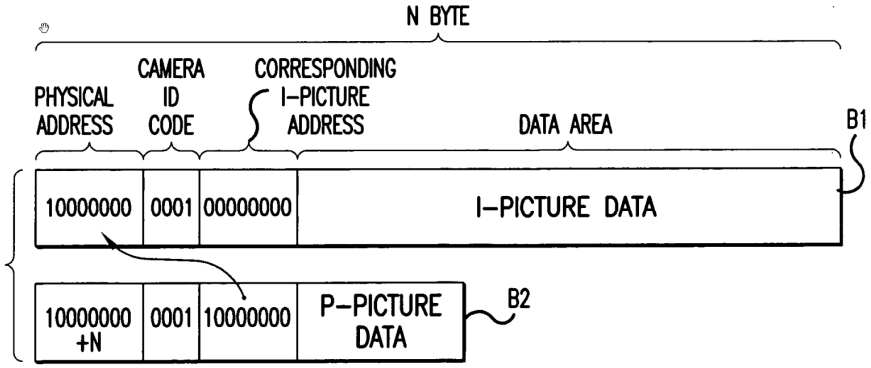

FIG.6

Figure 6 illustrates bitstream B1 with I-picture data and bitstream B2 with P-picture data. *See* Ex. 1006, 4:59–5:4, Fig. 6.

As Figure 6 shows, each bitstream includes the following information in the following order: (1) a current physical address (CAD) for the picture in a first position, (2) a camera (channel) ID code (CHID) in a second position, (3) an I-picture reference address (IAD) in a third position, and (4) the picture data in a fourth position, i.e., in a data area. Ex. 1006, 4:61–5:4, Fig. 6. As Figure 6 also shows, bitstream B1 with I-picture data has a CAD of 10000000 and an IAD of 00000000, and bitstream B2 with P-picture data has an IAD of 10000000 referencing the CAD of 10000000 in bitstream B1. *Id.* at 4:65–5:4, Fig. 6.

Kim's Figure 4 (reproduced below) depicts steps in a method for "reproducing compressed intermittent data":

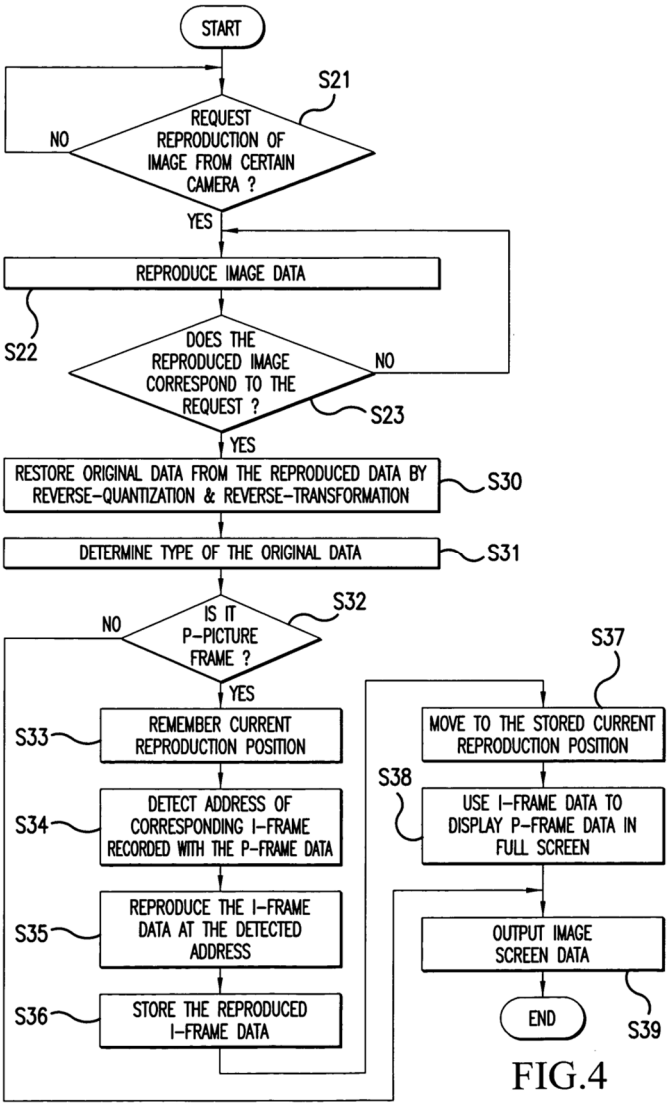

FIG.4

Figure 4 illustrates steps S21 to S23 and S30 to S39 in a method for "reproducing compressed intermittent data," e.g., image data arranged as shown in Figure 6. Ex. 1006, 2:44–47, 5:8–11, Fig. 4.

In steps S21 and S22, "if the user requests reproduction of an image data from a particular camera or channel among the intermittent image data" recorded on a recording medium, a controller controls a recording/ reproducing unit to "reproduce the corresponding image data" from the

recording medium. Ex. 1006, 5:12–17, Fig. 4. Hence, the recording/ reproducing unit reads image data from the recording medium. Because the recording medium stores "multiplexed" image data from multiple cameras (channels), a demultiplexer demultiplexes the "reproduced" image data, i.e., the image data read from the recording medium. *Id.* at 5:17–19. The demultiplexer separates the camera (channel) ID code (CHID) from the "reproduced" image data and outputs the separated CHID to the controller. *Id.* at 5:19–22.

In step S23, the controller determines whether the "reproduced" image data corresponds to the "selected camera or channel." Ex. 1006, 5:22–25, Fig. 4. "This ensures that the correct image data is processed to comply with the user's request." *Id.* at 5:25–26. If "incorrect image data has been reproduced," the controller controls the recording/reproduction unit to "reproduce the correct image data" from the recording medium. *Id.* at 5:26–29.

In step S30, the "image data corresponding to the user's request is transmitted and decoded" by a decoder. Ex. 1006, 5:29–31, Fig. 4. The decoding process "involves reverse-quantization and reverse-transformation to restore the original image data prior to data compression carried out during recording." *Id.* at 5:31–34.

In step S31, the "property (type)," i.e., either I-picture type or P-picture type, of the "currently restored image data is determined" and "transmitted to the controller." Ex. 1006, 5:34–37, Fig. 4. In particular, if the "currently restored image data is detected to be P-picture frame data" in step S32, the controller "stores the current reproduction position" in step S33. *Id.* at 5:38–41, Fig. 4.

In step S34, the controller "detects the address of the corresponding I-picture frame," e.g., using the I-picture reference address (IAD) as shown in Figure 6's bitstream B2, from the "reproduced" image data provided by the demultiplexer. Ex. 1006, 5:41–44, Fig. 4.

In step S35, the controller "reproduces based on the detected address the corresponding (or previous) I-picture frame data recorded" on the recording medium by "controlling the recording/reproduction unit." Ex. 1006, 5:44–47, Fig. 4.

In step S36, the "reproduced corresponding I-picture frame data" is processed by a digital signal processor, decoded by the decoder, and then stored in a frame memory. Ex. 1006, 5:48–51, Fig. 4.

In step S37, the controller controls the recording/reproducing unit to "move the video heads to the original recording position" stored earlier in step S33. Ex. 1006, 5:51–53, Fig. 4.

In step S38, the "P-frame corresponding to the user's request signal is restored as a full screen image (background)" using (i) the "corresponding I-picture frame data stored in the frame memory" in step S36 and (ii) the "moving vectors obtained" from the demultiplexer. Ex. 1006, 5:55–59, Fig. 4. Then, the "full screen image data is reverse-transformed and reverse-quantized" by the decoder and stored as the "original image data corresponding to the user's request signal." *Id.* at 5:60–63.

In step S39, the "full screen image data is converted into an analog image signal" by a digital-to-analog converter and then output as a "reproduction signal." Ex. 1006, 5:63–65, Fig. 4.

If the "detected image data is not a P-picture frame" in step S32, i.e., the detected image data is an I-picture frame, then the "detected image data

is decoded" by the decoder and "output as an analog image signal" by the digital-to-analog converter in step S39. Ex. 1006, 5:66–6:3, Fig. 4.

According to Figure 4's method, when the "image data corresponding to the user's request signal is P-picture frame data, full screen image data can be obtained by retrieving corresponding or prior I-picture frame data based on the I-picture frame address recorded with the P-picture frame data." Ex. 1006, 6:4–8; *see id.* at 2:23–27.

2. INDEPENDENT CLAIM 8

(a) Preamble 8pre

Claim 8 recites "[a] method for decoding a compressed video sequence." Ex. 1001, 23:49–50.

Petitioner contends that Kim teaches claim 8's preamble because Kim discloses:

(1) "a recording method for compressing and intermittently recording image data on a recording medium with a maximum recording capacity"; and

(2) "a reproduction method for reproducing [the] compressed intermittent data from a recording medium" including "decoding image data in a decoder."

Pet. 43 (alteration by Petitioner) (quoting Ex. 1006, 2:4–9).

At this stage of the proceeding, Patent Owner makes no arguments specific to claim 8's preamble. *See, e.g.*, Prelim. Resp. 14–16, 31–37. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Generally, a preamble does not limit a claim. *Allen Eng'g*, 299 F.3d at 1346. We need not decide whether claim 8's preamble limits the claim because, based on the current record and for the reasons stated by Petitioner

and supported by Dr. Havlicek's testimony, Petitioner establishes sufficiently that Kim teaches claim 8's preamble. *See* Pet. 43; Ex. 1003 ¶¶ 144–145.

(b) Limitation 8a

Claim 8 recites "decoding from the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence, wherein all motion-compensated temporal prediction references of the independent sequence refer only to image frames within said independent sequence." Ex. 1001, 23:51–24:2 (limitation 8a).

(i) Petitioner's Contentions

Petitioner contends that Kim teaches limitation 8a for several related reasons. *See* Pet. 43–48. Specifically, Petitioner asserts that Kim teaches the claimed "independent sequence, wherein all motion-compensated temporal prediction references of the independent sequence refer only to image frames within said independent sequence" because Kim discloses:

(1) a bitstream including "intra-pictures (I-pictures) and predictive-pictures (P-pictures)";

(2) the I-pictures are coded based only on information within themselves;

(3) the P-pictures are coded with "the moving vector and the position value of the corresponding (or previous)" I-picture;

(4) grouping pictures in a bitstream so that an I-picture precedes the P-pictures referencing the I-picture;

(5) each P-picture has a current physical address (CAD) indicating the P-picture's location; and

(6) each P-picture has an I-picture reference address (IAD) identifying "the I-picture on which the P-picture depends for motion compensation."

Pet. 44–45 (citing Ex. 1003 ¶¶ 147–149; Ex. 1006, 2:17–27, 3:60–61, 4:15–27, 4:46–52, Fig. 5A). According to Petitioner, Kim's "grouping of an I-picture followed by P-pictures" corresponds to the claimed "independent sequence." *Id.* at 48.

Petitioner cites Kim's Figure 5A as depicting an example where (1) "every P-picture following the I-picture depends on that I-picture for motion prediction in the sequence" and (2) "all motion-compensated temporal prediction references of the sequence" refer only to "image frames within the sequence." Pet. 45–46.

Additionally, Petitioner asserts that in Kim's Figure 5A an I-picture reference address (IAD) of 0000 or zero for an I-picture corresponds to the claimed "indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence." Pet. 46. Petitioner asserts that Figure 5A shows that an I-picture has an IAD of 0000 or zero and that each P-picture referencing the I-picture has an IAD corresponding to the I-picture's current physical address (CAD). *Id.* Petitioner explains that because "each I-picture starts an independent sequence, the IAD of 0000 or zero indicates that a given I-picture starts an independent sequence (i.e., 'is the first image frame, in decoding order, of an independent sequence')." *Id.*

To support its assertions, Petitioner provides a highlighted version of Kim's Figure 5A as reproduced below (Pet. 47):

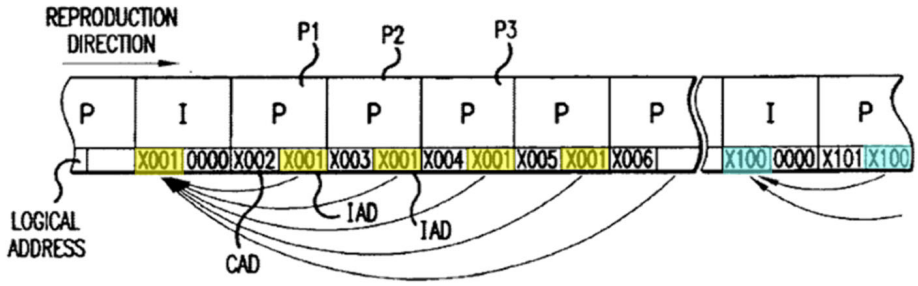

FIG.5A

Figure 5A illustrates the "logical structure" of an example bitstream "generated and transmitted" to a recording/reproducing unit. Ex. 1006, 4:46–48, Fig. 5A; *see id.* at 2:49–51. The above highlighted version of Figure 5A shows:

- a first I-picture with a CAD of X001, an IAD of 0000, and yellow highlighting over the CAD of X001;
- after the first I-picture, P-picture P1 with a CAD of X002, an IAD of X001, yellow highlighting over the IAD of X001, and an arrow from the IAD of X001 to the first I-picture's CAD of X001;
- after P-picture P1, P-picture P2 with a CAD of X003, an IAD of X001, yellow highlighting over the IAD of X001, and an arrow from the IAD of X001 to the first I-picture's CAD of X001;
- after P-picture P2, P-picture P3 with a CAD of X004, an IAD of X001, yellow highlighting over the IAD of X001, and an arrow from the IAD of X001 to the first I-picture's CAD of X001;
- a second I-picture with a CAD of X100, an IAD of 0000, and blue highlighting over the CAD of X100; and
- after the second I-picture, a P-picture with a CAD of X101, an IAD of X100, blue highlighting over the IAD of X100, and an arrow from the IAD of X100 to the second I-picture's CAD of X100.

See Pet. 47; Ex. 1003 ¶ 151.

Further, Petitioner asserts that Kim teaches "decoding from the video sequence" the claimed "indication" because Kim discloses a method for decoding Figure 5A's bitstream, including decoding the bitstream's components, such as the IAD values. Pet. 47 (citing Ex. 1003 ¶¶ 152–154; Ex. 1006, 2:48–51, 4:59–61, 5:8–6:8, Fig. 4).

(ii) Patent Owner's Contentions

Patent Owner disputes that Kim teaches limitation 8a. *See* Prelim. Resp. 14–16, 31–35. In particular, Patent Owner contends that an IAD of 0000 or zero indicates only that "the existing frame is an I-frame." *Id.* at 32 (citing Ex. 2001 ¶ 105); *see id.* at 15–16. Patent Owner also contends that an ordinarily skilled artisan would have understood that the IAD field for an I-picture could "take any value" since Kim discloses that the IAD is "zero or absent" for an I-picture. *Id.* at 16 (citing Ex. 1006, 4:66–5:1; Ex. 2001 ¶¶ 74–75).

Further, Patent Owner asserts that each I-picture does not start an independent sequence. Prelim. Resp. 32. As support, Patent Owner cites Kim's Figure 5B as showing "three I-frames in decoding order in a row, followed by three p-frames each depending on a different I-frame." *Id.* at 32–33.

Also, Patent Owner contends that Kim's IAD values "are not decoded by the decoder at all." Prelim. Resp. 33; *see id.* at 35. According to Patent Owner, Kim's controller "does not look at IAD information until after it decodes the requested frame." *Id.* at 33–34 (citing Ex. 2001 ¶ 109).

(iii) Analysis

Based on the current record, Petitioner establishes sufficiently that Kim teaches limitation 8a. *See* Pet. 43–48; Ex. 1003 ¶¶ 146–154. As

Petitioner asserts, Kim's "grouping of an I-picture followed by P-pictures" corresponds to the claimed "independent sequence." *See* Ex. 1003 ¶¶ 149–150, 156; Ex. 1006, 4:46–52, Fig. 5A; Pet. 44–46, 48.

Specifically, for recording/reproduction, Kim discloses two kinds of compressed image data as follows: (1) "I-picture frame data" that "carries the entire image information of a frame" and (2) "P-picture frame data" according to the Moving Picture Experts Group (MPEG) encoded based on "the moving vector and the position value of the corresponding (or previous) I-frame." *See, e.g.*, Ex. 1006, 3:60–61, 4:19, 4:28–33, 6:4–8, 6:55–58 (claim 3); *see also* Ex. 1003 ¶ 140. Kim explains that each picture in a bitstream for recording/reproduction includes two addresses: (1) a current physical address (CAD) for the picture and (2) an I-picture reference address (IAD) "indicating the address of the corresponding (or previous) I-frame." Ex. 1006, 4:48–52, 4:61–65; *see* Ex. 1003 ¶ 142.

As Petitioner asserts, Kim's Figure 5A depicts an example where (1) "every P-picture following the I-picture depends on that I-picture for motion prediction in the sequence" and (2) "all motion-compensated temporal prediction references of the sequence" refer only to "image frames within the sequence." *See* Ex. 1003 ¶¶ 149–150; Ex. 1006, 4:46–52, Fig. 5A; Pet. 45–46. Hence, Figure 5A shows the claimed "independent sequence." *See* Ex. 1003 ¶¶ 149–150.

As Petitioner also asserts, in Kim's Figure 5A an I-picture reference address (IAD) of 0000 or zero for an I-picture corresponds to the claimed "indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence." *See* Ex. 1003 ¶¶ 151, 153;

Pet. 46. Figure 5A shows an IAD of 0000 or zero for each I-picture in the bitstream. Ex. 1006, Fig. 5A.

Contrary to Patent Owner's arguments, Kim's Figure 5B does not undermine Petitioner's position. *See* Prelim. Resp. 32–33. Figure 5B illustrates a bitstream from multiple cameras (channels), i.e., from three cameras (channels), where:

> (1) the first channel's image data includes (i) an I-picture with a CHIP of 0, a CAD of X001, and an IAD of 0000 and (ii) a P-picture with a CHIP of 0, a CAD of X004, and an IAD of X001, and first channel's image data corresponds to a first "independent sequence";
>
> (2) the second channel's image data includes (i) an I-picture with a CHIP of 1, a CAD of X002, an IAD of 0000 and (ii) a P-picture with a CHIP of 1, a CAD of X005, and an IAD of X002, and the second channel's image data corresponds to a second "independent sequence"; and
>
> (3) the third channel's image data includes (i) a I-picture with a CHIP of 2, a CAD of X003, and an IAD of 0000 and (ii) a P-picture with a CHIP of 2, a CAD of X006, and an IAD of X003, and the third channel's image data corresponds to a third "independent sequence."

See Ex. 1006, 4:52–58, Fig. 5B.

As for Patent Owner's contention that an ordinarily skilled artisan would have understood that the IAD field for an I-picture could "take any value" since Kim discloses that the IAD is "zero or absent" for an I-picture, we disagree. *See* Prelim. Resp. 16. A field that is "zero," e.g., 0 or 0000, could not "take any value," e.g., 1 or 1010. Based on the current record, Kim's disclosure that the IAD is "zero" for an I-picture teaches the claimed "indication." *See* Ex. 1003 ¶¶ 151–153.

Additionally, as Petitioner asserts, Kim teaches "decoding from the video sequence" the claimed "indication" because Kim discloses a method for decoding Figure 5A's bitstream, including decoding the bitstream's components, such as the IAD values. *See* Ex. 1003 ¶¶ 152–154, 168; Ex. 1006, 2:44–51, 4:59–61, 5:8–6:8, Fig. 4; Pet. 47.

For instance, Kim discloses that "the image data corresponding to the user's request is transmitted and decoded" by a decoder. Ex. 1006, 5:29–31, Fig. 4 (step S30); *see* Ex. 1003 ¶ 143. After decoding the image data, Kim's controller uses the IAD in the image data, e.g., to "detect[] the address of the corresponding I-picture frame" if the image data is a P-picture frame. Ex. 1006, 5:34–44, Fig. 4 (steps S31, S32, S33, and S34); *see* Ex. 1003 ¶¶ 160, 162, 168. Thus, based on the current record, we disagree with Patent Owner that Kim's IAD values "are not decoded by the decoder at all." *See* Prelim. Resp. 33.

Thus, based on the current record and for the reasons discussed above, Petitioner establishes sufficiently that Kim teaches limitation 8a. *See* Pet. 43–48; Ex. 1003 ¶¶ 146–154.

(c) Limitation 8b

Claim 1 recites "starting the decoding of the video sequence from said first image frame of the independent sequence, whereby the video sequence is decoded without prediction from any image frame decoded prior to said first image frame." Ex. 1001, 24:3–6 (limitation 8b).

(i) Petitioner's Contentions

Petitioner contends that Kim teaches limitation 8b because (1) Kim's Figure 4 discloses a method that includes "decoding an image in response to a user requesting playback" and (2) Figure 4's method "start[s] the decoding

of the video sequence from said first image frame of the independent sequence" when applied to Figure 5A's bitstream. *See* Pet. 48–53.

Specifically, Petitioner asserts that Figure 4's method determines whether detected image data is an I-picture frame or a P-picture frame and "if the detected image data is not a P-picture frame, then the detected image data is decoded by the decoder" and "output as an analog image signal" by a digital-to-analog converter. Pet. 50 (citing Ex. 1006, 5:66–6:3). Petitioner also asserts that "Kim's use of the phrase 'not a P-picture' means that the picture is an I-picture because Kim's sequence includes only I- and P-pictures." *Id.* at 50–51. Therefore, according to Petitioner, Figure 4's method begins by decoding an I-picture, i.e., the first picture in each independent sequence, when applied to Figure 5A's bitstream. *Id.* at 51 (citing Ex. 1003 ¶¶ 158–159).

(ii) Patent Owner's Contentions

Patent Owner disputes that Kim teaches limitation 8b. *See* Prelim. Resp. 31–35. Specifically, Patent Owner asserts that Kim does not teach "starting the decoding of the video sequence from said first image frame of the independent sequence" according to limitation 8b because Kim does not teach "an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence" according to limitation 8a. *Id.* at 35 (citing Ex. 2001 ¶¶ 117–118).

(iii) Analysis

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Havlicek's testimony, Petitioner establishes sufficiently that Kim teaches limitation 8b. *See* Pet. 48–53; Ex. 1003 ¶¶ 155–165.

Patent Owner disputes that Kim teaches limitation 8b for the reasons Patent Owner disputes that Kim teaches limitation 8a. *See* Prelim. Resp. 35. Based on the current record and for the reasons discussed above for limitation 8a, we consider Patent Owner's arguments regarding limitation 8a unavailing. *See supra* § III.F.2(b)(iii).

(d) Limitation 8c

Claim 8 recites "decoding identifier values for image frames according to a numbering scheme." Ex. 1001, 24:7–8 (limitation 8c).

Petitioner contends that Kim teaches limitation 8c because Kim discloses that each picture has a "logical address" consisting of the picture's CAD and IAD and the "logical address" corresponds to the claimed "identifier value" for an image frame. Pet. 53.

Petitioner also contends that "the pictures (i.e., image frames) in Kim's [Figure 5A] bitstream have logical addresses that follow a numbering scheme" because Kim discloses that:

(1) for each picture, "the CAD component of the logical address provides the current address of a picture";

(2) the CAD component "increments by 1 for each picture in reproduction order";

(3) for each I-picture, the IAD component is 0000 or zero; and

(4) for each P-picture, the IAD component "provides the CAD of the corresponding I-picture."

Pet. 52–54.

Additionally, Petitioner contends that Kim discloses "decoding" according to a numbering scheme because Kim's decoder "decodes the logical addresses" and "uses the logical addresses to determine the order

in which pictures are decoded and reproduced." Pet. 55 (citing Ex. 1003 ¶ 168).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 8c. *See, e.g.*, Prelim. Resp. 14–16, 31–37.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Havlicek's testimony, Petitioner establishes sufficiently that Kim teaches limitation 8c. *See* Pet. 53–55; Ex. 1003 ¶¶ 166–168.

(e) Limitation 8d

Claim 1 recites "resetting the identifier value for the indicated first image frame of the independent sequence." Ex. 1001, 24:9–10 (limitation 8d).

(i) Petitioner's Contentions

Petitioner contends that Kim teaches limitation 8d because "Kim's Figure 5A shows that the IAD component of each logical address is reset to zero for each I-picture." Pet. 55; *see id.* at 58. To support its contention, Petitioner provides an annotated and highlighted version of Kim's Figure 5A as reproduced below (Pet. 56):

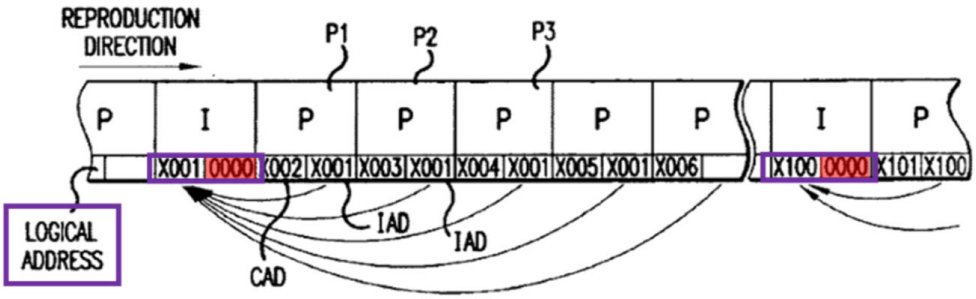

FIG.5A

Figure 5A illustrates the "logical structure" of an example bitstream "generated and transmitted" to a recording/reproducing unit. Ex. 1006,

4:46–48, Fig. 5A; *see id.* at 2:49–51. The above annotated and highlighted version of Figure 5A shows:

- a purple box around the label "logical address" with a line identifying the CAD and the IAD for each picture;
- a first I-picture with a CAD of X001, an IAD of 0000, red highlighting over the IAD of 0000, and a purple box around the picture's CAD and the IAD; and
- a second I-picture with a CAD of X100, an IAD of 0000, red highlighting over the IAD of 0000, and a purple box around the picture's CAD and the IAD.

See Pet. 56; Ex. 1003 ¶ 169.

(ii) Patent Owner's Contentions

Patent Owner disputes that Kim teaches limitation 8d. *See* Prelim. Resp. 35–37. Specifically, Patent Owner asserts that Kim lacks "any disclosure that the decoder is doing any logical addressing, let alone any resetting." *Id.* at 36 (citing Ex. 2001 ¶ 119). Further, Patent Owner asserts that the following disclosure about Figure 3's recording method undermines Petitioner's position: "In Step S13, the MUX 130 selectively outputs the I-picture data (or P-picture data), the camera ID code, and ***the address of the I-picture data received from the encoder 110***, the recording DSP 120 and the controller 150, ***and generates a bit stream of certain bytes for each frame***." *Id.* at 36–37 (emphases by Patent Owner) (quoting Ex. 1006, 4:38–42) (citing Ex. 2001 ¶ 120).

(iii) Analysis

Based on the current record, Petitioner establishes sufficiently that Kim teaches limitation 8d. *See* Pet. 55–58; Ex. 1003 ¶¶ 169–173. As Petitioner contends, "Kim's Figure 5A shows that the IAD component of

each logical address is reset to zero for each I-picture." *See* Ex. 1003 ¶ 169; Ex. 1006, Fig. 5A; Pet. 55–56.

As for Patent Owner's assertion that Kim lacks "any disclosure that the decoder is doing any logical addressing, let alone any resetting," regardless whether the other parts of Kim's specification use words to describe resetting the IAD component of each logical address to zero for each I-picture, Figure 5A still discloses that feature. *See* Ex. 1003 ¶ 169; Ex. 1006, Fig. 5A; Prelim. Resp. 36. A prior-art reference "must be considered for everything it *teaches* by way of technology." *See EWP Corp.*, 755 F.2d at 907 (emphasis in original).

As for Patent Owner's reliance on the disclosure about Figure 3's recording method, Patent Owner does not explain how that disclosure undermines Petitioner's position. *See* Prelim. Resp. 36–37. The disclosure that an encoder generates an address for an I-picture and a multiplexer generates a bitstream does not preclude resetting the IAD component of each logical address to zero for each I-picture. *See* Ex. 1006, 4:38–42, Fig. 3.

Thus, based on the current record and for the reasons discussed above, Petitioner establishes sufficiently that Kim teaches limitation 8d. *See* Pet. 55–58; Ex. 1003 ¶¶ 169–173.

(f) <u>Preliminary Conclusion About Obviousness/Nonobviousness</u>

As discussed above, Petitioner's analysis addresses how Kim teaches claim 8's subject matter. *See supra* §§ III.F.2(a)–(e). Hence, Petitioner demonstrates a reasonable likelihood of proving that claim 8 is unpatentable under § 103(a) as obvious over Kim.

3. Independent Claims 10 and 11

Claim 10 recites a "video decoder" in its preamble and includes limitations similar to claim 8. *Compare* Ex. 1001, 23:49–24:10 (claim 8), *with id.* at 24:13–32 (claim 10). Claim 11 recites a "computer program product, stored on a non-transitory computer readable medium and executable in a data processing device, for decoding a compressed video sequence" in its preamble and includes limitations similar to claim 8. *Compare id.* at 23:49–24:10 (claim 8), *with id.* at 24:33–53 (claim 11).

Petitioner identifies disclosures in Kim corresponding to claim 10's preamble and claim 11's preamble. Pet. 59–60, 62–64. Additionally, Petitioner contends that Kim teaches claim 10's limitations and claim 11's limitations for the reasons that Kim teaches claim 8's limitations. *See id.* at 58, 61–62, 64–66. Dr. Havlicek's testimony supports Petitioner's contentions. *See* Ex. 1003 ¶¶ 175–199.

At this stage of the proceeding, Patent Owner does not address claim 10's preamble or claim 11's preamble. *See, e.g.*, Prelim. Resp. 31–37. Patent Owner contends that Kim does not teach claim 10's limitations and claim 11's limitations for the reasons that Kim does not teach claim 8's limitations. *See id.* at 14–16, 31–37.

Based on the current record and for (1) the reasons stated by Petitioner and supported by Dr. Havlicek's testimony and (2) the reasons discussed above for claim 8, Petitioner establishes sufficiently that Kim teaches claim 10's subject matter and claim 11's subject matter. *See* Pet. 58–66; Ex. 1003 ¶¶ 175–199; *supra* §§ III.F.2(a)–(e). Hence, Petitioner demonstrates a reasonable likelihood of proving that claims 10 and 11 are unpatentable under § 103(a) as obvious over Kim.

G. The Weight Given to Dr. Havlicek's Declaration

Patent Owner argues that the Board should give no weight to Dr. Havlicek's declaration because his "analysis of the limitations is almost identical to the analysis in the Petition, down to the same parentheticals in the citations." Prelim. Resp. 21; *see id.* at 2, 20–22. As support, Patent Owner cites the following cases where the Board gave an expert's declaration little or no weight because, according to Patent Owner, the declaration "contained arguments that were identical to arguments set forth in the petition": *Kinetic Technologies, Inc. v. Skyworks Solutions, Inc.*, IPR2014-00529, Paper 8 at 14–15 (PTAB Sept. 23, 2014); *Volkswagen Group of America, Inc. v. StratosAudio, Inc.*, IPR2021-00717, Paper 12 at 36–38 (PTAB Nov. 12, 2021); and *Samsung Electronics Co., Ltd. v. RightQuestion, LLC*, IPR2022-00251, Paper 17 at 24 (PTAB June 9, 2022). Prelim. Resp. 20–22, 30.

Patent Owner's argument lacks merit. *See* Prelim. Resp. 2, 20–22. In *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15–16 (PTAB Aug. 24, 2022) (precedential), the Board accorded little weight to a proffered expert's declaration that (1) repeated verbatim a conclusory statement in a petition and (2) did not "cite to any additional supporting evidence or provide any technical reasoning to support" the conclusory statement.

But verbatim duplication between a petition and a declaration does not require giving the declarant's testimony little or no weight. *See Unified Patents, LLC v. Togail Techs., Ltd.*, IPR2023-00338, Paper 7 at 11 (PTAB Aug. 18, 2023) (declining to give "little or no weight" to declaration testimony "simply because it is verbatim to" statements in a petition); *Hum*

Indus. Tech., Inc. v. Amsted Rail Co., IPR2023-00540, Paper 10 at 37 (PTAB Aug. 11, 2023) (explaining that "[i]f declaration testimony is supported sufficiently and, in turn, supports contentions in the Petition, we do not give it little to no weight simply because it is repeated in the Petition"); *Epic Games, Inc. v. IngenioShare, LLC*, IPR2022-00202, Paper 29 at 9 (PTAB May 19, 2023) (declining to disregard a declarant's testimony that mirrored a brief). The Board decisions that Patent Owner cites do not hold otherwise. *See Kinetic*, IPR2014-00529, Paper 8 at 14–16; *Volkswagen*, IPR2021-00717, Paper 12 at 34–38; *Samsung*, IPR2022-00251, Paper 17 at 23–26; Prelim. Resp. 21–22.

In *Kinetic*, the Board determined that the petition failed to establish a reason to combine references and that a proffered expert's declaration with identical text also failed to establish a reason to combine references. *Kinetic*, IPR2014-00529, Paper 8 at 14–16. In *Volkswagen* and *Samsung*, the Board determined that the petition failed to explain how a reference taught a claim limitation and that a proffered expert's declaration with identical or virtually identical text also failed to explain how the reference taught the claim limitation. *Volkswagen*, IPR2021-00717, Paper 12 at 34–38; *Samsung*, IPR2022-00251, Paper 17 at 23–26.

Kinetic, *Volkswagen*, and *Samsung* do not apply under the circumstances here where Petitioner and Dr. Havlicek have not (1) failed to establish a reason to combine references or (2) failed to explain how a reference taught a claim limitation. *See* Pet. 10–74; Ex. 1003 ¶¶ 57–218; *supra* §§ III.D–III.F. Hence, we decline to give no weight to Dr. Havlicek's declaration.

IV. CONCLUSION

Based on the arguments and evidence presented by the parties, we determine that there is a reasonable likelihood Petitioner would prevail with respect to at least one claim challenged in the Petition. Hence, we institute an *inter partes* review of all challenged claims on all challenges included in the Petition. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1355 (2018) (noting that the language of 35 U.S.C. § 314(b) "indicates a binary choice—either institute review or don't"); *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute as requiring "a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition"); 37 C.F.R. § 42.108(a).

At this preliminary stage, we have not made a final determination about the patentability of any challenged claim, the construction of any claim term, phrase, or limitation, or any other legal or factual issue.

V. ORDER

Accordingly, it is

ORDERED that, according to 35 U.S.C. § 314(a), an *inter partes* review of claims 8–11 in the '321 patent is instituted on all challenges included in the Petition; and

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

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