

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CANON, INC. and CANON U.S.A., INC.,
Petitioner,

v.

WSOU INVESTMENTS, LLC
d/b/a BRAZOS LICENSING AND DEVELOPMENT,
Patent Owner.

IPR2021-00965
Patent 7,116,714 B2

Before BRIAN J. McNAMARA, ROBERT J. WEINSCHENK, and
JOHN A. HUDALLA, *Administrative Patent Judges*.

HUDALLA, *Administrative Patent Judge*.

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

Canon, Inc. and Canon U.S.A., Inc. (collectively, “Petitioner”) filed a
Petition (Paper 1, “Pet.”) requesting an *inter partes* review of claims 1–9,
12, 13, 16, 18–34, 36, and 37 (“the challenged claims”) of U.S. Patent
No. 7,116,714 B2 (Ex. 1001, “the ’714 patent”). Petitioner filed a
Declaration of Clifford Reader, Ph.D. (Ex. 1002) with its Petition. Patent

Owner, WSOU Investments, LLC d/b/a Brazos Licensing and Development (“Patent Owner”), did not file a preliminary response. We determined that the information presented in the Petition established that there was a reasonable likelihood that Petitioner would prevail with respect to its unpatentability challenges. Pursuant to 35 U.S.C. § 314, we instituted this proceeding on November 30, 2021, as to all challenged claims and all grounds of unpatentability. Paper 6 (“Dec. on Inst.”).

During the course of trial, Patent Owner filed a Patent Owner Response (Paper 9, “PO Resp.”), and Petitioner filed a Reply to the Patent Owner Response (Paper 10, “Pet. Reply”). Patent Owner also filed a Sur-reply. Paper 12 (“PO Sur-reply”).

An oral hearing was held on August 30, 2022, and a transcript of the hearing is included in the record. Paper 19.

We have jurisdiction under 35 U.S.C. § 6. This decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of claims 1–9, 12, 13, 16, 18–34, 36, and 37 of the ’714 patent. For the reasons discussed below, Petitioner has demonstrated by a preponderance of the evidence that claims 1–9, 12, 13, 16, 18–34, 36, and 37 of the ’714 patent are unpatentable.

I. BACKGROUND

A. *Real Parties-in-Interest*

Petitioner identifies Canon, Inc. and Canon U.S.A., Inc. as real parties-in-interest. Pet. 2. Patent Owner identifies WSOU Investments, LLC d/b/a Brazos Licensing and Development as the real party-in-interest. Paper 3, 1.

B. Related Proceedings

The parties identify the following proceeding related to the '714 patent (Pet. 2; Paper 3, 2):

WSOU Invs., LLC v. Canon, Inc., No. 6-20-cv-00981 (W.D. Tex. filed Oct. 19, 2020) (“the parallel litigation”).

C. The '714 patent

The '714 patent is directed to video coding. Ex. 1001, 1:6. According to the '714 patent, video compression methods may or may not use temporal redundancy. *Id.* at 1:35–37. Compressed pictures that do not utilize temporal redundancy reduction methods are called INTRA or I-frames or I-pictures. *Id.* at 1:37–39. Temporally predicted images are usually forwardly predicted from a picture occurring before the current picture and are called INTER or P-frames or P-pictures. *Id.* at 1:39–42. Many video compression schemes also use temporally bi-directionally predicted frames, which are commonly referred to as B-pictures or B frames. *Id.* at 1:47–48.

Figure 5 of the '714 patent is reproduced below.

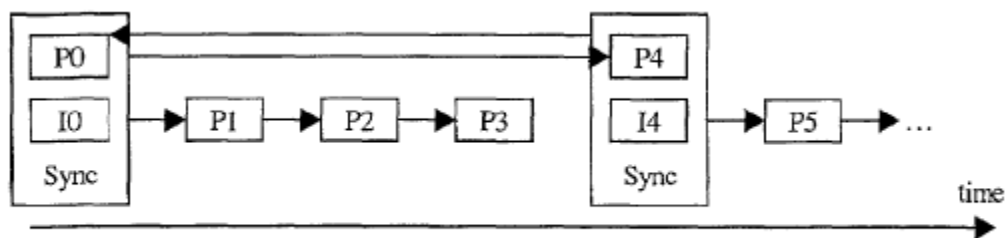


Fig. 5

Figure 5 shows an example of frame-by-frame output of a video encoder. *Id.* at 5:13–14, 8:30–31. I0 is an INTRA coded picture appearing at the very beginning of a video sequence, and I4 is a periodic INTRA picture. *Id.* at

8:31–34. In order to protect I0 and I4 from transmission errors, a second representation of each INTRA coded picture is temporally predictively encoded and transmitted. *Id.* at 8:34–37. For example, the second representation of picture 4 is an INTER picture (P4) predicted and motion-compensated with reference to picture 0. *Id.* at 8:37–40. Thus, when the encoder encodes a frame (or part of a frame) in an INTRA manner, the encoder also encodes the frame (or part of the frame) again, this time in a temporally predictive manner with reference to another frame within the video sequence. *Id.* at 4:5–9.

The '714 patent issued from a U.S. application filed on August 9, 2001, and claims priority to a United Kingdom patent application filed on August 14, 2000. Ex. 1001, codes (22), (30). Petitioner asserts that its references qualify as prior art under pre-AIA 35 U.S.C. § 102(b). Pet. 4–6. Therefore, as discussed below, we apply the August 9, 2001, filing date of the U.S. application that led to the '714 patent for qualifying the asserted references as prior art.

D. Illustrative Claim

Of the challenged claims of the '714 patent, claims 1, 6–9, 12, and 13 are independent. Claims 2–5, 36, and 37 depend from claim 1, and claims 16 and 18–34 depend directly or indirectly from claim 6. Claim 1 is illustrative of the challenged claims and recites:

1. A method of encoding a video signal representing a sequence of pictures to form an encoded video signal, the method comprising
 - receiving a first picture or a part thereof,
 - encoding the first picture or said part thereof, using a first encoding mode, without reference to another picture of the

sequence to form a first encoded representation of the first picture or said part thereof, and

encoding said first picture or said part thereof, using a second encoding mode, with reference to another picture of the sequence to produce a corresponding temporally predicted second encoded representation of the first picture or said part thereof.

Ex. 1001, 12:63–13:6 (formatting applied).

E. Prior Art

Petitioner relies on the following prior art:

N. Färber et al., “Robust H.263 Compatible Transmission for Mobile Video Server Access,” *Proceedings of First International Workshop on Wireless Image/Video Communications*, Sept. 4–5, 1996, pp. 8–13 (Ex. 1003, “Färber”);

Patent Cooperation Treaty (PCT) Patent Application Publication No. WO 1998/026604 A1, published June 18, 1998 (Ex. 1004, “Dalby”);

U.S. Patent No. 5,680,322, filed May 26, 1995, issued Oct. 21, 1997 (Ex. 1005, “Shinoda”);

Japanese Patent Application Publication No. H11-27645, published Jan. 29, 1999 (Ex. 1006, “Morishita”);¹ and

Japanese Patent Application Publication No. H6-205365, published July 22, 1994 (Ex. 1007, “Mashimo”).²

¹ Morishita is a Japanese-language publication (Ex. 1006, 19–35) that was filed with an English-language translation (*id.* at 2–18) and an affidavit attesting to the accuracy of the translation (*id.* at 1). Our citations to Morishita herein refer to the translation.

² Mashimo is a Japanese-language publication (Ex. 1007, 12–21) that was filed with an English-language translation (*id.* at 2–11) and an affidavit attesting to the accuracy of the translation (*id.* at 1). Our citations to Mashimo herein refer to the translation.

F. The Instituted Grounds

We instituted *inter partes* review of claims 1–9, 12, 13, 16, 18–34, 36, and 37 of the ’714 patent on the following grounds (Dec. on Inst. 32), which are all the grounds presented in the Petition (Pet. 6–7):

Claims Challenged	35 U.S.C. §	References
1–3, 5–9, 12, 13, 18–20, 22, 28, 30	102(b) ³	Färber
1–3, 5–9, 12, 13, 16, 18–20, 22, 24, 26–29, 31, 34, 36	102(b)	Dalby
1–3, 5–9, 12, 13, 16, 18–20, 22, 24, 26–31, 34, 36	103(a)	Färber, Dalby
4, 5, 12, 21, 23, 24, 29, 31, 32, 33, 37	103(a)	Färber, Dalby, Morishita
25, 34	103(a)	Färber, Dalby, Mashimo
1–9, 12, 13, 16, 18–24, 26–32, 36	103(a)	Shinoda, Morishita
16, 25, 34	103(a)	Shinoda, Morishita, Mashimo

II. ANALYSIS

A. Legal Standards

A claim is anticipated if a single prior art reference either expressly or inherently discloses every limitation of the claim. *Orion IP, LLC v. Hyundai Motor Am.*, 605 F.3d 967, 975 (Fed. Cir. 2010). Although the elements must

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103. Because the ’714 patent was filed before March 16, 2013 (the effective date of the relevant amendments), the pre-AIA versions of §§ 102 and 103 apply.

be arranged or combined in the same way as in the claim, “the reference need not satisfy an *ipsissimis verbis* test,” i.e., identity of terminology is not required. *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009) (citing *In re Bond*, 910 F.2d 831, 832–33 (Fed. Cir. 1990)).

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 the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *See 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 skill in the art; and (4) where in evidence, so-called secondary considerations.⁴ *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We also recognize that prior art references must be “considered together with the knowledge of one of ordinary skill in the pertinent art.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

B. Level of Ordinary Skill in the Art

Citing testimony from Dr. Reader, Petitioner contends a person of ordinary skill in the art (or “POSITA”) “would have had a bachelor’s degree in electrical engineering or computer science, or an equivalent degree, and two to three years of experience in the field of video coding.” Pet. 7 (citing

⁴ The trial record does not include any evidence of secondary considerations of nonobviousness.

Ex. 1002 ¶¶ 75–77). Patent Owner does not propose an alternative definition. *See* PO Resp. 4.

We adopt Petitioner’s definition of the level of ordinary skill in the art. We are satisfied that this definition comports with the level of skill necessary to understand and implement the teachings of the ’714 patent and the asserted prior art.

C. Claim Interpretation

In an *inter partes* review, we construe each claim using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

37 C.F.R. § 42.100(b) (2020). Accordingly, our claim construction standard is the same as that of a district court. *See id.* Under the standard applied by district courts, claim terms are generally given their plain and ordinary meaning as would have been 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 v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). “There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Petitioner contends that no claim constructions are necessary to resolve the unpatentability issues presented in the Petition. Pet. 14–15.

Petitioner also notes that the parties have no material disputes regarding the unpatentability of the challenged claims that would be resolved through claim construction. Pet. Reply 5.

Patent Owner objects to Petitioner’s claim construction position in this case because Petitioner “identified multiple claim terms for construction” in the parallel litigation. PO Resp. 6. Patent Owner highlights Petitioner’s proposed construction in the parallel litigation for the limitation “corresponding temporally predicted second encoded representation” and contends that “Petitioner is talking through both sides of its mouth where Petitioner advances [an] admittedly *different* and *broader* claim construction here than it did in litigation, though both forums apply the *same* claim construction standard.”⁵ *Id.* at 10 (emphasis added by Patent Owner). Patent Owner characterizes this situation as “gamesmanship between the forums.” *Id.* at 6. Patent Owner further argues that, as a result of this situation, the Petition is deficient under 37 C.F.R. § 42.104(b)(3)–(4) because it fails to identify “[h]ow the challenged claim *is to be construed*” and does not “set forth . . . where each element of the claim is found in the

⁵ In its Reply, Petitioner purports to show that, even under its proposed construction for “corresponding temporally predicted second encoded representation” in the parallel litigation, the prior art asserted here still discloses the claimed invention. Pet. Reply 8–15. Patent Owner objects to this line of argument as belatedly advancing a new claim construction. PO Sur-reply 1, 5. Patent Owner also disputes the merits of Petitioner’s reply arguments. *Id.* at 10–15. We do not reach these arguments because, as discussed below, we do not agree that Petitioner’s claim construction position in this case is deficient, and we are able to dispose of the instant unpatentability grounds by applying the plain and ordinary meaning of the claims.

prior art . . . relied upon.” *Id.* at 5–6, 11 (emphasis added by Patent Owner); *see also* PO Sur-reply 1–3, 15–16 (similar argument).

We do not agree with Patent Owner that Petitioner’s claim construction position is deficient. Throughout this proceeding, Petitioner has maintained that no construction of the claims is necessary to resolve the asserted grounds of unpatentability. *See* Pet. 14–15; Pet. Reply 5. This comports with the discussion of claim construction in our Trial Practice Guide, which contemplates that “a petitioner may include a statement that the claim terms require no express construction.” Patent Trial and Appeal Board Consolidated Trial Practice Guide at 44 (Nov. 2019), *available at* <https://www.uspto.gov/TrialPracticeGuideConsolidated>. Given Patent Owner has proposed no claim constructions of its own, and given that no issues in the fully developed trial record turn on claim interpretation, we find that Petitioner has satisfied the requirement of identifying “[h]ow the challenged claim is to be construed.”⁶ 37 C.F.R. § 42.104(b)(3).

We also disagree with Patent Owner that Petitioner’s claim constructions here must be the same as those that it put forth in the parallel litigation. Petitioner is correct that the posture of different cases may or may not require claim interpretation. For example, Petitioner posits that claim interpretation was necessary in the district court to consider certain infringement issues, whereas no claim construction is necessary here to resolve issues of patentability. *See* Pet. Reply 7. Although we need not

⁶ To address Patent Owner’s companion argument, we also find that Petitioner has satisfied the requirement of identifying “[h]ow the construed claim[s are] unpatentable.” 37 C.F.R. § 42.104(b)(4). Our analysis of Petitioner’s unpatentability grounds is set forth in detail below.

delve into the court’s consideration of infringement,⁷ we agree with Petitioner’s premise that the need to interpret claim terms varies depending on the posture of the case. And, as discussed below, no claim construction is necessary to resolve the issues in this *inter partes* review. Thus, based on the particular circumstances of this case, we see no impropriety in Petitioner’s different claim construction positions across the two forums.

For these reasons, we determine that no terms require explicit construction. *See, e.g., Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Obviousness Ground Based on Färber and Dalby

Petitioner contends the subject matter of claims 1–3, 5–9, 12, 13, 16, 18–20, 22, 24, 26–31, 34, and 36 would have been obvious over the combination of Färber and Dalby. Pet. 20–21, 31–49. Patent Owner does not put forth any arguments related to the merits of this ground.

1. Färber

Färber is a paper directed to “robust transmission of stored video bit-streams that is based on a feedback channel.” Ex. 1003, Abstr. Färber recognizes that compressed video signals are extremely vulnerable to

⁷ We note, for example, that the court in the parallel litigation declined to adopt Petitioner’s proposed construction for the limitation “corresponding temporally predicted second encoded representation” and instead applied the plain and ordinary meaning. Ex. 2003, 4.

transmission errors. *Id.* at 9.⁸ Färber also states that an important feature for video storage applications is the support of random access, fast forward, and fast reverse. *Id.* Figure 1 of Färber is reproduced below.

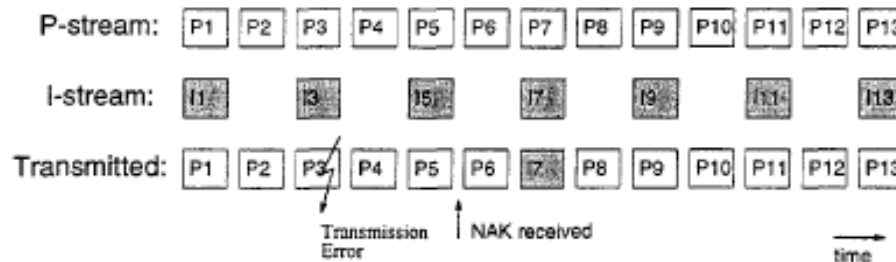


Figure 1: Sequence of transmitted frames after a transmission error.

Figure 1 depicts a video sequence of transmitted frames after a transmission error. *Id.* at 10. For this sequence, two bit-streams are stored at the video server. *Id.* at 9. The first stream (P-stream) results from regular encoding of the video sequence and consists of INTER-coded frames (P-frames). *Id.* at 9–10. In normal operation, the video server transmits the P-stream only. *Id.* at 10. The second stream (I-stream) consists of INTRA-coded frames (I-frames) and is used for resynchronization after transmission errors. *Id.* The I-stream is encoded at a lower frame rate to reduce the storage requirements at the video server. *Id.* As illustrated in Figure 1, there is a transmission error with frame P3. *Id.* This results in the video server receiving a Negative Acknowledgement (NAK), after which the video server replaces the next P-frame in the P-stream with its corresponding I-frame (I7) from the I-stream and then resumes transmitting the P-stream. *Id.*

⁸ We follow Petitioner’s convention of citing the native page numbers within the conference proceedings volume rather than the page numbers added by Petitioner in a footer.

Figure 2 of Färber is reproduced below.

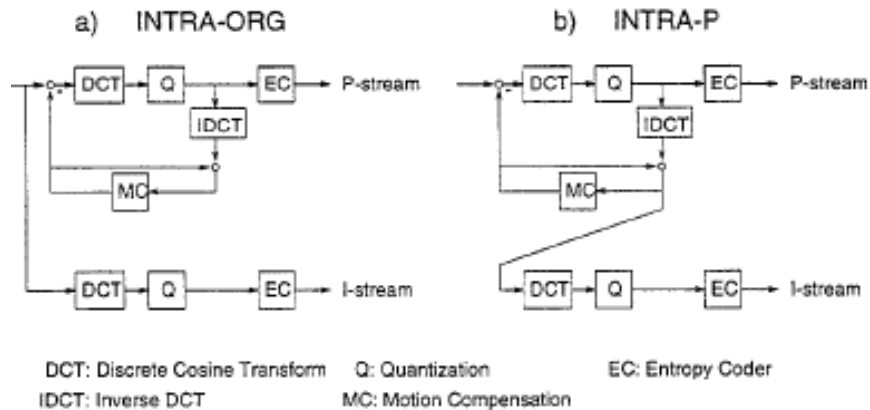


Figure 2 depicts block diagrams of exemplary encoders for encoding I-frames from a) an original sequence (INTRA-ORG) and b) reconstructed P-frames (INTRA-P). *Id.* at 10–11. The functional blocks of Figure 2 include Discrete Cosine Transform (DCT), Quantization (Q), Entropy Coder (EC), Inverse DCT (IDCT), and Motion Compensation (MC). *Id.* at 11.

Petitioner contends Färber qualifies as prior art under 35 U.S.C. § 102(b) based on its publication in conjunction with an Institute of Electrical and Electronics Engineers (IEEE) convention held September 4–5, 1996. Pet. 4–5 (citing Ex. 1008 ¶ 6–11). In support of its contention, Petitioner provides a declaration of Gordon MacPherson, a Director with IEEE. *See* Ex. 1008 ¶ 1. Mr. MacPherson testifies that copies of the conference proceedings containing Färber were made available no later than the last day of the conference. *Id.* ¶ 11. Patent Owner does not dispute the prior art status of Färber.

We credit Mr. MacPherson’s uncontested testimony and determine that Färber qualifies as prior art under 35 U.S.C. § 102(b) because Färber’s publication date of September 1996 is more than one year before the U.S.

application date of the '714 patent, which is August 9, 2001. Ex. 1001, code (22); Ex. 1008 ¶ 11.

2. Dalby

Dalby is a PCT patent application publication directed to encoding video signals for low bandwidth transmission. Ex. 1004, 1:3–5. According to Dalby, video compression techniques rely on the correlation between neighboring pixels in space and/or in time. *Id.* at 1:13–14. In other words, pixels of a single frame can be coded with the respect of their relationship to each other (intra-frame coding) and/or with respect to their relationship with pixels of neighboring frames (inter-frame coding). *Id.* at 1:18–21. Intra-frame coded frames (intra-frames) can be decoded without reference to any other frame, whereas inter-frame coded frames (inter-frames) require information in relation to the frames used in the prediction. *Id.* at 1:21–23.

Figure 2 of Dalby is reproduced below.

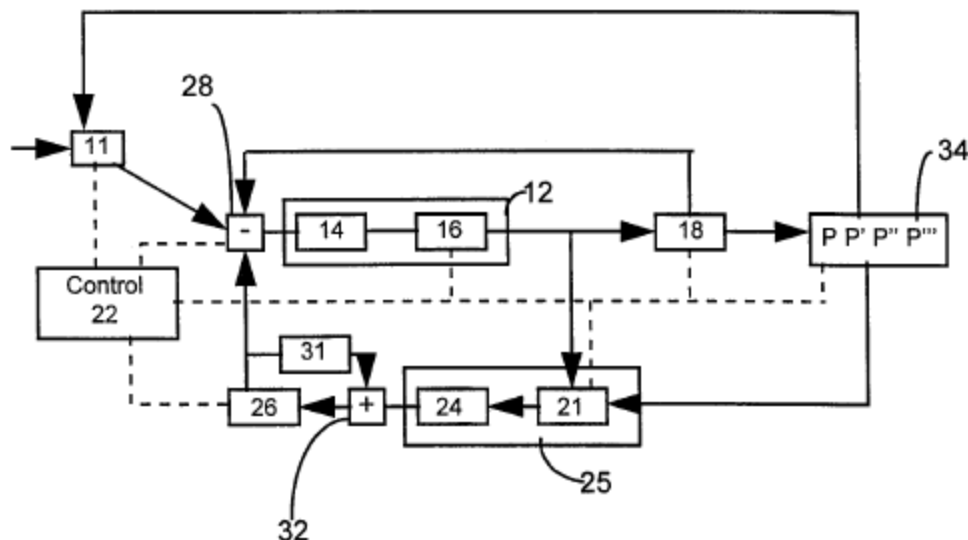


Fig. 2

Figure 2 depicts a video encoder with input 11, encoding means 12, quantiser 16, variable length coder (VLC) 18, control unit 22, local decoder 25, frame store 26, conventional motion estimator 31, and adder 32. *Id.* at 6:1–27. The output of the video encoder is stored in local store 34. *Id.* at 6:27.

Figure 3 of Dalby is reproduced below.

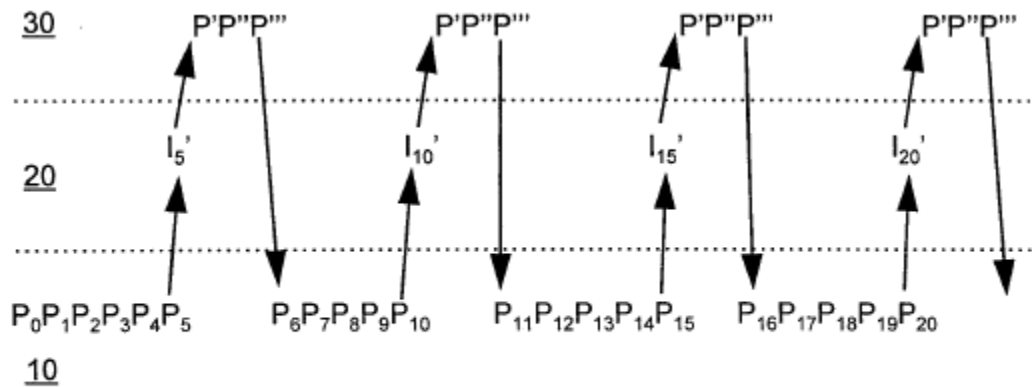


Fig. 3

Figure 3 depicts data generated by the video encoder that enables fast forward and fast reverse. *Id.* at 4:20–21, 6:28–30. The encoding of a video signal requires several passes through the encoder. *Id.* at 6:28–30. A first pass generates first set of data 10 corresponding to a normal playback mode bit stream, such as an initial I frame (not shown) followed by P frames. *Id.* at 6:31–7:1, 8:4–5. A second pass generates second set of data 20 including I frame sequence I'I'I'I' at a lower bit rate suitable for fast forward or fast reverse. *Id.* at 7:3–7, 8:5–6. Subsequent passes generate additional P', P'', and P''' frames 30 that allow normal playback mode bit stream 10 to be rejoined. *Id.* at 7:15, 8:6–8.

Petitioner contends Dalby qualifies as prior art under 35 U.S.C. § 102(b) based on its publication date. Pet. 4–5. Patent Owner does not

dispute the prior art status of Dalby. We determine that Dalby qualifies as prior art under 35 U.S.C. § 102(b) because Dalby's publication date of June 18, 1998, is more than one year before the U.S. application date of the '714 patent, which is August 9, 2001. Ex. 1001, code (22); Ex. 1004, code (43).

3. *Claim 1*

The preamble of claim 1 recites “[a] method of encoding a video signal representing a sequence of pictures to form an encoded video signal.” Ex. 1001, 12:63–64. Petitioner cites Färber's video encoder and methods for encoding video bit-streams. Pet. 31 (citing Ex. 1003, 9–10, Fig. 2). Petitioner also cites Dalby's disclosure of encoding video signals “representing moving pictures such as movies, documentaries etc.” *Id.* at 32 (quoting Ex. 1004, 4:32–5:9).

Neither party addresses whether the preamble is limiting. Patent Owner does not dispute Petitioner's analysis of the preamble. Because Petitioner has shown that Färber and Dalby both teach the preamble (*see, e.g.,* Ex. 1003, 9–10, Fig. 2; Ex. 1004, 4:32–5:9), we need not determine whether the preamble is limiting. *See Realtime Data*, 912 F.3d at 1375.

Claim 1 further recites “receiving a first picture or a part thereof.” Ex. 1001, 12:65–66. Petitioner cites Färber's Figure 2 and contends Figure 2 “shows an input to the video encoder for receiving the original sequence of pictures to produce the INTER-coded frames and INTRA-coded frames.” Pet. 33 (citing Ex. 1002 ¶ 186; Ex. 1003, Fig. 2). Petitioner also cites Dalby's input 11 to the video encoder, which “receives a picture to produce the INTER-coded frames and INTRA-coded frames from the

original sequence of pictures.” *Id.* at 33–34 (citing Ex. 1004, Abstr., 3:9–11, 6:2–5, Fig. 2).

Patent Owner does not dispute Petitioner’s analysis of this limitation. We are persuaded that Färber’s encoder in Figure 2 receives frames of a video (i.e., a picture or a part thereof). *See, e.g.*, Ex. 1003, 9, Fig. 2. We also are persuaded that Dalby’s input 11 receives frames of a video (i.e., a picture or a part thereof). *See, e.g.*, Ex. 1004, Abstr., 3:9–11, 6:2–5, Fig. 2.

Claim 1 further recites “encoding the first picture or said part thereof, using a first encoding mode, without reference to another picture of the sequence to form a first encoded representation of the first picture or said part thereof.” Ex. 1001, 12:66–13:2. For the first encoding mode, Petitioner cites Färber’s disclosure of encoding INTRA-coded frames, e.g., the I-stream of Figure 1. Pet. 34–35 (citing Ex. 1003, 9–10, Fig. 1). Petitioner also cites Dalby’s disclosure of encoding INTRA-coded frames, e.g., the I-frame sequence at reference number 20 of Dalby’s Figure 3. *Id.* at 34–35 (citing Ex. 1004, 3:15–17, 3:29–30, 5:15–16, 6:1–12, 7:3–14, claim 2, Fig. 3).

Patent Owner does not dispute Petitioner’s analysis of this limitation. We are persuaded that Färber’s I-Stream teaches the first encoding mode, because INTRA coding does not use temporal redundancy methods, i.e., it does not reference other pictures in the sequence. *See, e.g.*, Ex. 1001, 1:37–45; Ex. 1003, 9–10, Fig. 1. We likewise are persuaded that Dalby’s I-frame sequence 20 teaches the first encoding mode. *See, e.g.*, Ex. 1004, 3:15–17, 3:29–30, 5:15–16, 6:1–12, 7:3–14, claim 2, Fig. 3.

Claim 1 further recites “encoding said first picture or said part thereof, using a second encoding mode, with reference to another picture of the

sequence to produce a corresponding temporally predicted second encoded representation of the first picture or said part thereof.” Ex. 1001, 13:2–6. For the second encoding mode, Petitioner cites Färber’s disclosure of encoding INTER-coded frames, e.g., the P-stream of Figure 1. Pet. 36 (citing Ex. 1003, 9–10, Fig. 1). According to Petitioner, Färber’s Figure 1 “shows several examples of a frame that was encoded as an INTRA-frame . . . also being encoded as an INTER-frame.” *Id.* Petitioner also cites several instances in Dalby’s Figure 3 where “a frame that was encoded as an INTRA-frame (*e.g.*, I5) also [is] encoded as an INTER-frame (*e.g.*, P5).” *Id.* at 36–37 (citing Ex. 1004, 3:12–17, 3:29–31, 5:15–16, 6:31–7:2, Fig. 3).

Patent Owner does not dispute Petitioner’s analysis of this limitation. We are persuaded that Färber’s P-Stream teaches the second encoding mode, because INTER coding utilizes temporal prediction. *See, e.g.*, Ex. 1001, 1:37–45; Ex. 1003, 9–10, Fig. 1. We likewise are persuaded that Dalby’s P-frame encoding teaches the second encoding mode. *See, e.g.*, Ex. 1004, 3:12–17, 3:29–31, 5:15–16, 6:31–7:2, Fig. 3.

Regarding Petitioner’s rationale for combining Färber and Dalby, Petitioner notes that Dalby expressly mentions and builds upon the teachings of Färber. Pet. 20 (citing Ex. 1002 ¶¶ 351–355; Ex. 1004, 2:22–30). Petitioner further contends that Dalby provides solutions to a problem recognized in Färber, namely that “a mismatch error can result from the difference of a reconstructed P-frame and its corresponding I-frame.” *Id.* at 20–21 (citing Ex. 1002 ¶¶ 128, 129, 352; Ex. 1003, 3). Petitioner additionally contends that both references utilize the same video compression standard, “which demonstrates that they can successfully be

used together and predictably combined, without requiring undue experimentation.” *Id.* at 21 (citing Ex. 1002 ¶¶ 351–355).

Patent Owner does not dispute Petitioner’s reasons for combining Färber and Dalby. We are persuaded by Petitioner’s rationale for the combination because Dalby expressly mentions Färber and extends its teachings, which substantiates that an ordinarily skilled artisan would have combined the references with predictable success. *See, e.g.*, Ex. 1002 ¶¶ 128–133, 351–355; Ex. 1004, 2:22–3:8.

Petitioner has persuasively shown that the combination of Färber and Dalby teaches all limitations of claim 1. Petitioner also has put forth persuasive reasons for combining these references with a reasonable expectation of success. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 1 would have been obvious over the combination of Färber and Dalby.

4. *Claim 2*

Claim 2 depends from claim 1 and recites that “every picture or part thereof encoded without reference to another picture is also encoded with reference to another picture of the sequence to form a corresponding temporally predicted second encoded representation of each respective picture or part.” Ex. 1001, 13:7–12. Petitioner cites Färber’s Figure 1 for teaching that “every INTRA(I)-frame has a corresponding INTER(P)-frame.” Pet. 37–38 (citing Ex. 1002 ¶¶ 196–197; Ex. 1003, 9–10, Fig. 1). Petitioner likewise cites Dalby’s Figure 3 for teaching that every frame encoded as an I-frame is also encoded as a P-frame. *Id.* at 38 (citing

Ex. 1002 ¶ 198; Ex. 1004, 3:12–17, 3:29–31, 5:15–16, 6:1–12, 6:31–7:2, 7:3–14, Fig. 3).

Patent Owner does not dispute Petitioner’s analysis of the additional limitation in claim 2. We are persuaded that Färber and Dalby both teach instances where a frame encoded as an I-frame (i.e., a frame encoded without reference to another picture) is also encoded as a P-frame (i.e., a frame encoded with reference to another picture). *See, e.g.*, Ex. 1002 ¶¶ 196–198; Ex. 1003, 9–10, Fig. 1; Ex. 1004, 3:12–17, 3:29–31, 5:15–16, 6:1–12, 6:31–7:2, 7:3–14, Fig. 3. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 2 would have been obvious over the combination of Färber and Dalby.

5. *Claim 3*

Claim 3 depends from claim 1 and recites that “said first picture or part thereof is encoded with reference to another picture occurring in the sequence temporally prior to said first picture.” Ex. 1001, 13:13–16. Petitioner cites Dalby’s teaching of “coding each frame of the video signal ***with reference to a preceding frame*** of the video signal.” Pet. 39 (quoting Ex. 1004, 3) (citing Ex. 1002 ¶¶ 202, 206) (emphasis added by Petitioner). Petitioner also cites Färber’s teaching of “dual coding a single picture as both a P-frame and an I-frame”; Petitioner notes that P-frames are coded with reference to a preceding picture. *Id.* (citing Ex. 1002 ¶¶ 200–201, 204–205; Ex. 1003, 9–10, Fig. 1).

Patent Owner does not dispute Petitioner’s analysis of the additional limitation in claim 3. We are persuaded that Färber and Dalby both teach

encoding a frame with reference to a preceding frame. *See, e.g.*, Ex. 1002 ¶¶ 200–202, 204–206; Ex. 1003, 9–10, Fig. 1; Ex. 1004, 3. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 3 would have been obvious over the combination of Färber and Dalby.

6. *Claim 5*

Claim 5 depends from claim 1 and recites that “said first picture or part thereof is encoded with reference to one or more other pictures occurring in the sequence.” Ex. 1001, 13:21–23. Petitioner cites the same analysis discussed above with respect to claim 3. Pet. 38–39; *see supra* § II.D.5. Patent Owner does not dispute Petitioner’s analysis of the additional limitation in claim 5. We are persuaded that Färber and Dalby teach this limitation for the same reasons discussed above for claim 3. *See supra* § II.D.5. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 5 would have been obvious over the combination of Färber and Dalby.

7. *Claim 6*

Claim 6 is a system claim that recites a “video encoder” in its preamble but is otherwise similar in scope to the method claim recited in claim 1. Ex. 1001, 13:24–35. Petitioner contends that Färber and Dalby both disclose a video encoder. Pet. 41 (citing Ex. 1002 ¶¶ 207–210; Ex. 1003, 13, Fig. 2; Ex. 1004, 6:1–24, Fig. 2, claim 8). Otherwise, Petitioner relies on its analysis from claim 1. *Id.*

Patent Owner does not dispute Petitioner’s analysis for claim 6. We are persuaded that Färber and Dalby both teach a video encoder. *See, e.g.*, Ex. 1003, Fig. 2; Ex. 1004, 6:1–24, Fig. 2, claim 8. For all other limitations of claim 6, we also persuaded by Petitioner’s analysis for the same reasons discussed above for claim 1. *See supra* § II.D.3. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 6 would have been obvious over the combination of Färber and Dalby.

8. *Claim 7*

Claim 7 is a system claim that recites a “video codec including a video encoder” in its preamble but is otherwise similar in scope to the method claim recited in claim 1. Ex. 1001, 13:36–47. Petitioner relies on the same analysis from claim 6 for teaching the video encoder. *See* Pet. 41. To the extent that the recited “video codec” requires a decoder, Petitioner cites Dalby’s teaching of a system that includes both encoding means 12 and local decoder 25. *Id.* at 42 (citing Ex. 1004, 6:1–17, Fig. 2). Otherwise, Petitioner relies on its analysis from claim 1. *Id.* at 41.

Patent Owner does not dispute Petitioner’s analysis for claim 7. We are persuaded that Färber and Dalby both teach a video encoder for the same reasons discussed above for claim 6. *See supra* § II.D.7. We are further persuaded that Dalby teaches a decoder. *See, e.g.*, Ex. 1004, 6:1–17, Fig. 2. For all other limitations of claim 7, we also persuaded by Petitioner’s analysis for the same reasons discussed above for claim 1. *See supra* § II.D.3. On the entire trial record, we determine that Petitioner has shown,

by a preponderance of the evidence, that the subject matter of claim 7 would have been obvious over the combination of Färber and Dalby.

9. *Claim 8*

Claim 8 is a system claim that recites a “multimedia system including a video encoder” in its preamble but is otherwise similar in scope to the method claim recited in claim 1. Ex. 1001, 13:48–59. Petitioner relies on the same analysis from claim 6 for teaching the video encoder. *See* Pet. 41. For the “multimedia system,” Petitioner relies on Färber’s teaching of a video server application and Dalby’s teachings of a video-on-demand system. *Id.* at 42–43 (citing Ex. 1002 ¶¶ 240–244; Ex. 1004, 4:32–5:9, 11:27–12:12). Otherwise, Petitioner relies on its analysis from claim 1. *Id.* at 41.

Patent Owner does not dispute Petitioner’s analysis for claim 8. We are persuaded that Färber and Dalby both teach a video encoder for the same reasons discussed above for claim 6. *See supra* § II.D.7. We are further persuaded that Färber’s video server application and Dalby’s video-on-demand system are multimedia systems. *See, e.g.*, Ex. 1002 ¶ 241; Ex. 1003, 8; Ex. 1004, 4:32–5:9, 11:27–12:12. For all other limitations of claim 8, we also persuaded by Petitioner’s analysis for the same reasons discussed above for claim 1. *See supra* § II.D.3. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 8 would have been obvious over the combination of Färber and Dalby.

10. Claim 9

Claim 9 is a method claim that is similar in scope to the method claim recited in claim 1. Ex. 1001, 13:60–14:4. Claim 9 differs from claim 1 only insofar as it recites “a segment of a first picture” instead of “a first picture or a part thereof.” Petitioner relies on the same analysis from claim 1 and further contends that Färber teaches that its encoding method can apply to individual groups of blocks from the I-stream rather than just entire frames. Pet. 40 (citing Ex. 1002 ¶¶ 36, 51, 53, 260; Ex. 1003, 12). Patent Owner does not dispute Petitioner’s analysis for claim 9. We are persuaded that Färber’s encoding method may be applied to groups of blocks (i.e., segments). *See, e.g.*, Ex. 1003, 12. For all other limitations of claim 9, we are also persuaded by Petitioner’s analysis for the same reasons discussed above for claim 1. *See supra* § II.D.3. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 9 would have been obvious over the combination of Färber and Dalby.

11. Claim 12

Claim 12 is a system claim that recites a “portable electronic device incorporating a video encoder” in its preamble but is otherwise similar in scope to the method claim recited in claim 1. Ex. 1001, 14:54–65. Petitioner relies on the same analysis from claim 6 for teaching the video encoder. *See* Pet. 41. For the “portable electronic device,” Petitioner cites Dalby’s teachings of video calling. Pet. 43 (citing Ex. 1004, 2:13–15). Petitioner also cites Dalby’s user terminals 6. *Id.* (citing Ex. 1004, 5:1–12). Petitioner contends that, in light of Dalby’s teachings of video calling, it

would have been obvious to an ordinarily skilled artisan to apply Dalby's encoding to portable versions of user terminal 6. *Id.* (citing Ex. 1002 ¶¶ 270, 274–276). Otherwise, Petitioner relies on its analysis from claim 1. *Id.* at 41.

Patent Owner does not dispute Petitioner's analysis for claim 12. We are persuaded that Färber and Dalby both teach a video encoder for the same reasons discussed above for claim 6. *See supra* § II.D.7. We are further persuaded that an ordinarily skilled artisan considering Dalby's video calling application would have known to apply Dalby's video encoding methods to portable versions of its user terminals. *See, e.g.,* Ex. 1002 ¶¶ 270, 274–276; Ex. 1004, 2:13–15, 5:1–12. For all other limitations of claim 12, we also persuaded by Petitioner's analysis for the same reasons discussed above for claim 1. *See supra* § II.D.3. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 12 would have been obvious over the combination of Färber and Dalby.

12. Claim 13

Claim 13 is a system claim that recites a “multimedia system including a video codec, the codec comprising a video encoder” in its preamble but is otherwise similar in scope to the method claim recited in claim 1. Ex. 1001, 14:66–15:11. Petitioner relies on the same analysis discussed above with respect to claims 7 and 8. Pet. 43; *see supra* §§ II.D.8, II.D.9. Patent Owner does not dispute Petitioner's analysis for claim 13. We are persuaded by Petitioner's analysis for the same reasons discussed above for claims 7 and 8. *See supra* §§ II.D.8, II.D.9. On the entire trial

record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 13 would have been obvious over the combination of Färber and Dalby.

13. Claim 16

Claim 16 depends from claim 6 and recites that the video encoder comprises “a controller arranged to control processing means to encode a first picture or a part thereof received at the input.” Ex. 1001, 16:12–14. To explain its analysis, Petitioner provides an annotated version of Dalby’s Figure 2, which is reproduced below.

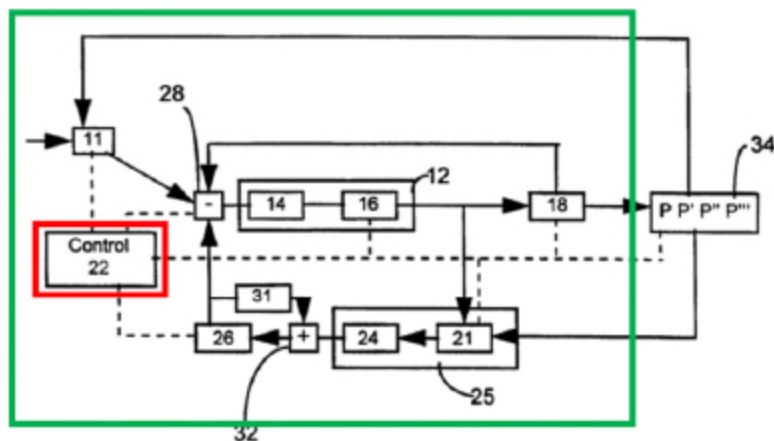


Fig. 2

This annotated version of Dalby’s Figure 2 depicts a block diagram of a video encoder. Ex. 1004, 4:18–19. As indicated in a red box, Petitioner maps the recited “controller” to Dalby’s control unit 22. Pet. 44 (citing Ex. 1004, 6:2–12, 6:14–15, 7:7–10, 7:16–18, 8:15–20, Fig. 2). As indicted in a green box, Petitioner maps the recited “processing means” to a number of processing elements in the video encoder, including input 11, encoding means 12 (with DCT calculating unit 14 and quantiser 16), variable length

coder (VLC) 18, local decoder 25 (with inverse quantiser 21 and inverse DCT unit 24), frame store (FS) 26, subtractor 28, conventional motion estimator 31, and adder 32. *Id.* (citing Ex. 1002 ¶ 305; Ex. 1004, Fig. 2); *see also* Ex. 1004, 6:1–27 (description of Figure 2).

Patent Owner does not dispute Petitioner’s analysis of the additional limitation in claim 16. As indicated in the annotated figure above, we are persuaded that Dalby teaches a controller that controls processing elements within a video encoder. *See, e.g.*, Pet. 44; Ex. 1002 ¶ 305; Ex. 1004, 6:1–27, 7:7–10, 7:16–18, 8:15–20, Fig. 2. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 16 would have been obvious over the combination of Färber and Dalby.

14. Claim 18

Claim 18 depends from claim 6 and recites that “the first encoding mode is an INTRA coding mode.” Ex. 1001, 16:12–14. Petitioner cites the same analysis from claim 1 showing that each of Färber and Dalby discloses an INTRA coding mode that generates INTRA-coded frames. Pet. 45; *see supra* § II.D.3. Patent Owner does not dispute Petitioner’s analysis for claim 18. We are persuaded by Petitioner’s analysis for the same reasons discussed above for claim 1. *See supra* § II.D.3. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 18 would have been obvious over the combination of Färber and Dalby.

15. *Claims 19 and 20*

Claim 19 depends from claim 6 and recites that “the second encoding mode is an INTER coding mode.” Ex. 1001, 16:20–21. Claim 20 depends from claim 6 and recites that “the second encoding mode provides a P frame.” Ex. 1001, 16:22–23. Petitioner cites the same analysis from claim 1 showing that each of Färber and Dalby discloses INTER coding modes that generate P-frames. Pet. 45; *see supra* § II.D.3. Patent Owner does not dispute Petitioner’s analysis for claims 19 and 20. We are persuaded by Petitioner’s analysis for the same reasons discussed above for claim 1. *See supra* § II.D.3. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claims 19 and 20 would have been obvious over the combination of Färber and Dalby.

16. *Claim 22*

Claim 22 depends from claim 6 and recites that “the second encoding mode is a forward prediction mode.” Ex. 1001, 16:26–27. Petitioner cites the same analysis from claim 3 showing that each of Färber and Dalby discloses encoding a frame with reference to a prior frame, i.e., a forward prediction mode. Pet. 45 (citing Ex. 1002 ¶¶ 318–321); *see supra* § II.D.5. Patent Owner does not dispute Petitioner’s analysis for claim 22. We are persuaded by Petitioner’s analysis for the same reasons discussed above for claim 3. *See supra* § II.D.5. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 22 would have been obvious over the combination of Färber and Dalby.

17. *Claim 24*

Claim 24 depends from claim 6 and recites that “the controller is arranged to determine which picture is to be encoded in the first encoding mode based on feedback signalling from a decoder.” Ex. 1001, 16:30–33. Petitioner cites Färber’s teaching that “I-frames may be inserted whenever it is requested from the client,” i.e., decoder feedback. Pet. 46 (quoting Ex. 1003, 10) (citing Ex. 1002 ¶ 323). Petitioner further cites Färber’s teaching of a client transmitting a Negative Acknowledgement (NAK) to the video server—meaning the decoder cannot decode an image—which causes the video server to replace the next P-frame in the P-stream with its corresponding I-frame from the I-stream. *Id.* (citing Ex. 1002 ¶ 323; Ex. 1003, 10). Petitioner additionally cites Dalby’s teaching that “[c]ommands from the client decoder are used to control the form of the bit stream that the server transmits.” *Id.* (quoting Ex. 1004, 12:13–19) (citing Ex. 1002 ¶ 324).

Patent Owner does not dispute Petitioner’s analysis for claim 24. We are persuaded that Färber teaches the insertion of I-frames based on decoder feedback. *See, e.g.*, Ex. 1003, 10. We also are persuaded that Dalby teaches a controller that changes the bit stream responsive to commands from the decoder. *See, e.g.*, Ex. 1004, 12:13–19. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 24 would have been obvious over the combination of Färber and Dalby.

18. Claims 26 and 36

Claim 26 depends from claim 6 and recites that “the first picture or part thereof is associated with a scene cut.” Ex. 1001, 16:39–40. Claim 36 depends from claim 1 and likewise recites that “the first picture or part thereof is associated with a scene cut.” Ex. 1001, 17:9–11. Petitioner cites Dalby’s teaching that I-frames are typically transmitted for scene changes. Pet. 46 (citing Ex. 1002 ¶¶ 326, 350; Ex. 1004, 2:12–15). Patent Owner does not dispute Petitioner’s analysis for claims 26 and 36. We are persuaded that Dalby associates I-frames with scene changes. *See, e.g.*, Ex. 1002 ¶¶ 326, 350; Ex. 1004, 2:12–15. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claims 26 and 36 would have been obvious over the combination of Färber and Dalby.

19. Claim 27

Claim 27 depends from claim 6 and recites that “the first picture or part thereof is associated with the very first picture of a video sequence.” Ex. 1001, 16:40–42. Petitioner cites Dalby’s teaching that a bit stream encoded according to the H.261 or H.263 standard will start with an I-frame. Pet. 47 (citing Ex. 1002 ¶¶ 328–329; Ex. 1004, 6:31–7:2). Patent Owner does not dispute Petitioner’s analysis for claim 27. We are persuaded that Dalby teaches that H.261- or H.263-encoded video consists of an initial I-frame. *See, e.g.*, Ex. 1002 ¶¶ 328–329; Ex. 1004, 6:31–7:2. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 27 would have been obvious over the combination of Färber and Dalby.

20. *Claim 28*

Claim 28 depends from claim 16 and recites that “the controller is arranged to control processing means to encode said first picture or part thereof in said first encoding mode at regular periodic intervals.” Ex. 1001, 16:44–47. Petitioner cites Dalby’s Figure 1, which shows an “I-stream” having INTRA-coded frames at the regular interval of every other frame. Pet. 47 (citing Ex. 1003, 10, Fig. 1). Petitioner also cites Dalby’s Figure 3, which shows second set of data 20 including INTRA-coded frames at the regular interval of every fifth frame. *Id.* (citing Ex. 1004, 7:3–14, Fig. 3). Patent Owner does not dispute Petitioner’s analysis for claim 28. We are persuaded that Dalby’s Figure 1 and Dalby’s Figure 3 show INTRA-coded frames at regular intervals. *See, e.g.*, Ex. 1003, 10, Fig. 1; Ex. 1004, 7:3–14, Fig. 3. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 28 would have been obvious over the combination of Färber and Dalby.

21. *Claim 29*

Claim 29 depends from claim 6 and recites that “said other picture corresponds to the picture temporally closest to the first picture or said part thereof, said temporally closest picture or part thereof to be encoded in the first encoding mode.” Ex. 1001, 16:40–42. Petitioner cites Dalby’s teaching of “coding each frame of the video signal *with reference to a preceding frame* of the video signal, so generating a first set of data.” Pet. 48 (quoting Ex. 1004, 3:12–13) (emphasis by Petitioner). Petitioner also notes Dalby’s reference to the MPEG standard and contends that an ordinarily skilled artisan would have understood that MPEG “includes the ability to vary the

number of P-frames.” *Id.* (citing Ex. 1002 ¶ 335); *see also* Ex. 1004, 1:27–2:7 (Dalby discussing MPEG standard). Petitioner further cites Dr. Reader’s testimony for the proposition that “[w]hen there is only a single P-frame, the ‘other picture’ must be an I-frame.” *Id.* (citing Ex. 1002 ¶¶ 335–336); *see also* Ex. 1002 ¶ 335 (Dr. Reader providing a modified version of Dalby’s Figure 3 to show this scenario).

Patent Owner does not dispute Petitioner’s analysis for claim 29. We are persuaded that Dalby teaches encoding a frame with reference to a preceding frame. *See, e.g.*, Ex. 1004, 3:12–13. We also are persuaded by Dr. Reader’s uncontested testimony that an ordinarily skilled artisan contemplating the MPEG standard would have known that when there is only one P-frame, the “other picture” must be an I-frame, which is encoded in the “first encoding mode.” *See, e.g.*, Ex. 1002 ¶¶ 335–336. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 29 would have been obvious over the combination of Färber and Dalby.

22. Claim 30

Claim 30 depends from claim 6 and recites that “the encoder is arranged to transmit encoded pictures or parts thereof in the order in which the pictures or said parts thereof are encoded.” Ex. 1001, 16:53–56. According to Petitioner, “*Färber* discloses this limitation by describing that the P-stream results from regular encoding of the video sequence and shows (Fig. 1) that the transmitted stream (*e.g.*, P1-P5) is in the same order in which the P-stream was encoded.” Pet. 48 (citing Ex. 1002 ¶¶ 338–340; Ex. 1003, 10, Fig. 1). Patent Owner does not dispute Petitioner’s analysis

for claim 30. We are persuaded that Färber's Figure 1 shows the transmitted stream in the same order in which the P-stream is encoded. *See, e.g.*, Ex. 1003, 10, Fig. 1. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 30 would have been obvious over the combination of Färber and Dalby.

23. *Claim 31*

Claim 31 depends from claim 6 and recites that “the encoder is arranged to transmit pictures encoded in the first mode in groups without interspersing pictures encoded in a mode other than the first mode.” Ex. 1001, 16:57–60. Petitioner cites Dalby's teaching that when fast-forward or fast-reverse is requested, “[s]uccessive I' frames continue to be transmitted until a control signal requesting the server 2 to resume normal playback mode is received.” Pet. 49 (quoting Ex. 1004, 9:7–11). Petitioner explains that, in this scenario, Dalby's encoder can transmit all I-frames (which are encoded in the first mode) without interspersing any P-frames (which are encoded in a different mode). *Id.* (citing Ex. 1002 ¶ 342). Patent Owner does not dispute Petitioner's analysis for claim 31. We are persuaded that Dalby teaches transmitting only I-frames (i.e., without interspersing pictures encoded in a different mode) when fast-forward or fast-reverse is requested. *See, e.g.*, Ex. 1002 ¶ 342; Ex. 1004, 9:7–11. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 31 would have been obvious over the combination of Färber and Dalby.

24. *Claim 34*

Claim 34 depends from claim 16 and recites that “the encoder comprises a switch arranged to allow switching of the processing means between the first and second encoding modes.” Ex. 1001, 17:1–4. Petitioner contends that “*Dalby*’s control unit 22 is **a switch** that changes the encoding mode by switching the local decoder from the encoding loop.” Pet. 49 (citing Ex. 1002 ¶¶ 347–348; Ex. 1004, 6:28–7:14). Dr. Reader explains that, in this way, “control unit 22 acts as a switch to change between intra-coding and inter-coding modes.” Ex. 1002 ¶¶ 347–348. Patent Owner does not dispute Petitioner’s analysis for claim 34. We are persuaded *Dalby*’s control unit 22 acts as a switch to change between intra-coding and inter-coding modes. *See, e.g.*, Ex. 1002 ¶¶ 347–348; Ex. 1004, 6:28–7:14. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 34 would have been obvious over the combination of *Färber* and *Dalby*.

E. Obviousness Ground Based on Färber, Dalby, and Morishita

Petitioner contends the subject matter of claims 4, 5, 12, 21, 23, 24, 29, 31, 32, 33, and 37 would have been obvious over the combination of *Färber*, *Dalby*, and *Morishita*. Pet. 26–28, 50–56. Patent Owner does not put forth any arguments related to the merits of this ground.

1. *Morishita*

Morishita is a Japanese patent application publication directed to a video telephone device that compresses digital moving images using

correlation with preceding and subsequent frames. Ex. 1006 ¶ 1. Morishita describes image processing means that compresses a key frame of image data that serves as a reference frame when expanding preceding and subsequent frames. *Id.* ¶ 37. Figure 4 of Morishita is reproduced below.

(FIG. 4)

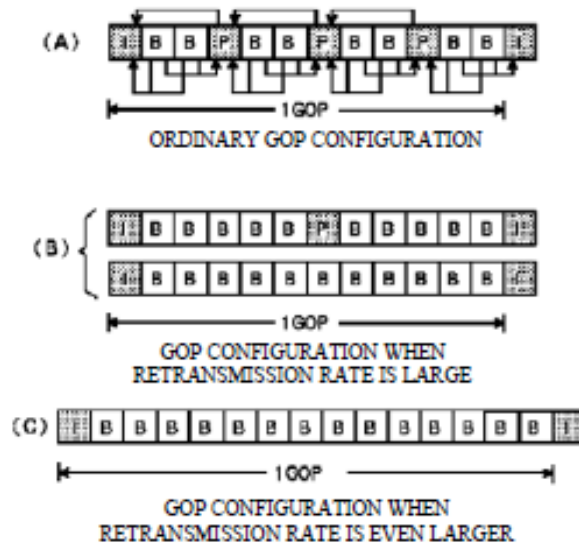


Figure 4 depicts a series of diagrams showing how the key frame can be adjusted during transmission. *Id.* at p. 9. Figure 4(A) shows how a frame is compressed in an ordinary group of pictures (GOP) configuration. *Id.* ¶ 68. A GOP consists of three types of frames: intraframe-coded frames that can be expanded with the frame alone (I-pictures), intraframe-coded frames that require the preceding frame for expansion (P-pictures), and frame interpolation-coded frames that require the preceding and subsequent frames for expansion (B-pictures). *Id.* ¶ 63. The arrows in Figure 4(A) indicate the dependence relationships of frames required at the time of expansion. *Id.* ¶ 64. If a retransmission request is received with a retransmission request rate that exceeds a predetermined threshold, the interval of the I-pictures or P-pictures is changed in accordance with the retransmission rate, as

illustrated in Figure 4(B). *Id.* ¶ 71. For example, the P-picture in the GOP of Figure 4(B) is changed to a B-picture. *Id.* If the retransmission rate increases further, then the length of the GOP is changed to lengthen the interval of the I-pictures, as illustrated in Figure 4(C). *Id.*

Figure 8 of Morishita is reproduced below.

(FIG. 8)

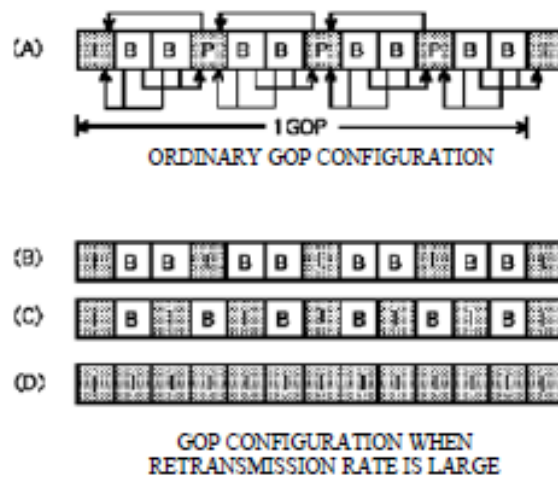


Figure 8 is a series of diagrams showing a different process for adjusting the key frame during transmission. *Id.* at p. 9. An ordinary GOP configuration is illustrated in Figure 8(A). *Id.* ¶ 77. In Figure 8(B), the P-pictures in the GOP are changed to B-pictures when a retransmission request is received with a retransmission request rate that exceeds a predetermined threshold. *Id.* ¶ 80. If the retransmission rate increases further, then the ratio of I-pictures in the GOP is increased (Figure 8(C)) until all of the pictures in the GOP are ultimately changed to I-pictures (or the length of the GOP is reduced) (Figure 8(D)). *Id.* As a result, even if a picture cannot be expanded at the receiver due to an error, it is possible to increase the likelihood that the next frame can be expanded at the receiver. *Id.*

Petitioner contends Morishita qualifies as prior art under 35 U.S.C. § 102(b) based on its publication date. Pet. 5–6. Patent Owner does not dispute the prior art status of Morishita. We determine that Morishita qualifies as prior art under 35 U.S.C. § 102(b) because Morishita’s publication date of January 29, 1999, is more than one year before the U.S. application date of the ’714 patent, which is August 9, 2001. Ex. 1001, code (22); Ex. 1006, code (43).

2. *Claims 4, 5, 21, and 23*

Claim 4 depends from claim 1 and recites that “said first picture or part thereof is encoded with reference to another picture occurring in the sequence temporally after said first picture.” Ex. 1001, 13:17–20. Claim 5 also depends from claim 1 and recites that “said first picture or part thereof is encoded with reference to one or more other pictures occurring in the sequence.” Ex. 1001, 13:21–23. Claim 21 depends from claim 6 and recites that “the second encoding mode provides a B frame.” Ex. 1001, 16:24–25. Claim 23 also depends from claim 6 and recites that “the second encoding mode is a backward prediction mode.” Ex. 1001, 16:28–29.

For these claims, Petitioner cites Morishita’s teaching of using “B-pictures, *i.e.*, temporally bidirectionally predicted frames, where possible.” Pet. 50 (citing Ex. 1006 ¶ 63). Petitioner notes that “B-frames comprise a frame coded with reference to preceding *and subsequent* frames.” *Id.* (citing Ex. 1002 ¶¶ 40–43). According to Petitioner, Morishita “explicitly teaches the benefits of backward prediction and B-frames and demonstrates how and why they may be advantageously used in

combination with, and in place of, P-frames.” *Id.* at 27 (citing Ex. 1002 ¶ 617; Ex. 1006 ¶¶ 63, 71, 80).

Petitioner contends that “[t]he combination of *Morishita*’s B-frame teachings with *Dalby* and *Färber* . . . renders these claims obvious because a B-frame is encoded with reference to multiple other pictures, including a backward prediction from a subsequent frame.” *Id.* at 52 (citing Ex. 1002 ¶¶ 571, 574, 582, 585, 601, 608). Specifically, Petitioner contends that an ordinarily skilled artisan would have further modified the *Färber*–*Dalby* combination with *Morishita*’s teachings to advantageously set appropriate I-frame cadences and to obtain the benefits of backward prediction. *Id.* at 27–28 (citing Ex. 1002 ¶ 618). Dr. Reader testifies that backward prediction was a known to be “an elegant solution to the problems of occlusion and exposure.” Ex. 1002 ¶¶ 41, 572. Thus, Petitioner contends this would have resulted in “additional robustness of a compressed video signal against its vulnerability against transmission errors such as by efficient retransmission.” Pet. 27 (citing Ex. 1002 ¶¶ 614–618). Petitioner contends that an ordinarily skilled artisan would have expected success in making the combination because “all references are standard compliant with MPEG coding techniques.” *Id.* at 28 (citing Ex. 1002 ¶ 618).

Patent Owner does not dispute Petitioner’s analysis for claims 4, 5, 21, and 23. We are persuaded that *Morishita* teaches the use of B-frames to encode a given video frame with reference to preceding and subsequent frames, which is commensurate with the limitations of claims 4, 5, 21, and 23. *See, e.g.*, Ex. 1006 ¶¶ 63, 80, Fig. 8. We also are persuaded that an ordinarily skilled artisan would have combined *Morishita* with *Färber* and *Dalby* with predictable success in order to obtain the additional robustness in

transmitting compressed video that comes with backwards prediction. *See, e.g.,* Ex. 1002 ¶¶ 41, 572, 614–618. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claims 4, 5, 21, and 23 would have been obvious over the combination of Färber, Dalby, and Morishita.

3. *Claim 12*

Claim 12 is a system claim that recites a “portable electronic device incorporating a video encoder” in its preamble but is otherwise similar in scope to the method claim recited in claim 1. Ex. 1001, 14:54–65. Petitioner relies on the same analysis for claim 12 from the Färber–Dalby obviousness ground except that Petitioner further cites Morishita’s teaching of a telephone device incorporating a video encoder. Pet. 56 (citing Ex. 1006 ¶¶ 29–30). Based on testimony from Dr. Reader, Petitioner contends that “[t]elephone devices at the time of the filing of the ’714 patent were portable electronic devices.” *Id.* (citing Ex. 1002 ¶ 580). Patent Owner does not dispute Petitioner’s analysis for claim 12. We are persuaded that, based on Morishita’s teaching of a telephone device with a video encoder, an ordinarily skilled artisan would have known to apply this teaching to the Färber–Dalby combination to obtain the recited “portable electronic device.” *See, e.g.,* Ex. 1002 ¶ 580; Ex. 1006 ¶¶ 29–30. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 12 would have been obvious over the combination of Färber, Dalby, and Morishita.

4. *Claim 24*

Claim 24 depends from claim 16 and recites that “the controller is arranged to determine which picture is to be encoded in the first encoding mode based on feedback signalling from a decoder.” Ex. 1001, 16:30–33. Petitioner cites Morishita’s key frame retransmission means 22 in data processor 2, which is capable of providing feedback to the decoder when there is a reception error. Pet. 54 (citing Ex. 1002 ¶ 588; Ex. 1006 ¶ 64); *see also* Ex. 1006 ¶¶ 36–39, 41, Fig. 2 (further teachings from Morishita about key frame transmission means 22 that are reproduced in Dr. Reader’s testimony). Petitioner contends that, when there are errors in Morishita’s system, “the image processing means 20 of the data processor 2—the controller—causes the encoder to increase the cadence of I-pictures in the encoding scheme.” Pet. 54 (citing Ex. 1002 ¶¶ 588–589; Ex. 1006 ¶ 80, Fig. 8); *see also* Ex. 1006 ¶¶ 36–39, 41, Fig. 2 (further teachings from Morishita cited by Dr. Reader about retransmission request rates). Petitioner contends that these teachings from Morishita “would be readily combined with *Dalby* and *Färber*, which disclose the encoder’s use of feedback from the decoder,” thereby taking advantage of Morishita’s teachings on changing the I-frame encoding cadence. Pet. 54 (citing Ex. 1002 ¶ 589; Ex. 1004, 12:13–19).

Patent Owner does not dispute Petitioner’s analysis for claim 24. We are persuaded that Morishita teaches changing the cadence of I-picture encoding in response to feedback from frame retransmission means 22 in data processor 2. *See, e.g.*, Ex. 1002 ¶¶ 588–589; Ex. 1006 ¶¶ 36–39, 41, 64, 80, Figs. 2, 8. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of

claim 24 would have been obvious over the combination of Färber, Dalby, and Morishita.

5. *Claims 29 and 32*

Claim 29 depends from claim 6 and recites that “said other picture corresponds to the picture temporally closest to the first picture or said part thereof, said temporally closest picture or part thereof to be encoded in the first encoding mode.” Ex. 1001, 16:48–52. Claim 32 depends from claim 6 and recites that “said other picture is a picture encoded in the first mode.” Ex. 1001, 16:61–62. Petitioner cites Morishita’s teaching of increasing the ratio of I-pictures in a group pictures until all pictures are coded as I-pictures. Pet. 55 (citing Ex. 1006 ¶ 80, Fig. 8). Petitioner also notes that Färber’s encoder encodes every I-frame as a P-frame. *Id.* (citing Ex. 1003, Fig. 2). Thus, according to Petitioner, “the combination of *Färber, Dalby*, and *Morishita* renders the Claims 29 and 32 obvious because *Färber*’s encoder used with *Morishita*’s I-frame encoding strategy results in a P-frame encoded *with* reference to an I-frame that is the temporally closest picture to the encoded frame in the all I-frame scenario.” *Id.* (citing Ex. 1002 ¶¶ 590–593, 597–599).

Patent Owner does not dispute Petitioner’s analysis for claims 29 and 32. We are persuaded that when Morishita’s all I-frame cadence is used with Färber’s encoder, the temporally closest frame (i.e., the “other picture”) will always be an I-Frame (i.e., “encoded in the first encoding mode”), and Färber’s encoder always produces a redundantly encoded P-frame. *See, e.g.*, Ex. 1002 ¶¶ 590–593, 597–599; Ex. 1003, Fig. 2; Ex. 1006 ¶ 80, Fig. 8. On the entire trial record, we determine that Petitioner has shown, by a

preponderance of the evidence, that the subject matter of claims 29 and 32 would have been obvious over the combination of Färber, Dalby, and Morishita.

6. *Claim 31*

Claim 31 depends from claim 6 and recites that “the encoder is arranged to transmit pictures encoded in the first mode in groups without interspersing pictures encoded in a mode other than the first mode.” Ex. 1001, 16:63–67. Petitioner again cites Morishita’s teaching of encoding and transmitting all pictures as I-pictures. Pet. 55 (citing Ex. 1006 ¶ 80, Fig. 8). Patent Owner does not dispute Petitioner’s analysis for claim 31. We are persuaded that Morishita’s all I-frame cadence teaches the “without interspersing” limitation of claim 31. *See, e.g.*, Ex. 1006 ¶ 80, Fig. 8. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 31 would have been obvious over the combination of Färber, Dalby, and Morishita.

7. *Claims 33 and 37*

Claim 33 depends from claim 6 and recites that “the video encoder is arranged to encode a third representation of the first picture or said part thereof, the third representation being encoded with respect to a different other picture than the second representation.” Ex. 1001, 16:63–67. Claim 37 depends from claim 1 and recites that the method comprises “encoding a third representation of the first picture or said part thereof, the third representation being encoded with respect to a different other picture than the second representation.” Ex. 1001, 17:12–18:3. Petitioner cites

Dalby's Figure 3 as teaching second and third representations of a video signal. Pet. 52–53 (citing Ex. 1004, 6:28–30, 7:15–18, Figs. 3, 4).

Petitioner explains that, in Figure 3, “[t]he third P' representation 30 is based on the difference between a decoded frame of I' data 20 and a decoded frame of P data 10, which is a different encoding mode than the second representation.” *Id.* at 53 (citing Ex. 1004, 6:31–7:1, 7:18–25, Fig. 3).

Petitioner contends that, in light of Morishita, an ordinarily skilled artisan would have found it obvious “to substitute B-frame encoding for P-frame encoding, including *Dalby's P' frames* or P-frames.” *Id.* at 53 (citing Ex. 1002 ¶¶ 600–613). According to Petitioner, “[s]uch a B'-frame would employ backward prediction and, therefore, ‘be encoded with respect to a different other picture than the second representation.’” *Id.*

Patent Owner does not dispute Petitioner's analysis for claims 33 and 37. We are persuaded that Dalby's Figure 3 teaches second and third representations of a first picture. *See, e.g.*, Ex. 1004, 6:31–7:1, 7:18–25, Fig. 3. For similar reasons to those discussed above (*see supra* § II.E.2), we are further persuaded that an ordinarily skilled artisan would have substituted Morishita's B-frame encoding for Dalby's P-frame encoding. *See, e.g.*, Ex. 1002 ¶¶ 605–606; Ex. 1006 ¶ 63. On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claims 33 and 37 would have been obvious over the combination of Färber, Dalby, and Morishita.

F. Obviousness Ground Based on Färber, Dalby, and Mashimo

Petitioner contends the subject matter of claims 25 and 34 would have been obvious over the combination of Färber, Dalby, and Mashimo.

Pet. 30–31, 56–58. Patent Owner does not put forth any arguments related to the merits of this ground.

1. *Mashimo*

Mashimo is a Japanese patent application publication directed to an image playback device capable of playing back images by means of reverse playback. Ex. 1007 ¶ 1. Figure 5 of Mashimo is reproduced below.

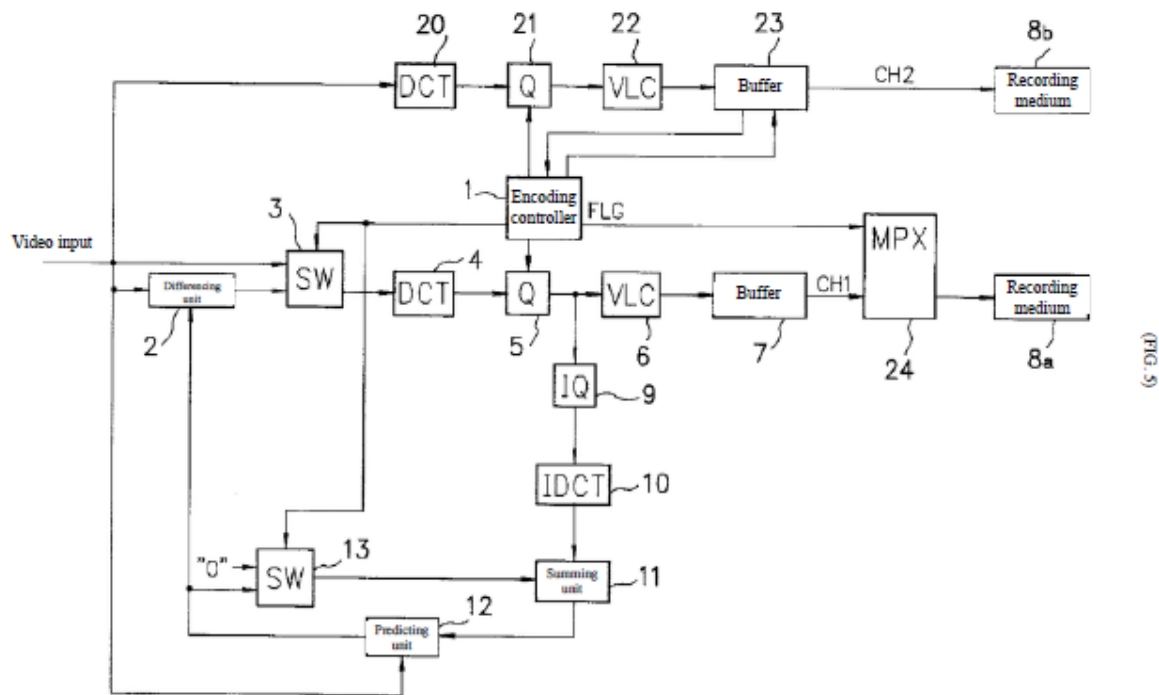


Figure 5 is a block diagram of a recording device controlled by encoding controller 1. *Id.* ¶ 4, p. 6. A new intra-frame is provided on CH2 in the same frame as the inter-frame encoding frame, which is the frame immediately prior to the intra-frame on CH1. *Id.* ¶ 40. This provides a frame that can serve as a reference during reverse playback. *Id.* ¶ 44. Encoding controller 1 specifies intra-frame encoding or inter-frame encoding and transmits the signal to switches 3, 13. *Id.* ¶ 8. Differencing unit 2 obtains the difference between the output of predicting unit 12 and the

next input frame image, which is used to determine whether to output an intra-frame. *Id.* ¶ 42.

Petitioner contends Mashimo qualifies as prior art under 35 U.S.C. § 102(b) based on its publication date. Pet. 5–6. Patent Owner does not dispute the prior art status of Mashimo. We determine that Mashimo qualifies as prior art under 35 U.S.C. § 102(b) because Mashimo’s publication date of July 22, 1994, is more than one year before the U.S. application date of the ’714 patent, which is August 9, 2001. Ex. 1001, code (22); Ex. 1007, code (43).

2. *Claims 25 and 34*

Claim 25 depends from claim 16 and recites that “the controller is arranged to determine which picture is to be encoded in the first encoding mode based on prediction error.” *See* Ex. 1001, 16:35–38. Petitioner cites Mashimo’s controller and contends that it calculates a difference, i.e., a prediction error, between a predicted image and the next input frame. Pet. 57 (citing Ex. 1007 ¶ 42). Petitioner contends that that an ordinarily skilled artisan would have known to use the prediction error “to determine INTRA vs. INTER coding . . . as was well-known in the art.” *Id.* (citing Ex. 1002 ¶¶ 625–627).

Claim 34 depends from claim 16 and recites that “the encoder comprises a switch arranged to allow switching of the processing means between the first and second encoding modes.” Ex. 1001, 17:1–4. Petitioner cites Mashimo’s teaching of encoding controller 1 that “specifies intra-frame encoding or inter-frame encoding and transmits the signal to the switch 3, 13.” Pet. 57–58 (citing Ex. 1007 ¶¶ 8, 9, 27, 30, Fig. 5).

Petitioner contends an ordinarily skilled artisan “would have recognized that the hardware and control structures of *Mashimo* could be adapted to provide the encoding of a video in two data streams.” Pet. 31 (citing Ex. 1002 ¶¶ 630–633). Dr. Reader testifies that the video compression standards of Färber and Dalby “require switching the encoders and decoders between intra-coding mode and inter-coding mode,” but Färber and Dalby only describe the functional details of the controller. Ex. 1002 ¶ 631. As such, Dr. Reader testifies that an ordinarily skilled artisan would have implemented Mashimo’s details regarding its switch, including the use of prediction differences, in the controller of the Färber–Dalby system without undue experimentation and with predictable results. *Id.* ¶¶ 630, 632, 634.

Patent Owner does not dispute Petitioner’s analysis of claims 25 and 34. We are persuaded that Mashimo teaches the prediction error limitation of claim 25 (*see, e.g.*, Ex. 1007 ¶¶ 5, 42) and the switch limitation of claim 34 (*see, e.g., id.* ¶¶ 8, 9, 27, 30, Fig. 5). We also are persuaded that an ordinarily skilled artisan would have implemented Mashimo’s switch and difference calculations within the controller of the Färber–Dalby system and would have expected success in doing so. *See, e.g.*, Ex. 1002 ¶¶ 630–634.

On the entire trial record, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claims 25 and 34 would have been obvious over the combination of Färber, Dalby, and Mashimo.

G. Other Grounds

Petitioner additionally contends that:

(1) claims 1–3, 5–9, 12, 13, 18–20, 22, 28, and 30 are anticipated by Färber (Pet. 31–43, 45, 47–49);

(2) claims 1–3, 5–9, 12, 13, 16, 18–20, 22, 24, 26–29, 31, 34, and 36 are anticipated by Dalby (*id.* at 31–50);

(3) claims 1–9, 12, 13, 16, 18–24, 26–32, and 36 would have been obvious over the combination of Shinoda and Morishita (*id.* at 25–26, 58–75); and

(4) claims 16, 25, and 34 would have been obvious over the combination of Shinoda, Morishita, and Mashimo (*id.* at 29–30, 75–78).

Because the grounds we have already analyzed are dispositive as to all challenged claims, we do not reach these other grounds. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”).

III. CONCLUSION⁹

Petitioner has shown, by a preponderance of the evidence, that:

(1) claims 1–3, 5–9, 12, 13, 16, 18–20, 22, 24, 26–31, 34, and 36 would have been obvious over the combination of Färber and Dalby;

⁹ 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

(2) claims 4, 5, 12, 21, 23, 24, 29, 31, 32, 33, and 37 would have been obvious over the combination of Färber, Dalby, and Morishita; and

(3) claims 25 and 34 would have been obvious over the combination of Färber, Dalby, and Mashimo.

IV. ORDER

Accordingly, it is

ORDERED that claims 1–9, 12, 13, 16, 18–34, 36, and 37 of the '714 are unpatentable; and

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

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).

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1–3, 5–9, 12, 13, 18–20, 22, 28, 30	102(b)	Färber ¹⁰		
1–3, 5–9, 12, 13, 16, 18– 20, 22, 24, 26– 29, 31, 34, 36	102(b)	Dalby ¹¹		
1–3, 5–9, 12, 13, 16, 18– 20, 22, 24, 26– 31, 34, 36	103(a)	Färber, Dalby	1–3, 5–9, 12, 13, 16, 18–20, 22, 24, 26–31, 34, 36	
4, 5, 12, 21, 23, 24, 29, 31, 32, 33, 37	103(a)	Färber, Dalby, Morishita	4, 5, 12, 21, 23, 24, 29, 31, 32, 33, 37	
25, 34	103(a)	Färber, Dalby, Mashimo	25, 34	

¹⁰ We do not reach this ground. *See supra* § II.G.

¹¹ We do not reach this ground. *See supra* § II.G.

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1–9, 12, 13, 16, 18–24, 26–32, 36	103(a)	Shinoda, Morishita ¹²		
16, 25, 34	103(a)	Shinoda, Morishita, Mashimo ¹³		
Overall Outcome			1–9, 12, 13, 16, 18–34, 36, 37	

¹² We do not reach this ground. *See supra* § II.G.

¹³ We do not reach this ground. *See supra* § II.G.

IPR2021-00965
Patent 7,116,714 B2

PETITIONER:

Richard F. Martinelli
Joseph A. Calvaruso
ORRICK, HERRINGTON & SUTCLIFFE LLP
ipprosecution@orrick.com
ipprosecution@orrick.com

PATENT OWNER:

Brian Koide
Ryan Loveless
James Etheridge
Brett Mangrum
Jeffrey Huang
Nathan Cummings
ETHERIDGE LAW GROUP
IPTeam@etheridgelaw.com