

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS, LLC,
Petitioner,

v.

WSOU INVESTMENTS, LLC,
Patent Owner.

IPR2021-00378
Patent 8,179,960 B2

Before THU A. DANG, BRIAN J. McNAMARA, and
JOHN D. HAMANN, *Administrative Patent Judges*.

HAMANN, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

In this *inter partes* review, instituted pursuant to 35 U.S.C. § 314, Unified Patents, LLC (“Petitioner”) challenges the patentability of claims 9–11 and 23–25 (“the challenged claims”) of U.S. Patent No. 8,179,960 B2 (Ex. 1001, “the ’960 patent”), owned by WSOU Investments, LLC (“Patent Owner”). We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a) (2018) and 37 C.F.R. § 42.73 (2020).

For the reasons discussed herein, we determine that Petitioner has shown by a preponderance of the evidence that the challenged claims are unpatentable.

A. Procedural History

Petitioner filed a Petition requesting *inter partes* review of the challenged claims of the ’960 patent. Paper 2 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). With our authorization, Petitioner filed a Preliminary Reply to the Preliminary Response (Paper 10) relating to discretionary denial under 35 U.S.C. § 314(a), and Patent Owner filed a Preliminary Sur-reply in response to the Preliminary Reply (Paper 13).

We instituted *inter partes* review of all of the challenged claims of the ’960 patent on all of the grounds raised in the Petition. Paper 14 (“Dec. on Inst.”), 7, 44. Patent Owner filed a Response to the Petition. Paper 18 (“PO Resp.”). Petitioner filed a Reply to Patent Owner’s Response. Paper 20 (“Pet. Reply”). Patent Owner filed a Sur-reply to Petitioner’s Reply. Paper 21 (“PO Sur-reply”).

An oral hearing was held on April 21, 2022. A transcript of the oral hearing is included in the record. Paper 27.

B. Real Parties-in-Interest

The parties identify themselves as the real parties-in-interest. Pet. 1; Paper 3, 1.

C. Related Matters

The parties identify *WSOU Investments, LLC v. ZTE Corp.*, 6-20-cv-00490 (W.D. Tex. 2020) as a judicial proceeding in which the '960 patent is asserted and which may affect, or be affected by, a decision in this proceeding. Pet. 1; Paper 17, 2. In addition, Patent Owner identifies (i) *ZTE (USA) Inc. v. WSOU Investments, LLC*, 3-21-cv-02128 (N.D. Tex. 2021); and (ii) *ZTE Corporation v. WSOU Investments, LLC*, IPR2021-00696 (PTAB 2021), as active proceedings involving the challenged patent. Paper 17, 2.

D. The '960 Patent

The '960 patent relates to “the field of video compression[,] and more particularly to an improved method and apparatus for performing block-based video coding and decoding”—a block typically is a rectangular region of pixels treated as a single unit. Ex. 1001, 1:8–11, 1:24–25. According to the '960 patent, “[m]ost major standard video codecs (i.e., coders and decoders) achieve a data compression advantage over still image coding techniques by using a block-based, motion-compensated prediction scheme.” *Id.* at 1:15–18. The '960 patent discloses that a typical method for encoding employed by these video standards “is to code a block by providing a pointer to a similar, previously coded block which is used as a reference, and to further provide an error block that indicates the differences

between the reference and the block to be coded (i.e., inter-coding).” *Id.* at 1:30–34. However, “there exist certain limitations in current video coding techniques which limit the possible efficiency thereof,” according to the ’960 patent. *Id.* at 1:62–64.

The first such limitation the ’960 patent identifies “is that the reference blocks used in current video coders must necessarily be part of a previously decoded video frame”—a frame is a single still-image picture in a video sequence. *Id.* at 1:64–66, 2:5–6. Put differently, “the reference block must necessarily be based on an actual part of the video as presented in an actual video frame.” *Id.* at 2:1–3.

The second such limitation the ’960 patent identifies “is that reference blocks must be updated en masse, as part of a slice [(i.e., a subset of a frame)] or frame.” *Id.* at 2:3–4, 2:7. According to the ’960 patent, “in many standard video codec implementations, such as H.264, the encoder can save multiple slices or frames to use as references, but ultimately, some finite limit is chosen to fix the storage required at the decoder.” *Id.* at 2:8–11.

To address these identified limitations, the ’960 patent discloses employing a “virtual reference,” which is “a group of pixels (e.g., a block) that is used as reference material for encoding portions of the video signal . . . , but that does not comprise or represent any portion of the actual video sequence to be displayed.” *Id.* at 2:17–22. According to the ’960 patent, “a video codec . . . in which virtual reference data (e.g., virtual reference blocks) are advantageously employed by a video coder and decoder . . . significantly improve[s] coding efficiency as compared to [the] prior art codecs.” *Id.* at 2:12–17; *see also id.* at 4:30–53 (discussing having “a net reduction in the total number of required bits”).

Figure 4, shown below, illustrates an embodiment of the '960 patent.
Id. at 3:21–24.

FIG. 4

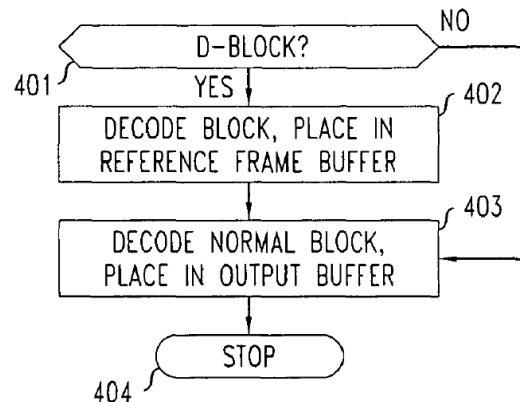


Figure 4 illustrates “a flow chart of a method of decoding an encoded video signal with use of virtual reference data in accordance with” an embodiment of the '960 patent. *Id.* More specifically, the method relates to the '960 patent's use of D-blocks, which the '960 patent defines as being composed of three parts: a header, a primary block, and a secondary block. *Id.* at 5:48–50, Fig. 4. The '960 patent further describes a D-block as follows:

The header is a flag indicating the type of reference to follow. For example, if the header is a “DBLOCK_NO” flag (which may, for example, be represented by a 0 bit), it indicates that there is no virtual reference block, which therefore indicates a conventional encoding. In this case the flag may be merely removed by the decoder, and the block may be decoded as it is in conventional decoders (e.g., as an I-block, a P-block, or a B-block). If, on the other hand, the header is a “DB LOCK_YES” flag (which may, for example, be represented by a 1 bit), it indicates that two blocks will be encoded (and will immediate follow the header). First, what will be referred to herein as the “primary” block will be encoded in the bits immediately following the initial flag, and this will advantageously comprise

the encoding of a virtual reference block. Following the encoding of the virtual reference block will be an encoding of what will be referred to herein as the “secondary” block, which will comprise an encoding of the actual block representing the current location in the video (i.e., a “normal video block” in a conventional coder).

Id. at 5:50–6:2.

As illustrated, the method begins by “examin[ing] the DBLOCK flag in the header of the encoded data for the video block” (flowchart box 401). *Id.* at 6:29–31, Fig. 4. The ’960 patent discloses that “[i]f the flag is equal to DBLOCK_YES, flowchart box 402 decodes the first (primary) video block, which comprises a virtual reference block, and writes the decoded virtual reference block directly into the reference frame buffer.” *Id.* at 6:31–34, Fig. 4. The method “then decodes the next (secondary) video block, which represents the actual video block to be displayed, and writes the decoded video block directly into a video frame output buffer” (flowchart box 403), and “then terminates” (flowchart box 404). *Id.* at 6:34–38, Fig. 4. The ’960 patent discloses that “[i]f, on the other hand, the flag from flowchart box 401 is equal to DBLOCK_NO, flow proceeds directly to flowchart box 403 where the (actual) video block is decoded and written to the video frame output buffer,” and then the method terminates (flowchart box 404). *Id.* at 6:38–42, Fig. 4.

E. The Challenged Claims

Petitioner challenges claims 9–11 and 23–25 of the ’960 patent. Claims 9 and 23 are independent claims. Claim 9 is illustrative of the challenged claims and is reproduced below:

9. A method for decoding an encoded video signal to generate a decoded video signal for use in a subsequent video

display of an original video signal, the original video signal comprising a sequence of video frames, the encoded video signal having been generated from the original video signal, the method comprising the steps of:

identifying in said encoded video signal an indication that encoded virtual reference data has been incorporated therein, wherein said encoded virtual reference data does not represent any portion of any individual frame of the original video signal which is to be displayed in said subsequent video display thereof;

decoding, using a processor, from said encoded video signal said encoded virtual reference data incorporated therein; and

decoding, using a processor, from said encoded video signal one or more encoded portions of the original video signal which are to be displayed in said subsequent video display thereof, wherein said encoded portions of said original video signal which are to be displayed are based on and specifically reference a portion of said encoded virtual reference data.

Ex. 1001, 13:5–26.

F. Instituted Grounds of Unpatentability

We instituted trial based on the following grounds of unpatentability, which are all the grounds of unpatentability raised in the Petition:

Claim(s) Challenged	35 U.S.C. § ¹	Reference(s)/Basis
9–11, 23–25	103(a)	Bankoski, ² Hannuksela ³
9–11, 23–25	103(a)	Bankoski, Hannuksela, Cheung ⁴

Pet. 4–5, 17–69; Dec. on Inst. 7, 44. Petitioner submits in support of its arguments the Declaration of Immanuel Freedman, Ph.D. SMIEEE (Ex. 1003)⁵; the Declaration of Kevin Jakel (Ex. 1005); the Declaration of Sylvia Hall-Ellis, Ph.D. (Ex. 1011); and the Supplemental Declaration of Immanuel Freedman, Ph.D. SMIEEE (Ex. 1039).

II. LEVEL OF ORDINARY SKILL IN THE ART

To determine whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). In assessing the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art;

¹ The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. Because the ’960 patent issued from an application filed before March 16, 2013, we apply the pre-AIA version of the statutory basis for unpatentability.

² Bankoski, US 2010/0061461 A1, published Mar. 1, 2010 (Ex. 1006). Patent Owner’s Response does not dispute Petitioner’s contention that Bankoski qualifies as prior art under 35 U.S.C. § 102(e) based on its provisional application’s (Ex. 1007) filing date of September 11, 2008. Thus, Patent Owner has forfeited any argument to the contrary. Paper 15 (“Scheduling Order”), 8 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.”).

³ Hannuksela, US 2008/0095228 A1, published Apr. 24, 2008 (Ex. 1008).

⁴ Cheung, US 6,178,205 B1, issued Jan. 23, 2001 (Ex. 1009).

⁵ We rely on the version of this declaration that was filed on January 27, 2021, which provides a missing identifying label in the lower right-hand corner of the document. *See* Papers 5, 6.

prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citing *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962–63 (Fed. Cir. 1986)). “[O]ne or more factors may predominate.” *Id.*

In our Decision on Institution, we adopted Petitioner’s proposed definition for one having ordinary skill in the art at the time of the invention of the ’960 patent as one who “would have had a bachelor’s degree in electrical engineering, computer engineering, computer science, physics, or a related subject, and two to three years of work experience in image and/or video processing,” and that “[l]ess experience can be remedied with additional education (e.g., a Master’s degree), and likewise, less education can be remedied with additional work experience (e.g., 5–6 years).” Dec. on Inst. 18 (quoting Pet. 16 (citing Ex. 1003 ¶ 41)).

Patent Owner does not dispute our adoption of Petitioner’s definition, and does not provide its own definition for the level of ordinary skill at the time of the invention of the ’960 patent. *See* PO Resp. 4.

Because Petitioner’s definition of the level of skill in the art is consistent with the ’960 patent and the asserted prior art, we maintain Petitioner’s definition for purposes of this Final Written Decision. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *GPAC*, 57 F.3d at 1579; *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978). We apply Petitioner’s definition in our analysis below.

III. CLAIM CONSTRUCTION

Because the Petition was filed after November 13, 2018, we apply the same claim construction standard that would be used in a civil action under

35 U.S.C. § 282(b), following the standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b). In applying such standard, claim terms are generally given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art, at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. “In determining the meaning of the disputed claim limitation, we look 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).

The parties both argue that the Specification of the ’960 patent explicitly provides a definition for the term “virtual reference data.” *See* Pet. 17 (citing Ex. 1001, code (57), 2:17–22); PO Resp. 5–6 (citing same). Namely, the ’960 patent’s Specification states the following:

[A] “virtual reference,” as used herein, is defined as a group of pixels (e.g., a block) that is used as reference material for encoding portions of the video signal (e.g., a motion-compensated inter-predicted block), but that does not comprise or represent any portion of the actual video sequence to be displayed.

Ex. 1001, 2:17–22; Pet. 17 (citing same); PO Resp. 5 (citing same). The parties agree that “virtual reference data” should be given this express definition. Pet. 17; PO Resp. 6.

We agree with the parties and conclude that “virtual reference data” has the meaning provided by this definition. Ex. 1001, 2:17–22. And although the parties do not explicitly address that the Specification defines “virtual reference” without including the word “data,” we agree with the

parties that this same definition applies for the claim term “virtual reference data.” *See id.*; *Cont’l Cirs. LLC v. Intel Corp.*, 915 F.3d 788, 796 (Fed. Cir. 2019) (citing *Phillips*, 415 F.3d at 1316) (“When the patentee acts as its own lexicographer, that definition governs.”).

The parties do not identify and other claim terms for construction. Pet. 17; PO Resp. 5–6. We conclude that no other claim term requires express construction for purposes of this Decision. *See, e.g., Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’”).

IV. PRINCIPLES OF LAW

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time of the invention to a person having ordinary skill in the art. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of non-obviousness, if present.⁶ *See Graham*, 383 U.S. at 17–18. When evaluating a claim for obviousness, we also must “determine whether there was an apparent reason to combine the known elements in the fashion

⁶ Patent Owner does not present arguments or evidence of such objective evidence of non-obviousness. *See generally* Prelim. Resp.

claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

V. ALLEGED OBVIOUSNESS OVER BANKOSKI AND HANNUKSELA

Petitioner argues that the combination of Bankoski and Hannuksela renders the challenged claims of the ’960 patent obvious. Pet. 17–63. We have reviewed the parties’ arguments and the evidence of record. For the reasons that follow, we determine that Petitioner shows by a preponderance of the evidence that one of ordinary skill in the art would have found claims 9–11 and 23–25 obvious over the combination of Bankoski and Hannuksela.

A. *Summary of Bankoski*

Bankoski “relates in general to video encoding and decoding.”

Ex. 1006 ¶ 2. More specifically, Bankoski teaches:

[A] method for digital video encoding prediction comprising creating a constructed reference frame using an encoder and compressing a series of source video frames using the constructed reference frame to obtain a bitstream including a compressed digital video signal for a subsequent decoding process. The constructed reference frame is omitted from the series of digital video frames during the subsequent viewing process.

Id. at code (57); *see also id.* ¶ 6 (similarly describing Bankoski’s teachings). Bankoski teaches that its “constructed reference frame . . . serves to improve the encoding of subsequently transmitted frames,” and “giv[es] subsequent frames a better predictive choice than a prior transmitted frame might offer.” *Id.* ¶ 30. Moreover, in Bankoski, “[t]he creation of a constructed reference frame is not defined by the bitstream,” but rather “is a task left to the encoder.” *Id.* Bankoski teaches that the constructed reference frame “need

not correspond to an actual image,” and thus, “the size and configuration of the constructed reference frame are arbitrary and can be determined programmatically by the encoder . . . to optimize the quality of the encoding.” *Id.* ¶ 76. This provides a benefit, according to Bankoski, because “the decode[r] need not re-perform the computations used to create the constructed reference frame, . . . thus permitting faster, lighter and more efficient decoding.” *Id.* ¶ 77.

B. Summary of Hannuksela

Hannuksela “relates to video coding,” and more particularly, “to the use of decoded pictures for purposes other than outputting.” Ex. 1008 ¶ 2. To that end, Hannuksela teaches having an “explicit signaling element for controlling decoded picture output,” such as “a syntax element in a coded video bitstream,” that indicates whether a certain decoded picture, or portion thereof, should be displayed. *Id.* at code (57). For example, Hannuksela teaches using an output flag as a signal. *Id.* ¶¶ 47–48.

C. Challenged Claim 9

Petitioner argues that the combination of Bankoski and Hannuksela teaches claim 9. Pet. 21–42. Patent Owner argues that the combination fails to teach claim 9’s “identifying” limitation. PO Resp. 6–11. As we discuss below, we find that Petitioner shows that the combination of Bankoski and Hannuksela teaches this limitation, and renders claim 9 obvious.

1. Decoding an Encoded Video Signal

Claim 9’s preamble recites “[a] method for decoding an encoded video signal to generate a decoded video signal for use in a subsequent video display of an original video signal, the original video signal comprising a sequence of video frames, the encoded video signal having been generated

from the original video signal.” Ex. 1001, 13:5–9. Petitioner argues that Bankoski teaches the preamble. Pet. 21–24. In particular, Petitioner argues that Bankoski teaches the following:

a decoder that receives and decodes a compressed bitstream containing an encoded input video stream (*decoding an encoded video signal*) generated from an input video stream (*generated from the original video signal*), where the input video stream is comprised of individual frames (*the original video signal comprising a sequence of video frames*), to produce an output video stream for display to a user (*for use in a subsequent video display of an original video signal*).

Id. at 21–22 (citing Ex. 1003 ¶ 91). Petitioner first argues that Bankoski teaches that “video streams are made up of a sequence of video frames (*the original video signal comprising a sequence of video frames*).” *Id.* at 22–23 (citing Ex. 1006, Fig. 1, ¶¶ 7, 10, 18; Ex. 1003 ¶ 92). Petitioner adds that having a video stream comprise a sequence of video frames was well known in the art by 2008. *Id.* at 22 (citing Ex. 1003 ¶ 92); *see also id.* (citing Ex. 1027, 10–11, 20) (arguing that H.264 discusses successive frames in a video sequence).

Second, Petitioner argues that “Bankoski teaches an encoder that generates from an input video stream . . . an encoded video signal for transmission within a compressed bitstream (*the encoded video signal having been generated from the original video signal*).” *Id.* at 23 (citing Ex. 1006, Fig. 2, ¶¶ 11, 19–22).

Third, Petitioner argues that Bankoski teaches “a decoder that receives and decodes a compressed bitstream 26 (*decoding an encoded video signal*) to produce an output video stream 35 for display of the input video stream to a user (*to generate a decoded video signal for use in a subsequent video display of an original video signal*).” *Id.* at 23–24 (citing Ex. 1006, Fig. 3). Put differently, Bankoski teaches that “‘a decoder 21’ is used ‘to decode compressed bitstream 26,’” resulting in “output as output video stream 35,” according to Petitioner. *Id.* at 24 (citing Ex. 1006 ¶¶ 22–24; Ex. 1003 ¶ 95).

After reviewing Petitioner’s arguments and evidence, including Dr. Freedman’s Declaration, which are not addressed by Patent Owner (*see generally* PO Resp.), we are persuaded that Petitioner demonstrates by a preponderance of the evidence that Bankoski teaches claim 9’s preamble. In light of this finding, we need not, and thus do not, reach whether claim 9’s preamble is limiting.

2. *Identifying an Indication*

Claim 9 further recites “identifying in said encoded video signal an indication that encoded virtual reference data has been incorporated therein.” Ex. 1001, 13:11–13. Petitioner argues that Bankoski⁷ teaches this limitation. Pet. 25–30; Pet. Reply 2–17. Patent Owner disputes that this limitation is taught. PO Resp. 6–11; PO Sur-reply 1–7. We address the parties’ arguments for this limitation in two parts: whether Petitioner shows (i) that encoded virtual reference data has been incorporated in the encoded video signal, and (ii) identifying in the encoded video signal an indication of such incorporation.

a. Encoded Virtual Reference Data Has Been Incorporated

We agree with Petitioner and find that Bankoski teaches that a constructed reference frame (i.e., encoded virtual reference data) has been incorporated into an encoded bitstream (i.e., the encoded video signal). Pet. 25–27. More specifically, we agree with Petitioner and find that Bankoski teaches that its encoder 14 creates and uses “a constructed reference frame, which is a frame of image data that is encoded into the bitstream and serves to improve the encoding of subsequently transmitted frames.” Ex. 1006 ¶ 30; Pet. 25. Put differently, Bankoski teaches “transmit[ing] within the bitstream information that will be used to populate a reference buffer(s) that is used in prediction of subsequent frames.” Ex. 1006 ¶ 6; Pet. 25–26. Moreover, Bankoski teaches that “[t]he constructed reference frame need not be displayed to the end user (that is, need not be included in the final decoded video output) and need not correspond to an actual image.” Ex. 1006 ¶ 76; *see also id.* ¶ 6, code (57) (“The constructed reference frame is omitted from the series of digital video frames during the subsequent viewing process.”); Pet. 26; Pet. Reply 3; *infra* Section V(C)(3).

Moreover, these findings are consistent with our construction for virtual reference data, which we construe as a group of pixels (Bankoski

⁷ Petitioner argues that Bankoski “alone or in view of the knowledge of” one of ordinary skill in the art renders obvious this limitation. *See, e.g.*, Pet. 26. We treat this as a single inquiry, however, because we do not view such knowledge separately, but rather we consider it as part of our obviousness analysis. *See Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1337–38 (Fed. Cir. 2020); *Randall Mfg. v. Rea*, 733 F.3d 1355, 1362–63 (Fed. Cir. 2013). In addition, Petitioner argues that Bankoski combined with Hannuksela also teaches this limitation. We do not reach this alternative as we find that Bankoski alone teaches this limitation.

teaches that a constructed reference frame is a frame of image data (i.e., a group of pixels)) that is used as reference material for encoding portions of the video signal (Bankoski teaches that the constructed reference frame is used for encoding subsequent frames), but that does not comprise or represent any portion of the actual video sequence to be displayed (Bankoski teaches that the constructed reference frame is not displayed). *See supra* Section III (construing virtual reference data); Ex. 1006 ¶¶ 6, 30, code (57). We also credit Dr. Freedman’s testimony that Bankoski’s constructed reference frame meets our construction for virtual reference data, as this testimony is consistent with Bankoski’s teachings. *See* Ex. 1003 ¶ 98 (citing Ex. 1006 ¶¶ 6, 30, code (57)); Pet. 25.

In addition, we find unavailing Patent Owner’s argument that baldly asserts that Bankoski’s constructed reference frames are not virtual reference data. PO Resp. 8–9. Simply put, Patent Owner does not provide any rationale, nor cite to any evidence, in support of its argument. *Id.*

b. Identifying in the Encoded Video Signal an Indication

We agree with Petitioner and find that Bankoski teaches identifying in the encoded bitstream (i.e., the encoded video signal) a flag (i.e., an indication) that a constructed reference frame (i.e., encoded virtual reference data) has been incorporated therein. Pet. 26–30; Pet. Reply 2–17.

We agree with Petitioner and find that Bankoski teaches that creating the “constructed reference frame is a task left to the encoder,” and “that the decode[r] need not re-perform the computations used to create the constructed reference frame,” saving computational expense and permitting more efficient decoding. Ex. 1006 ¶¶ 30, 77; Pet. 26. Rather, Bankoski teaches that the constructed reference frame is transmitted in the bitstream to

the decoder, which uses, *inter alia*, “header information decoded from the . . . bitstream.” Ex. 1006 ¶¶ 6, 7, 24; Pet. 27. Bankoski, however, does not detail the format of this header information in the bitstream that the decoder uses. *See* Ex. 1006 ¶¶ 6, 24.

We agree with Petitioner and find that it would have been obvious to one of ordinary skill in the art for Bankoski’s header information to comprise a flag as a means of conveying information to Bankoski’s decoder. *See* Pet. 26–27; Pet. Reply 8. In particular, we agree with Petitioner and find that before the ’960 patent, it was well-known in the art to use flags, such as header flags, to communicate information. Ex. 1003 ¶ 100; Ex. 1010,⁸ 29 (defining a flag as “[a] variable that can take one of the two possible values 0 and 1”); Ex. 1027,⁹ 114, 182, 201, 210, 212, 221 (describing using a flag to convey information for video processing); Pet. 27. We find persuasive Dr. Freedman’s testimony that it was well-known in the art to use flags, including header flags, to communicate information, as this testimony is supported by H.264’s and Richardson’s teachings. *Compare* Ex. 1003 ¶ 100, *with* Ex. 1010, 29 *and* Ex. 1027, 114, 182, 201, 210, 212, 221.

In sum, we find that it would have been obvious to one of ordinary skill in the art for Bankoski’s header information to comprise a flag, which was a well-known way in video processing to communicate information.

⁸ ITU-T, Telecommunication Standardization Sector of ITU, Series H: Audiovisual and Multimedia Systems, Infrastructure of audiovisual services – Coding of moving video, Recommendation H.264 (Nov. 2007) (Ex. 1010, “H.264”).

⁹ Iain E.G. Richardson, H.264 and MPEG-4 Video Compression (Wiley 2003) (“Richardson”). We, as Petitioner does, cite to Richardson’s page numbers, rather than the page numbers provided in the Bates label.

See Ex. 1003 ¶ 100; *see also* *KSR*, 550 U.S. at 421 (“When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp.”).

We also agree with Petitioner and find that it would have been obvious to one of ordinary skill in the art to use a flag to communicate the presence in the bitstream of a constructed reference frame to Bankoski’s decoder, which would store the frame in the reference buffer for use in decoding subsequent frames. Pet. 25–27; Pet. Reply 11–12. In particular, Bankoski teaches “transmit[ing] within the bitstream information that will be used to populate a reference buffer(s) that is used in prediction of subsequent frames[, and that t]his information corresponds to a constructed reference frame.” Ex. 1006 ¶ 6; *see also id.* ¶ 30 (“[T]he reference frame created and used by the encoder . . . is a constructed reference frame . . . that is encoded into the bitstream and serves to improve the encoding of subsequently transmitted frames.”). Bankoski also teaches that its decoder uses header information decoded from the bitstream. *Id.* ¶ 24. And as we discuss above, one of ordinary skill in the art would have found it obvious for the header information to comprise a flag. We find that Bankoski thus teaches that its decoder identifies what in the bitstream is a constructed reference frame and then stores it in the reference buffer, using information (i.e., a flag) decoded from the bitstream. *See* Ex. 1006 ¶¶ 6, 24, 30. We also find persuasive Dr. Freedman’s testimony that “using [a] flag (i.e., upon encountering [a] flag in the bitstream), the decoder would understand that it should . . . store the constructed reference frame in the reference buffer for use in decoding other frames.” Ex. 1039 ¶ 14 (citing Ex. 1006 ¶ 6); *see also*

id. (citing Ex. 1006 ¶¶ 6, 30) (testifying that Bankoski teaches “transmit[ting] information (constructed reference frames) used to populate a reference buffer that is used in prediction of other frames”); Pet. Reply 11–12. We find that this testimony is supported by Bankoski’s teachings. Compare Ex. 1039 ¶ 14, with Ex. 1006 ¶¶ 6, 24, 30; see also Ex. 1003 ¶¶ 97, 100 (testifying that transmitting a flag in the bitstream to indicate to the decoder that a constructed reference frame is included in the encoded video signal was obvious).

Moreover, we find that Bankoski’s teaching of a decoder identifying a constructed reference frame in the bitstream using a flag (as we find above) also teaches (and subsumes) identifying an indication that the bitstream incorporates a constructed reference frame. Put differently, (i) teaching that the decoder uses a flag also teaches that the decoder identifies the flag so that it could be used, and (ii) teaching that the flag identifies the constructed reference frame in the bitstream also teaches that the flag indicates that the bitstream contains a constructed reference frame. Ex. 1039 ¶ 31 (testifying that “a flag is an *indication* that virtual reference data is in the bitstream, and the decoder’s reading and appropriately using that flag would involve *identifying* that indication or else the decoder would not be able to use the flag”); Pet. Reply 4, 16.

Accordingly, we find that Bankoski teaches identifying in the encoded video signal an indication that a constructed reference frame has been incorporated therein.

Alternatively, we agree with Petitioner and find that Bankoski teaches identifying in the encoded video signal an indication that a constructed reference frame has been incorporated therein based on Bankoski’s

teachings of not displaying the constructed reference frame. Pet. 26–27; Pet. Reply 8–15. More specifically, we agree with Petitioner and find that it would have been obvious to one of ordinary skill in the art to use a flag to communicate with Bankoski’s decoder and identify a frame that should not be displayed. *See* Ex. 1006 ¶¶ 6 (teaching that constructed reference frames are transmitted in the bitstream and are not displayed), 24 (teaching that the decoder uses decoded header information); Ex. 1003 ¶ 100 (testifying that (i) using a flag was well-known in video processing as shown in H.264 and Richardson, and (ii) “it would have been obvious to [one of ordinary skill in the art] that the decoder would decode and use that flag, for example, to identify a frame that should not be displayed”); Pet. 27. This testimony is consistent with Bankoski’s teaching that the decoder uses header information decoded from the bitstream and that constructed reference frames are not displayed. Ex. 1006 ¶¶ 6, 7, 24, 76.

We also find persuasive Dr. Freedman’s testimony that one of ordinary skill in the art “would have understood that, for the decoder to not display a conformant bitstream with particular content, the decoder would need instructions or information so indicating.” Ex. 1003 ¶ 99; Pet. Reply 4. This testimony is supported by H.264, which reflects the knowledge of one of ordinary skill in the art, and defines a `no_output_of_prior_pics_flag`, as well as an `output_flag`, which “affects the decoded picture output.” *See* Ex. 1010, 49, 382; Ex. 1008 ¶ 21; Pet. 29.

In addition, we agree with Petitioner and find that one of ordinary skill in the art “would have understood that . . . [in Bankoski] a flag would convey (or indicate) whether or not there is a constructed reference frame—not solely whether or not that frame should be displayed.” Pet. Reply 4; *see*

also id. at 11 (same). In particular, we agree with Petitioner and find that Bankoski teaches that constructed reference frames are not displayed, and does not teach any other types of frames that are not displayed. Ex. 1006 ¶¶ 6, 30, 76, code (57); Ex. 1039 ¶ 15 (testifying that Bankoski does not teach other frame types that are not displayed); Pet. Reply 21. We thus find persuasive Dr. Freedman’s testimony that “indicating to not display a frame would correspond to the constructed reference frame because *Bankoski* does not describe any other types of frames that are not displayed.” Ex. 1039 ¶ 15 (citing Ex. 1006 ¶¶ 6, 30, 76); Pet. Reply 21. Likewise, we find persuasive Dr. Freedman’s testimony that in Bankoski, the flag would convey (i) whether the bitstream includes a constructed reference frame, as well as (ii) to not display the constructed reference frame. Ex. 1039 ¶ 14. Dr. Freedman’s testimony on this issue is supported by Bankoski’s teaching to not display constructed reference frames, while not teaching other frame types to not display. *See* Ex. 1006 ¶¶ 6, 30, 76.

Accordingly, we again find that Bankoski teaches identifying in the encoded video signal an indication that a constructed reference frame has been incorporated therein.

We find unavailing Patent Owner’s argument that Petitioner “only alleges that a ‘flag’ . . . is *placed* into the bitstream, but . . . fails to show the required *identifying* in said encoded video signal an *indication* that the encoded *virtual reference data* has been incorporated therein.” PO Resp. 7. Rather, as we discuss above, we find that Petitioner shows that Bankoski’s decoder uses a flag decoded from the bitstream to identify a constructed reference frame to populate a reference buffer, and to omit the frame from display. *See* Ex. 1006 ¶¶ 6, 7 (“The constructed reference frame is decoded

but is then omitted from the series of digital video frames during the subsequent viewing process.”), 24 (describing decoding the bitstream using header information); Ex. 1003 ¶ 100; Ex. 1039 ¶ 14.

We also find unavailing Patent Owner’s arguments faulting Petitioner’s reliance on Bankoski’s paragraph six for teaching transmitting information that identifies a constructed reference frame so that the frame may be stored in a reference buffer. *See* PO Sur-reply 5–6; Pet. Reply 11–12. More specifically, Patent Owner argues that “the most obvious reading of the two sentences [of paragraph six] in Bankoski is that by definition, if the bitstream contains constructed reference frames, the reference buffer will subsequently be populated with information *corresponding to* a constructed reference frame.” PO Sur-reply 6. We disagree. Rather, we find that these sentences teach that the transmitted information (i) corresponds to a constructed reference frame, and (ii) is “*used* to populate a reference buffer(s),” which we find teaches that the constructed reference frame is what is stored in the reference buffer, rather than the information (e.g., a flag) corresponding to the frame. Ex. 1006 ¶ 6 (emphasis added). Rather than being stored, the information is used to identify the constructed reference frame. *Id.* Dr. Freedman’s testimony, which we find persuasive, is in accord with these findings. *See* Ex. 1039 ¶ 14. We also find that Bankoski referring to the buffer as a “reference” buffer teaches what is stored in the buffer (i.e., constructed *reference* frames). *See* Ex. 1006 ¶ 6; *see also id.* ¶¶ 7 (teaching that “[t]he constructed reference frame is decoded”), 30 (teaching that the constructed reference frame “is encoded into the bitstream and serves to improve the encoding of subsequently transmitted frames”).

Thus, we also find unavailing Patent Owner’s arguments that

- (i) “there is certainly nothing in Bankoski that *requires* identifying a constructed reference frame in order to populate a reference buffer with information *corresponding to* a constructed reference frame,” and
- (ii) “[t]here is nothing in Bankoski that limits the information populating the reference buffer to only information corresponding to a constructed reference frame,” as they are incorrectly premised on storing the information in the reference buffer. PO Sur-reply 6. Again, paragraph six teaches that the reference buffer is populated with reference frames. Ex. 1006 ¶ 6; Ex. 1039 ¶ 14.

We also find unavailing Patent Owner’s argument that in paragraphs 100 through 105 of his Declaration, Dr. Freedman “offers nothing but conclusory statements without any support.” PO Resp. 10 (citing Ex. 1003 ¶¶ 100–105). Patent Owner does not identify specific statements in these paragraphs that are purportedly conclusory. *Id.* Of these five paragraphs, we rely only on testimony from paragraph 100. In particular, we cite Dr. Freedman’s testimony that flags were well-known in the art before the ’960 patent, and that one of ordinary skill in the art would have found it obvious for Bankoski’s decoder to use a flag to identify a constructed reference frame. As we discuss above, Dr. Freedman supports this testimony with specific cites to Bankoski, H.264, and Richardson. *See* Ex. 1003 ¶ 100.

Similarly, Patent Owner argues that in paragraphs 13 through 17 of his Supplemental Declaration, Dr. Freedman “offers nothing but conclusory statements without any support.” PO Sur-reply 7 (citing Ex. 1039 ¶¶ 13–17). Of these five paragraphs, we rely on testimony from paragraphs 14 and

15. In particular, we cite Dr. Freedman’s testimony that the decoder uses a flag to identify the constructed reference frame for storage, and not to display it, the flag is identified before its use, and that Bankoski does not teach other frame types that are not displayed. As we discuss above, Dr. Freedman supports this testimony with specific cites to Bankoski. Ex. 1039 ¶¶ 14–15 (citing Ex. 1006 ¶¶ 6, 30, 76). Accordingly, we disagree with Patent Owner that Dr. Freedman’s testimony that we cite is conclusory.

We also find unavailing Patent Owner’s argument that the “flags of H.264 at best indicate whether something should be output or not, and there is nothing in the Petition that shows the . . . flags of H.264 are somehow **identified as an indicator** that encoded **virtual reference data** has been incorporated into an encoded video signal as the claim limitation requires.” PO Resp. 8; PO Sur-reply 3 (making the same argument). First, as we discuss above, we find that H.264 evidences that it was well-known in the art to use flags in video processing to convey information, and Patent Owner’s argument is incorrect to the extent that it limits H.264’s teachings to specific flags. *See EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985) (“A reference must be considered for everything it *teaches* by way of technology and is not limited to the particular *invention* it is describing and attempting to protect.”).

Second, as we discuss above, we find that one of ordinary skill in the art would have understood that Bankoski teaches using a flag to indicate both the presence of a constructed reference frame and that the frame should not be displayed. For these same reasons, we find unavailing Patent Owner’s argument that “[a]t best all Bankoski discloses . . . is that a flag is used to indicate a frame that should not be displayed, there is no **identifying**

an **indication** that the frame that is not to be displayed is the required **virtual reference data.**” PO Resp. 9–10; PO Sur-reply 4 (making the same argument).

In sum, we find that Bankoski teaches “identifying in said encoded video signal an indication that encoded virtual reference data has been incorporated therein.”

3. Wherein Said Encoded Virtual Reference Data

Claim 9 further recites “wherein said encoded virtual reference data does not represent any portion of any individual frame of the original video signal which is to be displayed in said subsequent video display thereof.” Ex. 1001, 13:13–16. Petitioner argues that Bankoski teaches this limitation. Pet. 30–35. More specifically, Petitioner argues that Bankoski “teaches that its constructed reference frame need not correspond to frames of the input video stream.” *Id.* at 30 (citing Ex. 1006 ¶¶ 76 (“The constructed reference frame need not be displayed to the end user (that is, need not be included in the final decoded video output) and ***need not correspond to an actual image.***”) (emphases added), 28–30). “Indeed, the constructed reference frame ‘may not even have the same dimensions as the video stream’s raw image frames or the frames displayed to the user,’” according to Petitioner. *Id.* at 31 (citing Ex. 1006 ¶¶ 30, 40, 42; Ex. 1003 ¶ 108).

In addition, Petitioner argues that Bankoski teaches that “the constructed reference frame is made up of pixels that represent average intensity values rather than a portion of an actual frame of the input video stream.” *Id.* at 35 (citing Ex. 1003 ¶ 114). According to Petitioner, “[b]ecause the constructed reference frame created according to [Bankoski’s] method does not represent the original video, Bankoski teaches

that the encoded constructed reference frame is decoded, but is not subsequently displayed to a user.” *Id.* (citing Ex. 1006 ¶¶ 6–7, 30, code (57); Ex. 1003 ¶ 115).

After reviewing Petitioner’s arguments and evidence, including Dr. Freedman’s Declaration, which are not addressed by Patent Owner (*see generally* PO Resp.), we are persuaded that Petitioner demonstrates by a preponderance of the evidence that Bankoski teaches “wherein said encoded virtual reference data does not represent any portion of any individual frame of the original video signal which is to be displayed in said subsequent video display thereof.”

4. *Decoding Encoded Virtual Reference Data*

Claim 9 further recites “decoding, using a processor, from said encoded video signal said encoded virtual reference data incorporated therein.” Ex. 1001, 13:17–19. Petitioner argues that Bankoski and Hannuksela teach this limitation. Pet. 35–37. More specifically, Petitioner argues that the combination of Bankoski and Hannuksela teaches “this limitation because *Bankoski* explains that the encoded constructed reference frame (*said encoded virtual reference data*) is decoded from the compressed bitstream (*decoding . . . from said encoded video signal said encoded virtual reference data incorporated therein*), while *Hannuksela* explains that such decoding occurs using a processor (*decoding, using a processor*).” Pet. 35–36 (citing Ex. 1003 ¶ 117).

As to Bankoski, Petitioner argues that Bankoski teaches that “[t]he constructed reference frame is decoded’ from the compressed bitstream.” *Id.* at 36 (citing Ex. 1006 ¶ 7, Fig. 3 (arguing that “decoder structure showing receipt and decoding of the compressed bitstream”)). Petitioner

argues that Bankoski thus teaches “a decoder that receives a compressed bitstream that includes an encoded constructed reference frame then decodes that constructed reference frame.” *Id.* (citing Ex. 1003 ¶ 119).

As to Hannuksela, Petitioner argues that Hannuksela teaches “further details about a decoder.” *Id.* In particular, Petitioner argues that Hannuksela teaches “a ‘decoding apparatus’ that comprises a ‘processor’ and ‘a memory unit communicatively connected to the processor.’” *Id.* (quoting Ex. 1008, claim 41; citing Ex. 1008, claims 53–54, code (57), ¶¶ 26, 45). According to Petitioner, Hannuksela teaches “that the memory unit includes ‘computer code for decoding the plurality of pictures from an encoded bitstream’ and ‘computer code for decoding information from the bitstream.’” *Id.* (quoting Ex. 1008, claim 41; citing Ex. 1008, claim 53 (“computer code *for processing* information from a bitstream”)). Petitioner argues that Hannuksela thus “teaches that the decoder uses a processor to decode information from a compressed bitstream (*from said encoded video signal*), such as the encoded virtual reference data.” *Id.* at 36–37 (citing Ex. 1003 ¶ 120).

According to Petitioner, one of ordinary skill in the art “would have used Hannuksela’s processor in Bankoski’s system because [one of ordinary skill in the art] would have understood that Bankoski’s decoder uses a processor with such executable commands to perform its functions, and Hannuksela merely articulates that understanding expressly.” *Id.* at 37 (citing Ex. 1003 ¶ 120).

After reviewing Petitioner’s arguments and evidence, including Dr. Freedman’s Declaration, which are not addressed by Patent Owner (*see generally* PO Resp.), we are persuaded that Petitioner demonstrates by a

preponderance of the evidence that Bankoski and Hannuksela teach “decoding, using a processor, from said encoded video signal said encoded virtual reference data incorporated therein.”

5. *Decoding Encoded Portions of the Original Video Signal*

Claim 9 further recites “decoding, using a processor, from said encoded video signal one or more encoded portions of the original video signal which are to be displayed in said subsequent video display thereof.” Ex. 1001, 13:20–23. Petitioner argues that Bankoski and Hannuksela teach this limitation. Pet. 37–39. More specifically, Petitioner argues that the combination of Bankoski and Hannuksela teaches this limitation because Bankoski “teaches that frames of the input video stream that are encoded in the compressed bitstream (*one or more encoded portions of the original video signal*) are decoded (*decoding, . . . from said encoded video signal*) for subsequent display (*which are to be displayed in said subsequent video display thereof*),” and Hannuksela teaches “that such decoding occurs using a processor (*decoding, using a processor*).” *Id.* at 37 (citing Ex. 1003 ¶ 122).

As to Bankoski, Petitioner argues that “*Bankoski* explains that video streams are made up of a sequence of video frames (*one or more . . . portions of the original video signal*).” *Id.* at 37–38 (citing Ex. 1006, Fig. 1, ¶¶ 7, 10, 18; Ex. 1027, 30; Ex. 1003 ¶ 123). According to Petitioner, Bankoski teaches that “[t]hese frames of the original input video stream are intended for ultimate display to a user (*which are to be displayed in said subsequent video display thereof*).” *Id.* at 38 (citing Ex. 1006 ¶ 7 (arguing that Bankoski teaches “a method of viewing a series of digital video frames obtained from a series of source video frames”), Figs. 2–3; Ex. 1003 ¶ 123).

Petitioner argues that Bankoski teaches that “each frame is encoded by the encoder and transmitted within the compressed bitstream (*one or more encoded portions of the original video signal*).” *Id.* (citing Ex. 1006 ¶¶ 11, 20–22, 25–27, 31, Figs. 2–3).

As to Hannuksela, Petitioner argues that Hannuksela teaches “further details about a decoder.” *Id.* Moreover, Petitioner argues that Hannuksela thus “teaches that the decoder uses a processor to decode information from a compressed bitstream (*from said encoded video signal*), such as the frames of the original video signal intended for display to a user.” *Id.* at 39 (citing Ex. 1003 ¶ 125); *see also supra* Section V(C)(4) (providing additional arguments about Hannuksela’s teachings about processors and reasons to combine with Bankoski’s teachings).

After reviewing Petitioner’s arguments and evidence, including Dr. Freedman’s Declaration, which are not addressed by Patent Owner (*see generally* PO Resp.), we are persuaded that Petitioner demonstrates by a preponderance of the evidence that Bankoski and Hannuksela teach “decoding, using a processor, from said encoded video signal one or more encoded portions of the original video signal which are to be displayed in said subsequent video display thereof.”

6. *Wherein Said Encoded Portions*

Claim 9 further recites “wherein said encoded portions of said original video signal which are to be displayed are based on and specifically reference a portion of said encoded virtual reference data.” Ex. 1001, 13:23–26. Petitioner argues that Bankoski teaches this limitation. Pet. 39–42. More specifically, Petitioner argues that “*Bankoski* teaches that the encoded frames of the input video stream for display (*said encoded portions*

of said original video signal which are to be displayed) are encoded using prediction, including inter-prediction and motion compensation (are based on and specifically reference a portion of said encoded virtual reference data).” Id. at 39–40.

According to Petitioner, Bankoski “teaches that the encoding process us[es] prediction and motion compensation to encode frames, and that the constructed reference frames are used as reference frames in that prediction process.” *See id.* at 40 (citing Ex. 1006, code (57), ¶¶ 5–6, 20–21, 24, 26, 30–31; Ex. 1003 ¶ 129). In particular, Petitioner argues that “[d]uring encoding, ‘each frame 17 within input video stream 16 is processed in units of macroblocks,’ and ‘each macroblock is encoded using either intra prediction or inter prediction mode.” *Id.* (citing Ex. 1006 ¶¶ 20–21). Bankoski teaches that “[i]nter-frame coding, such as intra- and inter-prediction, ‘refers to predictive encoding schemes such as schemes that comprise encoding a frame **based on** other so-called “reference” frames,” according to Petitioner. *Id.* (quoting Ex. 1006 ¶ 25). Petitioner argues that Bankoski teaches that “[c]onstructed reference frame buffers are used ‘as a predictor for pieces of the current frame data.’” *Id.* (quoting Ex. 1006 ¶ 31; citing Ex. 1006 ¶ 20). Moreover, Bankoski teaches “ensur[ing] that both the encoder and the decoder use the same reference frames required to decode the macroblocks,” according to Petitioner. *Id.* at 41 (citing Ex. 1006 ¶¶ 21–22, Fig. 2; Ex. 1003 ¶ 130). In addition, Petitioner argues that “H.264 provides details regarding encoding using prediction.” *Id.* at 40 (citing Ex. 1003 ¶ 127); *see also id.* at 41 (citing Ex. 1010, 10–11; Ex. 1003 ¶ 131) (arguing that one of ordinary skill in the art would have understood Bankoski’s prediction process in light of, *inter alia*, H.264’s teachings).

After reviewing Petitioner’s arguments and evidence, including Dr. Freedman’s Declaration, which are not addressed by Patent Owner (*see generally* PO Resp.), we are persuaded that Petitioner demonstrates by a preponderance of the evidence that Bankoski and Hannuksela teach “wherein said encoded portions of said original video signal which are to be displayed are based on and specifically reference a portion of said encoded virtual reference data.”

7. Summary

In summary, based on the arguments and evidence of record, we find that Petitioner demonstrates by a preponderance of the evidence that claim 9 is unpatentable under 35 U.S.C. § 103(a) over the combination of Bankoski and Hannuksela.

D. Challenged Claims 10, 11, and 23–25

Petitioner argues, with specific cites to Bankoski and Hannuksela, as well as Dr. Freedman’s testimony, that the combination of Bankoski and Hannuksela teaches the limitations recited in claims 10, 11, and 23–25. Pet. 42–63. Patent Owner’s Response does not separately address Petitioner’s arguments directed to these claims. PO Resp. 6 (arguing that the Petition’s deficiency for claim 9 “applies equally to both independent claims 9 and 23 in both” asserted grounds), 11 (arguing that “[b]ecause Petitioner has failed to meet its burden to prove unpatentability of independent claims 9 and 23 under any ground, the challenged dependent claims likewise have not been shown to be unpatentable”); PO Sur-Reply 8.

Based on the evidence and arguments of record, we find that Petitioner demonstrates by a preponderance of the evidence that claims 10,

11, and 23–25 would have been obvious to one of ordinary skill in the art over the combined teachings of Bankoski and Hannuksela.

VI. ALLEGED OBVIOUSNESS OVER BANKOSKI, HANNUKSELA, AND CHEUNG

Petitioner argues that the combination of Bankoski, Hannuksela, and Cheung renders claims 9–11 and 23–25 of the '960 patent obvious under 35 U.S.C. § 103(a). Pet. 63–69. Thus, this ground of unpatentability challenges the same claims we already determine are unpatentable over the combination of Bankoski and Hannuksela. *See supra* Section V (determining Petitioner shows that claims 9–11 and 23–25 are unpatentable). Under the circumstances of this case, analyzing an additional ground challenging the same claims, which we have determined to be unpatentable, would not be an efficient use of the Board's time and resources. *See Bos. Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App'x 984, 990 (Fed. Cir. 2020) (“We agree that the Board need not address issues that are not necessary to the resolution of the proceeding.”).

Accordingly, we do not reach this remaining obviousness ground. *Cf. In re Gleave*, 560 F.3d 1331, 1338 (Fed. Cir. 2009) (not reaching other grounds of unpatentability after affirming the anticipation ground); *see also Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984) (determining once a dispositive issue is decided, there is no need to decide other issues).

VII. CONCLUSION¹⁰

Based on the full record, we determine that Petitioner shows by a preponderance of the evidence that claims 9–11 and 23–25 of the '960 patent are unpatentable under 35 U.S.C. § 103(a) in view of the combination of Bankoski and Hannuksela.

Claim(s)	35 U.S.C. §	Reference(s) /Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
9–11, 23–25	103(a)	Bankoski, Hannuksela	9–11, 23–25	
9–11, 23–25	103(a) ¹¹	Bankoski, Hannuksela, Cheung		
Overall Outcome			9–11, 23–25	

VIII. ORDER

In consideration of the foregoing, it is hereby

ORDERED that, pursuant to 35 U.S.C. § 314(a), Petitioner has shown by a preponderance of the evidence that claims 9–11 and 23–25 of the '960

¹⁰ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

¹¹ As we explain above, because we determine that claims 9–11 and 23–25 are unpatentable over Bankoski and Hannuksela, we decline to address this ground.

patent are unpatentable; and

FURTHER ORDERED that parties to the proceeding seeking judicial review of this Final Written Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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