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Paper 29
Entered: April 15, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NETFLIX, INC., and COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

REALTIME ADAPTIVE STREAMING LLC,
Patent Owner.

IPR2018-01630[1]
Patent 9,769,477 B2

Before GEORGIANNA W. BRADEN, KEVIN W. CHERRY, and KAMRAN JIVANI, *Administrative Patent Judges*.

BRADEN, *Administrative Patent Judge*.

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

[1] Comcast Cable Communications, LLC, which filed a petition in IPR2019-01109, has been joined as a party to this proceeding.

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6, and this Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine Petitioner has shown by a preponderance of the evidence that claims 7, 8, 15–19, 23, 24, 28, and 29 of U.S. Patent No. 9,769,477 B2 are unpatentable.

I. INTRODUCTION

A. Procedural History

Netflix, Inc., ("Petitioner") filed a Petition (Paper 2, "Pet.") requesting an *inter partes* review of claims 7, 8, 15–19, 23, 24, 28, and 29 of U.S. Patent No. 9,769,477 B2 (Ex. 1001, "the '477 patent"). Realtime Adaptive Streaming LLC ("Patent Owner") timely filed a Preliminary Response (Paper 12, "Prelim. Resp."). Pursuant to 35 U.S.C. § 314(a), we instituted an *inter partes* review of all challenged claims on all proposed grounds of unpatentability. *See* Paper 13 ("Dec. to Inst."), 60.

After institution of trial, Patent Owner filed a Patent Owner Response (Paper 17, "PO Resp."), to which Petitioner filed a Reply (Paper 18, "Reply"). Patent Owner then filed a Sur-Reply (Paper 22, "PO Sur-Reply").

An oral argument was held on October 15, 2019. A transcript of the oral argument is included in the record. Paper 28 ("Tr.").

B. Real Parties-in-Interest

Petitioner certifies that it and Netflix Streaming Services, Inc. are real parties-in-interest. Pet. 71. Additionally, joined Petitioner, Comcast Cable Communications, LLC, certifies that it and Comcast Corporation are real parties-in-interest. *See* IPR2019-00786, Paper 1, 67.

C. Related Matters

Petitioner informs us of multiple pending district court proceedings involving the '477 patent, some of which involve Petitioner. Pet. 71–74. Patent Owner informs us of two pending *inter partes* review petitions challenging the '477 patent, IPR2018-01413 and IPR2018-01187. Paper 9, 1 (Patent Owner's Mandatory Notices). We note IPR2018-01413 was terminated prior to the issuance of a decision on institution. IPR2018-01413, Paper 10.

D. The '477 Patent

The '477 patent was filed on October 6, 2015, and is titled "Video Data Compression Systems." Ex. 1001, code (54). The '477 patent issued on September 19, 2017. *Id*. at code (45).

1. Written Description

The specification is directed to systems and methods for "compressing and decompressing based on the actual or expected throughput (bandwidth) of a system employing data compression and a technique of optimizing based upon planned, expected, predicted, or actual usage." Ex. 1001, 7:66–8:3, 9:27–31. The '477 patent states that "dynamic modification of compression system parameters so as to provide an optimal balance between execution speed of the algorithm (compression rate) and the resulting compression ratio, is highly desirable." *Id.* at 1:64–67. The '477 patent also states that it seeks to "provide[] a desired balance between execution speed (rate of compression) and efficiency (compression ratio)." *Id.* at 8:24–27. For example, where the speed of the encoder causes a "bottleneck" because "the compression system cannot maintain the required or requested data rates," "then the controller will command the data compression system to

utilize a compression routine providing faster compression . . . so as to mitigate or eliminate the bottleneck." *Id.* at 14:14–24. The '477 patent discloses that it can resolve "bottlenecks" in the throughput of a system by switching between different compression algorithms applied to data. *Id.* at 10:3–8.

One embodiment of the '477 patent is shown in Figure 2, reproduced below.

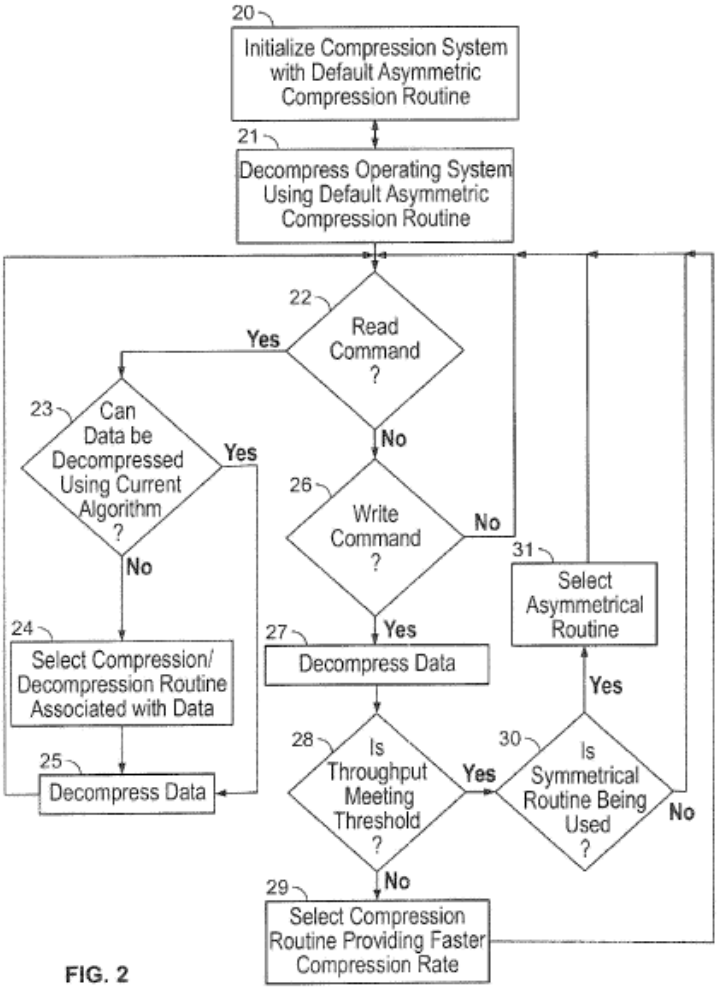

FIG. 2

Figure 2, above, illustrates a method for providing bandwidth sensitive data compression. *Id.* at 13:25–27. The data compression system is initialized during a boot-up process after a computer is powered on and a

default compression/decompression routine is initiated (step 20). *Id.* at 13:31–34. According to the '477 patent, the default algorithm comprises an asymmetrical algorithm, because asymmetric algorithms provide "a high compression ratio (to effectively increase the storage capacity of the hard disk) and fast data access (to effectively increase the retrieval rate from the hard disk)." *Id.* at 13:35–45. According to the '477 patent, depending on the access profile, it "is preferable to utilize an asymmetrical algorithm that provides a slow compression routine and a fast decompression routine so as to provide an increase in the overall system performance as compared to performance that would be obtained using a symmetrical algorithm." *Id.* at 12:23–28. The '477 patent notes that symmetric routines "compris[e] a fast compression routine." *Id.* at 14:40–43. In one embodiment, the '477 patent discloses a controller "tracks and monitors the throughput . . . of the data compression system 12." *Id.* at 10:54–57. When the throughput of the system falls below a predetermined threshold, the system generates control signals to enable/disable different compression algorithms. *Id.* at 10:55–58.

2. Illustrative Claims

Petitioner challenges claims 7, 8, 15–19, 23, 24, 28, and 29, which depend directly or indirectly from either independent claim 1 or 20. Unchallenged independent claims 1 and 20, as well as challenged dependent claims 7, 16, and 23 are reproduced below:

> 1. A system, comprising:
> a plurality of different asymmetric data compression encoders,
> wherein each asymmetric data compression encoder of the plurality of different asymmetric data compression encoders is configured to utilize one or more data compression algorithms, and

wherein a first asymmetric data compression encoder of the plurality of different asymmetric data compression encoders is configured to compress data blocks containing video or image data at a higher data compression rate than a second asymmetric data compression encoder of the plurality of different asymmetric data compression encoders; and

one or more processors configured to:

determine one or more data parameters, at least one of the determined one or more data parameters relating to a throughput of a communications channel measured in bits per second; and

select one or more asymmetric data compression encoders from among the plurality of different asymmetric data compression encoders based upon, at least in part, the determined one or more data parameters.

Ex. 1001, 20:57–21:13.

7. The system of claim 1, wherein at least one of the determined one or more data parameters comprises:
a resolution of the data blocks containing video or image data.

Id. at 21:35–38.

16. The system of claim 1, wherein the selected one or more asymmetric data compression encoders are utilized to compress the data blocks containing video or image data to create one or more compressed data blocks, and wherein a descriptor indicating the selected one or more asymmetric data compression encoders is included with the one or more compressed data blocks.

Id. at 22:4–10.

20. A system, comprising:
a plurality of video data compression encoders;
wherein at least one of the plurality of video data compression encoders is configured to utilize an asymmetric data compression algorithm, and

wherein at least one of the plurality of video data compression encoders is configured to utilize an arithmetic data compression algorithm,
wherein a first video data compression encoder of the plurality of video data compression encoders is configured to compress at a higher compression ratio than a second data compression encoder of the plurality of data compression encoders; and
one or more processors configured to:
determine one or more data parameters, at least one of the determined one or more data parameters relating to a throughput of a communications channel; and
select one or more video data compression encoders from among the plurality of video data compression encoders based upon, at least in part, the determined one or more data parameters.

Id. at 22:20–42.

23. The system of claim 20, wherein at least one of the determined one or more data parameters are related to a resolution of one or more data blocks containing video data.

Id. at 22:52–54.

E. Evidence of Record and Asserted Challenges to Patentability

Petitioner asserts the following grounds of unpatentability:

Claims Challenged	35 U.S.C. §[2]	Reference(s)/Basis
15–19, 28, 29	103	Imai[3], Pauls[4]
7, 23	103	Imai, Pauls, Dawson[5]
8, 24	103	Imai, Pauls, Lai[6]

Pet. 4.

Petitioner submits (i) the Declaration of James A. Storer, Ph.D. ("Dr. Storer") in Support of Petition for *Inter Partes* Review (Ex. 1003) and (ii) the Declaration of Sylvia D. Hall-Ellis, Ph.D ("Dr. Hall-Ellis") (Ex. 1023) regarding the public availability of certain prior art references. Patent Owner submits the Declaration of Kenneth A. Zeger, Ph.D. ("Dr. Zeger") in Support of Patent Owner's Response (Ex. 2002).

II. ANALYSIS

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103(a) if "the differences between the subject matter sought to be patented and the prior art are such

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[2] The Leahy-Smith America Invents Act ("AIA") included revisions to 35 U.S.C. § 100 *et seq.* effective on March 16, 2013. Because the '477 patent issued from an application filed after March 16, 2013, we apply the AIA versions of the statutory bases for unpatentability.
[3] Japanese Patent Application Publication No. H11331305, published Nov. 30, 1999 (Ex. 1005, "Imai").
[4] European Patent Application Publication No. EP0905939A2, published Mar. 31, 1999 (Ex. 1007, "Pauls").
[5] U.S. Patent No. 5,553,160, issued Sep. 3, 1996 (Ex. 1025, "Dawson").
[6] U.S. Patent No. 6,407,680, issued Jun. 18, 2002 (Ex. 1016, "Lai").

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." *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) objective evidence of nonobviousness, i.e., secondary considerations. *See Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966). "[I]t is error to reach a conclusion of obviousness until all [the *Graham*] factors are considered." *Apple v. Samsung Elecs. Co., Ltd.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016) (en banc) (citations omitted). "This requirement is in recognition of the fact that each of the *Graham* factors helps inform the ultimate obviousness determination." *Id.*

"In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review). Furthermore, Petitioner cannot satisfy its burden of proving obviousness by employing "mere conclusory statements." *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

Thus, to prevail in an *inter partes* review, Petitioner must explain how the proposed combinations of prior art would have rendered the challenged claims unpatentable. At this final stage, we determine whether a preponderance of the evidence of record shows that the challenged claims would have been obvious over the cited prior art.

B. Level of Ordinary Skill in the Art

In determining 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*, 383 U.S. at 17. "The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry." *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). The person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention. *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). The level of ordinary skill in the art may be reflected by the prior art of record. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). Factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field. *GPAC*, 57 F.3d at 1579. In a given case, one or more factors may predominate. *Id.* Generally, it is easier to establish obviousness under a higher level of ordinary skill in the art. *Innovention Toys, LLC v. MGA Entm't, Inc*., 637 F.3d 1314, 1323 (Fed. Cir. 2011) ("A less sophisticated level of skill generally favors a determination of nonobviousness . . . while a higher level of skill favors the reverse.").

Petitioner argues that a person of ordinary skill in the art relevant to the '477 patent would have had "a bachelor's degree in electrical engineering, computer science, or a similar field with at least two years of experience in data compression or a person with a master's degree in electrical engineering, computer science, or a similar field with a specialization in data compression." Pet. 7. Petitioner relies on the Declaration of Dr. Storer to support its contentions. Dr. Storer proffers the same level of skill as that argued by Petitioner but also states that "[a] person with less education but more relevant practical experience may also meet this standard." Ex. 1003 ¶ 65.

Patent Owner does not specifically contest Petitioner's definition of a person of ordinary skill in the art. *See generally* PO Resp. Dr. Zeger states, "I do not disagree with those views [of Dr. Storer], except to add that a qualified [person of ordinary skill in the art] would additionally be trained in evaluating both the costs and benefits of a design choice." Ex. 2002 ¶ 24. Dr. Zeger further states:

> I would consider anyone who does not recognize those realities or who forms design motivations because a particular combination of known elements or knowledge in the field is possible to not be a [person of ordinary skill in the art], regardless of that person's education, experience, or technical knowledge. Likewise, a [person of ordinary skill in the art] in this field would not form design motivations because a design may provide some benefit without consideration of the relevance of the benefit in a specific context, or the costs of the design choice. The ordinarily skilled artisan in this field is not impulsive. That person is deliberative and considered.

Id. ¶ 25.

Based on our review of the '477 patent, the types of problems and solutions described in the '477 patent and cited prior art, and the testimony of Dr. Storer and Dr. Zeger, we find that a person of ordinary skill in the art at the time of the claimed invention would have had "a bachelor's degree in electrical engineering, computer science, or a similar field with at least two years of experience in data compression," or that such a person would have had "a master's degree in electrical engineering, computer science, or a similar field with a specialization in data compression." Our analysis below would not differ, however, if we were to adopt Dr. Zeger's definition.

C. Claim Construction

For petitions filed before November 13, 2018, we interpret the claims of an unexpired patent that will not expire before issuance of a final written decision using the broadest reasonable interpretation in light of the specification. *See* 37 C.F.R. § 42.100(b) (2018); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016); *see also* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340, 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018). Under that standard, claim terms are presumed to be given their ordinary and customary meaning, as would have been understood by one of ordinary skill in the art, in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). To rebut this presumption by acting as a lexicographer, the patentee must give the term a particular meaning in the specification with "reasonable clarity, deliberateness, and precision." *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). Limitations, however, are not to be read from the specification into the claims. *In re Van Geuns*, 988

F.2d 1181, 1184 (Fed. Cir. 1993). In addition, the Board may not "construe claims during [an *inter partes* review] so broadly that its constructions are *unreasonable* under general claim construction principles." *Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1298 (Fed. Cir. 2015). Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011); *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (cited with approval in *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017)).

Petitioner proposes to construe "asymmetric data compression encoders" as "an encoder(s) configured to utilize a compression algorithm in which the execution time for the compression and decompression routines differ significantly." Pet. 7. Petitioner further proposes to construe "data block" as "a unit of data comprising more than one bit" (*id*. at 8) and "video or image data profile" as "information used to determine which compression algorithm should be used for a video or image data type" (*id.* at 10). Patent Owner has not provided proposed alternative constructions for these terms, but rather states that the terms do not require construction in order to resolve the parties' dispute. PO Resp. 7. We agree with Patent Owner and determine that an explicit construction of these claim terms is not necessary for the purposes of our analysis.

Nevertheless, although neither party proposes an express construction of the term "configured to," it appears throughout the claims and its meaning is central to the application of the prior art to the claims. We discuss its interpretation below, in context.

D. Alleged Obviousness of Claims 15–19, 28, and 29 of the '477 Patent in View of Imai and Pauls

Petitioner contends claims 15–19, 28, and 29 of the '477 patent are unpatentable under 35 U.S.C. § 103 as obvious in view of Imai and Pauls. Pet. 19–54. Patent Owner disputes Petitioner's contentions. PO Resp. 7–33. For reasons that follow, we determine Petitioner has established by a preponderance of the evidence that claims 15–19, 28, and 29 of the '477 patent are unpatentable under 35 U.S.C. § 103 as obvious in view of Imai and Pauls.

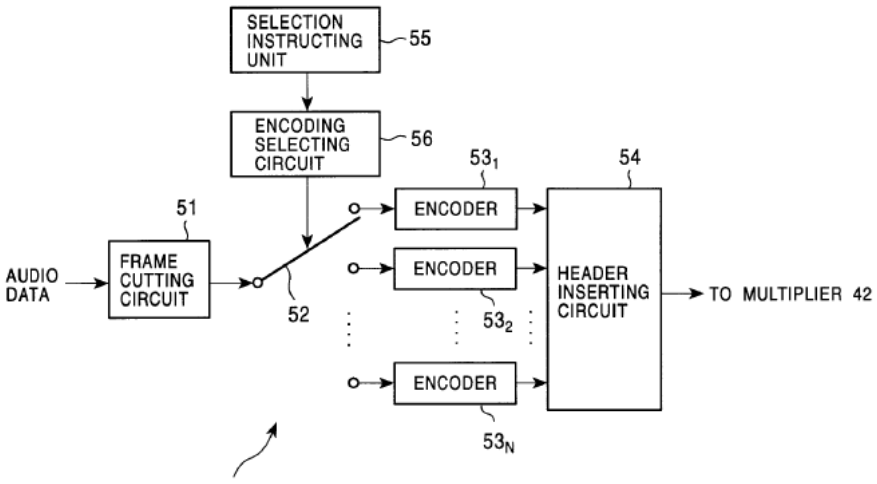
1. Overview of Imai (Ex. 1005)

Imai is a Japanese Patent Application[7] titled "Transmitting apparatus and transmitting method, receiving apparatus and receiving method, as well as providing medium." Ex. 1005, Title. Imai is related to encoding and transmitting digital signals to the receiving side where they are decoded and reproduced in real time. Ex. 1005 ¶ 1. According to Imai, real time encoding, transmitting, and decoding can present several problems. *Id.* ¶¶ 3–5. For example, the transmission rate of the network can vary and drop below the data rate of the coded data, which leads to the encoded digital signals arriving too late. *Id.* ¶ 3. The hardware capabilities or decoding method of the receiving device can also slow down real time decoding of the received signals. *Id.* ¶ 4. To address these problems, Imai includes a plurality of coding methods and selects the appropriate coding method to

[7] The original application is in Japanese and provided in the record as Exhibit 1004. A certified English language translation of Imai is provided in the record as Exhibit 1005. All citations to Imai in the Petition, Patent Owner Response, and this Decision are made to Exhibit 1005.

encode the digital signals, or part of the digital signals, based on certain relevant factors. *Id.* ¶ 7. The digital signals Imai is particularly concerned with are audio signals, and the plurality of coding methods can include PCM, ADPCM, layers 1, 2, 3, of MPEG, ATRAC, ATRAC2, and HVXC. *Id.* ¶ 67. The factors that can affect which coding method is used include the processing capability of the receiving device (*see id.* at Fig. 9, ¶¶ 88–99), transmission rate of the network (*see id.* ¶¶ 145–166), and the audio content of the audio signals (*see id.* ¶¶ 101–102). For example, Imai describes a situation where the audio signal is predominantly voice, in which case HVXC may be appropriately used as the coding method. *Id.* ¶ 102. On the other hand, if the audio signal is predominantly instrument sounds, then ATRAC may be appropriately used as the coding method. *Id.*

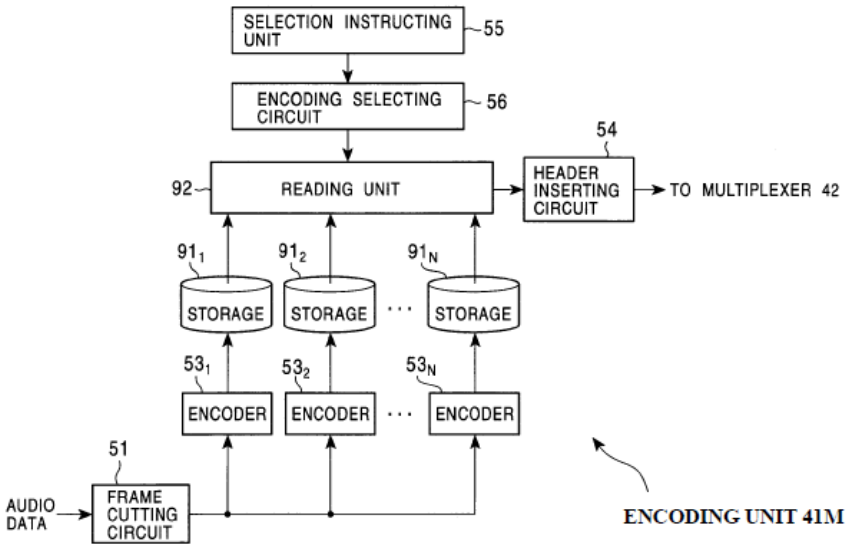
One embodiment of a coding unit in Imai is illustrated in Figure 5, reproduced below.



As shown above in Figure 5, audio signals are encoded using a chosen encoder 53_1-53_N. *Id.* ¶ 66, Fig. 5. According to Imai, the encoders are constructed to encode the audio signal with different coding methods from

each other. *Id.* ¶ 67. Selection instructing unit 55 then decides the appropriate coding methods corresponding to encoders 53_1 to 53_N, and instructs encoding selecting circuit 56 to select the decided coding method. *Id.* ¶ 70. Imai discloses that switch 52 may be changed midway through a sequence of continued encoding of the audio signal, so one portion of the audio signal is encoded with one coding method while another part of the audio signal is encoded with another coding method. *Id.* ¶ 72. Imai further discloses that header inserting circuit 54 adds, to the coded data of each frame, an ID indicating the coding method selected to encode the frame. *Id.* The coded data added with the ID in header inserting circuit 54 is supplied to multiplexing unit 42 and transmitted to a client. *Id.* ¶ 74.

Another embodiment of a coding unit in Imai is illustrated in Figure 16, reproduced below. *See, e.g.*, *id.* ¶¶ 165–171.



As shown above in Figure 16, the audio signal is encoded into coded date by encoders 53_1–53_N and stored in storage 91_1–91_N. *Id.* ¶ 167. According to Imai, when a request for an audio signal is issued from client terminal 3, encoding selecting circuit 56 controls read-out unit 92 in

accordance with an instruction based on the encoding schedule provided from selection instructing unit 55. *Id.* ¶ 169.

2. Overview of Pauls (Ex. 1007)

Pauls is a European Patent Application Publication titled "Adaptive communication data formatting," and is directed to improving data transfer performance over data networks using adaptive communication formatting. Ex. 1007, codes (54), (57). Pauls discloses that adaptive communication formatting includes encoding (or compressing) data and applying error control schemes to reduce the amount of data being transmitted and to correct/conceal errors occurring during data transmission. *Id.* at code (57). Pauls further discloses that data is formatted using a mixture of transcoding techniques and error control schemes. *Id.* ¶ 9. Pauls provides a list of different encoding algorithms that can be used. *Id.* ¶ 10. Pauls teaches that the particular transcoding techniques used to format the data should be adaptive to factors, such as the nature of the network, the preferences of the users, and the data type. *Id.* ¶ 12.

One embodiment of Pauls's system is illustrated in Figure 3, reproduced below.

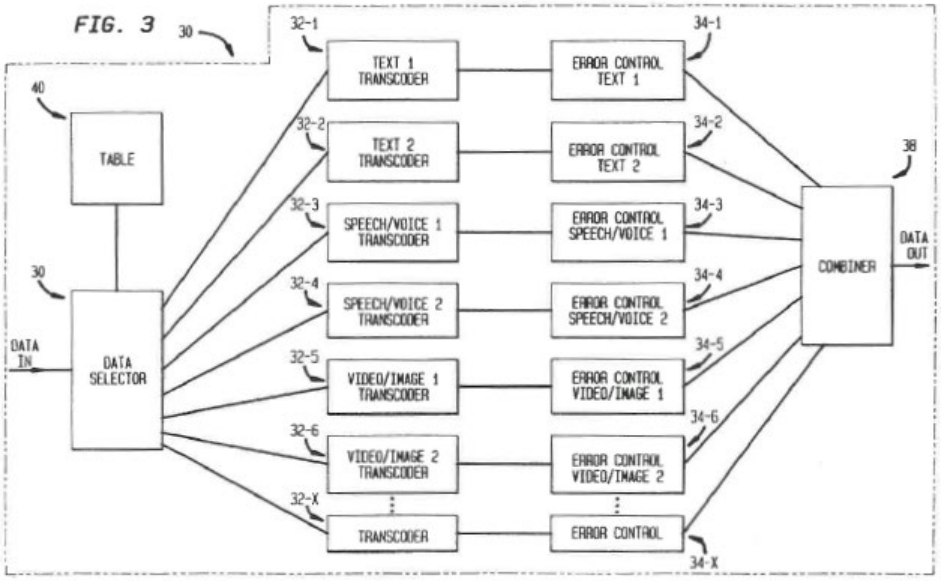


Figure 3 depicts Pauls's access server 20 as including data selector 30, a plurality of text/speech/voice/video/image transcoding techniques 32-n, a plurality of error control schemes 34-n, and combiner 38 for multiplexing formatted data. *Id.* ¶¶ 19, 20.

Examples of transcoding techniques and error control schemes used in Pauls are listed in Figure 5, reproduced below.

FIG. 5

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DATA TYPE	SUB-TYPES (BIT RATE)	TRANSCODER ENCODING ALGORITHMS (BIT RATE)	ADAPTATION LAYERS
SPEECH/VOICE	AUDIO (256 Kbps) WAVE (64 Kbps) SPEECH (32 Kbps)	VCELP (8Kbps) VSELP (8Kbps) EDRU (4-8 Kbps)	HYBRID ARQ ERROR CONCEALMENT (MUTING)
VIDEO/IMAGE	TIFF GIFF MPEG (1.5Mbps) MPEG2 (2.0 Mbps)	H.263 (8-24 Kbps)	HYBRID ARQ ERROR CONCEALMENT (INTERPOLATION)
TEXT	ASCII MSWORD	GZIP PKZIP	ARQ

Figure 5 illustrates chart 50, which shows data sub-types and their associated bit rates, encoding algorithms and the bit rate of the data after

encoding (or compression), and error control schemes. Ex. 1007 ¶ 24. Pauls teaches that data with an audio sub-type has a 256 Kbps bit rate. *Id.* According to Figure 5 of Pauls, "[i]f a transcoding technique with a VCELP encoding algorithm is used to encode the audio data, the bit rate can be reduced to 8 Kbps." *Id.*

3. *Analysis of Cited Art as Applied to Independent Claim 1*

a. *"a plurality of different asymmetric data compression encoders, wherein each asymmetric data compression encoder of the plurality of different asymmetric data compression encoders is configured to utilize one or more data compression algorithms"*

Claims 15 and 16 depend directly from independent claim 1 and, therefore, recite all the limitations of claim 1. Although claim 1 is not challenged in the Petition, we will address each limitation of this independent claim before analyzing the limitations recited specifically in the challenged dependent claims. Claim 1 recites "a plurality of different asymmetric data compression encoders, wherein each asymmetric data compression encoder of the plurality of different asymmetric data compression encoders is configured to utilize one or more data compression algorithms." Ex. 1001, 20:58–63.

Petitioner contends Imai teaches this limitation, because Imai discloses "a plurality of coding methods corresponding to the encoders 53_1 to 53_N" and "[the] encoders 53_1 to 53_N employ 'different coding methods from each other' and are thus different encoders." Pet. 22 (citing Ex. 1005 ¶¶ 67, 70; Ex. 1003 ¶ 126–129). According to Petitioner, "Imai's encoders comprise a plurality of different ***asymmetric*** data compression encoders that utilize data compression algorithms" because the cited "MPEG layers 1, 2, and 3, and the ATRAC and ATRAC 2 compression algorithms are each

different asymmetric data compression algorithms that are each used by Imai's encoders." *Id.* at 23 (citing Ex. 1005 ¶¶ 67, 68; Ex. 1003 ¶¶ 128–130).

Petitioner further contends that Imai's teaching is equally applicable to video. *Id.* at 25 (citing Ex. 1005 ¶ 172). According to Petitioner, a person of ordinary skill in the art would have known to use Imai's teachings for video data because video is an "asymmetric application" that realizes the same benefits from compression with asymmetric encoders and algorithms as other media, such as audio. *Id.* (citing Ex. 1003 ¶ 135; Ex. 1012, 5). Petitioner notes that asymmetric application for compression/decompression was known in the art because the MPEG family of audio compression algorithms, discussed in Imai, uses a slow, complex algorithm for compression and a simpler algorithm for decompression. *Id.* (citing Ex. 1003 ¶ 135; Ex. 1009, 81; Ex. 1010, 7).

Petitioner also contends Pauls teaches this limitation because "[t]he access server 20 comprises a data selector 30, ***a plurality of text, speech/voice and video/image transcoding techniques 32–n*** (i.e., transcoding techniques for text, speech/voice and video/image data types), a plurality of text, speech/voice and video/image error control schemes 34–n (i.e., error control schemes for text, speech/voice and video/image data types) and a combiner 38 for multiplexing formatted data." Pet. 26 (citing Ex. 1007 ¶ 19). Petitioner argues that the "access server" and "plurality of different transcoders 32–n" are depicted in Pauls's Figure 3 (reproduced above). *Id.*

Petitioner further argues that several of Pauls' data compression algorithms are asymmetric and that a person of ordinary skill in the art

would have recognized that at least the H.263, MPEG, and MPEG-2 compression algorithms are asymmetric compression algorithms. *Id.* at 28. According to Petitioner, these algorithms use motion compensation, which causes the compression routine of each to require substantially more execution time than the respective decompression routine. *Id.* (citing Ex. 1003 ¶ 140). Petitioner concludes that Pauls teaches "a plurality of different *asymmetric data compression encoders"* because Pauls teaches a plurality of different transcoders that can be configured to utilize different asymmetric compression algorithms, including H.263, MPEG, and MPEG2. *Id.* (citing Ex. 1003 ¶¶ 139–141).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the entire record before us, including (1) Imai's teaching that encoders 53_1 to 53_N use different coding methods from each other and are thus different encoders (*see* Ex. 1005 ¶¶ 67, 70), (2) Pauls's identification of several compression algorithms that may be used as an encoder, including H.263, MPEG and MPEG2, and JPEG (*see* Ex. 1007 ¶ 10, Fig. 5), and (3) Dr. Storer's testimony that a person of ordinary skill in the art would have recognized that at least the H.263, MPEG, and MPEG2 compression algorithms are asymmetric compression algorithms because motion compensation causes the compression routine of each to require substantially more execution time than the respective decompression routine (Ex. 1003 ¶¶ 73, 74, 169–171, 176–178; *see* Ex. 1009, 50–52), we determine Petitioner has shown by a preponderance of the evidence that the combined teachings from Imai and Pauls satisfy the challenged claim limitation.

b. "first asymmetric data compression encoder" "configured to compress data blocks containing video or image data at a higher data compression rate than" a "second asymmetric data compression encoder"

Claim 1 recites "wherein a first asymmetric data compression encoder of the plurality of different asymmetric data compression encoders is configured to compress data blocks containing video or image data at a higher data compression rate than a second asymmetric data compression encoder of the plurality of different asymmetric data compression encoders." Ex. 1001, 20:64–21:3.

Petitioner contends Imai in view of Pauls renders this limitation obvious because Imai teaches using a plurality of asymmetric data compression encoders 53_1 to 53_N. Pet. 29. Petitioner argues that a person of ordinary skill in the art would have found it obvious that "a first encoder of a plurality of asymmetric data compression encoders in Imai would compress data blocks at a higher data compression rate than a second encoder for several reasons." *Id*. Petitioner notes that the '477 patent uses the term "data compression rate" to refer to the execution or algorithmic speed of a compression encoder. *Id.* (citing Ex. 1001, 2:63–67, 8:10–18, 14:11–38; Ex. 1003 ¶ 142). Based on the disclosure of the '477 patent, Petitioner then argues that Imai meets the claim limitation because it includes asymmetric compression encoders that have different execution speeds, and compares and contrasts different asymmetric data compression encoders in terms of their "compression rate," and identifies several asymmetric data compression algorithms that "provide[] a high *compression rate*," referring

to MPEG layer 3 and ATRAC 2 as "example[s]." *Id.* at 30 (citing Ex. 1005 ¶ 68; Ex. 1003 ¶¶ 156–157).

Petitioner further argues that Imai teaches a first encoder using an asymmetric compression algorithm (MPEG layer 3) configured to compress data at a higher compression rate than a second encoder using another asymmetric algorithm (ATRAC 2). Pet. 30 (citing Ex. 1005 ¶¶ 67–69). Petitioner notes that "Imai explains that ATRAC 2 can encode at various compression rates (*e.g.*, "64 Kbps, 32K bps, 24 Kbps")." *Id.* (citing Ex. 1005 ¶ 69; Ex. 1003 ¶ 157). According to Petitioner, a person of ordinary skill in the art "would have appreciated from Imai's various teachings that the different asymmetric data compression encoders have different data compression rates, with some encoders having higher rates than others." *Id.* (citing Ex. 1003 ¶ 157). And Petitioner asserts a person of ordinary skill in the art "would have also found it obvious to select among different encoders having higher and lower data compression rates to better match the incoming data stream to the throughput of the communication channel. *Id.* at 31 (citing Ex. 1003 ¶ 161).

Petitioner then argues that although Imai's examples are directed to audio data, "it would have been obvious to perform the step using data blocks containing video," because Imai discloses that "the present invention is also applicable to other signals, such as *video signals*, other types of time-series signals, and signals being not in time series." *Id.* at 33 (citing Ex. 1005 ¶ 172; Ex. 1003 ¶ 164).

Petitioner contends it would have been obvious to perform the processing of Imai using video or image data blocks of Pauls because Pauls teaches a plurality of encoders 32-n that use different encoding algorithms

depending on the type of data to be encoded and Pauls teaches compressing data blocks containing video or image data. Pet. 34–35. Petitioner argues that "Pauls teaches using a first asymmetric data compression encoder and a second asymmetric data compression encoder where the encoders compress video and image data at higher and lower data compression rates." *Id.* at 35. According to Petitioner, Pauls identifies several asymmetric data compression algorithms and a person of ordinary skill in the art would have appreciated that each algorithm would have different relative rates of compression. *Id.* Accordingly, Petitioner concludes that Pauls must teach the limitation because "it is only a remote possibility that any two different asymmetric data compression encoders would have the same execution speed." *Id.* at 35–36 (citing Ex. 1003 ¶¶ 155, 170).

Petitioner relies on the testimony of Dr. Storer to support its position. Dr. Storer testifies that "H.263, MPEG, and MPEG2 are asymmetric data compression algorithms identified by Pauls." Ex. 1003 ¶ 168. Dr. Storer cites to Pauls's Figure 5 for teaching that "H.263 renders video at a bit rate of 8-24 Kbps, MPEG renders video at a bit rate of 1.5 Mbps, and MPEG2 renders video at a bit rate of 2.0 Mbps." *Id.* ¶ 169 (citing Ex. 1007, Fig. 5). According to Dr. Storer, a person of ordinary skill in the art "would have appreciated that each of these well-known and widely used video compression standards have different relative rates of compression, with MPEG having the lowest compression ratio and MPEG2 and H.263 having relatively higher compression ratios." *Id.* (citing Ex. 1019, 7–9 (comparing average compression ratios for MPEG, MPEG2, and H.263)). Dr. Storer testifies that "an encoder implementing any one of these compression algorithms would have a different execution speed from another encoder that

implements a different one of the compression algorithms, and therefore at least one encoder would perform at a higher data compression rate." *Id.* ¶ 155.

Patent Owner contests Petitioner's reliance on Imai and Pauls to meet the limitations of claim 1 for several reasons. Patent Owner first contends Petitioner fails to specify which encoder of Imai or Pauls is the "first encoder" and which is the "second encoder," as required by the claim, so Petitioner's challenge is inadequate. PO Resp. 7–12, 20. According to Patent Owner, the "Petition must identify a specific first encoder that is configured to compress at a higher rate than a specific second encoder." *Id.* at 37–38. Patent Owner argues Petitioner "never even attempts to specify any encoder that would constitute the "first" or "second" encoder for purposes of the claims." *Id.* at 38 (citing Ex. 2002 ¶ 126).

Patent Owner then argues that the term "configured to" means that the "first encoder" must, by design, compress at a higher rate than the "second encoder." *Id.* at 8–9 (citing *Aspex Eyewear, Inc. v. Marchon Eyewear, Inc.*, 672 F.3d 1335, 1349 (Fed. Cir. 2012) (construing "adapted to" in the narrower sense of "configured to," "made to," or "designed to," rather than in the "broader sense" of "capable of" or "suitable for")); Sur-Reply 4–7. According to Patent Owner, the "configured to" limitation cannot be met by an accidental difference in compression rates because the invention relies on the *predictable* relationship between the compression rates of two encoders and the invention would not function if the relationship was reversed. PO Resp. 11. Patent Owner cites to the '477 patent to support its position, because the specification describes switching from an encoder having a relatively slow compression rate to one having a "faster rate of compression"

when the "throughput falls below a predetermined threshold" "so as to increase the throughput." *Id.* (citing Ex. 1001, 8:12–18); Sur-Reply 5–6. Patent Owner argues that "[i]f the arrangement or configuration of the encoders were reversed, the opposite would occur: the system would switch from the relatively fast encoder to the relatively slow encoder, *reducing* the throughput and *exacerbating* the bottleneck it was seeking to alleviate." PO Resp. 11; Sur-Reply 23. Patent Owner concludes that the mere possibility that Imai may have encoders with different compression rates fails to meet the required "configured to" limitation. PO Resp. 11–12; Sur-Reply 6, 24.

Patent Owner further contends Petitioner fails to explain how Imai teaches a "first asymmetric data compression encoder" *configured* to compress data "at a higher data compression rate" than the "second asymmetric data compression encoder." PO Resp. 12–26. Patent Owner argues that because "the Petition defines 'data compression rate' as 'the execution or algorithmic speed of a compression encoder"" and because Petitioner states that "it is the throughput of the asymmetric data compression encoder measured by the amount of input data that it can compress per unit of time at a given compression ratio," claim 1 must "require[]'a first asymmetric data compression encoder' that is configured to compress more *input data* per unit of time at a given compression ratio than a 'second asymmetric data compression encoder.'" *Id.* at 8 (citing Pet. 29; Ex. 2002 ¶ 37).

Patent Owner then contends that the Petition fails to show Imai teaches compression rates (i.e., speed of compression measured by input data compressed per unit of time). PO Resp. 16–19, 21 (citing Pet. 30; Ex. 2002 ¶¶ 55, 71). According to Patent Owner, the cited teachings do not

pertain to the encoders' "compression rate" and fail to show the use of encoders with varying compression rates. *Id.* at 16–17. Patent Owner asserts that the Petition points to no evidence of Imai teaching lowering the output rate by modifying the speed of compression, as claim 1 requires, or offering any reason why a person of ordinary skill in the art would have solved the problem of a slow network by varying the compression rate as opposed to the compression ratio. *Id.* Patent Owner argues the Petition's suggested approach of modifying the speed of compression would be ineffectual at best, and counterproductive at worst, in view of Imai's solution of increasing the degree of compression. *Id.* at 21–22; Ex. 2002 ¶¶ 78–80; Tr. 23:7–43:2. Patent Owner further argues that Imai uses "compression rate" in a different way than the '477 patent and that Imai's reference to "a relatively less bit rate" means that Imai is actually referring to compression ratio rather than compression rate. *Id.* at 16–17 (citing Ex. 2002 ¶ 57; Ex. 2003, 110:1–5, 114:14–115:4); Tr. 31:17–23, 41:1–42:17.

Patent Owner also contends the Petition fails to demonstrate that Imai meets the limitations of claim 1 because Imai's references to (1) the amount of computation for decoding rather than the speed of encoding (*id.* at 19 (citing Ex. 1005 ¶ 69); Tr. 30:12–25), and (2) ATRAC 2's compression rates of "64 Kbps, 32 Kbps, 24 Kbps," do not describe the "compression rates," but rather disclose "the output rates from the encoder" (*id.* at 19 (citing Ex. 1005 ¶ 69; Ex. 2002 ¶ 65; Ex. 2003, 105:4–106:13); Tr. 31:6–13). Patent Owner then states that "the parties are in agreement that *the only purported examples of compression rates cited in the Petition* are not in fact compression rates at all." PO Resp. 20.

Patent Owner then argues that Pauls fails to teach (1) "compression rates" as defined by Petitioner or (2) encoders that are "configured to compress data blocks containing video or image data at a higher data compression rate than a second asymmetric data compression encoder." PO Resp. 26–32. According to Patent Owner, the Petition only points to Pauls's disclosures regarding compression ratios not rates. *Id.* at 27. Patent Owner also takes issues with the Petitioner's reliance on encoders that just happen to have different speeds but fail to demonstrate a deliberate configuration that requires different encoders have different compression speeds. *Id.* at 28–29.

We agree with Patent Owner that, in certain instances, Imai uses the term "compression rate" in a different way than the '477 patent does. Nonetheless, we determine Imai's teachings would have rendered this claim limitation obvious because Imai explicitly teaches encoders 53_1 to 53_N that are specifically "constructed" to encode a signal using "different coding methods from each other." *See* Pet. 22; Ex. 1005 ¶ 67. The Petition's citations to these encoders, and Imai's teachings regarding the function of encoders 53_1 to 53_N, render one of them a "first encoder" and another one a "second encoder" as required by the claim. *See* Ex. 1005 ¶¶ 67–69. Additionally, Imai discloses that its encoders should vary in a number of ways, such as compression ratio, execution speed, and suitability for compressing particular data-types. *See* Ex. 1005 ¶ 67. Imai specifically discloses that the encoders are constructed to encode the audio signal with different coding methods from each other; thus, the different rates of encoding are intentional and distinguishable. *Id.* ¶ 67. Imai then discloses a plurality of coding methods with different compression speeds, such as

PCM, ADPCM, layers 1, 2, 3, of MPEG, ATRAC, ATRAC2, and HVXC. *Id.* Imai also teaches that selection instructing unit 55 decides the appropriate coding methods corresponding to encoders 53_1 to 53_N, and instructs encoding selecting circuit 56 to select the decided coding method. *Id.* ¶ 70. And, Patent Owner does not dispute that a person of ordinary skill in the art at the time of the invention would have known how to implement these different encoding algorithms. Tr. 47:13–48:1.

Patent Owner's argument that Imai discloses only different output bit rates that are unrelated to the compression rate of an encoder (*see* PO Resp. 25–26; Ex. 2002 ¶ 65) is unpersuasive because Imai specifically teaches that ATRAC 2 can encode at various compression rates (*e.g.*, "64 Kbps, 32 Kbps, 24 Kbps"). We credit the testimony of Dr. Storer, who explains that a person of ordinary skill in the art would have found this obvious in view of Imai's teaching of an embodiment where all of the encoders use a single asymmetric compression algorithm (ATRAC 2) but differ in their output data rates. Ex. 1003 ¶¶ 139–142. Moreover, it appears that Dr. Zeger's deposition testimony supports Dr. Storer's explanation. Specifically, Dr. Zeger testified as follows:

> Q: So if you use a faster data compression rate, you achieve a higher output rate?
> A: Well, if you use a faster data compression rate -- if you go back to the definition of data compression rate as measuring the amount of input data that can compress per unit of time at a given compression ratio, so if you increase the data compression rate, you're pulling in more input data per unit time at a given compression ratio. So that would -- in general, that would increase the output rate of the encoder, so you'd be having to send more data across the channel.

Ex. 1029, 148:13–24. Thus, we credit Dr. Storer's testimony that Imai's teaching of "coding methods that differ in the amount of computation required . . . is directly related to execution speed or data compression rate." Ex. 1003 ¶ 154 (citing Ex. 1005 ¶ 67); *see also id.* ¶ 155 ("A [person of ordinary skill in the art] would have understood that an encoder implementing any one of these compression algorithms would have a different execution speed from another encoder that implements a different one of the compression algorithms, and therefore at least one encoder would perform at a higher data compression rate."); *see also id.* ¶ 156 ("Imai makes it clear that each encoder will have different execution speeds."); *see* Tr. 58:25–60:1.

We also do not agree with Patent Owner's argument that Imai's teaching regarding selecting decoders based on the amount of computation is insufficient to render the claimed limitation obvious to a person of ordinary skill. PO Resp. 19–20 (citing Ex. 2003, 105:4–106:13); Tr. 32:5–34:22. Nor are we persuaded by Patent Owner's position that "Imai does not disclose that the system should include encoders." Sur-Reply 9 (emphasis omitted); Tr. 39:24–40:14. Rather, we find that Imai's teaching of a relationship between computational load for a decoder and a selected encoder comports with Petitioner's position that a person of ordinary skill in the art would have found it obvious to use a system that selected a coding method based on the computational load it could encode. Dr. Zeger's testimony supports Petitioner's position:

> Q. So if you use a faster data compression rate, you achieve a higher output rate?
> A. Well, if you use a faster data compression rate -- if you go back to the definition of data compression rate as measuring the

> amount of input data that can compress per unit of time at a given compression ratio, so if you increase the data compression rate, you're pulling in more input data per unit time at a given compression ratio. So that would -- in general, that would increase the output rate of the encoder, so you'd be having to send more data across the channel.

Ex. 1029, 148:13–24. Dr. Zeger further testified that the execution speed of a compression algorithm relates to measuring the amount of computation: "Ultimately, it's a measure of something, whether it be data process—how much data is processed, how many seconds it takes for something to happen, how many CPU cycles are used, something of that nature." *Id.* at 65:5–66:22. Additionally, we agree with Petitioner's explanation regarding Imai selecting different encoders with higher and lower data compression rates to better match the transmission rate of the communication channel. *See* Pet. 31 (citing Ex. 1003 ¶ 161; Ex. 1005 ¶¶ 145, 146); Tr. 12:21–25.

Pauls discloses a system that has multiple, different encoders, which includes H.263, MPEG, and MPEG2 encoders. Ex. 1007 ¶ 10, Fig. 5. Although we find that Pauls does not explicitly require that the encoder use different encoding methods or different encoding rates, it does disclose that "[e]ach of the aforementioned encoding algorithms have associated different levels or percentages of compression." Ex. 1007 ¶ 10. While we agree with Patent Owner that Petitioner provides minimal explanation as to how or why the bit rate would be different for different encoders that compress video/image data in the same format (e.g., both data sets are MPEG), Pauls's teachings render Patent Owner's argument regarding output bit rate unpersuasive, especially in light of the following testimony from Dr. Storer:

> [E]ach [encoder] ha[s] very different processing characteristics that impact their speed and compression throughput. For example, H.263 has a very different throughput from an MPEG 1 or MPEG 2 encoder because H.263 is typically only used for low bit video applications. In other words, in a typical application of H.263, the input video data rate [is] appreciably lower than the types of input data rates used with an MPEG or MPEG 2 encoder. This is further reflected by the fact that H.263 can achieve much lower output bit rates on average than an MPEG or MPEG 2 encoder because the input data rate to an H.263 is lower to begin with.

Ex. 1003 ¶ 170; *see also* Ex. 1003 ¶ 154 ("coding methods that differ in the amount of computation required . . . [are] directly related to execution speed or data compression rate."). Additionally, we credit the testimony of Dr. Storer that a person of ordinary skill in the art at the time of the invention would have understood that two different encoders (e.g., encoders that implement different compression algorithms) would have different execution/algorithmic speeds. Ex. 1003 ¶¶ 73, 74; *see also id.* ¶ 155 ("A [person of ordinary skill in the art] would have understood that an encoder implementing any one of these compression algorithms would have a different execution speed from another encoder that implements a different one of the compression algorithms, and therefore at least one encoder would perform at a higher data compression rate."); *see* Ex. 1009, 50–52. Dr. Zeger's deposition testimony cited above supports Dr. Storer's explanation. *See* Ex. 1029, 148:13–24.

Therefore, we find that Pauls's teaching of "a plurality of text, speech/voice and video/image transcoding techniques 32–n (i.e., transcoding techniques for text, speech/voice and video/image data types)" would have

rendered obvious the "first encoder" and the "second encoder" recited in the claim. *See* Ex. 1007 ¶ 19, Fig. 3; Pet. 26.

Accordingly, we determine Petitioner has shown by a preponderance of the evidence that both Imai and Pauls teach a "first encoder" that is "configured to" compress data "at a higher data compression rate" than the "second asymmetric data compression encoder." *See* Ex. 1003 ¶¶ 73, 74, 142–171, 176–178; Ex. 1005 ¶¶ 67–68; Ex. 1007 ¶¶ 10, 19, Fig. 5. Thus, we find that Imai in view of Pauls teaches or at least suggests "wherein a first asymmetric data compression encoder of the plurality of different asymmetric data compression encoders is configured to compress data blocks containing video or image data at a higher data compression rate than a second asymmetric data compression encoder of the plurality of different asymmetric data compression encoders," as required by challenged claim 1.

c. "one or more processors configured to"

Claim 1 recites "one or more processors configured to." Ex. 1001, 21:4.

Petitioner contends this limitation is met by Imai in view of Pauls because Imai teaches that its "CPU 12 decides which one of the coding methods executed in the encoders 531 to 53n is used." Pet. 36 (citing Ex. 1005 ¶ 100). According to Petitioner, a person of ordinary skill in the art "would have understood that Imai's CPU is a controller that is configured to execute the compression and transmission functions of the server." *Id.* (citing Ex. 1003 ¶ 171). Petitioner further contends that Pauls teaches that the access server performs "adaptive communications formatting" (Ex. 1007 ¶ 9) with the access server as a computer (*id.* ¶ 5). Pet. 36. Petitioner argues

that a person of ordinary skill in the art would have understood that a "computer" contains one or more processors. *Id.* at 37 (citing Ex. 1003 ¶¶ 171–173). Based upon Pauls's teaching that the access server is a computer and Imai's teaching of CPU 12 that selects coding methods, Petitioner concludes that a person of ordinary skill in the art would have known how to implement Claim 1 using one or more processors. *Id.* (citing Ex. 1003 ¶ 174).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We agree with Petitioner that Imai's disclosure of "CPU 12" where CPU 12 "decides which one of the coding methods executed in the encoders 53_1 to 53_n is used" meets the challenged claim limitation. *See* Ex. 1005 ¶ 100, Fig. 2. We also agree with Petitioner that Pauls's access server is a computer that would contain one or more processors. *See* Pet. 36–37 (citing Ex. 1007 ¶¶ 5, 9; Ex. 1003 ¶¶ 171–173). Based on the disclosures in Imai and Pauls, we determine Petitioner has established by a preponderance of the evidence that Imai and Pauls must use "one or more processors" that are "configurable" as required by the claims.

d. "determine one or more data parameters, at least one of the determined one or more data parameters relating to a throughput of a communications channel measured in bits per second"

Claim 1 recites "determine one or more data parameters, at least one of the determined one or more data parameters relating to a throughput of a communications channel measured in bits per second." Ex. 1001, 21:5–8.

Petitioner contends this limitation is met by Imai in view of Pauls because Imai selects a coding method that impacts the transmission rate of the communication channel used to transmit the coded data from server to client, which varies due to the amount of traffic being sent across the channel and impacts the ability of the client to reproduce the transmitted signals in real-time. Pet. 37 (citing Ex. 1005 ¶¶ 145, 146, 149; Ex. 1003 ¶¶ 175–176). Petitioner argues that the "transmission rate" of the network in Imai is a measure of a throughput of a communication channel. *Id.* (citing Ex. 1003 ¶¶ 176–177). Thus, according to Petitioner, the determined transmission rate of the network is a data parameter relating to a throughput of the communication channel or network, and Imai measures this determined data parameter in bits per second. *Id.* at 37 (citing Ex. 1003 ¶¶ 178, 181, 185).

Petitioner contends this limitation is met by Imai because Imai teaches selection instructing unit 55 that selects an appropriate "one from a plurality of coding methods corresponding to the encoders 53_1 to 53_N . . . and then instructs the encoding selecting circuit 56 to select the decided coding method." Pet. 38 (citing Ex. 1005 ¶ 70). According to Petitioner, Imai selects a specific encoder from the plurality of encoders based on the transmission rate of the communication channel used to transmit coded data. *Id.* at 38–39 (citing Ex. 1005 ¶¶ 146, 152, 154–160; Ex. 1003 ¶ 180).

Petitioner argues that Pauls also teaches selecting encoding or transcoding techniques based on determined parameters relating to the nature of the communications system such as the "throughput of a communications channel" (i.e., bit rate). *Id.* at 39 (citing Ex. 1007 ¶ 12). Petitioner notes that Pauls claims a method where "***the transcoding***

technique and error control scheme are ***also selected based on nature of the communications network***." *Id.* (citing Ex. 1007, claim 5). Petitioner argues that a person of ordinary skill in the art would have understood that a "bit rate" is conventionally measured in terms of bits per second. Pet. 40 (citing Ex. 1003, 185). Thus, Petitioner concludes that a person of ordinary skill in the art would have had reason to use the combined teachings of Imai and Pauls to select an appropriate asymmetric data compression encoder based upon network throughput, and that applying this technique would have been obvious and within the level of skill in the art, as shown by Imai and Pauls. *Id.* at 40–41 (citing Ex. 1003 ¶¶ 114–123, 186).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Having reviewed the entirety of the record and cited evidence, we determine Petitioner has established by a preponderance of the evidence that that the "determined transmission rate of the network" is a data parameter relating to a throughput of the communication channel or network and that Imai's measuring of this determined data parameter in bits per second satisfies the challenged claim limitation. *See* Ex. 1005 ¶¶ 145, 146, 149. We also find Pauls meets this claim limitation because it teaches selecting encoding or transcoding techniques based on determined parameters relating to the nature of the communications system such as the "throughput of a communications channel" (i.e., bit rate). *See* Ex. 1005 ¶¶ 146, 152, 154–160, 175–186.

e. "select one or more asymmetric data compression encoders from among the plurality of different asymmetric data compression encoders based upon, at least in part, the determined one or more data parameters"

Claim 1 recites "select one or more asymmetric data compression encoders from among the plurality of different asymmetric data compression encoders based upon, at least in part, the determined one or more data parameters." Ex. 1001, 21:9–13.

Petitioner contends this limitation is met by Imai because Imai teaches selection instructing unit 55 that selects an appropriate "one from a plurality of coding methods corresponding to the encoders 53_1 to 53_N . . . and then instructs the encoding selecting circuit 56 to select the decided coding method." Pet. 38 (citing Ex. 1005 ¶ 70). According to Petitioner, Imai selects a specific encoder from the plurality of encoders based on the transmission rate of the communication channel used to transmit coded data. *Id.* at 38–39 (citing Ex. 1005 ¶¶ 146, 152, 154–160; Ex. 1003 ¶ 154).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Having reviewed the entirety of the record and cited evidence, we determine Petitioner has established by a preponderance of the evidence that Imai's selection instruction unit 55 selects an appropriate encoder based on a data parameter, which is the transmission rate of the communication channel, and thereby satisfies the challenged claim limitation. *See* Ex. 1005 ¶¶ 146, 152, 154–160. We also find Pauls meets this claim limitation because it teaches selecting encoding or transcoding techniques based on

determined parameters relating to the nature of the communications system such as the "throughput of a communications channel" (i.e., bit rate). *See* Ex. 1007 ¶¶ 12–14.

f. Summary regarding Independent Claim 1

Based on the foregoing, we conclude Petitioner has demonstrated by a preponderance of the evidence that challenged independent claim 1 would have been obvious under 35 U.S.C. § 103 in view of the combined teachings of Imai and Pauls.

4. Analysis of Cited Art as Applied to Dependent Claims 15 and 16

Claim 15 recites "[t]he system of claim 1, wherein the selected one or more asymmetric data compression encoders are utilized to compress the data blocks containing video or image data to create one or more compressed data blocks, and wherein a descriptor is associated with the one or more compressed data blocks that indicates the selected one or more asymmetric data compression encoders." Ex. 1001, 21:64–22:3. Claim 16 recites "[t]he system of claim 1, wherein the selected one or more asymmetric data compression encoders are utilized to compress the data blocks containing video or image data to create one or more compressed data blocks, and wherein a descriptor indicating the selected one or more asymmetric data compression encoders is included with the one or more compressed data blocks. *Id.* at 22:4–10.

Petitioner contends dependent claims 15 and 16 of the '477 patent are unpatentable under 35 U.S.C. § 103 because they would have been obvious to one of skill in the art in view of Imai and Pauls. Pet. 43–46 (citing Ex. 1003 ¶¶ 192–195). Specifically, Petitioner argues Imai teaches that "[c]oded data resulted from encoding made in the selected encoder is supplied to the

header inserting circuit 54 where an ID (Identification) (coding method information) representing the selected coding method is added to the coded data." Pet. 44 (citing Ex. 1005 ¶ 71). Petitioner notes that Imai explains that "the header inserting circuit 54 adds, to the coded data of each frame, an ID indicating the coding method selected to encode the frame, *i.e.*, information indicating with which one of the coding methods each frame of the audio signal has been encoded." *Id.* (citing Ex. 1005 ¶ 72). Petitioner argues that from these teachings a person of ordinary skill in the art would have recognized that Imai teaches "including" a coding method identifier (i.e., descriptor) included in each of the compressed data blocks, as required by Claim 16. *Id.* (citing Ex. 1003 ¶ 193).

Petitioner further argues Pauls would have rendered the limitations of claims 15 and 16 obvious because it teaches that data is compressed into compressed data blocks and that a coding method identifier is included in each of the compressed data blocks. Pet. 45. Petitioner notes that Pauls specifically teaches that "[a]fter the data selector 30 selects a transcoding technique . . . the selected transcoding technique 32-n is used to encode (or compress) the data . . . [and] [d]ata type indicator-control information is then added to the formatted data (i.e., encoded data with associated error control information)." *Id.* (citing Ex. 1007 ¶ 23). According to Petitioner, a person of ordinary skill in the art would have recognized that the arrangement taught by both Imai and Pauls teaches claim 15 and broader claim 16, which only requires that the coding method be "associated" with the compressed data blocks. *Id.* at 46 (citing Ex. 1003 ¶ 195).

Patent Owner does not address the additional limitations of dependent claims 15 and 16, but the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We have considered carefully all arguments and supporting evidence in light of the limitations recited in challenged dependent claims 15 and 16, including testimony from Dr. Storer (*see* Ex. 1003 ¶¶ 155–165). We agree with Petitioner's analysis, as supported by Dr. Storer's testimony, that the specific limitations recited in these claims would have been rendered obvious to a person of ordinary skill in the art at the time of the invention by the teachings of Imai and Pauls. Specifically, we agree that Imai teaches that "[c]oded data resulted from encoding made in the selected encoder is supplied to the header inserting circuit 54 where an ID (Identification) (coding method information) representing the selected coding method is added to the coded data." *See* Ex. 1005 ¶ 71. Accordingly, we conclude Petitioner has demonstrated by a preponderance of the evidence that challenged dependent claims 15 and 16 would have been obvious under 35 U.S.C. § 103 in view of Imai and Pauls.

5. Analysis of Cited Art as Applied to Dependent Claim 17

Claim 17 recited "[t]he system of claim 1, wherein at least one of the determined one or more data parameters comprises: a video or image data profile." Ex. 1001, 22:11–13.

Petitioner contends dependent claim 17 of the '477 patent is unpatentable under 35 U.S.C. § 103 as obvious in view of Imai and Pauls. Pet. 46–49 (citing Ex. 1003 ¶¶ 196–197). Specifically, Petitioner argues that a person of ordinary skill in the art would have understood that Pauls teaches a video or image data profile because "Pauls describes a user table 40 that

specifies compression algorithms based on the nature of the communications network, hardware and/or software capabilities, and/or data type or sub-type." *Id.* at 46–47 (citing Ex. 1007 ¶ 20, Fig. 4; Ex. 1003 ¶ 196). Petitioner further argues that a person of ordinary skill in the art would have understood that Pauls's Figure 5 teaches a video or image data profile because it shows a mapping between video and image data types with preferred compression algorithms. *Id.* at 48 (citing Ex. 1007, Fig. 5; Ex. 1003 ¶ 197).

Patent Owner does not address the additional limitations of dependent claim 17, but the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We have considered carefully all arguments and supporting evidence in light of the limitations recited in challenged dependent claim 17. For the reasons given with regard to independent claim 1 and the additional citations provided in the Petition, we agree with Petitioner's analysis, as supported by Dr. Storer's testimony, that the specific limitations recited in these claims would have been rendered obvious to a person of ordinary skill in the art at the time of the invention. Specifically, we agree that Pauls's Figure 5 teaches a video or image data profile because it shows a mapping between video and image data types with preferred compression algorithms. *See* Ex. 1007, Fig. 5. Accordingly, we conclude Petitioner has demonstrated by a preponderance of the evidence that challenged dependent claim 17 would have been obvious under 35 U.S.C. § 103 in view of Imai and Pauls.

6. Analysis of Cited Art as Applied to Dependent Claims 18 and 19

Claim 18 recites "[t]he system of claim 1, wherein the one or more processors are further configured to encode each of the data blocks containing video or image data with a plurality of the selected one or more asymmetric data compression encoders to create compressed data blocks. Ex. 1001, 22:15–19. Claim 19 recites "[t]he system of claim 18, further comprising: a memory for storing the compressed data blocks." *Id.* at 22:20–21.

Petitioner contends dependent claims 18 and 19 of the '477 patent are unpatentable under 35 U.S.C. § 103 as obvious in view of Imai and Pauls. Pet. 49–55 (citing Ex. 1003 ¶¶ 186–204). Specifically, Petitioner relies on an embodiment in Imai that teaches encoding each data block with a plurality of the selected one or more asymmetric data compression encoders to create compressed data blocks and storing the compressed data blocks in a memory. *Id.* at 49 (citing Ex. 1005 ¶¶ 167–168, Fig. 16). According to Petitioner, the compressed data blocks are stored in a variety of compressed formats to simplify the transmission process by eliminating the need to compress data blocks in real time and in response to every request. *Id.* (citing Ex. 1003 ¶ 198; Ex. 1005 ¶¶ 165–168). Petitioner further argues that Imai teaches that certain compression encoders can be eliminated from consideration for certain data blocks based on data parameters relating to a throughput of a communications channel (*i.e.*, a known or reserved bandwidth of a communication channel), and other data parameters. *Id.* at 50–51 (citing Ex. 1003 ¶ 200). Given these teachings, Petitioner contends that a person of ordinary skill in the art at the time of the invention would

not have used compression algorithms identified by Imai as unsuitable to compress a given data block. *Id.* at 51 (citing Ex. 1003 ¶ 201). Petitioner further contends that a person of ordinary skill in the art at the time of the invention would have had even less reason to store the erroneous output of those unsuitable algorithms because Imai aims to transmit data compressed with the most "suitable" compression algorithm. *Id.* at 52–53 (citing Ex. 1005 ¶¶ 67, 68, 102; Ex. 1003 ¶ 201). And because Imai "notes that its teachings are 'also applicable to other signals such as video signals,'" Petitioner argues that a person of ordinary skill in the art at the time of the invention would have used appropriate video encoding techniques such as those taught by Pauls. *Id.* at 53–54 (citing Ex. 1005 ¶ 172; Ex. 1007 ¶¶ 17–19; Ex. 1003 ¶¶ 203–204).

Patent Owner does not address the additional limitations of dependent claims 18 and 19, but the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We have considered carefully all arguments and supporting evidence in light of the limitations recited in challenged dependent claims 18 and 19. For the reasons given with regard to independent claim 1 and the additional citations provided in the Petition, we agree with Petitioner's analysis, as supported by Dr. Storer's testimony, that the specific limitations recited in these claims would have been rendered obvious to a person of ordinary skill in the art at the time of the invention. Specifically, based on the current record, we are persuaded that Imai's teachings are "also applicable to other signals such as video signals" and that a person of ordinary skill in the art would have known to use encoding techniques appropriate for video signals. *See* Ex. 1005 ¶ 172; Ex. 1007 ¶¶ 17–19; Ex. 1003 ¶¶ 203–204. Accordingly,

we conclude Petitioner has demonstrated by a preponderance of the evidence that challenged dependent claims 18 and 19 would have been obvious under 35 U.S.C. § 103 in view of Imai and Pauls.

7. Analysis of Cited Art as Applied to Independent Claim 20 and Dependent Claims 28 and 29

Independent claim 20 includes all limitations of independent claim 1 and has the additional requirements that the encoders are specifically "video data compression encoders" and "at least one of the plurality of video data compression encoders is configured to utilize an arithmetic algorithm." Ex. 1001, 22:22–42. Claims 28 and 29 additionally recite "wherein the one or more data blocks containing video data are compressed with the selected one or more video data compression encoders to create one or more compressed data blocks, and wherein a descriptor is associated with the one or more compressed data blocks that indicates the selected one or more video data compression encoders" (*id.* at 23:4–10) and "wherein the one or more processors are configured to encode each of one or more data blocks with a plurality of the selected one or more asymmetric data compression encoders to create compressed data blocks" (*id.* at 23:11–15), respectively.

Petitioner contends independent claim 20 and dependent claims 28 and 29 of the '477 patent are unpatentable under 35 U.S.C. § 103 as obvious in view of Imai and Pauls. Pet. 41–46, 49–54 (citing Ex. 1003 ¶¶ 187–195, 198–204). Petitioner specifically argues that Pauls teaches using asymmetric video compression algorithms including H.263 and JPEG, which both have arithmetic algorithm modes. Pet. 41 (citing Ex. 1003 ¶ 188; Ex. 1007 ¶ 10; Ex. 1020, 69–76 (describing Arithmetic Coding mode of H.263 standard); Ex. 1008 at 32 ("JPEG uses two techniques for entropy

coding: Huffman coding and arithmetic coding"), 34 (JPEG uses an adaptive binary arithmetic coder that can code only two symbols, 0 and 1), 49 (describing lossless entropy-coding by arithmetic coding)). Petitioner then argues that arithmetic data compression encoders were well-known in the prior art years before the filing of the '477 patent. Pet. 41–42 (citing Ex. 1003 ¶ 189; Ex. 1018, 14–15). Petitioner further notes that "[t]he '477 Patent admits that arithmetic compression was not only known in the prior art, but that it was a 'popular compression technique' and that it 'possesses the highest degree of algorithmic effectiveness.'" *Id.* at 42 (citing Ex. 1001, 5:11–12).

Patent Owner contends Petitioner fails to analyze the entirety of claim 20 and instead only focuses on the requirement for "at least one of the plurality of different asymmetric data compression encoders is configured to utilize an arithmetic algorithm." PO Resp. 33. According to Patent Owner, the Petition fails to address the recitation in claim 20 of "a plurality of *video* data compression encoders." *Id.* Patent Owner then argues that the Petition fails to explain why a person of ordinary skill in the art would have configured the compression encoders to encode at different ratios. *Id.* at 34.

Patent Owner also contends Petitioner does not specifically identify its theory of unpatentability for claim 20 because the Petition fails to analyze all the limitations of independent claim 20. Sur-Reply 21. According to Patent Owner, the combined teachings of Imai and Pauls fail to render obvious (1) "a plurality of video data compression encoders" wherein (2) a "first video data compression encoder" is (3) "configured to compress," (4) "at a higher compression ratio than a second data compression encoder," as required by claim 20. Sur-Reply 21–23. Patent Owner further argues that

Petitioner's reliance on Pauls's JPEG encoder as a video data compression encoder is a new argument not found in the Petition and is improper. Sur-Reply 22.

We do not agree with Patent Owner for several reasons. First, the Petition cites to persuasive evidence demonstrating the cited art would have rendered each limitation of the challenged claim obvious to a person of ordinary skill in the art at the time of the invention (*see* Pet. 41–43 (citing Ex. 1003 ¶¶ 188–191; Ex. 1007 ¶ 10; Ex. 1008, 32, 49; Ex. 1018, 14–15; Ex. 1020, 69–76;), including the use of JPEG as a video compression encoder (*see* Pet. 41 (citing Ex. 1003 ¶ 188)). Second, we find, and Patent Owner and its declarant appear to admit, that Imai discloses encoders with different compression ratios as recited in claim 20. *See* Ex. 1005 ¶ 68; *see also* Ex. 1029, 139:19–22 (Q: So is it your position that Imai teaches switching between encoders that have different compression ratios? A: That's basically correct.); Tr. 31:13–20 ("That's paragraph 68 of Imai which states, '[a]n example of the coding method which provides a relatively less bit rate of the resulting coded data, i.e., which provides a high compression rate or MPEG3,' MPEG layer 3 that's MP3 and ATRAK2. Now here it does use the term compression rate but I think everyone agrees that's actually referring to compression ratio. It's a high amount of compression, not a high speed of compression and Dr. Storer agreed with that interpretation.")[8]. Third, Patent Owner appears to admit that Pauls discloses encoders with different compression ratios as recited in claim 20. *See* Tr. 45:12–16 ("So

[8] Despite its admission, Patent Owner states it does not agree Imai discloses compression ratios as required by claim 20. *See* Tr. 72:3–19.

the part of Pauls that Petitioner is relying on for references the different levels of percentages of compression, this again is talking about compression ratio, the degree of compression, not the rate of compression and that's evident here from reference to losing information and reducing the amount of data to be transmitted."). Lastly, we are persuaded that the Petition does address Pauls's teaching of using asymmetric video compression algorithms including H.263 and JPEG, which both have arithmetic algorithm modes. *See* Pet. 41; Ex. 1003 ¶ 188; Ex. 1007 ¶ 10; Ex. 1020, 69–76; Ex. 1008, 32, 34, 49.

Patent Owner does not address the additional limitations of claims 28 and 29, but the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Accordingly, for many of the reasons provided above with regard to Imai and Pauls individually, and because we agree Pauls teaches use of arithmetic algorithms, we conclude Petitioner has shown that challenged independent claim 20 and dependent claims 28 and 29 are obvious under 35 U.S.C. § 103 in view of Imai and Pauls.

8. Rationale to Combine Imai and Pauls

Petitioner contends a person of ordinary skill in the art would have had many motivations to combine Imai and Pauls, because both references (1) are used for the same purpose: encoding data at a server for transmission to a client over a distributed network such as the Internet, (2) teach encoding data using asymmetric encoding methods, (3) choose an encoding method based upon the type of data being transmitted, (4) choose an encoding method based upon a throughput of the communications channel connecting the client, and (5) implement their inventions on known computer systems.

Pet. 19. According to Petitioner, although most of Imai is directed to audio signals, it mentions the applicability to video signals, so a person of ordinary skill in the art would have known to look to other references directed to video encoding techniques, such as those taught by Pauls, for compatible teachings. *Id.* at 19–20.

Petitioner argues that a person of ordinary skill in the art would have been motivated to combine the systems of Imai and Pauls to utilize the numerous video and image data compression encoders of Pauls to enable video compression in Imai's system. Pet. 20 (citing Ex. 1003 ¶¶ 119–120). Petitioner relies on the testimony of Dr. Storer to support its position. Specifically, Dr. Storer testifies that "Imai and Pauls'[s] teachings are presented in such a manner that generic encoders can be readily swapped in and out of the configuration." Ex. 1003 ¶ 119. Dr. Storer further testifies that the encoders disclosed in Imai are ones that could have been "easily modified or replaced to include the compression algorithms of Pauls, and Imai's teachings are structured to support such a configuration." *Id.*

Petitioner further argues that a person of ordinary skill in the art would have been motivated to apply Imai's detailed teachings regarding determining the bandwidth of a communication channel to Pauls's system that selects from multiple video data compression encoders to fine-tune Pauls's video transmission system. Pet. 20 (citing Ex. 1003 ¶ 120). According to Petitioner, a person of ordinary skill in the art would have had a reasonable expectation of success in combining the teachings of Imai and Pauls and also would have achieved predictable results from the combination. *Id.*

Patent Owner contests Petitioner's position, arguing that Petitioner fails to provide an adequate rationale as to how or why a person of skill in the art would have combined the system of Imai with the specific encoders of Pauls. PO Resp. 35–46. Patent Owner argues that Petitioner provides no analysis regarding the combination of Imai and Pauls but, rather, offers only conclusory statements that Imai could be modified for video encoding and that a person of ordinary skill in the art would have used the encoders taught by Pauls. *Id.* at 31–32, 37–38. Patent Owner then argues that the Petitioner does not state how any encoders in the resulting combination would map onto the encoders recited in the claims. *Id.* at 37–38. Patent Owner also argues that the Petition fails to indicate which encoder of the combined teachings would be the "first" encoder and which would be the "second" encoder. *Id.* at 38. Patent Owner further contends the Petition's proposed challenge based on the combination of Imai and Pauls fails because it does not purport to address any flaw in the challenges based on the individual references. PO Resp. 31–32.

We have considered carefully all arguments and supporting evidence regarding the rationale for combining Imai and Pauls. Based on the entirety of the record, we find Petitioner provides sufficient rationale for why a person of skill in the art would have combined the teachings from the cited prior art to arrive at the inventions recited in the challenged claims. As Petitioner notes, Imai explicitly states that its teachings are "also applicable to other signals such as video signals, other types of time series signals, and signals being not in time series." Pet. 53 (citing Ex. 1005 ¶ 172). We agree with Petitioner's position that because Imai expressly applies its teachings to video encoding, a person of ordinary skill in the art "would logically look

towards other prior art references involving data encoding and video encoding techniques to create a video encoding and transmission system" and "[o]ne such prior art reference is Pauls, which includes extensive teachings specific to video." *See* Pet. 19–20 (citing Ex. 1007 ¶¶ 17–19).

Moreover, a motivation to combine may be found "explicitly or implicitly in market forces; design incentives; the 'interrelated teachings of multiple patents'; 'any need or problem known in the field of endeavor at the time of invention and addressed by the patent'; and the background knowledge, creativity, and common sense of the person of ordinary skill." *ZUP, LLC v. Nash Mfg., Inc.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018) (quoting *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013)). As Petitioner argues, both references are used for the same purpose of encoding data at a server for transmission to a client over a distributed network such as the Internet. Pet. 19 (citing Ex. 1003 ¶¶ 114–123). Additionally, they both teach (1) encoding the data using encoding methods that achieve data compression using asymmetric techniques, (2) choosing an encoding method based upon the type of data being transmitted, and (3) choosing the encoding method based upon a throughput of the communications channel connecting the client. *Id.* Based on the entirety of the record, Petitioner appears to bring in Pauls to provide a more explicit teaching of asymmetric compression encoders for Imai's system using compression algorithms directed to video or image data blocks because Pauls teaches use of well-known compression techniques for video data compression. We specifically credit the testimony of Dr. Storer regarding the ease with which a person of ordinary skill in the art could have modified or replaced the encoders disclosed in Imai to include the compression algorithms of Pauls, especially

in light of Imai's suggestion that Imai's system could additionally be used for video data compression. *See* Ex. 1003 ¶¶ 119–121. And Patent Owner does not dispute that a person of ordinary skill in the art at the time of the invention would have known how to implement these different encoding algorithms. Tr. 47:13–48:1.

Given Imai's express teaching regarding the use of video compression encoders in its system, and the fact that both audio and video compression techniques were similar and well known, we agree with Petitioner that a person of ordinary skill would have been motivated to turn to Pauls's video compression encoders for use with Imai's system. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1374 (Fed. Cir. 2019) (finding the Board had sufficient evidence for a motivation to combine references where the second reference was "well known," the techniques taught in the two references "share[d] striking similarities," and one reference "suggests that a wide variety of adaptive compression algorithms could be used and encourages a person having ordinary skill in the art to turn to 'well known' algorithms such as [the other reference's]").

Accordingly, on the entirety of the record, we determine Petitioner has established by a preponderance of the evidence that claims 15–19, 28, and 29 would have been obvious under 35 U.S.C. § 103 in view of Imai and Pauls.

E. Alleged Obviousness of Claims 7 and 23 of the '477 Patent in View of Imai, Pauls, and Dawson

Petitioner contends claims 7 and 23 of the '477 patent are unpatentable under 35 U.S.C. § 103(a) in view of Imai, Pauls, and Dawson. Pet. 54–61. Patent Owner disputes Petitioner's contentions. PO Resp. 58–

59. For reasons that follow, we determine Petitioner has established by a preponderance of the evidence that claims 7 and 23 would have been obvious under 35 U.S.C. § 103 in view of Imai, Pauls, and Dawson.

1. Prior Art Overview

a. Overview of Imai (Ex. 1005)

See supra Section II.D.1.

b. Overview of Pauls (Ex. 1007)

See supra Section II.D.2.

c. Overview of Dawson (Ex. 1025)

Dawson is a U.S. patent titled "Method and Apparatus for Dynamically Selecting an Image Compression Process Based on Image Size and Color Resolution." Ex. 1025, Title. Dawson is directed to a method including compressing electing an image for compression, compressing the image, and storing or transferring the image. *Id.* at Abstract. Dawson teaches selecting between a lossless compression algorithm, such as LZW (Lempel-Ziv-Welch), or a lossy compression algorithm, such as JPEG, to compress image data based on the estimated "entropy of the image." *Id.* at 10:23–27, 12:17–22. In one embodiment, Dawson first determines whether the input image size, or resolution, is less than a predetermined value. *Id.* at 9:57–59. Dawson determines the "size" of the image by "multiplying the screen resolution of the image by the color resolution of the image. The screen resolution of the image refers to the number of pixels which comprise the image." *Id.* at 9:60–63.

Figure 4 of Dawson is reproduced below.

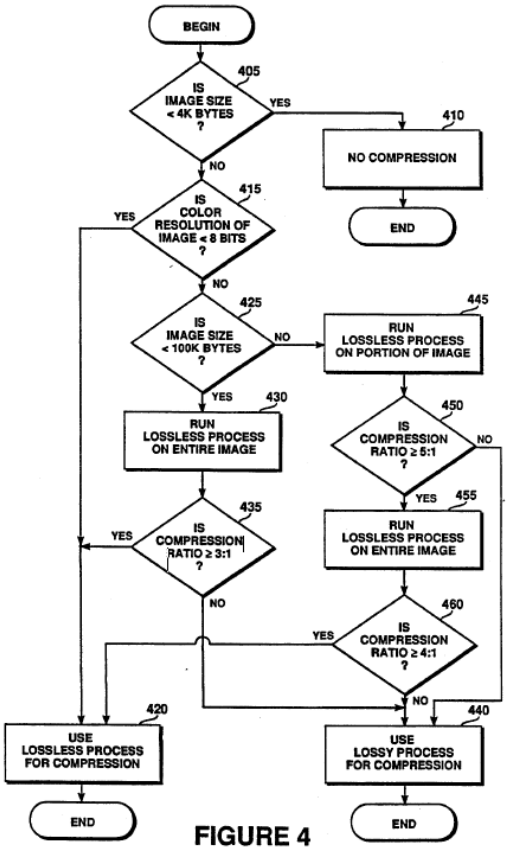


FIGURE 4

As shown in Figure 4, reproduced above, Dawson teaches using the image resolution, color resolution, and a compression ratio of a sample of the image in certain embodiments when deciding whether to compress with lossless or lossy compression. *Id.* at 9:55–10:22, Fig. 4.

1. Analysis of the Prior Art as Applied to Claims 7 and 23

Petitioner relies on the combined teachings of Imai and Pauls with Dawson to address specific limitations recited in dependent claims 7 and 23. Pet. 57–61. Specifically, Petitioner relies on Dawson to meet the limitation requiring the selection of encoders from a plurality of encoders. *Id.* at 57. Petitioner argues that Dawson teaches selecting a lossless asymmetric compression encoder, such as LZW (Lempel-Ziv-Welch), or a lossy compression encoder, such as JPEG, to compress image data based on the

source image resolution. *Id.* (citing Ex. 1025, 9:55–11:40, 12:18–22; Ex. 1001, 10:19–20). Petitioner further argues Dawson teaches applying a series of tests relating to the resolution of image data blocks in deciding which particular asymmetric encoder to apply to each data block. *Id.* at 58 (citing Ex. 1003, ¶ 214; Ex. 1025, 9:55–10:65, Fig. 4).

Petitioner contends it would have been obvious to a person of ordinary skill in the art at the time of the invention to apply the teachings of Dawson to data blocks containing video data because Dawson teaches that its encoder selection techniques are implemented in personal conferencing software that included video conferencing features. Pet. 60 (citing Ex. 1003 ¶ 217; Ex. 1025, 1:34–54, 6:1–6; Ex. 1027, 2). In addition, Petitioner argues that a person of ordinary skill in the art at the time of the invention would have understood that video and image data compression were related because uncompressed digital video frames are images, and video compression techniques were adapted from image compression techniques, such as transform coding of source image frames. *Id.* (citing Ex. 1003 ¶ 217). According to Petitioner, "[v]ideo and image encoders were also used interchangeably, which is demonstrated by Pauls'[s] transcoder assignments based on 'video/image' data type and example using 'h.263 for video/image data.'" *Id.* at 60–61 (citing Ex. 1007 ¶ 17, Figs. 3, 4; Ex. 1003 ¶ 217; Ex. 1008, 22). Thus, Petitioner concludes that a person of ordinary skill in the art at the time of the invention would have understood Dawson's teachings to be equally applicable to data blocks containing video data as set forth in claim 23. *Id.* at 61 (citing Ex. 1003 ¶ 218).

Patent Owner contests Petitioner's position, arguing that Petitioner fails to explain how or why a person of ordinary skill in the art would have

combined the teachings of Imai and Pauls with Dawson. PO Resp. 47–58. Patent Owner specifically argues that the Petition says nothing about *how* a POSITA would have achieved "improv[ing] the encoder/transcoder selection process" by means of "accounting for content resolution," as it must. *Id.* at 47 (citing *Personal Web*, 848 F.3d at 994; Ex. 2002 ¶ 165). According to Patent Owner, it would not have been clear to a person of ordinary skill in the art how the Imai/Pauls combination could benefit from "accounting for content resolution." Ex. 2002 ¶ 167. Patent Owner then argues "it is not possible for a POSITA to infer how Dawson's teachings would be implemented from Dawson itself, because Dawson discloses a mechanism for choosing between a single lossy encoder and a single lossless encoder." PO Resp. 47–48 (citing Ex. 1025, Fig. 4; Ex. 2002 ¶ 169).

Patent Owner further contends that the Petition fails to explain *why* a person of ordinary skill in the art would have made its alleged modifications. *Id.* at 49. To support its position, Patent Owner reiterates its arguments regarding the combination of Pauls with Imai. *Id.* at 50–57. Patent Owner also argues that the Petition does not address the tradeoffs inherent in its motivation to modify Pauls's encoders. *Id.* at 58–61.

For the reasons provided above with regards to the combined teachings of Imai and Pauls, and because we agree Dawson teaches that its encoder selection techniques are implemented in personal conferencing software that included video conferencing features (*see* Ex. 1025, 1:34–54, 6:1–6), we are satisfied Petitioner has provided ample analysis and evidence demonstrating that a person of ordinary skill in the art would have had reason and motivation to combine the teachings of Imai, Pauls, and Dawson. Accordingly, based on the entirety of the record, we determine Petitioner has

established by a preponderance of the evidence that claims 7 and 23 would have been obvious under 35 U.S.C. § 103 in view of Imai, Pauls, and Dawson.

F. Alleged Obviousness of Claims 8 and 24 of the '477 Patent in View of Imai, Pauls, and Lai

Petitioner contends claims 8 and 24 of the '477 patent are unpatentable under 35 U.S.C. § 103(a) in view of Imai, Pauls, and Lai. Pet. 61–70. Patent Owner does not address the specific combination of Imai, Pauls, and Lai, but the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. For the reasons that follow, we determine Petitioner has established by a preponderance of the evidence that claims 8 and 24 would have been obvious under 35 U.S.C. § 103 in view of Imai, Pauls, and Lai.

1. Prior Art Overview

a. Overview of Imai (Ex. 1005)

See supra Section II.D.1.

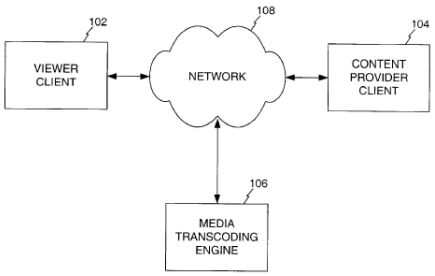
b. Overview of Pauls (Ex. 1007)

See supra Section II.D.2.

c. Overview of Lai (Ex. 1016)

Lai is a U.S. patent titled "Distributed On-Demand Media Transcoding System and Method." Ex. 1016, Title. Lai is directed to a "media transcoding system" for "on-demand transcoding of media content" that "expedites the publishing process for media content providers by allowing them to publish media content without first employing off-line encoding services," and thereby decreases publishing costs and delay for content providers. Ex. 1016, 2:65, 3:35–36, 4:36–45. Lai discloses a media

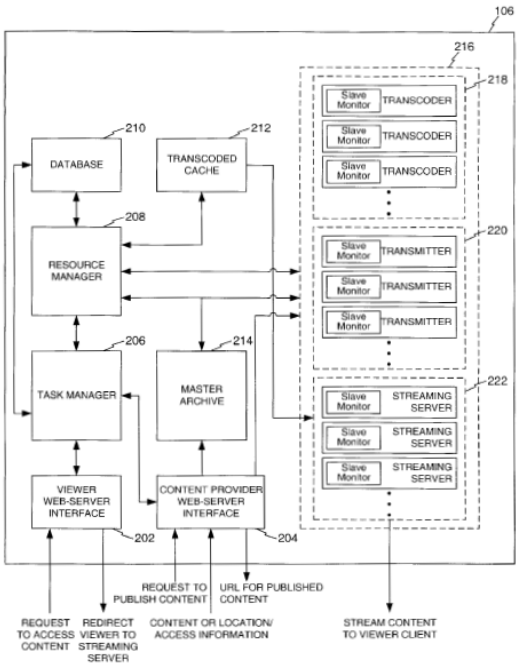
transcoding engine 106 that acts as an "intermediate" between the content provider and the content viewer by "selecting one of a plurality of transcoders for transcoding from a plurality of source types to a plurality of destination types based on the source type and the destination type." *Id.* at 7:39–41, 3:3–6. As shown in Figure 1, illustrated below, Lai teaches that the media transcoding engine receives requests for media content from the viewer and obtains the requested content from the content provider. *Id.* at 7:39–41.



Lai's Figure 1, reproduced above, illustrates that "[t]he media transcoding engine 106 then transcodes the media received from the content provider 104 from a source type to a destination type that can be accommodated by the viewer client 102 and delivers the transcoded media content to the viewer." *Id.* at 7:39–49. The "source type" and "destination type" are defined in Lai according to "publishing variables" that "may be the file format of the media content, the bit-rate of the media content, the compression algorithm according to which the media content is stored, the communication protocol according to which the media content is transferred, or the physical medium on which the media content is stored." *Id.* at 4:1–11. Lai teaches that its transcoding engine may further identify an "optimal" destination type configuration for a client that "may be updated periodically in case of network condition changes between the viewer client 102 and the

network 108 (e.g., change of Internet Service Provider, or change of connection speed)." *Id.* at 9:38–43.

One embodiment of media transcoding engine 106 is shown in Figure 2, reproduced below.



As shown above in Figure 2, Lai discloses that media transcoding engine 106 is comprised of a number of components including viewer Web server interface 202, content provider Web server interface 204, transcoded cache 212, a master archive 214, transcoder servers 218, transmitter servers 220, and streaming servers 222. *Id.* at 8:1–7, Fig. 2. Lai also discloses that transcoder servers 21 each perform "a number of different conversion operations, the particular conversion operations used depend upon the media content and associated publishing variables being converted." *Id.* at 18:27–35.

2. Analysis of the Prior Art as Applied to Claims 8 and 24

Petitioner relies on the combined teachings of Imai and Pauls with Lai to address specific limitations recited in dependent claims 7 and 24. Pet. 61–70. Specifically, Petitioner relies on Lai to meet the limitation regarding a data parameter comprising a data transmission rate of the data blocks containing video or image data. *Id.* at 65–66. Petitioner argues that Lai's media transcoding engine 106 "includes one or more transcoders 218" that each perform "a number of different conversion operations, the particular conversion operations used depend upon the media content and associated publishing variables being converted." *Id.* at 66 (citing Ex. 1016, 18:27–35; Ex. 1003 ¶ 227). Petitioner further argues Lai teaches that its transcoders include different compression algorithms because they each convert data between different source and destination "types," which include information such as "the compression algorithm according to which the media content is stored." *Id.* (citing Ex. 1016, 4:3–7; Ex. 1003 ¶ 228). According to Petitioner, Lai's transcoders comprise a plurality of compression encoders because each transcoder converts between different "compression algorithms" (i.e., from a source compression algorithm to a destination algorithm). *Id.* (citing Ex. 1003 ¶ 228).

Petitioner further contends that the source "bit rate" of Lai is a transmission rate of the data. *Id.* at 68 (citing Ex. 1003 ¶ 233). Petitioner argues that in Lai, a content publisher "transmits" the source data to the transcoding engine using a "transmitter" server and that source content is "delivered" or transmitted to the transcoding engine "as a continuous stream of data, as in the case of a live audio or video feed," and that its transcoding

process is performed in "'real-time' after the publication of the media content." *Id.* at 68 (citing Ex. 1016, 12:43–46, 14:24–27, 17:14–17).

Petitioner then contends it would have been obvious to a person of ordinary skill in the art at the time of the invention to add Lai's additional transcoder selection criteria to the combined system of Imai and Pauls because it would have added the capability to consider the input data source type and bit rate to the encoder selection criteria of Imai and Pauls so that "[c]ompression algorithm choices can be made based on optimization according to bit-rate choices, or according to the nature of the content." Pet. 62 (citing Ex. 1016, 20:36–38; Ex. 1003 ¶¶ 219–225).

In addition, Petitioner argues that a person of ordinary skill in the art the time of the invention would have had reason to incorporate Lai's teachings regarding additional source and destination parameters, including the source data bit rate, into the combined system of Imai and Pauls to improve Imai's client "processing ability" determination, which discusses decoding test "dummy data" at a client. Pet. 62 (citing Ex. 1005 ¶¶ 99–100; Ex. 1003 ¶ 225). Petitioner notes Lai teaches that one of the "benefit[s] of the invention is that it permits content providers to deliver media content to users with media players incapable of accommodating the source type of the original media content" by leveraging the source and destination type parameters. *Id.* at 62–63 (citing Ex. 1016, 4:46–49). According to Petitioner, a person of ordinary skill in the art would have understood this feature of Lai to obviate the transmission and testing of "dummy data" at the client as Imai describes, and that this would have saved time in furtherance of the real-time streaming configurations described in all three references. *Id.* at 63 (citing Ex. 1005 ¶ 1; Ex. 1007 ¶ 7; Ex. 1016, 2:39–40; Ex. 1003

¶ 225). Thus, Petitioner concludes that a person of ordinary skill in the art would have had reason to incorporate consideration of Lai's input data bit rate to improve the speed and efficiency of the combined system. *Id.* (citing Ex. 1003 ¶¶ 224–225).

Patent Owner does not address the specific combination of Imai, Pauls, and Lai, but does generally argue that all of Petitioner's proposed combinations suffer from the same shortcomings of Petitioner's flawed combination of Imai and Pauls. PO Resp. 62.

For the reasons provided above with regards to the combined teachings of Imai and Pauls, and because we agree Lai teaches a data parameter comprising a data transmission rate of the data blocks containing video or image data (*see* Ex. 1016, Ex. 1016, 4:46–49, 12:43–46, 14:24–27, 17:14–17, 18:27–35) as required by claims 8 and 24, we are satisfied Petitioner has provided ample analysis and evidence demonstrating a person of ordinary skill in the art would have had reason and motivation to combine the teachings of Imai, Pauls, and Lai. Accordingly, based on the entirety of the record, we determine Petitioner has established by a preponderance of the evidence that claims 8 and 24 would have been obvious under 35 U.S.C. § 103 in view of Imai, Pauls, and Lai.

III. CONCLUSION[9]

Based on the full record before us, we determine Petitioner has shown by a preponderance of the evidence that claims 15–19, 28, and 29 of the

[9] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the

'477 patent would have been obvious under 35 U.S.C. § 103 in view of Imai and Pauls. In addition, we determine Petitioner has shown by a preponderance of the evidence that claims 7 and 23 would have been obvious under 35 U.S.C. § 103 in view of Imai, Pauls, and Dawson. We further determine Petitioner has shown by a preponderance of the evidence that claims 8 and 24 of the '477 patent would have been obvious in view of Imai, Pauls, and Lai. In summary:

Claims	35 U.S.C. §	References/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
15–19, 28, 29	103	Imai, Pauls	15–19, 28, 29	
7, 23	103	Imai, Pauls, Dawson	7, 23	
8, 24	103	Imai, Pauls, Lai	8, 24	
Overall Outcome			7, 8, 15–19, 23, 24, 28, 29	

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).

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has shown by a preponderance of the evidence that claims 7, 8, 15–19, 23, 24, 28, 29 of the ’477 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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