

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

MASIMO CORPORATION,
Patent Owner.

IPR2024-00294
Patent 10,736,507 B2

Before RICHARD H. MARSCHALL, DAVID COTTA, and
ALYSSA A. FINAMORE, *Administrative Patent Judges*.

COTTA, *Administrative Patent Judge*.

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

I. INTRODUCTION

On December 12, 2023, Apple Inc. (“Petitioner”)¹ filed a Petition to institute *inter partes* review of claims 1–20 of U.S. Patent No. 10,736,507 B2 (Ex. 1001, “the ’507 patent”). Paper 3 (“Pet.” or “Petition”). Masimo Corporation (“Patent Owner”)² filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). With our authorization, Petitioner filed a Preliminary Reply to Patent Owner’s Preliminary Response and Patent Owner filed a Preliminary Sur-reply. Paper 9 (“Prelim. Reply”); Paper 10 (“Prelim. Sur-reply”).

Under 35 U.S.C. § 314(a), *inter partes* review may not be instituted unless the Petition “shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” Petitioner has established a reasonable likelihood of prevailing on its assertion that at least one of the challenged claims are unpatentable based on the grounds advanced here. We decline to deny the Petition on a discretionary basis as requested by Patent Owner. Thus, for reasons explained below, we institute *inter partes* review of claims 1–20 of the ’507 patent.

A. Related Matters

The parties identify *Apple Inc. v. Masimo Corp. et al.*, No. 1-22-cv-01378 (D. Del.) (“the Delaware Litigation”), in which Patent Owner asserts a counterclaim of infringement of the ’507 patent, as a related matter. Pet.

¹ Petitioner identifies itself as the real party-in-interest. Pet. 86.

² Patent Owner identifies itself as the real party-in-interest. Paper 5, 1.

86; Paper 5, 1.

The parties identify IPR2024-00293 as a parallel *inter partes* review proceeding in which Petitioner filed another petition challenging the '507 patent. Paper 2, 1; Paper 8, 1. In a concurrently issued decision, we deny institution in that case.

Patent Owner also identifies as related matters the following *inter partes* review proceedings involving patents asserted by Patent Owner in the above-referenced district court litigation:

Petitioner	Case No.	Patent No.
Apple Inc.	IPR2024-00290	8,190,223 B2
Apple Inc.	IPR2024-00296	10,984,911 B2
Apple Inc.	IPR2024-00243	10,722,159 B2
Apple Inc.	IPR2024-00244	10,722,159 B2
Apple Inc.	IPR2024-00293	10,736,507 B2
Apple Inc.	IPR2024-00241	10,687,743 B1
Apple Inc.	IPR2024-00242	10,687,743 B1

Paper 5, 2.

B. The '507 Patent

The '507 patent relates to “patient monitors capable of connectivity to a mobile computing device.” Ex. 1001, 1:22–24. The '507 patent describes “a physiological monitoring system,” which includes “a sensor and cable assembly with a processing board or card,” and is “connectable to a mobile computing device, such as a smartphone, such that display of the monitored physiological data can occur on the computing device.” *Id.* at 2:24–29.

Figure 1A of the '507 patent, reproduced below, shows physiological monitoring system 100, including “sensor 110, first cable 120, processing module 130, second cable 140, connection port 150, and a mobile computing device, illustrated here as smartphone 160.” *Id.* at 3:58–62.

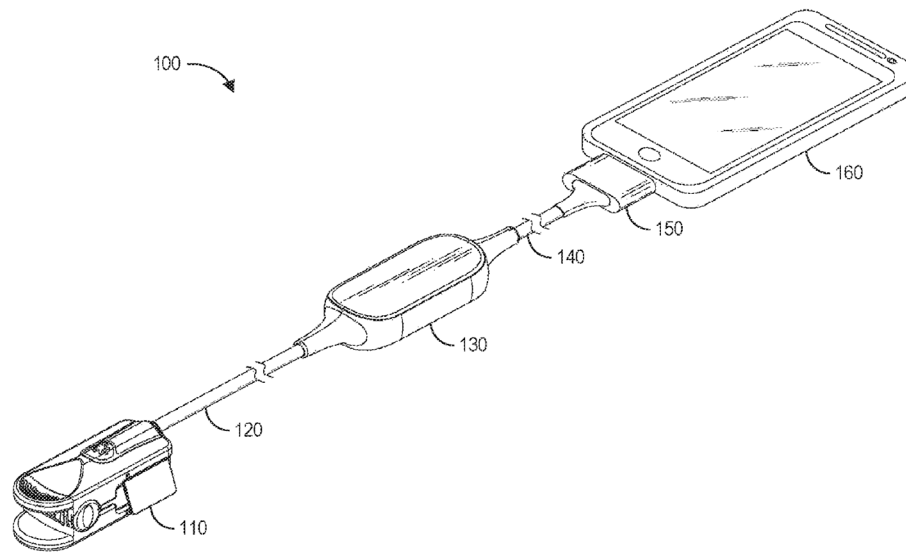


FIG. 1A

As shown in Figure 1A, “[s]martphone 160 can be coupled to the processing module 130 by a second cable 140 and connection port 150.” *Id.* at 5:9–11. Sensor 110 may be “a pulse oximeter capable of being secured to a digit such as a finger.” *Id.* at 4:9–13. According to the '507 patent, “the sensor data is transmitted from sensor 110 along the first cable 120 to the processing module 130, which can apply noise filtering and signal processing techniques . . . to provide output data for display on the smartphone 160.” *Id.* at 4:67–5:4. The Specification describes that “[t]he smartphone 160 can include software such as an application configured to

manage output measurement data from the processing module 130.” *Id.* at 5:25–27.

Figure 4A of the ’507 patent, reproduced below, shows an embodiment of an application for display and management of physiological monitoring data. *Id.* at 13:10–12.

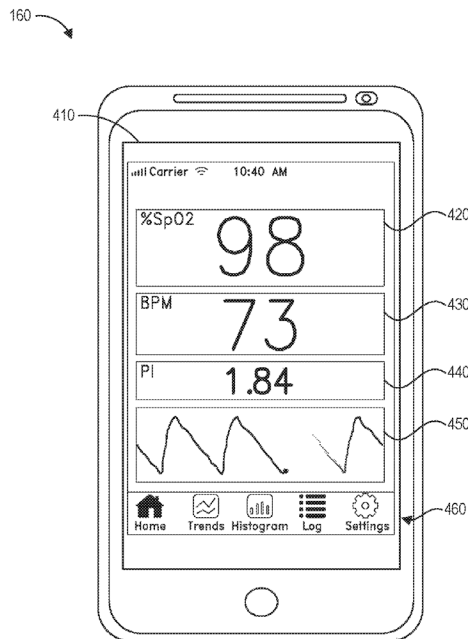


FIG. 4A

Figure 4A depicts smartphone 160 with display 410, “which can be used to generate a user interface for the software application.” *Id.* at 13:25–27. According to the Specification, the application may include “a plurality of display portions in which a plurality of physiological parameters can be displayed, such as SpO₂ display 420, heart rate display 430, perfusion index display 450, or plethysmographic waveform display 450.” *Id.* at 13:27–31.

C. Challenged Claims

The '507 patent includes 20 claims, all of which are challenged in the Petition. Claims 1 and 13 are independent claims and read as follows:

1. A mobile pulse oximetry system for informing a user of mobile measurement of oxygen saturation ("SpO2"), the mobile pulse oximetry system comprising:

an SpO2 measurement system including:

an optical sensor configured to output one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue; and

a processing board in data communication with the optical sensor and a mobile computing device including a display and cellular communication, wherein the processing board is ***configured to:***

receive said one or more signals from the optical sensor;

process said one or more signals to generate SpO2 measurement values; and

output the SpO2 measurement values to the mobile computing device; and

one or more hardware processors of the mobile computing device configured to execute an application, the application configured to execute commands to:

generate a graphical user interface having a plurality of display portions;

display, in at least one portion of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO2 measurement values; and

display, in a different portion of the plurality of display portions, a plurality of user inputs configured to allow the user to interact with at least one of the plurality of display portions or the application;

wherein the processing of the one or more signals to generate SpO2 measurement values is performed only on the processing board, thereby freeing up memory available to the mobile computing device; and

wherein the processing board is configured to draw power for operation from the mobile computing device.

13. A computer-implemented method of informing a user of mobile measurement of oxygen saturation (“SpO2”), the computer-implemented method comprising:

outputting, from an optical sensor of an SpO2 measurement system, one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue; and

via a processing board of the SpO2 measurement system, the processing board in data communication with the optical sensor and a mobile computing device including a display:

receiving said one or more signals from the optical sensor;

processing said one or more signals to generate the SpO2 measurement values; and

outputting the SpO2 measurement values to the mobile computing device; and

via an application configured to execute commands on the mobile computing device:

generating a graphical user interface having a plurality of display portions;

displaying, in at least one portion of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO2 measurement values; and

displaying, in a different portion of the plurality of portions, a plurality of user inputs configured to allow the user to interact with at least one of the plurality of display portions or the application.

Ex. 1001, 20:26–63, 21:42–22:20 (emphasis added to reflect claim language relating to issues in dispute).

D. Asserted Ground of Unpatentability

Petitioner asserts the following grounds of unpatentability in this Petition (Pet. 1–2):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
13, 15, 18, 19	102(b) ³	Mendelson ⁴
13, 15, 18, 19	103(a)	Mendelson
16, 18, 20	103(a)	Mendelson, Tran ⁵
14, 17	103(a)	Mendelson, Kianl ⁶
1, 2, 5, 7, 9, 12–15, 17–19	103(a)	Mendelson, D’Angelo ⁷
3	103(a)	Mendelson, D’Angelo, Ording ⁸

³ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013. Based on the earliest possible effective filing date of the ’507 patent, i.e., September 20, 2012, we apply the pre-AIA versions of §§ 102 and 103. See Ex. 1001, code (60).

⁴ Mendelson, *A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring*, Proceedings of the 28th IEEE EMBS Annual International Conference, pp. 912–915 (Aug. 30–Sept. 3, 2006) (New York City) (Ex. 1011, “Mendelson”).

⁵ Tran, U.S. Patent Application Publication No. 2008/0004904 A1, published Jan. 3, 2008 (Ex. 1005, “Tran”).

⁶ Kianl et al., U.S. Patent No. 6,658,276 B2, issued Dec. 2, 2003 (Ex. 1006, “Kianl”).

⁷ D’Angelo et al., *A Sensor Network to iPhone Interface Separating Continuous and Sporadic Processes in Mobile Telemedicine*, Proceedings of the 33rd Annual International Conference of the IEEE EMBS, pp. 1528–1531 (Aug. 30–Sept. 3, 2011) (Boston, MA) (Ex. 1007, “D’Angelo”).

⁸ Ording et al., U.S. Patent No. 7,812,826 B2, issued Oct. 12, 2010 (Ex. 1008, “Ording”).

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
4–6, 8, 16, 18, 20	103(a)	Mendelson, D’Angelo, Tran
2, 7, 14, 17	103(a)	Mendelson, D’Angelo, Kianl
3	103(a)	Mendelson, D’Angelo, Kianl, Ording
10, 11	103(a)	Mendelson, D’Angelo, Goldsmith ⁹
13, 15, 18, 19	103(a)	Mendelson, Moon ¹⁰
16, 18, 20	103(a)	Mendelson, Moon, Tran
14, 17	103(a)	Mendelson, Moon, Kianl
1, 2, 5, 7, 9, 12–15, 17–19	103(a)	Mendelson, Moon, D’Angelo
3	103(a)	Mendelson, Moon, D’Angelo, Ording
4–6, 8, 16, 18, 20	103(a)	Mendelson, Moon, D’Angelo, Tran
2, 7, 14, 17	103(a)	Mendelson, Moon, D’Angelo, Kianl
3	103(a)	Mendelson, Moon, D’Angelo, Kianl, Ording
10, 11	103(a)	Mendelson, Moon, D’Angelo, Goldsmith

Petitioner relies on the declaration of Dr. Thomas W. Kenny, among other evidence. Ex. 1003. Patent Owner relies upon the declaration of Dr. R. James Duckworth, among other evidence. Ex. 2002.

II. DISCRETIONARY DENIAL

A. Discretionary Denial in View of Parallel District Court Litigation

Patent Owner argues that we should deny institution under *Fintiv* based on the Delaware Litigation. Prelim. Resp. 20–31; *see Apple Inc. v.*

⁹ Goldsmith et al., U.S. Patent Application Publication No. 2007/0093786 A1, published Apr. 26, 2007 (Ex. 1009, “Goldsmith”).

¹⁰ Moon et al., U.S. Patent Application Publication No. 2010/0324387 A1, published Dec. 23, 2010 (Ex. 1010, “Moon”).

Fintiv, Inc., IPR2020-00019, Paper 11 at 11–12 (PTAB Mar. 20, 2020) (precedential) (holding that PTAB has discretion to deny institution in certain circumstances where there are parallel district court proceedings). Our analysis under *Fintiv* is guided by the USPTO Director’s Memorandum issued on June 21, 2022, titled “Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation” (“Director’s Memo”).¹¹ Pursuant to the Director’s Memo, we “will not discretionarily deny institution . . . where a petitioner presents a [*Sotera*] stipulation.” Director’s Memo, 3 (citing *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020) (precedential as to § II.A)). Because Petitioner has offered a stipulation like that in *Sotera*, i.e., a stipulation to “not pursue for the instituted claims, in [the Delaware Litigation], the same grounds as in the IPR2024-00293 petition or any grounds that could have reasonably been raised in that Petition” (Ex. 1078, 1), we do not discretionarily deny institution under *Fintiv*.

Patent Owner argues that Petitioner’s stipulation “does not carry the benefits underlying the Director’s Guidance” because it was filed “only after the parties and the court conducted extensive and costly fact and expert discovery, and fully briefed and argued dispositive motions.” Prelim. Sur-reply 2. This argument is not persuasive because the Director’s Guidance does not afford us discretion to discount a *Sotera* stipulation based on how far a parallel district court litigation has progressed when the stipulation was

¹¹ Available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

made. Director’s Memo, 7 (explaining, without qualification, that “the PTAB will not discretionarily deny institution of an IPR or PGR in view of parallel district court litigation where a petitioner stipulates not to pursue in a parallel district court proceeding the same grounds as in the petition or any grounds that could have reasonably been raised in the petition”).

B. Discretionary Denial in View of Parallel Petitions

Petitioner filed two petitions for *inter partes* review of claims 1–20 of the ’507 patent, this Petition and the petition filed in IPR2024-00293. *See Apple Inc. v. Masimo Corp.*, IPR2024-00293, Paper 3 (PTAB, filed December 12, 2023). Patent Owner argues that Petitioner “fails to establish that two petitions on the ’507 Patent are necessary” and that “if the Board institutes one of the Petitions, it should deny the other.” Paper 8, 1. This argument is moot because, concurrently herewith, we deny institution of *inter partes* review in IPR2024-00293 on the merits.

III. PATENTABILITY ANALYSIS

A. Principles of Law

“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”)).

“A claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently

described, in a single prior art reference.” *Verdegaal Bros. Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987). Moreover, “[b]ecause the hallmark of anticipation is prior invention, the prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements ‘arranged as in the claim.’” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). Whether a reference anticipates is assessed from the perspective of an ordinarily skilled artisan. *See Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d 1358, 1368 (Fed. Cir. 2003).

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 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 that 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 ordinary skill in the art; and (4) objective indicia of nonobviousness when presented.¹² *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

¹² The current record in this proceeding does not include any argument or evidence directed to objective indicia of nonobviousness

B. Person of Ordinary Skill in the Art

In determining the level of skill in the art, we consider the problems encountered in the art, the art's solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986).

Petitioner refers to Dr. Kenny's declaration testimony for the definition of a person of ordinary skill in the art ("POSITA" or "POSA"). See Pet. 14 n.2 (citing Ex. 1003 ¶¶ 32–33). Dr. Kenny testifies:

In my opinion, a person of ordinary skill in the art as of the Critical Date of the '507 Patent (hereinafter a "POSITA") would have been a person with a working knowledge of physiological monitoring technologies. The person would have had at least a bachelor's degree in electrical engineering, mechanical engineering, biomedical engineering, computer engineering, physics, or a related field, and would have had at least two years of relevant work experience with physiological monitoring technologies and devices, including user interfaces and capture and processing of physiological information, or equivalents thereof. Alternatively, the person could have also had a Master of Science degree in a relevant academic discipline to compensate for less related work experience in the same discipline or vice versa.

Ex. 1003 ¶ 32.

Patent Owner contends:

A POSITA at the time of the '507 Patent would be a person with a working knowledge of physiological monitoring technologies and/or optical sensors used in physiological monitoring technologies. Ex2002, ¶35. The person would have had a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, software, or

optical technologies, in combination with training or at least one to two years of related work experience with capture and processing of data or information, or designing and using optical sensors or systems, including but not limited to physiological monitoring technologies. *Id.* Alternatively, the person could have had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline. *Id.*

Prelim. Resp. 6.

The main differences between the parties' definitions of the POSA appear to be that Patent Owner specifies that the POSA's knowledge and experience may include optical sensors and that the POSA may have a degree emphasizing software. On the present record, we do not deem these differences material, particularly because the optical sensors and technologies at issue are those used in physiological monitoring technologies and both parties agree that the POSA would have a working knowledge of physiological monitoring technologies. Ex. 1003 ¶ 24; Prelim. Resp. 6. We find the additional specificity of Patent Owner's definition to be helpful. In addition, Patent Owner's definition appears to be consistent with the level of skill in the art reflected in the prior art of record and the disclosure of the '507 patent. Accordingly, for purposes of this Decision, we adopt Patent Owner's proposed definition of the person of ordinary skill in the art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) ("the prior art itself [may] reflect[] an appropriate level" as evidence of the ordinary level of skill in the art) (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985)). We note that we would reach the same outcome under either definition of the POSA.

C. Claim Construction

We interpret a claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2023). Under this standard, we construe the claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.*

Petitioner asserts that “no claim terms need to be construed to resolve issues of controversy in the present Petition.” Pet. 3 (citing *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011)).

Patent Owner asserts that “the claims have their plain meaning and thus require no construction,” noting that this is the same position it took in the Delaware Litigation. Prelim. Resp. 11. Patent Owner then asserts that Petitioner “presents inconsistent claim construction positions in the parallel proceedings” that “warrant denying institution.” *Id.* at 11–12. In particular, Patent Owner faults Petitioner for not applying its litigation claim construction of the terms “mobile measurement” and “one or more signals.” *Id.* at 13–19. We address Patent Owner’s arguments regarding Petitioner’s alleged inconsistent positions in connection with our discussion of the application of the cited art to the claims. *See infra* §§ III.E and III.G.

We determine that no terms require express construction at this stage. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’”

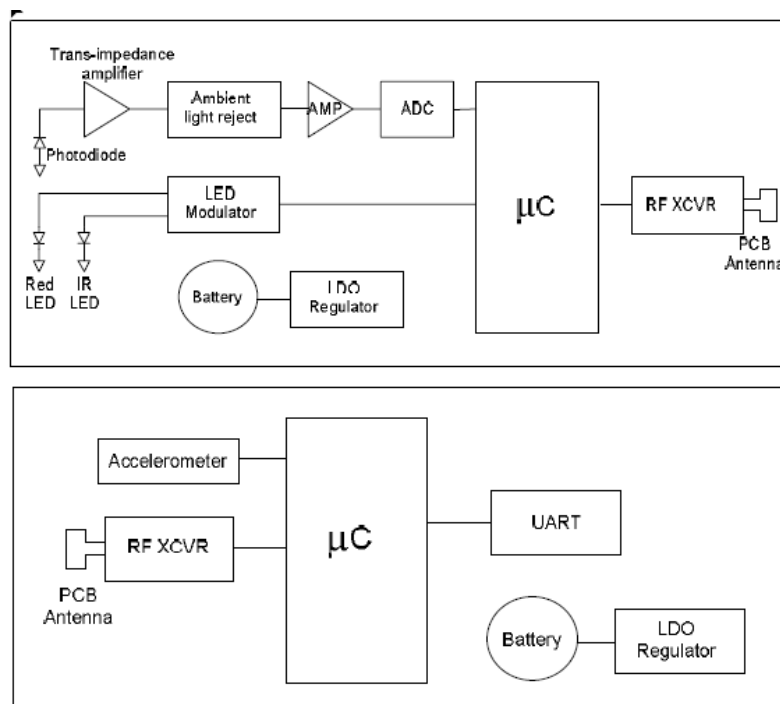
(quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

D. Overview of Asserted Prior Art Relevant to Disputed Issues

1. Mendelson

Mendelson is a paper presented at an IEEE conference held in New York City on August 30–September 3, 2006. Ex. 1011, 1.¹³ Petitioner contends that Mendelson is prior art under pre-AIA 35 U.S.C. § 102(b). Pet. 2. Mendelson discloses a wearable pulse oximeter system consisting of three units: 1) a “Sensor Module,” 2) a “Receiver Module,” and 3) a “PDA [personal digital assistant].” Ex. 1011, 913.

Figure 2 of Mendelson is reproduced below.



¹³ All citations in this opinion are to the native pagination rather than to the page numbering added by the parties.

Id. Figure 2 shows a “[s]ystem block diagram of [Mendelson’s] wearable, wireless, pulse oximeter” with the “Sensor Module” shown at top and the “Receiver Module” shown at bottom. The Sensor Module comprises, among other things, two LEDs and a photodiode as well as “analog signal processing circuitry, ADC, an embedded microcontroller [μ C], and an RF transceiver [RF XCVR].” *Id.* “The Receiver Module contains an embedded microcontroller [μ C], RF transceiver for communicating with the Sensor Module [RF XCVR], and a Universal Asynchronous Receive Transmit (UART).” *Id.*

Mendelson discloses that “[t]he data processed by the Receiver Module can be transmitted wirelessly to a PDA,” which “can monitor multiple wearable pulse oximeters simultaneously and allows medics to collect vital physiological information to enhance their ability to extend more effective care to those with the most urgent needs.” *Id.* Figure 3 of Mendelson is reproduced below. *Id.* at 914.



Fig. 3. Sample PDA Graphical User Interface (GUI).

Figure 3 shows a “Sample PDA Graphical User Interface (GUI),” which displays, among other things, SpO₂. *Id.*

2. D’Angelo

D’Angelo is a paper presented at an IEEE conference held in Boston, Massachusetts on August 30–September 3, 2011. Ex. 1007, 1528.

Petitioner contends that D’Angelo is prior art under pre-AIA 35 U.S.C. § 102(b). Pet. 2. D’Angelo describes a “new concept for interfacing sensor network nodes (motes) and smartphones,” and discloses a system that “allows receiving and storing data continuously using a mote and visualizing or sending it on the go using the smartphone as user interface only when desired.” Ex. 1007, 1528.

D’Angelo describes using “a dedicated device, called management device, which is part of the sensor network used to acquire health information and a smartphone.” *Id.* at 1529. Using the Apple iPhone as a

smartphone, D'Angelo's system transfers the data stored inside the management device to the iPhone by the iPhone application via the serial interface. *Id.* at 1530. D'Angelo discloses that the charging pin of its management device may be connected to "the smartphone's power output pin . . . , allowing [the smartphone] to read out the management device with the smartphone even when its battery is empty." *Id.*

3. Moon

Moon is a U.S. Patent Application published on December 23, 2010. Ex. 1010, code (43). Petitioner contends that Moon is prior art under pre-AIA 35 U.S.C. § 102(b). Pet. 2. Moon discloses "a body-worn monitor that continuously measures pulse oximetry and other vital signs, along with motion, posture, and activity level, from an ambulatory patient." Ex. 1010 ¶ 13.

Figures 23A and 23B of Moon, reproduced below, show body-worn monitor 190 attached to patient 270. *Id.* ¶ 124.

Configuration for Indexing cNIBP Measurement
(first ~60 seconds)

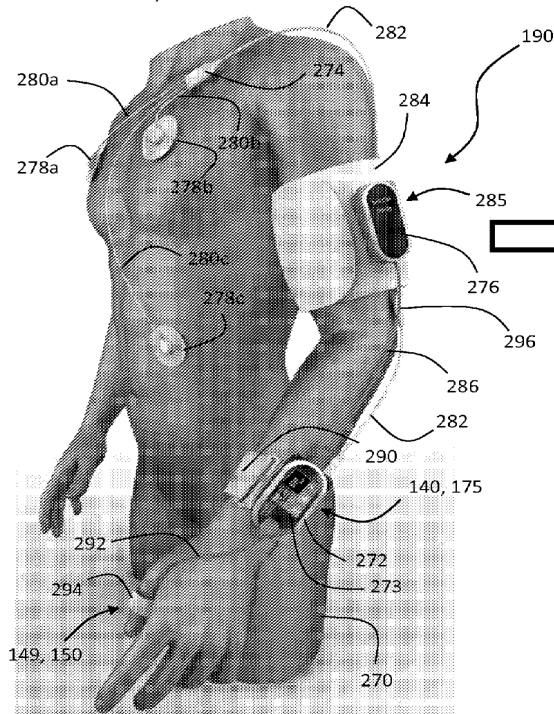


Fig. 23A

Configuration for cNIBP /SpO2 Measurements
(remaining 3 hours, 59 minutes)

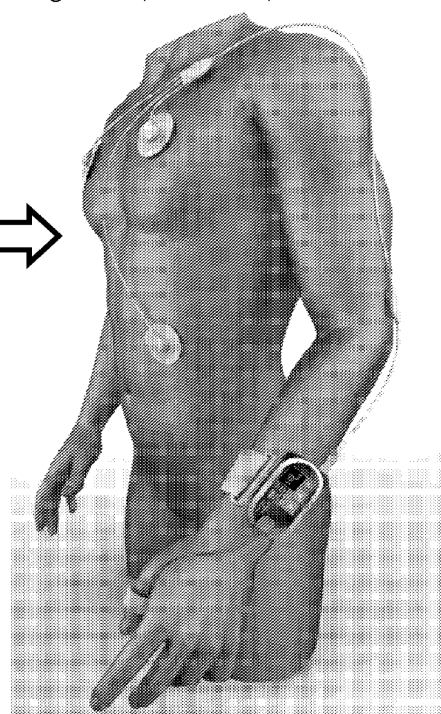


Fig. 23B

Figure 23A shows a system including “a pneumatic, cuff-based system 285,” while Figure 23B shows “the system used for subsequent SpO2 and cNIBP [continuous blood pressure] measurements.” *Id.* Body-worn monitor 190 includes wrist-worn transceiver 272, “featuring a touch panel interface 273 that displays SpO2, blood pressure values and other vital signs.” *Id.* ¶ 125.

According to Moon:

A flexible cable 292 connects the transceiver 272 to a pulse oximeter probe 294 that wraps around the base of the patient’s thumb. During a measurement, the probe 294 generates a time-dependent PPG waveform which is processed along with an ECG to measure cNIBP and SpO2.

Id.

Moon explains that “ACC waveforms [time-dependent motion

signals] correspond to signals measured along the x, y, and z axes by a single accelerometer worn on the patient's wrist” *Id.* ¶ 95. According to Moon, “[a] patient's activity level, as characterized by ACC waveforms, can have a significant impact on the RED/IR(PPG) [red and infrared plethysmography] and ECG [electrocardiogram] waveforms used to measure both SpO₂ and cNIBP.” *Id.* Moon discloses that ACC, ECG, and PPG waveforms can be “analyzed to estimate the effects of specific motions and activities on the ECG and PPG waveforms, and then deconvolute these factors using known mathematical techniques to effectively remove any motion related artifacts. The deconvoluted ECG and PPG waveforms can then be used to calculate vital signs.” *Id.* ¶ 102.

E. Anticipation by and/or Obviousness over Mendelson

Petitioner asserts that claims 13, 15, 18, and 19 are anticipated by, and/or would have been obvious over, Mendelson, and sets forth an element-by-element comparison of the challenged claims to the asserted art. Pet. 9–21. On the current record, Petitioner has sufficiently shown that Mendelson teaches or suggests each of the elements of claims 13, 15, 18, and 19. We focus our discussion on the aspect of Petitioner's assertions that is disputed by Patent Owner: whether Mendelson discloses “outputting, from an optical sensor[,] . . . one or more signals” and, “via a processing board[,] . . . receiving said one or more signals from the optical sensor,” as recited in claim 13. *See* Prelim. Resp. 32–38.

Petitioner contends that Mendelson's Sensor Module meets the requirement of claim 13 for an “optical sensor” that “output[s]” “one or more signals” and that Mendelson's Receiver Module meets the requirement

of claim 13 for a “processing board” that “receiv[es] said one or more signals from the optical sensor.” Pet. 10–11 (discussing application of Mendelson to the “optical sensor” “outputting” claim language), 12–13 (discussing application of Mendelson to the “processing board” “receiving” claim language).

Patent Owner argues that Mendelson’s Receiver Module does not meet the requirement for “receiving . . . one or more signals” because the signals it receives are not the unaltered signal originally generated by the photodiode. Prelim. Resp. 32–38. Before the signal generated by the photodiode is sent to Mendelson’s Receiver Module, it “enters a transimpedance amplifier, ‘ambient light reject’ signal conditioning, an amplifier, . . . an analog to digital converter[, and] . . . a microcontroller.” *Id.* at 33. As a result, according to Patent Owner, “[t]he ‘information’ sent by the RF Transceiver . . . is packetized,” and “[n]one of the packets are the ‘signal’ from the photodiode.” *Id.*

As support for its assertion that the information sent to Mendelson’s Receiver Module is “packetized,” Patent Owner cites the testimony of Dr. Duckworth, one of the co-authors of Mendelson. Dr. Duckworth testifies that a POSA would understand Mendelson to transmit packets because it uses an RF transceiver to transmit information. Ex. 2002 ¶ 97 (“[B]ecause Mendelson uses an RF Transceiver to transmit information to the Receiver Module, the Sensor Module is sending RF packets to the Receiver Module.”). Dr. Duckworth further testifies that the system described in Mendelson used a “Texas Instruments CC1100 Low-Power Sub- 1GHz RF Transceiver (‘CC1100’), which is designed to packetize data before

transmission.” *Id.* ¶ 98. According to Dr. Duckworth, the packets in the CC1100 include “a preamble, a sync word, length and address fields, a data field which contains the sensor data for the packet, and a checksum.” *Id.* Dr. Duckworth asserts that a POSA “would understand that this packetized sensor data is not a ‘signal’ under any construction of the term.” *Id.* ¶ 100.

Patent Owner asserts that packetized information is “not a signal for at least two reasons.” *Id.* at 36. “**First**, the packet contains packet specific information like a checksum or a packet header that a sensor signal would not contain. **Second**, a packet would contain multiple values derived from sensor data over a period of time,” whereas a “sensor signal does not contain multiple values collected over time.” *Id.* Patent Owner’s arguments are unavailing.

There does not appear to be any dispute, on the present record, that the signal output by Mendelson’s photodiode meets the claim requirement for “one or more signals.” Nor is there any dispute that the signal received by Mendelson’s Receiver Module includes the information output by the photodiode. Indeed, without this information, Mendelson’s PDA, which relies on information transmitted by Mendelson’s Receiver Module, would be unable to display SpO2 values. Ex. 1011, 913 (teaching that Mendelson’s Receiver Module transmits wirelessly to a PDA), 914 (teaching that Mendelson’s PDA displays SpO2 values and explaining that “[t]he stream of data received from the wearable unit is distributed to various locations on the PDA’s graphical display”). Accordingly, the present record supports that Mendelson’s Receiver Module receives “one or more signals,” as required by claim 13.

It may be that, as Patent Owner asserts, the information received by Mendelson's Receiver Module is "packetized" so that it includes information in addition to the information included in the raw signal originally output by Mendelson's photodiode.¹⁴ On the present record, however, the evidence does not support that any such additional information in the "packets" received by Mendelson's Receiver Module distinguishes those "packets" from the claimed "signal." Patent Owner asserts that "Mendelson's packetized 'information' is not the photodiode 'signal' under any construction of the term." Prelim. Resp. 35. But, beyond its *ipse dixit* assertion that no claim construction of "signal" encompasses packetized information, Patent Owner does not direct us to evidence or argument that the "signal" claim term should be construed to exclude the additional information allegedly included in Mendelson's packets.

Patent Owner faults Petitioner for applying inconsistent claim constructions here and in the Delaware Litigation, arguing that the information received by Mendelson's Receiver Module would not be considered a "signal" under the claim construction Petitioner offered in the Delaware Litigation. Prelim. Resp. 13–16, 35. But, at this stage in the proceeding, neither party offers an express construction of the term "signal." Pet. 3; Prelim. Resp. 11. And, on the present record, we are persuaded that the plain and ordinary meaning of "signal" encompasses the information

¹⁴ For purposes of this decision, we accept as true Patent Owner's assertion that the information sent from Mendelson's Sensor Module to its Receiver Module is "packetized." Should Patent Owner maintain this position in its Response, Petitioner is, of course, free to challenge this assertion.

received by Mendelson’s receiver unit.

We recognize that, in the Delaware Litigation, Petitioner asserted that “one or more signals” meant “raw detected signals” (Ex. 2029, 35–38) and that this construction is potentially inconsistent with Petitioner’s assertion in this proceeding that Mendelson’s Receiver Module receives one or more signals (*see* Prelim. Resp. 13–16). However, as discussed above, Petitioner’s position that Mendelson’s Receiver Module receives “one or more signals” is supported by the current record.

Moreover, Patent Owner’s positions in the Delaware Litigation are also potentially inconsistent with their positions in this proceeding. In the Delaware Litigation, Patent Owner asserted that Petitioner’s proposed “raw detected signal” construction was wrong and that it was “common for sensors to perform preprocessing on signals.” Ex. 2029, 38–39. In contrast, Patent Owner now argues that Mendelson’s Receiver Module does not receive “one or more signals” because the signal that originated from the photodiode is “packetized” before it is sent to the Receiver Module. Prelim. Resp. 32–38. We see this as, essentially, a claim construction argument that the term “signal” means the unaltered signal sent out by the photodiode—i.e., that “signal” means “raw detected signal.”¹⁵ Thus, in this proceeding, Petitioner seeks to rely on a claim construction Patent Owner relies upon in its infringement positions in the Delaware Litigation, and Patent Owner

¹⁵ To the extent Patent Owner contends otherwise, Patent Owner is encouraged to address the issue at trial.

seeks to rely on a claim construction Petitioner relies upon in its non-infringement positions in the Delaware Litigation.

Given that the present record supports that Mendelson’s Receiver Module receives “one or more signals,” that neither party offers an express construction of “one or more signals” in this proceeding, and that both parties have advanced positions that are potentially inconsistent with positions they advanced in district court, we decline to deny institution on the basis that Petitioner’s positions are potentially inconsistent with the positions they have advanced in the Delaware Litigation.

Other than as discussed above, Patent Owner does not challenge Petitioner’s assertions that claims 13, 15, 18, and 19 are anticipated by, or would have been obvious over, Mendelson. We have reviewed Petitioner’s arguments and the underlying evidence cited in support and are persuaded that, at this stage, Petitioner sufficiently demonstrates a reasonable likelihood of succeeding in establishing that claims 13, 15, 18, and 19 are anticipated by and/or obvious over Mendelson.

F. Obviousness over the Combination of Mendelson and D’Angelo

Petitioner asserts that claims 1, 2, 5, 7, 9, 12–15, and 17–19 would have been obvious over the combination of Mendelson and D’Angelo and sets forth an element-by-element comparison of the challenged claims to the asserted art. Pet. 37–55. On the current record, Petitioner has sufficiently shown that the combination of Mendelson and D’Angelo teaches or suggests each of the elements of claims 1, 2, 5, 7, 9, 12–15, and 17–19. Patent Owner disputes two aspects of Petitioner’s showing for this ground. First, Patent Owner argues that the combination of Mendelson and D’Angelo does not

meet the requirement of claim 1 for a “processing board” configured to “receive one or more signals from the optical sensor.” Prelim. Resp. 32–38. This argument is the same as the argument discussed *supra* § III.E for the corresponding limitation of claim 13, and we do not find it persuasive for the reasons already discussed. Accordingly, we focus our discussion on the second aspect of Petitioner’s showing that Patent Owner disputes: whether a POSA would have been motivated to modify Mendelson’s Receiver Module to draw power from a smartphone based on the teachings of D’Angelo. *See* Prelim. Resp. 39–41.

Claim 1 requires that the processing board of the claimed pulse oximetry system be “configured to draw power for operation from [a] mobile computing device.” Ex. 1001, 20:62–63. Petitioner contends that it would have been obvious to modify Mendelson’s Receiver Module to draw power from a mobile device, explaining:

modifying Mendelson’s system such that the Receiver Module draws power from the PDA/smartphone (as suggested by D’Angelo) would have allowed the PDA/smartphone “to read out the” measured physiological data “even when its battery is empty.” [Ex. 1007], 1530; [Ex. 1003], ¶124. Such functionality would have, thus, provided crucial backup functionality for collecting important physiological data, including SpO₂ readings, even after the Receiver Module of Mendelson has lost power.

Pet. 42.

Patent Owner argues that modifying Mendelson’s device to draw power from a smartphone would “defeat the purpose of Mendelson’s design.” Prelim. Resp. 39. More particularly, Patent Owner argues that “the impetus of [Mendelson’s] design was the ‘development of compact, low-

power, small-size, light- weight, and unobtrusive **wearable** devices’ based on advancements in ‘physiological sensing, hardware miniaturization, and **wireless communication.**’” *Id.* Patent Owner quotes Mendelson as teaching that its device would be useful “for firefighters, hazardous material workers, mountain climbers, or emergency first-responders operating in harsh and hazardous environments.” *Id.* at 40 (quoting Dr. Duckworth (Ex. 2002 ¶ 108), who quotes Mendelson (Ex. 1011, 1)). According to Patent Owner, Mendelson’s “wireless design ‘allows the PDA to communicate with a remote unit that is beyond the PDA’s wireless range . . . therefore allow[ing] medical personnel to quickly distribute sensors to multiple causalities and begin immediate triage, thereby substantially simplifying and reducing deployment time.’” Prelim. Resp. 40 (quoting Mendelson (Ex. 1011, 3)). Modifying Mendelson to draw power from a smartphone would, Patent Owner argues, “prevent the Receiver Module from being wearable and prevent the PDA from connecting to multiple receiver modules at the same time.” *Id.* at 40–41. Thus, Patent Owner asserts, the POSA “would not have been motivated to modify Mendelson” as described in the Petition. *Id.* at 41.

We do not find Patent Owner’s argument persuasive because it is based on an apparent misunderstanding of Petitioner’s position. Patent Owner asserts that modifying Mendelson’s Receiver Module to “**require** it to draw power from the PDA, **instead of the battery**, would defeat the purpose of the Mendelson design.” Prelim. Resp. 40 (emphasis added). But this is not what Petitioner proposes. Petitioner contends that the POSA would have been motivated to modify Mendelson’s system to draw power from a PDA/smartphone to provide “**backup functionality** . . . even after the

Receiver Module of Mendelson has lost power.” Pet. 42 (emphasis added). Thus, Petitioner does not contend that the PDA or smartphone would be the primary or sole source of power for Mendelson’s Receiver Module. Nor does Petitioner contend that the PDA or smartphone would be a *required* power source. Rather Petitioner contends that its proposed modification would be a backup in the event Mendelson’s primary power source fails. *Id.*; *see also* Ex. 1003 ¶ 124 (Dr. Kenny’s testimony explaining that the proposed modification would allow Mendelson’s Receiver Module “to be able to draw power from the smartphone *in at least some scenarios*,” and identifying one beneficial scenario as being when the Receiver Module’s battery is empty) (emphasis added). Accordingly, on the present record, we are not persuaded that Petitioner’s proposed modification would defeat the purpose of Mendelson’s design or otherwise deprive the POSA of reason to modify Mendelson’s system to draw power from a PDA or smartphone.

Other than as discussed above, Patent Owner does not additionally challenge Petitioner’s assertions that claims 1, 2, 5, 7, 9, 12–15, and 17–19 would have been obvious over the combination of Mendelson and D’Angelo. We have reviewed Petitioner’s arguments and the underlying evidence cited in support and are persuaded that, at this stage, Petitioner sufficiently demonstrates a reasonable likelihood of succeeding in its obviousness challenge to claims 1, 2, 5, 7, 9, 12–15, and 17–19 over the combination of Mendelson and D’Angelo.

G. Obviousness over the Combination of Mendelson and Moon and/or over the Combination of Mendelson, Moon, and D’Angelo

The Petition can be grouped into two sets of nine grounds. In the first

set of grounds, Petitioner relies on Mendelson alone or together with D'Angelo as disclosing the elements of independent claims 1 and 13. In the second set of grounds, Petitioner relies on Mendelson and D'Angelo in the same manner as in the first set of grounds, but adds Moon in the event the language “mobile measurement of oxygen saturation (‘SpO₂’)” in the preamble of claim 1 is construed to require “active reduction and/or correction of motion artifacts caused by user motion.” Pet. 64–65.

Neither party in this proceeding asserts that the preamble is limiting or, more specifically, that the term “mobile measurement of oxygen saturation (‘SpO₂’)” should be construed to require “active reduction and/or correction of motion artifacts caused by user motion.” *See* Pet. 3; Prelim. Resp. 11–12. However, Patent Owner argues that the Petition should be denied because Petitioner did not apply the construction of “mobile measurement of oxygen saturation (‘SpO₂’)” that it proffered in the Delaware Litigation. Prelim. Resp. 12, 16–19. According to Patent Owner, under Petitioner’s district court claim construction, Moon does not disclose “mobile measurement of oxygen saturation.” *Id.* at 16–19. Rather, Moon’s system “determines that too much motion is present and then declines to provide a measurement at all.” *Id.* at 17.

We do not find Patent Owner’s argument persuasive because, as discussed above, neither party asserts in this proceeding that claim 1 should be construed to require “active reduction and/or correction of motion artifacts caused by user motion.”

Moreover, even if claim 1 were construed to require correction of motion artifacts, on the present record, Moon appears to meet this

requirement. Patent Owner is correct that Moon’s system may not take measurements where “significant motion is present,” i.e., where there is “an amount of motion that would render the RED/IR(PPG) waveforms unreliable for calculation of SpO2.” Ex. 1010 ¶ 73. However, that does not mean that Moon does not correct motion artifacts. Moon discloses that when motion is detected and it falls below a predetermined threshold, “it is assumed that the PTT [(pulse transit time)] and corresponding pulse may be relatively uncorrupted, but are in need of additional filtering to potentially remove any noise that may have caused the abnormal PTT value.” *Id.* ¶ 92. Moon then proceeds to describe how to filter out the noise caused by the motion artifact. *Id.*; *see also id.* ¶¶ 89 (“With this embodiment the body-worn monitor can determine accurate SpO2 and cNIBP values even when motion-related noise is present.”), 102 (“These data can then be analyzed to estimate the effects of specific motions and activities on the ECG and PPG waveforms, and then deconvolute these factors using known mathematical techniques to effectively remove any motion related artifacts.”). Thus, Moon teaches a system where at least some motion artifacts are corrected. To the extent Patent Owner disagrees, or contends that more is required, Patent Owner may address the issue at trial.

H. Remaining Obviousness Grounds

The remaining obviousness grounds set forth in the Petition rely on Mendelson, D’Angelo, and/or Moon to address the requirements of independent claims 1 and 13 and add additional references—Tran, Kianl, Ording, and Goldsmith—to address the requirements added by certain of the

dependent claims. For each of these three grounds, Petitioner sets forth an element-by-element comparison of the challenged claims to the asserted art. Pet. 21–37, 55–64, 72–73. Patent Owner asserts that all of the challenged claims depend from claims 1 or 13, and thus the remaining grounds fail for the same reasons discussed with respect to claims 1 and 13. Prelim. Resp. 42. For the reasons discussed *supra* §§ III.D, III.E, and III.F, we are not persuaded by Patent Owner’s arguments that Petitioner’s showing with respect to claims 1 and 13 is deficient. Having considered all of the arguments and evidence currently of record, we determine that Petitioner has shown a reasonable likelihood that it will prevail in establishing that claims challenged in the remaining grounds would have been obvious over the cited art.

IV. CONCLUSION

On this preliminary record, Petitioner has established a reasonable likelihood of prevailing in showing that at least one of the challenged claims is unpatentable based on the grounds advanced in the Petition.

V. NOTICES

The Board shall deem waived any issue not raised by Patent Owner in a timely response to the Petition or as permitted in another manner during trial, even if the issue was raised in the Preliminary Response or discussed in this Decision.

Nothing in this Decision authorizes Petitioner, in a manner not otherwise permitted by the Board’s rules or controlling precedent, to supplement the information supporting any ground advanced in the Petition.

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is *granted*, and we institute *inter partes* review of claims 1–20 based on the grounds asserted in this Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is given of the institution of trial, which will commence on the entry date of this Decision.

IPR2024-00294
Patent 10,736,507 B2

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