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Paper 11
Date: October 25, 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.

IPR2024-00572
Patent 7,724,818 B2

Before JAMESON LEE, 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 6–9, 11, 15, 21, and 23 in U.S. Patent No. 7,724,818 B2 (Ex. 1001, "the '818 patent") under 35 U.S.C. §§ 311–319. Paper 3 ("Pet."). Nokia Technologies Oy ("Patent Owner") filed a Preliminary Response. Paper 8 ("Prelim. Resp."). Further, after receiving Board authorization to address certain issues, Petitioner filed a Preliminary Reply, and Patent Owner filed a Preliminary Sur-reply. *See* Paper 9 ("Prelim. Reply"); Paper 10 ("Prelim. Sur-reply"); Ex. 3001.

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 6–9, 11, 15, 21, and 23 in the '818 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. 85. Out of "an abundance of caution," Petitioner also discloses "Twitch Interactive, Inc. as a potential real party in interest." *Id.* Patent Owner identifies itself as the sole real party in interest. Paper 5, 1. 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 Technologies Oy v. Lenovo (Shanghai) Electronics Technology Co. Ltd. et al.*, No. 5:19-cv-00427 (E.D.N.C. filed Sept. 25, 2019);
- *Certain Electronic Devices, Including Computers, Tablet Computers, and Components and Modules Thereof*, Inv. No. 337-TA-1208 (Int'l Trade Comm'n filed July 1, 2020);
- *Nokia Corp. et al. v. Amazon.com, Inc.*, No. 1:23-cv-01232 (D. Del. filed Oct. 27, 2023);
- *Nokia Technologies Oy v. Amazon.com, Inc. et al.*, No. 1:23-cv-01236 (D. Del. filed Oct. 31, 2023);
- *Nokia Technologies Oy v. HP Inc.*, No. 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. 85–86; Paper 5, 1–2.

C. The '818 Patent (Exhibit 1001)

The '818 patent, titled "Method for Coding Sequences of Pictures," issued on May 25, 2010, from an application filed on April 30, 2003. Ex. 1001, codes (22), (45), (54). The patent states that the invention relates to:

(1) "a method for coding sequences of pictures into a bitstream, wherein parameters are defined in a parameter set and each picture comprises information of one or more slices";

(2) "a method for decoding sequences of pictures from a bitstream, wherein parameters are defined in a parameter set and each picture comprises information of one or more slices"; and

(3) "a system, transmitting device, receiving device, an encoder, a decoder, an electronic device, a software program, a storage medium, and a bitstream."

Id. at 1:6–15; *see id.* at code (57).

The '818 patent explains that an International Telecommunication Union document introduced the "parameter set" concept to replace picture, group-of-pictures (GOP), and sequence headers. Ex. 1001, 2:49–51. The patent discusses "disadvantages with pre-defined parameter sets." *Id.* at 3:17–18; *see id.* at 3:18–28. The patent purports to "avoid the problems of [the] prior art and provide a more efficient method to transmit parameters relating to picture information." *Id.* at 3:56–58.

The '818 patent discloses splitting "the parameter set structure to multiple parameter set structures according to the persistency and target of parameters," including using a "sequence parameter set," a "picture parameter set," and a "slice header." Ex. 1001, 4:15–19, 4:21–24. For example, parameters "whose value may change in every slice or whose

value is likely to change in every picture, are included in the slice header." *Id.* at 4:21–24. "If it is probable that a parameter remains unchanged in multiple pictures but is allowed to change in every picture, such parameter is included in a picture parameter set." *Id.* at 4:24–26. Additionally, parameters that "are not allowed to change in a coded video sequence are included in the sequence parameter set." *Id.* at 4:26–28.

The '818 patent's Figure 1 (reproduced below) depicts dependencies between various packets and parameter set instances:

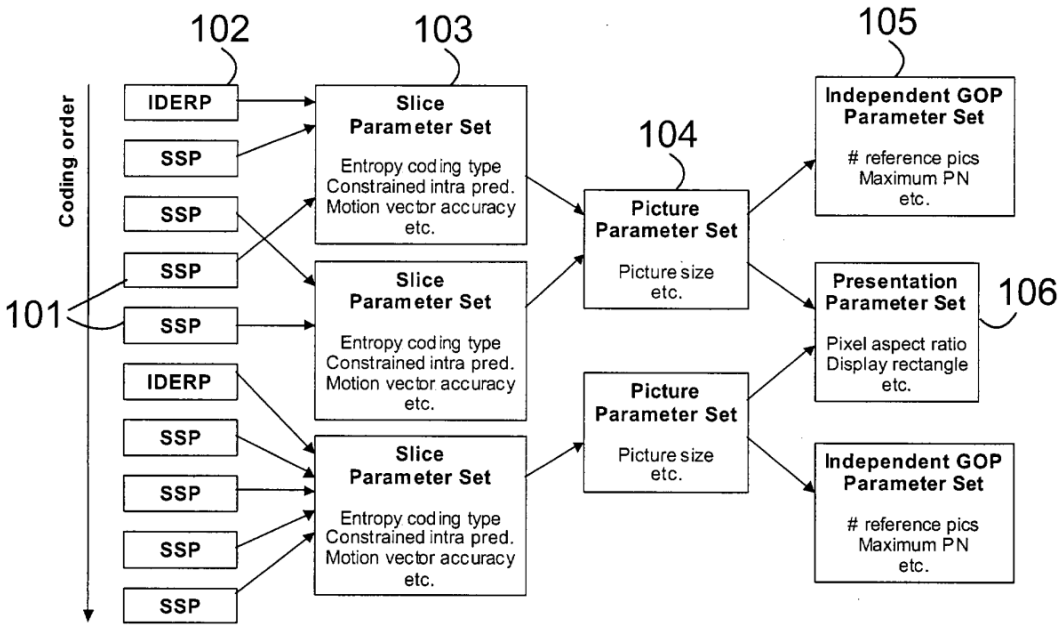

Fig. 1

Figure 1 illustrates dependencies between network abstraction layer (NAL) packets, i.e., multiple single slice packets (SSPs) 101 and multiple instantaneous decoder refresh NAL packets (IDERPs) 102, and parameter set instances, i.e., slice parameter sets 103, picture parameter sets 104, independent GOP parameter sets 105, and presentation parameter set 106. Ex. 1001, 7:8–9, 7:45–57, 7:65–66, Fig. 1.

In Figure 1, an "arrow indicates a reference based on a parameter set identifier." Ex. 1001, 7:46–47, Fig. 1. "The starting point of an arrow is the entity, which refers to the parameter set instance where the arrow points." *Id.* at 7:47–49. "The ending point of an arrow is the owner of the parameter set identifier." *Id.* at 7:49–50.

In Figure 1, "[a] slice parameter set 103 refers to a picture parameter set 104, and a picture parameter set 104 refers to both an independent GOP parameter set 105 and a presentation parameter set 106, or to a sequence parameter set." Ex. 1001, 7:53–57, Fig. 1. "All the slices of a picture should refer to the same picture parameter set and all the slices of a sequence should refer to the same sequence parameter set." *Id.* at 7:57–59.

The '818 patent's Figure 2 (reproduced below) depicts a system for implementing parameter sets:

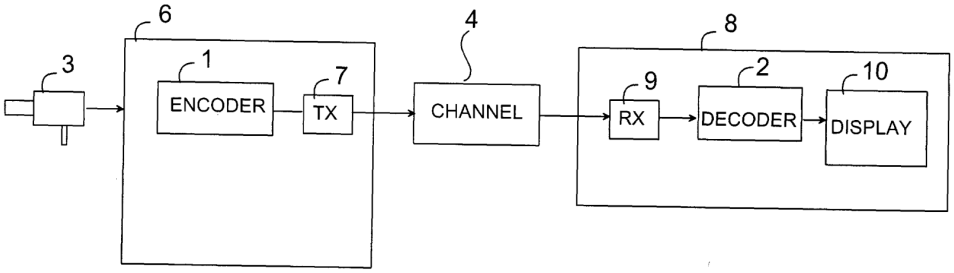

Fig. 2

Figure 2 illustrates a system where:

(1) video source 3, e.g., a video camera or video recorder, provides a video stream to transmitting device 6;

(2) transmitting device 6 encodes the video stream to "reduce the information";

(3) transmitting device 6 transmits the encoded information through channel 4 to receiving device 8; and

(4) receiving device 8 decodes the encoded information to "form uncompressed pictures corresponding as much as possible to the encoded pictures."

See Ex. 1001, 10:52–11:40, Fig. 2. As Figure 2 shows, transmitting device 6 includes encoder 1 and transmitter 7, and receiving device 8 includes decoder 2, receiver 9, and display 10. *See id.*

Encoder 1 "selects proper parameter sets for use with the encoding process and sends the selected parameter sets to" decoder 2. Ex. 1001, 10:58–61. "If the decoder already has a correct parameter set, it is not necessary to transmit such parameter set to the decoder 2 but only an indication of the correct parameter set." *Id.* at 10:62–64.

D. The Challenged Claims

Petitioner challenges the following claims in the '818 patent:

- independent claim 6 for a "method for decoding sequences of pictures from a bitstream";
- claim 7–9 that depend directly from claim 6;
- independent claim 11 for a "decoder for decoding sequences of pictures from a bitstream";
- independent claim 15 for a "receiving device comprising a decoder for decoding sequences of pictures from a bitstream";
- independent claim 21 for a "computer readable storage medium embedded with a computer program comprising programming code for execution on a processor, the programming code for decoding sequences of pictures from a bitstream"; and
- independent claim 23 for a "decoder for decoding sequences of pictures from a bitstream."

Pet. 2, 11–81.

Claims 6 and 23 exemplify the challenged claims and read as follows (with bracketed letters added for reference purposes):[1]

> 6. [pre] A method for decoding sequences of pictures from a bitstream, wherein parameters are defined in a parameter set and each picture comprises information of one or more slices, the method comprising:
>
> [a] recognizing, in a decoder, a sequence parameter set and forming at least one sequence parameter pertaining to a sequence using the parameter set;
>
> [b] recognizing, in the decoder, a picture parameter set and forming at least one first picture parameter value pertaining to a picture using the parameter set;
>
> [c] forming, in the decoder, at least one second picture parameter value using information of a slice header, the at least one second picture parameter value remaining unchanged at least in all slice headers of one picture; and
>
> [d] using, in the decoder, the at least one second picture parameter value in decoding.
>
> 23. [pre] A decoder for decoding sequences of pictures from a bitstream, wherein parameters are defined in a parameter set and each picture comprises information of one or more slices, the decoder comprising:
>
> [a] means for recognizing a sequence parameter set for a sequence of pictures and forming at least one sequence parameter pertaining to a sequence using the parameter set for a picture;
>
> [b] means for recognizing a picture parameter set and forming at least one first picture parameter value pertaining to a picture using the parameter set;

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

> [c] means for forming at least one second picture parameter value using information of a slice header, the at least one second picture parameter value remaining unchanged at least in all slice headers of one picture; and
>
> [d] means for using the at least one second picture parameter value in decoding.

Ex. 1001, 12:1–16, 14:46–62.

E. The Asserted References

For its challenges, Petitioner relies on the following references:

Name	Reference	Exhibit
Linzer	US 7,660,356 B2, issued February 9, 2010 (based on an application filed April 8, 2004)	1005
JVT-E022d7	Joint Video Team (JVT) of ISO/IEC MPEG and ITU-T VCEG, Document JVT-E022d7 (September 2002)[2]	1007
Au	US 6,646,578 B1, issued November 11, 2003 (based on an application filed November 22, 2002)	1008
VCEG-N52	ITU - Telecommunications Standardization Sector, Document VCEG-N52 (September 2001)	1012
Sriram	US 6,539,059 B1, issued March 25, 2003 (based on an application filed March 2, 2000)	1021

Pet. 2, 11–81.

Petitioner asserts that:

(1) Linzer and Au qualify as prior art "at least under § 102(e)(2)";

[2] The acronym "ISO" stands for "International Organization for Standardization." Ex. 1007, 13. The acronym "IEC" stands for "International Electrotechnical Commission." *Id.* The acronym "MPEG" stands for "Moving Picture Experts Group." *Id.* The acronym "ITU" stands for "International Telecommunication Union." *Id.* The acronym "VCEG" stands for "Video Coding Experts Group." *Id.*

(2) JVT-E022d7 qualifies as prior art "at least under § 102(a)";

(3) VCEG-N52 qualifies as prior art "at least under § 102(b)"; and

(4) Sriram qualifies as prior art "at least under § 102(a) and § 102(e)(2)."

Pet. 1–2; *see* 35 U.S.C. § 102(a), (b), (e)(2) (2006).[3]

At this stage of the proceeding, and as explained below, Patent Owner disputes that Linzer, JVT-E022d7, and Au qualify as prior art. *See* Prelim. Resp. 1, 10–21; Prelim. Sur-reply 1–4; *infra* §§ III.D.2(b), III.D.3(a). In particular, Patent Owner contends that (1) Linzer and JVT-E022d7 are not "by another" and (2) the '818 patent has "an earlier invention date" than Au. *See* Prelim. Resp. 1, 10–21; Prelim. Sur-reply 1–4. At this stage of the proceeding, Patent Owner does not dispute that VCEG-N52 and Sriram qualify as prior art. *See, e.g.*, Prelim. Resp. 10–48.

F. The Asserted Challenges to Patentability

Petitioner asserts the following challenges to patentability:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
6–9, 11, 15, 21, 23	103(a)	JVT-E022d7
6–9, 11, 15, 21, 23	103(a)	Linzer
6–9, 11, 15, 21, 23	103(a)	Au
6–9, 11, 15, 21, 23	103(a)	VCEG-N52, Sriram

Pet. 2, 11–81.

[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.

G. Testimonial Evidence

To support its challenges, Petitioner relies on the declaration of Eli Saber, Ph.D. (Exhibit 1003). Dr. Saber states that he was "retained on behalf of [Petitioner] to offer technical opinions related to" the '818 patent. Ex. 1003 ¶ 1. Dr. Saber explains that he received "a Bachelor of Science Degree in Electrical and Computer Engineering, Summa Cum Laude, from the State University of New York at Buffalo in 1988," "a Master of Science Degree in Electrical Engineering from the University of Rochester in 1992," and "a Ph.D. in Electrical Engineering from the University of Rochester in 1996." *Id.* ¶ 9.

Further, Petitioner relies on the declaration of June Ann Munford (Exhibit 1014) and the declaration of Dr. Clifford Reader (Exhibit 1025) to establish (1) the authenticity of JVT-E022d7 and VCEG-N52 and (2) the public accessibility of those references before the '818 patent's filing date. *See* Pet. 11, 55–56.

To support its positions, Patent Owner relies on the declaration of Omid Kia, Ph.D. (Exhibit 2001). Dr. Kia states that he was "retained by Patent Owner" to "provide expert opinions in connection with this *inter partes* review." Ex. 2001 ¶ 1. Dr. Kia explains that he received a "Ph.D. degree in Electrical Engineering from the University of Maryland at College Park in 1997." *Id.* ¶ 9.

Additionally, Patent Owner relies on the declarations of the inventors named in the '818 patent—Miska Hannuksela (Exhibit 2009) and Ye-Kui Wang (Exhibit 2010)—to establish conception of the inventions claimed in the '818 patent. *See* Prelim. Resp. 10–21.

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 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.

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[4] The parties do not address objective indicia of nonobviousness. *See, e.g.*, Pet. 11–81; Prelim. Resp. 21–48.

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 2–3 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. Saber's testimony supports Petitioner's assertions. *See* Ex. 1003 ¶¶ 21–22.

Patent Owner asserts that a person of ordinary skill in the art at the time of the alleged invention would have had "a bachelor's degree in electrical engineering, computer engineering, or a related field, with about two years of experience in video decoding and encoding technologies." Prelim. Resp. 8–9. Patent Owner also asserts that (1) "[a]dditional work or practical experience may qualify one not having requisite education as" an ordinarily skilled artisan and (2) "a higher level of education could offset less experience." *Id.* at 9. Dr. Kia's testimony supports Patent Owner's assertions. *See* Ex. 2001 ¶¶ 18–19.

For an ordinarily skilled artisan, Petitioner and Patent Owner propose essentially the same educational level. Pet. 9; Prelim. Resp. 8–9. But

Petitioner proposes a slightly higher experience level than Patent Owner, i.e., "2–3 years" according to Petitioner and "about two years" according to Patent Owner. Pet. 9; Prelim. Resp. 8–9.

Based on the current record and for purposes of this decision, we accept Patent Owner's description of an ordinarily skilled artisan because it comports with the technology and claims of the '818 patent as well as the asserted references. *See* Ex. 2001 ¶ 19. We note that our analysis would not change if we accepted Petitioner's description of an ordinarily skilled artisan.

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.* Regarding claim 23's means-

plus-function limitations, Petitioner identifies "a decoder as described in the '818 patent specification in figure 4 and equivalents thereof" as "the structure corresponding to the claimed functions" of each limitation. *Id.* at 10 (citing Ex. 1003 ¶ 57; Ex. 1011).

Patent Owner "agrees that no terms need to be construed to resolve the issues presented" at this stage of the proceeding. Prelim. Resp. 9 (citing Pet. 9). Patent Owner does not address claim 23's means-plus-function limitations. *Id.* Patent Owner "reserves the right to address construction of any terms raised at trial or in the related actions." *Id.*

"[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. Whether Petitioner Establishes a Reasonable Likelihood that Linzer, JVT-E022d7, and Au Qualify as Prior Art

1. General Principles

Pre-AIA § 102(a) prohibits patenting if "the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent." 35 U.S.C. § 102(a). But an inventor's "own work is not prior art under § 102(a) even though it has been disclosed to the public in a manner or form which otherwise would fall under § 102(a)." *In re Katz*, 687 F.2d 450, 454 (CCPA 1982). A contrary interpretation "would negate

the one year period afforded under § 102(b) during which an inventor is allowed to perfect, develop and apply for a patent" and "publish descriptions of it." *Id.* (footnote omitted).

Pre-AIA § 102(e)(2) prohibits patenting if "the invention was described in . . . a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent." 35 U.S.C. § 102(e)(2). When deciding whether a reference patent or publication is "by another" for purposes of § 102(e)(2), the Board must:

(1) "determine what portions of the reference" were (a) relied on as prior art and (b) "relevant to establishing" unpatentability;

(2) "evaluate the degree to which those portions were conceived 'by another'"; and

(3) "decide whether that other person's contribution is significant enough" to those portions to qualify that other person as "a joint inventor of those portions."

Google LLC v. IPA Techs. Inc., 34 F.4th 1081, 1085–86, 1086 n.3 (Fed. Cir. 2022); *see Duncan Parking Techs., Inc. v. IPS Grp., Inc.*, 914 F.3d 1347, 1358 (Fed. Cir. 2019).

Determining "inventorship" involves "determining who conceived the subject matter at issue," e.g., subject matter recited "in a count in an interference." *Sewall v. Walters*, 21 F.3d 411, 415 (Fed. Cir. 1994).

Pre-AIA § 102(g) prohibits patenting if "before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it." 35 U.S.C. § 102(g). Additionally, "[i]n determining priority of invention under this subsection [§ 102(g)], there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the

reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other." *Id.*

A patent owner may antedate a reference by "proving earlier conception and reasonable diligence in reducing to practice." *Perfect Surgical Techniques, Inc. v. Olympus Am., Inc.*, 841 F.3d 1004, 1007 (Fed. Cir. 2016); *see* 37 C.F.R. § 1.131(b). "Conception exists when a definite and permanent idea of an operative invention, including every feature of the subject matter sought to be patented, is known." *Sewall*, 21 F.3d at 415; *see Gunter v. Stream*, 573 F.2d 77, 80 (CCPA 1978). Additionally, the "diligence requirement implements the principle that, to antedate a reference," an inventor "must not only have conceived the invention before the reference date, but must have reasonably continued activity to reduce the invention to practice." *ATI Techs. ULC v. Iancu*, 920 F.3d 1362, 1369 (Fed. Cir. 2019).

An inventor's testimony does not alone suffice to prove conception. *Price v. Symsek*, 988 F.2d 1187, 1194 (Fed. Cir. 1993). Instead, "when a party seeks to prove conception through an inventor's testimony the party must proffer evidence, 'in addition to [the inventor's] own statements and documents,' corroborating the inventor's testimony." *Apator Miitors ApS v. Kamstrup A/S*, 887 F.3d 1293, 1295 (Fed. Cir. 2018) (alteration by the court) (quoting *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1577 (Fed. Cir. 1996)). Hence, a party must prove conception with "corroborating evidence which shows that the inventor disclosed to others [a] 'completed thought expressed in such clear terms as to enable those skilled in the art' to make the invention." *Coleman v. Dines*, 754 F.2d 353, 359 (Fed. Cir. 1985) (quoting *Field v. Knowles*, 183 F.2d 593, 600 (CCPA 1950)).

A patent owner may antedate a reference by proving an earlier reduction to practice. *Purdue Pharma L.P. v. Boehringer Ingelheim GmbH*, 237 F.3d 1359, 1365 (Fed. Cir. 2001); *see* 37 C.F.R. § 1.131(b). Filing a patent application serves as a constructive reduction to practice. *Hyatt v. Boone*, 146 F.3d 1348, 1352 (Fed. Cir. 1998). For an actual reduction to practice, a patent owner must show three things: (1) construction of an embodiment or performance of a process meeting all limitations in the challenged claims; (2) "that the invention would work for its intended purpose"; and (3) "sufficient evidence to corroborate inventor testimony regarding these events." *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1169 (Fed. Cir. 2006). Except for "very simple" inventions, demonstrating that the invention would work for its intended purpose requires testing. *Yorkey v. Diab*, 601 F.3d 1279, 1286 (Fed. Cir. 2010).

If a patent owner attempts to antedate a reference in an *inter partes* review, the patent owner bears the burden of producing evidence supporting an invention date before the reference's effective date. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1379–80 (Fed. Cir. 2015).

At the institution stage of an *inter partes* review, the statutory "reasonable likelihood" standard for institution applies to the issue whether a reference qualifies as prior art. *Cf. Hulu*, IPR2018-01039, Paper 29 at 12 (precedential) (citing 35 U.S.C. § 314(a)).

2. LINZER AND JVT-E022d7

(a) Background

Linzer incorporates JVT-E022d7 by "reference in its entirety." Ex. 1005, 1:30–36. Petitioner relies on Linzer to establish unpatentability if

Patent Owner "disputes the printed publication status of JVT-E022d7." Pet. 34. Specifically, Petitioner asserts that claims 6–9, 11, 15, 21, and 23 are unpatentable under § 103(a) because the claims would have been obvious over Linzer "based on the same disclosures of JVT-E022d7 (incorporated by reference into Linzer)" and identified for the challenge based on JVT-E022d7. *Id.* at 34; *see id.* at 13–33. Petitioner does not rely on any of Linzer's own disclosures to establish unpatentability. *Id.* at 33–34.

Thus, under the circumstances here, the question whether Linzer qualifies as prior art turns on whether JVT-E022d7 qualifies as prior art. *See* Pet. 33–34; Prelim. Resp. 10 n.1, 11; Prelim. Reply 1–4; Prelim. Sur-reply 1–4.

(b) Patent Owner's Contentions

Patent Owner contends that the inventors named in the '818 patent—Miska Hannuksela and Ye-Kui Wang—conceived the subject matter disclosed in JVT-C078 (Exhibit 2003) and JVT-C078 Annex A (Exhibit 2004) and that the inventors authored those documents. Prelim. Resp. 10–11; Prelim. Sur-reply 1–2. Patent Owner contends that the concepts disclosed in those documents were adopted and included in JVT-E022d7. *See* Prelim. Resp. 11–13; Prelim. Sur-reply 1–4. Patent Owner also contends that (1) "the portions of JVT-E022d7 relied upon by the Petition are simply adopted from the original contributions of Miska Hannuksela and Ye-Kui Wang" and (2) the inventors' contributions "are now being cited against their own patent." Prelim. Resp. 11, 17; *see* Prelim. Sur-reply 4. Therefore, according to Patent Owner, the portions of JVT-E022d7 and Linzer relied on to establish unpatentability are not "by another"

as required by the relevant sections of the patent statute. Prelim. Resp. 11; *see id.* at 13, 20.

To support its contentions, Patent Owner reproduces Figure 1 from JVT-C078 as shown below (Prelim. Resp. 12):

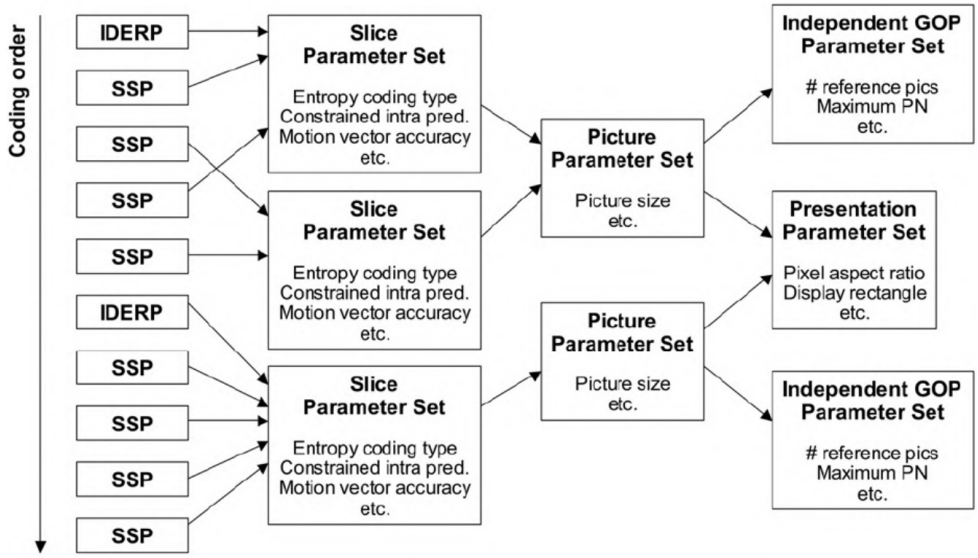

Figure 1. Illustration of dependencies between coding entities.

Figure 1 illustrates dependencies between network abstraction layer (NAL) packets and parameter set instances, i.e., slice parameter sets, picture parameter sets, independent GOP parameter sets, and a presentation parameter set. Ex. 2003, 3.

Patent Owner asserts that the ’818 patent includes Figure 1 from JVT-C078 as Figure 1 in the patent. Prelim. Resp. 12.

For the "sequence parameter set" recited in the challenged claims, Patent Owner asserts that the following table from JVT-C078 evidences conception by the inventors named in the '818 patent (Prelim. Resp. 13–14):

independent_GOP_parameter_set( ) {	**Category**	**Mnemonic**
parameter_set_id(independent_GOP_parameter_set)		
profile		ecselbf
level		ecselbf
version		ecselbf
log2_max_picture_number_minus_4		ecselbf
number_of_reference_picture_buffers_minus_1		ecselbf
required_picture_number_update_behavior		uimsbf(1)
}		

The table above defines an independent GOP parameter set and includes the following information and parameters:

- "parameter_set_id(independent_GOP_parameter_set)";
- "profile";
- "level";
- "version";
- "log2_max_picture_number_minus_4";
- "number_of_reference_picture_buffers_minus_1"; and
- "required_picture_number_update_behavior."

Ex. 2003, 5.

For the "picture parameter set" recited in the challenged claims, Patent Owner asserts that the following table from JVT-C078 evidences conception by the inventors named in the '818 patent (Prelim. Resp. 14–15):

picture_parameter_set( ) {	Category	Mnemonic
parameter_set_id(picture_parameter_set)		
parameter_set_id(independent_GOP_parameter_set)		
parameter_set_id(presentation_parameter_set)		
picture_width_in_MBs_minus_1		ecselbf
picture_height_in_MBs_minus_1		ecselbf
}		

The table above defines a picture parameter set and includes the following information and parameters:

- "parameter_set_id(picture_parameter_set)";
- "parameter_set_id(independent_GOP_parameter_set)";
- "parameter_set_id(presentation_parameter_set)";
- "picture_width_in_MBs_minus_1"; and
- "picture_height_in_MBs_minus_1."

Ex. 2003, 6.

For the "slice header" recited in the challenged claims, Patent Owner asserts that the following disclosure from JVT-C078 evidences conception by the inventors named in the '818 patent:

> 3.9 Slice Header: The proposed slice header modifications relative to JVT WD2 are included in the accompanying annex of the contribution. In addition to including a parameter set identifier in the slice header, the annex proposes removal of redundancies and inconsistencies from the slice header. See the comments in-line for the justification of the each detailed proposal.

Prelim. Resp. 15–16 (quoting Ex. 2003, 9).

Patent Owner also contends that "[a]ny additional details in JVT-E022d7 are not new concepts but instead are related to mere syntax and other implementation details derived as a result of the original contributions in JVT-C078." Prelim. Resp. 19.

(c) Petitioner's Contentions

Petitioner contends that JVT-E022d7 does not list as authors any of the inventors named in the '818 patent. Prelim. Reply 1. Petitioner also contends that the inventor declarations (Exhibit 2009 and Exhibit 2010) are "unsupported" and "provide no corroborating evidence whatsoever, rendering them conclusory." *Id.* at 1–3. According to Petitioner, the inventor declarations "raise at most factual questions to be developed during trial (e.g., what Hannuksela and Wang allegedly conceived, when, and with whom)." *Id.* at 3 (emphasis omitted).

Further, Petitioner asserts that the Petition "relies on disclosures in JVT-E022d7" to establish unpatentability that "cannot trace their origins to" JVT-C078 (Exhibit 2003) or JVT-C078 Annex A (Exhibit 2004). Prelim. Reply 4. As an example of a disclosure in JVT-E022d7 relied on to establish unpatentability that "cannot trace [its] origins to" JVT-C078 or JVT-C078 Annex A, Petitioner identifies the "frame_num" parameter in JVT-E022d7's slice header. *Id.*; *see* Pet. 20–21. Petitioner asserts that JVT-C078 and JVT-C078 Annex A do not propose including the "frame_num" parameter in a slice header. Prelim. Reply 4. According to Petitioner, "Gary Sullivan—the JVT chair—appears to have first proposed including 'frame_num' in the slice header." *Id.* (citing Ex. 1026, 1; Ex. 1028, 5–6; Ex. 1029, 7–8).

As other examples of disclosures in JVT-E022d7 relied on to establish unpatentability that "cannot trace their origins to" JVT-C078 or JVT-C078 Annex A, Petitioner identifies the following:

- the "pic_order_cnt_type" parameter in JVT-E022d7's sequence parameter set;
- the "num_slice_groups_minus1" parameter in JVT-E022d7's picture parameter set;
- the "num_ref_idx_10_active_minus1" parameter in JVT-E022d7's picture parameter set; and
- the "weighted_pred_flag" parameter in JVT-E022d7's picture parameter set.

Prelim. Reply 4; *see* Pet. 15–16, 18–19.

(d) Analysis

Based on the current record, Patent Owner does not show sufficiently that Petitioner relies on the inventors' own work to establish unpatentability. Patent Owner's arguments rest on inventor declarations and inventor-authored documents (JVT-C078 and JVT-C078 Annex A), and the inventors have not yet been subject to cross-examination. *See* Ex. 2003; Ex. 2004; Ex. 2009; Ex. 2010. Also, Patent Owner identifies no evidence corroborating the inventors' own statements. *See* Prelim. Resp. 10–20; Prelim. Reply 2–3 (noting the lack of "corroborating evidence").

Further, based on the current record, the following disclosures in JVT-E022d7 relied on to establish unpatentability "cannot trace their origins to" JVT-C078 or JVT-C078 Annex A:

- the "pic_order_cnt_type" parameter in JVT-E022d7's sequence parameter set;
- the "num_slice_groups_minus1" parameter in JVT-E022d7's picture parameter set;

- the "num_ref_idx_10_active_minus1" parameter in JVT-E022d7's picture parameter set; and
- the "weighted_pred_flag" parameter in JVT-E022d7's picture parameter set.

See Pet. 15–16, 18–19; Prelim. Reply 4; *infra* §§ III.E.2(b)–(c). The parameter sets in JVT-C078 that Patent Owner cites as evidence of conception lack the above-identified disclosures. *See* Ex. 2003, 5–6; *supra* § III.D.2(b). Based on the current record, the above-identified disclosures were conceived "by another" and do not represent the work of a common inventive entity as the '818 patent.

The above-identified disclosures relate to at least two limitations in each challenged independent claim. *See* Pet. 15–16, 18–19, 26–32; *infra* §§ III.E.2(b)–(c). The above-identified disclosures comprise a material part of and significant contribution to the disclosures in JVT-E022d7 relied on to establish unpatentability. Hence, we disagree with Patent Owner that the inventors' contributions "are now being cited against their own patent." *See* Prelim. Resp. 11.

Patent Owner attempts to diminish the above-identified disclosures by calling them "mere syntax and other implementation details." *See* Prelim. Resp. 19. But these "details" do not constitute the inventors' own work. And as just explained, these "details" comprise a material part of and significant contribution to the disclosures in JVT-E022d7 relied on to establish unpatentability.

Citing *Duncan Parking*, 914 F.3d at 1358, Patent Owner asserts that the "by another" analysis requires an "identifiable" other person as a joint inventor, not just "those in the prior art." Prelim. Resp. 20. But *Duncan Parking* does not include the word "identifiable" or the phrase "those in the

prior art." *See, e.g.*, *Duncan Parking*, 914 F.3d at 1357–60. Moreover, *Duncan Parking* did not address potential prior art promulgated by a standard-setting organization. *See id.* Additionally, JVT-E022d7 explains that it was "prepared jointly" by the "VCEG (Video Coding Experts Group)" and the "MPEG (Moving Picture Experts Group)," not just "those in the prior art." Ex. 1007, 13.

Based on the current record and for the reasons discussed above, Petitioner establishes a reasonable likelihood that JVT-E022d7 qualifies as prior art. For the same reasons, Petitioner establishes a reasonable likelihood that Linzer qualifies as prior art.

Further, as Petitioner asserts, JVT-C078 and JVT-C078 Annex A do not propose including the "frame_num" parameter in a slice header. *See* Ex. 2003, 6–7, 9, 11; Ex. 2004, 1–2; Prelim. Reply 4. As Petitioner also asserts, Gary Sullivan (the JVT chair) "appears to have first proposed" that concept. *See* Ex. 1026, 1; Prelim. Reply 4. Although JVT-C078 Annex A discloses including a "picture number" in a slice header, we cannot determine based on the current record whether that concept originated with the inventors named in the '818 patent or with someone else, e.g., the authors of JVT-WD2r7 referenced in JVT-C078 Annex A. *See* Ex. 1027, 1–2; Ex. 2004, 1–2. This issue is better resolved at trial on a more developed record.

3. AU

(a) Patent Owner's Contentions

Patent Owner contends that Au's priority date corresponds to Au's filing date, i.e., November 22, 2002. Prelim. Resp. 20. Patent Owner also contends that the challenged claims have an "earlier invention date" than

Au's filing date. *Id.* As support, Patent Owner identifies the following "contribution documents" from the inventors named in the '818 patent: JVT-C078 (Exhibit 2003), JVT-C078 Annex A (Exhibit 2004), the Hannuksela declaration (Exhibit 2009), and the Wang declaration (Exhibit 2010). *Id.* at 20–21.

Additionally, Patent Owner contends that the "invention" of the '818 patent was "diligently reduced to practice at least through" (1) incorporation by the JVT group, (2) incorporation into software code, and (3) the filing of the application that issued as the '818 patent. Prelim. Resp. 21; *see id.* at 50. Patent Owner identifies no evidence supporting that contention. *Id.* at 21, 50.

(b) Analysis

Au's November 22, 2002, filing date precedes the '818 patent's April 30, 2003, filing date. Ex. 1001, code (22); Ex. 1008, code (22). Filing a patent application serves as a constructive reduction to practice. *Hyatt*, 146 F.3d at 1352.

Patent Owner identifies no evidence relating to reasonable diligence or actual reduction to practice before or after Au's November 22, 2002, filing date, which serves as a constructive reduction to practice. *See* Prelim. Resp. 20–21. Instead, Patent Owner offers inventor declarations and inventor-authored documents (JVT-C078 and JVT-C078 Annex A) that at best relate to conception. *See* Ex. 2003; Ex. 2004; Ex. 2009; Ex. 2010. Also, Patent Owner identifies no evidence corroborating the inventors' own statements. *See* Prelim. Resp. 20–21; Prelim. Reply 2–3 (noting the lack of "corroborating evidence"). "[W]hen a party seeks to prove conception through an inventor's testimony the party must proffer evidence, 'in addition

to [the inventor's] own statements and documents,' corroborating the inventor's testimony." *Apator Miitors*, 887 F.3d at 1295.

Hence, based on the current record and Au's November 22, 2002, filing date, which serves as a constructive reduction to practice, Petitioner establishes a reasonable likelihood that Au qualifies as prior art. *See* Ex. 1001, code (22); Ex. 1008, code (22).

E. Alleged Obviousness over JVT-E022d7: Claims 6–9, 11, 15, 21, and 23

Petitioner contends that claims 6–9, 11, 15, 21, and 23 are unpatentable under § 103(a) because the claims would have been obvious over JVT-E022d7. *See* Pet. 2, 11–33. Patent Owner disputes that JVT-E022d7 qualifies as prior art. *See* Prelim. Resp. 1, 10–20; Prelim. Sur-reply 1–4; *supra* § III.D.2(b).

Below, we provide an overview of JVT-E022d7. Then, we consider obviousness issues. For the reasons explained below, Petitioner establishes sufficiently for purposes of institution that JVT-E022d7 teaches the subject matter in claims 6–9, 11, 15, 21, and 23.

1. OVERVIEW OF JVT-E022d7 (EXHIBIT 1007)

JVT-E022d7 is a proposed industry standard "for compressed video representation" that was "prepared jointly" by the "VCEG (Video Coding Experts Group)" and the "MPEG (Moving Picture Experts Group)." Ex. 1007, 1, 13–14.

JVT-E022d7 explains that a "video source that is represented by the bitstream is a sequence of frames and/or fields (called collectively pictures) in decoding order." Ex. 1007, 27; *see id.* at 21 (defining "picture"). "A frame contains sampled and quantized luma and chroma data of all rows of a video signal frame. A frame consists of two fields, a top field and a bottom

field. For interlaced video signal, one of these fields is sampled temporally later than the other." *Id.* at 20 (emphases omitted).

Partitioning a picture divides the picture "into slice groups." Ex. 1007, 23. A slice includes an "integer number of macroblocks ordered contiguously in raster scan order within a particular slice group." *Id.* (emphases omitted). A slice also includes a slice header "containing the coded representation of data elements pertaining to the slice data that follow the slice header." *Id.* (emphases omitted).

JVT-E022d7 defines a network abstraction layer (NAL) unit as "[a] syntax structure containing an indication of the type of data to follow and bytes containing that data interspersed as necessary with emulation prevention bytes." Ex. 1007, 21 (emphasis omitted). Among other things, JVT-E022d7 specifies syntax in tabular form. *See id.* at 35–49. JVT-E022d7 provides tables for the NAL unit syntax and raw byte sequence payloads (RBSP) syntax including the following:

- sequence parameter set RBSP syntax;
- picture parameter set RBSP syntax;
- slice layer RBSP syntax; and
- slice header syntax.

Id. at 35–36, 38, 40.

JVT-E022d7 specifies that decoders "shall be capable of receiving NAL units in decoding order." Ex. 1007, 70. JVT-E022d7 also specifies that:

(1) the "decoding order of a sequence parameter set shall precede the decoding order of other NAL units that refer to that sequence parameter set"; and

(2) the "decoding order of a picture parameter set shall precede the decoding order of other NAL units that refer to that picture parameter set."

Id.

2. INDEPENDENT CLAIM 6

(a) Preamble 6pre

Claim 6 recites "[a] method for decoding sequences of pictures from a bitstream, wherein parameters are defined in a parameter set and each picture comprises information of one or more slices." Ex. 1001, 12:1–3.

Petitioner contends that JVT-E022d7 teaches claim 6's preamble for several related reasons. *See* Pet. 13–15. First, Petitioner asserts that JVT-E022d7 describes an industry standard for "compressed video representation" including a "decoding process," i.e., a "method for decoding." *Id.* at 13 (citing Ex. 1003 ¶ 63; Ex. 1007, 14, 16).

Second, Petitioner asserts that JVT-E022d7 defines (1) a "bitstream" as a "sequence of bits that forms the representation of data and coded fields and frames" and (2) the "decoding order" as the "order in which the coded pictures are to be decoded." Pet. 13 (quoting Ex. 1007, 19–20).

Third, Petitioner asserts that JVT-E022d7 teaches a "parameter set" because JVT-E022d7 discloses that:

(1) the "decoding order of a sequence parameter set shall precede the decoding order of other NAL units that refer to that sequence parameter set"; and

(2) the "decoding order of a picture parameter set shall precede the decoding order of other NAL units that refer to that picture parameter set."

Pet. 14 (quoting Ex. 1007, 70). According to Petitioner, an ordinarily skilled artisan "would have understood the sequence parameter set and picture

parameter set have parameters defined in one or more parameter sets and are used in decoding of picture sequences because JVT-E022d7 describes the decoding order for these parameters sets." *Id.* (citing Ex. 1003 ¶ 64).

Fourth, Petitioner asserts that JVT-E022d7 teaches that "each picture comprises information of one or more slices" because JVT-E022d7 discloses that "'pictures are divided into macroblocks'; a slice contains an 'integer number of macroblocks ordered contiguously in raster scan order within a particular slice group'; and each picture, therefore, includes one or more slices, where each slice includes macroblocks." Pet. 14 (citing Ex. 1007, 23, 29).

At this stage of the proceeding, Patent Owner makes no arguments specific to claim 6's preamble. *See, e.g.*, Prelim. Resp. 1, 10–20. 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 Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). We need not decide whether claim 6's preamble limits the claim because, based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that JVT-E022d7 teaches claim 6's preamble. *See* Pet. 13–15; Ex. 1003 ¶¶ 62–65.

(b) <u>Limitation 6a</u>

Claim 6 recites "recognizing, in a decoder, a sequence parameter set and forming at least one sequence parameter pertaining to a sequence using the parameter set." Ex. 1001, 12:5–7 (limitation 6a).

Petitioner contends that JVT-E022d7 teaches limitation 6a for several related reasons. *See* Pet. 15–17. First, Petitioner asserts that JVT-E022d7

discloses a "sequence parameter set" containing values that are "replaced only when an IDR [instantaneous decoder refresh] NAL [network abstraction layer] unit refers to a different sequence parameter set." *Id.* at 15 (alterations by Petitioner) (quoting Ex. 1007, 52). Petitioner also asserts that JVT-E022d7 "provides examples of parameters for a sequence parameter set in raw byte sequence payloads (RBSP) syntax in Table 7.3.2.1," including "parameters providing information about properties and characteristics of a video sequence." *Id.*

Specifically, Petitioner identifies the following parameters in JVT-E022d7's sequence parameter set:

- "log2_max_frame_num_minus4" relating to "a range of frame numbers that can be used in a video sequence";
- "pic_order_cnt_type" relating to picture order output;
- "num_of_ref_frames" relating to the number of pictures in a buffer;
- "required_frame_num_update_behaviour_flag" relating to decoding;
- "pic_width_in_mbs_minus1" relating to picture size; and
- "pic_height_in_mbs_minus1" relating to picture size.

Pet. 15–16. According to Petitioner, an ordinarily skilled artisan "would have understood JVT-E022d7 discloses using a sequence parameter set in decoding because the sequence parameter set includes values needed in decoding sequences, and such values are specific for a sequence parameter set." *Id.* at 15 (citing Ex. 1003 ¶ 66).

Second, Petitioner asserts that JVT-E022d7 discloses "recognizing" according to limitation 6a because either (1) the "decoder extracts data elements (such as the sequence parameter set) from the bitstream based on

the syntax described in the document" or (2) a sequence parameter set "is *a priori* predefined in the decoder and the decoder recognizes a reference to the sequence parameter set from the bitstream." Pet. 17 (citing Ex. 1003 ¶ 70; Ex. 1007, 14–15).

Third, Petitioner asserts that JVT-E022d7 discloses "forming" according to limitation 6a because its "parsing, extraction, and copying process" creates in a local memory a data element corresponding to a sequence parameter, such as "a maximum number of reference frames, a picture order count, and a flag indicating missing frame numbers." Pet. 17 (citing Ex. 1003 ¶ 70).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 6a. *See, e.g.*, Prelim. Resp. 1, 10–20.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that JVT-E022d7 teaches limitation 6a. *See* Pet. 15–17; Ex. 1003 ¶¶ 66–70.

(c) Limitation 6b

Claim 6 recites "recognizing, in the decoder, a picture parameter set and forming at least one first picture parameter value pertaining to a picture using the parameter set." Ex. 1001, 12:8–10 (limitation 6b).

Petitioner contends that JVT-E022d7 teaches limitation 6b for several related reasons. *See* Pet. 17–20. First, Petitioner asserts that JVT-E022d7 discloses a "picture parameter set" because JVT-E022d7 explains that "[e]very picture parameter set shall refer to the active sequence parameter set [and] [t]he picture parameters of an active picture parameter set shall be replaced only when the first slice NAL unit or DPA [Data Partition Type A] NAL unit of a picture refers to a different picture parameter set." *Id.*

at 17–18 (alterations by Petitioner) (quoting Ex. 1007, 52). Petitioner asserts that JVT-E022d7's picture parameter set contains "parameters that remain unchanged within a coded picture." *Id.* at 17 (quoting Ex. 1007, 52). Petitioner also asserts that JVT-E022d7 "provides examples of parameters for its picture parameter set in RBSP syntax in Table 7.3.2.2." *Id.* at 18.

Specifically, Petitioner identifies the following parameters in JVT-E022d7's picture parameter set:

- "num_slice_groups_minus1" relating to slice grouping;
- "num_ref_idx_10_active_minus1" relating to decoding; and
- "weighted_pred_flag" relating to decoding.

Pet. 19–20. According to Petitioner, an ordinarily skilled artisan "would have understood JVT-E022d7 discloses using a picture parameter set in decoding because JVT-E022d7 discloses decoding such parameter sets before decoding other NAL units that refer to that parameter set." *Id.* at 18 (citing Ex. 1003 ¶ 71).

Second, Petitioner asserts that JVT-E022d7 discloses "recognizing" according to limitation 6b because either (1) the "decoder extracts data elements (such as the picture parameter set) from the bitstream based on the described syntax" or (2) a picture parameter set "is *a priori* predefined in the decoder and the decoder recognizes a reference to the picture parameter set from the bitstream." Pet. 20 (citing Ex. 1003 ¶ 73; Ex. 1007, 14–15).

Third, Petitioner asserts that JVT-E022d7 discloses "forming" according to limitation 6b because its "parsing and execution process" creates in a local memory a data element corresponding to a picture

parameter, such as "at least one first picture parameter value pertaining to a picture using the parameter set." Pet. 20 (citing Ex. 1003 ¶¶ 73–74).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 6b. *See, e.g.*, Prelim. Resp. 1, 10–20.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that JVT-E022d7 teaches limitation 6b. *See* Pet. 17–20; Ex. 1003 ¶¶ 71–74.

(d) Limitation 6c

Claim 6 recites "forming, in the decoder, at least one second picture parameter value using information of a slice header, the at least one second picture parameter value remaining unchanged at least in all slice headers of one picture." Ex. 1001, 12:11–14 (limitation 6c).

Petitioner contends that JVT-E022d7 teaches limitation 6c because JVT-E022d7 discloses "pictures" and "slice headers" and "provides examples of parameters for a slice header syntax in Table 7.3.3." Pet. 20. Specifically, Petitioner identifies the following parameter in JVT-E022d7's slice header: "frame_num" referring to "a value that changes only from picture to picture." *Id.* at 20–21 (citing Ex. 1003 ¶ 77; Ex. 1007, 40).

Petitioner also contends that JVT-E022d7 discloses that:

(1) "frame_num serves as a unique ID for each frame stored in the reference picture buffer"; and

(2) "frame_num shall be incremented by 1 for each coded picture in decoding order."

Pet. 21 (quoting Ex. 1007, 57).

Petitioner asserts that an ordinarily skilled artisan "would have understood the 'frame_num' value serves as a unique identifier for each

frame and remains the same for all the slice headers of a frame (i.e., a frame corresponding to a picture)." Pet. 21 (citing Ex. 1003 ¶ 77; Ex. 1007, 57).

Further, Petitioner asserts that JVT-E022d7 teaches "forming" according to limitation 6c because JVT-E022d7 "describes extracting data elements (such as the slice header) from the bitstream based on the syntax described in the document and because the value of frame_num is saved in local memory along with the reference picture." Pet. 22 (citing Ex. 1003 ¶ 78; Ex. 1007, 14–15).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 6c. *See, e.g.*, Prelim. Resp. 1, 10–20.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that JVT-E022d7 teaches limitation 6c. *See* Pet. 20–22; Ex. 1003 ¶¶ 75–78.

(e) <u>Limitation 6d</u>

Claim 6 recites "using, in the decoder, the at least one second picture parameter value in decoding." Ex. 1001, 12:15–16 (limitation 6d).

Petitioner contends that JVT-E022d7 teaches limitation 6d because JVT-E022d7 discloses that in decoding:

> the "frame_num shall be incremented by 1 for each coded picture in decoding order . . . [t]he decoding order of primary coded pictures shall be non-decreasing in frame number order . . . frame_num serves as a unique ID for each frame stored in the reference picture buffer [and a] decoder . . . encounters a frame number."

Pet. 22 (alterations by Petitioner) (quoting Ex. 1007, 57)

Petitioner asserts that an ordinarily skilled artisan "would have understood frame_num, which is a unique ID for a given frame, when

present is used in decoding a sequence of frames to identify each frame." Pet. 22 (citing Ex. 1003 ¶ 79); *see id.* at 22–23.

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 6d. *See, e.g.*, Prelim. Resp. 1, 10–20.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that JVT-E022d7 teaches limitation 6d. *See* Pet. 22–23; Ex. 1003 ¶ 79.

(f) Preliminary Conclusion About Alleged Obviousness

As discussed above, Petitioner's analysis sufficiently addresses how JVT-E022d7 teaches claim 6's subject matter. *See supra* §§ III.E.2(a)–(e). Hence, Petitioner demonstrates a reasonable likelihood of proving that claim 6 is unpatentable under § 103(a) because the claim would have been obvious over JVT-E022d7.

3. Dependent Claims 7–9 and Independent Claims 11, 15, 21, and 23

Claims 7–9 depend directly from claim 6. Ex. 1001, 12:17–24. Independent claims 11, 15, 21, and 23 recite subject matter similar to claim 6. *Compare id.* at 12:1–16 (claim 6), *with id.* at 12:37–54 (claim 11), *and id.* at 13:30–46 (claim 15), *and id.* at 14:15–34 (claim 21), *and id.* at 14:46–62 (claim 23).

For claims 7–9, 11, 15, 21, and 23, Petitioner provides an analysis supported by Dr. Saber's testimony about how JVT-E022d7 teaches the claimed subject matter. *See* Pet. 23–33; Ex. 1003 ¶¶ 80–115.

At this stage of the proceeding, Patent Owner makes no arguments specific to any of claims 7–9, 11, 15, 21, and 23. *See, e.g.*, Prelim. Resp. 1, 10–20.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that JVT-E022d7 teaches the subject matter in claims 7–9, 11, 15, 21, and 23. *See* Pet. 23–33; Ex. 1003 ¶¶ 80–115. Hence, Petitioner demonstrates a reasonable likelihood of proving that claims 7–9, 11, 15, 21, and 23 are unpatentable under § 103(a) because the claims would have been obvious over JVT-E022d7.

F. Alleged Obviousness over Linzer: Claims 6–9, 11, 15, 21, and 23

Petitioner contends that claims 6–9, 11, 15, 21, and 23 are unpatentable under § 103(a) because the claims would have been obvious over Linzer. *See* Pet. 2, 33–34. Specifically, Petitioner asserts that the claims would have been obvious over Linzer "based on the same disclosures of JVT-E022d7 (incorporated by reference into Linzer)" and identified for the challenge based on JVT-E022d7. *Id.* at 34; *see id.* at 13–33.

Patent Owner disputes that Linzer qualifies as prior art for the reasons Patent Owner disputes that JVT-E022d7 qualifies as prior art. *See* Prelim. Resp. 1, 10–20; Prelim. Sur-reply 1–4; *supra* § III.D.2(b). Patent Owner acknowledges that the challenge based on Linzer "rises and falls" with the challenge based on JVT-E022d7 because Petitioner "relies on Linzer solely because it allegedly incorporates JVT-E022d7 by reference." Prelim. Resp. 11; *see id.* at 10 n.1.

Based on the current record and for the reasons discussed above for the challenge based on JVT-E022d7, Petitioner demonstrates a reasonable likelihood of proving that claims 6–9, 11, 15, 21, and 23 are unpatentable under § 103(a) because the claims would have been obvious over Linzer. *See* Pet. 11–34; Ex. 1003 ¶¶ 62–117.

G. Alleged Obviousness over Au: Claims 6–9, 11, 15, 21, and 23

Petitioner contends that claims 6–9, 11, 15, 21, and 23 are unpatentable under § 103(a) because the claims would have been obvious over Au. *See* Pet. 2, 34–55. Patent Owner disputes that Au qualifies as prior art. *See* Prelim. Resp. 1, 20–21; *supra* § III.D.3(a).

Below, we provide an overview of Au. Then, we consider obviousness issues. For the reasons explained below, Petitioner establishes sufficiently for purposes of institution that Au teaches the subject matter in claims 6–9, 11, 15, 21, and 23.

1. OVERVIEW OF AU (EXHIBIT 1008)

Au is a U.S. patent titled "Context Adaptive Variable Length Decoding System and Method," filed on November 22, 2002, and issued on November 11, 2003. Ex. 1008, codes (12), (22), (45), (54). Au states that the invention "relates to a system and method for context adaptive entropy decoding of transform coefficients in compressed video images." *Id.* at 1:7–9; *see id.* at code (57).

Au explains that video data is "a temporal sequence of pictures, each referred to as the frame (or field)." Ex. 1008, 7:25–26. "Each picture is organized as a matrix of the macroblocks." *Id.* at 7:27. Consecutive macroblocks are "combined in a slice." *Id.* at 7:30–31. A slice includes a slice header and the slice data, i.e., picture data "representing a sub-set of the macroblocks" of "the complete picture." *Id.* at 8:36–40; *see id.* at 9:1–8.

Au's Figure 2 (reproduced below) depicts a bitstream containing compressed video data:

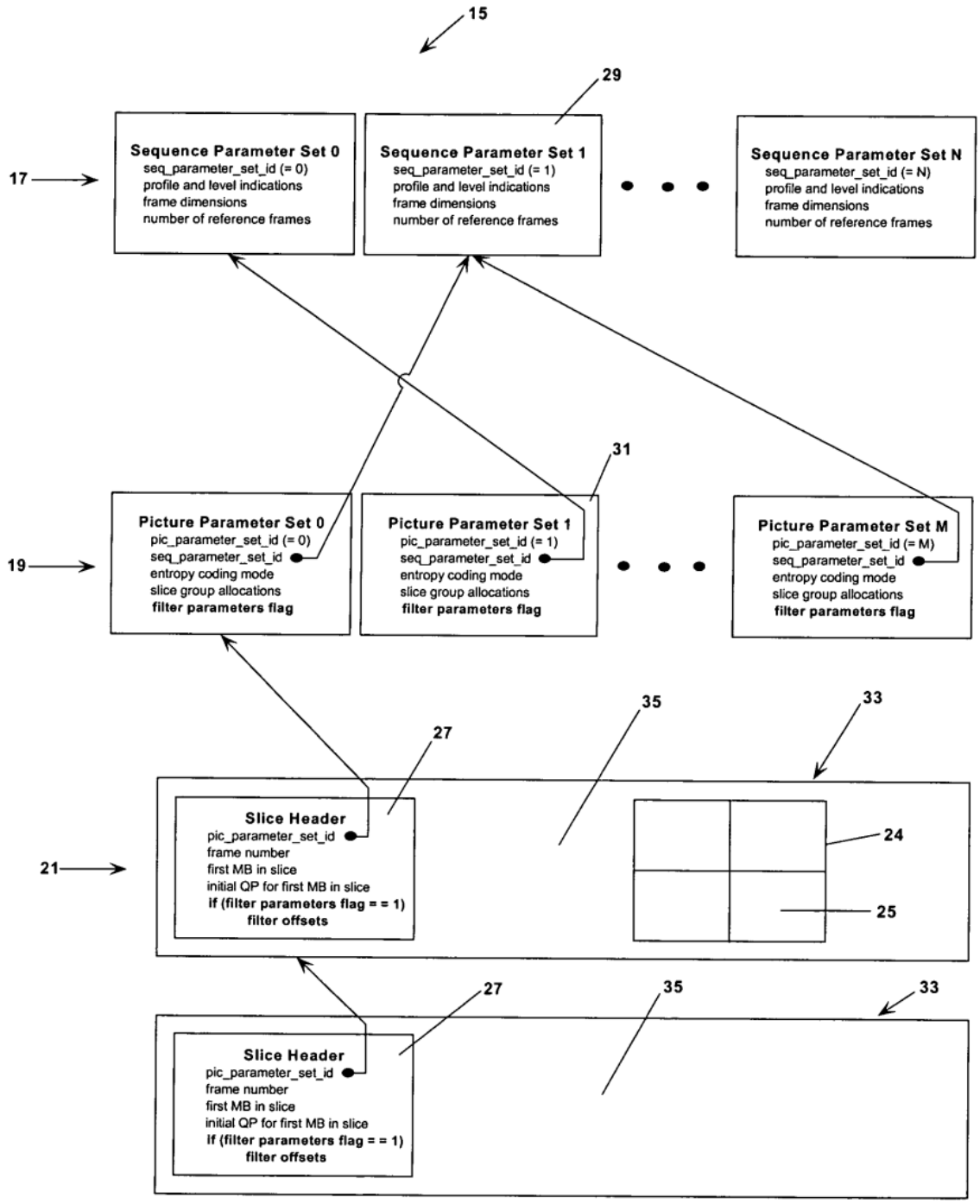

Figure 2

Figure 2 illustrates bitstream 15 organized into "a hierarchy of syntax levels, with the 3 main levels being a sequence level 17, a picture (or frame) level 19, and [a] slice level 21." Ex. 1008, 8:6–9, Fig. 2.

Au explains that the "parameter set" concept permits "efficient transmission of infrequently changing data" at the sequence level 17 and the picture (or frame) level 19. Ex. 1008, 8:9–11. Figure 2 shows sequence parameter set 29 in the sequence level 17, picture parameter set 31 in the picture (or frame) level 19, and slice header 27 in the slice level 21. *See id.* at 8:11–16, 8:20–22, 8:39–40, 9:1–2, Fig. 2.

Sequence parameter set 29 includes "values of parameters that will remain unchanged for an entire video sequence, or from one instantaneous decoder refresh (IDR) picture to the next." Ex. 1008, 8:11–16. Examples of parameters in sequence parameter set 29 include "frame dimensions," "profile and level indications," and "the maximum number of reference frames." *Id.* at 8:16–18, Fig. 2.

Picture parameter set 31 includes "values of parameters that will remain unchanged within a coded representation of a picture (frame or field)." Ex. 1008, 8:20–22. Examples of parameters in picture parameter set 31 include "the entropy coding mode," "a flag that specifies whether deblocking filter parameters will be transmitted in the slice headers 27 of the picture 22," and "slice group allocations." *Id.* at 8:23–26, Fig. 2.

Slice header 27 "contains a coded representation of data elements" that "pertain to the decoding of the slice data that follow the slice header." Ex. 1008, 8:40–43. A slice header includes:

- "a reference to a valid picture parameter set" that "specifies the picture parameter values (and indirectly

the sequence parameter values) to be used when decoding the elements";

- the "position of the respective slice" in the frame;
- the "initial quantization parameter" (QP) for the first macroblock (MB) in the slice; and
- the "frame number."

Id. at 8:43–51, 9:1–4, Fig. 2.

Au's Figure 3 (reproduced below) depicts a decoder:

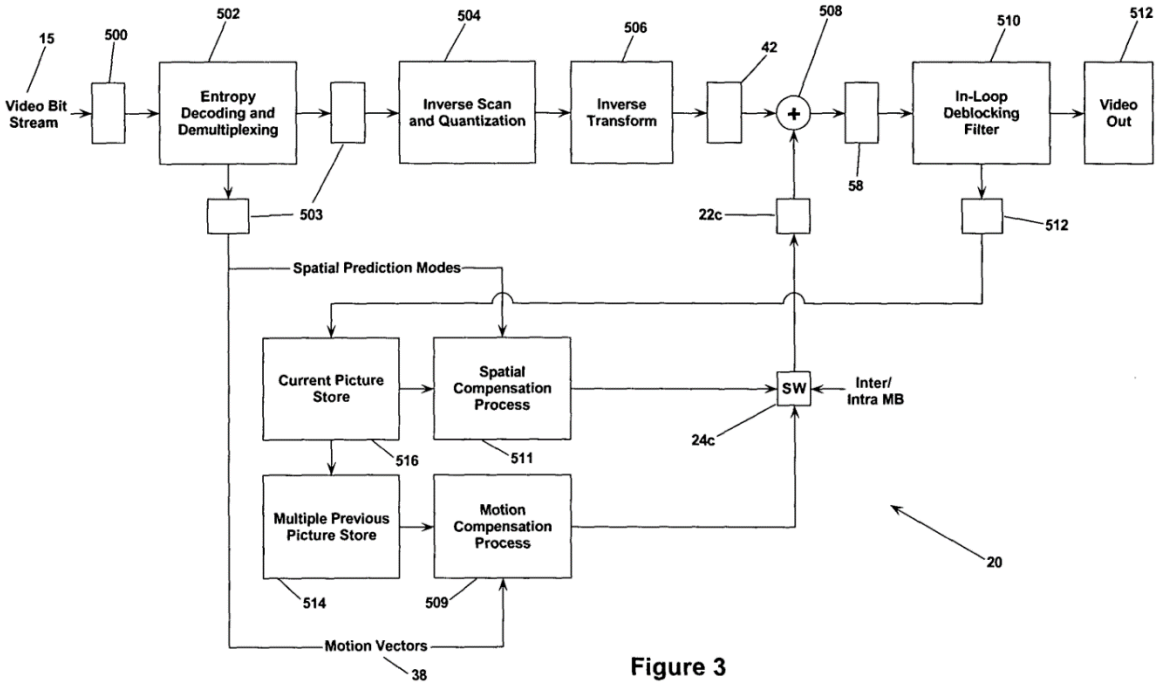

Figure 3

Figure 3 illustrates decoder 20 that processes bitstream 15 to "produce reconstructed video images 512" corresponding to "reconstructed frames 58." Ex. 1008, 6:54–55, 10:50–52, Fig. 3. In decoder 20, entropy decoder 502 decodes bitstream 15 to "produce syntax elements 503 used in subsequent processing by the other decoder components." *Id.* at 10:57–59. An example decoder is "fully specified in the H.264 standard." *Id.* at 10:53–54.

2. INDEPENDENT CLAIM 6

(a) Preamble 6pre

Claim 6 recites "[a] method for decoding sequences of pictures from a bitstream, wherein parameters are defined in a parameter set and each picture comprises information of one or more slices." Ex. 1001, 12:1–3.

Petitioner contends that Au teaches claim 6's preamble because Au discloses:

(1) a "method . . . for block-based motion-compensated decoding";

(2) a bitstream processed by a decoder to "produce reconstructed video images" corresponding to "reconstructed frames";

(3) "parameter sets" containing "values of parameters"; and

(4) a slice containing picture data "representing a sub-set of the macroblocks" of "the complete picture."

Pet. 37–38 (alteration by Petitioner) (quoting Ex. 1008, 8:9–13, 8:36–38, 10:51–52, code (57)) (citing Ex. 1003 ¶¶ 122–125).

At this stage of the proceeding, Patent Owner makes no arguments specific to claim 6's preamble. *See, e.g.*, Prelim. Resp. 1, 20–21. 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 6's preamble limits the claim because, based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that Au teaches claim 6's preamble. *See* Pet. 37–38; Ex. 1003 ¶¶ 122–125.

(b) Limitation 6a

Claim 6 recites "recognizing, in a decoder, a sequence parameter set and forming at least one sequence parameter pertaining to a sequence using the parameter set." Ex. 1001, 12:5–7 (limitation 6a).

Petitioner contends that Au teaches limitation 6a for several related reasons. *See* Pet. 38–39. First, Petitioner asserts that Au discloses that a decoder decodes video data in "the form of a compressed bitstream." *Id.* at 38 (citing Ex. 1008, 1:55–57; Ex. 1003 ¶ 126).

Second, Petitioner asserts that Au discloses a "sequence parameter set" including "values of parameters that will remain unchanged for an entire video sequence, or from one instantaneous decoder refresh (IDR) picture to the next." Pet. 38 (quoting Ex. 1008, 8:11–15). As examples of the parameters in Au's "sequence parameter set," Petitioner identifies "frame dimensions," "profile and level indications," and "the maximum number of reference frames." *Id.* (citing Ex. 1008, 8:16–19, Fig. 2). Petitioner also asserts that Au's sequence parameters "are used when decoding coded pictures." *Id.* at 38–39 (quoting Ex. 1008, 8:32–33) (citing Ex. 1008, 8:30–34, 9:12–14).

Third, Petitioner asserts that an ordinarily skilled artisan would have understood that "recognizing" according to limitation 6a "encompasses a decoder parsing the incoming bitstream and identifying the recited 'sequence parameter set.'" Pet. 39.

Fourth, Petitioner asserts that an ordinarily skilled artisan would have understood that "forming" according to limitation 6a "encompasses the decoder creating in local memory the data element, such as, for this

limitation 'at least one sequence parameter pertaining to a sequence using the parameter set.'" Pet. 39 (citing Ex. 1003 ¶ 127).

Fifth, Petitioner asserts that Au's decoder "parses the incoming bitstream to extract ('recognizing') and store ('forming') data elements, including the recited 'sequence parameter set' or the sequence parameter set is *a priori* predefined in the decoder and the decoder recognizes a reference to the sequence parameter set from the bitstream described above." Pet. 39 (citing Ex. 1003 ¶¶ 127–128).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 6a. *See, e.g.*, Prelim. Resp. 1, 20–21.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that Au teaches limitation 6a. *See* Pet. 38–39; Ex. 1003 ¶¶ 126–128.

(c) Limitation 6b

Claim 6 recites "recognizing, in the decoder, a picture parameter set and forming at least one first picture parameter value pertaining to a picture using the parameter set." Ex. 1001, 12:8–10 (limitation 6b).

Petitioner contends that Au teaches limitation 6b for several related reasons. *See* Pet. 39–40. First, Petitioner asserts that Au discloses a "picture parameter set" including "values of parameters that will remain unchanged within a coded representation of a picture (frame or field)." *Id.* at 39 (quoting Ex. 1008, 8:20–22). As examples of the parameters in Au's "picture parameter set," Petitioner identifies "the entropy coding mode," "a flag that specifies whether deblocking filter parameters will be transmitted in the slice headers 27 of the picture 22," and "slice group allocations." *Id.* (citing Ex. 1008, 8:23–26, Fig. 2).

Second, Petitioner asserts that Au discloses a decoder "using, for example, entropy coding mode, a flag that specifies whether deblocking filter parameters will be transmitted in the slice headers, and slice group allocations ('forming at least one first picture parameter value pertaining to a picture using the parameter set')." Pet. 40 (citing Ex. 1003 ¶ 129).

Third, Petitioner asserts that an ordinarily skilled artisan would have understood that "recognizing" according to limitation 6b "encompasses a decoder parsing the incoming bitstream and identifying the recited 'picture parameter set.'" Pet. 40 (citing Ex. 1003 ¶ 130).

Fourth, Petitioner asserts that an ordinarily skilled artisan would have understood that "forming" according to limitation 6b "encompasses the decoder creating in local memory the value associated with the data element, such as, for this limitation 'at least one first picture parameter value pertaining to a picture using the parameter set.'" Pet. 40 (citing Ex. 1003 ¶ 130).

Fifth, Petitioner asserts that Au's decoder "parses the incoming bitstream to extract ('recognizing') and store ('forming') data elements, including the recited 'picture parameter set' or the picture parameter set is *a priori* predefined in the decoder and the decoder recognizes a reference to the picture parameter set from the bitstream described above." Pet. 40 (citing Ex. 1003 ¶¶ 130–131).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 6b. *See, e.g.*, Prelim. Resp. 1, 20–21.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that Au teaches limitation 6b. *See* Pet. 39–40; Ex. 1003 ¶¶ 129–131.

(d) Limitation 6c

Claim 6 recites "forming, in the decoder, at least one second picture parameter value using information of a slice header, the at least one second picture parameter value remaining unchanged at least in all slice headers of one picture." Ex. 1001, 12:11–14 (limitation 6c).

Petitioner contends that Au teaches limitation 6c for several related reasons. *See* Pet. 40–42. First, Petitioner asserts that Au discloses:

(1) "pictures" that correspond to a "frame or field" and include slices representing macroblocks; and

(2) "slice headers" that include a "frame number" parameter.

Id. (citing Ex. 1003 ¶ 135; Ex. 1008, 7:25–26, 8:22, 8:36–38, 8:40–42, Fig. 2).

To support its assertion, Petitioner provides a highlighted excerpt from Au's Figure 2 as reproduced below (Pet. 41):

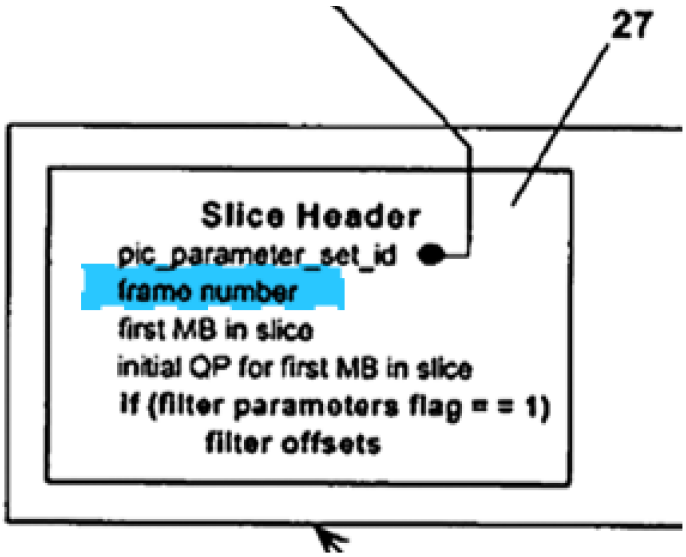

Figure 2 illustrates bitstream 15 organized into "a hierarchy of syntax levels" with sequence parameter set 29 in the sequence level 17, picture parameter set 31 in the picture (or frame) level 19, and slice header 27 in the slice level 21. Ex. 1008, 8:6–9, 8:11–16, 8:20–22, 8:39–40, 9:1–2, Fig. 2. The

above highlighted excerpt from Figure 2 shows slice header 27 including the following information and parameters:

- "pic_parameter_set_id";
- "frame number" highlighted in blue;
- "first MB in slice";
- "initial QP for first MB in slice"; and
- "if (filter parameters flag = = 1) filter offsets."

See Pet. 41; Ex. 1003 ¶ 132; Ex. 1008, 8:43–51, Fig. 2.

Second, Petitioner asserts that an ordinarily skilled artisan would have understood that the "frame number" parameter in a slice header corresponds to "at least one second picture parameter value" according to limitation 6c. Pet. 41 (citing Ex. 1003 ¶¶ 132–133).

Third, Petitioner asserts that an ordinarily skilled artisan would have understood that "forming" according to limitation 6c "encompasses a decoder creating in local memory the value associated with the data element, such as, for this limitation 'at least one second picture parameter value using information of a slice header.'" Pet. 41 (citing Ex. 1003 ¶ 134).

Fourth, Petitioner asserts that Au's decoder "parses the incoming bitstream to extract and store ('forming') values associated with data elements in order for them to be utilized in the decoding process, including the recited 'second picture parameter value' described above." Pet. 41–42 (citing Ex. 1003 ¶ 134).

Fifth, Petitioner asserts that the "frame number" parameter in a slice header "remain[s] unchanged at least in all slice headers of one picture" according to limitation 6c because "each slice of the picture would have the same frame number to properly reconstruct the frame." Pet. 42 (citing

Ex. 1003 ¶ 135). According to Petitioner, the "frame number" parameter in a slice header "functions this way to ensure all slices belonging to a given frame are indexed accordingly to spatially position them correctly within the frame for proper reconstruction." *Id.* (citing Ex. 1003 ¶ 135).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 6c. *See, e.g.*, Prelim. Resp. 1, 20–21.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that Au teaches limitation 6c. *See* Pet. 40–42; Ex. 1003 ¶¶ 132–135.

(e) Limitation 6d

Claim 6 recites "using, in the decoder, the at least one second picture parameter value in decoding." Ex. 1001, 12:15–16 (limitation 6d).

Petitioner contends that Au teaches limitation 6d because Au discloses that:

> (1) "the information in the slice headers 'pertain[s] to the decoding of the slice data that follow the slice header'"; and
>
> (2) a decoder uses the "frame number" parameter in a slice header when decoding a video sequence "to know which frame the slice belongs to and is currently being decoded in the picture buffer."

Pet. 42–43 (alteration by Petitioner) (quoting Ex. 1008, 8:42–43) (citing Ex. 1003 ¶ 136).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 6d. *See, e.g.*, Prelim. Resp. 1, 20–21.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that Au teaches limitation 6d. *See* Pet. 42–43; Ex. 1003 ¶ 136.

(f) Preliminary Conclusion About Alleged Obviousness

As discussed above, Petitioner's analysis sufficiently addresses how Au teaches claim 6's subject matter. *See supra* §§ III.G.2(a)–(e). Hence, Petitioner demonstrates a reasonable likelihood of proving that claim 6 is unpatentable under § 103(a) because the claim would have been obvious over Au.

3. Dependent Claims 7–9 and Independent Claims 11, 15, 21, and 23

Claims 7–9 depend directly from claim 6. Ex. 1001, 12:17–24. Independent claims 11, 15, 21, and 23 recite subject matter similar to claim 6. *Compare id.* at 12:1–16 (claim 6), *with id.* at 12:37–54 (claim 11), *and id.* at 13:30–46 (claim 15), *and id.* at 14:15–34 (claim 21), *and id.* at 14:46–62 (claim 23).

For claims 7–9, 11, 15, 21, and 23, Petitioner provides an analysis supported by Dr. Saber's testimony about how Au teaches the claimed subject matter. *See* Pet. 43–55; Ex. 1003 ¶¶ 137–173.

At this stage of the proceeding, Patent Owner makes no arguments specific to any of claims 7–9, 11, 15, 21, and 23. *See, e.g.*, Prelim. Resp. 1, 20–21.

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that Au teaches the subject matter in claims 7–9, 11, 15, 21, and 23. *See* Pet. 43–55; Ex. 1003 ¶¶ 137–173. Hence, Petitioner demonstrates a reasonable likelihood of proving that claims 7–9, 11, 15, 21, and 23 are unpatentable under § 103(a) because the claims would have been obvious over Au.

H. Alleged Obviousness over VCEG-N52 and Sriram: Claims 6–9, 11, 15, 21, and 23

Petitioner contends that claims 6–9, 11, 15, 21, and 23 are unpatentable under § 103(a) because the claims would have been obvious over VCEG-N52 and Sriram. *See* Pet. 2, 55–81. Patent Owner disputes Petitioner's contentions. *See* Prelim. Resp. 1–2, 21–48.

Below, we provide overviews of VCEG-N52 and Sriram. Then, we consider obviousness issues. For the reasons explained below, Petitioner establishes sufficiently for purposes of institution that the combined disclosures in VCEG-N52 and Sriram teach the subject matter in claims 6–9, 11, 15, 21, and 23.

1. OVERVIEW OF VCEG-N52 (EXHIBIT 1012)

VCEG-N52 is a document from the ITU - Telecommunications Standardization Sector titled "H.26L over IP and H.324 Framework" that "discusses one possible concept for the transport of H.26L over IP and H.324 networks."[5] Ex. 1012, 1. VCEG-N52 explains that (1) the "fundamental data structure of the video coder is a slice" and (2) a slice includes a header and "an integer number of macroblocks in scan order corresponding to the same picture." *Id.* at 4.

VCEG-N52 proposes conveying a "parameter set" containing information concerning "more than a single slice" out of band, typically "through a reliable control channel." Ex. 1012, 1, 3. In particular, "all information traditionally conveyed" in a picture header, a group-of-pictures (GOP) header, and a sequence header is "conveyed out of band." *Id.* at 1, 8.

[5] The acronym "ITU" stands for "International Telecommunication Union." Ex. 1007, 13.

VCEG-N52 proposes that a slice comprises "a maximum of three partitions" as follows: partition A containing "all header information"; partition B containing "all Intra information"; and partition C containing "all Inter information." Ex. 1012, 4. More specifically, partition A includes "everything traditionally associated" with a slice header and other information about the slice, including the following information and parameters:

- "PartitionID" indicating partition type;
- "ParameterSet" indicating "the parameter set number used for the slice";
- "SliceType" indicating the slice type, e.g., Intra (I-) slice, Inter (P-) slice, or B-Slice;
- "FirstMBInSlice" indicating the number of the first macroblock in the slice;
- "InitialQP" indicating a quantization parameter for the slice;
- "PictureID" indicating "the PictureID of the picture the slice belongs to"; and
- "NumberMBsInSlice" indicating the number of macroblocks in the slice.

Id. at 4–5 (emphasis omitted).

VCEG-N52's Figure 1 (reproduced below) depicts a system architecture:

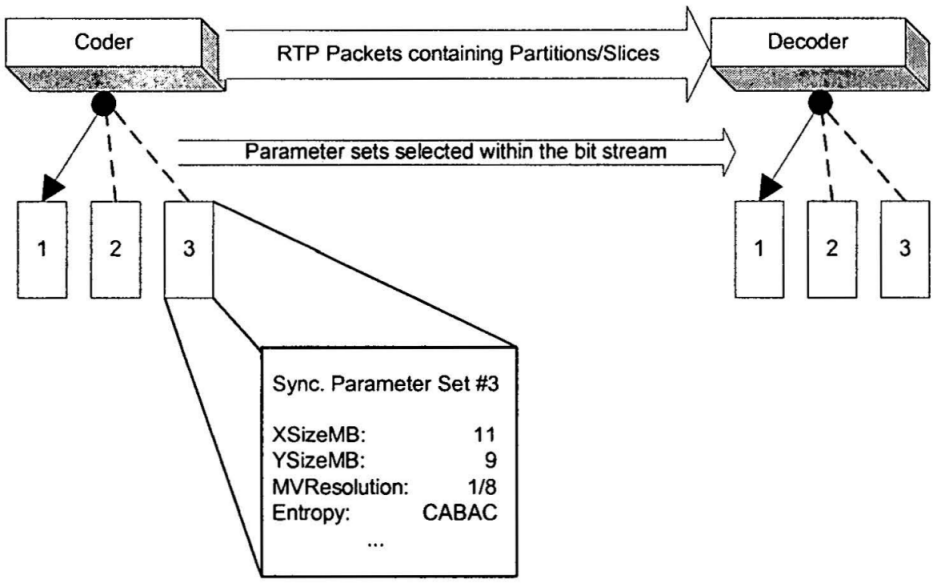

Figure 1: System Architecture

Figure 1 illustrates an encoder on the left and a decoder on the right with (1) partitions/slices sent in real-time transport protocol (RTP) packets from the encoder to the decoder and (2) parameter sets "selected within the bit stream" sent out of band from the encoder to the decoder. Ex. 1012, 3.

The encoder and decoder "maintain a synchronized set of parameter sets," e.g., "in numbered storage locations." Ex. 1012, 1, 8 (emphasis omitted). Each parameter set, "as referenced by the slice header, uses one location which contains information of all four syntax levels." *Id.* at 8. Thus, "all storage spaces for parameter sets contain information of all the sequence, GOP, picture and slice layers," including "all information associated with a picture and/or higher syntax layers." *Id.* VCEG-N52 provides examples of particular sequence parameters, GOP parameters, and picture parameters stored in one location. *Id.*

VCEG-N52 proposes a syntax for "parameter updates" that includes the following information: "ParameterSetNumber," e.g., an integer; "ParameterName," e.g., a particular name; and "ParameterValue," e.g., a string. Ex. 1012, 10.

2. OVERVIEW OF SRIRAM (EXHIBIT 1021)

Sriram is a U.S. patent titled "Apparatus and Method for Efficiently Scalable Digital Video Decoding," filed on March 2, 2000, and issued on March 25, 2003. Ex. 1021, codes (12), (22), (45), (54). Sriram states that the invention "relates to a technique for efficiently scalable digital video decoding of a Motion Compensated-Discrete Cosine Transform (MC-DCT) video signal." *Id.* at 1:8–11; *see id.* at 2:22–3:30, code (57).

Sriram identifies several design goals, including efficiency, flexibility, and additional functionality. Ex. 1021, 1:43–44, 1:58–60, 2:18–20, 2:32–34, 2:48–52. Regarding efficiency, Sriram explains that "it is important to efficiently process shared parameters" in a video bitstream, e.g., a video bitstream that "has been split into independent parts." *Id.* at 1:43–44, 1:52–57.

To efficiently process shared parameters in a video bitstream, Sriram discloses using a "hierarchy of data structures including a sequence data structure, a picture data structure, a slice data structure, and a macroblock data structure" when encoding and decoding video data. Ex. 1021, 2:66–3:5, 3:14–18, 3:39–43, 3:50–53, 5:15–17, 5:22–24, 5:58–6:5, code (57), Figs. 1–2. Sriram identifies the following "constraint" associated with the invention: "All parameter data that is needed at a certain level shall be accessible from the data structure defined for that level." *Id.* at 6:8–11.

Due to that "constraint," however, "the lower level code does not have any direct access to the upper level data structures." Ex. 1021, 6:16–18. Instead, a primary data structure at a lower level includes a pointer to a secondary data structure at an upper level. *Id.* at 6:19–22; *see id.* at 12:66–13:9.

Sriram identifies various advantages with using a hierarchy of data structures, such as "efficient data flow (minimal data replication)." Ex. 1021, 5:62–67, 6:11–13. Also, using a hierarchy of data structures, "in addition to having a very efficient data flow, significantly reduces the number of fields in the upper level data structures and hence, reduces the data bandwidth requirements of the video process." *Id.* at 6:29–33.

Sriram provides examples of data structures used at different levels, such as the following examples of data structures used at the picture level and the slice level:

typedef struct { int horizontal_size; int vertical_size; int code_picture_width; int code&_pictureheight; int pict type; int pictstruct; int progframe; int prog_seq; int chrorna_format; int framepred_dct; int conceal_my; int repeatfirst; int topfirst; int secondfield; } PicParam;	typedef struct slice_data { SliceStrptr *btstream; int MBAstart; int MBAstop; int VideoType; MvecMisc *mvparam; PicParam *picparam; PicBlockparam *picBlockParm; PicFrame *PicFramePtr; vlcptr *vlcPtr; } SliceData;

Above on the left, the example picture data structure called "PicParam" includes information and parameters relating to a picture. Ex. 1021,

14:35–53. Above on the right, the example slice data structure called "SliceData" includes information and parameters relating to a slice. *Id.* at 15:51–66.

The above examples of data structures "are disclosed in the context of an MPEG-2 implementation of the invention." Ex. 1021, 13:27–28; *see id.* at 5:40–42. Implementation of the invention "with a different standard," such as MPEG-1, MPEG-4, H.261, or H.263, "will result in modified code." *Id.* at 13:28–30; *see id.* at 5:42–45.

Sriram's Figure 2 (reproduced below) depicts a video decoder:

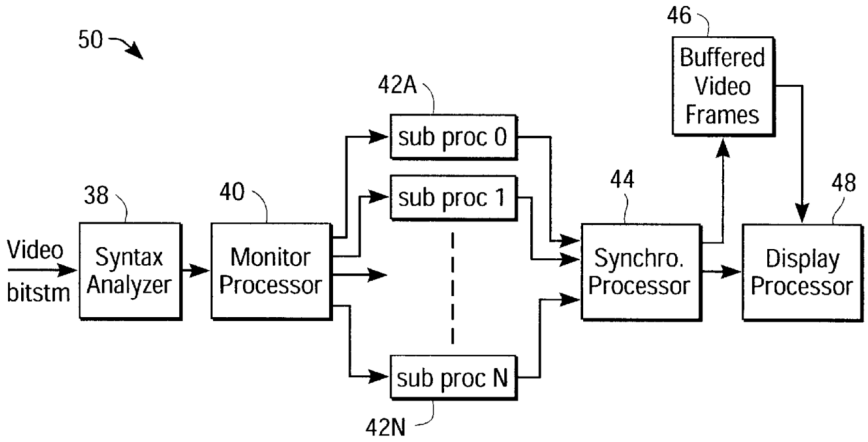

FIG. 2

Figure 2 illustrates video decoder 50 including the following components:

- syntax analyzer 38 that extracts header information and synchronization information from a video bitstream, including extracting "sequence, group of picture [GOP] and picture level header information" and "slice header information";
- monitor processor 40 that "splits the video decoding process into N independent sub-processes";
- sub-processors 42A–42N that perform assigned computational tasks on "a specified hierarchical level of the associated hierarchy of data structures";

- synchronization processor 44 that "verifies the completion of the N independent sub-processes" in sub-processors 42A–42N;
- video buffer 46 that temporarily stores the frame outputs from synchronization processor 44, i.e., because "the decoded frames may have to be re-ordered" for display; and
- display processor 48 that coordinates the video display.

Ex. 1021, 4:11–12, 4:49–5:14, 5:17–19, 9:24–31, 9:57–60, 12:64–66, code (57), Fig. 2.

3. Independent Claim 6

(a) Preamble 6pre

Claim 6 recites "[a] method for decoding sequences of pictures from a bitstream, wherein parameters are defined in a parameter set and each picture comprises information of one or more slices." Ex. 1001, 12:1–3.

Petitioner contends that the combined disclosures in VCEG-N52 and Sriram teach claim 6's preamble because:

(1) "VCEG-N52 and Sriram each disclose a video decoder";

(2) "both VCEG-N52 and Sriram disclose decoding pictures comprised of slices from a bitstream"; and

(3) "VCEG-N52 discloses the 'Parameter Set Concept.'"

Pet. 61–62 (quoting Ex. 1001, 2:48) (citing Ex. 1001, 2:49–58; Ex. 1002, 142; Ex. 1003 ¶¶ 188–190; Ex. 1012, 1, 3–6, 12; Ex. 1021, 4:11–12, 4:59–5:14, 6:1–5, Fig. 2).

At this stage of the proceeding, Patent Owner makes no arguments specific to claim 6's preamble. *See, e.g.*, Prelim. Resp. 1–2, 21–48. 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 6's preamble limits the claim because, based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that the combined disclosures in VCEG-N52 and Sriram teach claim 6's preamble. *See* Pet. 61–62; Ex. 1003 ¶¶ 188–190.

(b) Limitation 6a

Claim 6 recites "recognizing, in a decoder, a sequence parameter set and forming at least one sequence parameter pertaining to a sequence using the parameter set." Ex. 1001, 12:5–7 (limitation 6a).

(i) Petitioner's Contentions

Petitioner contends that the combined disclosures in VCEG-N52 and Sriram teach limitation 6a for several related reasons. *See* Pet. 62–65. First, Petitioner asserts that VCEG-N52 discloses the "parameter set" concept and particular parameters, including "Sequence Parameters" and "Group of Picture [GOP] Parameters." *Id.* at 62–63 (citing Ex. 1001, 2:49–58; Ex. 1002, 142; Ex. 1003 ¶ 191; Ex. 1012, 3, 8). Petitioner also asserts that VCEG-N52 discloses transmitting parameter sets from an encoder to a decoder, including "how the information is formatted for the decoder to recognize the parameter set (e.g., 'ParameterSetNumber,' 'ParameterName,' and 'ParameterValue')." *Id.* at 64 (citing Ex. 1003 ¶ 193; Ex. 1012, 9–11).

Second, Petitioner asserts that Sriram teaches (1) a "sequence parameter data structure storing sequence parameters" and (2) a "GOP parameter data structure storing GOP parameters." Pet. 63 (citing Ex. 1003 ¶ 191; Ex. 1021, 13:2–9, 17:55–60); *see id.* at 58–59 (citing Ex. 1003 ¶ 181; Ex. 1021, 6:8–11). According to Petitioner, each of those data structures

contains data corresponding to a "sequence parameter set." *Id.* at 64 (citing Ex. 1003 ¶ 195).

Third, Petitioner asserts that an ordinarily skilled artisan would have understood that "recognizing" according to limitation 6a "encompasses a decoder parsing the incoming bitstream and identifying a 'sequence parameter set.'" Pet. 63 (citing Ex. 1003 ¶ 192).

Fourth, Petitioner asserts that an ordinarily skilled artisan would have understood that a decoder according to the combined disclosures in VCEG-N52 and Sriram would extract "values of a sequence parameter included in the sequence parameter set and GOP parameter set" and then store the extracted values in "local memory for later use." Pet. 64–65 (citing Ex. 1003 ¶¶ 195–196).

(ii) Patent Owner's Contentions

Patent Owner disputes that the combined disclosures in VCEG-N52 and Sriram teach limitation 6a. *See* Prelim. Resp. 31–37. In particular, Patent Owner contends that neither VCEG-N52 nor Sriram teaches (1) a "sequence parameter set structure storing sequence parameters" or (2) a "GOP parameter set structure storing GOP parameters." *Id.* at 33 (citing Ex. 2001 ¶ 112). Patent Owner contends that "nowhere does Sriram describe creating a sequence level data structure by breaking down any other bigger structure." *Id.* at 34 (citing Ex. 2001 ¶ 114). Patent Owner also contends that "Sriram does not group parameters together into any data structures based on persistency (i.e. grouping sequence parameters and picture parameters), but instead groups the parameters based on a given process to be performed, such that the video stream can be split and

processed independently, in parallel with other processes." *Id.* at 35 (citing Ex. 1021, 5:19–24, 6:22–29; Ex. 2001 ¶ 115).

Further, Patent Owner asserts that "Sriram discloses extracting information from sequence, GOP, and picture headers in the bitstream and creating smaller data structures at the decoder based on that information." Prelim. Resp. 32 (citing Ex. 1021, 9:10–22, 9:29–30, 10:57–59, 12:64–13:13; Ex. 2001 ¶ 110). Patent Owner also asserts that "Sriram does not disclose extracting information from a parameter set to create smaller parameter sets." *Id.* (citing Ex. 2001 ¶ 110).

(iii) Analysis

Based on the current record, Petitioner establishes sufficiently that the combined disclosures in VCEG-N52 and Sriram teach limitation 6a. *See* Pet. 62–65; Ex. 1003 ¶¶ 176, 179, 181–182, 191–196. As Petitioner asserts, VCEG-N52 discloses the "parameter set" concept and transmitting parameter sets from an encoder to a decoder. Ex. 1012, 1, 3–5, 8–10; *see* Ex. 1003 ¶¶ 176, 191–193; Pet. 62–63. Each parameter set contains "information of all four syntax levels," i.e., "information of all the sequence, GOP, picture and slice layers." Ex. 1012, 8.

Sriram discloses using a "hierarchy of data structures including a sequence data structure, a picture data structure, [and] a slice data structure" when encoding and decoding video data. Ex. 1021, 2:66–3:5, 3:14–18, 3:39–43, 5:15–17, 5:22–24, 5:58–6:5, code (57), Figs. 1–2; *see* Ex. 1003 ¶¶ 179, 182. Sriram also discloses extracting header information from a video bitstream, including extracting "sequence, group of picture [GOP] and picture level header information" and "slice header information." Ex. 1021, 9:24–31, 9:57–60, 12:64–66; *see* Ex. 1003 ¶ 191.

As Dr. Saber explains, "a group of pictures is a sequence of pictures." Ex. 1003 ¶ 195 (citing Ex. 1023, 11). Thus, an ordinarily skilled artisan "would have recognized that both the GOP parameter set and sequence parameter set of the combination of VCEG-N52 and Sriram would meet the 'sequence parameter set' limitation." *Id.* Hence, we disagree with Patent Owner that neither VCEG-N52 nor Sriram teaches (1) a "sequence parameter set structure storing sequence parameters" or (2) a "GOP parameter set structure storing GOP parameters." *See* Prelim. Resp. 33.

Additionally, as Petitioner asserts, an ordinarily skilled artisan would have understood that a decoder according to the combined disclosures in VCEG-N52 and Sriram would:

(1) "recognize" a sequence parameter set and GOP parameter set in a video bitstream;

(2) extract "values of a sequence parameter included in the sequence parameter set and GOP parameter set"; and

(3) store the extracted values in "local memory for later use," thus "forming" the extracted values (sequence parameters) as required by limitation 6a.

See Ex. 1003 ¶¶ 192, 195–196; Pet. 63–65.

Patent Owner's arguments largely relate to unclaimed features. *See* Prelim. Resp. 31–37. As an example, Patent Owner contends that "nowhere does Sriram describe creating a sequence level data structure by breaking down any other bigger structure." *Id.* at 34. But limitation 6a does not require "creating a sequence level data structure by breaking down any other bigger structure." Ex. 1001, 12:5–7. As another example, Patent Owner contends that "Sriram does not group parameters together into any data structures based on persistency." Prelim. Resp. 35. But limitation 6a does

not require grouping "sequence parameters" based on "persistency." Ex. 1001, 12:5–7.

(c) Limitation 6b

Claim 6 recites "recognizing, in the decoder, a picture parameter set and forming at least one first picture parameter value pertaining to a picture using the parameter set." Ex. 1001, 12:8–10 (limitation 6b).

(i) Petitioner's Contentions

Petitioner contends that the combined disclosures in VCEG-N52 and Sriram teach limitation 6b for several related reasons. *See* Pet. 65–67. First, Petitioner asserts that VCEG-N52 discloses the "parameter set" concept and transmitting parameter sets from an encoder to a decoder, including "how the information is formatted for the decoder to recognize the parameter set (e.g., 'ParameterSetNumber,' 'ParameterName,' and 'ParameterValue')." *Id.* at 65–66 (citing Ex. 1003 ¶ 199; Ex. 1012, 3, 9–11).

Second, Petitioner asserts that Sriram discloses a "picture parameter data structure" storing multiple picture parameters, including the following picture parameters: "horizontal_size," "vertical_size," and "chroma_format." Pet. 65 (citing Ex. 1021, 14:35–54, 15:57–65). According to Petitioner, each of these parameters corresponds to "at least one first picture parameter value." *Id.*

Third, Petitioner asserts that an ordinarily skilled artisan would have understood that "recognizing" according to limitation 6b "encompasses a decoder parsing the incoming bitstream and identifying a 'picture parameter set.'" Pet. 65 (citing Ex. 1003 ¶ 198).

Fourth, Petitioner asserts that an ordinarily skilled artisan would have understood that a decoder according to the combined disclosures in VCEG-

N52 and Sriram would extract a "value of a picture parameter included in the picture parameter set" and then store the extracted value in "local memory for later use." Pet. 66–67 (citing Ex. 1003 ¶ 202).

(ii) Patent Owner's Contentions

Patent Owner disputes that the combined disclosures in VCEG-N52 and Sriram teach limitation 6b. *See* Prelim. Resp. 37–41. Specifically, Patent Owner asserts that:

(1) Sriram "discloses extracting information from sequence, GOP, and picture headers in the bitstream and creating smaller data structures at the decoder based on that information"; and

(2) VCEG-N52 "discloses that picture header information is extracted from headers and transmitted out of band."

Id. at 38 (citing Ex. 1012, 1; Ex. 1021, 9:10–22, 9:29–30, 12:64–66).

Patent Owner also asserts that because "VCEG-N52 removes header information for out-of-band transmissions, Sriram would be unable to extract the required header information from VCEG-N52's headers to 'recogniz[e] . . . a picture parameter set' and 'form[] at least one first picture value pertaining to a picture using the parameter set,'" as claimed. Prelim. Resp. 39 (alterations by Patent Owner) (citing Ex. 1012, 1).

(iii) Analysis

Based on the current record, Petitioner establishes sufficiently that the combined disclosures in VCEG-N52 and Sriram teach limitation 6b. *See* Pet. 65–67; Ex. 1003 ¶¶ 176, 191–193, 197–202. As Petitioner asserts, VCEG-N52 discloses the "parameter set" concept and transmitting parameter sets from an encoder to a decoder. Ex. 1012, 1, 3–5, 8–10; *see* Ex. 1003 ¶¶ 176, 191–193, 198–199; Pet. 65–66. Each parameter set

contains "information of all four syntax levels," i.e., "information of all the sequence, GOP, picture and slice layers." Ex. 1012, 8.

As discussed above for limitation 6a, Sriram discloses using a "hierarchy of data structures including a sequence data structure, a picture data structure, [and] a slice data structure" when encoding and decoding video data. Ex. 1021, 2:66–3:5, 3:14–18, 3:39–43, 5:15–17, 5:22–24, 5:58–6:5, code (57), Figs. 1–2; *see* Ex. 1003 ¶¶ 179, 182; *supra* § III.H.3(b)(iii). The picture parameter data structure includes, among other things, the parameters "horizontal_size," "vertical_size," and "chroma_format" that correspond to the claimed "at least one first picture parameter value." Ex. 1021, 14:35–54; *see* Ex. 1003 ¶ 197.

Additionally, as Petitioner asserts, an ordinarily skilled artisan would have understood that a decoder according to the combined disclosures in VCEG-N52 and Sriram would:

(1) "recognize" a picture parameter set in a video bitstream;

(2) extract a "value of a picture parameter included in the picture parameter set"; and

(3) store the extracted value in "local memory for later use," thus "forming" the extracted value (picture parameter) as required by limitation 6b.

See Ex. 1003 ¶¶ 198, 202; Pet. 65–67.

Patent Owner mischaracterizes VCEG-N52 when asserting that "VCEG-N52 removes header information for out-of-band transmissions." *See* Prelim. Resp. 39. VCEG-N52 explains that "all information traditionally conveyed" in a picture header, a GOP header, and a sequence header is "conveyed out of band," typically "through a reliable control channel." Ex. 1012, 1, 3, 8. Based on the current record, a decoder

according to the combined disclosures in VCEG-N52 and Sriram would parse the bitstream in the out-of-band channel to determine "information associated with a picture and/or higher syntax layers." *See* Ex. 1003 ¶¶ 192, 198; Ex. 1012, 8–10. The '818 patent contemplates a decoder processing information in an out-of-band channel. Ex. 1001, 2:61–64. And claim 6 encompasses processing information in an out-of-band channel. *Id.* at 12:1–16.

(d) Limitation 6c

Claim 6 recites "forming, in the decoder, at least one second picture parameter value using information of a slice header, the at least one second picture parameter value remaining unchanged at least in all slice headers of one picture." Ex. 1001, 12:11–14 (limitation 6c).

(i) Petitioner's Contentions

Petitioner contends that the combined disclosures in VCEG-N52 and Sriram teach limitation 6c for several related reasons. *See* Pet. 67–69. First, Petitioner asserts that "[b]oth VCEG-N52 and Sriram disclose sending slice headers from the coder to the decoder, and extracting information from such slice headers." *Id.* at 67 (citing Ex. 1012, 4; Ex. 1021, 1:47–49, 9:26–29).

Second, Petitioner asserts that Sriram discloses a slice data structure (called "SliceData") storing "slice data and slice header information (e.g., a pointer to a data bit stream ('btstream'), as well as variables that relate to the data (e.g., 'VideoType,' 'PicFramePtr'))." Pet. 67 (citing Ex. 1003 ¶ 204; Ex. 1021, 15:9–10, 15:52–66). Petitioner asserts that Sriram also discloses a picture frame data structure (called "PicFrame") storing "the starting address of all the frames that are needed" for decoding. *Id.* at 58, 67–68 (citing Ex. 1003 ¶¶ 181, 204; Ex. 1021, 15:9–10, 15:57–65).

Third, Petitioner asserts that an ordinarily skilled artisan would have included a "frame number" parameter in the picture frame data structure (called "PicFrame") as "a further use of data encapsulation." Pet. 68 (citing Ex. 1003 ¶ 204). According to Petitioner, an ordinarily skilled artisan would have understood that "all of the slice data structures for a particular picture would have the same value" for the "frame number" parameter because "each of the addresses of the frame being decoded and the frame number of the frame being decoded are defined by the frame being decoded." *Id.* (citing Ex. 1003 ¶ 204).

Fourth, Petitioner alternatively asserts that an ordinarily skilled artisan would have included a "frame number" parameter in the slice data structure (called "SliceData") that also includes slice header information. Pet. 69 (citing Ex. 1003 ¶ 205). Petitioner explains that VCEG-N52 discloses a slice header including a "PictureID" parameter indicating "the PictureID of the picture the slice belongs to." *Id.* (quoting Ex. 1012, 5). Petitioner also explains that (1) "Sriram states its invention is applicable to" the H.263 standard and (2) the H.263 standard specifies that a "Group of Blocks (GOB) Frame ID" has "the same value in every GOB (or slice) header of a given picture." *Id.* (citing Ex. 1003 ¶ 205; Ex. 1021, 5:38–45; Ex. 1022, 19, 32–33). According to Petitioner these teachings in VCEG-N52, Sriram, and the H.263 standard would have motivated an ordinarily skilled artisan to include a "frame number" parameter in the slice data structure. *Id.* (citing Ex. 1003 ¶ 205).

Fifth, Petitioner asserts that Sriram discloses storing the slice data structure and the picture frame data structure in the decoder, and thus teaches "forming, in the decoder, at least one second picture parameter value

using information of a slice header" according to limitation 6c. Pet. 68 (citing Ex. 1003 ¶ 204; Ex. 1021, 4:59–62, 5:51–6:43).

(ii) Patent Owner's Contentions

Patent Owner disputes that the combined disclosures in VCEG-N52 and Sriram teach limitation 6c. *See* Prelim. Resp. 41–48. Specifically, Patent Owner asserts that Sriram's slice data structure (called "SliceData") does not include "picture parameter values in its slice header and the pointers identified by the Petitioner in Sriram are not picture parameter values." *Id.* at 41–42; *see id.* at 47 (citing Ex. 1021, 15:56–67). Patent Owner asserts that an ordinarily skilled artisan "would have understood that the PicFramePtr of Sriram within the slice data structure is not a picture parameter value, but rather a pointer or reference to another data structure (i.e., the PicFrame data structure)." *Id.* at 43 (citing Ex. 2001 ¶ 126). Patent Owner also asserts that Sriram "does not teach that the picture parameter value is formed using information of a slice header." *Id.* (citing Ex. 1021, 9:10–22, 9:29–30, 12:64–66; Ex. 2001 ¶ 124).

Additionally, Patent Owner asserts that Sriram "expressly teaches away from a picture parameter value" in a slice header and a slice data structure. Prelim. Resp. 42, 45 (citing Ex. 1021, 6:8–18). As support, Patent Owner quotes the following statements in Sriram concerning a "constraint" associated with the invention:

(1) "[a]ll parameter data that is needed at a certain level shall be accessible from the data structure defined for that level"; and

(2) "[d]ue to the above mentioned constraint, the lower level code does not have any direct access to the upper level data structures."

Id. at 42 (alterations by Patent Owner) (quoting Ex. 1021, 6:9–11, 6:16–18).

Patent Owner asserts that Sriram's picture frame data structure (called "PicFrame") contains only the "starting address of all the frames that are needed for MPEG-2 decoding." Prelim. Resp. 42 (quoting Ex. 1021, 15:8–9).

Further, Patent Owner asserts that Petitioner "fails to identify any picture parameter values in Sriram that remain unchanged in all slice headers of one picture and that are formed using information of a slice header." Prelim. Resp. 44–45 (citing Ex. 2001 ¶ 128).

Additionally, Patent Owner contends that "Sriram discloses a complete decoding process that does not require a frame number or identifier for decoding frames" and does not disclose "including a frame identifier within [its] data structures because they are not required for the decoding process." Prelim. Resp. 46 (citing Ex. 2001 ¶ 131); *see id.* at 46–48 (citing Ex. 1021, 5:58–67, 6:34–37, 12:46–51, 13:9–12, 15:56–67; Ex. 2001 ¶¶ 131–132).

(iii) <u>Analysis</u>

Based on the current record, Petitioner establishes sufficiently that the combined disclosures in VCEG-N52 and Sriram teach limitation 6c. *See* Pet. 67–69; Ex. 1003 ¶¶ 203–205. VCEG-N52 discloses sending a slice header from an encoder to a decoder and extracting information from the slice header at the decoder. Ex. 1012, 4–5; *see* Ex. 1003 ¶ 203. Sriram similarly discloses sending a slice header from an encoder to a decoder and extracting information from the slice header at the decoder. Ex. 1021, 1:47–49, 9:24–29, 10:48–49; *see* Ex. 1003 ¶ 203.

Sriram discloses an example slice data structure called "SliceData" that includes information and parameters relating to a slice, such as header information. Ex. 1021, 15:51–66; *see* Ex. 1003 ¶ 204. VCEG-N52 discloses a slice header including a "PictureID" parameter indicating "the PictureID of the picture the slice belongs to." Ex. 1012, 4–5. For the majority of digital video, the "PictureID" parameter corresponds to a "frame number" parameter that "remain[s] unchanged at least in all slice headers of one picture" as required by limitation 6c. Ex. 1003 ¶ 205. 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).

Also, as Petitioner explains, (1) "Sriram states its invention is applicable to" the H.263 standard and (2) the H.263 standard specifies that a "Group of Blocks (GOB) Frame ID" has "the same value in every GOB (or slice) header of a given picture." Ex. 1003 ¶ 205; Ex. 1021, 5:38–45; Ex. 1022, 32–33; *see* Pet. 69.

Additionally, Sriram discloses storing the slice data structure in the decoder, and thus teaches "forming, in the decoder, at least one second picture parameter value using information of a slice header" as required by limitation 6c. Ex. 1021, 2:66–3:5, 3:14–18, 3:39–43, 4:59–62, 5:51–6:43, code (57); *see* Ex. 1003 ¶ 204.

We disagree with Patent Owner that Sriram "expressly teaches away from a picture parameter value" in a slice header and a slice data structure. *See* Prelim. Resp. 42, 45. A "reference does not teach away" if "it merely expresses a general preference for an alternative invention but does not 'criticize, discredit, or otherwise discourage' investigation into the invention

claimed." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (quoting *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004)).

Sriram identifies the following "constraint" associated with the invention: "All parameter data that is needed at a certain level shall be accessible from the data structure defined for that level." Ex. 1021, 6:8–11. That "constraint" does not "criticize, discredit, or otherwise discourage" including a "frame number" parameter in a slice data structure. *Id.* Also, Sriram's explanation that "the lower level code does not have any direct access to the upper level data structures" does not "criticize, discredit, or otherwise discourage" including a "frame number" parameter in a slice data structure. *See id.* at 6:16–18. Instead, Sriram explains that "an occasional parameter might be replicated in different data structures" as "a compute-vs-bandwidth compromise." *Id.* at 6:41–43.

As for Patent Owner's contention that "Sriram discloses a complete decoding process that does not require a frame number or identifier for decoding frames," Petitioner relies on VCEG-N52 as teaching the "PictureID" parameter corresponding to a "frame number" parameter. *See* Pet. 69; Prelim. Resp. 46. As explained in greater detail below, the proposed combination "break[s] up VCEG-N52's parameter set into multiple parameter sets for each level of the video hierarchy" at an encoder and a decoder. *See* Pet. 60; Ex. 1003 ¶¶ 183–184, 191, 194; *infra* § III.H3(f)(i). VCEG-N52's parameter set includes the "PictureID" parameter. Ex. 1012, 4–5; *see* Ex. 1003 ¶ 205.

(e) Limitation 6d

Claim 6 recites "using, in the decoder, the at least one second picture parameter value in decoding." Ex. 1001, 12:15–16 (limitation 6d).

Petitioner contends that the combined disclosures in VCEG-N52 and Sriram teach limitation 6d because the slice header "indicates to the decoder in which frame to decode each slice," and thus the decoder uses the "frame number" parameter in decoding. Pet. 69–70 (citing Ex. 1003 ¶ 206).

Patent Owner disputes that the combined disclosures in VCEG-N52 and Sriram teach limitation 6d for "analogous reasons" discussed for limitation 6c. *See* Prelim. Resp. 48 (citing Ex. 2001 ¶¶ 135–136).

Based on the current record and for the reasons stated by Petitioner and supported by Dr. Saber's testimony, Petitioner establishes sufficiently that the combined disclosures in VCEG-N52 and Sriram teach limitation 6d. *See* Pet. 69–70; Ex. 1003 ¶ 206. Based on the current record and for the reasons discussed above, Patent Owner's arguments regarding limitation 6c are unavailing. *See* Prelim. Resp. 41–48; *supra* § III.H.3(d)(iii).

(f) Whether an Ordinarily Skilled Artisan Would Have Been Motivated to Combine the Teachings of the References with a Reasonable Expectation of Success

(i) Petitioner's Position

Petitioner identifies a reason that would have prompted an ordinarily skilled artisan to combine Sriram's teachings with VCEG-N52's teachings in the way Petitioner proposes, i.e., to improve VCEG-N52's "parameter set" concept and increase bandwidth. *See* Pet. 59–60. 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 59; *see id.*

at 60–61. Dr. Saber's testimony supports Petitioner's position. *See* Ex. 1003 ¶¶ 182–187, 190–191, 194, 197, 201, 205.

For instance, Dr. Saber testifies that "because VCEG-N52 and Sriram both focus on efficiently processing parameters," an ordinarily skilled artisan would have been motivated to improve VCEG-N52's "parameter set" concept "based on Sriram's teaching of '[s]everal smaller data structures' for holding the 'several parameters' extracted from the 'picture, sequence and GOP headers . . . .'" Ex. 1003 ¶ 183 (alterations in original) (citing Ex. 1012, 3; Ex. 1021, 12:64–13:13). More specifically, according to Dr. Saber, an ordinarily skilled artisan would have been motivated to "break up VCEG-N52's parameter set into multiple parameter sets for each level of the video hierarchy" because "doing so would have contributed to the shared goal of VCEG-N52 and Sriram of increasing bandwidth." *Id.* (citing Ex. 1012, 8; Ex. 1021, 6:29–33); *see id.* ¶ 191.

Dr. Saber explains that each level of parameters in the proposed combination "would need to be transmitted only once, as part of the related parameter set, as opposed to being included in every parameter set." Ex. 1003 ¶ 183. As specific examples, Dr. Saber explains that "sequence and GOP parameters would not need to be repeated in each picture parameter data structure to promote Sriram's stated goal of reducing 'data bandwidth.'" *Id.* ¶ 191 (citing Ex. 1021, 6:29–33, 13:11–13).

Additionally, Dr. Saber testifies that an ordinarily skilled artisan "would have had a reasonable expectation of success" in combining the teachings of the references because both references disclose:

(1) "video decoding and processing parameters for video decoding";

(2) "the same video hierarchy of sequence, GOP, picture, slices, and macroblocks";

(3) "how to efficiently process the parameters for these levels contained within a bitstream";

(4) "storing parameters together," i.e., storing in VCEG-N52's "parameter set" and Sriram's data structures; and

(5) "identifying the parameter set to use for each slice."

Ex. 1003 ¶ 182 (citing Ex. 1012, 3–4, 6, 8; Ex. 1021, 1:43–44, 3:14–18, 6:4–5, 9:29–30, 12:64–13:13, 14:35–54, 15:56–67).

Dr. Saber also testifies that extending VCEG-N52's "parameter set" concept with "Sriram's multiple parameter sets would involve only routine engineering tasks that would yield predictable results." Ex. 1003 ¶ 185; *see id.* ¶¶ 186–187, 190, 201. According to Dr. Saber, the proposed combination "would have been accomplished using well-known software engineering techniques applied to the disclosures of VCEG-N52 and Sriram, and would have been well within the capabilities" of an ordinarily skilled artisan. *Id.* ¶ 185.

(ii) <u>Patent Owner's Position</u>

Patent Owner disputes that an ordinarily skilled artisan would have been motivated to combine Sriram's teachings with VCEG-N52's teachings to yield the claimed invention. Prelim. Resp. 21–31; *see id.* at 31–48. In particular, Patent Owner contends that VCEG-N52 and Sriram are "inapposite and have distinct and incompatible implementations." *Id.* at 21; *see id.* at 23. Patent Owner explains that:

(1) VCEG-N52 proposes that "parameters for all four syntax levels (sequence, GOP, picture, and slice layer) be placed into a single parameter set to be transmitted out of band

in order to 'mak[e] more transmissions (e.g. of picture headers) unnecessary'";

(2) "VCEG-N52 eliminates the sequence and picture headers and instead transmits all the information associated with the picture and higher layers within a single parameter set out of band";

(3) "VCEG-N52 eliminates the headers at the sequence, GOP, and picture level in favor of a consolidated parameter set with parameters from all of the syntax layers"; and

(4) "Sriram proposes the exact opposite," i.e., "receiving parameters from the sequence, GOP, and picture headers and then creating smaller data structures."

Id. at 23, 29 (alteration by Petitioner) (emphasis omitted) (quoting Ex. 1012, 8) (citing Ex. 1021, 6:19–20; Ex. 2001 ¶¶ 89, 97).

According to Patent Owner, an ordinarily skilled artisan "would not have been motivated to":

(1) "use VCEG-N52's process, which describes removing sequence, GOP, and picture headers entirely in favor of transmitting such information out-of-band, with Sriram because this proposed modification would require extracting information from picture headers that were specifically removed in VCEG-N52";

(2) "modify VCEG-N52 in a way that goes directly against" VCEG-N52's express teaching that employing "a single parameter set" could "reduce transmissions" and "be sent in an out of band, more reliable channel"; or

(3) "include the identifier for the frame as a field within the slice data structure, because such a modification goes against the express teachings of Sriram."

Prelim. Resp. 39–40, 46 (citing Ex. 2001 ¶¶ 114, 118–119, 130).

Further, Patent Owner asserts that VCEG-N52's "parameter set" concept is "fundamentally very different" and "markedly different" than Sriram's "header" concept. Prelim. Resp. 28, 30 (citing Ex. 2001 ¶ 98). Patent Owner asserts that VCEG-N52 and Sriram require "fundamentally different" data structures because Sriram's data structures "were created based on their access pattern by the decoder such that the video stream can be split up into independent sub-processes and processed in parallel." *Id.* at 33 (citing Ex. 1021, 6:22–29; Ex. 2001 ¶ 112). Patent Owner similarly asserts that "the picture parameters stored in Sriram's picture parameter data structure are not compatible with the single parameter concept of VCEG-N52." *Id.* at 40 (citing Ex. 2001 ¶ 119).

Patent Owner asserts that "Sriram will not work with VCEG-N52 and would render VCEG-N52 inoperable" because Sriram "does not provide any method or ability to extract parameters out of a single consolidated parameter set transmitted out of band." Prelim. Resp. 30 (citing Ex. 2001 ¶ 100). Patent Owner also asserts that "[m]odifying Sriram, as suggested by Petitioner, departs from the teachings of Sriram which is essential to its operability." *Id.* at 36; *see id.* at 33.

Additionally, Patent Owner contends that VCEG-N52 and Sriram contain "no support" for Petitioner's position that an ordinarily skilled artisan would have been motivated to "break up VCEG-N52's parameter set into multiple parameter sets for each level of the video hierarchy" to increase bandwidth. Prelim. Resp. 23 (citing Ex. 1003 ¶ 183; Ex. 2001 ¶ 89). According to Patent Owner, "VCEG-N52 does not itself disclose or suggest" breaking up the "single parameter set structure." *Id.* at 40 (citing Ex. 1003 ¶ 201; Ex. 2001 ¶ 120).

Patent Owner argues that "the purported goal of reducing the data bandwidth between an encoder and a decoder [is] not supported by Sriram" because "Sriram's discussion on 'bandwidth' refers to the transmission between the blocks of the decoder." Prelim. Resp. 36–37 (citing Ex. 1021, 5:64–65; Ex. 2001 ¶ 113). Patent Owner also argues that some "parameters may in fact be repeated" in Sriram's data structures "since they are being used to processes parallel bit streams." *Id.* at 37 (citing Ex. 1021, 6:41–43; Ex. 2001 ¶ 113).

Further, Patent Owner asserts that Petitioner "never substantively addresses reasonable expectation of success." Prelim. Resp. 27 (citing Pet. 59). According to Patent Owner, Petitioner's assertions regarding reasonable expectation of success rest on "an oversimplification of the engineering process" and fail to consider an ordinarily skilled artisan's "design consideration when developing an integrated system." *Id.* at 25 (citing Ex. 2001 ¶ 93).

(iii) Analysis

Based on the current record, Petitioner establishes sufficiently that an ordinarily skilled artisan would have had a reason to combine Sriram's teachings with VCEG-N52's teachings in the way Petitioner proposes. *See* Pet. 59–60; Ex. 1003 ¶¶ 182–184, 190–191, 194, 197, 205. Further, based on the current record, Petitioner establishes sufficiently that an ordinarily skilled artisan would have had a reasonable expectation of success in combining the teachings of the references. *See* Pet. 59–61; Ex. 1003 ¶¶ 182, 185–187, 190, 201.

Regarding a reason to combine Sriram's teachings with VCEG-N52's teachings, Sriram explains that "it is important to efficiently process shared

parameters" in a video bitstream, e.g., a video bitstream that "has been split into independent parts." Ex. 1021, 1:43–44, 1:52–57; *see* Ex. 1003 ¶ 182. To efficiently process shared parameters in a video bitstream, Sriram discloses using a "hierarchy of data structures including a sequence data structure, a picture data structure, [and] a slice data structure" when encoding and decoding video data. Ex. 1021, 2:66–3:5, 3:14–18, 3:39–43, 3:50–53, 5:15–17, 5:22–24, 5:58–6:5, code (57), Figs. 1–2; *see* Ex. 1003 ¶ 189. Sriram identifies various advantages with using a hierarchy of data structures, such as "efficient data flow (minimal data replication)" that "reduces the data bandwidth requirements." Ex. 1021, 5:62–67, 6:11–13, 6:29–33. Sriram's disclosures about "minimal data replication" and reduced "data bandwidth requirements" provide a reason to combine Sriram's teachings with VCEG-N52's teachings. *See* Ex. 1003 ¶¶ 182–184.

A motivation to combine "can be found explicitly or implicitly in the prior art references themselves, in market forces, in design incentives, or in 'any need or problem known in the field of endeavor at the time of invention and addressed by the patent.'" *Forest Lab'ys, LLC v. Sigmapharm Lab'ys, LLC*, 918 F.3d 928, 934 (Fed. Cir. 2019) (quoting *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1359 (Fed. Cir. 2017)). Here, Petitioner identifies a motivation to combine "in the prior art references themselves," i.e., in Sriram's disclosures about "minimal data replication" and reduced "data bandwidth requirements." *See* Pet. 59–60; Ex. 1003 ¶¶ 182–184; Ex. 1021, 5:62–67, 6:11–13, 6:29–33.

Because Petitioner identifies a motivation to combine in Sriram's disclosures, we disagree with Patent Owner that VCEG-N52 and Sriram contain "no support" for Petitioner's position that an ordinarily skilled

artisan would have been motivated to "break up VCEG-N52's parameter set into multiple parameter sets for each level of the video hierarchy" to increase bandwidth. *See* Pet. 59–60; Prelim. Resp. 23. Further, even if "VCEG-N52 does not itself disclose or suggest" breaking up the "single parameter set structure," as Patent Owner asserts, that does not matter because Petitioner identifies a motivation to combine in Sriram's disclosures. *See* Pet. 59–60; Prelim. Resp. 40.

That some "parameters may in fact be repeated" in Sriram's data structures, as Patent Owner points out, does not negate a motivation to combine. *See* Prelim. Resp. 37. Sriram explains that "an occasional parameter might be replicated in different data structures" as "a compute-vs-bandwidth compromise." Ex. 1021, 6:41–43.

We disagree with Patent Owner that "Sriram's discussion on 'bandwidth' refers to the transmission between the blocks of the decoder." *See* Prelim. Resp. 36–37 (citing Ex. 1021, 5:64–65; Ex. 2001 ¶ 201). Sriram discloses using a "hierarchy of data structures" when encoding and decoding video data. Ex. 1021, 2:66–3:5, 3:14–18, 3:39–43, 5:15–17, 5:22–24, 5:58–6:5, code (57), Figs. 1–2. Sriram explains that a decoder "receive[s] an MC-DCT video stream with an associated hierarchy of data structures." *Id.* at 2:66–3:5, 3:14–18, 3:39–43. Because the video stream transmitted by an encoder and received by a decoder has "an associated hierarchy of data structures," the video stream has "minimal data replication" and reduced "data bandwidth requirements." *Id.* at 5:62–67, 6:29–33.

By using a "hierarchy of data structures" when encoding and decoding video data, each level of parameters in the proposed combination "would need to be transmitted only once, as part of the related parameter set, as

opposed to being included in every parameter set." Ex. 1003 ¶ 183; *see id.* ¶ 184. For example, "sequence and GOP parameters would not need to be repeated in each picture parameter." *Id.* ¶ 191 (citing Ex. 1021, 6:29–33, 13:11–13).

Further, we disagree with Patent Owner that VCEG-N52's "parameter set" concept is "fundamentally very different" and "markedly different" than Sriram's "header" concept. *See* Prelim. Resp. 28, 30. Both references disclose "the same video hierarchy of sequence, GOP, picture, slices, and macroblocks." Ex. 1003 ¶ 182; Ex. 1012, 4–6, 8–9; Ex. 1021, 2:66–3:5, 3:14–18, 3:39–43, 6:1–5, 9:26–31, 9:57–60, 12:64–66, code (57).

As for Patent Owner's assertion that "Sriram will not work with VCEG-N52 and would render VCEG-N52 inoperable" because Sriram "does not provide any method or ability to extract parameters out of a single consolidated parameter set transmitted out of band," the proposed combination does not "extract parameters out of a single consolidated parameter set." *See* Pet. 59–60; Prelim. Resp. 30. Instead, the proposed combination "break[s] up VCEG-N52's parameter set into multiple parameter sets for each level of the video hierarchy" at an encoder and a decoder. *See* Pet. 60; Ex. 1003 ¶¶ 183–184, 191, 194.

Patent Owner's assertion that Petitioner "never substantively addresses reasonable expectation of success" lacks merit. *See* Prelim. Resp. 27. Petitioner explains that extending VCEG-N52's "parameter set" concept with "Sriram's multiple parameter sets would involve only routine engineering tasks that would yield predictable results." Pet. 60. Petitioner also explains that the proposed combination "would have been accomplished using well-known software engineering techniques applied to the disclosures

of VCEG-N52 and Sriram, and would have been well within the capabilities" of an ordinarily skilled artisan. *Id.* Dr. Saber's testimony supports Petitioner's position. *See* Ex. 1003 ¶ 185; *see id.* ¶¶ 186–187, 190, 201.

Additionally, as discussed above, Dr. Saber testifies that an ordinarily skilled artisan "would have had a reasonable expectation of success" in combining the teachings of the references because both references disclose:

(1) "video decoding and processing parameters for video decoding";

(2) "the same video hierarchy of sequence, GOP, picture, slices, and macroblocks";

(3) "how to efficiently process the parameters for these levels contained within a bitstream";

(4) "storing parameters together," i.e., storing in VCEG-N52's "parameter set" and Sriram's data structures; and

(5) "identifying the parameter set to use for each slice."

Ex. 1003 ¶ 182 (citing Ex. 1012, 3–4, 6, 8; Ex. 1021, 1:43–44, 3:14–18, 6:4–5, 9:29–30, 12:64–13:13, 14:35–54, 15:56–67); *see supra* § III.H.3(f)(i).

Thus, based on the current record, Petitioner establishes sufficiently that an ordinarily skilled artisan would have had a reasonable expectation of success in combining the teachings of the references. *See* Pet. 59–61; Ex. 1003 ¶¶ 182, 185–187, 190, 201.

(g) <u>Preliminary Conclusion About Alleged Obviousness</u>

As discussed above, Petitioner's analysis sufficiently addresses how the combined disclosures in VCEG-N52 and Sriram teach claim 6's subject matter. *See supra* §§ III.H.3(a)–(e). Additionally, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan

would have been motivated to combine Sriram's teachings with VCEG-N52's teachings in the way Petitioner proposes and would have had a reasonable expectation of success. *See supra* § III.H.3(f)(iii). Hence, Petitioner demonstrates a reasonable likelihood of proving that claim 6 is unpatentable under § 103(a) because the claim would have been obvious over VCEG-N52 and Sriram.

4. Dependent Claims 7–9 and Independent Claims 11, 15, 21, and 23

Claims 7–9 depend directly from claim 6. Ex. 1001, 12:17–24. Independent claims 11, 15, 21, and 23 recite subject matter similar to claim 6. *Compare id.* at 12:1–16 (claim 6), *with id.* at 12:37–54 (claim 11), *and id.* at 13:30–46 (claim 15), *and id.* at 14:15–34 (claim 21), *and id.* at 14:46–62 (claim 23).

For claims 7–9, 11, 15, 21, and 23, Petitioner provides an analysis supported by Dr. Saber's testimony about how the combined disclosures in VCEG-N52 and Sriram teach the claimed subject matter. *See* Pet. 70–81; Ex. 1003 ¶¶ 207–248.

Patent Owner disputes that the combined disclosures in VCEG-N52 and Sriram teach the subject matter in claims 7–9, 11, 15, 21, and 23 for the reasons Patent Owner disputes that the combined disclosures teach claim 6's subject matter. Prelim. Resp. 31–48.

Based on the current record and for (1) the reasons stated by Petitioner and supported by Dr. Saber's testimony and (2) the reasons discussed above for claim 6, Petitioner establishes sufficiently that the combined disclosures in VCEG-N52 and Sriram teach the subject matter in claims 7–9, 11, 15, 21, and 23. *See* Pet. 70–81; Ex. 1003 ¶¶ 207–248; *supra* §§ III.H.3(a)–(e).

Additionally, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine Sriram's teachings with VCEG-N52's teachings in the way Petitioner proposes and would have had a reasonable expectation of success. *See supra* § III.H.3(f)(iii). Hence, Petitioner demonstrates a reasonable likelihood of proving that claims 7–9, 11, 15, 21, and 23 are unpatentable under § 103(a) because the claims would have been obvious over VCEG-N52 and Sriram.

IV. DISCRETIONARY DENIAL UNDER § 314(a)

Under § 314(a), the Director possesses "broad discretion" in deciding whether to institute an *inter partes* review. *See* 35 U.S.C. § 314(a); *Saint Regis Mohawk Tribe v. Mylan Pharms. Inc.*, 896 F.3d 1322, 1327 (Fed. Cir. 2018). The Director is "permitted, but never compelled," to institute an *inter partes* review. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016). The Board decides whether to institute an *inter partes* review on the Director's behalf. 37 C.F.R. § 42.4(a).

Patent Owner argues that we should exercise our discretion under § 314(a) to deny institution because (1) Petitioner "fails to demonstrate a likelihood of success" and (2) "the majority of the grounds are facially deficient." Prelim. Resp. 49. Patent Owner also argues that "[e]ven if Petitioner had met its burden with respect to one ground, the Board should still use its discretion to deny the Petition if the majority of the proposed grounds or challenged claims do not meet that standard." *Id.*

For the reasons discussed in the patentability analysis above, we disagree with Patent Owner that (1) Petitioner "fails to demonstrate a likelihood of success" and (2) "the majority of the grounds are facially

deficient." *See* Prelim. Resp. 49; *supra* §§ III.E.2–III.E.3, III.F, III.G.2–III.G.3, III.H.3–III.H.4. Hence, we decline to exercise our discretion under § 314(a) to deny institution.

V. DISCRETIONARY DENIAL UNDER § 325(d)

A. Background

Section 325(d) provides that "[i]n determining whether to institute" an *inter partes* review, "the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office." 35 U.S.C. § 325(d).

When deciding whether to exercise our discretion under § 325(d), we follow the two-part framework set forth in *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020) (precedential). Specifically, we must first determine "whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office." *Advanced Bionics*, Paper 6 at 8. That determination involves "two separate issues":

(1) "whether the petition presents to the Office the same or substantially the same art previously presented to the Office"; and

(2) "whether the petition presents to the Office the same or substantially the same arguments previously presented to the Office."

Id. at 7. "Previously presented art includes art made of record by the Examiner, and art provided to the Office by an applicant," e.g., with an information-disclosure statement. *Id.* at 7–8.

If "either condition of first part of the framework is satisfied," we must then determine "whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims." *Advanced Bionics*, Paper 6 at 8. "An example of a material error may include misapprehending or overlooking specific teachings of the relevant prior art where those teachings impact patentability of the challenged claims." *Id.* at 8 n.9.

When deciding whether to exercise our discretion under § 325(d) in view of the *Advanced Bionics* framework, we weigh the following nonexclusive factors:

(a) the similarities and material differences between the asserted references and the prior art involved during prosecution;

(b) the cumulative nature of the asserted references and the prior art evaluated during prosecution;

(c) the extent to which the asserted references were evaluated during prosecution, including whether a rejection rested on any reference;

(d) the extent of overlap between the arguments made during prosecution and Petitioner's reliance on the asserted references or Patent Owner's contentions concerning them;

(e) whether Petitioner has pointed out sufficiently how the Examiner erred in analyzing the asserted references; and

(f) the extent to which additional evidence and facts presented in the petition warrant reconsideration of the asserted references or arguments.

See Becton, Dickinson & Co. v. B. Braun Melsungen AG, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first paragraph) ("*Becton*").

Under the *Advanced Bionics* framework, *Becton* factors (a), (b), and (d) relate to "whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office." *Advanced Bionics*, IPR2019-01469, Paper 6 at 8, 10. *Becton* factors (c), (e), and (f) relate to "whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims." *See id.* at 7–8, 10.

B. Patent Owner's Position

Patent Owner argues that Petitioner admits that:

(1) "Au and VCEG-N52 were before the Office"; and

(2) "Au contains 'overlapping disclosure' with respect to references that the Examiner applied during prosecution."

Prelim. Resp. 50 (citing Pet. 83).

Patent Owner also argues that we should exercise our discretion under § 325(d) to deny institution because Au and VCEG-N52 "were previously before the Office." Prelim. Resp. 50.

C. Analysis

We have analyzed the *Becton* factors in view of the *Advanced Bionics* framework and the record before us, and we determine that, on balance, the factors do not weigh against an *inter partes* review.

For the "same or substantially the same art" inquiry under the *Advanced Bionics* framework, most of the asserted references were not previously presented to the Office. In particular, JVT-E022d7, Linzer, and Sriram were not previously presented to the Office. *See* Ex. 1001, code (56); Ex. 1002, 77–79, 108–15, 146, 162–69, 193–95, 332–38, 359–67, 388–98. Patent Owner does not contend otherwise. Prelim. Resp. 50.

Although VCEG-N52 was previously presented to the Office, the Examiner did not consider whether the challenged claims would have been obvious over VCEG-N52 and Sriram. *See* Ex. 1002, 108–15, 146–60, 162–69, 332–38, 359–67, 388–98. Patent Owner does not contend otherwise. Prelim. Resp. 50.

For the "same or substantially the same arguments" inquiry under the *Advanced Bionics* framework, Patent Owner does not contend that any arguments in the Petition parallel any arguments made during prosecution. Prelim. Resp. 50.

Accordingly, we determine that Petitioner relies on different art and different arguments than the art and arguments previously presented to the Office. Although Au was previously presented to the Office, only one of Petitioner's four patentability challenges relies on Au. *See supra* § II.F, III.E–III.H. Hence, § 325(d) is not sufficiently implicated by granting institution such that doing so would undermine § 325(d)'s statutory purpose to avoid duplicative effort by the Office. Because we determine that Petitioner relies on different art and different arguments than the art and arguments previously presented to the Office, we do not address "whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims." *See Advanced Bionics*, Paper 6 at 8.

For these reasons, we decline to exercise our discretion under § 325(d) to deny institution.

VI. 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). Additionally, we decline to exercise our discretion under § 314(a) or § 325(d) to deny institution.

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.

VII. ORDER

Accordingly, it is

ORDERED that, according to 35 U.S.C. § 314(a), an *inter partes* review of claims 6–9, 11, 15, 21, and 23 in the '818 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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