Trials@uspto.gov
571-272-7822

Paper 39
Date: March 2, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

LBT IP I LLC,
Patent Owner.

IPR2020-01189
Patent 8,497,774 B2

Before JOHN A. HUDALLA, SHEILA F. McSHANE, and JULIET MITCHELL DIRBA, *Administrative Patent Judges*.

HUDALLA, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

Apple Inc. ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1, 4–6, 8, 10, 13, and 15 ("the challenged claims") of U.S. Patent No. 8,497,774 B2 (Ex. 1001, "the '774 patent"). LBT IP I LLC ("Patent Owner") filed a Preliminary Response (Paper 8, "Prelim. Resp."). Taking into account the arguments presented in Patent

Owner's Preliminary Response, we determined that the information presented in the Petition established that there was a reasonable likelihood that Petitioner would prevail with respect to its unpatentability challenges. Pursuant to 35 U.S.C. § 314, we instituted this proceeding on March 4, 2021, as to all challenged claims and all grounds of unpatentability. Paper 9 ("Dec. on Inst.").

During the course of trial, Patent Owner filed a Patent Owner Response (Paper 17, "PO Resp."), and Petitioner filed a Reply to the Patent Owner Response (Paper 25, "Pet. Reply"). Patent Owner also filed a Sur-reply. Paper 31 ("PO Sur-reply").

In addition, Patent Owner filed a contingent motion to amend (Paper 16, "MTA") proposing to substitute claims 20, 23–25, 27, 29, 32, and 34[1] for claims 1, 4–6, 8, 10, 13, and 15, respectively, if we are to determine claims 1, 4–6, 8, 10, 13, and 15 unpatentable. Petitioner filed an opposition to the motion to amend. Paper 26 ("MTA Opp."). On September 24, 2021, pursuant to Patent Owner's request (*see* MTA 2), we issued Preliminary Guidance on Patent Owner's motion to amend. Paper 28 ("PG"). Patent Owner then filed a reply in support of its motion to amend (Paper 30 ("MTA Reply")), to which Petitioner filed a sur-reply (Paper 36 ("MTA Sur-reply")).

An oral hearing was held on December 8, 2021, and a transcript of the hearing is included in the record. Paper 38 ("Tr.").

Petitioner filed Declarations of Scott Andrews with its Petition (Ex. 1003) and with its Reply and opposition to the motion to amend

[1] *See infra* § III.B.2.

(Ex. 1077). Both parties filed a transcript of the deposition of Mr. Andrews. Exs. 1068, 2003.

We have jurisdiction under 35 U.S.C. § 6. This decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of claims 1, 4–6, 8, 10, 13, and 15 of the ’774 patent. For the reasons discussed below, Petitioner has demonstrated by a preponderance of the evidence that claims 1, 4–6, 8, 10, 13, and 15 of the ’774 patent are unpatentable. We also *deny* Patent Owner’s motion to amend.

I. BACKGROUND

A. Real Parties-in-Interest

Petitioner identifies Apple Inc. as the real party-in-interest. Pet. 72. Patent Owner identifies LBT IP I LLC as the real party-in-interest. Paper 3, 2; Paper 6, 2.

B. Related Proceedings

The parties identify the following proceedings related to the ’774 patent (Pet. 72; Paper 3, 2; Paper 6, 2):

LBT IP I LLC v. Apple Inc., No. 1:19-cv-01245-UNA (D. Del. filed July 1, 2019); and

IPR2020-01190, IPR2020-01191, IPR2020-01192, and IPR2020-01193, in which Petitioner challenges other patents owned by Patent Owner. We issue final written decisions in IPR2020-01190, IPR2020-01191, IPR2020-01192, and IPR2020-01193 concurrently with this Decision.

C. The '774 patent

The '774 patent is directed to location and tracking communication systems. Ex. 1001, 1:33–34. Figure 1 of the '774 patent is reproduced below.

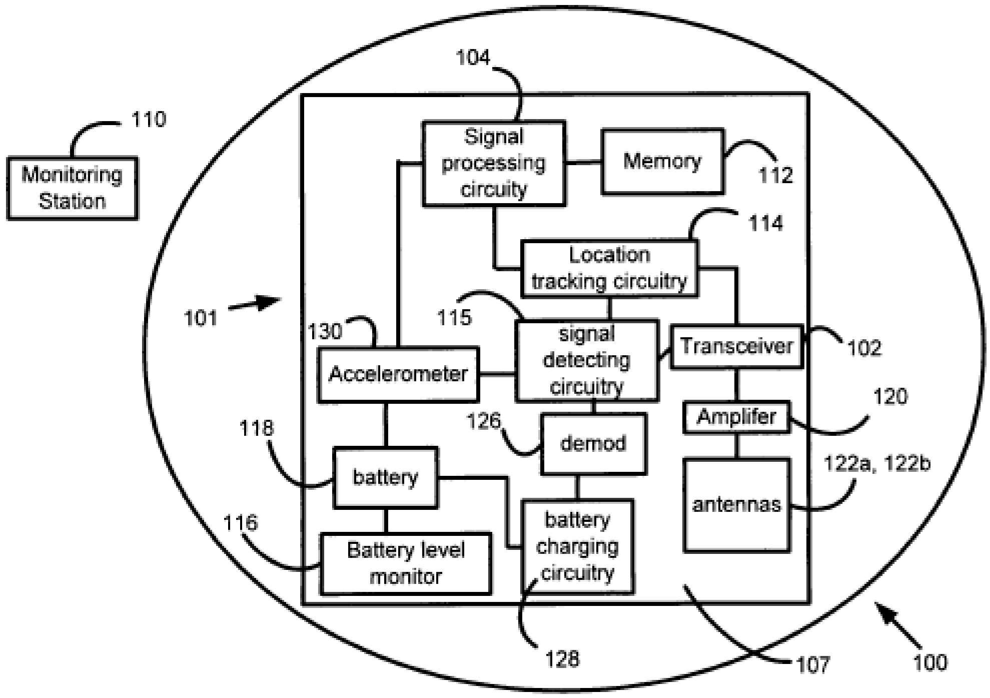

Figure 1

Figure 1 depicts a schematic of tracking device 100, which contains electronic components 101 such as transceiver 102, signal processing circuitry 104 (e.g., a microprocessor or other signal logic circuitry), and accelerometer 130. *Id.* at 4:62–64, 6:54–57. Location tracking circuitry 114 (e.g., global positioning system (GPS) circuitry) calculates location data received and sends the data to signal processing circuitry 104. *Id.* at 7:17–19. Signal detecting circuitry 115 detects and measures signal power level. *Id.* at 7:22–23. Battery level monitor 116 detects a battery level of battery 118. *Id.* at 7:25–28.

Tracking device 100 periodically checks availability of a GPS signal by performing a GPS signal acquisition to determine if a receive communication signal is above a first signal level. *Id.* at 8:7–10. Location tracking circuitry 114 or transceiver 102 may be placed in a sleep or standby mode to conserve a battery level of battery 118. *Id.* at 8:4–8. Electronic tracking device 100 may resume GPS signal acquisition using GPS satellites when the acquired receive communication signal level is above the first signal level. *Id.* at 8:10–16.

Accelerometer 130 may also activate if a power level of the receive communication signal (e.g., GPS signal) is insufficient for processing. *Id.* at 10:47–49. In this case, processing unit 104 computes current location coordinates using acceleration measurements. *Id.* at 10:53–54. When the receive communication signal again becomes sufficient for processing, accelerometer 130 is deactivated and location tracking circuitry 114 is activated. *Id.* at 10:58–67. In this case, processing unit 104 resumes the calculation of location coordinates from the receive communication signal. *Id.*

Figure 4 of the ’774 patent is reproduced below.

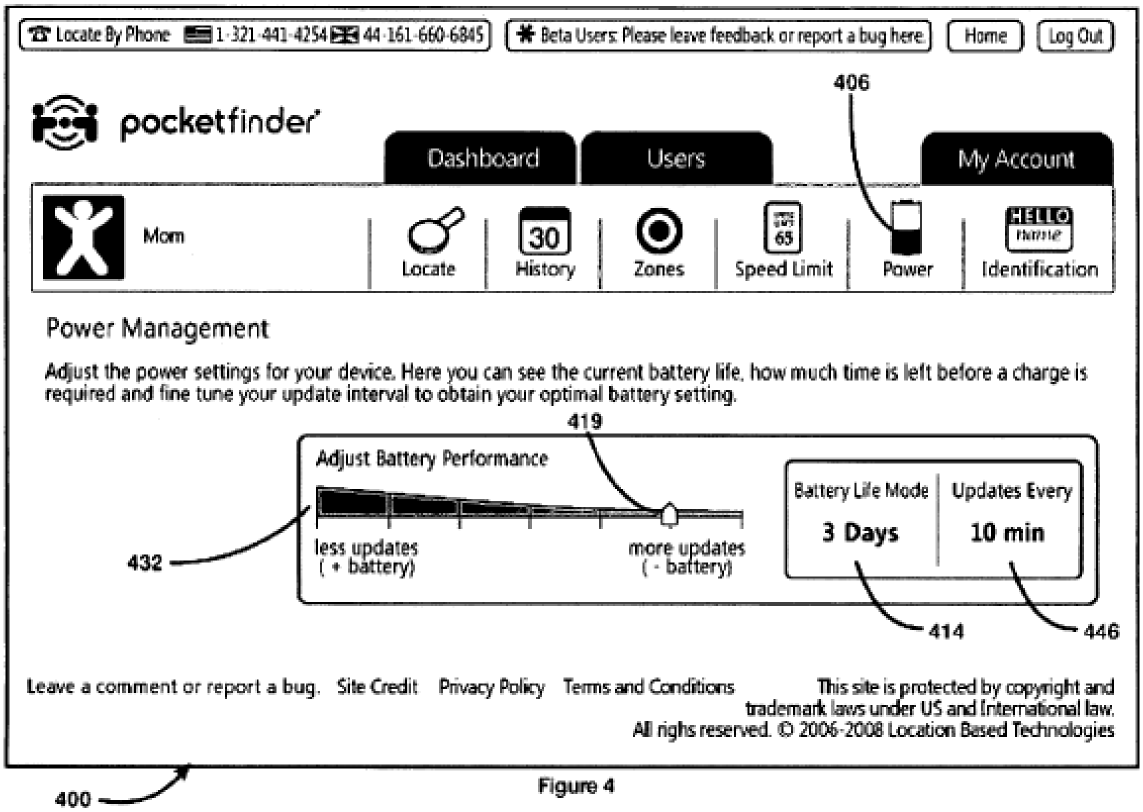

Figure 4

Figure 4, above, depicts screen display 400 of a personal communication device including a user definable adjustable power level monitor for an electronic tracking device. *Id.* at 5:5–7, 11:2–4, 11:12–17. Battery level monitor 116 measures in real-time battery charge level 406 of battery 118 and predicts estimated remaining battery charge life 414 in response to battery charge level 406. *Id.* at 11:22–25, 13:52–58. Battery level monitor 116 also adjusts the power level applied to location tracking circuitry 114 or transceiver 102 responsive to one or more signal levels. *Id.* at 13:52–58.

A local battery power adjustment mechanism generates in substantially real-time an updated set of network communication signaling protocols including, for example, update rate 446 (e.g., refresh rate) of location coordinate packets. *Id.* at 11:31–36. Update rate 446 consists of a request rate of location coordinate packets by the target host and/or a listen rate of location coordinate packets by the portable electronic tracking device. *Id.* at 11:36–41. The local battery power adjustment mechanism includes user-adjustable slider 432[2] to graphically display in substantially real-time the trade-off relationships between remaining battery charge level 414 and update rate 446 of location coordinate packets. *Id.* at 11:53–57. The user may select a multitude of threshold values via slider 432 to intermittently activate or deactivate location tracking circuitry 114 in order to conserve the power of battery 118. *Id.* at 13:58–67. For example, the user may adjust slider 432 to choose a range of values between a lower update rate 446 (and less battery usage) and a higher update rate 446 (and more battery usage). *Id.* at 11:53–57, Fig. 4. This results in "an appropriate update[d] set of network communication signaling protocols to achieve a desired user defined battery operating environment, e.g., obtain optimal battery life, obtain optimal update rate, [and the] tradeoffs between them." *Id.* at 11:58–63. This further may result in the local battery power adjustment mechanism communicating a message to activate or deactivate a portion of the transceiver circuitry, processor circuitry, or location tracking circuitry. *Id.* at 11:44–53.

The '774 patent issued from Application No. 12/419,451 ("the '451 application") filed on April 7, 2009, which is a continuation-in-part of six applications. Ex. 1001, codes (21), (63). As discussed below, Petitioner

[2] Slider 432 is also called "user adjustable screen icon 432," "on-line user adjustable cursor display 432," and "active display 432" in the Specification of the '774 patent. *See, e.g.*, Ex. 1001, 11:53–57, 13:13–18, 13:58–67.

applies the April 5, 2007, filing date of two of these six applications (i.e., the earliest possible effective filing date) for qualifying the asserted references as prior art. *See* Pet. 3, 7–8.

D. Illustrative Claim

Of the challenged claims of the '774 patent, claims 1 and 8 are independent. Claims 4–6 depend directly or indirectly from claim 1, and claims 10, 13, and 15 depend from claim 8. Claim 1 is illustrative of the challenged claims and recites:

> 1. A portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system, the portable electronic tracking device comprising:
>
> a battery having a battery charge level;
>
> transceiver circuitry;
>
> processor circuitry;
>
> a battery power monitor to measure in real-time the battery charge level and to make a prediction of an estimated remaining battery charge level in response to the battery charge level;
>
> local battery power adjustment mechanism to generate in substantially real-time an updated set of network communication signaling protocols associated with at least one of a request rate of location coordinate packets to be communicated to a target host and a listen rate of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols having a value that is responsive to a user input request;
>
> wherein the local battery power adjustment mechanism actives or deactivates at least one portion of the transceiver

> circuitry or the processor circuitry to conserve the battery charge level in response to the value.

Ex. 1001, 15:46–16:2.

E. Prior Art

Petitioner relies on the following prior art:

> Japanese Unexamined Patent Application Publication No. JP 2004-37116A, published Feb. 5, 2004 (Ex. 1004, "Sakamoto");[3]
>
> Applicants' Admitted Prior Art (Ex. 1001, 11:22–30, "AAPA");
>
> U.S. Patent No. 5,845,142, filed Aug. 29, 1997, issued Dec. 1, 1998 (Ex. 1011, "Hayasaka").

F. The Instituted Grounds

We instituted *inter partes* review of claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent on the following grounds (Dec. on Inst. 29), which are all the grounds presented in the Petition (Pet. 6):

Claims Challenged	35 U.S.C. §	References/Basis
1, 4–6, 8, 10, 13, 15	103(a)[4]	Sakamoto
1, 4–6, 8, 10, 13, 15	103(a)	Sakamoto, AAPA

[3] Sakamoto is a Japanese-language publication (Ex. 1004, 36–49, 58) that was filed with an English-language translation (*id.* at 1–19, 21–34, 52–56) and declarations attesting to the accuracy of the translation (*id.* at 20, 50). Our citations to Sakamoto herein refer to the translation.

[4] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103, and 112. Because the '774 patent was filed before March 16, 2013 (the effective date of the relevant amendments), the pre-AIA versions of §§ 102, 103, and 112 apply.

Claims Challenged	35 U.S.C. §	References/Basis
1, 4–6, 8, 10, 13, 15	103(a)	Sakamoto, Hayasaka

II. ANALYSIS

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations.[5] *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We also recognize that prior art references must be "considered together with the knowledge of one of ordinary skill in the pertinent art." *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

B. Level of Ordinary Skill in the Art

Citing testimony from Mr. Andrews, Petitioner contends a person of ordinary skill in the art (or "POSITA") "would have had a bachelor's degree in Electrical Engineering, Computer Engineering, Computer Science, or an

[5] The trial record does not include any evidence of secondary considerations of nonobviousness.

equivalent degree, with at least two years of experience in GPS navigation, portable tracking devices, or related technologies." Pet. 3 (citing Ex. 1003 ¶¶ 29–30). For purposes of our Decision on Institution, we adopted Petitioner's definition of the level of ordinary skill in the art without the qualifier "at least." Dec. on Inst. 10. Patent Owner states that it adopts this definition. MTA 16. Thus, we discern no reason to change the level of ordinary skill in the art applied in this Final Written Decision. Accordingly, a person of ordinary skill in the art would have had a bachelor's degree in Electrical Engineering, Computer Engineering, Computer Science, or an equivalent degree, with two years of experience in GPS navigation, portable tracking devices, or related technologies. We determine that this definition comports with the level of skill necessary to understand and implement the teachings of the '774 patent and the asserted prior art.

C. Claim Interpretation

In an *inter partes* review, we construe each claim "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b). Accordingly, our claim construction standard is the same as that of a district court. *See id.* Under the standard applied by district courts, claim terms are generally given their plain and ordinary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). "There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

1. "Multitude"

Claim 8 recites a "power level comprising a multitude of threshold values." Ex. 1001, 16:56–57. In its obviousness analysis, Petitioner relies on Sakamoto for teaching two such threshold values. *See* Pet. 50–51. In the Preliminary Response, Patent Owner contended that Petitioner's showing of two threshold values was not sufficient to teach the recited "multitude" of claim 8. Prelim. Resp. 16–17. We construed "multitude" to include two thresholds for purposes of our Decision on Institution, and we encouraged the parties to further address the interpretation of the term during trial. Dec. on Inst. 12.

In post-institution briefing, Patent Owner contends that "a multitude in the context of the '774 Patent is necessarily more than two," i.e., three or more. PO Resp. 12–17; PO Sur-reply 2–4. Petitioner asks us to maintain our construction that a "multitude" includes two. Pet. Reply 1–10. We now consider the parties' arguments and the evidence of record pertaining to the construction of "multitude."

At the outset, we note that an exemplary embodiment in Figure 4 of the '774 patent depicts 5–7 thresholds. *See* Ex. 1001, 13:58–67, Fig. 4 (432). In our Decision on Institution, we found that these 5 or 7 thresholds are not a benchmark for what constitutes a "multitude" in claim 8. Dec. on Inst. 11 (citing *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014)). During the course of trial, both parties acknowledged the exemplary embodiment in Figure 4 (PO Resp. 16; Pet. Reply 8; PO Sur-reply 5–7), but neither party contends that the 5–7 thresholds depicted therein should limit our interpretation of "multitude." Thus, we maintain our determination from the Decision on Institution that the embodiment of Figure 4 with 5–7 thresholds constitutes a non-limiting example.

Patent Owner contends that another portion of the Specification of the '774 patent supports an interpretation of "multitude" as being three or more. PO Sur-reply 6–7. Specifically, Patent Owner cites the following passage: "Advantageously as compared to conventional tracking devices, user input request 430 adjusts value 419 to select an appropriate update set of network communication signaling protocols to achieve a desired user defined battery operating environment, e.g., *obtain optimal battery life, obtain optimal update rate, tradeoffs between them*." *Id.* (quoting Ex. 1001, 11:58–67) (emphasis added). Patent Owner contends this language "clearly discloses that a threshold value may be any value along a line between two end points, including the end points (*i.e.*, 'obtain optimal battery life' as one end point, 'obtain optimal update rate' as another end point, and 'tradeoffs between them' as any value along the line)." *Id.* at 7. At oral argument, Patent Owner also emphasized that the plural "tradeoffs" supported its interpretation, because values between the endpoints allegedly represent tradeoffs. *See* Tr. 29:20–32:13. Thus, Patent Owner interprets "the number of available values" as being "at least three (*i.e.*, each end point and the value depicted as 419)." *Id.* Petitioner disputes Patent Owner's position because "the '774 Specification establishes, at best, only 5–7 thresholds." Pet. Reply 8.

We do not agree with Patent Owner that the Specification's statement about tradeoffs between "optimal battery life" and "optimal update rate" necessarily requires a spectrum of at least three threshold values (i.e., two endpoints and at least one value between them). If anything, this statement supports the view that such tradeoffs can be made between as few as two points: an endpoint where less updates are traded for better battery life, and an endpoint where worse battery life is traded for more updates. *See* Ex. 1001, Fig. 4 (slider 432). We also do not ascribe any significance to the plural "tradeoffs" in Patent Owner's cited statement, because every point in such a spectrum would involve its own tradeoffs between battery life and update frequency. Thus, we agree with Petitioner that the Specification does not support Patent Owner's interpretation of a multitude as necessarily being three or more. We also consider the Specification's statement about "obtain[ing] optimal battery life, obtain[ing] optimal update rate, [and the] tradeoffs between them" (Ex. 1001, 11:58–63) to at least be consistent with the notion that "multitude" means two or more in the context of the '774 patent.

Patent Owner also contends that the prosecution history of the application that issued as the '774 patent supports an interpretation of "multitude" as being three or more. Specifically, Patent Owner cites the patentees' amendment of claim 8,[6] which Patent Owner alleges was made to overcome a rejection of the claim based on U.S. Patent No. 7,826,968 (Ex. 2011, "Huang"). PO Resp. 14 (citing Ex. 1002, 270, 297–98). Patent Owner further contends that Huang discloses "two preset speed-of-

[6] Prosecution claim 8 issued as claim 8 in the '774 patent, so we refer to it simply as "claim 8."

movement thresholds for adjusting the frequency of positioning updates."[7] *Id.* at 14–16 (citing Ex. 2011, 2:43–52, 2:55–3:8). According to Patent Owner, the patentees made the amendment "in order to overcome prior art that disclosed two thresholds," so "the amendment is intrinsic evidence of the patentee[s'] clear intent to define 'multitude' as more than two." *Id.* at 16; *see also* PO Sur-reply 3–4 (same argument).

Petitioner notes that the patentees amended claim 8 to include the limitations of prosecution claim 17, which the patent examiner indicated was allowable. Pet. Reply 3–4 (citing Ex. 1002, 297–99). Petitioner argues that the added language from prosecution claim 17 "includes at least four distinct limitations: (1) a multitude of thresholds; (2) determined by a user or system administrator; (3) to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit; and (4) in response to the estimated charge level of the charging unit." *Id.* Petitioner further notes that the patentees "did not present any substantive arguments distinguishing this amendment over Huang, but only relied on the Examiner's indication that claim 17 was allowable." *Id.* at 4. For these reasons, Petitioner contends that "any alleged prosecution disclaimer is 'ambiguous, or even amenable to multiple reasonable interpretations.'" *Id.* at 3, 6–7 (quoting *Avid Tech., Inc. v. Harmonic, Inc.*, 812 F.3d 1040, 1045 (Fed. Cir. 2016)).

We agree with Petitioner. First, the patentees added the limitations of prosecution claim 17 (and intervening prosecution claim 16) after the patent

[7] Petitioner disputes that Huang teaches only two thresholds. Pet. Reply 5–6. We need not resolve this dispute because we dispose of the instant prosecution history argument based on other grounds.

examiner objected to prosecution claim 17 "as being dependent upon a rejected base claim, but . . . allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims." Ex. 1002, 271–72. The patentees' amendment rewrote prosecution claim 17 in independent form, which included base claim 8. *Id.* at 292–94, 297–98. The patentees made no arguments relative to the previous rejection of claim 8 (based on Huang), at which time claim 8 did not include the additional limitations of prosecution claims 16 and 17. *See id.* This undermines Patent Owner's suggestion that the amendment was made to overcome Huang. Second, we agree with Petitioner that, even if we were to consider the amendment of claim 8 to be responsive to the Huang rejection, the patentees' addition of multiple different limitations to claim 8 (Ex. 1002, 297; Pet. Reply 3) does not make it "clear and unmistakable" that the amendment was directed to and disclaimed devices with two thresholds. *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1325 (Fed. Cir. 2013). Thus, we do not find Patent Owner's cited prosecution history supports a construction of "multitude" as being three or more.

Patent Owner additionally argues that we should rely on evidence of the plain and ordinary meaning of "multitude" from contemporaneous dictionaries only in the sense that it means "a large number or amount." PO Resp. 17 (citing Ex. 3001, 4; Ex. 3002, 4). As such, Petitioner cites "synonyms for 'multitude' [that] include 'host,' 'legion,' and 'army,' all of which 'denote a very great number of people or things.'" *Id.* (citing Ex. 3001, 3). Petitioner contends that we should interpret "multitude" as synonymous with "plurality" based on "substantially identical dictionary definitions for the two terms and one dictionary that defined 'plurality' as 'multitude.'" Pet. Reply 1 (citing Dec. on Inst. 11–12). Petitioner also contends that none of the dictionary definitions in evidence "is consistent with drawing a line between two and three, or with drawing a line between two and 'between five and seven.'" *Id.* at 9.

In our Decision on Institution, we stated "that one dictionary . . . defines 'plurality' as 'a multitude,'" which supports a construction of "multitude" as "at least two" in accordance with universally applied patent practice. Dec. on Inst. 12 (citing Ex. 3001, 4; *SIMO Holdings Inc. v. Hong Kong uCloudlink Network Tech. Ltd.*, 983 F.3d 1367, 1377 (Fed. Cir. 2021)). Patent Owner asks us to instead focus on definitions of multitude as being "a large number or amount." PO Resp. 17. We note, however, that such definitions are inconsistent with Patent Owner's position that a multitude of thresholds could encompass as few as three thresholds. In other words, we do not agree that three is consistent with a "host," "legion," "army," or "a very great number of people or things." Ex. 3001, 3. Nor has Patent Owner put forth evidence suggesting that two must be excluded from what is considered a multitude. Given the breadth of dictionary definitions in evidence, we find that this extrinsic evidence does not support limiting the definition of "multitude" to three or more as suggested by Patent Owner. Instead, we find that the breadth of the dictionary definitions in evidence supports our initial construction that "multitude" includes two. *See, e.g.*, *id.*; Ex. 3002, 3.

Finally, we consider Patent Owner's argument based on the patent law maxim "that claims should be construed to preserve their validity." *Phillips* 415 F.3d at 1327; *see also* PO Sur-reply 3, 5 (citing same). Specifically, Patent Owner makes the following argument:

> Since a claim term must be construed in a way that preserves validity and Petitioner asserts that a construction of "multitude" as a number that is less than five lacks written description support, the only proper interpretation of "multitude" is "a number that is necessarily more than two", which also encompasses a number larger than four.

PO Sur-reply 6.

We do not agree with Patent Owner's argument. *Phillips* is clear that the "preserving validity" maxim is limited "to cases in which the [Board] concludes, after applying all the available tools of claim construction, that the claim is still ambiguous." *Phillips*, 415 F.3d at 1327 (internal quotation omitted). At the oral hearing, Patent Owner conceded that "multitude" was not ambiguous; rather, Patent Owner only sought to invoke the maxim to the extent that we might agree with Petitioner's claim construction arguments. Tr. 29:1–19. This undermines any suggestion that the term is ambiguous. Thus, just like the court in *Phillips*, we can construe "multitude" "without the need to consider whether one possible construction would render the claim invalid while the other would not." *Phillips*, 415 F.3d at 1328.

Having considered all the evidence of record, we discern no reason to change our initial determination that a "multitude" may include two. Thus, we maintain our determination from the Decision on Institution that a "multitude" includes two (as opposed to being no fewer than three). This construction is consistent with the counsel of our reviewing court that "it seems unlikely that a claim drafter would use a term of such biblical imprecision as 'multitude' if that term were meant to have an important restrictive function in the claim." *TiVo, Inc. v. EchoStar Commc'ns Corp.*, 516 F.3d 1290, 1297 (Fed. Cir. 2008).

2. Other Terms

We determine that no other terms require explicit construction. *See, e.g.*, *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy' . . . ." (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Obviousness Ground Based on Sakamoto

Petitioner contends the subject matter of claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over Sakamoto. Pet. 8–55; Pet. Reply 10–19. Patent Owner disputes Petitioner's contentions. PO Resp. 4–17; PO Sur-reply 8–14.

1. Sakamoto

Sakamoto is a Japanese patent application publication directed to the use of a GPS positioning system that includes a portable terminal and remote server. Ex. 1004, code (57), ¶ 18. Figure 1, reproduced below, is a diagram showing a position information communication terminal.

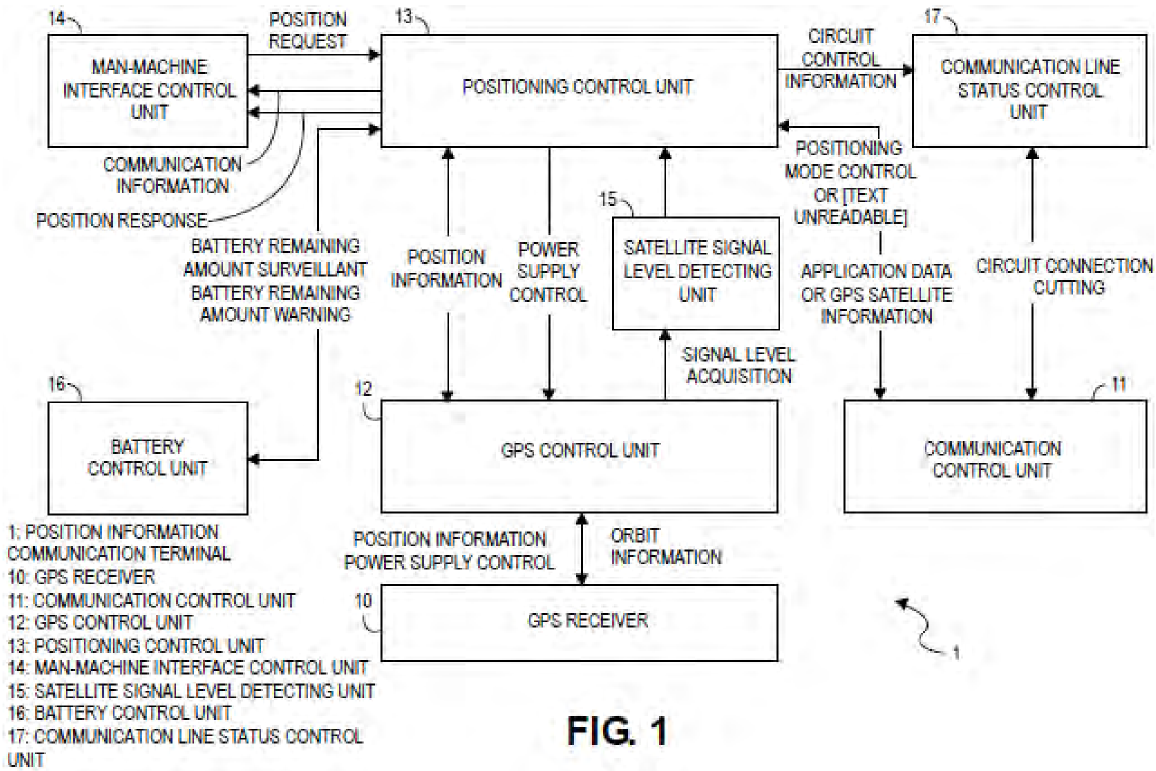

FIG. 1

Figure 1, above, depicts position information communication terminal 1, which includes GPS receiver 10, communication control unit 11 for mobile communications, GPS control unit 12, positioning control unit 13, man-machine interface control unit 14, satellite signal level detection unit 15, battery control unit 16, and communication line status control unit 17. *Id.* ¶ 19. Battery control unit 16 constantly monitors the remaining battery level. *Id.* ¶ 28. Battery control unit 16 provides positioning control unit 13 a remaining battery life warning when the remaining battery amount falls below a preset threshold value. *Id.* ¶ 19.

Satellite signal level detector 15 detects a level of the GPS signal received by GPS receiver 10 via GPS control unit 12. *Id.* When the signal level value is equal to or higher than a predetermined threshold value, positioning mode control unit 22 initiates a normal sensitivity positioning mode. *Id.* ¶ 38. Normal sensitivity positioning mode is a mode in which the

GPS receiver is operated only when necessary. *Id.* ¶¶ 4–5, 19. When the signal level value is equal to or lower than a predetermined threshold value, positioning mode control unit 22 initiates a high sensitivity positioning mode. *Id.* ¶ 38. High sensitivity positioning mode is a mode in which the GPS receiver is operated constantly. *Id.* ¶¶ 4–5, 19. When the signal level value is equal to or lower than a threshold value associated with the inability to perform positioning, positioning mode control unit 22 stops the position search. *Id.* ¶ 38. A user may select among normal sensitivity positioning mode, high sensitivity positioning mode, and the power-off of terminal 1 via man-machine interface control unit 14. *Id.* ¶¶ 26, 28.

Figure 2 of Sakamoto is reproduced below.

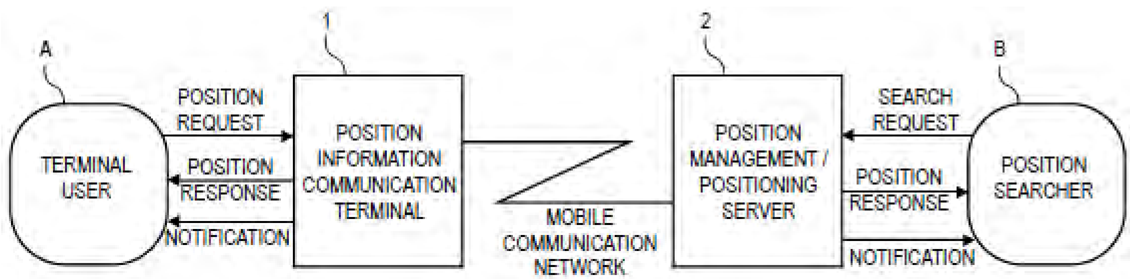

FIG. 2

Figure 2 depicts a GPS positioning system with position management/ positioning server 2 connected to position information communication terminal 1 by a mobile communication network. Ex. 1004 ¶ 18. Terminal 1 responds to a position request from terminal user A by showing the position of terminal 1 to terminal user A. *Id.* Server 2 responds to a position search request of terminal 1 from position searcher B with a position response. *Id.* Server 2 may also send a position search request message to terminal 1, and terminal 1 responds by sending a search response message including position information to server 2. *See id.* ¶¶ 31–35, Figs. 4, 5.

Petitioner contends Sakamoto qualifies as prior art under 35 U.S.C. § 102(b) based on its publication date. Pet. 7. Patent Owner does not contest the prior art status of Sakamoto. We determine that Sakamoto qualifies as prior art under 35 U.S.C. § 102(b) because Sakamoto's publication date of February 5, 2004, is more than one year before the earliest effective filing date of the challenged claims, which is April 5, 2007. Ex. 1001, code (63); Ex. 1004, code (43).

2. Claim 1

The preamble of claim 1 recites "[a] portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system." Ex. 1001, 15:46–48. Petitioner cites Sakamoto's position information communication terminal 1, which comprises GPS receiver 10, communication control unit 11, GPS control unit 12, position control unit 13, man-machine interface control unit 14, satellite signal level detecting unit 15, battery control unit 16 and battery, and communication line status controlling unit 17. Pet. 13 (citing Ex. 1004 ¶ 19, Fig. 1). Petitioner contends an ordinarily skilled artisan would have considered terminal 1 to be portable based on Sakamoto's teaching of using terminal 1 with a battery and a mobile communication network. *Id.* at 14–15 (citing Ex. 1003 ¶ 76; Ex. 1004 ¶¶ 3, 11, 14, 30, 31, 46). Regarding "monitor[ing] location coordinates of . . . individuals and objects using a satellite navigation system," Petitioner cites Sakamoto's GPS receiver 10 and GPS control unit 12, which allegedly "determine terminal user A's (an individual's) and terminal 1's (an object's) position." *Id.* at 15 (citing Ex. 1004 ¶¶ 18, 20–24, Fig. 2).

Patent Owner does not contest Petitioner's analysis of the preamble. Neither party addresses whether the preamble is limiting. We are persuaded that Sakamoto teaches a "portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system a battery with a battery charge level." *See, e.g.*, Ex. 1004 ¶¶ 3, 18–19. Because Petitioner has shown that Sakamoto teaches the preamble, we need not determine whether the preamble is limiting. *See Nidec*, 868 F.3d at 1017.

Claim 1 further recites "a battery having a battery charge level." Ex. 1001, 15:50. Petitioner cites Sakamoto's teachings of battery control unit 16 in terminal 1 that notifies "positioning control unit 13 of a remaining battery amount warning when the remaining amount value of a battery (not shown) that supplies operating power falls below a preset threshold value." Pet. 16 (quoting Ex. 1004 ¶ 19) (emphasis omitted). Petitioner also notes Sakamoto's reference that battery control unit 16 monitors "remaining battery level." *Id.* at 17 (quoting Ex. 1004 ¶ 28) (emphasis omitted). Petitioner additionally notes that "*Sakamoto's* claims include the battery in the of [sic] components of the terminal." *Id.* at 16 (citing Ex. 1004 ¶¶ 9, 10, 14, 15). Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that Sakamoto teaches "a battery having a battery charge level." *See, e.g.*, Ex. 1004 ¶¶ 9, 10, 14, 15, 19, 28.

Claim 1 further recites "transceiver circuitry." Ex. 1001, 15:51. Petitioner cites, *inter alia*, Sakamoto's teaching of "communication control unit 11" including "mobile communication means." Pet. 18 (citing Ex. 1004 ¶¶ 19, 30). Petitioner further cites Sakamoto's teachings that communications control unit 11 transmits positioning control messages and remaining battery amount warning messages and receives positioning control messages. *Id.* (citing Ex. 1004 ¶¶ 7, 34, 35). In light of these teachings, Petitioner contends an ordinarily skilled artisan would have known Sakamoto's communication control unit 11 to be a transceiver. *Id.* (citing Ex. 1003 ¶ 80). Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that Sakamoto teaches transceiver circuitry. *See, e.g.*, Ex. 1003 ¶ 80; Ex. 1004 ¶¶ 7, 34, 35.

Claim 1 further recites "processor circuitry." Ex. 1001, 15:52. Petitioner cites Sakamoto's teaching of GPS receiver 10 performing "positioning operations" when it determines location coordinates from a received communication signal. Pet. 20 (citing Ex. 1004 ¶ 19, Fig. 1). Petitioner further cites Sakamoto's teaching of satellite level detecting unit 15 detecting the level of the GPS satellite signal and performing calculations based on the received signal level. *Id.* at 21 (citing Ex. 1003 ¶ 83; Ex. 1004 ¶¶ 19, 37). Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that Sakamoto teaches processor circuitry. *See, e.g.*, Ex. 1004 ¶¶ 19, 37.

Claim 1 further recites "a battery power monitor to measure in real-time the battery charge level and to make a prediction of an estimated remaining battery charge level in response to the battery charge level." Ex. 1001, 15:53–56. Petitioner again cites Sakamoto's battery control unit 16 and notes that it "constantly" monitors a remaining battery amount in order to determine when battery power falls below a predetermined threshold. Pet. 22–24 (citing Ex. 1004 ¶¶ 19, 28, 39). Petitioner further contends an ordinarily skilled artisan would have known that monitoring the remaining battery charge amount necessarily requires an estimate based on "conditions such as temperature and battery age." *Id.* at 24–25 (citing Ex. 1003 ¶ 85). Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that Sakamoto's battery control unit 16 teaches the recited "battery power monitor." *See, e.g.*, Ex. 1003 ¶ 85; Ex. 1004 ¶¶ 19, 28, 39.

Claim 1 further recites:

> local battery power adjustment mechanism to generate in substantially real-time an updated set of network communication signaling protocols associated with at least one of a request rate of location coordinate packets to be communicated to a target host and a listen rate of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols having a value that is responsive to a user input request.

Ex. 1001, 15:57–65. For the recited "local battery power adjustment mechanism," Petitioner cites Sakamoto's man-machine interface control unit 14 and positioning control unit 13. Pet. 26–27 (citing Ex. 1004, Fig. 1). Petitioner contends these elements "act in concert to reduce (*i.e.,* 'adjust') the battery usage of *Sakamoto's* terminal." *Id.* at 27 (citing Ex. 1004 ¶ 46). Petitioner explains that a user sets a "preset threshold value" using man-machine interface control unit 14 "to specify the battery level below which the terminal will automatically switch from high sensitivity positioning mode to normal sensitivity positioning mode." *Id.* at 27–28 (citing Ex. 1004 ¶¶ 29, 46). Based on this threshold value, positioning control unit 13 switches between the high sensitivity positioning mode and the normal sensitivity positioning mode by turning on and off the GPS receiver according to the current positioning mode. *Id.* at 28 (citing Ex. 1003 ¶ 87; Ex. 1004 ¶¶ 20, 24). Petitioner contends modes are changed "substantially [in] real-time" based on Sakamoto's real-time battery monitoring and

Sakamoto's teaching of "automatically" switching modes at a preset threshold battery level. *Id.* at 29–30 (citing Ex. 1003 ¶ 88; Ex. 1004 ¶¶ 19, 29, 46). Petitioner further contends that an ordinarily skilled artisan "would have appreciated that switching the positioning mode updates the communication signaling protocol." *Id.* at 31 (citing Ex. 1003 ¶¶ 89–94); *see also id.* at 29–30 (same argument); Pet. Reply 15 (same argument).

Petitioner maps the recited "communication signal protocols" to Sakamoto's normal sensitivity positioning mode, high sensitivity positioning mode, and power-off mode. Pet. 31 (citing Ex. 1004 ¶¶ 5–10, 28). For the recited "listen rate," Petitioner notes that, after an initial position request, "high-sensitivity positioning mode keeps the GPS continuously powered on, 'constantly' updating the position of the terminal," so an ordinarily skilled artisan would have known the GPS receiver to have "an associated refresh rate of location coordinates (commonly 1Hz)." *Id.* (citing Ex. 1003 ¶ 90; Ex. 1004 ¶¶ 20, 25, 31, 36). Petitioner further notes that, in Sakamoto's normal sensitivity positioning mode, GPS receiver 10 is powered on and off in response to requests at man-machine interface control unit 14, which Petitioner characterizes as regular or irregular. *Id.* at 32–33 (citing Ex. 1003 ¶ 92; Ex. 1004 ¶¶ 24, 34). Petitioner additionally notes that Sakamoto discloses search requests made during a regular "short cycle." *Id.* at 33 (citing, *inter alia*, Ex. 1004 ¶ 40). Furthermore, Petitioner notes that even when no positioning request is pending, the server may periodically (i.e., at a "cycle set in advance") send a satellite signal level request message, which "causes the terminal to monitor the satellite signal level for a specified length of time and send a 'satellite signal level response message' with signal strength data to the server." *Id.* at 32 (citing Ex. 1004 ¶ 37). As such, Petitioner contends an ordinarily skilled artisan would have understood that the periodic satellite signal request message cycle is "a minimum value for the listen rate of the GPS receiver in normal sensitivity position." *Id.* (citing Ex. 1003 ¶ 92). Finally, Petitioner asserts that the listen rate for GPS signals is zero when the GPS receiver is in power-off mode. *Id.* at 33–34 (citing Ex. 1003 ¶ 94; Ex. 1004 ¶¶ 28, 39, 51).

For the "request rate," Petitioner contends that search response messages in Sakamoto's normal and high sensitivity modes "are generated in response to a position search request message and as such may be generated in response to a request by a position searcher or repeatedly in a 'short cycle.'" Pet. 33 (citing Ex. 1004 ¶¶ 31–35, 40, 53). In light of this, Petitioner contends that an ordinarily skilled artisan "would have understood that the communication signaling protocol associated with normal sensitivity positioning mode has a response rate that may be irregular (based on manual searches) or regular (at a predefined cycle frequency)." *Id.* (citing Ex. 1003 ¶¶ 91–92). Petitioner also contends that an ordinarily skilled artisan would have known that the response rate for requests is zero in power-off mode "because GPS signal levels are not monitored and position searching is stopped." *Id.* at 34 (citing Ex. 1003 ¶ 94; Ex. 1004 ¶ 38). Petitioner provides a chart, reproduced below, summarizing its "request rate" and "listen rate" mappings to Sakamoto's teachings.

Communication signaling protocol	**GPS Listen Rate**	**Response Rate (to Request Rate of Location Coordinate Packets)**
High sensitivity positioning mode	Maximum GPS refresh rate (*e.g.*, 1Hz*)*	irregular request rate or regular "short cycle"
Normal sensitivity positioning mode	irregular request rate, regular "short cycle," or "cycle set in advance"	irregular request rate or regular "short cycle"
Power-off mode	0Hz	0Hz

Id. In this chart from the Petition, Petitioner has listed its contentions regarding the "GPS Listen Rate" and "Response Rate (to Request Rate of Location Coordinate Packets)" for Sakamoto's high and normal sensitivity modes and power-off mode. *Id.*

For the limitation that "the updated set of network communication signaling protocols hav[e] a value that is responsive to a user input request," Petitioner cites Sakamoto's teaching that "terminal user A can select the positioning mode (and therefore the value of the communication signaling protocol) using man-machine interface control unit 14." Pet. 34–35 (citing Ex. 1004 ¶ 26). Petitioner contends the "value of the communication signaling protocol" is responsive to the user's selection of either normal sensitivity positioning mode, high sensitivity positioning mode, or power-off mode. *Id.* at 35 (citing Ex. 1004 ¶ 28). Petitioner further contends that an ordinarily skilled artisan would have known the listen rate and response rate are "value[s]" associated with the communication signaling protocol. *Id.* at 36 (citing Ex. 1003 ¶¶ 92–93).

Patent Owner argues the "local battery power adjustment mechanism" limitation of claim 1 "is directed to updating a schedule of repeating events."

PO Resp. 9. In support of its argument, Patent Owner contends that "the claimed 'request rate' and 'listening rate' of independent claims 1 and 8 are parameters of 'cycle timing,' (*i.e.*, scheduling)." *Id.* at 7 (quoting Ex. 1001, Abstr., 4:37–43). Patent Owner also cites embodiments of the '774 patent where "the request rate of location coordinate packets to be communicated to a target host and the listen rate of the location coordinate packets from a satellite navigation system represent a schedule for when repeating activities occur." *Id.* at 8 (citing Ex. 1001, 12:1–18); *see also id.* at 9 (citing examples from the '774 patent related to request rate and listen rate schedules for tracking a dog, a car, and rented construction equipment). Patent Owner contrasts these disclosures from the '774 patent with Petitioner's cited teachings from Sakamoto insofar as "*Sakamoto* does not disclose a schedule of repeating events or any updating of such schedule." *Id.* at 9–10.

We do not agree with Patent Owner's arguments because they are not commensurate with the language of claim 1. In particular, claim 1 includes no requirement that the "updated set of network communication signaling protocols" must relate to schedules of repeating events or the updating of such schedules. *See* Ex. 1001, 15:57–65. "While we read claims in view of the specification, of which they are a part, we do not read limitations from the embodiments in the specification into the claims." *Hill-Rom*, 755 F.3d at 1371. Thus, Patent Owner is wrong to suggest (*see* PO Resp. 7–9) that various exemplary embodiments from the Specification of the '774 patent limit the recited "local battery power adjustment mechanism."

Patent Owner acknowledges that "*Sakamoto* may disclose three positioning modes and three associated refresh rates," but argues that "*Sakamoto* does not disclose 'an updated set' as a distinct element from the three fixed refresh rates." PO Sur-reply 9. Patent Owner also argues that "Petitioner does not show how any of these fixed refresh rates might be generated in substantially real-time." *Id.* at 10. Patent Owner likewise argues that Petitioner has not shown how Sakamoto's "fixed refresh rates" meet the "generated in substantially real time" limitation of claim 1. *Id.*

We do not agree with Patent Owner's arguments. Petitioner relies on switching among Sakamoto's positioning modes for teaching the updated sets. Pet. 31 (citing Ex. 1004 ¶¶ 5–10, 28). Mr. Andrews testifies that an ordinarily skilled artisan "would have appreciated that switching the positioning modes (responsive to a low-power condition or to user command) changes the frequency with which *Sakamoto's* terminal transmits and receives data (*i.e.,* updates the communication signaling protocol of the terminal)." Ex. 1003 ¶ 89. Petitioner also explains how changing Sakamoto's modes changes the associated listen rate and request rate. *See* Pet. 31–34. And, as acknowledged by Patent Owner at the oral hearing, the "updated set based on the claim language would include either/or both a refresh rate and a listen rate." Tr. 39:17–18. Thus, Petitioner persuasively shows that Sakamoto teaches the recited "updated set of network communication signaling protocols."

We also are persuaded that Sakamoto's modes switch "in substantially real-time" based on Sakamoto's teaching of an "automatic shift" from high sensitivity mode to normal mode based on the battery falling below a threshold and based on Sakamoto's aim of reducing power consumption. Pet. 29–30 (quoting Ex. 1004 ¶¶ 29, 46); Ex. 1003 ¶ 88. Mr. Andrews testifies that an ordinarily skilled artisan "would have appreciated that switching the positioning modes (responsive to a low-power condition or to user command) changes the frequency with which *Sakamoto's* terminal transmits and receives data (*i.e.,* updates the communication signaling protocol of the terminal)." Ex. 1003 ¶ 89. Against this showing, Patent Owner has not put forth any evidence to support its contention that "generat[ing] . . . an updated set" requires the generation of entirely new parameters or that such parameters cannot be taken from predetermined sets. As such, Patent Owner's position amounts to unsupported attorney argument; it does not undermine Petitioner's persuasive showing that Sakamoto teaches real-time updating of network signaling protocol sets in order to reduce power consumption via Sakamoto's mode switching. *See, e.g.*, Ex. 1003 ¶¶ 88–89; Ex. 1004 ¶¶ 28, 29, 46.

Patent Owner also argues that Sakamoto updates its positioning modes based on charge level, and that Sakamoto does not disclose a "value that is responsive to a user input request." PO Sur-reply 11. At oral argument, Patent Owner explained this argument as meaning that the "value" must be known to the user. *See* Tr. 41:22–45:4. We do not agree with Patent Owner's argument because neither the language of claim 1 nor the Specification of the '774 patent requires the "value" to be known to the user. In particular, the '774 patent states that the "[u]pdated set of network communication signaling protocols, for instance, has value (e.g., X Y Z) responsive to user input request 430." Ex. 1001, 11:41–43. With respect to the embodiment of Figure 5, the '774 patent states further that the values "X Y Z" are request rate 420, location coordinates packet 422, and listen rate 425. *Id.* at 13:1–12, Fig. 5. Yet nothing in these descriptions requires the user to know what these values are or how they change based on the user input request. The '774 patent further provides examples of "value 419" as "a user input screen control or mouse adjustable cursor value" and states that "user input request 430 adjusts value 419 to select an appropriate update set of network communication signaling protocols to achieve a desired user defined battery operating environment." *Id.* at 11:51–53, 11:59–62. Again, the user input changes the value, but nothing in the '774 patent requires the user's knowledge of what the value is. Based on this understanding, we find that the user's selection of an operating mode in Sakamoto via man-machine interface control unit 14 (i.e., "a user input request") changes the "value" of the operating mode and/or the "value" of the request rate and listen rate associated with the selected operating mode. *See, e.g.*, Ex. 1003 ¶¶ 92–93, Ex. 1004 ¶ 28. As such, we determine that Sakamoto teaches an "updated set of network communication signaling protocols having a value that is responsive to a user input request."

Based on the entire trial record, we are persuaded that Sakamoto's normal sensitivity positioning mode, high sensitivity positioning mode, and power-off mode teach an "updated set of network communication signaling protocols." *See, e.g.*, Ex. 1004 ¶¶ 5–10, 28. Petitioner also shows that Sakamoto either teaches, or an ordinarily skilled artisan would have appreciated from Sakamoto, that each of these modes has an associated "listen rate of the location coordinate packets from a satellite navigation system." *See, e.g.*, Ex. 1003 ¶¶ 90–92, 94; Ex. 1004 ¶¶ 20, 24, 25, 28, 31, 34, 36, 37, 39, 40, 51. Petitioner likewise demonstrates that Sakamoto's normal and high sensitivity modes have an associated "request rate of location coordinate packets to be communicated to a target host." *See, e.g.*, Ex. 1003 ¶¶ 91, 92; Ex. 1004 ¶¶ 31–35, 40, 53. In addition, the user can select a preset threshold battery level using man-machine interface control unit 14, which controls in real-time how positioning control unit 13 switches between modes (i.e., "responsive to a user input request"). *See, e.g.*, Ex. 1003 ¶¶ 87–88; Ex. 1004 ¶¶ 19, 20, 24, 29, 46. Thus, we are persuaded that Sakamoto's man-machine interface control unit 14 and positioning control unit 13 act together as a "local battery power adjustment mechanism" that generates Sakamoto's various modes. *See, e.g.*, Ex. 1004 ¶ 46, Fig. 1.

Claim 1 further recites "wherein the local battery power adjustment mechanism actives or deactivates at least one portion of the transceiver circuitry or the processor circuitry to conserve the battery charge level in response to the value." Ex. 1001, 15:66–16:2. Petitioner cites Sakamoto's teaching that positioning control unit 13 (a part of the recited "local battery power adjustment mechanism") activates and deactivates GPS receiver 10 (a portion of the recited "transceiver circuitry" and "processor circuity") via GPS control unit 12. Pet. 36–37 (citing Ex. 1004 ¶¶ 19, 20, 24, 25, 29, 36). According to Petitioner, "the purpose of deactivating GPS receiver (and reactivating it only on demand) is to conserve battery charge level." *Id.* at 37–38 (citing Ex. 1003 ¶ 95; Ex. 1004 ¶ 39). Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that Sakamoto's positioning control unit 13 activating and deactivating GPS receiver 10 via GPS control unit 12 teaches this limitation. *See, e.g.*, Ex. 1003 ¶ 95; Ex. 1004 ¶¶ 19, 20, 24, 25, 29, 36, 39.

Based on the entire trial record, Petitioner has persuasively shown that Sakamoto teaches all limitations of claim 1 in light of the knowledge of a person of ordinary skill in the art. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 1 would have been obvious over Sakamoto.

3. Claim 4

Claim 4 depends from claim 1 and recites that "the local battery power adjustment mechanism comprises a user adjustable electronic display that indicates a current level of battery power and allows a user a capability to adjust power level thereof." Ex. 1001, 16:18–21. As discussed above, Petitioner maps the "local battery power adjustment mechanism" recited in claim 1 to Sakamoto's man-machine interface control unit 14 and positioning control unit 13. *See supra* § II.D.2. For the "user adjustable electronic display," Petitioner cites Sakamoto's teaching that a "display unit [is] provided in the man-machine interface control unit 14." Pet. 39 (quoting Ex. 1004 ¶ 13) (emphasis omitted). Petitioner further cites Sakamoto's teaching of position control unit 13 "issu[ing] a remaining battery amount warning notification to the terminal user A via the man-machine interface control unit 14." *Id.* (quoting Ex. 1004 ¶ 28). Petitioner contends that an ordinarily skilled artisan "would have understood that this remaining battery amount warning notification would have been 'issue[d]' on the display of man-machine interface control unit 14." *Id.* (citing Ex. 1003 ¶ 96; Ex. 1004 ¶ 6). For "allow[ing] a user a capability to adjust power level," Petitioner cites Sakamoto's teachings of a user adjusting a power level of the terminal by selecting a positioning mode and by changing the battery threshold at which the device automatically switches from high to normal sensitivity positioning mode. *Id.* at 40 (citing Ex. 1004 ¶¶ 28–29).

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that Sakamoto teaches a display in man-machine interface control unit 14 that is used to present battery warning notifications to a user. *See, e.g.*, Ex. 1004 ¶¶ 6, 13, 28. We also are persuaded that the display in man-machine interface control unit 14 allows the user to adjust the power level by selecting modes and by allowing the user to set a battery power threshold for automatic battery conservation. *See, e.g.*, Ex. 1004 ¶¶ 28–29. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 4 would have been obvious over Sakamoto.

4. Claim 5

Claim 5 depends from claim 4 and recites that

> the local battery power adjustment mechanism comprises an automatic sleep mode to set at least one of the request rate of the location coordinate packets to the target host and the listen rate of the location coordinates from the satellite navigation system to a minimal level until the battery power monitor measures a sustainable battery charge level to process the at least one portion of an receive signal.

Ex. 1001, 16:22–29. For the "automatic sleep mode," Petitioner cites Sakamoto's teaching of "turning off the power of the GPS receiver so that longer operating time can be achieved." Pet. 41 (quoting Ex. 1004 ¶ 51). Petitioner contends this would result in a listen rate of zero, which is a "minimal level." *Id.* (citing Ex. 1003 ¶ 94). For the recited condition "until the battery power monitor measures a sustainable battery charge level to process the at least one portion of an receive signal," Petitioner cites Sakamoto's teaching that "the terminal side can recognize that the remaining battery level is low and can cope with the charging of the battery." *Id.* (quoting Ex. 1004 ¶ 47). Petitioner contends an ordinarily skilled artisan

> would have recognized that this "coping" with the battery being charged would have included switching the positioning mode back to normal sensitivity positioning mode or high sensitivity positioning mode once the remaining battery level was no longer below the threshold that caused the terminal to switch to power off mode.

Id. at 40–41 (citing Ex. 1003 ¶ 97).

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that Sakamoto teaches the recited "automatic sleep mode." *See, e.g.*, Ex. 1004 ¶ 51. We also are persuaded by Mr. Andrews's uncontested testimony that an ordinarily skilled artisan would have known that Sakamoto's system switches back to normal or high sensitivity positioning mode once battery power has been replenished based on Sakamoto's teaching of the terminal "cop[ing] with the charging of the battery." *See, e.g.*, Ex. 1003 ¶ 97; Ex. 1004 ¶ 47. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 5 would have been obvious over Sakamoto.

5. Claim 6

Claim 6 depends from claim 4 and recites that

> the local battery power adjustment mechanism comprises a charge control management of the portable electronic tracking device that estimates charge capability and adjusts cycling of the at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets from the satellite navigation system to maximize charge capability.

Ex. 1001, 16:30–36. For "charge control management . . . that estimates charge capability," Petitioner cites Sakamoto's teaching that positioning control unit 13 receives a "battery remaining amount" from battery control unit 16. Pet. 42–43 (citing Ex. 1004, Fig. 1). Petitioner also cites Sakamoto's teaching of positioning control unit 13 automatically shifting to normal sensitivity positioning mode based on a remaining battery amount warning. *Id.* at 43–44 (citing Ex. 1004 ¶ 29). For "adjust[ing] cycling," Petitioner contends that "[c]hanging the positioning mode adjusts the cycling of request rate and the listen rate." *Id.* at 44 (citing Ex. 1003 ¶ 98). Petitioner contends this mode switch is performed in order to reduce the power consumption and extend operating time, which meets the "maximize charge capability" limitation of claim 6. *Id.* (citing Ex. 1004 ¶ 46).

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that Sakamoto's positioning control unit 13 (i.e., part of the "local battery power adjustment mechanism") receives remaining battery amount information and shifts operating modes to adjust request rate and listen rate cycling. *See, e.g.*, Ex. 1003 ¶ 98; Ex. 1004 ¶ 29, Fig. 1. This "maximiz[es] charge capacity" by reducing power consumption. *See, e.g.*, Ex. 1004 ¶ 46. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 6 would have been obvious over Sakamoto.

6. Claim 8

Independent claim 8 recites "[a] local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device." Ex. 1001, 16:43–45. For the "local charging management device," Petitioner cites Sakamoto's battery, battery control unit 16, positioning control unit 13, and GPS control unit 12. Pet. 44. Petitioner maps the "electronic tracking device" to Sakamoto's GPS receiver 10, communication control unit 11, GPS control unit 12, position control unit 13, man-machine interface control unit 14, satellite signal level detecting unit 15, battery control unit 16 and battery, and communication line status controlling unit 17. *Id*. at 13 (citing Ex. 1004 ¶ 19, Fig. 1), 44–45. For "track[ing] by at least one other tracking device," Petitioner contends the "electronic tracking device" is tracked by position management server 2. *Id.* at 44–45; *see also id.* at 15–16 (analyzing similar limitation in claim 1).

Patent Owner does not contest Petitioner's analysis of the preamble. Neither party addresses whether the preamble is limiting. We are persuaded that Sakamoto teaches a "local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device." *See, e.g.*, Ex. 1004 ¶¶ 3, 18–24, Fig. 1. Because Petitioner has shown that Sakamoto teaches the preamble, we need not determine whether the preamble is limiting. *See Nidec*, 868 F.3d at 1017.

Claim 8 further recites "a battery power level monitor." Ex. 1001, 16:46. Petitioner maps this limitation to Sakamoto's battery control unit 16 and GPS control unit 12 and relies on its analysis of the "battery power monitor" limitation of claim 1. Pet. 22–25, 45–46 (citing Ex. 1004, Fig. 1). Notwithstanding, Petitioner notes that its mapping is slightly different compared to the "battery power monitor" of claim 1 due to added functionality (discussed below) recited in claim 8. *Id.* at 45 n.5. Patent

Owner does not contest Petitioner's analysis of this limitation. Based on Petitioner's analysis from claim 1, we are persuaded that Sakamoto's battery control unit 16 and GPS control unit 12 teach the recited "battery power level monitor." *See, e.g.*, Ex. 1004 ¶¶ 19, 28, 39, Fig. 1.

Claim 8 further recites "a charging unit." Ex. 1001, 16:47. Petitioner cites the same analysis from claim 1 for the "battery having a battery charge level" limitation. Pet. 46. Patent Owner does not contest Petitioner's analysis of this limitation. Based on Petitioner's analysis from claim 1, we are persuaded that Sakamoto teaches "a charging unit." *See, e.g.*, Ex. 1004 ¶¶ 9, 10, 14, 15, 19, 28.

Claim 8 recites "an electrical power resource management component to adjust cycle timing of at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets responsive to an estimated charge level of the charging unit." Ex. 1001, 16:48–52. According to Petitioner, the '774 patent states that a local battery adjustment mechanism is one example of an "electrical resource management component." Pet. 46 (citing Ex. 1001, 13:13–15). As such, Petitioner cites its analysis from the "local battery power adjustment mechanism" limitation of claim 1. *Id.* Petitioner contends that the same analysis related to Sakamoto's switching of positioning modes teaches "adjust[ing] cycle timing." *See* Pet. 46–47.

Patent Owner argues that "*Sakamoto's* transitioning between positioning modes and corresponding different refresh rates . . . does not disclose '**adjust** cycle timing of at least one of a request rate . . . and a listen rate'" because Sakamoto merely teaches "changing from one refresh rate to a completely different refresh rate." PO Sur-reply 12. We do not agree with

Patent Owner's argument for the same reasons discussed above with respect to claim 1. We find that Sakamoto's changing of refresh rates—which is acknowledged by Patent Owner (*id.*)—teaches adjusting the cycle timing. Patent Owner also disputes Petitioner's analysis to the extent that Sakamoto's positioning modes do not disclose a schedule of repeating events or any updating of such schedule. *See* PO Resp. 10–12. Again, however, claim 8 does not require any such schedule, and we decline to read in a schedule requirement from the exemplary embodiments of the '774 patent. Thus, we do not agree with Patent Owner's argument.

As above, we are persuaded by Petitioner's contentions (Pet. 47) that Sakamoto teaches "adjust[ing] . . . cycle rates (by switching positioning mode and therefore updating the communication signaling protocol) responsive to an estimated charge level (remaining battery amount) of the charging unit (battery)." *See, e.g.*, Ex. 1003 ¶¶ 98, 102; Ex. 1004 ¶¶ 5–10, 28, 29.

Claim 8 further recites

> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

Ex. 1001, 16:53–61. Petitioner's analysis of the "measures a power level of the charging unit" limitation is similar to that of claim 1; Petitioner contends "*Sakamoto* teaches battery control unit 16 measures a power level of the battery." Pet. 48 (citing Ex. 1003 ¶ 101); *see also id.* at 23–24 (citing Ex. 1004 ¶¶ 28, 39). For "adjust[ing] a power level applied to location tracking circuitry," Petitioner cites Sakamoto's teaching of changing the power level applied to GPS receiver 10 depending on positioning mode. *Id.* at 48–49 (citing Ex. 1004 ¶¶ 24, 25). Petitioner contends the adjustment to GPS receiver 10 is "responsive to one or more signal levels" based on Sakamoto's detection of GPS satellite signal levels and teachings of (1) threshold K1, below which positioning control unit 13 automatically transitions to high sensitivity positioning mode; and (2) threshold K2, above which positioning control unit 13 automatically transitions to normal sensitivity positioning mode. *Id.* at 49–50 (citing Ex. 1004 ¶ 27).

For the recited "multitude of threshold values," Petitioner cites Sakamoto's teachings of two battery power level thresholds related to (1) the user-defined battery power level threshold below which the mode switches from high sensitivity positioning mode to normal sensitivity positioning mode; and (2) "a still lower-power mode whereby the GPS receiver is completely shut down." Pet. 50–51 (citing Ex. 1004 ¶¶ 29, 39, 51). Regarding the "still-lower power mode," Petitioner contends an ordinarily skilled artisan "would have understood these teachings of *Sakamoto* to indicate a second battery threshold below which this complete GPS power off occurs." *Id.* at 51 (citing Ex. 1003 ¶ 103).

Patent Owner argues that Petitioner's two cited thresholds from Sakamoto cannot teach the recited "multitude of threshold values." PO Resp. 12–17. Patent Owner's arguments turn on the construction of the term "multitude." We have considered Patent Owner's arguments regarding this term, and, as discussed above, we interpret the word "multitude" to include two. *See supra* § II.C. Thus, Petitioner's two cited power level thresholds from Sakamoto (i.e., the battery power level thresholds triggering shifts between (1) high sensitivity and normal mode; and (2) normal mode and power-off mode) teach the recited "multitude of threshold values" under this interpretation. *See, e.g.*, Ex. 1003 ¶ 103; Ex. 1004 ¶¶ 29, 39, 51.

Patent Owner does not otherwise contest Petitioner's analysis of this limitation. We are persuaded that Sakamoto teaches measuring a power level of the battery (*see, e.g.*, Ex. 1004 ¶¶ 28, 39), adjusting a power level applied to GPS receiver 10 (*see, e.g.*, Ex. 1004 ¶¶ 24, 25), and making the adjustment to GPS receiver 10 responsive to a comparison with Sakamoto's GPS satellite signal level thresholds K1 and K2 (*see, e.g.*, Ex. 1004 ¶ 27).

Based on the entire trial record, Petitioner has persuasively shown that Sakamoto teaches all limitations of claim 8 in light of the knowledge of a person of ordinary skill in the art. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 8 would have been obvious over Sakamoto.

7. Claim 10

Claim 10 depends from claim 8 and recites a limitation similar to that of claim 6. Ex. 1001, 17:4–10. Petitioner relies on the same analysis from claim 6. Pet. 54. Patent Owner relies on the same arguments from claim 8. PO Resp. 12–17; PO Sur-reply 14. For the same reasons discussed above for claim 6 (*see supra* § II.D.5), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 10 would have been obvious over Sakamoto.

8. Claim 13

Claim 13 depends from claim 8 and recites that "the listen rate of the location coordinates comprises a global positioning system (GPS) system refresh rate of the location coordinates." Ex. 1001, 17:23–25. Petitioner cites its analysis from claim 1 and contends that "*Sakamoto's* listen rate of location coordinates is a GPS system refresh rate of location coordinates." Pet. 54 (citing Ex. 1003 ¶ 108); *see also id.* at 31–32 (Petitioner's analysis of Sakamoto's high sensitivity positioning mode and of how "a continuously operating GPS receiver has an associated refresh rate of location coordinates"). Patent Owner relies on the same arguments from claim 8. PO Resp. 12–17; PO Sur-reply 14. For the same reasons discussed above for claim 1 (*see supra* § II.D.2), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 13 would have been obvious over Sakamoto.

9. Claim 15

Claim 15 depends from claim 8 and recites that "the battery power level monitor measures a power level of the charging unit and substantially automatically adjusts power usage responsive to available power of the charging unit to maximize power unit life." Ex. 1001, 17:29–33. For "measur[ing] a power level of the charging unit," Petitioner cites Sakamoto's teaching that battery control unit 16 monitors a remaining battery amount in order to determine when battery power falls below a predetermined threshold. Pet. 22 (citing Ex. 1004 ¶¶ 19, 28), 54. Regarding the recited adjustment to power usage, Petitioner cites Sakamoto's teaching of automatically changing from high to normal sensitivity power mode based on a notification sent when battery control unit 16 detects that the battery level is lower than a predetermined threshold. *Id.* at 54–55 (citing Ex. 1004 ¶¶ 29, 46). Petitioner contends an ordinarily skilled artisan "would have understood that this would have the purpose (and the effect) of increasing (maximize) the battery (power unit) life." *Id.* at 55 (citing Ex. 1003 ¶ 109).

Patent Owner relies on the same arguments discussed above with respect to claim 8. PO Resp. 12–17; PO Sur-reply 14. We are persuaded that Sakamoto's battery control unit 16 monitors a remaining battery amount and notifies positioning control unit 13 when appropriate to switch modes and maximize the life of the battery. *See, e.g.*, Ex. 1004 ¶¶ 19, 28, 29, 46. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 15 would have been obvious over Sakamoto.

E. Obviousness Ground Based on Sakamoto and AAPA

Petitioner contends the subject matter of claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over the combination of Sakamoto and AAPA. Pet. 56–60. As discussed above, Petitioner has demonstrated that the subject matter of claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over Sakamoto, so we do not reach the ground based on Sakamoto and AAPA. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner "is entitled to a final written decision addressing all of the claims it has challenged"); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App'x 984, 990 (Fed. Cir. 2020) (non-precedential) (recognizing that the "Board need not address issues that are not necessary to the resolution of the proceeding" and, thus, agreeing that the Board has "discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims").

F. Obviousness Ground Based on Sakamoto and Hayasaka

Petitioner contends the subject matter of claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over Sakamoto and Hayasaka. Pet. 60–71. We already have found claims 1, 4–6, 8, 10, 13, and 15 to be unpatentable over Sakamoto, so we do not reach the ground based on Sakamoto and Hayasaka. *See SAS*, 138 S. Ct. at 1359; *Boston Sci.*, 809 F. App'x at 990.

III. PATENT OWNER'S MOTION TO AMEND

Pursuant to 35 U.S.C. § 316(d)(1) and 37 C.F.R. § 42.121(a), Patent Owner moves to replace claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent with proposed substitute claims 20, 23–25, 27, 29, 32, and 34, respectively. MTA 1; MTA Reply 1. The motion is contingent on our determination as to whether a preponderance of the evidence establishes that claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent are unpatentable. MTA 1. As discussed above, we determine that original claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent have been shown to be unpatentable by a preponderance of the evidence. *See supra* § II.D.2–9. Therefore, we proceed to address Patent Owner's motion to amend.

A. Proposed Substitute Claims

Independent proposed substitute claims 20 and 27, which are illustrative of the proposed substitute claims, are reproduced below with underlining to indicate added text and strikethrough to indicate deleted text.

> 20. A portable electronic tracking device to monitor location coordinates of one or more individuals and objects using a satellite navigation system, the portable electronic tracking device comprising:
>
> a battery having a battery charge level;
>
> transceiver circuitry;
>
> processor circuitry;
>
> a battery power monitor to measure in real-time the battery charge level and to make a prediction of an estimated remaining battery charge level in response to the battery charge level; and
>
> local battery power adjustment mechanism to generate in substantially real-time an updated set of network communication signaling protocols associated with at least one of a request rate representing a repeating time interval for ~~of~~ location coordinate packets to be communicated to a target host and a listen rate representing a repeating time interval for receipt of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols having a value that is responsive to a user input request and representing a timing schedule for at least one of the request rate and the listen rate;
>
> wherein the local battery power adjustment mechanism actives or deactivates at least one portion of the transceiver circuitry or the processor circuitry to conserve the battery charge level in response to the value.

> 27. A local charging management device to manage electrical resource capability for an electronic tracking device that is tracked by at least one other tracking device comprising:

> a battery power level monitor;
>
> a charging unit; and
>
> an electrical power resource management component to adjust cycle timing of at least one of a request rate representing a repeating time interval for transmission of location coordinate packets to a target host and a listen rate representing a repeating time interval for receipt of the location coordinate packets responsive to an estimated charge level of the charging unit, the cycle timing representing a timing schedule for at least one of the request rate and the listen rate,
>
> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a multitude of threshold values determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

MTA 25–26, 28–29.

B. Procedural Requirements

"Before considering the patentability of any substitute claims, . . . the Board first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121." *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15, 4–8 (PTAB Feb. 25, 2019) (precedential). Patent Owner bears the burden of proving these requirements by a preponderance of the evidence. 37 C.F.R. § 42.121(d)(1).

1. Claim Listing

The motion to amend includes a claim listing that clearly shows the changes, as required by 37 C.F.R. § 42.121(b). *See* MTA 25–30; *Lectrosonics*, Paper 15 at 8.

2. Reasonable Number of Substitute Claims

We now consider whether the motion to amend proposes a reasonable number of substitute claims. 35 U.S.C. § 316(d)(1)(B). "There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim." *Lectrosonics*, Paper 15 at 4–5 (citing 37 C.F.R. § 42.121(a)(3)). Patent Owner's motion originally proposed 15 substitute claims, including 8 proposed substitute claims corresponding to claims challenged in this *inter partes* review and 7 proposed substitute claims corresponding to dependent claims that are not challenged here. MTA 25–30. In our Preliminary Guidance, we indicated that "Section 316(d) does not permit Patent Owner to cancel or propose substitutes for non-challenged claims," so we would "only consider the Motion with respect to the proposed substitute claims that correspond to the challenged claims." PG 3–4. Patent Owner acknowledged this in its reply and now agrees that "only corresponding proposed substitute claims 20, 23–25, 27, 29, 32, and 34 are to be considered in relation to Patent Owner's Motion to Amend." MTA Reply 1. As such, the Petition challenges 8 claims, and the motion to amend proposes 8 substitute claims. *Id.* We determine that the number of proposed substitute claims is reasonable.

3. Respond to a Ground of Unpatentability Involved in the Trial

Next, we consider whether the proposed substitute claims respond to a ground of unpatentability involved in this trial. *Lectrosonics*, Paper 15 at 5–6 (citing 37 C.F.R. § 42.121(a)(2)(i)). Patent Owner characterizes its amendments as adding the following limitations to the original claims:

> (1) that request rate represents a repeating time interval for location coordinate packets to be communicated to a target host in proposed substitute independent claims 20 and 27; (2) that listen rate represents a repeating time interval for receipt of the location coordinate packets in proposed substitute independent claims 20 and 27; (3) that the updated set of network communication signaling protocols represent a timing schedule for at least one of the request rate and the listen rate in proposed substitute independent claim 20; and (4) that the cycle timing represents a timing schedule for at least one of the request rate and the listen rate in proposed substitute independent claim 27.

MTA 2–3. Patent Owner highlights these added limitations in asserting that that the proposed substitute claims are patentable over the references in the instituted grounds. *See id.* at 3–4. Petitioner does not argue otherwise. Based on Patent Owner's showing, we determine that the amended language in the proposed substitute claims is responsive to the grounds of unpatentability involved in this trial.

4. No Enlargement to the Scope of the Claims

We also consider the breadth of the proposed substitute claims. "A motion to amend may not present substitute claims that enlarge the scope of the claims of the challenged patent or introduce new subject matter." *Lectrosonics*, Paper 15 at 6–7 (citing 35 U.S.C. § 316(d)(3); 37 C.F.R. § 41.121(a)(2)(ii)). For the independent proposed substitute claims, Patent Owner's proposed amendments add several limitations, including the ones highlighted directly above. Based on the added limitations, Patent Owner contends that the proposed substitute claims do not enlarge the scope of any original claim. MTA 3.

Petitioner contends that proposed substitute claims 20, 23–25, 27, 29, 32, and 34 impermissibly attempt to broaden the scope of corresponding original claims 1, 4–6, 8, 10, 13, and 15. MTA Opp. 3. Specifically, Petitioner contends that proposed substitute claims 20 and 27 require "an updated set of network communication signaling protocols associated with at least one of a request rate <u>representing a repeating time interval for</u> [[of]] location coordinate packets to be communicated to a target host and a listen rate <u>representing a repeating time interval for receipt</u> of the location coordinate packets from a satellite navigation system," where corresponding original claims 1 and 8 require that the request rate and listen rate actually be *for* the corresponding packets. *Id*. (alteration in original) (citing MTA 25–26). According to Petitioner, a system where a refresh rate merely "represent[s]" (but does not include) an actual transmission or reception rate for a corresponding type of packet would satisfy proposed substitute claims 20 and 27, but would not satisfy corresponding original claims 1 and 8. *Id.* at 3–4.

Proposed substitute claims 20 and 27 require that the recited "request rate" and "listen rate" represent "<u>a repeating timing interval</u>." Corresponding original claims 1 and 8 do not recite such a requirement, so these proposed amendments represent a narrowing of the claims. We do not agree with Petitioner's argument that the use of word "representing" in the proposed amendments acts to broaden the proposed substitute claims. Petitioner's argument is premised on the notion that the word "of" in the challenged claims means "includes." *See* MTA Opp. 3–4. But Petitioner does not support its argument with any record evidence, and we are not persuaded that the word "representing" meaningfully changes the scope of the proposed substitute claims compared to the word "of" in the original claims. Petitioner's argument also does not account for the narrowing of claim scope caused by the added "<u>repeating time interval</u>" limitations. Thus, we determine that the limitations added by Patent Owner result in claims that are narrower than the original claims.

5. No New Matter

We now consider whether proposed substitute claims 20, 23–25, 27, 29, 32, and 34 have introduced new matter. "[T]he Board requires that a motion to amend set forth written description support in the originally filed disclosure of the subject patent for each proposed substitute claim, and also set forth support in an earlier filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought." *Lectrosonics*, Paper 15 at 7 (citing 37 C.F.R. § 42.121(b)(1)–(2)). For this requirement, Patent Owner must cite "to the *original disclosure of the application*, as filed, rather than to the patent as issued." *Id.* at 8 (emphasis added). In this case, the original disclosure is the '451 application. Ex. 1001, code (21).

Nevertheless, in its motion to amend, Patent Owner cites the published version of the '451 application, U.S. Patent Application Publication No. 2009/0189807 A1 ("the '807 publication"), to show support for the proposed substitute claims. *See* MTA 4–16 (citing Ex. 2013); Ex. 2013 (the '807 publication). In our Preliminary Guidance, we noted that

Patent Owner was required to cite the ’451 application. PG 6 (citing *Lectrosonics* for the proposition that a motion to amend must set forth written description support in the originally filed disclosure of the subject patent). Patent Owner responded by filing a copy of the ’451 application with its reply in support of the motion to amend. *See* Ex. 2017. Patent Owner’s reply also included some citations to the ’451 application as part of Patent Owner’s arguments that various amendments are supported by the original disclosure document. *See* MTA Reply 2–5.

Via its belated references to the ’451 application, Patent Owner has complied, to some degree, with the requirement from *Lectrosonics* that its motion set forth written description support in the original disclosure document. And, even to the extent Patent Owner’s only citations in the record are made to the ’807 publication, we find the ’807 publication to be substantially identical to the ’451 application. Moreover, Petitioner does not base any of its arguments on potential differences between the publication and the original application. Thus, under the particular circumstances of this case, we determine that any error Patent Owner made is harmless and decline to deny Patent Owner’s motion to amend for failure to comply with the original disclosure requirement of *Lectrosonics*. Hereinafter, we refer to the ’451 application when discussing written description arguments. We turn now to those arguments.

Petitioner contends that Patent Owner has not shown that the ’451 application adequately supports “a request rate <u>representing a repeating time interval for</u> ~~of~~ location coordination packets to be communicated to a target host and a listen rate <u>representing a repeating time interval for receipt</u> of the location coordinate packets from a satellite navigation system,” as recited in proposed substitute claim 20 and similarly recited in proposed substitute claim 27. MTA Opp. 5. Specifically, Petitioner argues that neither the word "represent" nor any variation thereof appears in the '451 application. *Id.* Petitioner also argues that there is no disclosure in the '451 application of any "time interval" that repeats, and the word "repeating" only appears in the Specification in the context of a repeatedly tapping Morse code to generate a distress signal. *Id.* (citing Ex. 1001, 9:58–62). Petitioner additionally argues that there is no disclosure of how a "rate" that "represents" a "time interval," repeating or otherwise, is in any way different from any other rate disclosed in the '451 application. *Id.* Petitioner further argues that the paragraphs cited by Patent Owner in its motion to amend (i.e., paragraphs 53, 64, 65, and 66 of the '807 publication[8]) merely describe that a communication protocol has an associated request rate or listen rate that may be specified by a frequency or an interval, and do not provide adequate written description support for a rate "representing a repeating time interval." *Id.* at 5–6.

In reply, Patent Owner cites the '451 application as disclosing that "portable tracking device 402 adjusts settings (an internal time schedule)" and "checks internal time schedule to determine if it should listen for (perform a location lookup of) location coordinates 422 from satellite navigation system 403." MTA Reply 2 (quoting Ex. 2017, 18:7–12). Patent Owner also cites various examples in the '451 application related to request rate and listen rate schedules for tracking a dog, a car, and rented construction equipment. *Id.* (citing Ex. 2017, 21:8–22:16).

[8] These paragraphs correspond to page 17, lines 12–21, and page 21, line 8 to page 22, line 16 in the '451 application. *See* Ex. 2017.

Based on our understanding of this limitation (*see infra* § III.C), we do not agree with Petitioner's arguments. Regarding the request rate and listen rate, the '451 application discloses that the "updated set of network communication signaling protocols . . . includes an update rate (e.g., refresh rate) of location coordinate packets 446." Ex. 2017, 17:14–16. In turn, "the update rate of location coordinate packets 446 includes request rate 420 of location coordinate packets 422 by target host 452 . . . and/or listen rate 425 of location coordinate packets 422 by portable electronic tracking device 402." *Id.* at 17:16–19. Regarding the repeating time interval, the '451 application discloses that "[i]n response to receipt of updated set of network communication signaling protocols, portable location tracking device 402 adjusts settings (an internal time schedule)" and "[p]ortable location tracking device 402 checks internal time schedule to determine if it should listen for (perform a location lookup of) location coordinates 422 from satellite navigation system 403." *Id.* at 18:7–15. Further, the '451 application describes examples of update rate intervals (in minutes) for tracking a dog, a car, and rented construction equipment that constitute the repeating time intervals for the request rate and/or listen rate. *See id.* at 21:8–22:16. In light of these disclosures, we determine that the '451 application adequately supports "a request rate representing a repeating time interval for ~~of~~ location coordination packets to be communicated to a target host and a listen rate representing a repeating time interval for receipt of the location coordinate packets from a satellite navigation system," as recited in proposed substitute claim 20 and similarly recited in proposed substitute claim 27.

For these reasons, and considering Patent Owner's evidence of support in the '807 publication and the '451 application, we determine that Patent Owner has shown adequate written description support for proposed substitute claims 20, 23–25, 27, 29, 32, and 34.

6. Conclusion Regarding Procedural Requirements

In view of the above, we determine that Patent Owner has shown, by a preponderance of the evidence, that its motion to amend meets all of the statutory and regulatory requirements of 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. We now proceed to consider whether Petitioner has met its burden of persuasion with respect to patentability. 37 C.F.R. § 42.121(d)(2).

C. Claim Interpretation

Patent Owner puts forth a claim construction for the following limitation in proposed substitute claim 20:

> at least one of a request rate <u>representing a repeating time interval for</u> ~~of~~ location coordinate packets to be communicated to a target host and a listen rate <u>representing a repeating time interval for receipt</u> of the location coordinate packets from a satellite navigation system, the updated set of network communication signaling protocols . . . <u>representing a timing schedule for at least one of the request rate and the listen rate</u>.

MTA 16–17. Patent Owner contends this limitation requires that "the intervals represented by the request rate and the listen rate, as part of the updated set of network communication signaling protocols, represent a timing schedule for when the events occur." *Id.* at 17. Patent Owner contends this construction is consistent with the proposed claim language itself and with the Specification; in support of this contention, Patent Owner reproduces block quotations of portion of the proposed claim language and an excerpt from the Specification, but Patent Owner does not explain how these block quotations support its contention. *Id.* at 17–19 (quoting MTA 25; Ex. 1001, 12:1–18). Patent Owner also states that the same construction should apply to the similar language in proposed substitute claim 27. *Id.* at 17.

Petitioner disputes Patent Owner's proposed construction insofar as it "requires that the schedule indicate 'when'—rather than 'how often'—the events occur." MTA Opp. 2. In support of this argument, Petitioner notes that the Specification of the '774 patent states that "refresh rate 446" is one example of a schedule. *Id.* (citing Ex. 1001, 12:59–60). Petitioner further notes that refresh rate 446 is shown to be a time interval (i.e., "10 min") in Figure 4. *Id.* (citing Ex. 1001, Fig. 4). Petitioner additionally notes that the '774 patent describes time intervals in minutes as exemplary schedules for tracking a dog, a car, and rented construction equipment. *Id.* at 2–3 (citing Ex. 1001, 14:1–57). As such, Petitioner contends that a "timing schedule" does not require an indication of *when* an event should occur. *Id.* at 3.

We agree with Petitioner that the Specification of the '774 patent includes several examples where a "timing schedule" is indicated with time intervals denominated in minutes. *See* Ex. 1001, 14:1–57, Fig. 4. We additionally agree that a refresh rate is given as an example of a timing schedule in the Specification. *Id.* at 12:57–62 (describing an exemplary "timing schedule (e.g., refresh rate 446) to maximize effectiveness of request rate 420 and listen rate 425 in response to substantially real-time measured velocity of travel of portable electronic tracking device 402"). For these reasons, we reject Patent Owner's contention (MTA 17) that the recited "timing schedule" must include an indication of *when* an event must occur. Instead, we apply the plain and ordinary meaning to this limitation and note that time intervals (e.g., refresh rates) in minutes are described as exemplary timing schedules in the Specification of the '774 patent.

Accordingly, we determine that no terms of the proposed substitute claims require explicit construction. *See Nidec*, 868 F.3d at 1017; *Vivid*, 200 F.3d at 803.

D. Whether the Proposed Substitute Claims Are Unpatentable Under 35 U.S.C. § 112 ¶ 1

Petitioner contends that proposed substitute claims 20, 23–25, 27, 29, 32, and 34 are unpatentable under 35 U.S.C. § 112 ¶ 1 for failing to satisfy the written description requirement. MTA Opp. 4–6. The parties' arguments for this issue are the same as discussed above with respect to the new matter analysis. *See supra* § III.B.5. Thus, for the same reasons discussed above, we determine that Petitioner has not shown, by a preponderance of the evidence, that proposed substitute claims 20, 23–25, 27, 29, 32, and 34 are unpatentable for failing to comply with 35 U.S.C. § 112 ¶ 1.

E. Patentability of Proposed Substitute Claims 20, 23–25, 27, 29, 32, and 34 over Sakamoto

Petitioner contends the subject matter of proposed substitute claims 20, 23–25, 27, 29, 32, and 34 would have been obvious over Sakamoto. MTA Opp. 7–15; MTA Sur-reply 7–10. Patent Owner disputes Petitioner's contentions. MTA 20–22; MTA Reply 5–9.

1. Proposed Substitute Claim 20

Petitioner's analysis for proposed substitute claim 20 builds upon its analysis for original claim 1 from the Sakamoto obviousness ground discussed above. We now focus on the amendments in proposed substitute claim 20.

Proposed substitute claim 20 recites "a request rate <u>representing a repeating time interval for</u> ~~of~~ location coordinate packets to be communicated to a target host." MTA 25. Petitioner cites Sakamoto's teaching of position management/positioning server 2 sending position search request messages to position information communication terminal 1. MTA Opp. 7 (citing Ex. 1004 ¶¶ 31–34). In particular, Petitioner cites Sakamoto's teaching of sending position search request messages at a "short cycle" in normal or high sensitivity positioning modes. *Id.* (citing Ex. 1004 ¶ 40). Petitioner further notes that Sakamoto's terminal 1 responds to the position search request message with a search response message that includes position information. *Id.* at 8 (quoting Ex. 1004 ¶¶ 34–35). Petitioner also cites Mr. Andrews's testimony that "'short cycle' tracking would involve sending these position search request messages at a 'regular' rate, *i.e.,* such requests would be transmitted at a 'repeating time interval' (i.e., with a particular frequency) to the position information communication terminal." *Id.* at 8–9 (citing Ex. 1003 ¶¶ 91, 93). Petitioner additionally references its analysis from the Petition regarding Sakamoto's adjusting positioning modes responsive to an estimated charge level of the charge unit and regarding how each mode has an associated refresh rate. *Id.* at 9 (citing Pet. 31–34). Petitioner also contends an ordinarily skilled artisan would have known that, in Sakamoto's power-off mode, the GPS unit in terminal 1 has an associated transmission rate of 0 Hz. *Id.* (citing Ex. 1003 ¶ 94).

Patent Owner does not dispute Petitioner's analysis of the "request rate" limitation of proposed substitute claim 20. We are persuaded that Sakamoto's positioning server 2 sends position search request messages to terminal 1 at a "short cycle" in normal or high sensitivity positioning modes, which teaches the recited "request rate representing a repeating time interval for ~~of~~ location coordinate packets to be communicated to a target host." *See, e.g.*, Ex. 1003 ¶ 91; Ex. 1004 ¶¶ 31–34, 40.

Proposed substitute claim 20 further recites "a listen rate representing a repeating time interval for receipt of the location coordinate packets from a satellite navigation system." MTA 25. Petitioner contends that Sakamoto's terminal 1 "receives GPS location coordinate packets at a regular rate and that this rate (and the corresponding interval) changes based on the positioning mode." MTA Opp. 10. In particular, Petitioner contends that "*Sakamoto's* position information communication terminal, when continuously operated, has an associated update rate and that, as such, would 'listen' for GPS packets at a 'repeating time interval.'" *Id.* at 11. Petitioner links continuous operation with Sakamoto's high sensitivity positioning mode and contends that, in such a mode, "many GPS receivers generate a position update once per second (i.e., at a rate of 1 Hz)." *Id.* at 10 (quoting Ex. 1003 ¶ 90). Petitioner additionally contends that Sakamoto's normal positioning mode has a listen rate with a "repeating time interval" insofar as Sakamoto sends a satellite signal level request message at "the cycle set in advance in the position information database." *Id.* at 11–12 (citing Ex. 1003 ¶ 92; Ex. 1004 ¶ 37). Petitioner again contends an ordinarily skilled artisan would have known that, in Sakamoto's power-off mode, the GPS unit in terminal 1 has an associated refresh rate of 0 Hz. *Id.* at 12 (citing Ex. 1003 ¶ 94).

Patent Owner argues that "*Sakamoto's* refresh rate is not the same as 'update rate 446/refresh rate 446/refresh rate' as disclosed in the '451 application." MTA Reply 7. Patent Owner, however, does not identify how Sakamoto's refresh rate differs from that disclosed in the '451 application. In particular, the '774 patent and the '451 application describe an embodiment where "listen rate 425 of location coordinate packets 422 to the host target 428 and response rate 425 include global positioning system (GPS) system refresh rate 446." Ex. 1001, 13:40–43; Ex. 2017, 20:19–21; *see also* MTA Sur-reply 8 (Petitioner making same argument). Therefore, we are persuaded that Sakamoto's GPS system refresh rate, which Petitioner discusses in conjunction with Sakamoto's high sensitivity positioning mode, is a refresh rate in the same sense described in the '774 patent and the '451 application. Pet. 31–32 (citing Ex. 1003 ¶ 90; Ex. 1004 ¶¶ 25, 36), 34 (chart).

Furthermore, Mr. Andrews explains that "a continuously operating GPS receiver (such as *Sakamoto's* GPS receiver operating in high sensitivity positioning mode) has an associated update rate," e.g., once per second (1 Hz). Ex. 1003 ¶ 90. Mr. Andrews also testifies that "the rate at which a GPS receiver listens for . . . signals (the claim[ed] 'location coordinate packets') from GPS satellites is tied to its update rate." *Id.* Thus, consistent with the disclosures in the '774 patent and the '451 application, we are persuaded that Sakamoto's GPS refresh rate teaches the recited "listen rate <u>representing a repeating time interval for receipt</u> of the location coordinate packets from a satellite navigation system" with respect to Sakamoto's high sensitivity positioning mode. *See* MTA Opp. 9–10; *see also* MTA 30 (Patent Owner's proposed substitute claim 32 reciting that "the listen rate of the location coordinates comprises a global positioning system (GPS) system refresh rate of the location coordinates"); MTA Reply 5 (Patent Owner acknowledging that "request rate, listen rate, and update rate/refresh rate may be represented as time intervals"). We also are persuaded that Sakamoto teaches the "listen rate" limitation insofar as Sakamoto has a periodic GPS listen rate in normal mode at "the cycle set in advance in the position information database." *See, e.g.*, Ex. 1003 ¶ 92; Ex. 1004 ¶ 37.

Proposed substitute claim 20 further recites "the updated set of network communication signaling protocols having a value that is responsive to a user input request <u>and representing a timing schedule for at least one of the request rate and the listen rate</u>." MTA 25–26. Petitioner contends that the disclosed examples of a "schedule" in the '774 patent "correspond to either a time interval or an update frequency, no different from the short-cycle tracking request rate or GPS listen rate present in *Sakamoto* and explained by Mr. Andrews." MTA Opp. 13–14 (citing Ex. 1003 ¶ 89–94; Ex. 1004 ¶¶ 37, 40). Thus, Petitioner contends that each of Sakamoto's positioning modes "has a set associated refresh rate." *Id.* at 14. Petitioner additionally contends that "the '774 Patent gives 'refresh rate' as one example of a 'schedule,'" so "*Sakamoto's* disclosure of per-mode refresh rates for the listen rate and request rate teaches or otherwise renders obvious" the "<u>timing schedule</u>" limitation. *Id.* at 14–15.

Patent Owner disputes Petitioner's analysis of the "<u>timing schedule</u>" limitation. In particular, Patent Owner cites the '451 application for the proposition that "a time schedule is utilized to determine when to listen for location coordinates (i.e., 'listen rate 425') and transmit those location coordinates (i.e., 'request rate 420')." MTA Reply 4 (citing Ex. 2017, 18:7–9). Moreover, according to Patent Owner,

> "request rate" and "listen rate" represent intervals of a "timing schedule" for when events (i.e., listen for location coordinates and transmit location coordinates) occur while "update rate 446/ refresh rate 446/refresh rate" is an update to the timing schedule that includes "request rate 420 … and/or listen rate 425" as explicitly disclosed by the '451 application.

Id. at 5 (citing Ex. 2017, 17:17–19). Patent Owner further argues that the recited "updated set of network communication signaling protocols" is "a distinct element, in particular distinct from either a 'request rate' or a 'listen rate.'" *Id.* at 8.

As discussed above (*see supra* § III.C), we do not agree that the recited "<u>timing schedule</u>" must be distinct from a refresh rate. Rather, Petitioner cites several examples establishing that "the '774 Patent uses the terms 'refresh rate,' 'update rate' and 'timing schedule' interchangeably" with respect to reference numeral 446. MTA Sur-reply 3–4 (citing Ex. 1001, 11:56–57, 12:59–60, 13:33). Nor do we understand Patent Owner's argument that the '774 patent's use of the abbreviation "e.g." should be read as "based on" rather than "for example" in the context of describing timing schedules. MTA Reply 4 (quoting Ex. 2017, 19:15–19[9]) (arguing that "timing schedule (e.g., refresh rate 446)" should be interpreted as "'timing schedule' based on 'refresh rate 446'"). Instead, the natural reading of the

[9] This disclosure from the '451 application is the same as column 12, lines 57–62 from the issued '774 patent.

'774 patent's Specification is that a refresh rate is an example of timing schedule. Ex. 1001, 12:57–62. Based on this understanding, we are persuaded by Petitioner's contention that "*Sakamoto's* short-cycle tracking request rate and GPS listen rate 'represent[] a timing schedule' for the request rate and the listen rate, respectively." MTA Opp. 13–14 (alteration by Petitioner) (citing Ex. 1003 ¶¶ 89–94; Ex. 1004 ¶¶ 37, 40). We also agree with Petitioner that the "refresh rates for the location coordinate packets transmitted to a target host and received from a satellite navigation system," which are associated with each of Sakamoto's three positioning modes, teach the "timing schedule" limitation. *See id.* at 13–15 (including chart on page 14 where each row represents a "timing schedule" for a given mode from Sakamoto).

Patent Owner also repeats several arguments that it makes with respect to the original claims. For example, Patent Owner again argues that Sakamoto does not teach "the updated set of network communication signaling protocols having a value that is responsive to a user input request." MTA Reply 6–7. In particular, Patent Owner argues that "none of *Sakamoto's* thresholds 'represent[] a timing schedule for at least one of the request rate and the listen rate' and, therefore, *Sakamoto* does not disclose a 'value that is responsive to a user input request.'" *Id.* at 7. We do not agree for reasons similar to those discussed above with respect to original claim 1. *See supra* § II.D.2. In particular, Petitioner relies on Sakamoto's teaching of a user selecting a positioning mode. Pet. 34–35 (citing Ex. 1004 ¶ 26). As discussed with respect to claim 1, this changes the "value" of the operating mode and/or the "value" of the request rate and listen rate associated with the selected operating mode. *See, e.g.*, Ex. 1003 ¶¶ 92–93; Ex. 1004 ¶ 28.

And, as discussed directly above, changing Sakamoto's operating mode changes the refresh rates for location coordinate packets transmitted to a target host and received from a satellite navigation system, which is a "timing schedule" as described in the '774 patent. *See, e.g.*, Ex. 1001, 12:57–62; Ex. 1004 ¶¶ 37, 40. Thus, we do not agree with Patent Owner's arguments.

Patent Owner additionally argues that "*Sakamoto* does not disclose an **updated** set of network communication signaling protocols that has a user input request responsive value and represents a timing schedule." MTA Reply 8. Patent Owner further argues that "*Sakamoto* cannot disclose a refresh rate that is generated in substantially real-time." *Id.* at 9. We do not agree with these arguments for the same reasons discussed above for original claim 1. *See supra* § II.D.2. As acknowledged by Patent Owner at the oral hearing, the "updated set based on the claim language would include either/or both a refresh rate and a listen rate." Tr. 39:17–18. Petitioner has established as much because changing Sakamoto's positioning modes updates the listen rate and request rate. *See, e.g.*, Ex. 1003 ¶ 89; Ex. 1004 ¶¶ 5–10, 28. We also are persuaded that Sakamoto's "automatic shift" from high sensitivity mode to normal mode based on the battery falling below a threshold teaches the "substantially real-time" limitation. *See, e.g.*, Ex. 1003 ¶ 88; Ex. 1004 ¶¶ 29, 46.

The remaining limitations in proposed substitute claim 20 are the same as in original claim 1. We have discussed these limitations with respect to claim 1 of the Sakamoto obviousness ground above. *See supra* § II.D.2.

Having considered Petitioner's contentions and evidence and Patent Owner's arguments, we find that Sakamoto teaches every limitation of proposed substitute claim 20 in light of the knowledge of a person of ordinary skill in the art. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of proposed substitute claim 20 would have been obvious over Sakamoto.

2. Proposed Substitute Claims 23–25

Proposed substitute claims 23–25 depend directly or indirectly from proposed substitute claim 20 and are the same as original claims 4–6 except that the claim dependencies have been updated. We have analyzed all limitations of proposed substitute claims 23–25 above. *See supra* §§ II.D.3–5. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 23–25 would have been obvious over Sakamoto.

3. Proposed Substitute Claim 27

Petitioner's analysis for proposed substitute claim 27 builds upon its analysis for original claim 8 in the Sakamoto obviousness ground. We now focus on the amendments in proposed substitute claim 27.

Proposed substitute claim 27 recites

> an electrical power resource management component to adjust cycle timing of at least one of a request rate <u>representing a repeating time interval for transmission</u> of location coordinate packets to a target host and a listen rate <u>representing a repeating time interval for receipt</u> of the location coordinate packets responsive to an estimated charge level of the charging unit.

MTA 28. Petitioner relies on the same analysis for the "repeating time interval" limitations discussed above with respect to proposed substitute claim 20. MTA Opp. 7–12. Patent Owner also relies on the same arguments discussed above. MTA Reply 5–9.

Proposed substitute claim 27 further recites "the cycle timing representing a timing schedule for at least one of the request rate and the listen rate." MTA 28. Petitioner relies on the same analysis for the "timing schedule" limitation discussed above with respect to proposed substitute claim 20. MTA Opp. 13–15. Patent Owner also relies on the same arguments discussed above. MTA Reply 5–9.

Thus, based on the same analysis discussed above (*see supra* §§ II.D.6, III.E.1), we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claim 27 would have been obvious over Sakamoto.

4. Proposed Substitute Claims 29, 32, and 34

Proposed substitute claims 29, 32, and 34 depend from proposed substitute claim 27 and are the same as original claims 10, 13, and 15 except that the claim dependencies have been updated. We have analyzed all limitations of proposed substitute claims 29, 32, and 34 above. *See supra* §§ II.D.7–9. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 29, 32, and 34 would have been obvious over Sakamoto.

F. Patentability of Proposed Substitute Claims 20, 23–25, 27, 29, 32, and 34 over Sakamoto and Huang

Petitioner contends the subject matter of proposed substitute claims 20, 23–25, 27, 29, 32, and 34 would have been obvious over the combination of Sakamoto and U.S. Patent No. 7,826,968 B2 (Ex. 2011, "Huang"). MTA Opp. 16–24; MTA Sur-reply 10–12. We already have found proposed substitute claims 20, 23–25, 27, 29, 32, and 34 to be unpatentable over Sakamoto, so we do not reach the ground based on Sakamoto and Huang. *See SAS*, 138 S. Ct. at 1359; *Boston Sci.*, 809 F. App'x at 990.

IV. CONCLUSION[10]

Petitioner has shown, by a preponderance of the evidence, that claims 1, 4–6, 8, 10, 13, and 15 would have been obvious over Sakamoto. Patent Owner has shown that its motion to amend complies with the statutory and regulatory requirements. Nevertheless, Petitioner has shown, by a preponderance of the evidence, that proposed substitute claims 20, 23–25, 27, 29, 32, and 34 would have been obvious over Sakamoto. Thus, we *deny* Patent Owner's motion to amend.

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

V. ORDER

Accordingly, it is

ORDERED that claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent are held to be unpatentable;

FURTHER ORDERED that Patent Owner's motion to amend is *denied*; and

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

In summary:

Claims	**35 U.S.C. §**	**Reference(s)/Basis**	**Claims Shown Unpatentable**	**Claims Not shown Unpatentable**
1, 4–6, 8, 10, 13, 15	103(a)	Sakamoto	1, 4–6, 8, 10, 13, 15	
1, 4–6, 8, 10, 13, 15	103(a)[11]	Sakamoto, AAPA		
1, 4–6, 8, 10, 13, 15	103(a)[12]	Sakamoto, Hayasaka		
Overall Outcome			1, 4–6, 8, 10, 13, 15	

[11] As explained above, we do not reach this ground. *See supra* § II.E.

[12] As explained above, we do not reach this ground. *See supra* § II.F.

Motion to Amend Outcome	**Claims**
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment[13]	20, 23–25, 27, 29, 32, 34
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	20, 23–25, 27, 29, 32, 34
Substitute Claims: Not Reached	

[13] Although Patent Owner's motion originally proposed claims to replace dependent claims not challenged in this proceeding (*see* MTA 25–30), Patent Owner later agreed that "only corresponding proposed substitute claims 20, 23-25, 27, 29, 32, and 34 are to be considered in relation to Patent Owner's Motion to Amend." MTA Reply 1; *see supra* § III.B.2.

PETITIONER:

Jennifer C. Bailey
Adam P. Seitz
ERISE IP, P.A.
jennifer.bailey@eriseip.com
adam.seitz@eriseip.com

PATENT OWNER:

Shaun D. Gregory
TAFT STETTINIUS & HOLLISTER LLP
sgregory@taftlaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

LBT IP I LLC,
Patent Owner.

IPR2020-01190
Patent 8,542,113 B2

Before JOHN A. HUDALLA, SHEILA F. McSHANE, and JULIET MITCHELL DIRBA, *Administrative Patent Judges*.

HUDALLA, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

Apple Inc. ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1–20 ("the challenged claims") of U.S. Patent No. 8,542,113 B2 (Ex. 1001, "the '113 patent"). LBT IP I LLC ("Patent Owner") filed a Preliminary Response (Paper 8). Taking into account the arguments presented in Patent Owner's Preliminary Response, we determined that the information presented in the Petition established that there was a reasonable likelihood that Petitioner would prevail with respect to its unpatentability challenges. Pursuant to 35 U.S.C. § 314, we instituted this proceeding on March 4, 2021, as to all challenged claims and all grounds of unpatentability. Paper 9 ("Dec. on Inst.").

During the course of trial, Patent Owner filed a Patent Owner Response (Paper 17, "PO Resp."), and Petitioner filed a Reply to the Patent Owner Response (Paper 25, "Pet. Reply"). Patent Owner also filed a Sur-reply. Paper 31 ("PO Sur-reply").

In addition, Patent Owner filed a contingent motion to amend (Paper 16, "MTA") proposing to substitute claims 21–40 for claims 1–20, respectively, if we are to determine claims 1–20 unpatentable. Petitioner filed an opposition to the motion to amend. Paper 26 ("MTA Opp."). On September 24, 2021, pursuant to Patent Owner's request (*see* MTA 2), we issued Preliminary Guidance on Patent Owner's motion to amend. Paper 28 ("PG"). Patent Owner then filed a revised motion to amend in which it proposed revised substitute claims 21–40.[1] Paper 30 ("RMTA"). Petitioner opposed Patent Owner's revised motion to amend. Paper 34 ("RMTA Opp."). Patent Owner filed a reply in support of its revised motion to amend (Paper 39 ("RMTA Reply")), to which Petitioner filed a sur-reply (Paper 40 ("RMTA Sur-reply")).

An oral hearing was held on January 7, 2022, and a transcript of the hearing is included in the record. Paper 41 ("Tr.").

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[1] Hereinafter, we refer only to the proposed substitute claims in the revised motion to amend unless otherwise noted.

Petitioner filed Declarations of Scott Andrews with its Petition (Ex. 1003), with its Reply and opposition to the motion to amend (Ex. 1080), and with its opposition to the revised motion to amend (Ex. 1081). Both parties filed a transcript of the deposition of Mr. Andrews. Exs. 1068, 2003.

We have jurisdiction under 35 U.S.C. § 6. This decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of claims 1–20 of the ’113 patent. For the reasons discussed below, Petitioner has demonstrated by a preponderance of the evidence that claims 1–20 of the ’113 patent are unpatentable. We also *deny* Patent Owner’s revised motion to amend.

I. BACKGROUND

A. Real Parties-in-Interest

Petitioner identifies Apple Inc. as the real party-in-interest. Pet. 74. Patent Owner identifies LBT IP I LLC as the real party-in-interest. Paper 3, 2; Paper 6, 2.

B. Related Proceedings

The parties identify the following proceeding related to the ’113 patent (Pet. 74; Paper 3, 2; Paper 6, 2):

LBT IP I LLC v. Apple Inc., No. 1:19-cv-01245-UNA (D. Del. filed July 1, 2019).

We additionally note that Petitioner has challenged other patents owned by Patent Owner in IPR2020-01189, IPR2020-01191, IPR2020-01192, and IPR2020-01193. We issue final written decisions in

IPR2020-01189, IPR2020-01191, IPR2020-01192, and IPR2020-01193 concurrently with this Decision.

C. The '113 patent

The '113 patent is directed to location and tracking communication systems. Ex. 1001, 1:33–34. Figure 1 of the '113 patent is reproduced below.

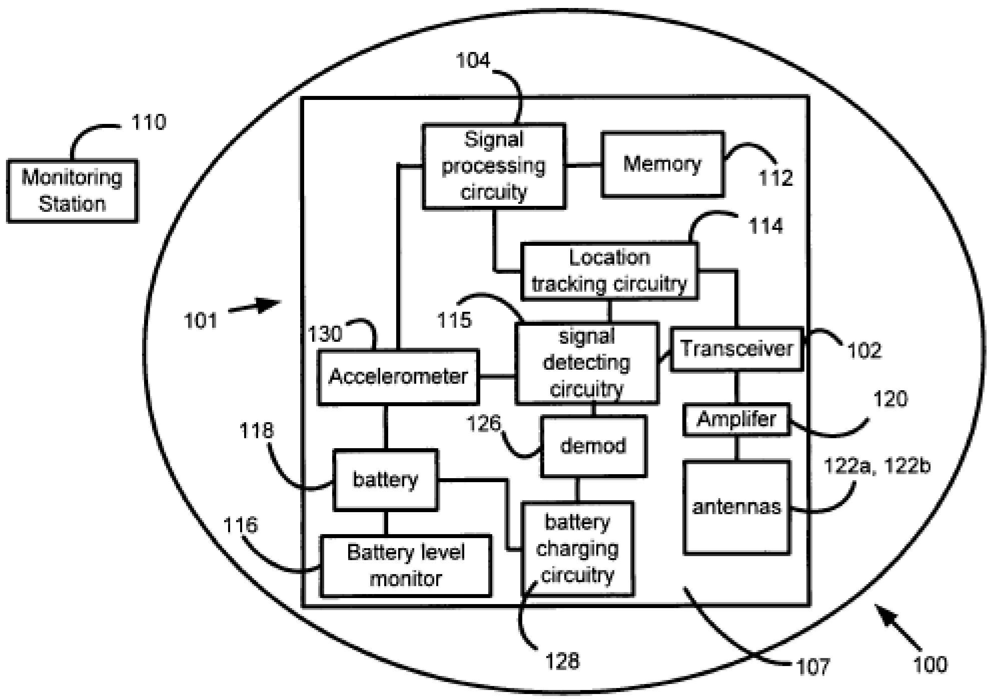

Figure 1

Figure 1 depicts a schematic of tracking device 100, which contains electronic components 101 such as transceiver 102, signal processing circuitry 104 (e.g., a microprocessor or other signal logic circuitry), and accelerometer 130. *Id.* at 4:6–8, 5:53–56. Location tracking circuitry 114 (e.g., global positioning system (GPS) circuitry) calculates location data received and sends the data to signal processing circuitry 104. *Id.* at 6:16–18. Signal detecting circuitry 115 detects and measures signal power level.

Id. at 6:21–22. Battery level monitor 116 detects a battery level of battery 118. *Id*. at 6:24–26.

Tracking device 100 periodically checks availability of a GPS signal by performing a GPS signal acquisition to determine if a receive communication signal is above a first signal level. *Id.* at 7:7–10. Location tracking circuitry 114 or transceiver 102 may be placed in a sleep or standby mode to conserve a battery level of battery 118. *Id.* at 7:4–8. Electronic tracking device 100 may resume GPS signal acquisition using GPS satellites when the acquired receive communication signal level is above the first signal level. *Id.* at 7:10–16.

Accelerometer 130 may also activate if a power level of the receive communication signal (e.g., GPS signal) is insufficient for processing. *Id.* at 9:48–50. In this case, processing unit 104 computes current location coordinates using acceleration measurements. *Id.* at 9:53–54. When the receive communication signal again becomes sufficient for processing, accelerometer 130 is deactivated and location tracking circuitry 114 is activated. *Id.* at 9:58–67. In this case, processing unit 104 resumes the calculation of location coordinates from the receive communication signal. *Id.*

The ’113 patent issued from Application No. 13/356,614 (“the ’614 application”) filed on January 23, 2012, which is a division of Application No. 11/969,905 (“the ’905 application”) filed on January 6, 2008. Ex. 1001, codes (22), (62). As discussed below, Petitioner applies the January 6, 2008, filing date of the ’905 application (i.e., the earliest possible effective filing date) for qualifying the asserted references as prior art. *See* Pet. 5, 9–12; MTA Opp. 8–9.

D. Illustrative Claim

Of the challenged claims of the ’113 patent, claims 1, 7, and 17 are independent. Claims 2–6 depend from claim 1; claims 8–16 depend from claim 7; and claims 18–20 depend from claim 17. Claim 1 is illustrative of the challenged claims and recites:

> 1. A method to control power usage comprising:
>
> measuring a receive communication signal level by primary location tracking circuitry of an electronic tracking device communicated by a primary location tracking system;
>
> reducing applied power level to the primary location tracking circuitry in response to measurement of a receive communication signal level less than a first signal level;
>
> increasing applied power level to supplemental location tracking circuitry response to measurement of the receive communication signal less than the first signal level;
>
> determining differential positional measurements based in part on acceleration measurements of supplemental location tracking circuitry associated with a secondary location tracking system; and
>
> determining positional coordinates of electronic tracking device responsive to a known reference coordinate values and the differential positional measurements.

Ex. 1001, 10:26–44.

E. Prior Art

Petitioner relies on the following prior art:

> Japanese Unexamined Patent Application Publication No. JP 2004-37116A, published Feb. 5, 2004 (Ex. 1004, “Sakamoto”);[2]

[2] Sakamoto is a Japanese-language publication (Ex. 1004, 36–49, 58) that was filed with an English-language translation (*id.* at 1–19, 21–34, 52–56)

U.S. Patent Application Publication No. 2003/0217070 A1, filed Apr. 11, 2003, published Nov. 20, 2003 (Ex. 1005, "Gotoh");

U.S. Patent No. 5,583,776, filed Mar. 16, 1995, issued Dec. 10, 1996 (Ex. 1006, "Levi"); and

U.S. Patent Application Publication No. 2007/0208544 A1, filed Mar. 1, 2007, published Sept. 6, 2007 (Ex. 1007, "Kulach").

F. The Instituted Grounds

We instituted *inter partes* review of claims 1–20 of the '113 patent on the following grounds (Dec. on Inst. 29), which are all the grounds presented in the Petition (Pet. 7–8):

Claims Challenged	35 U.S.C. §	References/Basis
1–20	103(a)[3]	Sakamoto, Gotoh, Levi
1–20	103(a)	Sakamoto, Gotoh, Levi, Kulach

II. ANALYSIS

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was

and declarations attesting to the accuracy of the translation (*id.* at 20, 50). Our citations to Sakamoto herein refer to the translation.

[3] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103, and 112. Because the '113 patent was filed before March 16, 2013 (the effective date of the relevant amendments), the pre-AIA versions of §§ 102, 103, and 112 apply.

made to a person having ordinary skill in the art to which said subject matter pertains. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations.[4] *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We also recognize that prior art references must be "considered together with the knowledge of one of ordinary skill in the pertinent art." *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

B. Level of Ordinary Skill in the Art

Citing testimony from Mr. Andrews, Petitioner contends a person of ordinary skill in the art (or "POSITA") "would have had a bachelor's degree in Electrical Engineering, Mechanical Engineering, Computer Engineering, Computer Science, or an equivalent degree, with at least two years of experience in GPS navigation, dead reckoning, portable tracking devices, or related technologies." Pet. 5 (citing Ex. 1003 ¶ 30). For purposes of our Decision on Institution, we adopted Petitioner's definition of the level of ordinary skill in the art without the qualifier "at least." Dec. on Inst. 7. Patent Owner states that it adopts this definition. PO Resp. 3; MTA 17; RMTA 17–18. Thus, we discern no reason to change the level of ordinary skill in the art applied in this Final Written Decision. Accordingly, a person

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

of ordinary skill in the art would have had a bachelor's degree in Electrical Engineering, Mechanical Engineering, Computer Engineering, Computer Science, or an equivalent degree, with two years of experience in GPS navigation, dead reckoning, portable tracking devices, or related technologies. We determine that this definition comports with the level of skill necessary to understand and implement the teachings of the '113 patent and the asserted prior art.

C. Claim Interpretation

In an *inter partes* review, we construe each claim "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b). Accordingly, our claim construction standard is the same as that of a district court. *See id.* Under the standard applied by district courts, claim terms are generally given their plain and ordinary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). "There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Neither party puts forth any terms for construction. *See* Pet. 8. We determine that no terms require explicit construction. *See, e.g.*, *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed.

Cir. 2017) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy' . . . ." (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Obviousness Ground Based on Sakamoto, Gotoh, and Levi

Petitioner contends the subject matter of claims 1–20 would have been obvious over the combination of Sakamoto, Gotoh, and Levi. Pet. 12–69; Pet. Reply 1–18. Patent Owner disputes Petitioner's contentions. PO Resp. 4–16; PO Sur-reply 1–10.

1. Sakamoto

Sakamoto is a Japanese patent application publication directed to the use of a GPS positioning system that includes a portable terminal and remote server. Ex. 1004, code (57), ¶ 18. Figure 1, reproduced below, is a diagram showing a position information communication terminal.

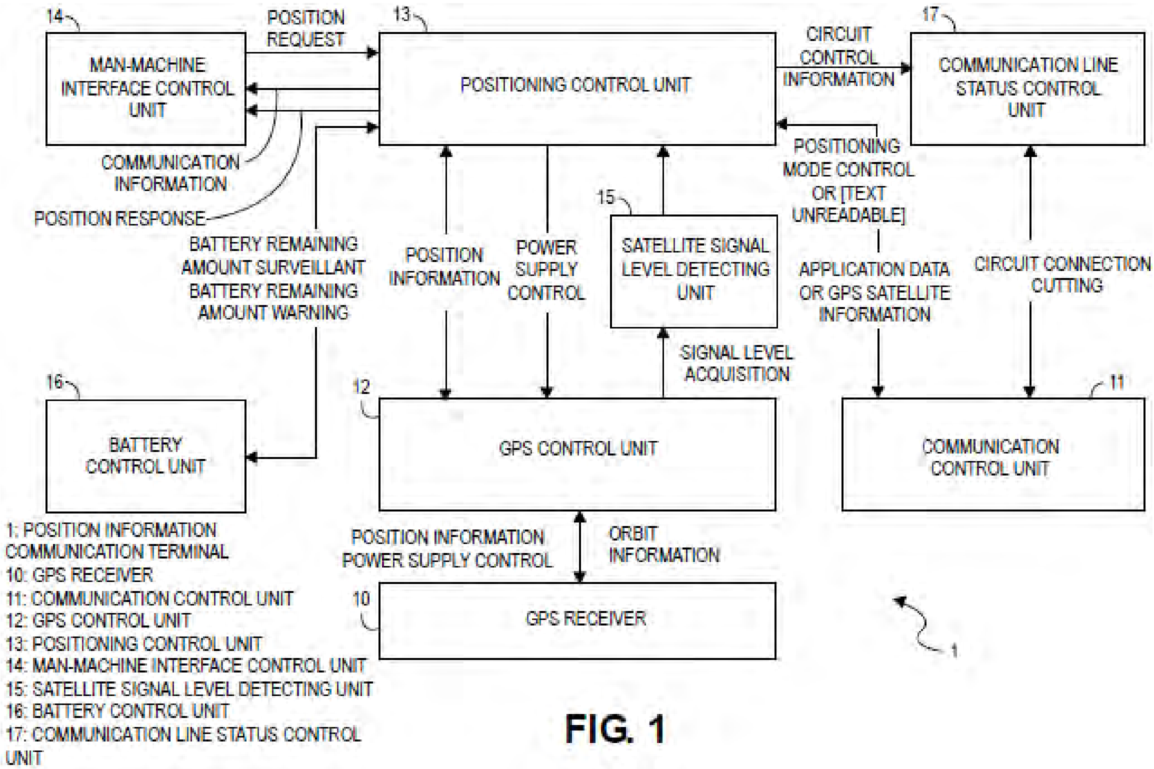

FIG. 1

Figure 1, above, depicts position information communication terminal 1, which includes GPS receiver 10, communication control unit 11 for mobile communications, GPS control unit 12, positioning control unit 13, man-machine interface control unit 14, satellite signal level detection unit 15, battery control unit 16, and communication line status control unit 17. *Id.* ¶ 19. Battery control unit 16 constantly monitors the remaining battery level. *Id.* ¶ 28. Battery control unit 16 provides positioning control unit 13 a remaining battery life warning when the remaining battery amount falls below a preset threshold value. *Id.* ¶ 19.

Satellite signal level detector 15 detects a level of the GPS signal received by GPS receiver 10 via GPS control unit 12. *Id.* When the signal level value is equal to or higher than a predetermined threshold value, positioning mode control unit 22 initiates a normal sensitivity positioning mode. *Id.* ¶ 38. Normal sensitivity positioning mode is a mode in which the

GPS receiver is operated only when necessary. *Id.* ¶¶ 4–5, 19. When the signal level value is equal to or lower than a predetermined threshold value, positioning mode control unit 22 initiates a high sensitivity positioning mode. *Id.* ¶ 38. High sensitivity positioning mode is a mode in which the GPS receiver is operated constantly. *Id.* ¶¶ 4–5, 19. When the signal level value is equal to or lower than a threshold value associated with the inability to perform positioning, positioning mode control unit 22 stops the position search.[5] *Id.* ¶ 38. A user may select among normal sensitivity positioning mode, high sensitivity positioning mode, and the power-off of terminal 1 via man-machine interface control unit 14. *Id.* ¶¶ 26, 28.

Figure 2 of Sakamoto is reproduced below.

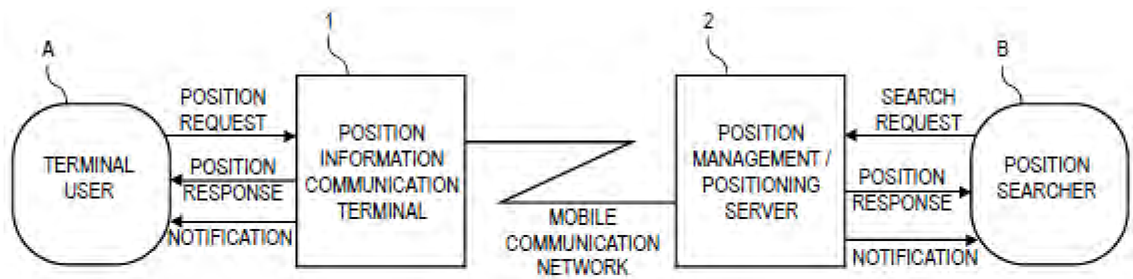

FIG. 2

Figure 2 depicts a GPS positioning system with position management/ positioning server 2 connected to position information communication terminal 1 by a mobile communication network. Ex. 1004 ¶ 18. Terminal 1 responds to a position request from terminal user A by showing the position of terminal 1 to terminal user A. *Id.* Server 2 responds to a position search request of terminal 1 from position searcher B with a position response. *Id.* Server 2 may also send a position search request message to terminal 1, and

[5] The parties refer to this state as "stop-position" mode.

terminal 1 responds by sending a search response message including position information to server 2. *See id.* ¶¶ 31–35, Figs. 4, 5.

Petitioner contends Sakamoto qualifies as prior art under 35 U.S.C. § 102(b) based on its publication date. Pet. 9. Patent Owner does not contest the prior art status of Sakamoto. We determine that Sakamoto qualifies as prior art under 35 U.S.C. § 102(b) because Sakamoto's publication date of February 5, 2004, is more than one year before the earliest effective filing date of the challenged claims, which is January 6, 2008. Ex. 1001, code (62); Ex. 1004, code (43).

2. Gotoh

Gotoh is a U.S. patent application publication directed to a positional information management system and method. Ex. 1005 ¶ 2. Figure 1 of Gotoh is reproduced below.

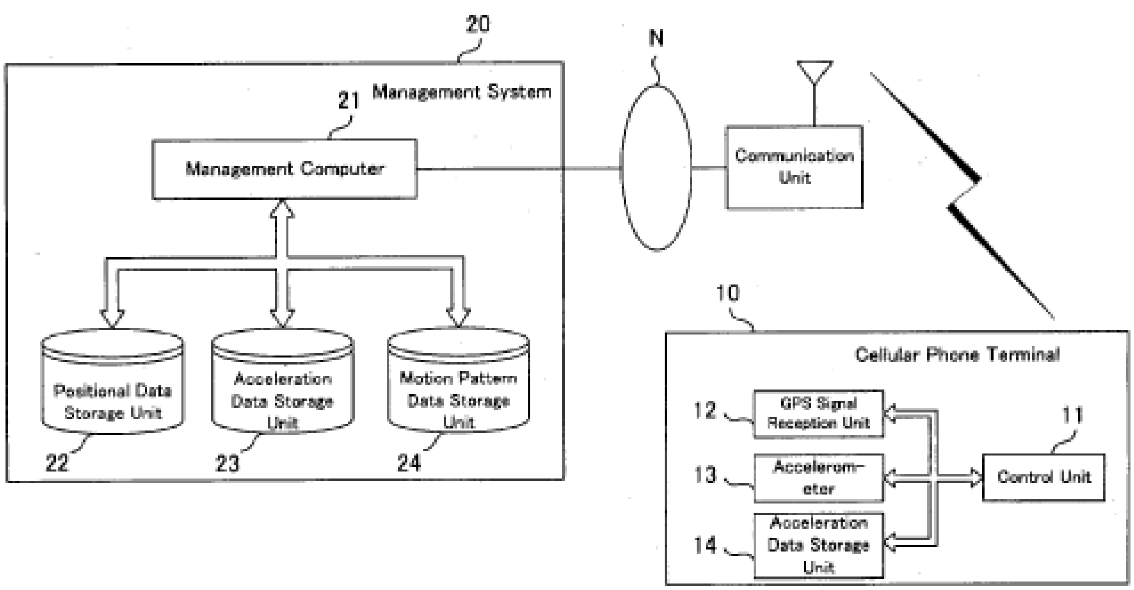

Figure 1, above, depicts an embodiment of a positional management system. *Id.* ¶¶ 43, 50, 51. Cellular phone terminal 10 comprises GPS signal reception unit 12, accelerometer 13, acceleration data storage unit 14, and control unit 11. *Id.* ¶ 51. GPS signal reception unit 12 receives GPS signals from GPS satellites. *Id.* ¶ 53. Accelerometer 13 measures the acceleration applied to cellular phone terminal 10 and stores acceleration data in acceleration data storage unit 14 in time series. *Id.* Control unit 11 controls GPS signal reception unit 12 and accelerometer 13 and includes a wireless communication function for communicating with communication system 30 (not shown). *Id.* ¶ 52. Management system 20 is a computer system for managing positional information received from cellular phone terminal 10. *Id.* ¶ 56.

Cellular phone terminal 10 starts measuring the acceleration when cellular phone terminal 10 cannot receive GPS signals. *Id.* ¶ 66. Control unit 11 sends the acceleration data (including measurement start time and an acceleration log) stored in acceleration data storage unit 14 to management system 20 through communication system 30. *Id.* ¶ 84. Management system 20 includes management computer 21, which receives the acceleration data and then stores the data in acceleration data storage unit 23. *Id.* ¶ 85. Management computer 21 derives a distance traveled between the acceleration measurement start time and a measurement end time based on the acceleration data. *Id.* ¶ 90.

Petitioner contends Gotoh qualifies as prior art under 35 U.S.C. § 102(b) based on its publication date. Pet. 10. Patent Owner does not contest the prior art status of Gotoh. We determine that Gotoh qualifies as prior art under 35 U.S.C. § 102(b) because Gotoh's publication date of November 20, 2003, is more than one year before the earliest effective filing date of the challenged claims, which is January 6, 2008. Ex. 1001, code (62); Ex. 1005, code (43).

3. Levi

Levi is a U.S. patent directed to the use of a portable navigation device that integrates GPS data, dead reckoning (DR) sensors, and digital maps into a self-contained navigation instrument. Ex. 1006, code (57), 1:60–63. The device uses an accelerometer to provide acceleration data indicative of footsteps, and sensed footsteps are converted to distance and velocity. *Id*. at 3:13–14, 3:35–36. A DR software module performs DR navigation by sampling vector velocities for incremental course changes. *Id*. at 7:64–66. The DR software accesses compass, altimeter, pedometer frequency, and calibration table data to obtain velocity magnitude and three-dimensional direction. *Id*. at 8:1–3. DR software normally uses GPS to obtain starting positions, but when GPS data is not valid, DR uses the last fix, whether GPS or manual, for a start point. *Id*. at 8:3–7. DR navigation is automatically used by the navigation module when GPS is unavailable. *Id*. at 8:7–9. The DR system allows users to designate landmarks for navigation. *Id*. at 8:50–9:52.

Petitioner contends Levi qualifies as prior art under 35 U.S.C. § 102(b) based on its issue date. Pet. 10. Patent Owner does not contest the prior art status of Levi. We determine that Levi qualifies as prior art under 35 U.S.C. § 102(b) because Levi's issue date of December 10, 1996, is more than one year before the earliest effective filing date of the challenged claims, which is January 6, 2008. Ex. 1001, code (62); Ex. 1006, code (45).

4. Claim 1

a. Preamble and Claim Limitations

The preamble of claim 1 recites "[a] method to control power usage." Ex. 1001, 10:26. Petitioner relies on Sakamoto's teachings of stopping a position search based on a satellite signal level equal to or lower than a predetermined threshold, which results in a reduction in power consumption. Pet. 12, 28 (citing Ex. 1003 ¶¶ 132, 146–147; Ex. 1004 ¶¶ 38, 50). Patent Owner does not contest Petitioner's analysis of the preamble. Neither party addresses whether the preamble is limiting. We are persuaded that Sakamoto's GPS positioning system switches operating modes and stops position searching when the received GPS signal level is low, which reduces power consumption. *See, e.g.*, Ex. 1003 ¶¶ 132, 146–147; Ex. 1004 ¶¶ 38, 50. Because Petitioner has shown that Sakamoto teaches the preamble, we need not determine whether the preamble is limiting. *See Nidec*, 868 F.3d at 1017.

Claim 1 further recites "measuring a receive communication signal level by primary location tracking circuitry of an electronic tracking device communicated by a primary location tracking system." Ex. 1001, 10:27–30. For the recited "primary location tracking system," Petitioner cites Sakamoto's teaching of GPS satellites from which GPS satellite signals are received. Pet. 21–22 (citing Ex. 1003 ¶ 137; Ex. 1004 ¶¶ 5, 19, code (57)). For the recited "electronic tracking device," Petitioner cites Sakamoto's GPS receiver 10, GPS control unit 12, positioning control unit 13, communication control unit 11, satellite signal level detection unit 15, communication line status control unit 17, and battery control unit 16, which Petitioner calls collectively the "*Sakamoto* Electronic Components," in combination with

Gotoh's accelerometer. *Id.* at 12–13 (citing Ex. 1003 ¶ 133; Ex. 1005 ¶¶ 53, 66, 81, 82), 22–23 (citing Ex. 1003 ¶ 139; Ex. 1004 ¶¶ 19, 37, 38, Figs. 1–3). Petitioner maps the recited "primary location tracking circuitry" to Sakamoto's GPS receiver 10, GPS control unit 12, satellite signal level detecting unit 15, and positioning control unit 13, which Petitioner calls collectively the "*Sakamoto* GPS Components." *Id.* at 24 (citing Ex. 1003 ¶ 143; Ex. 1004 ¶ 19). According to Petitioner, satellite signal level detection unit 15 detects (i.e., measures) the level of the GPS satellite signal received by the GPS receiver 10 (i.e., the "receive communication signal") via the GPS control unit 12. *Id.* at 29 (citing Ex. 1003 ¶¶ 152–154; Ex. 1004 ¶¶ 8, 19, 22, 50).

Patent Owner does not contest Petitioner's analysis of the "measuring" limitation. We are persuaded Sakamoto teaches that the "*Sakamoto* GPS Components" measure received signal levels received from GPS satellites. *See, e.g.*, Ex. 1003 ¶¶ 152–154; Ex. 1004 ¶¶ 8, 19, 22, 50.

Claim 1 further recites "reducing applied power level to the primary location tracking circuitry in response to measurement of a receive communication signal level less than a first signal level." Ex. 1001, 10:31–33. Petitioner cites the following teaching from Sakamoto: "If it is determined that the positioning cannot be performed when the signal level value is equal to or lower than a predetermined threshold value, the position search may be stopped." Pet. 35 (quoting Ex. 1004 ¶ 38). Petitioner maps the recited "first signal level" to Sakamoto's predetermined threshold value. *Id.* at 35–36. Petitioner further cites Sakamoto's teaching that "power consumption can be reduced by stopping the position search when positioning is not possible." *Id.* at 36 (quoting Ex. 1004 ¶ 50) (emphasis omitted). Petitioner contends an ordinarily skilled artisan "would have understood or found obvious [that] power applied to the *Sakamoto* GPS Components (i.e., primary location tracking circuitry) is reduced because position searching is stopped when a GPS signal level value is equal to or lower than a predetermined threshold value." *Id.* at 36–37 (citing Ex. 1003 ¶ 173).

Patent Owner disputes Petitioner's analysis of the "reducing" limitation. PO Resp. 4–15; PO Sur-reply 1–6. In particular, Patent Owner argues that "the reduction of power required by claim 1 cannot be read to eliminate the ability of the invention to receive and measure a signal strength level for reactivation as required by claim 3." PO Resp. 5. Patent Owner notes that power is cut off to Sakamoto's GPS receiver 10 when it is in stop-position mode. *Id.* at 10–11 (citing Pet. 37). Citing Mr. Andrews's deposition testimony that "GPS receiver 10 is the only component in Sakamoto that receives the GPS satellite signal," Patent Owner argues that Sakamoto's system cannot be reactivated in response to a signal level. *Id.* at 11–12 (citing Ex. 2003, 14:5–16:2).

We do not agree with Patent Owner's arguments because they are not commensurate with the scope of claim 1. Specifically, claim 1 requires reducing power to the primary location tracking circuitry, not reactivating the primary location tracking circuitry. *Compare* Ex. 1001, claim 1, *with id.* at claim 3. Thus, Patent Owner's arguments do not undermine Petitioner's persuasive showing that Sakamoto teaches stopping GPS position searching when the received signal level is below a predetermined threshold value (i.e., "a first signal level"). *See, e.g.*, Ex. 1004 ¶ 38. Sakamoto states expressly that this results in a reduction in power consumption. *See id.* ¶ 50.

Thus, we are persuaded that Sakamoto teaches the "reducing" limitation. And, even if Patent Owner's arguments regarding "reactivation" were commensurate with the language of claim 1, we would not agree with them for the same reasons discussed with respect to the "reactivating" limitation of claim 3 as discussed below. *See infra* § II.D.6.

Claim 1 further recites "increasing applied power level to supplemental location tracking circuitry response to measurement of the receive communication signal less than the first signal level." Ex. 1001, 10:34–37. Petitioner maps the recited "supplemental location tracking circuitry" to Gotoh's accelerometer 13. Pet. 26–27 (citing Ex. 1005 ¶ 51, Fig. 1). Petitioner cites Gotoh's teaching of cellular phone terminal 10 that "starts measuring the acceleration in a case where the cellular phone terminal 10 can not [sic] receive GPS signals." *Id.* at 40 (quoting Ex. 1005 ¶ 66) (emphases omitted). In light of Gotoh's teaching, Petitioner contends an ordinarily skilled artisan would have known "to use accelerometer data in situations where GPS signals cannot be received due to poor GPS signal reception, and thus increase applied power to the accelerometer to start measuring acceleration data only when such functionality was needed." *Id.* at 41 (citing Ex. 1003 ¶ 184). And, as discussed above, Petitioner maps the "predetermined threshold level" to the satellite signal level at which GPS position searching is stopped, as taught by Sakamoto. *Id.* at 38–39 (citing Ex. 1004 ¶¶ 38, 50).

Patent Owner does not dispute Petitioner's analysis of the "increasing" limitation. We are persuaded that the combination of Sakamoto and Gotoh teaches increasing power to Gotoh's accelerometer (i.e., "supplemental location tracking circuitry") when GPS position searching is stopped due to poor GPS signal reception. *See, e.g.*, Ex. 1003 ¶ 184; Ex. 1004 ¶ 38; Ex. 1005 ¶¶ 51, 66.

Claim 1 further recites "determining differential positional measurements based in part on acceleration measurements of supplemental location tracking circuitry associated with a secondary location tracking system." Ex. 1001, 10:38–41. For "determining differential positional measurements," Petitioner cites Levi's teachings on "the well-known technique of determining a position based on displacement from a known starting position (i.e., dead reckoning)." Pet. 46. Specifically, Levi teaches that "'dead reckoning' (DR) refers to a **position solution** that is obtained by **measuring or deducing displacements** from a known starting point in **accordance with motion** of the user." *Id.* (quoting Ex. 1006, 1:13–16) (emphases by Petitioner). Petitioner further maps the recited "supplemental location tracking circuitry associated with a secondary location tracking system" to "[t]he *Sakamoto* positioning control unit 13 programmed to perform *Levi's* DR functionality . . . in combination with an accelerometer as taught by both *Gotoh* and *Levi*." *Id.* at 27 (citing Ex. 1003 ¶ 145). Citing testimony from Mr. Andrews, Petitioner contends that "*Levi's* use of acceleration data from the user's movement (e.g., footsteps) to determine the displacement (through known mathematical techniques) indicates the *Levi* DR system is determining the differential positional measurements and that such measurements are 'based in part on acceleration measurements.'" *Id.* at 46–47 (citing Ex. 1003 ¶¶ 191–195; Ex. 1006, 1:19–25, 1:49–55, 3:13–16, 7:64–8:3).

Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that an ordinarily skilled artisan would have implemented

Levi's teachings on dead reckoning using Gotoh's accelerometer to obtain differential positional measurements. *See, e.g.*, Ex. 1003 ¶¶ 145, 191–195; Ex. 1005 ¶¶ 51, 66; Ex. 1006, 1:13–16, 1:19–25, 1:49–55, 3:13–16, 7:64–8:3.

Claim 1 further recites "determining positional coordinates of electronic tracking device responsive to a known reference coordinate values and the differential positional measurements." Ex. 1001, 10:42–44. For "determining positional coordinates," Petitioner cites Levi's teaching of "continuously displaying the user's position on the navigation device's graphical display." Pet. 47 (citing Ex. 1006, 2:5–14, 7:39–45, 8:25–26). Petitioner also contends that an ordinarily skilled artisan "would have readily understood that dead reckoning, as taught by *Levi*, determines a position of the user." *Id.* (citing Ex. 1003 ¶ 198; Ex. 1006, 1:13–17, 1:49–55). Regarding the recited "known reference coordinate values," Petitioner cites Levi's teaching that "DR calculates an incremental change in position from a known starting point." *Id.* at 48 (citing Ex. 1006, 7:49–52, 8:42–44) (emphasis omitted). Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that Levi teaches determining a user's position based on a known starting point via dead reckoning. *See, e.g.*, Ex. 1003 ¶ 198; Ex. 1006, 1:13–17, 1:49–55, 2:5–14, 7:39–45, 7:49–52, 8:25–26, 8:42–44.

For these reasons, Petitioner has established that the combination of Sakamoto, Gotoh, and Levi teaches all limitations of claim 1.

b. Reasons for the Combination

Petitioner contends an ordinarily skilled artisan

> would have found it obvious and been motivated to combine *Gotoh's* supplemental location tracking in the form of an accelerometer with *Sakamoto's* system employing GPS for determining a position in order to increase applied power level to the accelerometer when the receive communication signal level is less than a first signal level, as taught by *Sakamoto*.

Pet. 13 (citing Ex. 1003 ¶ 109). Petitioner further contends "[i]t was . . . well-known that an accelerometer was readily available for supplemental position determination when GPS location determination was unavailable (e.g., due to weak signal)." *Id.* at 14 (citing Ex. 1003 ¶¶ 110–111). Petitioner additionally contends "it would have been obvious and simple to add an accelerometer to *Sakamoto's* terminal, as *Sakamoto* already includes a positioning control unit performing evaluation of the signal strength and other processing steps." *Id.* at 15 (citing Ex. 1003 ¶ 116). In this way, Petitioner proposes modifying "*Sakamoto's* positioning control unit 13 such that it would have been capable of receiving signals from the accelerometer of *Gotoh* and performing necessary processing." *Id.* at 16 (citing Ex. 1003 ¶ 118). Petitioner characterizes this as a desirable and straightforward improvement to Sakamoto's system for computing positioning when a GPS signal is insufficient. *Id.* at 14 (citing Ex. 1003 ¶¶ 114–115). Citing testimony from Mr. Andrews, Petitioner also contends that an ordinarily skilled artisan would have had a reasonable expectation of success in making the combination. *Id.* at 15 (citing Ex. 1003 ¶ 117).

Petitioner also contends an ordinarily skilled artisan would have implemented Levi's DR techniques in Sakamoto's GPS system as modified with Gotoh's accelerometer. Pet. 49 (citing Ex. 1003 ¶ 201). Petitioner notes that "both *Gotoh* and *Levi* teach employing an accelerometer to supplement the GPS when GPS signals are unavailable." *Id.* Petitioner further notes that Gotoh teaches the use of an accelerometer for determining displacement, whereas Levi teaches the use of an accelerometer for determining displacement and position. *Id.* (citing Ex. 1003 ¶ 202). Petitioner contends that modifying the accelerometer in the combined Sakamoto–Gotoh system to perform Levi's dead reckoning steps uses a known technique in a similar device to obtain a predictable result, namely, "determining position via acceleration measurements when GPS is unavailable." *Id.* at 49–50 (citing Ex. 1003 ¶ 202). According to Petitioner, the combination obtains the benefit of local supplemental location determination in the absence of a GPS signal. *Id.* at 50 (citing Ex. 1003 ¶ 202).

Patent Owner does not dispute Petitioner's rationale for the combination. We are persuaded that an ordinarily skilled artisan would have modified Sakamoto's terminal to include Gotoh's accelerometer, which is used to record acceleration data when the terminal is unable to receive GPS signals. *See, e.g.*, Ex. 1003 ¶¶ 112–118; Ex. 1005 ¶ 81. We are further persuaded that an ordinarily skilled artisan would have implemented Levi's dead reckoning techniques in the combined system to determine differential position coordinates based on accelerometer data. *See, e.g.*, Ex. 1003 ¶¶ 201–202. We note that the secondary references themselves provide reasons for the combination insofar as Gotoh and Levi both teach the use of an accelerometer to supplement GPS positioning when a GPS signal is lost. *See* Ex. 1005 ¶ 66; Ex. 1006, 2:10–14. We are also persuaded by Mr. Andrews's uncontested testimony that an ordinarily skilled artisan would have reasonably expected success in making the combination. *See, e.g.*, Ex. 1003 ¶¶ 117, 202. For these reasons, Petitioner has established that an ordinarily skilled artisan would have had reasons to combine Gotoh and Levi with Sakamoto.

c. Conclusion Regarding Claim 1

Petitioner has persuasively shown that the combination of Sakamoto, Gotoh, and Levi teaches all limitations of claim 1. Petitioner also has put forth persuasive reasons for combining these references and has established that an ordinarily skilled artisan would have expected success in making the combination. On the entire trial record, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 1 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

5. Claim 2

Claim 2 depends from claim 1 and recites that

> the receive communication signal less than a first signal level comprises an attenuated receive communication signal less than a first signal level in response to the electronic tracking device moving to at least one of a partially enclosed or substantially enclosed structure at least partially blocked from communication with the primary location tracking system.

Ex. 1001, 10:45–51. Petitioner cites a description in the background section of the ’113 patent regarding the problem of GPS signals being attenuated when moving indoors to a partially enclosed or substantially enclosed structure. Pet. 51 (citing Ex. 1001, 2:65–3:21). Petitioner contends that this description serves as an admission that the problem was well-known in the art. *Id.*; *see also* Ex. 1003 ¶¶ 60, 63–67, 206–209 (Mr. Andrews’s testimony regarding the problem of GPS signal attenuation being known in the art). Petitioner also cites Levi's teaching that "GPS data can be either unreliable or unavailable due to antenna shading, jamming, or interference." Pet. 51 (quoting Ex. 1006, 1:59–60). Petitioner additionally cites Sakamoto's teaching that "GPS signals may be unavailable, such that position searching with the GPS receiver is 'not possible.'" *Id.* at 52 (quoting Ex. 1004 ¶ 50). In light of these teachings, Petitioner contends "[i]t would have been obvious to a POSITA [that] the GPS signal disclosed in *Sakamoto* as being below a first signal level is attenuated in response to at least the GPS receiver 10 being moved into a partially enclosed or substantially enclosed structure." *Id.* Petitioner further contends that "it would have been obvious to a POSITA [that] a cause of the attenuated signal, i.e., the signal below a predetermined threshold value taught by *Sakamoto*, was antenna shading or interference, as taught by *Levi*, from being indoors, as described as prior art by the '113 Patent." *Id.* (citing Ex. 1003 ¶¶ 208–209). Patent Owner relies on the same arguments discussed above with respect to claim 1.

Claim 2 is directed to a particular usage scenario wherein the user moves into a structure that at least partially blocks communication with the primary location tracking system. As noted by Petitioner (Pet. 51), the '113 patent describes this scenario in its background section as being known in the art. *See* Ex. 1001, 2:63–3:3 ("[A] minimal GPS signal level may not be detectable when an individual or object is not located in a skyward position. For instance, when an individual or object carrying a GPS transceiver enters a covered structure . . . , GPS satellite communication signals may be obstructed or partially blocked."). That this issue was known in the art is substantiated by Mr. Andrews's unrebutted testimony, where he surveys numerous contemporaneous references regarding, *inter alia*, GPS signal attenuation due to physical obstacles, such as buildings. Ex. 1003 ¶¶ 60, 63–67. Petitioner also cites Levi's teaching of GPS "antenna shading" and Sakamoto's teaching of GPS positioning being impossible when GPS signals are unavailable. Ex. 1003 ¶¶ 207–208; Ex. 1004 ¶¶ 38, 50; Ex. 1006, 1:59–60. In light of these teachings, we are persuaded that an ordinarily skilled artisan would have known to associate an attenuated signal below a predetermined threshold value (as discussed in claim 1) with antenna shading due to being in a partially or substantially enclosed structure. *See, e.g.*, Ex. 1003 ¶¶ 60, 63–67, 206–209. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 2 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

6. Claim 3

Claim 3 depends from claim 1 and further recites "reactivating the primary location tracking circuitry in response to measurement of the receive communication signal above the first signal level." Ex. 1001, 10:53–55. For the recited "reactivating," Petitioner cites the transition from Sakamoto's stop-position mode to normal mode. Pet. 52–53. Specifically, Petitioner cites Sakamoto's teaching that "if it is determined that the normal sensitivity positioning mode is required **when the signal level value is *equal to or higher than* a predetermined threshold value**," then the system places the GPS receiver in normal mode. *Id.* (quoting Ex. 1004 ¶ 38) (alteration omitted) (emphases by Petitioner). According to Petitioner, "[a] POSITA would have understood from *Sakamoto* that when position searching is stopped in stop-position searching mode (GPS receiver power level reduced), and then subsequently, the signal level detected is greater than the predetermined threshold level and normal mode is thereby designated, then GPS receiver is 'reactivated.'" *Id.* at 53 (citing Ex. 1003 ¶ 212).

In support of its contentions, Petitioner cites Sakamoto's teaching that the satellite signal level is measured periodically "at the cycle set in advance." Pet. Reply 1–4 (quoting Ex. 1004 ¶ 37). Petitioner also highlights Mr. Andrews's testimony that the "process of requesting measurements and measuring a receive communication signal level would have been performed automatically according to the 'cycle set in advance.'" *Id.* at 5 (quoting Ex. 1003 ¶ 160). Finally, Petitioner notes that it "**does not map** the periodic measurement of the satellite signal level 'at the cycle set in advance' as the claimed 'reactivating the primary location tracking circuitry.'" *Id.* at 9 (citing Pet. 53–54). Petitioner also disavows any mapping of the "reactivating" limitation to Sakamoto's manual activation. *Id.* at 3, 15 (both citing Ex. 1003 ¶ 161).

Patent Owner argues that power is cut to GPS receiver 10 in Sakamoto's stop-position mode, and GPS receiver 10 is the only component that receives GPS satellite signals. PO Resp. 11–12 (citing Pet. 37; Ex. 1004 ¶¶ 19, 27). As such, Patent Owner contends that "Sakamoto cannot then reactivate GPS receiver 10 or any component of GPS receiver 10 'in response to measurement of the receive communication signal above the first signal level.'" *Id.* Patent Owner explains that "the claimed primary location tracking circuitry cannot both (1) include the only ability to receive GPS signals and (2) be turned off completely when the power is reduced."

Id. at 10. In support of its contentions, Patent Owner cites Mr. Andrews's cross-examination testimony that GPS receiver 10 is the only component in Sakamoto that receives GPS satellite signals. *Id.* at 11 (citing Ex. 2003, 14:5–16:2). According to Patent Owner, Mr. Andrews "conceded that Sakamoto does not teach reactivating the GPS receiver 10 from the stop-position mode in response to a signal level." *Id.* at 12–13 (citing Ex. 2003, 20:1–4, 23:10–11). Patent Owner also argues that Sakamoto only discloses manual activation of GPS receiver 10 after it has been placed in stop-position mode. *Id*. at 14 (citing Ex. 1004 ¶ 20). Finally, Patent Owner characterizes Mr. Andrews's testimony as being speculative and unsupported by Sakamoto. PO Sur-reply 6–10.

We do not agree with Patent Owner's arguments. "[T]he test for obviousness is what the combined teachings of the references would have suggested to those having ordinary skill in the art." *In re Mouttet*, 686 F.3d 1322, 1333 (Fed. Cir. 2012). Here, Petitioner has presented testimony from Mr. Andrews as to how an ordinarily skilled artisan would have interpreted Sakamoto's monitoring of a satellite signal level "at the cycle set in advance" in conjunction with Sakamoto's teachings of how and when to move among various positioning modes. *See* Ex. 1003 ¶ 160; Ex. 1004 ¶¶ 37–38; Ex. 1080 ¶¶ 3–4. Based on Sakamoto's description, we are persuaded that measuring signal levels would have been performed automatically according to a predetermined cycle time. *See* Pet. Reply 1–4; Ex. 1003 ¶ 160; Ex. 1004 ¶¶ 37–38. Petitioner also cites Sakamoto's express teaching of implementing normal sensitivity positioning mode "when the signal level value is equal to or higher than a predetermined threshold value." Pet. 52–53 (emphasis omitted) (quoting Ex. 1004 ¶ 38).

In light of this, we are persuaded by Mr. Andrews's testimony that an ordinarily skilled artisan would have known that Sakamoto's periodic detection of a satellite signal (Ex. 1004 ¶ 37) showing a signal level above a threshold level associated with normal mode (*id.* ¶ 38) would result in "reactivating" the GPS receiver by transitioning it from stop-position to normal mode. Pet. 52–53; Pet. Reply 8–10; Ex. 1003 ¶ 212.

Against Petitioner's showing, Patent Owner has only put forth attorney argument. Although Patent Owner purports to find concessions in Mr. Andrews's cross-examination testimony such that we should discount his testimony (*see* PO Resp. 12–13 (quoting Ex. 2003, 20:1–4)), we do not agree after considering his testimony in context. *See* Pet. Reply 15–18 (quoting Ex. 2003, 19:8–20:22). In particular, Mr. Andrews testified on cross-examination that Sakamoto's receiver turns on briefly while in stop-position mode to check the level of the GPS signals. Ex. 2003, 19:16–25. We also agree with Petitioner that Mr. Andrews "explained that the reactivation of the GPS receiver occurs when the GPS signal level is measured 'above that stop-position threshold.'" Pet. Reply 17 (quoting Ex. 2003, 20:12–13, 20:21–22). As such, his testimony is consistent with Sakamoto's disclosure of (1) cyclically checking satellite signal levels (Ex. 1004 ¶ 37) and (2) moving to normal positioning mode (i.e., "reactivating") if the signal level is above a predetermined threshold value (*id.* ¶ 38).

Patent Owner also contends that Mr. Andrews's cross-examination testimony was speculative based on his use of certain conditional words. PO Sur-reply 2, 7–8 (quoting Ex. 2003, 23:10–24:3) (highlighting words such as "possible," "maybe," and "presumably"). We do not agree with Patent

Owner that these words undermine Mr. Andrews's testimony when the substance of his testimony is consistent with his declarations and the teachings of Sakamoto. Although Mr. Andrews acknowledges that Sakamoto does not describe the details of GPS receiver operation for signal checking (Ex. 2003, 21:7–8, 23:1–11), he provides testimony as to how an ordinarily skilled artisan would have interpreted Sakamoto's teachings related to signal checking (*id*. at 19:8–21:20, 23:10–24:10, 32:16–33:14, 34:12–35:4). His testimony is consistent with Sakamoto's teaching of checking GPS signals "at the cycle set in advance" (*see* Ex. 1003 ¶ 160; Ex. 1004 ¶ 37; Ex. 1080 ¶¶ 3–4) and of setting the operational mode based on a measured GPS signal level (*see* Ex. 1003 ¶¶ 88, 211–213; Ex. 1004 ¶ 38; Ex. 1080 ¶¶ 5–7).

Nor do we find Sakamoto's teaching of manual activation (*see* Ex. 1004 ¶ 20) to be inconsistent with Mr. Andrews's testimony about Sakamoto. Nothing in Sakamoto states that "pressing the button provided on the man-machine interface control unit 14" is the exclusive way to move out of stop-position mode. *Id.* We also are persuaded by Mr. Andrews's testimony that "a POSITA would have recognized that Sakamoto's system would have been configured to transition from one of the modes to any other mode (including directly from stop-position searching mode to normal mode and/or vice versa) when appropriate." Ex. 1003 ¶ 171.

Based on Petitioner's evidence from Sakamoto and Mr. Andrews's testimony as to how an ordinarily skilled artisan would have interpreted Sakamoto, we are persuaded that Sakamoto teaches the "reactivating" limitation of claim 3.

Claim 3 further recites that “the primary location tracking system comprises a wireless location tracking system” and that “the supplemental location tracking system comprises an accelerometer.” Ex. 1001, 10:56–59. As discussed in claim 1, Petitioner maps the “primary location tracking system” to Sakamoto’s GPS positioning system. *See* Pet. 54–55; *see also supra* § II.D.4.a. Petitioner contends that an ordinarily skilled artisan would have known GPS signals received from GPS satellites are transmitted wirelessly. Pet. 54 (citing Ex. 1003 ¶ 214; Ex. 1005 ¶ 53). As also discussed in claim 1, Petitioner maps the recited “supplemental location tracking circuitry” to Gotoh’s accelerometer. *See* Pet. 55; *see also supra* § II.D.4.a. (Petitioner’s obviousness analysis for the limitations in claim 1). Petitioner contends this mapping applies equally to the “supplemental location tracking *system*” (emphasis added) of claim 3, which Petitioner contends does not have antecedent basis. Pet. 55 (citing Ex. 1003 ¶ 216). Patent Owner does not dispute Petitioner’s analysis of these limitations. Based on the same analysis discussed above with respect to claim 1 (*see supra* § II.D.4), we are persuaded that Sakamoto’s GPS positioning system teaches the recited “wireless location tracking system” and Gotoh’s accelerometer teaches the recited “supplemental location tracking system.”

Claim 3 further recites that “the known reference coordinate values comprise last known coordinate values of the electronic tracking device.” Ex. 1001, 10:60–62. Petitioner cites Levi’s teaching of “dead reckoning to determine a current position by calculating the displacement from a ‘known starting point’ or ‘a last fix’ (whether GPS or manual) for a start point.” Pet. 55–56 (citing Ex. 1006, 8:3–7, 8:41–44). Patent Owner does not dispute Petitioner’s analysis of this limitation. We are persuaded that Levi’s "last fix" teaches the recited "last known coordinate values" for dead reckoning. *See, e.g.*, Ex. 1006, 8:3–7, 8:41–44.

Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 3 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

7. Claim 4

Claim 4 depends from claim 1 and recites "the primary location tracking circuitry is configured to communicate with a satellite based location tracking system." Ex. 1001, 10:63–65. Petitioner notes that the "*Sakamoto* GPS Components," which Petitioner maps to the "primary location tracking circuitry" in claim 1 (*see supra* § II.D.4.a), include GPS receiver 10 that "receives GPS satellite signals from GPS satellites." Pet. 56 (quoting Ex. 1004 ¶ 19). Citing testimony from Mr. Andrews, Petitioner contends an ordinarily skilled artisan would have known "the GPS satellites are part of a satellite based location tracking system." *Id.* (citing Ex. 1003 ¶ 220). Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that the "*Sakamoto* GPS Components" communicate with a satellite-based location tracking system. *See, e.g.*, Ex. 1003 ¶ 220; Ex. 1004 ¶ 19. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 4 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

8. Claim 5

Claim 5 depends from claim 1 and recites "the primary location tracking circuitry is configured to communicate with at least one of a portable wireless communication device, another tracking device, or a wireless communication monitoring station." Ex. 1001, 10:66–11:3. Petitioner cites Sakamoto's position management/positioning server 2 for teaching the recited "wireless communication monitoring station." Pet. 57 (citing Ex. 1004 ¶ 30). Petitioner contends position management/positioning server 2 communicates wirelessly with terminal 1 across a mobile communication network. *Id.* (citing Ex. 1004 ¶¶ 11–13, 18, 19, 30). Petitioner also notes that the "*Sakamoto* GPS Components" mapped to the recited "primary location tracking circuitry" for claim 1 are part of terminal 1. *Id.* According to Petitioner, the communication between position management/positioning server 2 and terminal 1 includes position information. *Id.* at 58 (citing Ex. 1004 ¶¶ 30–32, 35, Fig. 2). Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that Sakamoto's terminal 1, which includes the "primary location tracking circuitry," is configured to communicate wirelessly with server 2, including sending position information. *See, e.g.*, Ex. 1004 ¶¶ 11–13, 18, 19, 30–32, 35, Fig. 2. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 5 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

9. Claim 6

Claim 6 depends from claim 1 and recites "the supplemental location tracking circuitry is configured to communicate with at least one of a portable wireless communication device, another tracking device, or a wireless communication monitoring station." Ex. 1001, 11:4–8. Petitioner notes its mapping of claim 1 wherein "*Sakamoto* teaches a position searcher B searches a position of terminal 1" and "*Levi* teaches performing DR calculations at a portable terminal." Pet. 59; *see supra* § II.D.4.a. According to Petitioner, "*Gotoh's* accelerometer and *Levi's* DR teachings allow for position tracking of terminal 1" in Petitioner's proposed combination when GPS signals are too weak. Pet. 59; *see supra* § II.D.4.a. As such, and following the same analysis as for claim 5 (*see supra* § II.D.8), Petitioner contends an ordinarily skilled artisan

> would have found it obvious and been motivated to modify *Sakamoto's* system to respond to a position request from searcher B by communicating positioning information (e.g., DR positioning data from an accelerometer) to *Sakamoto's* server 2 ("wireless communication monitoring station") when a GPS signal is too weak to perform GPS position searching.

Pet. 59 (citing Ex. 1003 ¶¶ 225–226).

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded by Petitioner's analysis, which continues Petitioner's mapping from claim 5 of the recited "wireless communication monitoring station" to Sakamoto's position management/ positioning server 2 and extends the analysis to encompass Gotoh's accelerometer and Levi's DR teachings as they are mapped in claim 1. *See, e.g.*, Ex. 1003 ¶¶ 225–226. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 6 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

10. Claim 7

Like claim 1, independent claim 7 also recites "[a] method to control power usage" and is similar in scope to claim 1. Ex. 1001, 11:10. Rather than reciting separate "reducing" and "increasing" steps as in claim 1, however, claim 7 recites the following: "adjusting applied power levels to the primary location tracking circuitry and supplemental location tracking circuitry in response to measurement of a receive communication signal level relative to a predetermined signal level." *Id.* at 11:15–19. Petitioner's analysis for the "adjusting" step of claim 7 is substantially the same as for the "reducing" and "increasing" steps of claim 1. *See* Pet. 60. Petitioner relies on the same analysis from claim 1 insofar as the adjustment (i.e., reducing applied power to the "*Sakamoto* GPS Components" and increasing applied power to Gotoh's accelerometer) is made relative to "a predetermined signal level" (i.e., the satellite signal level at which GPS position searching is stopped, per Sakamoto). *Id.* at 32–45, 60 (citing Ex. 1003 ¶ 229).

Patent Owner makes the same arguments discussed above with respect to claim 1 regarding "reactivating" Sakamoto's GPS receiver when it is placed in stop-position mode. *See* PO Resp. 4–15; PO Sur-reply 2–10. Even if these arguments were commensurate with the scope of the "adjusting" limitation of claim 7—they are not—we would not agree with them for the same reasons mentioned above. *See supra* § II.D.4, 6. Based on the same analysis discussed above (*see supra* § II.D.4), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 7 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

11. Claim 8

Claim 8 depends from claim 7 and is almost identical to claim 2 except that the "attenuated receive communication signal" is less than "the predetermined signal level" rather than "a first signal level." Ex. 1001, 11:27–33. Petitioner relies on the same analysis as for claim 2. Pet. 60. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.5), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 8 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

12. Claim 9

Claim 9 depends from claim 7 and recites that "the primary location tracking circuitry is activated in response to a measurement of the receive communication signal being above the predetermined signal level." Ex. 1001, 11:34–37. Petitioner relies on the same analysis from the "reactivating" step of claim 3 and contends that an ordinarily skilled artisan would have understood that "reactivating" is a type of "activat[ing]." Pet. 60–61 (citing Ex. 1003 ¶ 233). Patent Owner relies on the same arguments discussed above with respect to claims 1 and 3. Based on the same analysis discussed above (*see supra* § II.D.6), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 9 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

13. Claim 10

Claim 10 depends from claim 7 and recites that "the primary location tracking circuitry is deactivated in response to a measurement of the receive communication signal being below the predetermined signal level."

Ex. 1001, 11:38–41. For the recited "deactivat[ing]," Petitioner relies on the same analysis from the "reducing applied power level to the primary location tracking circuitry" step of claim 1. Pet. 61. In particular, Petitioner cites Sakamoto's teaching of stopping a position search when the GPS signal level value is equal to or lower than a predetermined threshold value. *Id.*; *see also supra* § II.D.4.a. Petitioner contends that an ordinarily skilled artisan would have known the GPS circuitry, including GPS receiver 10, to be powered off in this circumstance. Pet. 61 (citing Ex. 1003 ¶ 234). Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.4.a), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 10 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

14. Claim 11

Claim 11 depends from claim 7 and recites that "the supplemental location tracking circuitry is activated in response to a measurement of the receive communication signal being below the predetermined signal level." Ex. 1001, 11:42–45. For the recited "activat[ing]," Petitioner relies on the same analysis from the "increasing applied power level to supplemental locating tracking circuitry" step of claim 1. Pet. 61. In particular, Petitioner cites Gotoh's teaching of starting to measure acceleration when the terminal cannot receive GPS signals. *Id.*; *see also supra* § II.D.4.a. Petitioner contends that an ordinarily skilled artisan would have known the supplemental location tracking circuitry, i.e., the accelerometer, to be activated in this circumstance. Pet. 61 (citing Ex. 1003 ¶ 236). Patent

Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.4.a), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 11 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

15. Claim 12

Claim 12 depends from claim 7 and recites that "the supplemental location tracking circuitry is deactivated in response to a measurement of the receive communication signal being above the predetermined signal level." Ex. 1001, 11:42–45. For the recited "deactivat[ing]," Petitioner refers to its analysis for claim 1 and contends that Gotoh teaches "finishing measuring acceleration and recording data." Pet. 62 (citing Ex. 1003 ¶ 238). Patent Owner relies on the same arguments discussed above with respect to claim 1.

Petitioner refers to Gotoh's teaching that "cellular phone terminal 10 finishes measuring the acceleration in a case where the cellular phone terminal 10 becomes able to receive GPS signals, and communication with the communication system 30 is recovered." Ex. 1005 ¶ 67; *see also* Ex. 1003 ¶¶ 94 (quoting same), 238 (partially quoting same). We are persuaded that an ordinarily skilled artisan would have known this to teach that Gotoh's accelerometer is "deactivated" in Petitioner's proposed combination when GPS signals are above a predetermined threshold level. *See, e.g.*, Ex. 1003 ¶ 238; Ex. 1005 ¶ 67. We also note that deactivating Gotoh's accelerometer above this threshold is consistent with Petitioner's analysis of claims 3 and 9, where Sakamoto's GPS receiver is activated to normal mode "when the signal level value is equal to or higher than a predetermined threshold value." Ex. 1004 ¶ 38; *see also supra* § II.D.6. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 12 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

16. Claim 13

Claim 13 depends from claim 7 and is similar to claim 3 except that claim 13 does not recite a "reactivating" step. Ex. 1001, 11:50–12:3. Petitioner relies on the same analysis for the limitations that are common with claim 3. Pet. 62. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.6), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 13 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

17. Claim 14

Claim 14 depends from claim 7 and is identical to claim 4. Ex. 1001, 12:4–6. Petitioner relies on the same analysis from claim 4. Pet. 62–63. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.7), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 14 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

18. Claim 15

Claim 15 depends from claim 7 and is identical to claim 5. Ex. 1001, 12:7–11. Petitioner relies on the same analysis from claim 5. Pet. 63. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.8), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 15 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

19. Claim 16

Claim 16 depends from claim 7 and is identical to claim 6. Ex. 1001, 12:11–15. Petitioner relies on the same analysis from claim 6. Pet. 63. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.9), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 16 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

20. Claim 17

The preamble of independent claim 17 recites "[a] portable electronic tracking device to monitor location coordinates of one or more individuals and objects." Ex. 1001, 12:16–18. Petitioner refers to its analysis for claim 1 and contends that the "*Sakamoto* Electronic Components" in terminal 1 are provided in a portable mobile terminal. Pet. 63–64 (citing Ex. 1004 ¶¶ 3, 18, 19, 30, 31, 50, 51). For "monitor[ing] location coordinates of one or more individuals and objects," Petitioner contends that an ordinarily skilled artisan "would have understood that *Sakamoto's* terminal 1 comprises GPS location tracking circuitry, such that the location coordinates of terminal 1 itself and an individual carrying or moving terminal 1 would have been monitored by the GPS location tracking circuitry." *Id.* at 64 (citing Ex. 1003 ¶ 247; Ex. 1004 ¶¶ 18–24).

Patent Owner does not contest Petitioner's analysis of the preamble. Neither party addresses whether the preamble is limiting. We are persuaded that Sakamoto's terminal 1, which includes GPS receiver 10, GPS control unit 12, positioning control unit 13, communication control unit 11, satellite signal level detection unit 15, communication line status control unit 17, and battery control unit 16, is a "portable electronic tracking device." *See, e.g.*, Ex. 1004 ¶¶ 3, 18, 19, 30, 31, 50, 51, Fig. 1. We also are persuaded that GPS location tracking components of Sakamoto's terminal 1 monitor the location of terminal 1 or of an individual carrying terminal 1. *See, e.g.*, Ex. 1003 ¶ 247; Ex. 1004 ¶¶ 18–24. Because Petitioner has shown that Sakamoto teaches the preamble, we need not determine whether the preamble is limiting. *See Nidec*, 868 F.3d at 1017.

Claim 17 further recites "primary location tracking circuitry to measure a receive communication signal level communicated by a primary location tracking system and received by the electronic tracking device." Ex. 1001, 12:19–22. For this limitation, Petitioner relies on its analysis from claim 1 regarding the "*Sakamoto* GPS Components." Pet. 64; *see also supra* § II.D.4.a. Based on the same analysis discussed above (*see supra* § II.D.4.a), we are persuaded that Sakamoto teaches the recited "primary location tracking circuitry."

Claim 17 further recites "supplemental location tracking circuitry to determine positional measurements based in part on measurements associated with a secondary location tracking system." Ex. 1001, 12:23–25. For this limitation, Petitioner relies on its analysis from claim 1 regarding Gotoh's accelerometer. Pet. 64; *see also supra* § II.D.4.a. Based on the same analysis discussed above (*see supra* § II.D.4.a), we are persuaded that Gotoh teaches the recited "supplemental location tracking circuitry."

Claim 17 further recites "a battery power monitor configured to" perform similar steps to those recited in method claim 1. *See* Ex. 1001, 12:27–38. For the "battery power monitor," Petitioner cites Sakamoto's teaching of "power management circuitry including a battery control unit 16 that notifies positioning control unit 13 of a remaining battery amount lower than a preset threshold value by sending a remaining battery amount warning." Pet. 65 (citing Ex. 1004 ¶¶ 10, 29). Petitioner further notes that Sakamoto's positioning control unit 13 requests GPS control unit 12 to switch among various modes in response to signals from battery control unit 16 or based on satellite signal levels measured by satellite signal level detecting unit 15. *Id.* at 65–66 (citing Ex. 1004, Fig. 1). Accordingly, Petitioner contends an ordinarily skilled artisan would have understood that "*Sakamoto's* battery control unit 16, positioning control unit 13, GPS control unit 12, and satellite signal level detection unit 15 together are a 'battery power monitor.'" *Id.* at 66 (citing Ex. 1003 ¶ 252). Patent Owner does not dispute Petitioner's analysis of the "battery power monitor" limitation. We are persuaded by Petitioner's analysis that Sakamoto's battery control unit 16, positioning control unit 13, GPS control unit 12, and satellite signal level detection unit 15 together teach a battery power monitor. *See, e.g.*, Ex. 1003 ¶ 252; Ex. 1004 ¶¶ 10, 29, Fig. 1.

Claim 17 further recites that the battery power monitor is configured to both "reduce applied power level to the primary location tracking circuitry" and "increase applied power level to supplemental location tracking circuitry" in response to "measurement of a receive communication signal level less than a first signal level." Ex. 1001, 12:27–34. Petitioner relies on the same analysis of the "reducing" and "increasing" limitations of claim 1 and relates it to the "battery power monitor" components discussed directly above. *See* Pet. 67–69. Citing Mr. Andrews's testimony, Petitioner contends that positioning control unit 13, GPS control unit 12, satellite signal level detection unit 15, and battery control unit 16 (i.e., the "battery power monitor") perform switching between positioning modes. *Id.* (citing Ex. 1003 ¶¶ 253, 255).

Patent Owner makes the same arguments discussed above regarding "reactivating" Sakamoto's GPS receiver when it is placed in stop-position mode. *See* PO Resp. 4–15; PO Sur-reply 2–10. Even if these arguments were commensurate with the scope of the "reduce" and "increase" limitations of claim 17—they are not—we would not agree with them for the same reasons mentioned above. *See supra* § II.D.4, 6. Based on the same analysis discussed above (*see supra* § II.D.4.a), and based on Petitioner's further analysis that Sakamoto's "battery power monitor" components perform switching between positioning modes (*see, e.g.*, Ex. 1003 ¶¶ 253, 255), we are persuaded that Sakamoto and Gotoh teach the "reduce" and "increase" limitations of claim 17.

Claim 17 further recites that "the electronic tracking device is configured to determine positional coordinates responsive to a known reference coordinate values and the differential positional measurements." Ex. 1001, 12:35–38. Petitioner relies on the same analysis regarding Levi's dead reckoning functionality from the "determining positional coordinates" step of claim 1. Pet. 69. Based on the same analysis discussed above (*see supra* § II.D.4.a), we are persuaded that Levi's dead reckoning functionality, as implemented with Gotoh's accelerometer, teaches the "determine positional coordinates" limitation of claim 17.

For these reasons, and based on the same analysis discussed above (*see supra* § II.D.4), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 17 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

21. Claim 18

Claim 18 depends from claim 17 and is identical to claim 4. Ex. 1001, 12:39–41. Petitioner relies on the same analysis from claim 4. Pet. 69. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.7), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 18 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

22. Claim 19

Claim 19 depends from claim 17 and is identical to claim 5. Ex. 1001, 12:42–46. Petitioner relies on the same analysis from claim 5.

Pet. 69. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.8), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 19 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

23. Claim 20

Claim 20 depends from claim 17 and is identical to claim 6. Ex. 1001, 12:47–51. Petitioner relies on the same analysis from claim 6. Pet. 69. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.9), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 20 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

E. Obviousness Ground Based on Sakamoto, Gotoh, Levi, and Kulach

Petitioner contends the subject matter of claims 1–20 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Kulach. Pet. 69–73. As discussed above, Petitioner has demonstrated that the subject matter of claims 1–20 would have been obvious over the combination of Sakamoto, Gotoh, and Levi, so we do not reach the ground based on Sakamoto, Gotoh, Levi, and Kulach. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner "is entitled to a final written decision addressing all of the claims it has challenged"); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App'x 984, 990 (Fed. Cir. 2020) (non-precedential) (recognizing that the "Board need not address issues that are not necessary to the resolution of the proceeding" and, thus, agreeing that the Board has "discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims").

III. PATENT OWNER'S REVISED MOTION TO AMEND

Pursuant to 35 U.S.C. § 316(d)(1) and 37 C.F.R. § 42.121(a), Patent Owner moves to replace claims 1–20 of the '113 patent with proposed substitute claims 21–40, respectively. RMTA 1. Patent Owner's revised motion to amend is contingent on our determination as to whether a preponderance of the evidence establishes that claims 1–20 of the '113 patent are unpatentable. *Id.* As discussed above, we determine that original claims 1–20 of the '113 patent have been shown to be unpatentable by a preponderance of the evidence. *See supra* § II.D.4–23. Therefore, we proceed to address Patent Owner's revised motion to amend.

A. Proposed Substitute Claims

Independent proposed substitute claims 21, 27, and 37, which are illustrative of the proposed substitute claims, are reproduced below with underlining to indicate added text and strikethrough to indicate deleted text.

> 21. A method to control power usage comprising:
>
> measuring a receive communication signal level by primary location tracking circuitry of an electronic tracking device communicated by a primary location tracking system;
>
> <u>in response to measurement of a receive communication signal level less than a single predetermined signal level:</u>
>
> > <u>reducing, to a low power mode in which the primary location tracking circuity consumes at least reduced power,</u> applied power level to the primary location tracking circuitry ~~in response to measurement of~~

~~a receive communication signal level less than a first signal level~~; <u>and</u>

increasing applied power level to supplemental location tracking circuitry ~~response to measurement of the receive communication signal less than the first signal level~~;

determining differential positional measurements based in part on acceleration measurements of supplemental location tracking circuitry associated with a secondary location tracking system; and

determining positional coordinates of electronic tracking device responsive to a known reference coordinate values and the differential positional measurements.

27. A method to control power usage comprising:

measuring a receive communication signal level by primary location tracking circuitry of an electronic tracking device communicated by a primary location tracking system;

adjusting applied power levels to the primary location tracking circuitry and supplemental location tracking circuitry in response to measurement of a receive communication signal level relative to a <u>single</u> predetermined signal level;

determining differential positional measurements based in part on acceleration measurements of supplemental location tracking circuitry associated with a secondary location tracking system; and

determining positional coordinates of electronic tracking device responsive to a known reference coordinate values and the differential positional measurements.

37. A portable electronic tracking device to monitor location coordinates of one or more individuals and objects, the device comprising:

primary location tracking circuitry to measure a receive communication signal level communicated by a primary location tracking system and received by the electronic tracking device;

supplemental location tracking circuitry to determine positional measurements based in part on measurements associated with a secondary location tracking system; and

a battery power monitor configured to:

in response to measurement of a receive communication signal level less than a single predetermined signal level:

reduce, to a low power mode in which the primary location tracking circuitry consumes at least reduced power, applied power level to the primary location tracking circuitry ~~in response to measurement of a receive communication signal level less than a first signal level~~; and

increase applied power level to supplemental location tracking circuitry ~~response to measurement of the receive communication signal less than the first signal level~~;

wherein the electronic tracking device is configured to determine positional coordinates responsive to a known reference coordinate values and the differential positional measurements.

RMTA 26, 28, 30–31.

B. Procedural Requirements

"Before considering the patentability of any substitute claims, . . . the Board first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121." *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15, 4–8 (PTAB Feb. 25, 2019) (precedential). Patent Owner bears the burden of proving these requirements by a preponderance of the evidence. 37 C.F.R. § 42.121(d)(1).

1. Claim Listing

The revised motion to amend includes a claim listing that clearly shows the changes, as required by 37 C.F.R. § 42.121(b). *See* RMTA 26–31; *Lectrosonics*, Paper 15 at 8.

2. Reasonable Number of Substitute Claims

We now consider whether the motion to amend proposes a reasonable number of substitute claims. 35 U.S.C. § 316(d)(1)(B). "There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim." *Lectrosonics*, Paper 15 at 4–5 (citing 37 C.F.R. § 42.121(a)(3)). The Petition challenges twenty claims, and the revised motion to amend proposes twenty substitute claims. RMTA 1, 4. We determine that the number of proposed claims is reasonable.

3. Respond to a Ground of Unpatentability Involved in the Trial

Next, we consider whether the proposed substitute claims respond to a ground of unpatentability involved in this trial. *Lectrosonics*, Paper 15 at 5–6 (citing 37 C.F.R. § 42.121(a)(2)(i)). Patent Owner characterizes its amendments as adding the following limitations to the original claims:

> (1) that reducing, increasing, and adjusting applied power level occurs in relation to a single predetermined signal level in proposed substitute independent claims 21, 27, and 37 and in proposed substitute dependent claims 22, 23, 28, and 30-32;
> (2) that applied power level is reduced to a low power mode in

> which the primary location tracking circuitry consumes at least reduced power in proposed substitute independent claims 21 and 37; and (3) that the primary location tracking circuitry is deactivated by placing the primary location tracking circuitry in a low power mode in which the primary location tracking circuitry consumes at least reduced power in proposed substitute dependent claim 30.

RMTA 2–3. Patent Owner highlights these added limitations in asserting that the proposed substitute claims are patentable over the references in the instituted grounds. *See id.* at 3. Petitioner does not argue otherwise. Based on Patent Owner's showing, we determine that the amended language in the proposed substitute claims is responsive to the grounds of unpatentability involved in this trial.

4. *No Enlargement to the Scope of the Claims*

We also consider the breadth of the proposed substitute claims. "A motion to amend may not present substitute claims that enlarge the scope of the claims of the challenged patent or introduce new subject matter." *Lectrosonics*, Paper 15 at 6–7 (citing 35 U.S.C. § 316(d)(3); 37 C.F.R. § 41.121(a)(2)(ii)). For the independent proposed substitute claims, Patent Owner's proposed amendments add several limitations, including the ones highlighted directly above. Based on the added limitations, Patent Owner contends that the proposed substitute claims do not enlarge the scope of any original claim. RMTA 3. Petitioner does not argue otherwise. We determine that the added limitations highlighted above result in claims that are either identical in scope or narrower than the original claims.

5. No New Matter

We now consider whether proposed substitute claims 21–40 have introduced new matter. "[T]he Board requires that a motion to amend set forth written description support in the originally filed disclosure of the subject patent for each proposed substitute claim, and also set forth support in an earlier filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought." *Lectrosonics*, Paper 15 at 7 (citing 37 C.F.R. § 42.121(b)(1)–(2)). For this requirement, Patent Owner must cite "to the *original disclosure of the application*, as filed, rather than to the patent as issued." *Id.* at 8 (emphasis added).

In the revised motion to amend, Patent Owner provides a listing indicating where each limitation of the proposed substitute claims is supported in the '614 application (Ex. 2014) and the '905 application (Ex. 2015). RMTA 4–17. Petitioner disputes that there is written description support for the proposed substitute claims only to the extent that (1) "adjusting applied power levels . . . in response to measurement of a receive communication signal level relative to a <u>single</u> predetermined signal level" is construed to mean "the adjustment occur[s] only in response to measuring a signal level relative to one and only one predetermined signal level" (RMTA Opp. 2–3; RMTA Sur-reply 1–2; *see infra* § III.C.2); and (2) "a low power mode in which the primary location tracking circuity consumes at least reduced power" is construed to mean that "power is *constantly* consumed during a low power mode" (RMTA Opp. 13–16).

We find that Patent Owner has put forth adequate support for the "<u>single</u> predetermined signal level" limitations under the plain and ordinary meaning of those limitations. *See, e.g.*, Ex. 2015, 9:30–10:2

("[A]ccelerometer 130 activates upon one or more designated antenna(s) . . . detecting a first signal level, e.g., a low signal level or threshold value, as specified by, for instance, a user or system administrator."); *see also* RMTA 5 (quoting same). We also find that Patent Owner has identified support for the "consumes at least reduced power" limitation because the '905 application states that "during supplemental location coordinates tracking, . . . the transceiver circuitry . . . consumes reduced battery power for GPS circuitry." Ex. 2015, 11:27–12:2; *see also* RMTA 6 (quoting same). As such, there is explicit disclosure of the primary location tracking circuity (i.e., GPS circuitry) consuming reduced power in a low power mode. Petitioner does not dispute Patent Owner's written description showing for any other aspects of the proposed substitute claims. We find that Patent Owner's listing sufficiently shows that the Specification of the '113 patent provides written description support as of the filing date of the '905 application.

6. Conclusion Regarding Procedural Requirements

In view of the above, we determine that Patent Owner has shown, by a preponderance of the evidence, that its revised motion to amend meets all of the statutory and regulatory requirements of 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. We now proceed to consider whether Petitioner has met its burden of persuasion with respect to patentability. 37 C.F.R. § 42.121(d)(2).

C. Claim Interpretation

1. "consumes at least reduced power"

Proposed substitute claim 21 recites "reducing, to a low power mode in which the primary location tracking circuity consumes at least reduced power," and proposed substitute claim 37 recites a similar limitation. RMTA 26, 31. Although the '905 application explicitly discloses that the primary location circuitry "consumes at least reduced power" in a low power mode (*see supra* § III.B.5), the parties nonetheless disagree on the interpretation and scope of these limitations. Patent Owner contends that these limitations "require[] that the primary location tracking circuitry consumes power while the supplemental location tracking circuitry is active" and that "although applied power level to the primary location tracking circuitry is reduced, applied power level is not eliminated and the primary location tracking circuitry is not shut off." RMTA 18. Patent Owner asserts that this construction is consistent with the Specification of the '113 patent. *Id.* at 19 (citing Ex. 1001, 8:5–11).

Petitioner contends that the plain and ordinary meaning of "consumes at least reduced power" should apply. MTA Opp. 6–7; RMTA Opp. 13–14. Petitioner argues that Patent Owner's proposed construction imports negative limitations, i.e., the limitations that the power "is not shut off" or "not eliminated." MTA Opp. 6. Petitioner also objects to Patent Owner's proposed construction to the extent it requires constant or continual power consumption, because Petitioner contends such an interpretation is not supported in the original priority document for the '113 patent. RMTA Opp. 14–16.

We need not resolve the parties' dispute regarding how to construe the "<u>consumes at least reduced power</u>" limitations because, as discussed below, Petitioner persuasively shows that the challenged claims are unpatentable over the asserted prior art even under Patent Owner's interpretation of these limitations. *See Nidec*, 868 F.3d at 1017; *Vivid*, 200 F.3d at 803.

2. "single predetermined signal level"

The proposed substitute claims also recite adjusting, reducing, and/or increasing the applied power level in response to measurement of a receive communication signal level relative to a "<u>single</u> predetermined signal level." RMTA 26, 28, 30–31. Although Patent Owner does not propose a construction for these limitations, its arguments with respect to these limitations seek to distinguish systems that take actions based on more than one signal level/threshold. RMTA 21–22; RMTA Reply 4. Specifically, Patent Owner argues that the '113 patent disclosure "provides clear support for limiting adjustment to only a single level in the claims." RMTA Reply 4.

Petitioner contends that we should apply the plain meaning to these limitations and find the limitations are "satisfied if the adjustment is 'in response to measurement of a receive communication signal level,' and the measurement of the receive signal level is relative to a **single** predetermined signal level **and <u>not</u> multiple predetermined signal levels**." RMTA Opp. 1–2. Petitioner notes that the proposed substitute claims "do[] not recite adjusting power levels in response to measuring a signal level relative to *one and only one* predetermined signal level, nor do[] the claim[s] recite the adjustment is *only* responsive to measuring a signal level relative to a single predetermined signal level." *Id.* at 2. Petitioner further contends that "[a]djusting power levels responsive to a 'single' signal level (applying [Patent Owner's] implicit construction) is not disclosed in the priority document." RMTA Sur-reply 1. Rather, according to Petitioner, "[t]he priority document only describes adjusting in response to measuring a signal level relative to a 'first signal level.'" RMTA Opp. 2–3 (citing Ex. 2015, 5:2–3, 10:1, Fig. 3 (steps 308, 312)).[6] Petitioner also characterizes Patent Owner's statement that "the inventors [of the '113 patent] envisioned more than one signal level at which adjustment may occur" as supporting Petitioner's view of the proper construction. RMTA Sur-reply 1–2 (quoting RMTA Reply 4).

We agree with Petitioner. The '905 application only discusses actions taken relative to "a first signal level, e.g., a low signal level or threshold value, as specified by, for instance, a user or system administrator." Ex. 2015, 9:30–10:2; *see also id.* at 4:30–5:9, 10:13–19, Fig. 3; Ex. 1001, 3:42–57, 6:55–59, 7:7–16, Fig. 3 (same citations in '113 patent). Nothing in the '905 application requires this "first signal level" to be the only threshold utilized for processing in a device. Patent Owner also admits that the inventors of the '113 patent contemplated devices with "more than one signal level at which adjustment may occur." RMTA Reply 4. Thus, we reject Patent Owner's suggestion that devices taking actions with respect to more than one threshold are excluded from the scope of the proposed

[6] For this citation, Petitioner appears to be applying a different page numbering convention for Exhibit 2015 than is used elsewhere in the record. We have transposed the citation to use the page numbers found in the bottom margin of Exhibit 2015.

substitute claims. Instead, we apply the plain and ordinary meaning to the "<u>single</u> predetermined signal level" limitations.

3. Other Terms

We determine that no other terms of the proposed substitute claims require explicit construction. *See Nidec*, 868 F.3d at 1017; *Vivid*, 200 F.3d at 803.

D. Whether the Proposed Substitute Claims Are Unpatentable Under 35 U.S.C. § 112 ¶ 1

In Petitioner's opposition to Patent Owner's initial motion to amend, Petitioner contended that the initial versions of proposed substitute claims 27–40 were unpatentable for failing to comply with the written description requirement. MTA Opp. 1–3. In our Preliminary Guidance, we found that Petitioner's arguments were reasonably likely to succeed with respect to proposed substitute claims 27–36, but not reasonably likely to succeed with respect to proposed substitute claims 37–40. PG 6–9. Subsequently, in the revised motion to amend, Patent Owner removed the language that formed the basis of Petitioner's argument with respect to proposed substitute claims 27–36. *Compare* MTA 28, *with* RMTA 28 (removing the limitation "<u>the primary location tracking circuitry continues to consume at least reduced power</u>" from proposed substitute claim 27).

In its opposition to the revised motion to amend, Petitioner does not address our analysis in the Preliminary Guidance (*see* PG 6–7) or otherwise maintain its contention that proposed substitute claims 37–40 lack sufficient written description support. Rather, Petitioner's only argument under 35 U.S.C. § 112 ¶ 1 (*see* RMTA Opp. 2–3) pertains to a particular construction of the "<u>single</u> predetermined signal level" limitation that we expressly reject above. *See supra* § III.C.2. Otherwise, Petitioner does not contend that the revised versions of the proposed substitute claims fail to comply with 35 U.S.C. § 112 ¶ 1.

Under these circumstances, we determine that Petitioner has not shown, by a preponderance of the evidence, that the proposed substitute claims are unpatentable for failing to comply with 35 U.S.C. § 112 ¶ 1.

E. Whether the Proposed Substitute Claims Are Unpatentable Under 35 U.S.C. § 112 ¶ 2

Petitioner put forth an indefiniteness argument with respect to proposed substitute claims 27–36 in the initial motion to amend (MTA Opp. 3–4), and we found this argument reasonably likely to succeed in our Preliminary Guidance. PG 9. Subsequently, in the revised motion to amend, Patent Owner removed the language that formed the basis of Petitioner's argument. *Compare* MTA 28, *with* RMTA 28 (removing the limitation "<u>the primary location tracking circuitry continues to consume at least reduced power</u>" from proposed substitute claim 27). Since that time, Petitioner has not addressed whether the revised versions of the proposed substitute claims fail to comply with 35 U.S.C. § 112 ¶ 2.

Under these circumstances, we determine that Petitioner has not shown, by a preponderance of the evidence, that the proposed substitute claims are unpatentable for failing to comply with 35 U.S.C. § 112 ¶ 2.

F. Patentability of Proposed Substitute Claims 27–29 and 31–36 over Sakamoto, Gotoh, and Levi

Petitioner contends the subject matter of proposed substitute claims 27–29 and 31–36 would have been obvious over the combination of Sakamoto, Gotoh, and Levi. RMTA Opp. 1–3; RMTA Sur-reply 1–5. Patent Owner disputes Petitioner's contentions. MTA 21–23; RMTA 20–22; RMTA Reply 1–4.

Proposed substitute claims 27–29 and 31–36 are the same as original claims 7–9 and 11–16 discussed above except that various actions taken "in response to measurement of a receive communication signal level relative to a predetermined signal level" are now done "relative to a <u>single</u> predetermined signal level" or "<u>one</u> predetermined signal level."[7] RMTA 28–29. Petitioner's obviousness analysis based on Sakamoto, Gotoh, and Levi is the same as it is for original claims 7–9 and 11–16 insofar as Petitioner cites the following teaching regarding Sakamoto's GPS receiver: "If it is determined that the positioning cannot be performed when the signal level value is equal to or lower than a predetermined threshold value, the position search may be stopped." RMTA Opp. 1–2; *see also* Pet. 35 (quoting Ex. 1004 ¶ 38), 60. Petitioner also relies on the same modification of Sakamoto from original claim 7 to include Gotoh's accelerometer, which Petitioner contends is powered up at the predetermined threshold value from Sakamoto. RMTA Opp. 2; *see also* Pet. 38–39 (citing Ex. 1005 ¶ 66), 60. Petitioner further contends that "placement of the GPS receiver in the stop-position searching mode is performed in response to

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[7] We also note that the claim dependencies for these claims have been updated in the revised motion to amend.

measuring a **single** GPS signal level below a 'predetermined threshold value.'"[8] RMTA Opp. 2 (citing Ex. 1004 ¶ 38).

Patent Owner argues that Sakamoto "discloses three modes of operation and two signal-level related thresholds." RMTA 21–22 (citing Ex. 1004 ¶¶ 27, 38). According to Patent Owner, Sakamoto cannot disclose "adjusting . . . relative to a single predetermined signal level" because it teaches two predetermined thresholds. *Id.* Yet Petitioner's mapping for "adjusting applied power levels" relies only on one threshold: Sakamoto's threshold below which the system enters stop-position searching mode. *See* RMTA Opp. 12–13 (citing Ex. 1004 ¶ 38); *see also* Pet. 35–38. Consistent with our comments on claim interpretation above (*see supra* § III.C.2), the fact that Sakamoto teaches another threshold for moving between normal and high sensitivity position modes does not detract from Petitioner's persuasive showing that Sakamoto's threshold for entering stop-position mode is "a single predetermined signal level" under the plain and ordinary meaning of that term. *See, e.g.*, Ex. 1004 ¶ 38.

Patent Owner also embarks upon a new argument in its reply in support of the revised motion to amend: that "*Sakamoto* does not . . . disclose that stopping a position search initiates any change or adjustment to applied power levels." RMTA Reply 2; *see also id.* at 8 ("*Sakamoto* does

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[8] For proposed substitute claims 29 and 39, which recite the opposite actions "in response to a measurement of the receive communication signal being above the single predetermined signal level," we note Petitioner's persuasive showing above based on Sakamoto's teaching of entering normal mode "when the signal level value is equal to or higher than a predetermined threshold value." Ex. 1004 ¶ 38; *see also supra* § II.D.6, 12, 15 (Petitioner's obviousness analysis for similar limitations in original claims 3, 9, and 12).

not provide any disclosure of reducing an applied power level to a GPS receiver when a position search is stopped.”). We agree with Petitioner (RMTA Sur-reply 2) that this is an improper reply argument because it (1) is not discussed in Patent Owner’s revised motion, which expressly alleges patentability over Sakamoto (*see* RMTA 20–22); and (2) does not respond to any portion of Petitioner’s opposition. As such, Patent Owner’s argument contravenes 37 C.F.R. § 42.23(b) because it does not “respond to arguments raised in the corresponding opposition.” *See also* Patent Trial and Appeal Board Consolidated Trial Practice Guide at 85–86 (Nov. 2019) (“Consolidated Trial Practice Guide”), *available at* https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf (“‘Respond,’ in the context of 37 C.F.R. § 42.23(b), does not mean proceed in a new direction with a new approach as compared to the positions taken in a prior filing.”). Thus, we will not entertain Patent Owner’s improper new argument.

And, even if we were to consider Patent Owner’s new argument, Sakamoto’s express teachings contradict it. As acknowledged by Patent Owner, “*Sakamoto* discloses [that] ‘power consumption can be reduced by stopping the position search when positioning is not possible.’” RMTA Reply 2 (quoting Ex. 1004 ¶ 50). Thus, consistent with our findings regarding the original claims above, we find that the combination of Sakamoto, Gotoh, and Levi teaches a “<u>single</u> predetermined threshold value” (i.e., Sakamoto’s “predetermined threshold value”) at which Sakamoto’s GPS transitions from normal sensitivity position mode to stop-position mode (thereby reducing power) and Gotoh’s accelerometer is activated (thereby increasing power). This teaches “adjusting applied power levels.”

For these reasons, and for the reasons discussed above with respect to original claims 7–9 and 11–16 (*see supra* § II.D.10–12, 14–19), we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 27–29 and 31–36 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

G. Patentability of Proposed Substitute Claims 21–26, 30, and 37–40 over Sakamoto, Gotoh, Levi, and Gronemeyer

Petitioner contends the subject matter of proposed substitute claims 21–26, 30, and 37–40 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and U.S. Patent No. 6,985,811 B2 (Ex. 1077, "Gronemeyer"). MTA Opp. 21–24; RMTA Opp. 1–3, 11–16; RMTA Sur-reply 1–5. Patent Owner disputes Petitioner's contentions. MTA 21–23; RMTA 20–24; RMTA Reply 7–12.

1. Gronemeyer

Gronemeyer is a U.S. patent describing a low power real time clock (RTC) operated continuously in a Global Positioning System (GPS) receiver unit while some receiver components are powered down. Ex. 1077, code (57). Figure 4 of Gronemeyer is reproduced below.

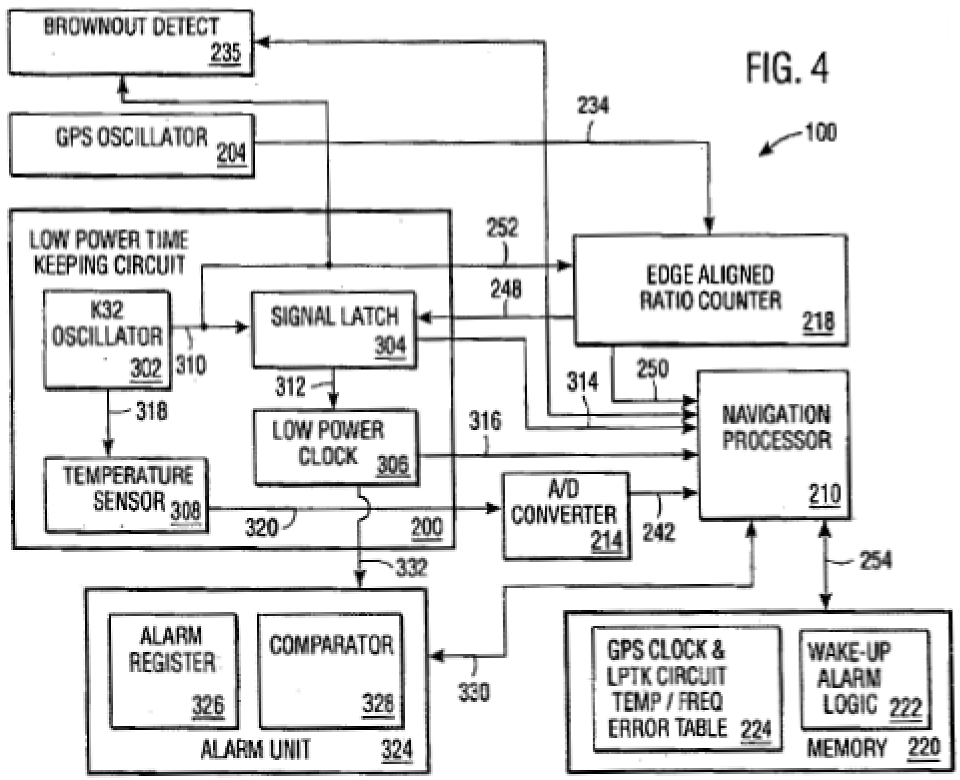

Figure 4 is a block diagram illustrating GPS receiver unit 100, which includes low power time keeping (LPTK) circuit 200. *Id.* at 8:3–5, 12:9–10. Low power time keeping circuit 200 includes K32 oscillator 302, signal latch 304, temperature sensor 308, and low power clock/real time clock (RTC) 306. *Id.* at 12:10–13. K32 oscillator 302 and low power clock 306 are very low-power consuming devices, particularly when compared to other components residing in GPS receiver unit 100 that are powered down in sleep mode. *Id.* at 12:58–62. K32 oscillator 302 and low power clock 306 are commercially available and relatively inexpensive. *Id.* at 12:62–64.

Power is conserved in GPS receiver unit 100 by shutting down selected components, including GPS oscillator 204, during periods when GPS receiver unit 100 is not actively acquiring satellite information used to calculate its location. *Id.* at 6:41–45. Such periods are called the sleeping period or the sleep mode. *Id.* at 14:3–6. Low power time keeping circuit 200 accurately maintains GPS time during the sleeping period, which enables GPS receiver unit 100 to more quickly reacquire GPS satellite signals when power is reapplied, thereby saving power resources. *Id.* at 14:45–48.

Petitioner contends Gronemeyer qualifies as prior art under 35 U.S.C. § 102(b) based on its issue date. MTA Opp. 8. Patent Owner does not contest the prior art status of Gronemeyer. For purposes of this Decision, we determine that Gronemeyer qualifies as prior art under 35 U.S.C. § 102(b) because Gronemeyer's issue date of January 10, 2006, is more than one year before the earliest effective filing date of the proposed substitute claims, which is January 6, 2008. Ex. 1001, code (62); Ex. 1077, code (45).

2. Proposed Substitute Claim 21

Petitioner's obviousness analysis for proposed substitute claim 21 builds upon its analysis for original claim 1 in the Sakamoto–Gotoh–Levi ground. We now focus on the amendments in proposed substitute claim 21.

Proposed substitute claim 21 recites "in response to measurement of a receive communication signal level less than a single predetermined signal level: reducing, to a low power mode in which the primary location tracking circuity consumes at least reduced power." RMTA 26. At the outset, we note that Sakamoto teaches "a single predetermined signal level" for the same reasons mentioned above. *See supra* § III.F. For the recited "reducing, to a low power mode," Petitioner cites Gronemeyer's teachings of conserving power "in GPS receiver unit 100 by shutting down selected components, including the GPS oscillator 204, during periods when the GPS receiver unit is not actively acquiring satellite information used to calculate the location of the GPS receiver unit." MTA Opp. 21 (quoting Ex. 1077, 6:41–45). Petitioner notes that Gronemeyer refers to periods when the components are shut off to conserve power as "the sleeping period or the sleep mode." *Id.* (quoting Ex. 1077, 14:3–5). Petitioner contends an ordinarily skilled artisan would have understood Gronemeyer's sleep mode to teach the recited "low power mode." *Id.* (citing Ex. 1080 ¶¶ 31, 33).

For the "primary location tracking circuitry consumes at least reduced power," Petitioner cites Gronemeyer's teaching of shutting down certain components during sleep mode, including oscillator 204, radio 202, clocks generator 216, and GPS signal processors 208. MTA Opp. 22 (citing Ex. 1077, 14:13–23). According to Petitioner, Gronemeyer also teaches that at least K32 oscillator 302 and low power clock 306 in low power time keeping circuit 200 remain powered on during sleep mode. *Id.* (citing Ex. 1077, 5:14–17, 6:45–48, 7:8–11, 12:9–13, Figs. 3, 4). Petitioner further notes Gronemeyer's teaching that K32 oscillator 302 and low power clock 306 are "very low-power consuming devices, particularly when compared to the selected components residing in the GPS receiver unit 100 that are powered down." *Id.* at 22–23 (quoting Ex. 1077, 12:58–61). Petitioner contends an ordinarily skilled artisan would have found it obvious to further modify the Sakamoto–Gotoh–Levi combination to include Gronemeyer's low power clock and oscillator powered on at all times in order to achieve the advantages expressly taught by Gronemeyer, including saving power and more quickly reacquiring GPS satellite signals when positioning resumes. *Id.* at 23–24 (citing Ex. 1077, 3:25–28, 14:3–12, 14:45–48, Ex. 1080 ¶¶ 37–38). Petitioner also notes the similarities between

Gronemeyer's GPS receiver unit 100 and Sakamoto's GPS receiver 10 and contends that adding a low power clock and oscillator—which were commercially available—to the existing Sakamoto–Gotoh–Levi combination would have been accomplished with a reasonable expectation of success. *Id.* at 24 (citing Ex. 1077, 12:62–64; Ex. 1080 ¶ 39).

Patent Owner attempts to distinguish Gronemeyer's "GPS circuitry" from an alleged "distinct time circuit" in Gronemeyer that "is utilized to maintain GPS time." RMTA 23 (citing Ex. 1077, 6:36–48, Figs. 3, 4). As such, Patent Owner acknowledges that "the GPS oscillator and K32 oscillator are both located in a GPS receiving unit," but Patent Owner contends "the K32 oscillator is not part of the GPS circuitry." *Id.* Patent Owner also argues that "Petitioner provides no . . . explanation of *how Sakamoto* might be modified to include *Gronemeyer's* low power time keeping circuit." RMTA Reply 11–12. In support of this argument, Patent Owner contends that "*Gronemeyer's* GPS receiver unit 100 is not a direct replacement for *Sakamoto's* GPS receiver 10." *Id.* at 12. Patent Owner additionally attempts to distinguish the recited "low power mode" from a sleep or standby mode. *Id.* at 8–10 (citing, *inter alia*, Ex. 2014 ¶¶ 30, 35; Ex. 2015, 10:2–10, 11:25). According to Patent Owner, Gronemeyer at most discloses "a 'sleep or standby mode' in which GPS receiver power is cycled between on and off." *Id.* at 10.

We do not agree with Patent Owner's arguments. First, the evidence of record contradicts Patent Owner's suggestion that Gronemeyer's K32 oscillator is separate from Gronemeyer's GPS circuitry. As noted by Petitioner, "[t]he *Gronemeyer* GPS receiver unit 100 includes the LPTK circuit 200, which includes the K32 oscillator." RMTA Opp. 21 (citing

Ex. 1077, 6:45–48, 8:3–5, Fig. 4). Indeed, Figures 3 and 4 of Gronemeyer depict LPTK circuit 200 as a part of GPS receiver unit 100. Ex. 1077, Figs. 3, 4; *see also id.* at 8:3–5 ("FIG. 3 is a block diagram illustrating selected components of the GPS receiver unit 100, including a low power time keeping circuit 200."). In Petitioner's proposed combination, Petitioner analogizes Gronemeyer's GPS receiver unit 100 to Sakamoto's GPS receiver 10 (MTA Opp. 24 (citing Ex. 1080 ¶ 39)), which itself is part of the "*Sakamoto* GPS Components" that Petitioner maps to the "primary location tracking circuitry" in the original claims. *See* Pet. 24. Moreover, Mr. Andrews testifies that "a POSITA would have understood that a combination with *Gronemeyer* would have advantageously allowed *Sakamoto's* primary location tracking circuitry, including GPS receiver 10, to consume reduced power in a low power mode." Ex. 1080 ¶ 38. As such, Petitioner maps the recited "primary location tracking circuitry" to Sakamoto's GPS receiver 10, GPS control unit 12, satellite signal level detecting unit 15, and positioning control unit 13—as modified to include Gronemeyer's LPTK circuit 200. *See* Pet. 24; MTA Opp. 23–24. Thus, we are persuaded that, in Petitioner's proposed combination, elements in the low power time keeping circuit "<u>consume[] at least reduced power</u>" even when other portions of the primary location tracking circuitry are powered down (i.e., are placed in a "<u>low power mode</u>"). *See, e.g.*, Ex. 1080 ¶¶ 31–37.

Second, we do not agree with Patent Owner's argument that Petitioner has failed to explain how and why an ordinarily skilled artisan would have combined the references. Petitioner proposes adding the components of Gronemeyer's low power time keeping circuit 200 (i.e., K32 oscillator 302 and low power clock 306) to the Sakamoto–Gotoh–Levi combination discussed above. MTA Opp. 23–24; *see also supra* § II.D.4 (Petitioner's obviousness analysis for original claim 1 in the Sakamoto–Gotoh–Levi ground). We are persuaded that an ordinarily skilled artisan would have expected success in making this modification based on Mr. Andrews's uncontested testimony and because Gronemeyer itself states that the low power time keeping circuit components were "commercially available and relatively inexpensive." Ex. 1077, 12:62–64; Ex. 1080 ¶¶ 37–39. Petitioner also notes that Gronemeyer teaches advantages arising from the use of a low power time keeping circuit, such as accurately maintaining GPS time during sleep mode and enabling quicker reacquisition of GPS signals after sleep mode. MTA Opp. 23 (citing Ex. 1077, 3:25–28, 14:3–12, 14:45–48). We are persuaded by Mr. Andrews's uncontested testimony that an ordinarily skilled artisan would have been motivated to make the modification proposed by Petitioner based on the advantages discussed in Gronemeyer. Ex. 1080 ¶¶ 37–38.

Third, we do not agree with Patent Owner's arguments (RMTA Reply 8–10) about Petitioner's cited teachings from Gronemeyer being a "sleep or standby mode" rather than a "low power mode." Notably, in its motion to amend and revised motion to amend, Patent Owner did not contend that "<u>low power mode</u>" should be accorded a particular construction beyond its inclusion in the fuller limitation that the primary tracking circuitry "<u>consumes at least reduced power</u>." MTA 18–19; RMTA 18–19. And Gronemeyer teaches the greater limitation including the "low power mode" even under Patent Owner's construction of that fuller limitation. *See* RMTA 18 (stating that, in low power mode, "although applied power level to the primary location tracking circuitry is reduced, applied power level is not eliminated and the primary location tracking circuitry is not shut off.”). Specifically, Petitioner establishes that Gronemeyer teaches a sleep mode where “low power time keeping circuit 200 ‘remains on’ even when ‘[s]elected components residing on the GPS receiver unit’ are ‘shut down (deactivated) to conserve power.’” MTA Opp. 22 (quoting Ex. 1077, 7:8–11) (alteration by Petitioner). Petitioner also puts forth uncontested testimony from Mr. Andrews that an ordinarily skilled artisan would have understood Gronemeyer’s sleep mode to be the recited “low power mode.” *Id.* at 21 (citing Ex. 1080 ¶¶ 31, 33). Thus, we are persuaded by Petitioner’s contentions, because power to Gronemeyer’s low power time keeping circuit 200—which is part of the “primary location tracking circuitry” under Petitioner’s mapping—is not eliminated.

Patent Owner also put forth another new argument at the oral hearing in which it attempted to differentiate the words “consumes” and “applied” in the limitation “reducing, to a low power mode in which the primary location tracking circuitry consumes at least reduced power, applied power level.” *See* Tr. 46:4–49:12, 50:17–53:5, 54:16–61:21, 68:4–73:26. In particular, Patent Owner argued that turning off power might reduce overall power consumption, but does not change applied power. *See, e.g.*, *id.* at 46:4–47:8. This argument does not appear in Patent Owner’s briefs.

The oral hearing is limited to “argument on an issue raised in a paper” and is not a vehicle for introducing new argument or evidence to the proceeding. 37 C.F.R. § 42.70(a); *see also* Consolidated Trial Practice Guide at 85–86 (“[A] party . . . may only present arguments relied upon in the papers previously submitted.”). At the oral hearing, the panel gave

Patent Owner's counsel multiple opportunities to point out where Patent Owner made an argument differentiating "consum[ed]" power and "applied" power in its papers, but counsel failed to provide any relevant citations. *See* Tr. 47:10–19, 68:14–74:7. As such, we do not consider Patent Owner's new argument attempting to differentiate consumed power from applied power.

The remaining limitations in proposed substitute claim 21 are the same as in original claim 1. We have discussed these limitations with respect to claim 1 of the Sakamoto–Gotoh–Levi ground above. *See supra* § II.D.4.

Having considered Petitioner's contentions and evidence and Patent Owner's arguments, we find that the combination of Sakamoto, Gotoh, Levi, and Gronemeyer teaches every limitation of proposed substitute claim 21. Petitioner also has provided persuasive reasons why an ordinarily skilled artisan would have further modified the Sakamoto–Gotoh–Levi combination based on Gronemeyer with predictable success. Thus, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claim 21 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer.

3. Proposed Substitute Claims 22 and 23

Proposed substitute claims 22 and 23, which depend from proposed substitute claim 21, differ substantively from original claims 2 and 3 only insofar as the recited "first signal level" of original claims 2 and 3 has been amended to read "a ~~first~~ single predetermined signal level" or "~~a first~~ one predetermined signal level." RMTA 27. For the same reasons discussed above, Sakamoto teaches a "single predetermined signal level" or "one

<u>predetermined</u> signal level." *See supra* § III.F and note 8. We have analyzed all other aspects of proposed substitute claims 22 and 23 above. *See supra* § II.D.5, 6. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 22 and 23 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer.

4. *Proposed Substitute Claims 24–26*

Proposed substitute claims 24–26 depend from proposed substitute claim 21 and are the same as original claims 4–6 except that the claim dependencies have been updated. We have analyzed all limitations of proposed substitute claims 24–26 above. *See supra* § II.D.7–9. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 24–26 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer.

5. *Proposed Substitute Claim 30*

Proposed substitute claim 30 depends from proposed substitute claim 27 and recites that "the primary location tracking circuitry is deactivated <u>by placing the primary location tracking circuitry in a low power mode in which the primary location tracking circuitry consumes at least reduced power</u> in response to a measurement of the receive communication signal being below the <u>single</u> predetermined signal level." RMTA 29. At the outset, we note that Sakamoto teaches "a <u>single</u> predetermined signal level" for the same reasons mentioned above. *See supra* § III.F. For the

"<u>low power mode in which the primary location tracking circuitry consumes at least reduced power</u>," Petitioner relies on the same analysis discussed above with respect to proposed substitute claim 21. *See supra* § III.G.2. We have analyzed all other aspects of proposed substitute claim 30 above with respect to original claim 10. *See supra* § II.D.13. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claim 30 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer.

6. Proposed Substitute Claim 37

Proposed substitute claim 37 is an independent claim that recites, *inter alia*,

> a battery power monitor configured to:
>
> <u>in response to measurement of a receive communication signal level less than a single predetermined signal level:</u>
>
> reduce<u>, to a low power mode in which the primary location tracking circuitry consumes at least reduced power,</u> applied power level to the primary location tracking circuitry.

RMTA 30–31. At the outset, we note that Sakamoto teaches "<u>a single predetermined signal level</u>" for the same reasons mentioned above. *See supra* § III.F. For the "<u>low power mode in which the primary location tracking circuitry consumes at least reduced power</u>," Petitioner relies on the same analysis discussed above with respect to proposed substitute claim 21. *See supra* § III.G.2. We have analyzed all other aspects of proposed substitute claim 37 above with respect to original claim 17. *See supra* § II.D.20. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claim 37 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer.

7. *Proposed Substitute Claims 38–40*

Proposed substitute claims 38–40 depend from proposed substitute claim 17 and are the same as original claims 18–20 except that the claim dependencies have been updated. We have analyzed all limitations of proposed substitute claims 38–40 above. *See supra* § II.D.21–23. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 38–40 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer.

H. *Patentability of Proposed Substitute Claims 21–40 on Other Grounds*

Petitioner additionally contends that (1) the subject matter of proposed substitute claim 30 would have been obvious over the combination of Sakamoto, Gotoh, and Levi (RMTA Opp. 1–3; RMTA Sur-reply 1–5); (2) the subject matter of proposed substitute claims 27–29 and 31–36 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer (MTA Opp. 21–24; RMTA Opp. 1–3; RMTA Sur-reply 1–5); (3) the subject matter of proposed substitute claims 27–36 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Kulach (RMTA Opp. 1–3; RMTA Sur-reply 1–5); (4) the subject matter of proposed substitute claims 21–40 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and U.S. Patent No. 6,438,381 B2 (Ex. 1076, "Alberth") (MTA Opp. 8–20; RMTA Opp. 1–3, 11–18; RMTA Sur-reply 1–

5, 8–11); and (5) the subject matter of proposed substitute claims 27–36 would have been obvious over the combination of Alberth, Gotoh, and Levi (RMTA Opp. 3–11; RMTA Sur-reply 6–8). We already have found proposed substitute claims 21–40 to be unpatentable, so we do not reach any of these grounds. *See SAS*, 138 S. Ct. at 1359; *Boston Sci.*, 809 F. App'x at 990.

IV. CONCLUSION[9]

Petitioner has shown, by a preponderance of the evidence, that claims 1–20 of the '113 patent would have been obvious over the combination of Sakamoto, Gotoh, and Levi. Patent Owner has shown that its revised motion to amend complies with the statutory and regulatory requirements. Nevertheless, Petitioner has shown, by a preponderance of the evidence, that (1) the subject matter of proposed substitute claims 27–29 and 31–36 would have been obvious over the combination of Sakamoto, Gotoh, and Levi; and (2) the subject matter of proposed substitute claims 21–26, 30, and 37–40 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer. Thus, we *deny* Patent Owner's revised motion to amend.

[9] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding.* *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent 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).

V. ORDER

Accordingly, it is

ORDERED that claims 1–20 of the ’113 patent are held to be unpatentable;

FURTHER ORDERED that Patent Owner’s revised motion to amend is *denied*; and

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

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1–20	103(a)	Sakamoto, Gotoh, Levi	1–20	
1–20	103(a)[10]	Sakamoto, Gotoh, Levi, Kulach		
Overall Outcome			1–20	

Motion to Amend Outcome	Claims
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	21–40
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	21–40
Substitute Claims: Not Reached	

[10] As explained above, we do not reach this ground. *See supra* § II.E.

PETITIONER:

Jennifer C. Bailey
Adam P. Seitz
ERISE IP, P.A.
jennifer.bailey@eriseip.com
adam.seitz@eriseip.com

PATENT OWNER:

Shaun D. Gregory
TAFT STETTINIUS & HOLLISTER LLP
sgregory@taftlaw.com

Trials@uspto.gov
571-272-7822

Paper 39
Date: March 2, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

LBT IP I LLC,
Patent Owner.

IPR2020-01191
Patent 8,102,256 B2

Before JOHN A. HUDALLA, SHEILA F. McSHANE, and JULIET MITCHELL DIRBA, *Administrative Patent Judges.*

McSHANE, *Administrative Patent Judge.*

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

I. INTRODUCTION

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons discussed herein, we determine that Petitioner has shown by a preponderance of the evidence that challenged claims 8–10 of U.S. Patent No. 8,102,256 B2 (Ex. 1001, "the '256 patent") are unpatentable.

Patent Owner filed a contingent Motion to Amend to cancel original claims 8–10 and replace them with proposed substitute claims 11–13. For the reasons discussed herein, we deny this motion because Petitioner has established by a preponderance of the evidence that the proposed substitute claims are unpatentable in view of the prior art.

A. Procedural Background

Apple Inc. ("Petitioner") filed a Petition requesting *inter partes* review of claims 8–10 of the '256 patent, along with the supporting Declaration of Scott Andrews. Paper 1 ("Pet."); Ex. 1003. LBT IP I LLC ("Patent Owner") filed a Preliminary Response to the Petition. Paper 8. On March 4, 2021, pursuant to 35 U.S.C. § 314(a), we instituted *inter partes* review based on the following grounds:

Claim(s)	35 U.S.C. §[1]	References/Basis
10	103(a)	Sakamoto[2], Gotoh[3]
10	103(a)	Sakamoto, Gotoh, Kulach[4]
8, 9	103(a)	Sakamoto, Gotoh, Krasner[5]
8, 9	103(a)	Sakamoto, Gotoh, Krasner, Kulach

Pet. 8; Paper 9 ("Inst. Dec"), 7.

Patent Owner filed a Patent Owner Response ("PO Resp."). Paper 17. Petitioner filed a Reply ("Pet. Reply") to the Patent Owner Response, as well as the Supplemental Declaration of Scott Andrews. Paper 25; Ex. 1080. Patent Owner filed a Sur-reply ("PO Sur-reply"). Paper 31.

In addition, Patent Owner filed a contingent Motion to Amend (Paper 16, "Mot."), which was opposed by Petitioner (Paper 26, "Pet. Mot. Opp."). At the request of Patent Owner (Mot. 2), we issued Preliminary Guidance to Patent Owner's Motion to Amend (Paper 28). Patent Owner submitted a Reply in Support of its Motion to Amend (Paper 30, "PO Mot.

[1] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103, and 112 effective March 16, 2013. Because the '256 patent was filed before this date, the pre-AIA versions of §§ 102, 103, and 112 apply.
[2] Japanese Unexamined Patent Application Publication No. 2004-37116 (published February 5, 2004). Ex. 1004. We refer to the English translation (Ex. 1004) of the original reference herein. Petitioner provides declarations attesting to the accuracy of the translation. *Id*. at 20, 50.
[3] U.S. Patent Application No. 2003/0217070 A1, published on November 20, 2003. Ex. 1005.
[4] U.S. Patent Application No. 2007/0208544A1, published on September 6, 2007. Ex. 1007.
[5] U.S. Patent No. 6,799,050 B1, filed June 4, 2001, issued September 28, 2004. Ex. 1010.

Reply"), and Petitioner filed a Sur-reply supporting its Opposition (Paper 36, "Pet. Mot. Sur-reply").

An oral hearing, consolidated with Cases IPR2020-01189 and IPR2020-01192, was conducted on December 9, 2021. A transcript of the hearing is included in the record. Paper 38 ("Tr.").

B. Related Matters

The parties identify *LBT IP I LLC v. Apple Inc.*, Civil Action No. 1:19-cv-01245-UNA (D. Del.), filed on July 1, 2019 as a related matter. Pet. 71; Paper 3, 2. Petitioner also identifies several petitions filed challenging other patents related to the '256 patent: IPR2020-01189, IPR2020-01190, IPR2020-01192, and IPR2020-01193. Pet. 71.

C. The '256 Patent

The '256 patent is titled "Apparatus And Method For Determining Location And Tracking Coordinates Of A Tracking Device" and issued on January 24, 2012, from an application filed on January 6, 2008. Ex. 1001, codes (22), (45), (54).

The '256 patent is directed to an apparatus to monitor location coordinates of an electronic tracking device. Ex. 1001, code (57), 3:19–20. The electronic tracking device apparatus includes electronic components such as a transceiver, signal processing circuitry, and an accelerometer. *Id.* at 5:44–47. Figure 1, reproduced below, depicts a schematic of the electronic tracking device.

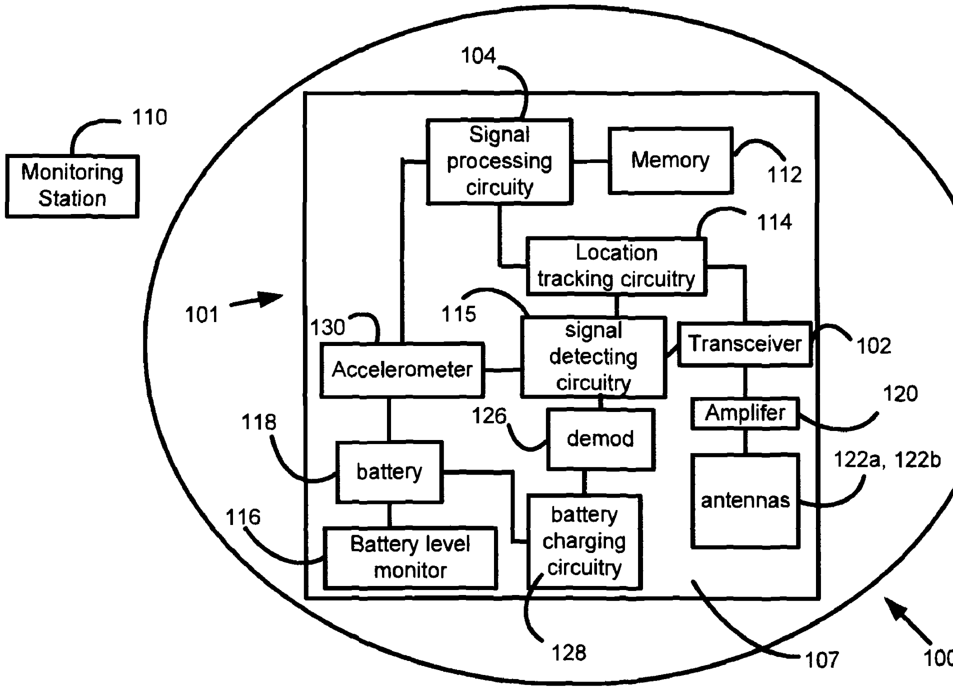

Figure 1

As depicted in the schematic of Figure 1, reproduced above, tracking device 100 contains electronic components 101 such as transceiver 102, signal processing circuitry 104 (e.g., a microprocessor or other signal logic circuitry), and accelerometer 130. Ex. 1001, 5:44–47. Signal processing circuitry 104 may store a first identification code, produce a second identification code, determine location coordinates, and generate a positioning signal that contains location data. *Id.* at 5:56–60. Location tracking circuitry 114 calculates location data received and sends the data to signal processing circuitry 104. *Id.* at 6:6–8. Memory 112 stores operating software and data communicated to and from signal processing circuit 104 and/or location tracking circuitry 114, for example, global positioning system (GPS) logic circuitry. *Id.* at 6:8–11. Signal power levels are detected and measured, and the battery level is detected. *Id.* at 6:11–16.

When a signal level received by the GPS receiver is below a first signal level, portions of GPS circuitry may be placed in a sleep mode to conserve the battery level, and GPS signal acquisition may be resumed when the signal level is above a first signal level. *Id.* at 6:60–7:5. "[W]hen GPS signaling is not practicable, electronic device proximity measurements provide differential location coordinate information to calculate current location coordinate information." *Id.* at 8:3–6.

Figure 3, reproduced below, is a flowchart illustrating battery conservation for electronic tracking device 100. Ex. 1001, 9:25–26.

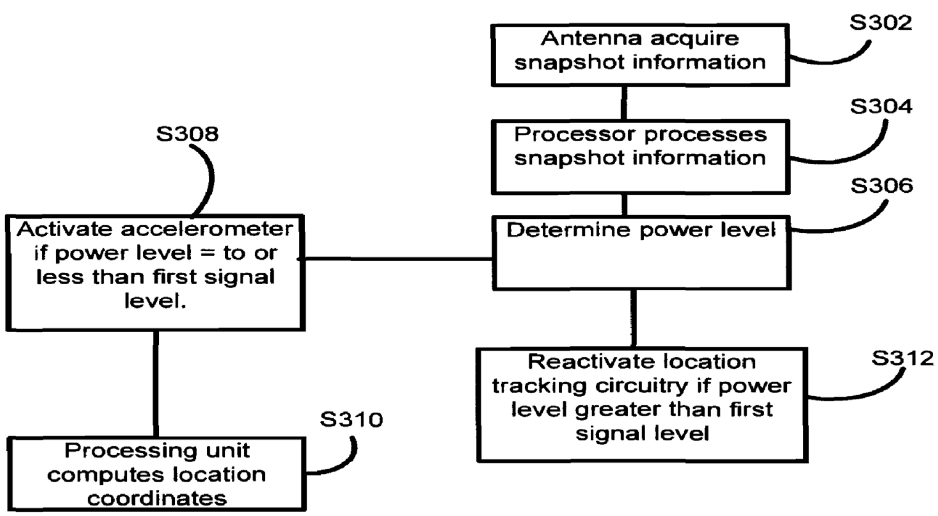

Figure 3

As shown the flow chart of Figure 3, above, antenna 122a associated with electronic tracking device 100 acquires a snapshot of receive communication signal in step 302, including location coordinates data, and processing unit 104 processes the data in step 304. Ex. 1001, 9:28–33. In step 306, processing unit 104 determines a power level of receive communication signal. *Id.* at 9:33–34. In step 308, accelerometer 130 activates if a power level of the receive communication signal is insufficient, and accelerometer

130 may measure acceleration of electronic tracking device 100 at time intervals, with processing unit 104 computing current location coordinates using acceleration measurements at step 310. *Id*. at 9:35–41. In a variation of step 312, upon determining receive communication signal is of sufficient signal strength, accelerometer 130 is deactivated and location tracking circuitry 114 is activated. *Id*. at 9:49–52.

Challenged claims 8, 9, and 10 are independent. These claims of the ’256 patent are reproduced below, with bracketed letters added to the limitations for reference purposes.

> 8. A location monitoring apparatus for an electronic tracking device to track by a monitoring station comprising:
>
> [a] an accelerometer to generate displacement vectors associated with the electronic tracking device;
>
> [b] a signal processor to measure a signal level of a receive communication signal comprising location coordinates information, wherein the accelerometer activates or deactivates based in part of a value of the signal level of the receive communication signal;
>
> [c] a power amplifier to amplify a signal level of at least one of the receive communication signal and a transmit communication signal; and
>
> [d] battery monitor circuitry to measure available battery power and adjust power usage to the power amplifier responsive to available battery power and to a signal level of the receive communication signal.
>
> 9. A location monitoring apparatus for an electronic tracking device to track by a monitoring station comprising:
>
> [a] an accelerometer to generate displacement vectors associated with the electronic tracking device;
>
> [b] a signal processor to measure a signal level of a receive communication signal comprising location coordinates information,

wherein the accelerometer activates or deactivates based in part of a value of the signal level of the receive communication signal;

[c] power amplifier circuitry;

[d] location tracking circuitry; and

[e] battery management circuitry to adjust power level applied to the location tracking circuitry and the power amplifier circuitry responsive to the signal level.

10. A location monitoring apparatus for an electronic tracking device powered by a battery to track by a monitoring station comprising:

[a] an accelerometer to generate displacement vectors associated with the electronic tracking device; and

[b] a signal processor to measure a signal level of a receive communication signal comprising location coordinates information; and

[c] a battery power monitor configured to activate and deactivate at least one portion of the electronic tracking device to conserve battery power in response to a signal level of the receive communication signal, wherein the accelerometer activates or deactivates based in part on the signal level of the receive communication signal.

Ex. 1001, 10:61–12:18.

II. ANALYSIS OF PATENTABILITY OF CLAIMS 8–10

A. The Parties' Arguments

In our Decision on Institution, we concluded that the arguments and evidence advanced by Petitioner demonstrated a reasonable likelihood that at least one claim of the '256 patent would have been obvious. Inst. Dec. 10–30. Here, we must consider whether Petitioner has established by a preponderance of the evidence that claims 8–10 of the '256 patent would have been obvious. 35 U.S.C. § 316(e). We previously instructed Patent Owner that "Patent Owner is cautioned that any arguments not raised in the response may be deemed waived." Paper 10, 9; *In re NuVasive, Inc*., 842 F.3d 1376, 1379–82 (Fed. Cir. 2016) (holding patent owner waived an argument addressed in the preliminary response by not raising the same argument in the patent owner response). Additionally, the Board's Trial Practice Guide states that the Patent Owner Response "should identify all the involved claims that are believed to be patentable and state the basis for that belief." Consolidated Trial Practice Guide ("TPG"), 66 (Nov. 2019).

Patent Owner has chosen not to address certain arguments and evidence advanced by Petitioner to support its unpatentability contentions. In this regard, the record contains persuasive arguments and evidence presented by Petitioner regarding the manner in which the prior art discloses the corresponding limitations of claims 8–10 of the '256 patent as well as rationale to combine the references.

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art the time of the invention would have had would have had a bachelor's degree in electrical engineering, computer engineering, computer science, or an equivalent degree, with at least two years of experience in GPS navigation, dead reckoning, portable tracking devices, or related technologies. Pet. 5. Petitioner contends that additional education may substitute for lesser work experience and vice-versa. *Id*. (citing Ex. 1003 ¶ 30).

In determining the level of ordinary skill in the art, various factors may be considered, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC Inc*., 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted). The level of ordinary skill in the art is also reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

In the Institution Decision, we considered the subject matter of the ’256 patent, the background technical field, and the prior art, and we agreed with Petitioner’s proposed qualifications; however, we deleted the use of the qualifier of “at least” because it introduces vagueness. Inst. Dec. 8–9. Accordingly, we determined that one of ordinary skill in the art would have had a bachelor’s degree in electrical engineering, computer engineering, computer science, or an equivalent degree, with two years of experience in GPS navigation, dead reckoning, portable tracking devices, or related technologies, and that additional education may substitute for lesser work experience and vice-versa. *Id*.

Patent Owner adopted the qualifications identified in the Institution Decision. PO Resp. 3.

In view of the relevant technology and claims of the ’256 patent, as well as the technology of the asserted prior art, and we adopt the same qualifications as those identified in the Institution Decision.

C. Claim Construction[6]

For petitions filed after November 13, 2018, the Board interprets claim terms in accordance with the standard used in federal district court in a civil action involving the validity or infringement of a patent. 37 C.F.R. § 42.100(b) (2019). Under the principles set forth by our reviewing court,

[6] This section applies to claim construction related to the original claims 8–10 of the ’256 patent. Claim construction issues related to the proposed substitute claims are addressed in Section III.C.1 *infra*.

the "words of a claim 'are generally given their ordinary and customary meaning,'" as would be understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp*., 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp. v. Conceptronic, Inc*., 90 F.3d 1576, 1582 (Fed. Cir. 1996)). "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc*., 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Petitioner asserts that no express claim construction is required in order to assess the grounds presented. Pet. 9; *see generally* Pet. Reply. Patent Owner does not present any proposed construction for any claim terms. *See generally* PO Resp.; PO Sur-reply.

In the Institution Decision, we determined that it was not necessary to provide express interpretations of any claim terms. Inst. Dec. 9–10. On the full record, we likewise determine that it is not necessary to provide an express interpretation of any claim terms. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co*., 868 F.3d 1013, 1017 (Fed. Cir. 2017); *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc*., 200 F.3d 795, 803 (Fed. Cir. 1999) ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.").

D. Alleged Obviousness of Claim 10 Over Sakamoto and Gotoh

Petitioner contends that claim 10 would have been obvious over the combination of Sakamoto and Gotoh. Pet. 12–44; Pet. Reply 10–11. To support its contentions, Petitioner provides explanations as to how Sakamoto and Gotoh teach each claim limitation and why there is a motivation to combine the references. *Id*. Petitioner also relies upon the Andrews Declaration (Ex. 1003) and the Supplemental Andrews Declaration (Ex. 1080) to support its positions. Patent Owner argues that the prior art does not teach all the claim limitations and Petitioner has not fully supported the rationale to combine the references. PO Resp. 11–19; PO Sur-reply 1–10.

We begin our discussion with a brief summary of Sakamoto and Gotoh, and then address the evidence and arguments presented.

1. Sakamoto (Ex. 1004)

Sakamoto is directed to the use of a GPS positioning system that includes a portable terminal and remote server. Ex. 1004, code (57), ¶ 18. Figure 1, reproduced below, is a diagram of the configuration of an embodiment of Sakamoto's system.

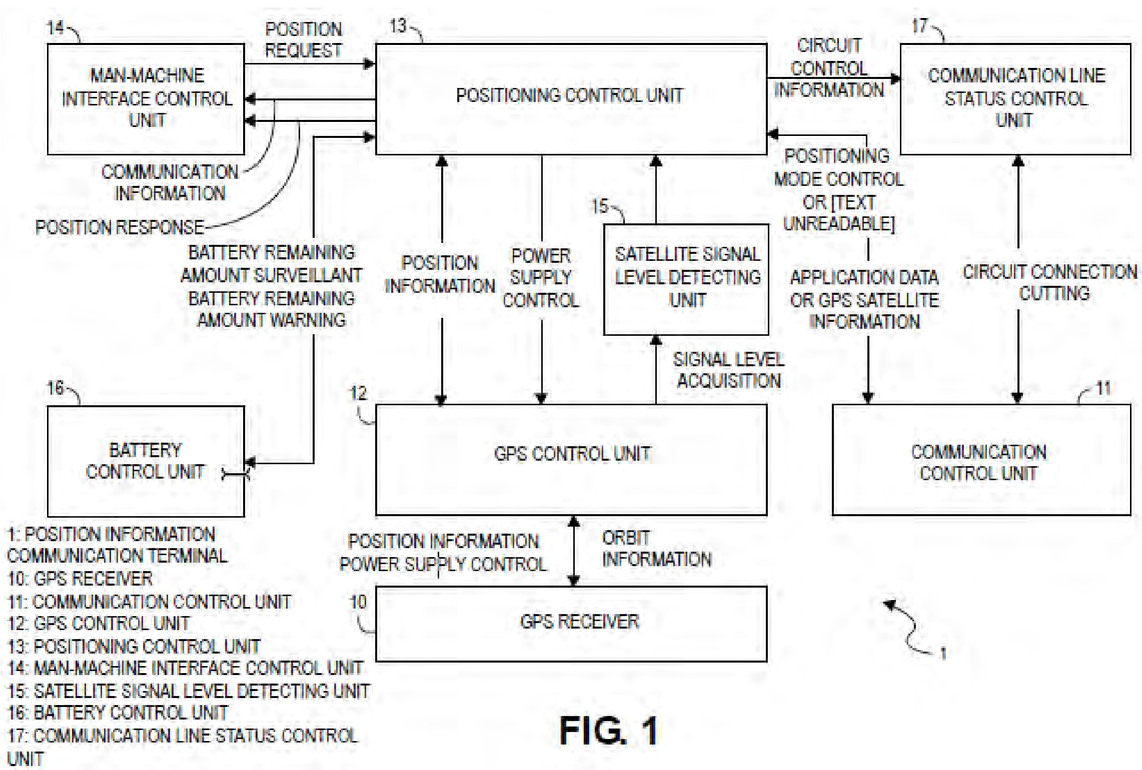

FIG. 1

Figure 1, above, depicts the position information communication terminal 1 which includes GPS receiver 10, positioning control unit 13, communication control unit 11 for mobile communications, man-machine interface control unit 14, which is an interface means with a terminal user, and battery control unit 16. Ex. 1004 ¶ 19. Battery control unit 16 provides positioning control unit 13 a remaining battery life warning when the remaining battery amount falls below a preset threshold value. *Id.* Terminal 1 also has satellite signal level detector 15 that detects a level of the GPS signal received by GPS receiver 10. *Id.* ¶ 50. When the satellite signal level received by terminal 1 is low such that positioning is not possible, power consumption can be reduced by stopping the position search. *Id.*

2. Gotoh (Ex. 1005)

Gotoh is directed to a positional information management system that includes a mobile terminal and server. Ex. 1005 ¶ 9. Figure 1 of Gotoh, which shows a schematic diagram of the system, is reproduced below.

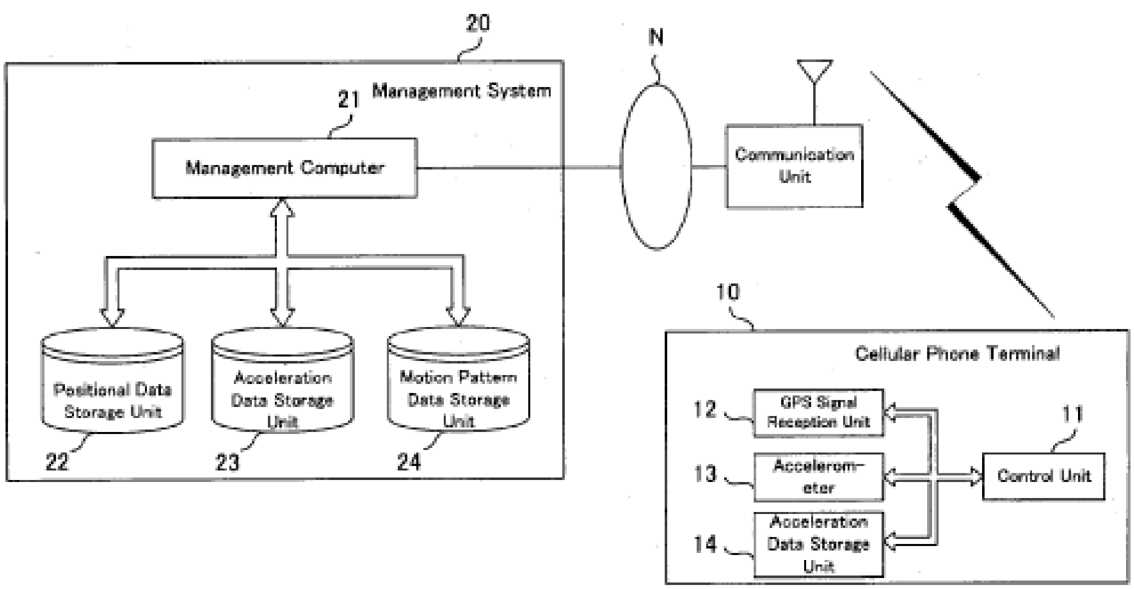

Figure 1, above, depicts a schematic diagram of Gotoh's system, with cellular phone terminal 10 acting as the mobile terminal, which includes

GPS signal reception unit 12, accelerometer 13, acceleration data storage unit 14, and control unit 11 for controlling the terminal. Ex. 1005 ¶ 51. Control unit 11 controls GPS signal reception unit 12 and accelerometer 13, and has a function for performing wireless communication. *Id.* ¶ 52. Management system 20 exchanges information with the cellular phone terminal 10 via a communication system. *Id.* ¶ 56. A communication system includes a wireless base station for sending and receiving predetermined information to and from cellular phone terminal 10, with the communication system specifying the position of cellular phone terminal 10 based on GPS signals sent from cellular phone terminal 10. *Id.* ¶ 54. When cellular phone terminal 10 cannot receive GPS signals, cellular phone terminal 10 starts measuring and storing acceleration data. *Id.* ¶¶ 66, 81.

3. Analysis

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *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.[7] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

[7] No evidence of objective indicia of nonobviousness has been presented by Patent Owner. *See generally* PO Resp.

a. Claim 10

Petitioner asserts that the combination of Sakamoto and Gotoh teaches all the limitations of claim 10, and one of ordinary skill in the art would have been motivated to combine the asserted prior art references. *See* Pet. 12–44; Pet. Reply 10–11.

1) Petitioner's Contentions

i. Preamble

The preamble of claim 10 recites "[a] location monitoring apparatus for an electronic tracking device powered by a battery to track by a monitoring station." Ex. 1001, 12:5–7. Petitioner cites Sakamoto in combination with Gotoh for the teaching of the location monitoring apparatus of the preamble. Pet. 21. More specifically, Petitioner asserts that Sakamoto teaches a GPS positioning system with a position information communication terminal that is tracked by a position management/ positioning server 2. *Id*. (citing Ex. 1004 ¶¶ 18–19). Petitioner argues that "Sakamoto's GPS receiver 10, GPS control unit 12, positioning control unit 13, signal level detection unit 15, and battery control unit 16 . . . in combination with the accelerometer taught by Gotoh, provide for location monitoring." *Id*. at 22. Petitioner contends that Sakamoto's GPS receiver 10 calculates a position of the position information communication terminal 1, and Gotoh's accelerometer enables determining a distance traveled when GPS signals are unavailable, so these components constitute the claimed "location monitoring apparatus" and are the "electronic tracking device," as claimed. *Id*. (citing Ex. 1004 ¶ 23; Ex. 1005, code (57), ¶ 90).

ii. Limitation 10[a]

Limitation 10[a] recites "an accelerometer to generate displacement vectors associated with the electronic tracking device." Ex. 1001, 12:8–9. For this limitation, Petitioner acknowledges that Sakamoto does not expressly teach an accelerometer, but argues that portable devices utilizing both GPS-based and accelerometer-based position determinations (such as Gotoh's) were well known in the art. Pet. 25. Petitioner asserts that Gotoh teaches an accelerometer to generate displacement vectors. *Id*. at 25–27 (citing Ex. 1005, code (57), ¶¶ 59, 64, 66–67, 81–82, 84, Figs. 1, 2; Ex. 1003 ¶¶ 135–137). Mr. Andrews testifies that when force is applied to an object at rest, it accelerates and moves, i.e., it is displaced. Ex. 1003 ¶ 137. Mr. Andrews testifies that an accelerometer, like that of Gotoh, measures the acceleration that causes displacement, and by measuring acceleration the displacement of the object is also measured. *Id*. ¶ 138. Mr. Andrews further testifies that a person of ordinary skill in the art would have known that an accelerometer is mounted in a fixed orientation within a cellular phone terminal, and that by measuring acceleration with this orientation, Gotoh teaches an accelerometer that generates displacement vectors associated with the electronic tracking device. *Id*. ¶ 139.

Petitioner contends that one of ordinary skill in the art would have been motivated to combine Sakamoto and Gotoh. Pet. 13–20. Petitioner argues that Sakamoto and Gotoh are analogous art to the '256 patent and that one of ordinary skill would have been motivated to combine Gotoh's accelerometer with Sakamoto's system that uses GPS for determining a position. Pet. 13–14 (citing Ex. 1003 ¶¶ 114–123). Petitioner contends that the use of accelerometers for location tracking of a device, in particular when GPS signals are unavailable, was well-known. *Id*. (citing Ex. 1003 ¶¶ 46–57). Petitioner contends that using an accelerometer to supplement a GPS receiver would have been the use of a known technique to improve a similar device in the same way and would have been an improvement to Sakamoto's device. *Id*. at 14 (citing Ex. 1003 ¶ 120). Petitioner further alleges that it would have been simple to add an accelerometer to Sakamoto's terminal, and the addition of Gotoh's accelerometer combined with Sakamoto's system would have performed the same function of supplemental location tracking to measure displacements with an accelerometer when GPS signals cannot be received. *Id*. at 15 (citing Ex. 1005 ¶ 81).

Petitioner argues that there would have been a reasonable expectation of success in adding the accelerometer of Gotoh in the system of Sakamoto. Pet. 16. Petitioner asserts that accelerometers were readily available, inexpensive, and ready for use and integration with larger electronic devices. *Id*. (citing Ex. 1001, 6:39–44; Ex. 1031, 1; Ex. 1003 ¶ 122). Petitioner further asserts that it also would have been obvious to only use the accelerometer data when such functionality was needed due to poor GPS signal reception, as taught by Gotoh. *Id*. (citing Ex. 1003 ¶ 123).

iii. Limitation 10[b]

Limitation 10[b] recites "a signal processor to measure a signal level of a receive communication signal comprising location coordinates information." Ex. 1001, 12:10–12. Petitioner asserts that Sakamoto teaches "a signal processor" that detects a level of the GPS signal received by the GPS receiver. Pet. 28 (citing Ex. 1004 ¶¶ 8, 19, 50, claim 4). More specifically, Petitioner refers to Sakamoto's satellite signal level detecting unit 15 that "monitor[s] the signal level from the GPS satellite during the measurement time specified in the satellite signal level request message" and calculates an "average value of the signal level." *Id*. (citing Ex. 1005 ¶ 37). Petitioner argues that it was well-known that "the GPS satellite signal includes information, i.e., time offsets associated with the location coordinates of the receiver, that the GPS receiver uses to determine position." *Id*. at 29 (citing Ex. 1003 ¶¶ 33–40, 144). Petitioner asserts that a person of ordinary skill in the art "would have understood Sakamoto teaches that the GPS satellite signal level that is monitored is a 'receive communication signal comprising location coordinates information.'" *Id*. at 30 (citing Ex. 1003 ¶¶ 143–144).

iv. Limitation 10[c]

Limitation 10[c] recites:

> a battery power monitor configured to activate and deactivate at least one portion of the electronic tracking device to conserve battery power in response to a signal level of the receive communication signal, wherein the accelerometer activates or deactivates based in part on the signal level of the receive communication signal.

Ex. 1001, 12:13–18.

Petitioner argues that Sakamoto teaches a battery power monitor (i.e., the battery control unit 16, positioning control unit 13, and GPS control unit 12). Pet. 33. Petitioner asserts that Sakamoto's battery control unit 16 notifies positioning control unit 13 of the remaining battery amount by sending a remaining battery amount warning to positioning control unit 13. *Id*. (citing Ex. 1004 ¶¶ 10, 29). Petitioner contends that in Sakamoto positioning control unit 13 sets the positioning mode in response to a signal level of the GPS satellite signal received by GPS receiver 10. *Id*.

Petitioner argues that Sakamoto teaches activating and deactivating the GPS receiver to conserve power and in response to a signal level. Pet. 30–44. Petitioner asserts that Sakamoto's GPS receiver monitors the GPS satellite signal and then, depending on the signal level, changes its mode of operation. *Id*. at 30–32 (citing Ex. 1004 ¶¶ 24–25, 27, 37–38, 45, 50). Mr. Andrews testifies that the three possible operational modes of Sakamoto are: (1) high sensitivity (poor signal); (2) normal mode (good signal); and (3) stop-position searching mode (GPS signal too low to perform positioning operations). Ex. 1003 ¶ 152 (citing Ex. 1004 ¶¶ 5, 24, 27, 38, 50).

Petitioner asserts that Sakamoto teaches activating and deactivating at least one portion of the mapped electronic tracking device in response to a signal level of the received communication signal to reduce power consumption. Pet. 31. Petitioner refers to Sakamoto's teaching that "the GPS receiver cyclically monitors the GPS satellite signal level according to a 'measurement time.'" *Id*. (citing Ex. 1004 ¶ 37). Petitioner asserts that "*Sakamoto* teaches transitioning to the normal mode (if not already in the normal mode)" in situations where "the GPS signal is 'high.'" *Id*. (citing Ex. 1004 ¶ 27). Petitioner further contends that "when the GPS signal is 'equal to or lower than a predetermined threshold value,' such that 'positioning cannot be performed,' the 'position search may be stopped.'" *Id*. (citing Ex. 1004 ¶ 38).

Mr. Andrews testifies that deactivating the GPS receiver, i.e., stopping position searching, is known to reduce power consumption. Ex. 1003 ¶¶ 146–147. Petitioner additionally refers to Sakamoto's teaching that "power consumption can be reduced by stopping the position search when positioning is not possible." Pet. 31–32 (citing Ex. 1004 ¶ 50).

Petitioner argues that Sakamoto teaches activating and deactivating the GPS receiver by performing signal level detection during a set measurement time. Pet. 34 (citing Ex. 1003 ¶¶ 151–157; Ex. 1004 ¶¶ 20, 37, Figs. 6, 7). Petitioner asserts that "at the cycle set in advance," terminal 1 repeats signal level detection via unit 15 and a positioning mode is set. *Id*. at 36 (citing Ex. 1003 ¶¶ 151–152; Ex. 1004 ¶¶ 37–38). According to Petitioner, "the positioning mode control unit 22 'sends a positioning control message (satellite signal level request message),'" and the positioning control unit then "causes the satellite signal level detection unit 15 to monitor the signal level from the GPS satellite" during this cycle. Pet. Reply 3–4 (citing Ex. 1003 ¶¶ 146–157; Ex. 1004 ¶¶ 37–38). Petitioner contends that in Sakamoto the satellite signal level response is sent to position management/positioning server 2, and the positioning mode control unit 22 reads it and "determines the required positioning mode based on the satellite signal level, including whether the signal level is above 'the predetermined threshold value.'" *Id*. at 4 (citing Ex. 1004 ¶ 38). Mr. Andrews testifies that Sakamoto teaches a cycle such that positioning operations are performed more than once over a period of time and "it would have been non-sensical to design Sakamoto's system such that positioning would only have been performed once." Ex. 1003 ¶ 152.

Petitioner refers to Sakamoto's disclosure that position searching would be stopped (stop-position mode) if the signal level detected is equal to or lower than a predetermined threshold value. *Id*. at 35–36 (citing Ex. 1003 ¶ 151; Ex. 1004 ¶¶ 20, 38). Mr. Andrews testifies that,

> in instances where the operation mode was previously in a stop-position searching mode because the signal level was equal to or lower than a predetermined threshold, and the subsequent detected signal level is good (e.g., above a threshold value, K2), then a POSITA [person of ordinary skill in the art] would have understood GPS control unit 12 instructs GPS receiver 10 to begin position searching.

Ex. 1003 ¶ 154 (citing Ex. 1004 ¶ 27). Mr. Andrews further testifies that a person of ordinary skill would have considered a location tracking device "useless" if it transitioned to stop-positioning mode when the signal level was low, but did not transition to a positioning mode by activating the GPS when the signal was high enough. *Id*. ¶ 155.

Petitioner argues that Sakamoto, as modified by Gotoh, teaches that "the accelerometer activates or deactivates based in part on the signal level of the receive communication signal." Pet. 39–44. Petitioner contends that Sakamoto teaches a "predetermined threshold value" of the satellite signal level when the position search may be stopped, and Gotoh teaches starting acceleration measurements when the GPS signals cannot be acquired and, conversely, stopping acceleration measurements when the GPS signals are again available. *Id*. at 39–40 (citing Ex. 1004 ¶¶ 38, 50; Ex. 1005 ¶¶ 66–67). Petitioner asserts that in the Sakamoto system, as modified by Gotoh, the system starts measuring acceleration when GPS signals cannot be received. *Id*. at 39 (citing Ex. 1003 ¶¶ 161–164). Further, Petitioner argues that because Gotoh teaches the terminal "finishes measuring the acceleration" when the terminal is again able to receive GPS signals, a person of ordinary skill in the art would have understood the accelerometer is deactivated based on the GPS signal. *Id*. at 43 (citing Ex. 1003 ¶¶ 163–164; Ex. 1005 ¶¶ 67–68).

Petitioner asserts that Sakamoto and Gotoh are both analogous art to the ’256 patent. Pet. 13. Petitioner argues, and Mr. Andrews provides supporting testimony, that one of ordinary skill in the art would have been motivated to combine Gotoh’s accelerometer with Sakamoto’s system. *Id*. (citing Ex. 1003 ¶¶ 114–123). Mr. Andrews testifies as early as 1991 it was known that inertial location tracking using accelerometers was used as supplemental location tracking to satellite based location tracking (i.e., GPS). Ex. 1003 ¶¶ 47–57. Petitioner contends that using an accelerometer to supplement a GPS receiver would have been use of a known technique, and using Gotoh’s accelerometer to supplement a GPS reception unit, that is, Sakamoto’s GPS receiver, in the same way would have been an improvement to Sakamoto’s device. Pet. 14 (citing Ex. 1003 ¶ 120).

2) Patent Owner’s Contentions

Patent Owner asserts that Petitioner fails to meet its burden to demonstrate that Sakamoto teaches limitation 10[c], “a battery power monitor configured to activate and deactivate at least one portion of the electronic tracking device to conserve battery power in response to a signal level of the receive communication signal.” PO Resp. 11–17. Patent Owner does not present arguments directed to the other limitations of claim 10. *See generally id*. Patent Owner notes that Petitioner relies upon the stop-position mode of Sakamoto to teach this limitation. *Id*. at 11–12 (citing Pet. 33–39). Patent Owner further notes Mr. Andrews’ testimony that Sakamoto’s GPS receiver 10 is the only component that receives GPS satellite signals. *Id*. at 12, 14 (citing Ex. 2003, 14:5–16:2, 20:1–4, 23:10–

11). As such, Patent Owner contends that if power has been cut off to the GPS receiver when the "portion of the electronic tracking device" has been deactivated, "and GPS receiver 10 is the only component in Sakamoto that receives the GPS satellite signal," then in Sakamoto there can be no activation of the GPS receiver as required by the claim limitation. *Id*. at 12–13. Patent Owner also disputes Petitioner's suggestion that Sakamoto's signal level detection unit 15 separately detects signal levels based on Sakamoto's statement that unit 15 is used "for detecting the level of the GPS satellite signal ***received by the GPS receiver 10*** via the GPS control unit 12." *Id*. at 13 (citing Pet. 36; Ex. 1003 ¶ 152; Ex. 1004 ¶¶ 19, 27).

Patent Owner also disputes Mr. Andrews' testimony regarding the reactivation of Sakamoto's GPS receiver from stop-position mode based on a signal level. PO Resp. 14–16 (citing, *inter alia*, Ex. 1003 ¶ 152). Patent Owner asserts that, in contrast to this testimony, Sakamoto teaches manual reactivation of the GPS receiver after it has been put into stop-position mode. PO Resp. 15–16 (citing Ex. 1004 ¶ 20). Patent Owner contends that Mr. Andrews' testimony is conclusory, unsupported, and speculative and cannot be a basis for a finding of unpatentability. PO Sur-reply 6–8 (citing Ex. 2003, 23:10–24:3).

Patent Owner argues that, in light of the claims and specification of the '256 patent, the accelerometer recited in limitation 10[c] "must be able to be activated and deactivated in response to the strength level of a signal." PO Resp. 17. Patent Owner asserts that Petitioner has not met its burden to show that that the accelerometer in Petitioner's proposed combination of

Sakamoto and Gotoh[8] is capable of being deactivated in response to a signal level. *Id*. at 17–18. Regarding Mr. Andrews' testimony that a person of ordinary skill would have combined Gotoh's accelerometer with Sakamoto "to start recording acceleration data when a cellular phone terminal cannot receive GPS signals," Patent Owner argues that he "offers no opinion as to why a POSITA would combine Gotoh with Sakamoto in any other context." *Id*. at 18 (citing Ex. 1003 ¶¶ 114–123). Patent Owner also argues that Mr. Andrews does not explain "how or why a POSITA would combine Gotoh's GPS capabilities with Sakamoto, which already includes GPS capabilities." *Id*. Patent Owner asserts that the proposed combination of Sakamoto and Gotoh cannot disclose deactivating the accelerometer in response to a signal level because the stop-position mode is the only time that Gotoh's accelerometer is used. *Id*. at 18–19.

3) Analysis

We have reviewed Petitioner's arguments and evidence and determine that Petitioner provides persuasive evidence that the combination of Sakamoto and Gotoh teaches the preamble [9] and the limitations of claim 10 and provides a persuasive rationale to combine the references.

Patent Owner's arguments are directed only to the adequacy of Petitioner's showing as to limitation 10[c]. For the teaching of "activate . . . one portion of the electronic tracking device . . . in response to a signal level

[8] Patent Owner also asserts that the showing with respect to a combination of the asserted prior art with Kulach is deficient. PO Resp. 16–18. We address those issues in Section II.E.2 *infra*.

[9] We make no specific determination as to whether the preamble of claim 10 is limiting.

of the receive communication signal," Petitioner relies upon paragraphs 37 and 38 of Sakamoto (Pet. 30; Pet. Reply 3–4), which state:

> [0037] *Further, at the cycle set in advance in the position information database 25*, as shown in the format in FIG. 6, the positioning mode control unit 22 in the position management / positioning server 2 sends a positioning control message (satellite signal level request message) comprising a search terminal address, a server address, a message identifier, and application data of the measurement time via the communication control unit 21. In the position information communication terminal 1 that has received this satellite signal level request message, *the positioning control unit 13 causes the satellite signal level detection unit 15 to monitor the signal level from the GPS satellite during the measurement time specified in the satellite signal level request message*, and as the calculation result of the average value of the signal level, as shown in the format in FIG. 7, *a positioning control message (satellite signal level response message) . . is returned to the position management / positioning server 2 via the communication control unit 11*.
>
> [0038] When the position management / positioning server 2 receives the satellite signal level response message, *the positioning mode control unit 22 reads out the signal level* from each satellite from the satellite signal level response . . . When the positioning mode control unit 22 *determines that the high sensitivity positioning mode is required when the signal level value is equal to or lower than a predetermined threshold value*, it sends a request to communication control unit 21 for the position search request message *including positioning mode information designating the positioning operation of the GPS receiver 10 of the position information communication terminal 1 as the high sensitivity*

> *positioning mode* to be transmitted to the corresponding position information communication terminal 1; *if it is determined that the normal sensitivity positioning mode is required when the signal level value is equal to or higher than a predetermined threshold value*, it sends a request to communication control unit 21 for the position search request message *including positioning mode information designating the positioning operation of the GPS receiver 10 of the position information communication terminal 1 as the normal sensitivity positioning mode* to be transmitted to the corresponding position information communication terminal 1. *If it is determined that the positioning cannot be performed when the signal level value is equal to or lower than a predetermined threshold value, the position search may be stopped.*

Ex. 1004 ¶¶ 38–39 (emphases added).

Based on this disclosure, Petitioner asserts, and we agree, that Sakamoto teaches activating and deactivating the GPS receiver by performing signal level detection during a set measurement time. Pet. 31, 34–36. Mr. Andrews testifies that Sakamoto teaches the use of the timed cycle such that a person of ordinary skill in the art would have understood that an appropriate mode of operation is selected based on the detected signal level. Ex. 1003 ¶ 151. Petitioner also refers to Sakamoto's disclosure that position searching would be stopped (stop-position mode) if the signal level detected is equal to or lower than a predetermined threshold value. Pet. 35 (Ex. 1004 ¶ 38). Mr. Andrews additionally testifies that if the GPS receiver was previously in the stop-position searching mode and a subsequently-received GPS signal level is good (i.e., above a threshold value), then a person of ordinary skill in the art would have understood that

GPS control unit 12 instructs GPS receiver 10 to begin position searching. Ex. 1003 ¶ 154 (citing Ex. 1004 ¶ 27).

Based on the weight of the evidence, we are persuaded by Petitioner's showing regarding the activation of Sakamoto's GPS receiver from a stop-position mode.

Patent Owner argues that Mr. Andrews' testimony is insufficient and incorrect regarding Sakamoto's teaching on reactivation based on detected signal levels, and instead contends that Sakamoto teaches manual reactivation after it was put in stop-position mode. PO Resp. 14–16 (citing Ex. 1004 ¶ 20). Although Sakamoto may teach manual reactivation from stop-position mode, this does not undermine Petitioner's persuasive showing that a person of ordinary skill in the art considering Sakamoto would have known to activate GPS receiver 10 from stop-position mode based on a sufficient signal level. More specifically, Petitioner relies upon the disclosures of paragraphs 38 and 39 to support its assertion that in Sakamoto the satellite signal level detection unit monitors the signal level from the GPS satellite on a preset periodic cycle, and based on the measured signal level, the positioning mode is set. *See* Pet. 31, 33–36; Ex. 1003 ¶¶ 146–155.

Petitioner also asserts that in Sakamoto, the positioning mode may be changed based on a comparison between a measured signal level and various thresholds. Pet. 33–34. More specifically, Mr. Andrews testifies that when the operation mode was previously in a normal mode or high mode and the subsequent detected signal level is equal to or lower than a predetermined threshold, GPS control unit 12 instructs GPS receiver 10 to stop position searching (deactivate) to conserve power. Ex. 1003 ¶ 154. Conversely, Mr. Andrews testifies that when the operation mode was previously in a stop-position "and the subsequent detected signal level is good (e.g., above a threshold value, K2), then a [person of ordinary skill in the art] would have understood that GPS control unit 12 instructs GPS receiver 10 to begin position searching" (activate). *Id*. Mr. Andrews explains that, because of changing signal conditions due to different factors, it would have not have made sense or have been useful to design the GPS positioner to set a system once and never transition out of it. *Id*. ¶¶ 152, 155. Mr. Andrews acknowledges that Sakamoto teaches a manual mode, but further testifies that Sakamoto also teaches the use of the automatic cycle to check signal levels for changing modes. *Id*. ¶ 152.

As identified above, Sakamoto discloses at least that periodic checking of signal levels is performed at a cycle set in advance, with the comparison of the detected signal level value to predetermined threshold values then used to set positioning modes.[10] Ex. 1004 ¶¶ 37, 38. This disclosure provides support for Mr. Andrews' testimony that a person of skill would have understood that, based on the detected signal level checked in a cycle, the operational mode is determined. Ex. 1003 ¶ 152. More specifically, Sakamoto's disclosures support Mr. Andrews' testimony that in resetting an operation mode, the mode could be changed to a stop-position mode from a normal mode or high mode and to a normal mode or high mode from a stop-position mode, depending on signal level. *See id.* ¶ 154. The testimony directed to moving from a stop-position mode to a positioning mode is further explained by Mr. Andrews' rationale that a person of

[10] Petitioner asserts, and we agree, that Sakamoto's teachings on the periodic checking of GPS signals align with similar disclosures in the '256 patent. *See* Ex. 1001, 6:63–66, 9:41–49; Pet. Reply 12.

ordinary skill in the art would have understood that signal conditions can change based on location and environmental conditions, so it would not have not made sense or have been useful for Sakamoto to set a mode once and then never change it. Ex. 1003 ¶¶ 152, 155; Ex. 2003, 23:21–24:10.

Although Sakamoto may not explicitly identify moving out of the stop-position mode as a result of the cyclic signal level checking, the issue is not whether there is express disclosure in the reference—it is whether the claimed invention as a whole would have been obvious to a person having ordinary skill in the art to which the claimed invention pertains. *See* 35 U.S.C. § 103. Thus, we accord significant weight to Mr. Andrews' understanding of Sakamoto's teachings in the view of one of skill of the art regarding its disclosure of periodic checking of signal levels that is used to set positioning modes. We further credit the additional rationale provided by Mr. Andrews as to why one of skill in the art would have not set a stop-position mode and not moved out of it, that is, signal conditions can change based on environmental conditions. *See* Ex. 1003 ¶ 152; *KSR*, 550 U.S. at 418 ("a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ."); *accord In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007). Moreover, Patent Owner's arguments disputing Mr. Andrews' testimony on an ordinarily skilled artisan's understanding of Sakamoto are attorney argument only and are unsupported by any record evidence. These attorney arguments are entitled to little, if any, weight. *See In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997) (explaining that attorney arguments and conclusory statements that are unsupported by factual evidence are entitled to little probative value). Accordingly, Petitioner has provided persuasive evidentiary support that, in the view of a person of ordinary skill in the art, Sakamoto teaches activating GPS receiver 10 from stop-position searching mode when a subsequently detected signal level is above a threshold value.

We turn to Patent Owner's argument regarding Mr. Andrews' testimony that Sakamoto's GPS receiver 10 is the only component that receives GPS satellite signals, and when this is deactivated (in stop-position mode), there can be no activation of the GPS receiver as required by the claim limitation in Sakamoto. PO Resp. 12–14 (citing Ex. 2003, 14:5–16:2, 20:1–4, 23:10–11). We do not agree with this argument because it does not accurately represent Mr. Andrews' testimony on Sakamoto's GPS receiver operation when cyclically checking signal levels.

As discussed above, Sakamoto discloses performing signal level detection on a cyclic basis, and then comparing the measured signal to thresholds to determine the operational positional mode to be set. *See* Ex. 1004 ¶¶ 24–25, 27, 37–38, 45, 50; Pet. 36. Depending on the positional operational mode determined, GPS receiver operation will be set to normal mode, high mode, or stop-position mode. Ex. 1004 ¶¶ 5, 24, 27, 38, 50.

Mr. Andrews' testimony reflects the distinction between GPS receiver operation when determining signal level and GPS receiver operation when it is performing position searching. More specifically, Mr. Andrews testifies that in Sakamoto, portions of the GPS receiver would be turned on, at the set cycle time, to measure the signal level. Ex. 1080 ¶ 5. Mr. Andrews also testifies that on a periodic basis, at least a portion of the GPS receiver that checks the level of the GPS signals would be turned on, and if the signal level is above the stop-position mode threshold, the GPS receiver would be turned on for position searching, but if the level of the signal level is below the stop-position mode threshold the GPS receiver would stop position searching. *See* Ex. 1003 ¶ 154; Ex. 2003, 20:23–21:20, 25:1–10, 28:9–16, 32:16–33:15, *see also id*. at 19:8–20:22. Patent Owner's argument that Sakamoto's GPS receiver 10 cannot be activated from stop-position mode in response to a signal level measurement disregards Mr. Andrews' testimony on GPS receiver operation during cyclic signal detection.

Patent Owner further contends that Mr. Andrews' testimony on GPS receiver operation is conclusory, unsupported, and speculative. PO Sur-reply 6–8. Although Mr. Andrews acknowledges that Sakamoto does not provide specifics on GPS receiver operation when checking signal levels, his testimony is that, in the view of one of ordinary skill in the art, portions of the GPS receiver would be periodically turned on for signal checking in order to reduce power consumption.[11] Ex. 1080 ¶ 5; Ex. 2003, 19:8–20:22, 23:10–24:10, 32:16–33:14, 34:12–35:4, *see also id*. at 21:7–11–22:6. We credit this testimony because it is consistent with Sakamoto's disclosure that signal levels are periodically checked. *See* Ex. 1004 ¶¶ 37, 38. Further, Patent Owner attempts to counter Petitioner's showing with only attorney argument; in our view, this does not undermine Mr. Andrews' testimony about how an ordinarily skilled artisan would have interpreted Sakamoto.

We turn to Patent Owner's arguments directed to accelerometer operation. PO Resp. 17–19. Patent Owner argues that Petitioner's proposed combination of Sakamoto and Gotoh is incapable of teaching that the accelerometer is deactivated in response to a signal when Sakamoto's GPS

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[11] Mr. Andrews testifies that, in order to check the signal level, at least the radio part of the GPS receiver would be need to be turned on briefly to check the signal level. Ex. 2003, 19:16–25.

receiver is inoperable. *Id*. This argument is similarly based on the issue regarding the activation/deactivation of the electronic tracking device in the stop-position mode, and we do not agree with this argument for the reasons discussed above. Patent Owner also argues that Mr. Andrews does not offer an opinion on how or why a person of ordinary skill in the art would have combined Gotoh's GPS capabilities with Sakamoto. PO Resp. 18. But Petitioner relies on Gotoh only for its disclosures related to accelerometer and not on its teachings related to GPS capabilities. Pet. 39–44.

Patent Owner further asserts that Mr. Andrews offers no opinion as to why a person of ordinary skill would have combined Gotoh with Sakamoto, other than "to start recording acceleration data when a cellular phone terminal cannot receive GPS signals." PO Resp. 18 (quoting Ex. 1003 ¶ 115). We do not agree with this argument. Mr. Andrews testifies that modifying Sakamoto's system with Gotoh's accelerometer would avoid "wasting processing resources and unnecessarily using battery power" by using the accelerometer instead of the GPS when GPS signals reception is poor. Ex. 1003 ¶ 123. Thus, the basis of the motivation for the combination stems from advantages of accelerometer use in low GPS signal conditions. In addition, Petitioner relies upon Gotoh's express teaching of stopping acceleration measurements when the GPS signals are again available. Pet. 43; Ex. 1003 ¶ 163; Ex. 1005 ¶ 67 ("the cellular phone terminal 10 finishes measuring the acceleration in a case where the cellular phone terminal 10 becomes able to receive GPS signals."). Thus, we are persuaded by Petitioner's showing because Gotoh's use of an accelerometer when GPS signals are poor complements and is consistent with Sakamoto's teachings of stopping GPS positioning in such conditions, particularly when considering Sakamoto's stated goal of reducing power consumption. Gotoh's express teaching of restarting GPS positioning when GPS signals again become available likewise reinforces the propriety of Petitioner's proposed combination.

Accordingly, we determine that Petitioner has provided persuasive evidence that the combination of Sakamoto and Gotoh teaches limitation 10[c].

4) Conclusion for Claim 10

On the full record, Petitioner has established by a preponderance of the evidence that claim 10 would have been obvious over the combination of Sakamoto and Gotoh.

E. Alleged Obviousness of Claim 10 Over Sakamoto, Gotoh, and Kulach

Petitioner contends that claim 10 would have been obvious over Sakamoto, Gotoh, and Kulach. Pet. 45–48. To support its contentions, Petitioner provides explanations as to how Sakamoto, Gotoh, and Kulach teach each claim limitation and why there is a motivation to combine the references. *Id*. Petitioner also relies upon the Andrews Declaration (Ex. 1003). Patent Owner argues that Petitioner fails to explain how or why the accelerometer of Kulach in the proposed combination with Sakamoto-Gotoh would stop being used in response to a signal level as required by the claim. PO. Resp. 19.

We begin our discussion with a brief summary of Kulach, and then address the evidence presented.

1. Kulach (Ex. 1007)

Kulach teaches a portable tracking apparatus, which includes a GPS receiver and an accelerometer. Ex. 1007 ¶¶ 23–26, 61, 88, Figs. 5–9. In Kulach, the portable tracking device determines motion parameters, including acceleration, velocity, and total distance. *Id.* ¶ 54. Kulach discloses that power usage can be controlled by disabling components, including accelerometer 12, "when not in use to achieve optimum system power consumption and functionality." *Id.* ¶¶ 83, 90.

2. Analysis

Petitioner contends that, to the extent that Gotoh does not teach "the accelerometer activates or deactivates" limitation of claim 10, Kulach teaches that limitation. Pet. 45. To support its contentions, Petitioner applies the prior art mappings from the Sakamoto–Gotoh ground and adds analysis based on Kulach for teaching the accelerometer activation/ deactivation limitation. *Id.*

Petitioner cites to Kulach's portable apparatus 10 including sensor unit 32, which has sensors 12, i.e., one or more accelerometers 12. Pet. 45 (citing Ex. 1007 ¶ 79, Fig. 5). Petitioner contends that Kulach teaches automatically disabling the sensor unit when not in use to achieve optimum system power consumption. *Id.* at 46 (citing Ex. 1007 ¶ 83). Petitioner also contends that Kulach's apparatus disables most of its sensors when not in use, but enables one or more accelerometers only enough to maintain context awareness. *Id.* at 46–47 (citing Ex. 1007 ¶ 90). As such, Petitioner asserts that one of ordinary skill in the art would have understood that Kulach teaches both deactivating (for energy conservation) and activating (for context awareness) the accelerometers. *Id*. at 47 (citing Ex. 1003 ¶ 171).

Petitioner contends that Kulach and Sakamoto are analogous art to the ’256 patent. Pet. 11–12, 47. Petitioner asserts that it would have been obvious to one of ordinary skill “to power off or deactivate a sensor, such as an accelerometer, when not in use, in light of *Kulach’s* teachings, especially considering both *Sakamoto* and *Gotoh* teach mobile devices having limited battery capacity.” *Id*. at 47–48 (citing Ex. 1003 ¶ 172).

We have reviewed the evidence and arguments and determine that Petitioner has presented persuasive evidence that the combination of Sakamoto, Gotoh, and Kulach teaches the limitations of claim 10 as well as a persuasive rationale to combine the references.

Patent Owner argues that “Mr. Andrews makes no attempt to explain how or why the accelerometer of Kulach in a proposed combination of Sakamoto with Gotoh and Kulach would stop being used in response to a signal level.” PO Resp. 19. We do not agree with this argument. As discussed above, Petitioner relies on Sakamoto for monitoring signal levels, comparing to thresholds, and then setting position modes, with Kulach’s functionality used in combination. Pet. 34–36, 45–47. More specifically, Petitioner relies on Kulach in the combination for its teaching of “power[ing] off or deactivat[ing] a sensor, such as an accelerometer, when not in use.” *Id*. at 47. Mr. Andrews testifies that “[b]ecause Kulach expressly teaches disabling the accelerometer when not in use ‘to conserve energy,’” a person of ordinary skill in the art “would have understood that conservation of energy is achieved by ‘deactivating’ the accelerometer.” Ex. 1003 ¶ 171 (citing Ex. 1007 ¶ 90). Mr. Andrews additionally testifies that because Sakamoto teaches methods of power control to reduce power consumption, one of ordinary skill would have been motivated to use Kulach's technique of powering off sensors. *Id*. ¶ 173 (citing Ex. 1004 ¶¶ 24, 26). Further, Mr. Andrews testifies that the combination would have had a reasonable expectation of success in view of Sakamoto's recognition of methods of powering components on and off as needed in normal mode. *Id*. (citing Ex. 1004 ¶ 24). Based on this testimony, and the referenced supporting evidence, we determine that Petitioner presents persuasive evidence that Kulach in combination with Sakamoto-Gotoh teaches the claim limitation and provides a persuasive rationale to combine the references.

Accordingly, on the full record, Petitioner has established by a preponderance of the evidence that claim 10 would have been obvious over the combination of Sakamoto, Gotoh, and Kulach.

F. Alleged Obviousness of Claims 8 and 9 Over Sakamoto, Gotoh, and Krasner

Petitioner contends that claim 8 and 9 would have been obvious over Sakamoto, Gotoh, and Krasner. Pet. 48–69. To support its contentions, Petitioner provides explanations as to how Sakamoto, Gotoh, and Krasner teach each claim limitation and why there is a motivation to combine the references. *Id*. Petitioner also relies upon the Andrews Declaration (Ex. 1003) and the Supplemental Andrews Declaration (Ex. 1080) to support its positions. Patent Owner argues that Petitioner has not met its burden to demonstrate that the prior art teaches an accelerometer that is both activated and deactivated in response to a signal strength level. PO Resp. 17–19.

We begin our discussion with a brief summary of Krasner, and then address the evidence and argument presented.

1. Krasner (Ex. 1010)

Krasner teaches a mobile device including a GPS receiver and a communication system, as depicted in Figure 1, reproduced below.
Ex. 1010, 2:29–33.

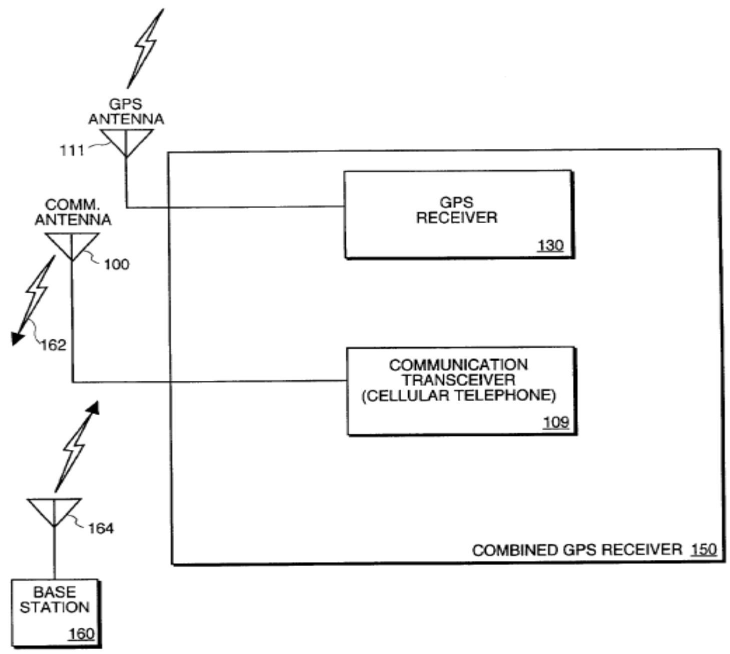

FIG. 1

As shown in Figure 1, above, Krasner's system includes mobile device 150 with GPS receiver 130. Ex. 1010, 3:16–17. Mobile device 150 also includes communication transceiver section 109. *Id*. at 3:31–32. Communication transceiver 109 transmits navigational data processed by GPS receiver 130 to remote base station 160. *Id*. at 3:33–36. Krasner's system determines position information using GPS. *Id*. at 3:5–16, 6:1–9. Krasner's mobile device reduces cross-interference between the communication transceiver and GPS receiver using signal gating. *Id*. at code (57), 6:37–62, 7:10–39.

2. Analysis

Petitioner relies on similar arguments and evidence for the majority of the limitations of claims 8 and 9 as those presented for claim 10 under the Sakamoto-Gotoh ground. *See* Pet. 48. Claim limitation 8[c] recites that the location monitoring apparatus includes "a power amplifier to amplify a signal level of at least one of the receive communication signal and a transmit communication signal," and limitation 8[d] includes "battery monitor circuitry to measure available battery power and adjust power usage to the power amplifier." Ex. 1001, 11:3–7. Claim limitations 9[c] and 9[e] recite a location monitoring apparatus with "power amplifier circuitry" and "battery management circuitry to adjust power level applied to the location tracking circuitry and the power amplifier circuitry responsive to the signal level." *Id*. at 11:19, 12:2–4.

For the recited "power amplifier" and "power amplifier circuitry," Petitioner relies on Krasner's teachings of a combined GPS receiver and communication system where the communication transceiver section of the mobile device includes a power amplifier. *Id*. at 49 (citing Ex. 1010, 3:5–16, 3:31–41, 5:20–25, 5:64–67, Fig. 2). Petitioner asserts that power amplifiers used with transceivers were well-known in the art. *Id.* (citing Ex. 1003 ¶ 175).

More specifically, Petitioner relies on Krasner's disclosure that "power amplifier 108 boosts the signal level of the communication signal, and this boosted signal is then transmitted to the communication antenna 100 through switch 101." Pet. 57 (citing Ex. 1010, 5:64–67). In view of this disclosure, Petitioner argues that a person of ordinary skill in the art would have understood that Krasner teaches a power amplifier as recited in claim 8.

Id. at 58 (citing Ex. 1003 ¶¶ 197–198). Petitioner further asserts that Sakamoto, as modified to perform the signal gating method of Krasner, adjusts power usage to the power amplifier in response to the battery level and the detected satellite signal level. *Id*. at 61. Petitioner relies on Krasner's disclosure of the "gating signal synchroniz[ing] the power control and GPS receiver operation." *Id*. at 62 (citing Ex. 1010, 6:58–59). Petitioner additionally refers to Krasner's disclosure of power reduction of the transmitter "for a period of time during which satellite positioning system signals may be processed, after which the transmitter is again powered up." *Id*. at 62 (citing Ex. 1010, 6:55–58). Petitioner also relies on Sakamoto's disclosures of battery monitoring circuitry and setting different modes to reduce power consumption. *Id*. at 59–60. Petitioner asserts that Sakamoto's operation, modified with Krasner's activation and deactivation of the power amplifier, teaches limitation 8[d]. *Id*. at 61–64. Petitioner relies on similar evidence and arguments for the teaching of the limitations of claim 9. *Id*. at 65–69.

Petitioner asserts that because Krasner, like the '256 patent, discloses a portable electronic tracking device including a GPS receiver, Krasner is in the same field of endeavor and is pertinent to a problem to be solved by the claimed invention in the '256 patent. Pet. 11. Petitioner argues that a person of ordinary skill in the art would been motivated to include Krasner's gating function to improve Sakamoto's system in order to "reduce cross-interference between the GPS receiver and transceiver signals while preventing increased power consumption." *Id*. at 52 (citing Ex. 1003 ¶ 182).

We have reviewed the evidence and arguments and determine that Petitioner has presented persuasive evidence that the combination of

Sakamoto, Gotoh, and Krasner teaches the limitations of claims 8 and 9 and provides a persuasive rationale to combine the references.

Patent Owner presents the same arguments for claims 8 and 9 as it presents for claim 10, that is, Patent Owner alleges that Petitioner has not met its burden to demonstrate that the prior art teaches an accelerometer that is both activated and deactivated in response to a signal strength level. PO Resp. 17–19. We do not agree with these arguments for the reasons discussed for claim 10 in Section II.D.3 *supra*.

Accordingly, on the full record, Petitioner has established by a preponderance of the evidence that claims 8 and 9 would have been obvious over the combination of Sakamoto, Gotoh, and Krasner.

G. Alleged Obviousness of Claims 8 and 9 Over Sakamoto, Gotoh, Krasner, and Kulach

Similar to the Sakamoto-Gotoh-Kulach ground presented for claim 10, Petitioner relies on Kulach under this ground for teaching "the accelerometer activates or deactivates" limitations of claims 8 and 9, to the extent Gotoh does not teach these limitations. Pet. 69. Petitioner relies on similar evidence and argument to that presented for claim 10 in its assertions for claims 8 and 9. *Id*. at 69–70.

Patent Owner presents no arguments specifically related to this ground and relies on its arguments presented for claim 10. *See* PO Resp. 19. We do not agree with these arguments for the reasons discussed in Section II.E.2 *supra*.

We have reviewed the evidence and arguments and determine that Petitioner has presented persuasive evidence that the combination of

Sakamoto, Gotoh, Krasner, and Kulach teaches the limitations of claims 8 and 9 and provides a persuasive rationale to combine the references.

Accordingly, on the full record, Petitioner has established by a preponderance of the evidence that claims 8 and 9 would have been obvious over the combination of Sakamoto, Gotoh, Krasner, and Kulach.

III. CONTINGENT MOTION TO AMEND

On a contingent basis, Patent Owner filed a Motion to Amend to replace original claims 8–10 with proposed substitute claims 11–13. Mot. 1–2. We have determined that original claims 8–10 of the ’256 patent have been shown to be unpatentable by a preponderance of the evidence. Accordingly, we proceed to address Patent Owner’s Motion to Amend.

Although the proposed substitute claims must meet the requirements of 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121, Petitioner “bears the burden of persuasion to show, by a preponderance of the evidence, that any proposed substitute claims are unpatentable.” 35 U.S.C. § 316(d); 37 C.F.R. § 42.121(d)(2); *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4 (PTAB Feb. 25, 2019) (precedential) (citing *Aqua Prods. Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017); *Bosch Auto. Serv. Sols. LLC v. Iancu*, 878 F.3d 1027 (Fed. Cir. 2017)).

Before considering the patentability of any substitute claims, we first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. Patent Owner is required to show that: (1) the amendment responds to a ground of unpatentability involved in the trial; (2) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter; (3) the amendment proposes a reasonable number of substitute claims; and (4) the proposed claims are supported in the original disclosure. 37 C.F.R. § 42.121; *Lectrosonics*, Paper 15.

Patent Owner proposes amendments to claims 8–10 by substitute claims 11–13, respectively, that recite as follows, with underlining designating added text and double brackets designating deleted text, and with letters in single brackets added to the limitations of proposed substitute claim 11 for reference purposes:

> 11. [a] A location monitoring apparatus for an electronic tracking device to track by a monitoring station comprising:
>
> > [b] an accelerometer to generate displacement vectors associated with the electronic tracking device;
> >
> > [c] a signal processor to measure a signal level of a receive communication signal comprising location coordinates information, wherein the accelerometer activates or deactivates based in part of a value of the signal level of the receive communication signal;
> >
> > [d] a power amplifier to amplify a signal level of at least one of the receive communication signal and a transmit communication signal; and
> >
> > [e] battery monitor circuitry to measure available battery power and adjust power usage to the power amplifier responsive to available battery power and to a signal level of the receive communication signal, [f] <u>wherein the power amplifier consumes at least reduced power while the accelerometer is active</u>.
>
> 12. A location monitoring apparatus for an electronic tracking device to track by a monitoring station comprising:
>
> > an accelerometer to generate displacement vectors associated with the electronic tracking device;

a signal processor to measure a signal level of a receive communication signal comprising location coordinates information, wherein the accelerometer activates or deactivates based in part of a value of the signal level of the receive communication signal;

power amplifier circuitry;

location tracking circuitry; and

battery management circuitry to adjust power level applied to the location tracking circuitry and the power amplifier circuitry responsive to the signal level, <u>wherein at least one of the power amplifier circuitry and the location tracking circuitry consumes at least reduced power while the accelerometer is active</u>.

13. A location monitoring apparatus for an electronic tracking device powered by a battery to track by a monitoring station comprising:

an accelerometer to generate displacement vectors associated with the electronic tracking device; [[and]]

a signal processor to measure a signal level of a receive communication signal comprising location coordinates information; and

a battery power monitor configured to activate and deactivate at least one portion of the electronic tracking device to conserve battery power in response to a signal level of the receive communication signal, wherein the accelerometer activates or deactivates based in part on the signal level of the receive communication signal <u>and the at least one portion of the electronic tracking device is deactivated by placing the at least one portion in a low power mode in which the at least one portion consumes at least reduced power</u>.

Mot. 25–27 (Claims Appendix).

A. Requirements Under 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121

Patent Owner asserts that its motion to amend proposes a reasonable number of substitute claims, is not broadening, and is responsive to the grounds of unpatentability involved in the proceeding. Mot. 2–3. Patent Owner proposes a single substitute claim for each challenged claim (i.e., one-for-one), and, therefore, meets the requirement for a reasonable number of proposed substitute claims. *See* 37 C.F.R. § 42.121(a)(3); *see also Lectrosonics*, Paper 15 at 4 ("There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim."). Patent Owner also proposes narrowing limitations in direct response to the grounds of unpatentability involved in this proceeding. *See* Mot. 2–3. Petitioner does not dispute Patent Owner's contentions as to these statutory and regulatory requirements. *See generally* Pet. Mot. Opp. We determine that Patent Owner has met these statutory and regulatory requirements for a motion to amend.

As to whether the proposed substitute claims are supported in the original disclosure, Patent Owner asserts that several portions of Application Ser. No. 11/969,905 ("the '905 application")[12] disclose the limitations

[12] The '256 patent issued from the '905 application. Ex. 1001, code (21). In its Motion to Amend, Patent Owner cites the published version of the '905 application—U.S. Pub. No. 2009/0174603 A1 ("the '603 publication")—rather than the '905 application, to show support for the substitute claims. *See* Mot. 4 (citing Ex. 2004). Petitioner's Opposition similarly cites to the '603 publication. *See* Pet. Mot. Opp. 1–2. In our Preliminary Guidance on the Motion to Amend, we noted that Patent Owner was required to cite the '905 application. Paper 28, 4 (citing *Lectrosonics* for the requirement that a motion to amend must set forth written description support in the originally filed disclosure of the subject patent). In its Reply, Patent Owner correctly

"battery monitor circuitry," as recited in substitute claim 11, "battery management circuitry," as recited in substitute claim 12, and "battery power monitor," as recited in substitute claim 13 (collectively referred to by Petitioner as "battery monitor"). Mot. 5–6, 8–11. Petitioner contends Patent Owner has not shown that the '905 application adequately supports the battery monitor limitations, which are limitations recited in original claims 8–10, respectively. Pet. Mot. Opp. 1. More specifically, Petitioner contends that paragraph 29 of the '905 application states that battery level monitor 116 merely detects a battery level, but it does not disclose battery level monitor 116 as performing any of the claimed functions (i.e., adjusting a power level or power usage or activating/deactivating circuitry). *Id*. (citing Ex. 2004 ¶ 29). Petitioner further contends that paragraphs 31, 32, and 36 the '905 application merely describe certain elements being placed in "a sleep or standby mode or low power mode," but they do not disclose that it is the battery monitor that places the components in any of the modes. *Id*.

Patent Owner asserts that paragraph 36 of the '905 application discloses "power amplifier consumes at least reduced power," as recited in proposed substitute claim 11, and similarly recited in proposed substitute claim 12. Mot. 6–7, 9. Petitioner contends that Patent Owner has not shown that the '905 application adequately supports this limitation. Pet. Mot. Opp.

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refers to the '905 application. *See* PO Mot. Reply 1–4 (citing Ex. 2015). Herein, we refer to the disclosures of the '905 application, except when we refer to the cites from the Motion to Amend and Petitioner's Opposition, which reference the '603 publication. We note that the content of the '603 publication is substantially similar to the '905 application and Petitioner does not assert that there are any differences between the publication and the original application that affect consideration of the merits. As such, we determine the earlier citations to the '603 publication are harmless error.

2. More specifically, Petitioner contends that paragraph 36 of the ’905 application describes the transceiver circuitry, not the power amplifier, as consuming the reduced battery power. *Id*. (citing Ex. 2004 ¶ 36). Petitioner argues that the amplifier as disclosed in paragraph 31 is a different component than location tracking circuitry 114. *Id*.

Patent Owner has shown that its proposed substitute claims do not introduce new matter. Turning first to the battery limitations, the ’905 application states that “[b]attery level detection circuitry (e.g., battery level monitor 116) detects a battery level of battery 118.” Ex. 2015, 9:9–10; *accord* Ex. 2004 ¶ 29. In addition, it states that, “[i]n response to measured signal strength level, a power management circuitry (e.g., battery monitor) controls power levels associated with [a] tracking device to reduce or increase power consumption of a transceiver and its associated circuitry.” Ex. 2015, 4:30–5:2; *accord* Ex. 2004 ¶ 14. This disclosure provides support that a battery monitor controls power levels associated with a tracking device to reduce or increase power consumption of a transceiver and its associated circuitry, which is sufficient disclosure for proposed substitute claim 13’s limitation which recites “a battery power monitor configured to activate and deactivate at least one portion of the electronic tracking device to conserve battery power.” This disclosure also provides support for the portion of the proposed substitute claim 12 limitation that recites “battery management circuitry to adjust power level applied to the location tracking circuitry . . . wherein . . . the location tracking circuitry consumes at least reduced power.” Below we address issues related to portions of the proposed substitute claims 11 and 12 specific to a power amplifier.

Turning to the issue of whether the ’905 application provides sufficient support that the claimed “battery monitor circuitry” adjusts power to the power amplifier, as well as whether the claimed power amplifier consumes at least reduced power, the ’905 application states:

> in one embodiment, the present invention *conserves battery power by placing on standby, low power mode, or disabling entirely GPS signal, acquisition, circuitry and other associated devices, e.g., all or a portion of amplifier block 120 including power amplifiers,* LNAs, switches, and the like. *Furthermore, during supplemental location coordinates tracking, e.g., electronic device proximity measurements, the transceiver circuitry (e.g., transceiver 102, location tracking circuitry 114, and signal[] processing circuitry 104) consumes reduced battery power for GPS circuitry* while the electronic tracking device 100 communicates displacement vectors (e.g., differential location coordinates) to monitoring station 110 (e.g., a mobile phone, a personal digital assistant) through a wireless network 140.

Ex. 2015, 11:24–12:2; *accord* Ex. 2004 ¶ 36 (emphases added). As discussed above, the ’905 application further states that “[i]n response to measured signal strength level, a power management circuitry (e.g., battery monitor) controls power levels associated with [a] tracking device to reduce or increase power consumption of transceiver and its associated circuitry.” Ex. 2015, 4:30–5:2; *accord* Ex. 2004 ¶ 14.

We do not discern that the use of “e.g.,” that is, “for example” in listing examples of “transceiver circuitry,” precludes a power amplifier from being included in the category of transceiver circuitry that has its power level controlled by the battery monitor in response to a signal level and consumes reduced battery. Ex. 2015, 4:30–5:2, 11:27–12:2. Further, the ’905 application explicitly states that battery power is conserved by “placing on standby, low power mode, or disabling entirely . . . e.g., all or a portion of amplifier block 120 *including power amplifiers*.” *Id*. at 11:24–27 (emphasis added). Based on the disclosures of the ’905 application, we find that there is sufficient written description support for the proposed substitute claims 11 and 12.

Accordingly, we determine that Patent Owner has shown that the ’905 application sets forth sufficient written description support for the new limitations in proposed substitute claims 11–13. We also determine that the original disclosure of the ’905 application supports the limitations recited in original claims 8–10 that have been carried over to proposed substitute claims 11–13.

We next analyze whether Petitioner shows that proposed substitute claims 11–13 are unpatentable by a preponderance of the evidence based on the entirety of the record.

B. Challenge to Proposed Substitute Claims Under § 35 U.S.C. § 112, First Paragraph

As described in Section III.A *supra*, Petitioner contends proposed substitute claims 11–13 fail to comply with the written description requirement. Pet. Mot. Opp. 1–3. For the reasons previously discussed, we determine that the ’905 application sets forth sufficient written description support for the proposed substitute claims under § 35 U.S.C. § 112, first paragraph.

C. Challenges to the Proposed Substitute Claims under § 103

Patent Owner and Petitioner address the patentability of proposed substitute claims 11–13 on the following grounds:

Claim(s)	35 U.S.C. §	References/Basis
13	103(a)	Sakamoto, Gotoh, Alberth[13]
13	103(a)	Sakamoto, Gotoh, Gronemeyer[14]
13	103(a)	Sakamoto, Gotoh, Kulach, Alberth
13	103(a)	Sakamoto, Gotoh, Kulach, Gronemeyer
11, 12	103(a)	Sakamoto, Gotoh, Krasner, Krasner ’327[15]
11, 12	103(a)	Sakamoto, Gotoh, Krasner, Kulach, Krasner ’327

Pet. Mot. Opp. 6–25; PO Mot. Reply 4–12.

We address the patentability of the proposed substitute claims below in view of these challenges.

1. Claim Construction

Patent Owner asserts that the added limitation of proposed substitute claim 11, “wherein the power amplifier consumes at least reduced power while the accelerometer is active,” “requires that the power amplifier continues to consume power while the accelerometer is active” and that “although power usage to the power amplifier is adjusted, power usage is not

[13] U.S. Patent 6,438,381 B1, filed June 8, 2000, issued August 20, 2002. Ex. 1076.
[14] U.S. Patent 6,985,811 B2, filed June 20, 2003, issued January 10, 2006. Ex. 1077.
[15] U.S. Patent 5,825,327, filed October 7, 1996, issued October 20, 1998. Ex. 1081.

eliminated and the power amplifier is not shut off." Mot. 12. For proposed substitute claim 12, Patent Owner makes similar assertions for the added limitation "wherein . . . the power amplifier circuitry and the location tracking circuitry consumes at least reduced power." *Id*. at 14. Patent Owner additionally makes a similar assertion for proposed substitute claim 13, that is, "at least one portion of the electronic tracking device continues to consume power while the accelerometer is active." *Id*. at 15. Patent Owner argues that this claim interpretation is supported by the written description of the '905 application. PO Mot. Reply 2–4.

Petitioner contends that the plain and ordinary meaning of "consumes at least reduced power" should apply. Pet. Mot. Opp. 3. Petitioner argues that Patent Owner's proposed construction imports negative limitations, that is, the limitations that the power "is not shut off" or "not eliminated." *Id*.

As discussed further below, we need not expressly construe the claim terms related to power consumption because the challenged claims are unpatentable over the asserted prior art, even under Patent Owner's proposed construction. *See Nidec Motor Corp.*, 868 F.3d at 1017; *Vivid Techs.,* 200 F.3d at 803.

2. Patentability of Proposed Substitute Claim 13 in View of Challenge Based on Sakamoto, Gotoh, and Gronemeyer

The parties address whether the combined disclosures of Sakamoto, Gotoh, and Gronemeyer render proposed substitute claim 13 obvious. Pet. Mot. Opp. 11–14; PO Mot. Reply 7–9; Pet. Mot. Sur-reply 7–11.

Gronemeyer describes a low power real time clock (RTC) operated continuously in a GPS receiver unit while some receiver components are powered down. Ex. 1077, code (57). More specifically, power is conserved in the GPS receiver unit by shutting down selected components, including a GPS oscillator, during periods when the GPS receiver unit is not actively acquiring satellite information used to calculate its location. *Id.* at 6:41–45.

As explained above, Petitioner has shown by a preponderance of the evidence that the combination Sakamoto and Gotoh teaches each limitation of claim 10. *See supra* Section II.D.3. For the same reasons provided there, we find the combination of Sakamoto and Gotoh teaches the limitations of proposed substitute claim 13 that are identical to those of claim 10. We focus on the amendments in proposed substitute claim 13. In particular, proposed substitute claim 13 recites that "at least one portion of the electronic tracking device is deactivated by placing the at least one portion in a low power mode in which the at least one portion consumes at least reduced power." *See* Mot. 26–27 (Claims Appendix).

Petitioner argues that the combination of Sakamoto, Gotoh, and Gronemeyer teaches all elements of the proposed substitute claim 13. Pet. Mot. Opp. 11–14. More specifically, Petitioner asserts that Gronemeyer discloses conserving power in a GPS receiver unit by shutting down select components "during periods when the GPS receiver unit is not actively acquiring satellite information used to calculate the location of the GPS receiver unit." *Id*. at 11 (citing Ex. 1077, 6:41–45, 5:11–14, 14:13–23). Petitioner refers to Gronemeyer's disclosure that "powering down these components is very desirable in a portable GPS receiver unit to conserve power resources." *Id*. (citing Ex. 1077, 4:1–5, 4:66–5:3, 14:16–21).

Petitioner contends that Gronemeyer discloses that the GPS receiver unit consumes at least reduced power in the low power mode because the low power time keeping ("LPTK") circuit 200 "remains on" and consumes power, even when "[s]elected components residing on the GPS receiver unit" are "shut down (deactivated) to conserve power" during Gronemeyer's sleep mode. Pet. Mot. Opp. 12 (citing Ex. 1077, 7:8–11, 14:13–2, Figs. 3, 4). Petitioner contends that the LPTK circuit in Gronemeyer includes K32 oscillator 302 that "resid[es] in a low power time keeping circuit [and] accurately preserves GPS time when the selected components are shut off." *Id*. (citing Ex. 1077, 5:14–17, 6:45–48, 12:9–13). Mr. Andrews provides supporting testimony that, even during Gronemeyer's sleep mode, "the low power components of low power time keeping circuit 200 remain on" and "'low power' components that operate continuously consume at least some power continuously." Ex. 1080 ¶¶ 39–40.

Petitioner additionally contends a person of ordinary skill in the art would have been motivated to modify the Sakamoto-Gotoh combination to include a portion of Gronemeyer's components, that is, low power clock 306 and oscillator 302, that would remain powered in a low power mode. Pet. Mot. Opp. 13. Specifically, Petitioner contends that a person of ordinary skill in the art would have been motivated to make such a modification to achieve the advantages expressly taught by Gronemeyer, including saving power and more quickly reacquiring GPS satellite signals. *Id*. at 13–14 (citing Ex. 1077, 3:25–28, 14:3–12, 14:45–48). Mr. Andrews testifies that a person of ordinary skill in the art "would have recognized that Gronemeyer teaches advantages over conventional systems that do not maintain the accuracy of various clocking signals because said conventional systems power down components that consume significant power, including a GPS oscillator and associated timing system." Ex. 1080 ¶ 41. Mr. Andrews testifies that a person of ordinary skill "would have been motivated to include Gronemeyer's low power time keeping circuit (including low power clock 306 and K32 oscillator 302) in the modified Sakamoto system" in order to save battery power and for faster signal acquisition by avoiding cold starts. *Id*. ¶ 42. Mr. Andrews further testifies that a person of ordinary skill in the art "would have understood that a combination with Gronemeyer would have advantageously allowed Sakamoto's at least one portion of the electronic tracking device, including GPS receiver 10, to consume reduced power in a low power mode, such as the stop-position search mode, thus saving battery resources in a mobile device with a limited power supply as taught by Gronemeyer." *Id*. Mr. Andrews additionally testifies that a person of ordinary skill in the art would have understood that there would have been a reasonable expectation of success in the combination because Sakamoto and Gronemeyer teach similar portable devices with a GPS receiver and combining components would have been within the skillset of a person of ordinary skill for implementation. *Id*. ¶ 43.

We agree with Petitioner that the combination of Sakamoto, Gotoh, and Gronemeyer discloses deactivating a portion of the electronic tracking device to place it in a low power mode with at least one portion of it, i.e., the low power clock and K32 oscillator in the LPTK circuit, continuing to consume power. Further, Petitioner provides persuasive evidence that one of ordinary skill in the art would have been motivated to modify the Sakamoto–Gotoh combination to include Gronemeyer's low power operation.

Patent Owner asserts that "Petitioner does not, and cannot, assert that Gronemeyer's oscillator 302 and low power clock 306 are the at least one portion of GPS receiver 100 that is 'deactivated by placing the at least one portion in a low power mode in which the at least one portion consumes at least reduced power' as recited." PO Mot. Reply 7. Patent Owner argues that, although Gronemeyer discloses that GPS circuitry, that is, its GPS receiver, is powered off, a distinct time circuit, which is a separate portion of the GPS receiver, is utilized to maintain GPS time. *Id*. (citing Ex. 1077, 6:36–48, Figs. 3, 4). More specifically, Patent Owner asserts that "[a]lthough the GPS oscillator and K32 oscillator are both located in a GPS receiving unit, the K32 oscillator is not part of the GPS circuitry." *Id*. at 8. Patent Owner contends that because Gronemeyer discloses that "[a] K32 . . . oscillator residing in a low power time keeping circuit accurately preserves GPS time when the selected components are shut off," "Gronemeyer clearly discloses that the deactivated portion (i.e., GPS circuitry) is 'shut off.'" *Id*. (citing Ex. 1077, 5:13–16, 6:45–48). Patent Owner argues that "Gronemeyer cannot disclose that such deactivated portion 'consumes at least reduced power' as recited . . ., when 'shut off' means that such deactivated portion consumes *no* power." *Id*. Patent Owner further asserts that Petitioner relies solely on Gronemeyer for disclosing the claim limitation. *Id*. at 8–9.

We do not agree with Patent Owner's arguments. As an initial matter, although Patent Owner argues that the K32 oscillator is not part of the GPS circuitry, Patent Owner does not explain why that is so. As shown in Petitioner's annotated Figures 3 and 4, reproduced below, LPTK circuit 200 includes K32 oscillator 302 and is depicted to be part of GPS receiver unit 100.

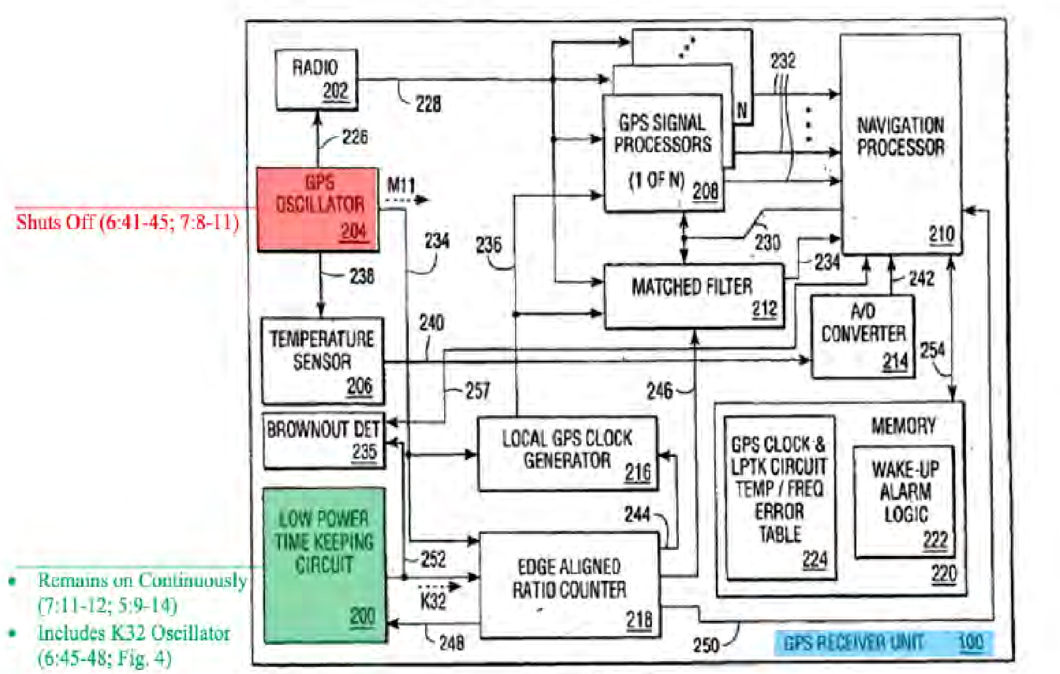

FIG. 3

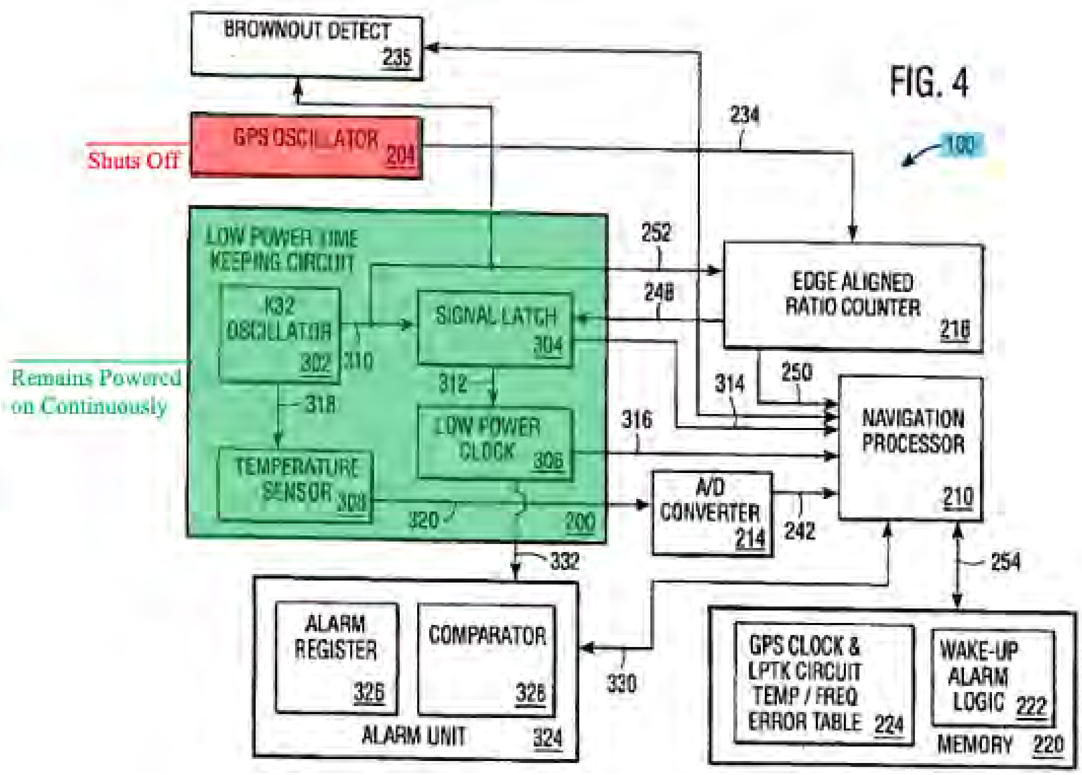

FIG. 4

Referring to Petitioner's annotated Figures 3 and 4 of Gronemeyer, above, Petitioner contends, and we agree, that GPS receiver unit 100 includes

LPTK circuit 200, which includes K32 oscillator 302. Pet. Mot. Sur-reply 7–8. Further, Gronemeyer explicitly discloses that "selected components of the GPS receiver unit 100, includ[e] a low power time keeping circuit 200." Ex. 1077, 8:3–5.

We also do not agree with Patent Owner's argument that Petitioner relies solely on Gronemeyer for disclosing the claim limitation "at least one portion of the electronic tracking device is deactivated by placing the at least one portion in a low power mode in which the at least one portion consumes at least reduced power." Instead, Petitioner contends, and Mr. Andrews testifies, that a person of ordinary skill in the art would have been motivated to modify Sakamoto's GPS receiver to include Gronemeyer's LPTK circuit (including low power clock 306 and K32 oscillator 302). Pet. Mot. Opp. 13–14; Ex. 1080 ¶¶ 41–42. Mr. Andrews additionally testifies that Gronemeyer's LPTK circuit advantageously would have been included to save battery power and to allow for faster signal reacquisition in a low power mode, such as the stop-position search mode. Ex. 1080 ¶ 42. Accordingly, we agree that the combination of Sakamoto, Gotoh, and Gronemeyer teaches that when the GPS receiver is placed in the stop-position mode with position searching stopped (deactivated), a portion of the GPS receiver would be in a low power mode, with the LPTK circuit continuing to consume reduced power. Thus, we determine that Petitioner's proposed combination of Sakamoto, Gotoh, and Gronemeyer teaches the amended limitation in proposed substitute claim 13, even under Patent Owner's proposed construction, that is, "at least one portion of the electronic tracking device continues to consume power while the accelerometer is active." Mot. 15.

Also, we note that Patent Owner's arguments appear to try to draw a distinction between the components of GPS receiver unit 100 and "GPS circuitry." *See* PO Mot. Reply 7. Patent Owner does not provide a basis for any alleged distinction. Further, we agree with Petitioner that the only reference to "GPS circuitry" in Gronemeyer indicates that that GPS units continuously power on some components (e.g., a clock), while others are powered down. Pet. Mot. Sur-reply 9–10 (citing Ex. 1077, 3:54–56 ("Typically, a conventional real time clock (RTC) circuit may be used to maintain rough GPS time while the rest of the GPS circuitry is off.")). Additionally, Patent Owner only presents attorney argument in support of its interpretation of Gronemeyer's disclosures, and this argument does not undermine Petitioner's persuasive showing, which is based on evidence of record.

In view of the foregoing, we conclude, that Petitioner has established by a preponderance of the evidence that proposed substitute claim 13 would have been unpatentable in view of Sakamoto, Gotoh, and Gronemeyer.

3. Patentability of Proposed Substitute Claim 13 in View of Challenge Based on Sakamoto, Gotoh, Kulach, and Gronemeyer

Petitioner contends that the subject matter of proposed substitute claim 13 would have been obvious over the combination of Sakamoto, Gotoh, Kulach, and Gronemeyer based on (1) Petitioner's analysis of original claim 10 in the Sakamoto-Gotoh-Kulach ground and (2) Petitioner's analysis of proposed substitute claim 13 in the Sakamoto-Gotoh-Gronemeyer ground. Pet. Mot. Opp. 15; *see supra* Section II.E. We have reviewed the evidence and determine that Petitioner has presented persuasive evidence of obviousness. Patent Owner presents no arguments specific to this ground besides those already addressed, and we do not agree with Patent Owner's arguments for the reasons discussed above. *See generally* PO Mot. Reply.

In view of the foregoing, we conclude that Petitioner has established by a preponderance of the evidence that proposed substitute claim 13 would have been unpatentable in view of Sakamoto, Gotoh, Kulach, and Gronemeyer.

4. Patentability of Proposed Substitute Claim 13 in View of Challenges Based on Sakamoto, Gotoh, and Alberth, with or without Kulach

Because we have determined that proposed substitute claim 13 would have been unpatentable in view of Sakamoto, Gotoh, and Gronemeyer, with or without Kulach, we need not reach Petitioner's other grounds for unpatentability of this claim. *Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc*., 809 F. App'x 984, 990 (Fed. Cir. 2020) (nonprecedential) (stating that the "Board need not address issues that are not necessary to the resolution of the proceeding," such as "alternative arguments with respect to claims [the Board] found unpatentable on other grounds").

5. Patentability of Proposed Substitute Claims 11 and 12 in View of Challenges Based on Sakamoto, Gotoh, Krasner, and, Krasner '327, with or without Kulach

The parties address whether the combined disclosures of Sakamoto, Gotoh, Krasner, and Krasner '327, with or without Kulach, render proposed substitute claims 11 and 12 obvious. Pet. Mot. Opp. 15–25; PO Mot. Reply 9–12.

As explained above, Petitioner has shown by a preponderance of the evidence that the combination Sakamoto, Gotoh, and Krasner, with or without Kulach, teaches each limitation of claims 8 and 9. *See supra* Sections II.F and II.G. For the same reasons provided there, we find the combination of Sakamoto, Gotoh, and Krasner, with or without Kulach, teaches the limitations of proposed substitute claims 11 and 12 that are identical to those of claims 8 and 9, respectively. We focus on the amendments in proposed substitute claims 11 and 12. In particular, proposed substitute claim 11 recites that the battery monitor circuitry adjusts power usage to the power amplifier, "wherein the power amplifier consumes at least reduced power while the accelerometer is active." *See* Mot. 25 (Claims Appendix). Proposed substitute claim 12 recites that the battery management circuitry adjusts the power level to the location tracking circuitry and the power amplifier circuitry, "wherein at least one of the power amplifier circuitry and the location tracking circuitry consumes at least reduced power while the accelerometer is active." *See id*. at 26.

Similar to the assertions made for claim 8, Petitioner relies on Sakamoto, Gotoh, and Krasner for the teaching of the unmodified limitations. *See* Pet. Mot. Opp. 15–17. Petitioner notes that in the original mapping for claim 8, with the combination of Sakamoto and Krasner used for teaching limitation 8[d], "the Sakamoto system adjusts the power usage to the power amplifier by reducing or cutting off power to the power amplifier when the GPS receiver is position searching." Pet. Mot. Opp. 15 (citing Pet. 50). Petitioner also refers to the Petition's mapping of Krasner's gating method when Sakamoto's system is operating in the normal positioning mode, with the GPS receiver powered on/off cyclically to conserve battery power for the teaching of limitation 8[d]. *Id*. at 15–16 (citing Pet. 49, 63–64).

Petitioner relies on Krasner ’327 in combination with Sakamoto, Gotoh, and Krasner for the teaching of new limitation 11[f], “wherein the power amplifier consumes at least reduced power while the accelerometer is active.” Pet. Mot. Opp. 17–18. Petitioner asserts that when Sakamoto, as modified by Gotoh, is in the stop-position searching mode, its GPS receiver is not active but the accelerometer is active, as recited in the claim limitation. *Id*. at 21–22.

Petitioner contends that Sakamoto, as modified by Gotoh, discloses transmitting a position determined by the accelerometer to a remote server over a mobile communication line. Pet. Mot. Opp. 22. Petitioner asserts that Sakamoto teaches that the mobile communication line may be disconnected after the terminal transmits a response on terminal position to the remote server. *Id*. at 19–20 (citing Ex. 1004 ¶ 40; Ex. 1080 ¶ 46).

Petitioner relies upon Sakamoto, as modified by Krasner ’327, for the teaching of the operation of a power amplifier, that is, the operation of the power amplifier in a reduced power mode when transmission via a communication line is not occurring. Pet. Mot. Opp. 16, 18–21, 23–25. More specifically, Petitioner contends that Krasner ’327 teaches setting a power amplifier to a reduced state when no transmissions are sent. *Id*. at 15–16, 18–21, 23, 25 (citing Ex. 1081, 6:65–7:5, 7:9–11). Mr. Andrews testifies that one of ordinary skill in the art would have disconnected the communication line in Sakamoto after transmissions of terminal position to save battery power. Ex. 1080 ¶ 46. Mr. Andrews also testifies that “*Krasner ’327* teaches placing the power amplifier 13 in a reduced power state until the next transmission is required," so a person of ordinary skill in the art "would have understood that Sakamoto as modified by Krasner '327 would likewise have placed the power amplifier in a reduced power state until the next transmission is required." *Id*. Mr. Andrews testifies that Krasner '327 discloses "that power to the power amplifier is not cut off or eliminated in at least some cases" (*Id*. ¶ 48), and refers Krasner '327 as follows:

> **The transmit power control 18 provides a controlled power signal for the power amplifier 13, the converter 12, and the modulator 11 such that after transmission of a communication signal, the transmit power control unit 18 may cause modulator 11, converter 12 and amplifier 13 to enter a reduced power state**. These components typically remain in this reduced power state until a further transmission through the communication link 14A is required. A typical example of this embodiment is a two-way pager system where the mobile unit 100 performs the functions of a two-way receiver and transmitter (in a two way pager system), and the transmitter is **turned off (or otherwise consumes reduced power)** when the transmitter is not transmitting.

Ex. 1080 ¶ 48 (quoting Ex. 1081, 6:65–7:11).

Petitioner further contends that a person of ordinary skill in the art would have been motivated to place the power amplifier in the modified Sakamoto system in a reduced power state when transmissions are not being performed for power savings, as expressly indicated by Krasner '327. Pet. Mot. Opp. 24. Mr. Andrews testifies that a person of ordinary skill in the art "would have been motivated to achieve power savings by placing components not being utilized, such as a power amplifier, in a reduced power state to save additional battery power, as taught by Krasner ’327. Ex. 1080 ¶ 50.

We have reviewed the evidence and arguments and determine that Petitioner has presented persuasive evidence that the combination of Sakamoto, Gotoh, Krasner, and Krasner ’327, with or without Kulach, teaches the limitations of proposed substitute claim 11. Petitioner also has provided a persuasive rationale to combine the references. More specifically, Krasner ’327 teaches a reduced power state for a power amplifier when transmissions are not being sent, which offers the advantage of power savings when it is applied in Sakamoto. *See* Ex. 1080 ¶ 46; Ex. 1081, 6:65–7:11. Accordingly, we determine that Petitioner’s proposed combination of Sakamoto, Gotoh, Krasner, and Krasner ’327 with or without Kulach, teaches the limitations of proposed substitute claim 11 even under Patent Owner’s proposed construction of the “consumes at least reduced power” limitation. *See* Mot. 12 (proposing that “consumes at least reduced power” means that “the power amplifier continues to consume power while the accelerometer is active. That is, although power usage to the power amplifier is adjusted, power usage is not eliminated and the power amplifier is not shut off.”).

Patent Owner argues that Petitioner’s mapping of proposed substitute claim 11 “is, at best, convoluted, and, at worst, contradictory.” PO Mot. Reply 9. Patent Owner asserts that Petitioner relies on a proposed combination of Sakamoto and Gotoh in which Sakamoto’s GPS receiver is deactivated in stop-positioning mode, but in the proposed combination of Sakamoto, Krasner, and Krasner ’327, Sakamoto performs GPS positioning in response to a position search request message. *Id.* Further, Patent Owner argues that Petitioner specifically maps that Krasner's gating method is used when the Sakamoto system is operating in the normal positioning mode. *Id*. Patent Owner argues that "Gotoh's accelerometer is only active in Sakamoto's stop positioning mode, but Krasner '327's power amplifier consumes reduced power only in Sakamoto's normal sensitivity or high sensitivity modes." *Id*. at 10.

We do not agree with Patent Owner's arguments on these issues because they are not based on Petitioner's mapping of the claim limitations. As discussed above, Petitioner relies upon Krasner's gating method when the Sakamoto system is in the normal positioning mode for the teaching of limitation 11[e], and relies upon Krasner '327's teaching of reduced power to the power amplifier in Sakamoto system when in the stop-position searching mode with positioning performed using the accelerometer for the teaching of limitation 11[f]. Petitioner's basis for teaching limitation 11[f] is that in Sakamoto's stop-position searching mode, the mobile communication line is connected to periodically transmit the position, with the power amplifier active for cellular transmission. *See* Pet. Mot. Opp. 16–18. The mobile communication line is then disconnected after the position is sent, with the power amplifier set to a reduced power state, as discussed above. *See id*. We discern no inconsistencies with Petitioner's assertions regarding respective limitations 11[e] and 11[f]. We agree with Petitioner that these limitations recite that the power amplifier consumes reduced power when the accelerometer is active (limitation 11[f]), but the claim does not require that the adjustment of the power usage responsive to the signal level must also occur while the accelerometer is active (limitation 11[e]). *See* Pet. Mot. Sur-reply 12. As discussed, Petitioner demonstrates that battery monitor circuitry measures available battery power and adjusts power usage to the power amplifier in one mode of Sakamoto's operation and demonstrates that the power amplifier consumes at least reduced power while the accelerometer is active in another mode of operation.

Patent Owner also argues that even if the power amplifier consuming reduced power of Krasner '372 were properly applied to Sakamoto's stop-positioning mode, this would be in response to "Sakamoto's 'line control signal' or 'line mode information' and not 'responsive to a signal level'" as per the claim. PO Mot. Reply 11. On this issue we agree with Petitioner that Patent Owner conflates limitations 11[e] and 11[f], as discussed above. Pet. Mot. Sur-reply 12.

Petitioner presents the same arguments and evidence in support of its challenge to proposed substitute claim 12 on the ground of obviousness over Sakamoto, Gotoh, Krasner, and, Krasner '327, with or without Kulach. Pet. Mot. Opp. 15–25. Patent Owner presents the same common arguments for proposed substitute claims 11 and 12. PO Mot. Reply 9–12. We do not find these arguments persuasive for the reasons discussed above.

In view of the foregoing, we conclude that Petitioner has established by a preponderance of the evidence that proposed substitute claims 11 and 12 would have been unpatentable in view of Sakamoto, Gotoh, Krasner, and Krasner '327, with or without Kulach.

IV. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has shown by a preponderance of the evidence that claims 8–10 of the '256 patent are unpatentable. The Motion to Amend is denied as to proposed substitute claims 11–13. In summary:

Claim(s)	**35 U.S.C. §**	**References/ Basis**	**Claims Shown Unpatentable**	**Claims Not Shown Unpatentable**
10	103(a)	Sakamoto, Gotoh	10	
10	103(a)	Sakamoto, Gotoh, Kulach	10	
8, 9	103(a)	Sakamoto, Gotoh, Krasner	8, 9	
8, 9	103(a)	Sakamoto, Gotoh, Krasner, Kulach	8, 9	
Overall Outcome			8–10	

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	11–13
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	11–13
Substitute Claims: Not Reached	

V. ORDER

Accordingly, it is

ORDERED that claims 8–10 of U.S. Patent 8,102,256 B2 have been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Amend is denied as to proposed substitute claims 11–13; and

FURTHER ORDERED that, because this is a Final Written Decision, the parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.[16]

[16] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16654 (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).

FOR PETITIONER:

Jennifer C. Bailey
Adam P. Seitz
ERISE IP, P.A.
Jennifer.bailey@eriseip.com
adam.seitz@eriseip.com

FOR PATENT OWNER:

Shaun D. Gregory
TAFT STETTINIUS & HOLLISTER LLP
sgregory@taftlaw.com

Trials@uspto.gov
571-272-7822

Paper 39
Date: March 2, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

LBT IP I LLC,
Patent Owner.

IPR2020-01192
Patent 8,421,618 B2

Before JOHN A. HUDALLA, SHEILA F. McSHANE, and
JULIET MITCHELL DIRBA, *Administrative Patent Judges*.

McSHANE, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

I. INTRODUCTION

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons discussed herein, we determine that Petitioner has shown by a preponderance of the evidence that challenged claims 1–24 of U.S. Patent No. 8,421,618 B2 (Ex. 1001, "the '618 patent") are unpatentable.

Patent Owner filed a contingent Motion to Amend to cancel original claims 1–24 and replace them with proposed substitute claims 25–48. For the reasons discussed herein, we deny this motion because Petitioner has established by a preponderance of the evidence that the proposed substitute claims are unpatentable in view of the prior art.

A. Procedural Background

Apple Inc. ("Petitioner") filed a Petition requesting *inter partes* review of claims 1–24 of the '618 patent, along with the supporting Declaration of Scott Andrews. Paper 1 ("Pet."); Ex. 1003. LBT IP I LLC ("Patent Owner") filed a Preliminary Response to the Petition. Paper 8. On March 4, 2021, pursuant to 35 U.S.C. § 314(a), we instituted *inter partes* review based on the following grounds:

Claim(s) Challenged	35 U.S.C. §[1]	References/Basis
1, 3, 9–11, 14–16, 19–21, 24	103(a)	Sakamoto[2], Levi[3]
4–6	103(a)	Sakamoto, Levi, Vaganov[4]
7, 12, 13, 17, 22, 23	103(a)	Sakamoto, Levi, Cervinka[5]
2	103(a)	Sakamoto, Levi, Krasner[6]
8, 18	103(a)	Sakamoto, Levi, Cervinka, Krasner

Pet. 8; Paper 9 ("Inst. Dec."), 6–7.

Patent Owner filed a Patent Owner Response ("PO Resp."). Paper 17. Petitioner filed a Reply ("Pet. Reply") to the Patent Owner Response, as well as the Supplemental Declaration of Scott Andrews. Paper 25; Ex. 1080. Patent Owner filed a Sur-reply ("PO Sur-reply"). Paper 31.

In addition, Patent Owner filed a contingent Motion to Amend (Paper 16, "Mot."), which was opposed by Petitioner (Paper 26, "Pet. Mot.

[1] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103, and 112 effective March 16, 2013. Because the '618 patent was filed before this date, the pre-AIA versions of §§ 102, 103, and 112 apply.

[2] Japanese Unexamined Patent Application Publication No. 2004-37116 (published February 5, 2004). Ex. 1004. We refer to the English translation (Ex. 1004) of the original reference herein. Petitioner provides declarations attesting to the accuracy of the translation. *Id*. at 20, 50.

[3] U.S. Patent No. 5,583,776, filed March 16, 1995, issued December 10, 1996. Ex. 1006.

[4] U.S. Patent Application No. 2006/027413 A1, published December 7, 2006. Ex. 1008.

[5] U.S. Patent No. 7,053,823 B2, filed July 3, 2003, issued May 30, 2006. Ex. 1009.

[6] U.S. Patent No. 6,799,050 B1, filed June 4, 2001, issued September 28, 2004. Ex. 1010.

Opp.”). We issued Preliminary Guidance on Patent Owner’s Motion to Amend. Paper 28. Patent Owner submitted a Reply in Support of its Motion to Amend (Paper 30, “PO Mot. Reply”), and Petitioner filed a Sur-reply supporting its Opposition (Paper 36, “Pet. Mot. Sur-reply”).

An oral hearing, consolidated with Cases IPR2020-01189 and IPR2020-01191, was conducted on December 9, 2021. A transcript of the hearing is included in the record. Paper 38 (“Tr.”).

B. Related Matters

The parties identify *LBT IP I LLC v. Apple Inc.*, Civil Action No. 1:19-cv-01245-UNA (D. Del.), filed on July 1, 2019 as a related matter. Pet. 70; Paper 3, 2. Petitioner also identifies several petitions filed challenging other patents related to the ’618 patent: IPR2020-01189, IPR2020-01190, IPR2020-01191, and IPR2020-01193. Pet. 70.

C. The ’618 Patent

The ’618 patent is titled “Apparatus And Method For Determining Location And Tracking Coordinates Of A Tracking Device” and issued on April 16, 2013, from an application filed on January 23, 2012. Ex. 1001, codes (22), (45), (54).

The ’618 patent is directed to an apparatus to monitor location coordinates of an electronic tracking device. Ex. 1001, code (57). The electronic tracking device apparatus includes electronic components such as a transceiver, signal processing circuitry, and an accelerometer. *Id*. at 5:50–53. Figure 1, reproduced below, depicts a schematic of the electronic tracking device.

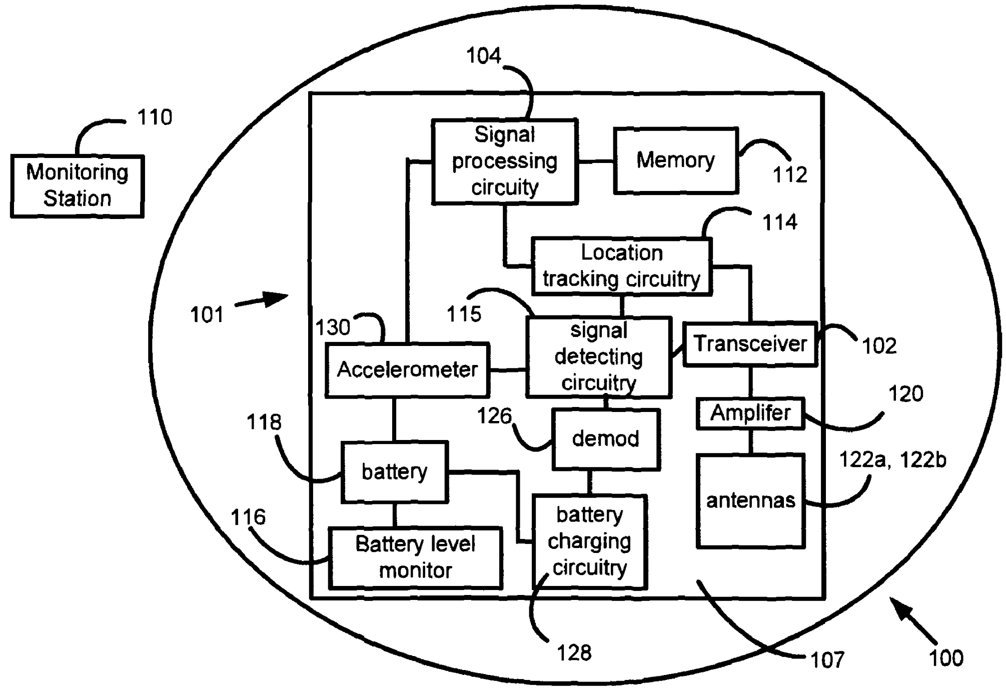

Figure 1

As depicted in the schematic of Figure 1, reproduced above, tracking device 100 contains electronic components 101 such as transceiver 102, signal processing circuitry 104 (e.g., a microprocessor or other signal logic circuitry), and accelerometer 130. Ex. 1001, 5:50–53. Signal processing circuitry 104 may store a first identification code, produce a second identification code, determine location coordinates, and generate a positioning signal that contains location data. *Id.* at 5:62–66. Location tracking circuitry 114 calculates location data received and sends the data to signal processing circuitry 104. *Id.* at 6:12–14. Memory 112 stores operating software and data communicated to and from signal processing circuit 104 and/or location tracking circuitry 114, which, for example, is global positioning system (GPS) logic circuitry. *Id.* at 6:14–17. Signal power levels are detected and measured, and the battery level is detected.

Id. at 6:17–22. When a signal level received by the GPS receiver is below a first signal level, portions of GPS circuitry may be placed in a sleep mode to conserve the battery level, and GPS signal acquisition may be resumed when the signal level is above a first signal level. *Id*. at 6:66–7:11. "[W]hen GPS signaling is not practicable, electronic device proximity measurements provide differential location coordinate information to calculate current location coordinate information." *Id*. at 8:9–12.

Figure 3, reproduced below, is a flow chart illustrating battery conservation for electronic tracking device 100. Ex. 1001, 9:32–33.

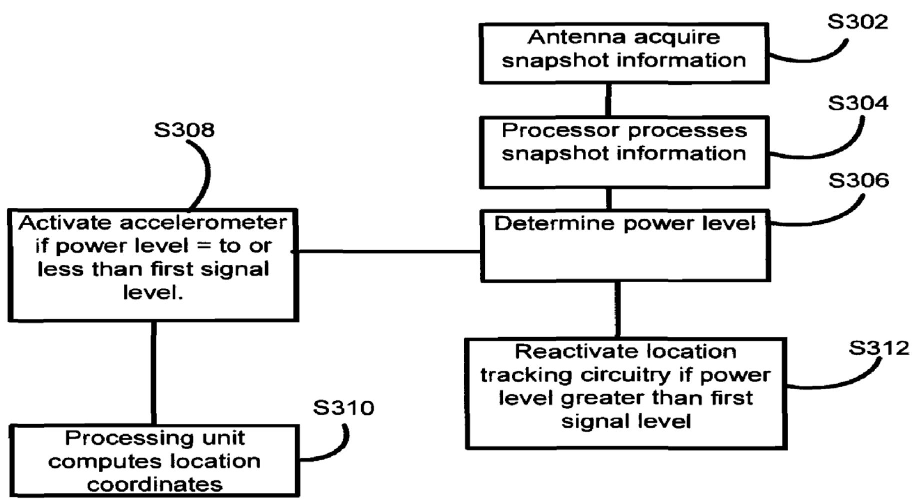

Figure 3

As shown in the flow chart of Figure 3, above, antenna 122a, which is associated with electronic tracking device 100, acquires a snapshot of receive communication signal in step 302, including location coordinates data, and processing unit 104 processes the data in step 304. Ex. 1001, 9:35–40. In step 306, processing unit 104 determines a power level of a receive communication signal. *Id*. at 9:40–41. In step 308, accelerometer 130 activates if a power level of the receive communication signal is insufficient, and accelerometer 130 may measure acceleration of electronic tracking device 100 at time intervals, with processing unit 104 computing current location coordinates using acceleration measurements at step 310. *Id*. at 9:42–48. In a variation of step 312, upon determining receive communication signal is of sufficient signal strength, accelerometer 130 is deactivated and location tracking circuitry 114 is activated. *Id*. at 9:56–61.

Challenged claims 1 and 15 are independent. Claim 1 of the ’618 patent is reproduced below, with bracketed letters added to the limitations for reference purposes.

> 1. A portable electronic tracking device to monitor location coordinates of one or more individuals or objects, the device comprising:
>
> > [a] transceiver circuitry to receive at least one portion of a receive communication signal comprising location coordinates information;
> >
> > [b] accelerometer circuitry to measure displacements of the portable electronic tracking device;
> >
> > [c] a battery power monitor configured to selectively activate and deactivate at least one portion of the transceiver circuitry and location tracking circuitry to conserve battery power in response to a signal level of the at least one portion of the receive communication signal; and
> >
> > [d] processor circuitry configured to process the at least one portion of the receive communication signal.

Ex. 1001, 10:19–10:33.

II. ANALYSIS OF PATENTABILITY OF CLAIMS 1–24

A. The Parties’ Arguments

In our Decision on Institution, we concluded that the arguments and evidence advanced by Petitioner demonstrated a reasonable likelihood that at least one claim of the ’618 patent would have been obvious. Inst. Dec. 7–39. Here, we must consider whether Petitioner has established by a preponderance of the evidence that claims 1–24 of the ’618 patent would have been obvious. 35 U.S.C. § 316(e). We previously instructed Patent Owner that “Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.” Paper 10, 9; *see also In re NuVasive, Inc.*, 842 F.3d 1376, 1379–82 (Fed. Cir. 2016) (holding patent owner waived an argument addressed in the preliminary response by not raising the same argument in the patent owner response). Additionally, the Board’s Trial Practice Guide states that the Patent Owner Response “should identify all the involved claims that are believed to be patentable and state the basis for that belief.” Consolidated Trial Practice Guide (“TPG”), 66 (Nov. 2019).

Patent Owner has chosen not to address certain arguments and evidence advanced by Petitioner to support its unpatentability contentions. In this regard, the record contains persuasive arguments and evidence presented by Petitioner regarding the manner in which the prior art discloses the corresponding limitations of claims 1–24 of the ’618 patent and the rationale for combining the asserted references.

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art the time of the invention would have had a bachelor’s degree in electrical engineering, computer engineering, computer science, or an equivalent degree, with at least two years of experience in GPS navigation, dead reckoning, portable tracking devices, or related technologies. Pet. 5. Petitioner contends that additional education may substitute for lesser work experience and vice-versa. *Id*. (citing Ex. 1003 ¶¶ 29–31).

In determining the level of ordinary skill in the art, various factors may be considered, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted). The level of ordinary skill in the art is also reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

In the Institution Decision, we considered the subject matter of the '618 patent, the background technical field, and the prior art, and we agreed with Petitioner's proposed qualifications; however, we deleted the use of the qualifier "at least" because it introduces vagueness. Inst. Dec. 7–8. Accordingly, we determined that one of ordinary skill in the art would have had a bachelor's degree in electrical engineering, computer engineering, computer science, or an equivalent degree, with two years of experience in GPS navigation, dead reckoning, portable tracking devices, or related technologies, and that additional education may substitute for lesser work experience and vice-versa. *Id*.

Patent Owner adopted the qualifications identified in the Institution Decision. PO Resp. 2.

In view of the relevant technology and claims of the '618 patent, as well as the technology of the asserted prior art, and we adopt the same qualifications as those identified in the Institution Decision.

C. Claim Construction[7]

For petitions filed after November 13, 2018, the Board interprets claim terms in accordance with the standard used in federal district court in a civil action involving the validity or infringement of a patent. 37 C.F.R. § 42.100(b) (2019). Under the principles set forth by our reviewing court, the "words of a claim 'are generally given their ordinary and customary meaning,'" as would be understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp*., 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp. v. Conceptronic, Inc*., 90 F.3d 1576, 1582 (Fed. Cir. 1996)). "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc*., 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Petitioner asserts that no express claim construction is required in order to assess the grounds presented. Pet. 8–9; *see generally* Pet. Reply. Patent Owner does not present any proposed construction for any claim terms. *See generally* PO Resp.; PO Sur-reply.

In the Institution Decision, we determined that it was not necessary to provide express interpretations of any claim terms. Inst. Dec. 8–9. On the full record, we likewise determine that it is not necessary to provide an express interpretation of any claim terms. *See Nidec Motor Corp. v.*

[7] This section applies to claim construction related to the original claims 1–24 of the '618 patent. Claim construction issues related to the proposed substitute claims are addressed *infra* Section III.C.1.

Zhongshan Broad Ocean Motor Co., 868 F.3d 1013, 1017 (Fed. Cir. 2017); *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc*., 200 F.3d 795, 803 (Fed. Cir. 1999) ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.").

D. Alleged Obviousness of Claims 1, 3, 9–11, 14–16, 19–21, and 24 Over Sakamoto and Levi

Petitioner contends that claims 1, 3, 9–11, 14–16, 19–21, and 24 would have been obvious over the combination of Sakamoto and Levi. Pet. 13–53. To support its contentions, Petitioner provides explanations as to how Sakamoto and Levi teach each claim limitation and why there is a motivation to combine the references. *Id*. Petitioner also relies upon the Andrews Declaration (Ex. 1003) and the Supplemental Andrews Declaration (Ex. 1080) to support its positions. Patent Owner argues that the prior art does not teach all the claim limitations. PO Resp. 4–14; PO Sur-reply 1–10.

We begin our discussion with a brief summary of Sakamoto and Levi, and then address the evidence and arguments presented.

1. Sakamoto (Ex. 1004)

Sakamoto is directed to the use of a GPS positioning system that includes a portable terminal and remote server. Ex. 1004, code (57), ¶ 18. Figure 1, reproduced below, is a diagram of the configuration of an embodiment of Sakamoto's system.

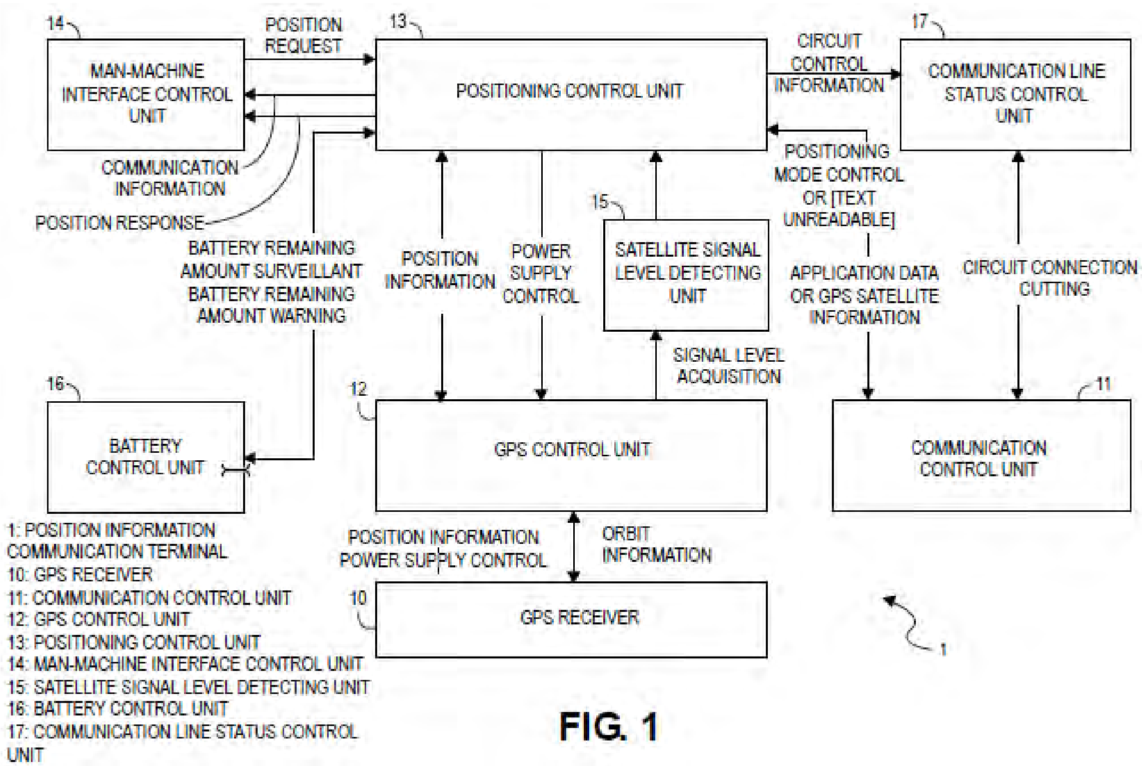

FIG. 1

Figure 1, above, depicts the position information communication terminal 1 which includes GPS receiver 10, positioning control unit 13, communication control unit 11 for mobile communications, man-machine interface control unit 14, which is an interface means with a terminal user, and battery control unit 16. Ex. 1004 ¶ 19. Battery control unit 16 provides positioning control unit 13 a remaining battery life warning when the remaining battery amount falls below a preset threshold value. *Id.* Terminal 1 also has satellite signal level detector 15 that detects a level of the GPS signal received by GPS receiver 10. *Id.* ¶ 50. When the satellite signal level received by terminal 1 is low such that positioning is not possible, power consumption can be reduced by stopping the position search. *Id.*

2. Levi (Ex. 1006)

Levi is directed to the use of a portable navigation device that integrates GPS data, dead reckoning (DR) sensors, and digital maps into a self-contained navigation instrument. Ex. 1006, code (57), 1:60–63. Levi's device uses an accelerometer to provide acceleration data indicative of footsteps, and sensed footsteps are converted to distance and velocity. *Id*. at 3:13–14, 3:35–36. A DR software module performs DR navigation by sampling vector velocities for incremental course changes. *Id*. at 7:64–66. The DR software accesses compass, altimeter, pedometer frequency, and calibration table data to obtain velocity magnitude and three-dimensional direction. *Id*. at 8:1–3. DR software normally uses GPS to obtain starting positions, but when GPS data is not valid, DR uses the last fix, whether GPS or manual, for a start point. *Id*. at 8:3–7. DR navigation is automatically used by the navigation module when GPS is unavailable. *Id*. at 8:7–9. The DR system allows users to designate landmarks for navigation. *Id*. at 8:50–9:52.

3. Analysis

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *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.[8] *Graham v. John Deere Co*., 383 U.S. 1, 17–18 (1966).

[8] No evidence of objective indicia of nonobviousness has been presented by Patent Owner. *See generally* PO Resp.

a. Claim 1

Petitioner asserts that the combination of Sakamoto and Levi teaches all the limitations of claim 1, and that one of ordinary skill in the art would have been motivated to combine the asserted prior art references. *See* Pet. 22–45; Pet. Reply 1–17.

1) Parties' Contentions

i. Preamble

The preamble of claim 1 recites "[a] portable electronic tracking device to monitor location coordinates of one or more individuals or objects." Ex. 1001, 10:19–20. Petitioner argues that Sakamoto in combination with Levi discloses the portable electronic tracking device recited in the preamble of claim 1. Pet. 22–24. More specifically, Petitioner asserts that Sakamoto discloses several electronic devices that collectively operate to enable monitoring location of a terminal using GPS. *Id*. at 22–23 (citing Ex. 1004 ¶ 19, Fig. 1; Ex. 1003 ¶ 121). Petitioner contends that Sakamoto teaches all the components of the electronic tracking device, except for the accelerometer circuitry, which Levi discloses for use in a portable navigation system. *Id*. at 24.

Petitioner contends that one of ordinary skill in the art would have understood that Sakamoto discloses a portable mobile terminal that uses batteries. Pet. 24 (citing Ex. 1004 ¶¶ 3, 19, 31, 46; Ex. 1003 ¶ 123). Petitioner asserts that Sakamoto discloses monitoring for determination of terminal users' positions where the GPS receiver "receives GPS satellite signals from GPS satellites and performs positioning operations." *Id*. at 25–26 (citing Ex. 1004 ¶¶ 5, 18–24, Fig. 2). Petitioner argues that a person of ordinary skill in the art would have understood that orbit information from the GPS satellite and position information from the GPS receiver is used to determine the position of the terminal, including location coordinates as recited in the preamble of claim 1. *Id*. at 26 (citing Ex. 1004 ¶¶ 5, 22; Ex. 1003 ¶ 124).

ii. Limitation 1[a]

Limitation 1[a] recites "transceiver circuitry to receive at least one portion of a receive communication signal comprising location coordinates information." Ex. 1001, 10:22–24. For the teaching of limitation 1[a], Petitioner argues that Sakamoto discloses transceiver circuitry that consists of GPS receiver 10, GPS control unit 12, positioning control unit 13, and communication control unit 11. Pet. 26–27 (citing Ex. 1004, Fig. 1). Petitioner asserts that Sakamoto teaches that its GPS receiver "receives GPS satellite signals from GPS satellites," which includes information to determine location coordinates. *Id*. at 27–28 (citing Ex. 1004 ¶¶ 5, 19; Ex. 1003 ¶¶ 125–126). Petitioner contends that a person of ordinary skill in the art would have understood Sakamoto's communication control unit 11 to be the claimed transceiver "because it transmits information (e.g., the battery level warning message) and receives information (e.g., positioning control information such as the position search request message)" with server 2. *Id*. at 29 (citing Ex. 1004 ¶ 48; Ex. 1003 ¶ 127).

Petitioner asserts that one of ordinary skill in the art would have been motivated to combine Sakamoto and Levi. Pet. 13–18. Petitioner contends Sakamoto and Levi are analogous art to the '618 patent, and that a person of ordinary skill in the art would have been familiar with both references. *Id*. at 13. Petitioner contends that a person of ordinary skill in the art would have been motivated to combine Levi's supplemental location tracking in the form of a DR system, which includes an accelerometer, with Sakamoto's GPS system because "[u]sing an accelerometer to supplement location tracking of a device, in particular when GPS signals are unavailable, was extremely well-known in the art prior to the invention of the '618 Patent, as taught by numerous references including Levi." *Id*. at 13–14 (citing Ex. 1003 ¶¶ 92–100). In support, Mr. Andrews testifies that it was known that the problems of weak GPS signals were well known prior to the '618 invention and Levi, as well as other references, "teaches a solution to the problem of insufficient GPS signal[s] by starting to measure acceleration data with an accelerometer." Ex. 1003 ¶¶ 93–94 (citing, *inter alia*, Ex. 1004, 8:6–9; Ex. 1015, 11:43–46, 13:29–33).

iii. Limitation 1[b]

Limitation 1[b] recites "accelerometer circuitry to measure displacements of the portable electronic tracking device" Ex. 1001, 10:25–26. Petitioner acknowledges that Sakamoto does not teach accelerometer circuitry, but argues that portable devices, as taught by Levi, were known to utilize both GPS-based and accelerometer-based position determinations. Pet. 29. Petitioner asserts that "Levi teaches a portable navigational system using both GPS and dead reckoning based on accelerometer data to determine a user's position." *Id*. at 29–30 (citing Ex. 1006, 1:8–11, 1:59–63). Petitioner contends that Levi's accelerometer, incorporated in a pedometer, senses "harmonic motions and impact accelerations that result from walking or running," and the accelerometer is used in the DR system. *Id*. at 30 (citing Ex. 1006, 2:5–14, 3:12–19; Ex. 1003 ¶ 129). Petitioner argues that Levi's DR system supplements the GPS system when GPS is unavailable. *Id*. (citing Ex. 1006, 1:51–53, 8:7–9). Petitioner refers to

Levi's disclosures that the accelerometer calculates displacement, including total displacement from a starting point, based on acceleration data. *Id*. (citing Ex. 1006, 1:13–17, 3:12–36, 4:18–28, 5:17–19; Ex. 1003 ¶ 130).

iv. Limitation 1[c]

Limitation 1[c] recites:

> a battery power monitor configured to selectively activate and deactivate at least one portion of the transceiver circuitry and location tracking circuitry to conserve battery power in response to a signal level of the at least one portion of the receive communication signal.

Ex. 1001, 10:27–31.

Petitioner argues that Sakamoto activates and deactivates the GPS receiver to conserve power and in response to a signal level. Pet. 31–41. More specifically, Petitioner asserts that Sakamoto teaches that its GPS receiver monitors the GPS satellite signal and then, depending on the signal level, changes its mode of its operation. *Id*. at 31–32 (citing Ex. 1004 ¶¶ 24–25, 27, 37–38, 45, 50). Petitioner contends that Sakamoto teaches selectively activating and deactivating a portion of the transceiver circuitry and location tracking circuitry in response to the signal level to conserve power. *Id*. at 32. Mr. Andrews testifies that the claimed transceiver circuitry, battery power monitor, and location tracking circuitry are disclosed in Sakamoto. Ex. 1003 ¶ 131. In support of his testimony, Mr. Andrews provides an annotated version of Sakamoto's Figure 1, which is reproduced below.

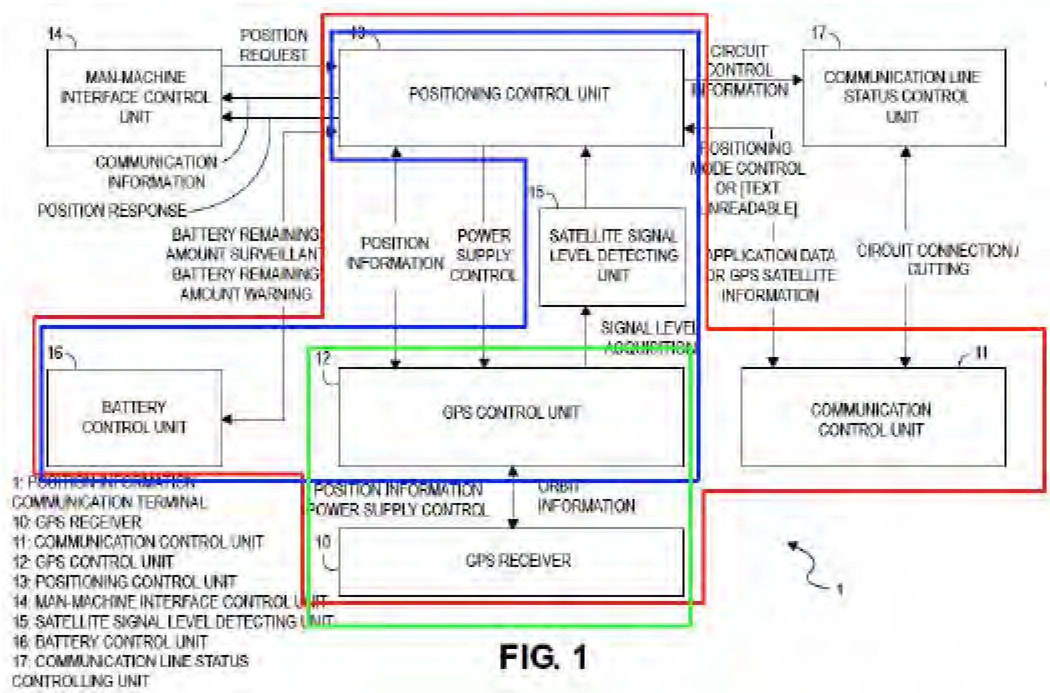

FIG. 1

In this annotated version of Sakamoto's Figure 1, Mr. Andrews outlines the transceiver circuitry in red, the battery power monitor in blue, and the location tracking circuitry in green. Ex. 1003 ¶ 131. Mr. Andrews testifies on the operation of the three operational modes of Sakamoto: 1) the "normal mode" where the GPS signal is above a threshold value and positioning by the GPS receiver is performed cyclically; 2) the "stop-position searching mode" where the received GPS satellite signal is below a predetermined threshold level and location determination is halted; and 3) the "high mode" where the GPS satellite signal is low, but position searching is performed continuously to stabilize positioning. *Id.* ¶ 132 (citing Ex. 1004 ¶¶ 27, 37–38, 50).

Petitioner argues that Sakamoto "teaches battery control unit 16, positioning control unit 13, and satellite signal level detecting unit 15, that either individually or collectively, selectively activate and deactivate GPS receiver 10 in response to a satellite signal." Pet. 34 (citing Ex. 1003 ¶ 131).

Petitioner contends that in Sakamoto the activation/deactivation is done in response to a satellite signal level detected by satellite signal level detecting unit 15. *Id*. Petitioner asserts that Sakamoto's GPS receiver monitors the GPS satellite signal and then, depending on the signal level, changes its mode of operation in order to conserve power. *Id*. at 31–32 (citing Ex. 1004 ¶¶ 24–25, 27, 37–38, 45, 50).

Petitioner refers to Sakamoto's teaching that "the GPS receiver cyclically monitors the GPS satellite signal level according to a 'measurement time.'" Pet. 32 (citing Ex. 1004 ¶ 37). Petitioner asserts that "Sakamoto teaches transitioning to the normal mode (if not already in the normal mode)" in situations where "the GPS signal is 'high.'" *Id*. (citing Ex. 1004 ¶ 27). Petitioner further contends that "when the GPS signal is 'equal to or lower than a predetermined threshold value,' such that 'positioning cannot be performed,' the 'position search may be stopped.'" *Id*. (citing Ex. 1004 ¶ 38).

Mr. Andrews testifies that deactivating the GPS receiver, i.e., stopping position searching, is known to reduce power consumption. Ex. 1003 ¶ 136. Petitioner additionally refers to Sakamoto's teaching that "power consumption can be reduced by stopping the position search when positioning is not possible." Pet. 32–33 (citing Ex. 1004 ¶ 50).

Petitioner argues that Sakamoto teaches activating and deactivating the GPS receiver by performing signal level detection during a set measurement time. Pet. 32, 35–36 (citing Ex. 1003 ¶ 137; Ex. 1004 ¶¶ 20, 27, 37, Figs. 6, 7). Petitioner asserts that "at the cycle set in advance," "a 'satellite signal level request message,' including the measurement time for signal level detection, is sent to terminal 1 from server 2." *Id*. at 35–36 (citing Ex. 1003 ¶ 137; Ex. 1004 ¶ 37). According to Petitioner, "the positioning mode control unit 22 'sends a positioning control message (satellite signal level request message),'" and the positioning control unit then "causes the satellite signal level detection unit 15 to monitor the signal level from the GPS satellite" during this cycle. Pet. Reply 3–4 (citing Ex. 1003 ¶¶ 135, 138; Ex. 1004 ¶¶ 37–38). Petitioner contends that in Sakamoto, the satellite signal level response is sent to position management/positioning server 2, and the positioning mode control unit 22 reads it and "determines the required positioning mode based on the satellite signal level, including whether the signal level is above 'the predetermined threshold value.'" *Id*. at 4 (citing Ex. 1004 ¶ 38). Mr. Andrews testifies that Sakamoto teaches a cycle such that positioning operations are performed periodically and "a POSITA [person of ordinary skill in the art] would have expected that the device would have been configured to regularly reselect the appropriate mode of operation based on currently-sensed parameters to ensure the most appropriate functioning of the device." Ex. 1003 ¶ 138.

Petitioner refers to Sakamoto's disclosure that position searching would be stopped (stop-position mode) if the signal level detected is equal to or lower than a predetermined threshold value. Pet. 32 (Ex. 1004 ¶ 38). Petitioner asserts that, in Sakamoto's stop-position mode, at least the signal acquisition and signal processing sub-components of the GPS receiver are deactivated. *Id*. at 39 (citing Ex. 1003 ¶ 139; Ex. 1004 ¶ 50). If the signal level is measured above the set threshold during a cyclic signal level detection, then GPS receiver components are activated. *Id*. at 35–39. Mr. Andrews testifies that

> if the device was previously in the stop-position searching mode (because the received GPS signal level was equal to or lower than a predetermined threshold) and a subsequently received GPS signal level is good (i.e., above a threshold value), then a POSITA would have understood GPS control unit 12 instructs GPS receiver 10 to begin position searching, resulting in increased power usage by the GPS receiver.

Ex. 1003 ¶ 138 (citing Ex. 1004 ¶ 27). Mr. Andrews further testifies that a person of ordinary skill in the art "would have understood that a location tracking device that transitioned to stop-positioning mode (i.e. deactivated GPS) when the signal level was low, but did not transition to a positioning mode (i.e. activate GPS) when the signal was high enough to obtain positioning . . . would have understood such a device to be useless." *Id.* ¶ 136.

Patent Owner asserts that Sakamoto does not disclose "selectively activating and deactivating at least one portion of the transceiver circuitry and location tracking circuitry . . . in response to a signal level." PO Resp. 4–13. Patent Owner notes that Petitioner relies upon the stop-position mode of Sakamoto to teach this limitation. *Id.* at 7–8 (citing Pet. 35). Patent Owner further notes Mr. Andrews' testimony that Sakamoto's GPS receiver 10 is the only component that receives GPS satellite signals. *Id.* at 9–10, 12 (citing Ex. 2003, 14:5–16:2, 20:1–4, 23:10–11). As such, Patent Owner contends that transceiver circuitry and location tracking circuitry cannot both include the ability to receive GPS signals and also be turned off completely when deactivated. *Id.* at 7. More specifically, Patent Owner argues that if Sakamoto is "'in a state in which the power of the GPS receiver 10 is cut off,' . . . or has deactivated the 'sub-components of GPS receiver related to signal acquisition (transceiver circuitry) and signal processing (location tracking circuitry),'" then Sakamoto cannot activate GPS receiver 10 or any component of GPS receiver 10 "in response to a signal level" as required by the claims of the '618 patent. *Id*. at 10 (citing Pet. 37).

Patent Owner disputes Mr. Andrews' testimony regarding the reactivation of Sakamoto's GPS receiver from stop-position mode based on a signal level. PO Resp. 9–13. Patent Owner contends that "[w]hile Mr. Andrews suggests that the resumption of position searching by GPS receiver 10 (i.e., 'activation') occurs when 'a subsequently received GPS signal level is good,'" he does not explain how Sakamoto can receive a GPS signal when the GPS receiver is not already activated. *Id*. at 12 (citing Ex. 1003 ¶ 138). Patent Owner asserts that, in contrast to Mr. Andrews' testimony, Sakamoto teaches manual reactivation of the GPS receiver after it has been put into stop-position mode. PO Sur-reply 8–9 (citing Ex. 1004 ¶ 20). Patent Owner contends that Mr. Andrews' testimony is conclusory, unsupported, and speculative and cannot be a basis for a finding of unpatentability. *Id*. at 6–8 (citing Pet. Reply 7; Ex. 2003, 23:21–24; 24:18–25).

iv. Limitation 1[d]

Limitation 1[d] recites "processor circuitry configured to process the at least one portion of the receive communication signal." Ex. 1001, 10:32–33. Petitioner asserts that Sakamoto teaches the claimed "processor circuitry" by its disclosure that the positioning control unit requests and receives orbit information from the server and then sends it to the GPS control unit. Pet. 42 (citing Ex. 1004 ¶ 22; Ex. 1003 ¶ 144). Mr. Andrews testifies that the positioning control system is configured to process the receive communication signal. Ex. 1003 ¶ 144.

2) Analysis

We have reviewed Petitioner's arguments and evidence and determine that Petitioner provides persuasive evidence that the combination of Sakamoto and Levi teaches the preamble [9] and the limitations of claim 1 and provides a persuasive rationale to combine the references.

Patent Owner's arguments are directed only to the adequacy of Petitioner's showing as to limitation 1[c]. For the teaching of "activate . . . one portion of the electronic tracking device . . . in response to a signal level of the receive communication signal," Petitioner relies upon paragraphs 37 and 38 of Sakamoto (Pet. 30; Pet. Reply 3–4), which state:

> [0037] *Further, at the cycle set in advance in the position information database 25*, as shown in the format in FIG. 6, the positioning mode control unit 22 in the position management / positioning server 2 sends a positioning control message (satellite signal level request message) comprising a search terminal address, a server address, a message identifier, and application data of the measurement time via the communication control unit 21. In the position information communication terminal 1 that has received this satellite signal level request message, *the positioning control unit 13 causes the satellite signal level detection unit 15 to monitor the signal level from the GPS satellite during the measurement time specified in the satellite signal level request message*, and as the calculation result

[9] We make no specific determination as to whether the preamble of claim 1 is limiting.

> of the average value of the signal level, as shown in the format in FIG. 7, *a positioning control message (satellite signal level response message) . . is returned to the position management / positioning server 2 via the communication control unit 11*.
>
> [0038] When the position management / positioning server 2 receives the satellite signal level response message*, the positioning mode control unit 22 reads out the signal level* from each satellite from the satellite signal level response . . . When the positioning mode control unit 22 *determines that the high sensitivity positioning mode is required when the signal level value is equal to or lower than a predetermined threshold value*, it sends a request to communication control unit 21 for the position search request message *including positioning mode information designating the positioning operation of the GPS receiver 10 of the position information communication terminal 1 as the high sensitivity positioning mode* to be transmitted to the corresponding position information communication terminal 1; *if it is determined that the normal sensitivity positioning mode is required when the signal level value is equal to or higher than a predetermined threshold value*, it sends a request to communication control unit 21 for the position search request message *including positioning mode information designating the positioning operation of the GPS receiver 10 of the position information communication terminal 1 as the normal sensitivity positioning mode* to be transmitted to the corresponding position information communication terminal 1. *If it is determined that the positioning cannot be performed when the signal level value is equal to or lower than a predetermined threshold value, the position search may be stopped.*

Ex. 1004 ¶¶ 38–39 (emphases added).

Based on this disclosure, Petitioner asserts, and we agree, that Sakamoto teaches activating and deactivating the GPS receiver by performing signal level detection during a set measurement time. Pet. 32, 35–36. Mr. Andrews testifies that Sakamoto teaches the use of the timed cycle such that a person of ordinary skill in the art would have understood that an appropriate mode of operation is selected based on the detected signal level. Ex. 1003 ¶ 138. Petitioner also refers to Sakamoto's disclosure that position searching would be stopped (stop-position mode) if the signal level detected is equal to or lower than a predetermined threshold value. Pet. 32 (Ex. 1004 ¶ 38). Mr. Andrews additionally testifies that if the GPS receiver was previously in the stop-position searching mode and a subsequently-received GPS signal level is good (i.e., above a threshold value), then a person of ordinary skill in the art would have understood that GPS control unit 12 instructs GPS receiver 10 to begin position searching. Ex. 1003 ¶ 138 (citing Ex. 1004 ¶ 27).

Based on the weight of the evidence, we are persuaded by Petitioner's showing regarding the activation of Sakamoto's GPS receiver from a stop-position mode.

Patent Owner argues that Mr. Andrews' testimony is insufficient and incorrect regarding Sakamoto's teaching on reactivation based on detected signal levels, and instead contends that Sakamoto teaches manual reactivation after it was put in stop-position mode. PO Resp. 7–12; PO Sur-reply 8–9 (citing Ex. 1004 ¶ 20). Although Sakamoto may teach manual reactivation from stop-position mode, this does not undermine Petitioner's persuasive showing that a person of ordinary skill in the art considering Sakamoto would have known to activate GPS receiver 10 from stop-position mode based on a sufficient signal level. More specifically, Petitioner relies upon the disclosures of paragraphs 38 and 39 to support its assertion that in Sakamoto the satellite signal level detection unit monitors the signal level from the GPS satellite on a preset periodic cycle, and based on the measured signal level, the positioning mode is set. *See* Pet. 32, 34–35 (citing Ex. 1003 ¶¶ 135–137; Ex. 1004 ¶¶ 20, 27, 37, 38, Figs. 6, 7); *see also* Pet. Reply 3–4.

Petitioner also asserts that in Sakamoto, the positioning mode may be changed based on a comparison between a measured signal level and various thresholds. Pet. 32, 38–39. More specifically, Mr. Andrews testifies that when the operation mode was previously in a normal mode or high mode and the subsequent detected signal level is equal to or lower than a predetermined threshold, GPS control unit 12 instructs GPS receiver 10 to stop position searching (deactivate) to conserve power. Ex. 1003 ¶ 138. Conversely, Mr. Andrews testifies that when the operation mode was previously in a stop-position "and a subsequently received GPS signal level is good (e.g., above a threshold value), then a [person of ordinary skill in the art] would have understood that GPS control unit 12 instructs GPS receiver 10 to begin position searching" (activate). *Id*. Mr. Andrews explains that it would have not have been useful to design the GPS positioner to set a mode once and never transition out of it. *Id*. ¶ 136. Mr. Andrews acknowledges that Sakamoto teaches a manual mode, but further testifies that Sakamoto also teaches the use of the automatic cycle to check signal levels for changing modes. *Id*. ¶ 137.

As identified above, Sakamoto discloses at least that periodic checking of signal levels is performed at a cycle set in advance, with the comparison of the detected signal level value to predetermined threshold values then used to set positioning modes.[10] Ex. 1004 ¶¶ 37, 38. This disclosure provides support for Mr. Andrews' testimony that a person of skill would have understood that, based on the detected signal level checked in a cycle, the operational mode is determined. Ex. 1003 ¶ 137. More specifically, Sakamoto's disclosures support Mr. Andrews' testimony that in resetting an operation mode, the mode could be changed to a stop-position mode from a normal mode or high mode and to a normal mode or high mode from a stop-position mode, depending on signal level. *See id.* ¶¶ 137–138. The testimony directed to moving from a stop-position mode to a positioning mode is further explained by Mr. Andrews' rationale that a person of ordinary skill in the art would have understood that it would not have been useful or practical for Sakamoto to set a mode once and then never change it. Ex. 1003 ¶ 136; Ex. 2003, 23:21–24:10.

Although Sakamoto may not explicitly identify moving out of the stop-position mode as a result of the cyclic signal level checking, the issue is not whether there is express disclosure in the reference—it is whether the claimed invention as a whole would have been obvious to a person having ordinary skill in the art to which the claimed invention pertains. *See* 35 U.S.C. § 103. Thus, we accord significant weight to Mr. Andrews' understanding of Sakamoto's teachings in the view of one of skill of the art regarding its disclosure of periodic checking of signal levels that is used to set positioning modes. *See* Ex. 1003 ¶¶ 137–138. We further credit the additional rationale provided by Mr. Andrews as to why one of skill in the

[10] Petitioner asserts, and we agree, that Sakamoto's teachings on the periodic checking of GPS signals align with similar disclosures in the '618 patent. *See* Ex. 1001, 6:63–66, 9:41–49; Pet. Reply 12–13.

art would have been motivated to design a device that would automatically move from a stop-position mode to a positioning mode when the GPS signal became strong enough because a device lacking this functionality would not be useful or practical. *See id*. ¶ 136; *KSR*, 550 U.S. at 418 ("a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ."); *accord In re Translogic Tech., Inc*., 504 F.3d 1249, 1259 (Fed. Cir. 2007). Moreover, Patent Owner's arguments disputing Mr. Andrews' testimony on an ordinarily skilled artisan's understanding of Sakamoto are attorney argument only and are unsupported by any record evidence. These attorney arguments are entitled to little, if any, weight. *See In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997) (explaining that attorney arguments and conclusory statements that are unsupported by factual evidence are entitled to little probative value). Accordingly, Petitioner has provided persuasive evidentiary support that, in the view of a person of ordinary skill in the art, Sakamoto teaches activating transceiver and location tracking circuitry from stop-position searching mode when a subsequently detected signal level is above a threshold value.

We turn to Patent Owner's argument regarding Mr. Andrews' testimony that Sakamoto's GPS receiver 10 is the only component that receives GPS satellite signals, and when this is deactivated (in stop-position mode), there can be no activation of the GPS receiver as required by the claim limitation in Sakamoto. PO Resp. 9–12 (citing Ex. 2003, 14:5–16:2, 20:1–4, 23:10–11). We do not agree with this argument because it does not accurately represent Mr. Andrews' testimony on Sakamoto's GPS receiver operation when cyclically checking signal levels.

As discussed above, Sakamoto discloses performing signal level detection on a cyclic basis, and then comparing the measured signal to thresholds to determine the operational positional mode to be set. *See* Ex. 1004 ¶¶ 24–25, 27, 37–38, 45, 50; Pet. 35–38. Depending on the positional operational mode determined, GPS receiver operation will be set to normal mode, high mode, or stop-position mode. Ex. 1004 ¶¶ 5, 24, 27, 38, 50.

Mr. Andrews' testimony reflects the distinction between GPS receiver operation when determining signal level and GPS receiver operation when it is performing position searching. More specifically, Mr. Andrews testifies that in Sakamoto, portions of the GPS receiver would be turned on, at the set cycle time, to measure the signal level. Ex. 1080 ¶¶ 4–5. Mr. Andrews also testifies that on a periodic basis, at least a portion of the GPS receiver that checks the level of the GPS signals would be turned on, and if the signal level is above the stop-position mode threshold, the GPS receiver would be turned on for position searching, but if the level of the signal level is below the stop-position mode threshold the GPS receiver would stop position searching. *See* Ex. 1003 ¶¶ 137–138; Ex. 1080 ¶ 7; Ex. 2003, 20:23–21:20, 25:1–10, 28:9–16, 32:16–33:15, *see also id*. at 19:8–20:22. Patent Owner's argument that portions of Sakamoto's GPS receiver 10 cannot be activated from stop-position mode in response to a signal level measurement disregards Mr. Andrews' testimony on GPS receiver operation during cyclic signal detection.

Patent Owner further contends that Mr. Andrews' testimony on GPS receiver operation is conclusory, unsupported, and speculative. PO Sur-reply 6–8. We disagree. Although Mr. Andrews acknowledges that

Sakamoto does not provide specifics on GPS receiver operation when cyclically checking signal levels, his testimony is that, in the view of one of ordinary skill in the art, portions of the GPS receiver would be periodically turned on for signal checking in order to reduce power consumption.[11] Ex. 1080 ¶ 4; Ex. 2003, 19:8–20:22, 23:10–24:10, 32:16–33:14, 34:12–35:4, *see also id*. at 21:7–11–22:6. We credit this testimony because it is consistent with Sakamoto's disclosure that signal levels are periodically checked. *See* Ex. 1004 ¶¶ 37, 38. Further, Patent Owner attempts to counter Petitioner's showing with only attorney argument; in our view, this does not undermine Mr. Andrews' testimony about how an ordinarily skilled artisan would have interpreted Sakamoto.

Accordingly, we determine that Petitioner has provided persuasive evidence that the combination of Sakamoto and Levi teaches limitation 1[c]. Additionally, we determine that Petitioner has provided sufficient evidence of the rationale to combine the prior art.

3) Conclusion for Claim 1

On the full record, Petitioner has established by a preponderance of the evidence that claim 1 would have been obvious over the combination of Sakamoto and Levi.

b. Independent Claim 15

Independent claim 15 is a method claim with limitations that parallel the limitations of claim 1. *See* Ex. 1001, 11:33–12:5. For claim 15, Petitioner relies on the same evidence and argument provided for claim 1.

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[11] Mr. Andrews testifies that, in order to check the signal level, at least the radio part of the GPS receiver would be need to be turned on briefly to check the signal level. Ex. 2003, 19:16–25.

See Pet. 52. On the full trial record and for the reasons discussed above, we find that Petitioner has provided persuasive evidence that the combination of Sakamoto and Levi teaches the limitations of claim 15. Additionally, we determine that Petitioner has provided persuasive evidence of the rationale to combine the prior art.

Patent Owner relies upon the same arguments for independent claim 15 as those presented for claim 1. *See generally* PO Resp. We do not agree with these arguments for the reasons discussed above.

Accordingly, Petitioner has established by a preponderance of the evidence that claim 15 would have been obvious over the combination of Sakamoto and Levi.

c. Dependent Claims 3 and 16

Claim 3 depends from claim 1 and further recites

> wherein the processor circuitry is further configured to compute the location coordinates of the portable electronic tracking device from the at least one portion of the receive communication signal and the displacements of the portable electronic tracking device in response to the signal level of the at least one portion of the receive communication signal.

Ex. 1001, 10:37–43. Claim 16 depends from claim 15 and recites a similar limitation. *Id*. at 12:6–12.

Petitioner asserts that Levi teaches computing location coordinates because Levi's portable navigation device tracks the position of the device and/or its user. Pet. 46 (citing Ex. 1006, 8:25–26, 2:5–14 , 7:39–45, 2:10–14). In support, Mr. Andrews testifies that claim 3 encompasses well-known dead reckoning techniques. Ex. 1003 ¶ 150. Mr. Andrews further testifies that a person of ordinary skill in the art "would have understood that the result of [] dead reckoning [of Levi] would have been to 'compute the location coordinates' of the device." *Id*. Petitioner contends that when a satellite signal level is below a predetermined threshold value such that position searching cannot be performed, as taught by in Sakamoto, then Levi's navigation system uses dead reckoning techniques to compute location from the GPS signal last received, that is, the last known location, as well as the device's displacements. Pet. 47 (citing Ex. 1003 ¶ 151). Petitioner contends that Levi's device uses GPS positioning while GPS signals are valid, but then starts computing location coordinates via dead reckoning from the last GPS fix (i.e., "from the at least one portion of the receive communication signal") whenever GPS signals are not valid. *Id*. Petitioner argues that a person of ordinary skill in the art would have been motivated to modify Sakamoto to include Levi's accelerometer, and its DR techniques, in view of the benefits of using an accelerometer to compute location coordinates when GPS signals are unavailable. *Id*. at 48 (citing Ex. 1003 ¶ 151).

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that Levi teaches computing displacements and location coordinates via dead reckoning based on the last known GPS fix (i.e., "from the at least one portion of the receive communication signal") in response to invalid GPS signals (i.e., "the signal level of the at least one portion of the receive communication signal"). *See, e.g.*, Ex. 1006, 7:39–45, 2:10–14; Ex. 1003 ¶¶ 150–151; *see also supra* Section II.D.3. We also are persuaded by Petitioner's rationale for combining Levi and Sakamoto in the view of the knowledge of one of ordinary skill in the art. Ex. 1003 ¶ 151. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claims 3 and 16 would have been obvious over the combination of Sakamoto and Levi.

d. Dependent Claims 9 and 19

Claim 9 depends from claim 1 and further recites "wherein the location tracking circuitry is configured to calculate location data based on the at least one portion of the receive communication signal." Ex. 1001, 11:10–12. Claim 19 depends from claim 15 and recites a similar limitation. *Id*. at 12:24–26. Petitioner asserts that Sakamoto teaches that its location tracking circuitry is configured to calculate location data, that is, the current location of terminal 1, based on the receive communication signal, i.e., GPS satellite signal received by GPS receiver 10, as mapped for limitation 1[c]. Pet. 48.

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that Sakamoto teaches that its location tracking circuitry is configured to calculate location data based on a receive communication signal. *See supra* Section II.D.3.a.1.iv; *see also, e.g.*, Ex. 1004 ¶¶ 19, 25. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claims 9 and 19 would have been obvious over the combination of Sakamoto and Levi.

e. Dependent Claims 10 and 20

Claim 10 depends from claim 9 and further recites "wherein the battery power monitor is configured to deactivate the location tracking circuitry when a communication signal is below a predefined level." Ex. 1001, 11:14–16. Claim 20 depends from claim 15 and recites a similar limitation. *Id*. at 12:27–29. Petitioner asserts that Sakamoto teaches stopping position searching when the GPS satellite signal level is below a predetermined threshold level, as discussed for limitation 1[c], and that a person of ordinary skill in the art would have understood that in the stop-position searching mode the GPS receiver is deactivated. Pet. 49 (citing Ex. 1004 ¶ 38; Ex. 1003 ¶ 140).

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that Sakamoto teaches that the GPS receiver is deactivated when the GPS satellite signal level is below a predetermined threshold level. *See supra* Section II.D.3.a.1.iv; *see also, e.g.*, Ex. 1004 ¶ 38. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claims 10 and 20 would have been obvious over the combination of Sakamoto and Levi.

f. Dependent Claims 11 and 21

Claim 11 depends from claim 9 and further recites "wherein the battery power monitor is configured to activate the location tracking circuitry when the at least one portion of the receive communication signal is above a predefined level." Ex. 1001, 11:17–20. Claim 21 depends from claim 15 and recites a similar limitation. *Id.* at 12:29–31. Petitioner asserts that Sakamoto teaches that the battery power monitor is configured to activate the location tracking circuitry (power on GPS receiver 10 and switch to normal mode) when the receive communication signal is above a predefined level, as discussed for limitation 1[c]. Pet. 50 (citing Ex. 1004 ¶¶ 27, 38; Ex. 1003 ¶ 155).

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that a person of ordinary skill in the art would understand Sakamoto to disclose that GPS receiver 10 is powered on and switched to normal mode when the GPS satellite signal level is above a predetermined threshold level. *See supra* Section II.D.3.a.1.iv; *see also, e.g.*, Ex. 1004 ¶¶ 27, 38. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claims 11 and 21 would have been obvious over the combination of Sakamoto and Levi.

g. Dependent Claims 14 and 24

Claim 14 depends from claim 1 and further recites "wherein the transceiver is configured to receive the at least one portion of the receive communication signal from a GPS satellite and from a wireless communication network." Ex. 1001, 11:29–32. Claim 24 depends from claim 15 and recites a similar limitation except it recites "is received from a GPS satellite *or* from a wireless communication network," which is subsumed within the scope of claim 14. *Id*. at 12:38–40 (emphasis added). Petitioner asserts that Sakamoto teaches that the GPS receiver receives GPS satellite signals from GPS satellites, as discussed for limitation 1[a]. Pet. 51 (citing Ex. 1004 ¶ 19). Petitioner refers to Sakamoto's teaching that the GPS receiver 10 "requests the latest orbit information from the GPS control unit 12," with GPS control unit 12 requesting that positioning control unit 13 acquires the GPS satellite information. *Id*. (citing Ex. 1004 ¶¶ 11, 21, 22). Petitioner further refers to Sakamoto's teaching that positioning control unit 13 uses the communication control unit 11 to acquire GPS satellite information via the mobile communication network. *Id*. In light of these teachings, Mr. Andrews testifies that "Sakamoto teaches a 'transceiver circuitry' that receives at least a portion of a receive communication signal via a transceiver and across a mobile communications network." Ex. 1003 ¶ 157.

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that Sakamoto's system receives communication signals from GPS satellites and from a wireless communication network via a transceiver. *See supra* Section II.D.3.a.1.ii; *see also, e.g.*, Ex. 1004 ¶¶ 19, 21, 22. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claims 14 and 24 would have been obvious over the combination of Sakamoto and Levi.

E. Alleged Obviousness of Claims 4–6 Over Sakamoto, Levi, and Vaganov

Petitioner contends that claims 4–6 would have been obvious over the combination of Sakamoto, Levi, and Vaganov. Pet. 53–57. To support its contentions, Petitioner provides explanations as to how Sakamoto, Levi, and Vaganov teach each claim limitation and why there is a motivation to combine the references. *Id*. Petitioner also relies upon the Andrews Declaration (Ex. 1003) and the Supplemental Andrews Declaration (Ex. 1080) to support its positions. Patent Owner does not present any arguments specific to this ground. *See generally* PO Resp.

We begin our discussion with a brief summary of Vaganov, and then address the evidence and arguments presented.

1. Vaganov (Ex. 1008)

Vaganov is directed to a three-dimensional accelerometer for measuring three components of an inertial force (or acceleration) vector with respect to an orthogonal coordinate system. Ex. 1008, code (57), ¶ 20. Vaganov's accelerometer can be used in hand-held devices. *Id*. ¶ 39. Vaganov also discloses a power management circuit for the accelerometer that reduces power consumption, which is beneficial when the accelerometer is used in portable devices. *Id*. ¶ 40.

2. Analysis

Claim 4 depends from claim 1 and additionally recites: "wherein the accelerometer comprises a multi-beam structure having at least one beam of the multi-beam structure comprising a directional orientation substantially orthogonal to at least one other beam of the multi-beam structure." Ex. 1001, 10:44–48.

Petitioner asserts that Vaganov teaches a three-axis accelerometer that measures three components of inertial force (or acceleration) in a three dimensional orthogonal coordinate system comprising three orthogonal axes. Pet. 53–54 (citing Ex. 1008, code (57), ¶¶ 20, 26, 40, 150). Petitioner contends that Vaganov discloses the use of a multi-beam structure, with beams having directional orientations substantially orthogonal to other beams. *Id*. at 54–55 (citing Ex. 1008, code (57), 20, 26, Fig. 6; Ex. 1003 ¶ 169).

Petitioner argues that Sakamoto and Vaganov are analogous art to the '618 patent, with Vaganov disclosing the use of an accelerometer for use in portable electronic devices, which is similar to that disclosed in the '618 patent, so Vaganov is from the same field of endeavor and is pertinent to a problem solved by the patent. Pet. 11, 55. Petitioner asserts that a person of ordinary skill in the art would have looked to other references describing accelerometers for use in small portable device to perform the functions described by Levi. *Id*. (citing Ex. 1003 ¶ 170). Petitioner asserts that Vaganov discloses power management circuitry to reduce power consumption, and Mr. Andrews testifies that a person of ordinary skill in the art would have "seen the value of the power conservation called out by Vaganov in a portable electronic device that is seeking to maximize battery life." Pet. 55 (citing Ex. 1008 ¶ 40; Ex. 1003 ¶ 170). Mr. Andrews also testifies that one of ordinary skill would have had a reasonable expectation of success with the combination because employing Vaganov's accelerometer as Levi's accelerometer would have been a simple substitution. Ex. 1003 ¶ 170.

Claims 5 and 6 depend from claim 4. Claim 5 further recites that the multi-beam structure measures differential displacement accelerations to compute differential location coordinates information. *See* Ex. 1001, 10:49–56. Claim 6 further recites that the multi-beam structure measures differential displacement accelerations. *Id*. at 10:57–64. For both claims, Petitioner relies on Vaganov's disclosure that "the location of the stress-sensitive sensors on the accelerometer's suspension is chosen such that 'all three components of acceleration vector can be determined using signals from at least three sensors.'" Pet. 56 (quoting Ex. 1008 ¶ 31). Petitioner asserts that a person of ordinary skill in the art would have understood that "Vaganov teaches an accelerometer that measures differential displacement accelerations in the x, y, and z orientation directions to compute differential location coordinates information, when used as an accelerometer for dead reckoning, as taught by Levi." *Id*. (citing Ex. 1003 ¶ 171).

We have reviewed the evidence and argument presented and, on the full trial record, we find that Petitioner has provided persuasive evidence that the combination of Sakamoto, Levi, and Vaganov teaches the limitations of claims 4–6. Additionally, we determine that Petitioner has provided persuasive evidence of the rationale to combine the prior art.

Accordingly, Petitioner has established by a preponderance of the evidence that claims 4–6 would have been obvious over the combination of Sakamoto, Levi, and Vaganov.

F. Alleged Obviousness of Claims 7, 12, 13, 17, 22, and 23 Over Sakamoto, Levi, and Cervinka

Petitioner contends that claims 7, 12, 13, 17, 22, and 23 would have been obvious over the combination of Sakamoto, Levi, and Cervinka. Pet. 57–65. To support its contentions, Petitioner provides explanations as to how Sakamoto, Levi, and Cervinka teach each claim limitation and why there is a motivation to combine the references. *Id*. Petitioner also relies upon the Andrews Declaration (Ex. 1003) and the Supplemental Andrews Declaration (Ex. 1080) to support its positions. Patent Owner does not present any arguments specific to this ground. *See generally* PO Resp.

We begin our discussion with a brief summary of Cervinka, and then address the evidence and arguments presented.

1. Cervinka (Ex. 1009)

Cervinka is directed to a system for protecting cargo that includes a tracking device for inclusion with cargo, which has a communication module and a dead reckoning module, with the communication module configured to communicate with a central server. Ex. 1009, 1:44–51. The cargo tracking device periodically receives position data from a GPS network. *Id*. at 6:44–65. If the tracking device detects that it is no longer receiving GPS position data, it starts data acquisition from dead reckoning sensors by energizing the sensors, which send data that is stored. *Id*. at 7:1–7.

2. Analysis

a. Claims 7 and 17

Claim 7 depends from claim 1 and further recites:

> wherein the displacements are transmitted to a monitoring station to determine current location coordinate information of the portable electronic tracking device based in part on the displacements and at least one of last known location coordinates of the portable electronic tracking device, last known location coordinates of another electronic tracking device, and landmark location coordinates.

Ex. 1001, 10:65–8:5. Claim 17 depends from claim 15 and recites a similar limitation. *Id.* at 12:12–19.

Petitioner asserts that because Cervinka, like the ’618 patent, is directed to tracking and monitoring of objects, Cervinka is in the same field of endeavor and is pertinent to the problem to be solved by the claimed invention of the ’618 patent, and thus is analogous art. Pet. 10–11. Petitioner contends that a person of ordinary skill in the art would have been motivated to combine the teachings of Cervinka with Sakamoto’s GPS positioning system. *Id*. at 59. Petitioner argues that Cervinka describes the benefits of sending accelerometer data to a central monitoring system, i.e., a central server, such as increased processing power and improved accuracy. *Id*. (citing Ex. 1009, 9:33–50). Because Sakamoto recognizes the possibility of a terminal losing battery power, Petitioner asserts that sending accelerometer measurements to the server, as taught in Cervinka, would assist in reducing terminal power consumption. *Id*. (citing Ex. 1004 ¶¶ 28, 39; Ex. 1003 ¶ 176). Petitioner contends that the proposed modification of Sakamoto with Cervinka’s remote monitoring station would have been straightforward with a reasonable expectation of success given the similarities in architecture and Sakamoto's contemplation of the local terminal sending information. *Id*. at 59–60 (citing Ex. 1003 ¶¶ 174–176).

Petitioner asserts that Cervinka teaches the use of dead reckoning including position determination using last known coordinates. Pet. 57–58 (citing Ex. 1009, 1:57–62, 3:53–4:1, 7:1–9, 7:50–55, Fig. 3; Ex. 1003 ¶¶ 174–175). Petitioner argues that Cervinka teaches that displacements data is transmitted to a central server (a monitoring station) for processing to determine a current location of the tracking device when GPS data is unavailable, which discloses the limitations of claims 7 and 17. *Id*. at 58 (citing Ex. 1009, 7:21–30, 7:48–55, Fig. 6).

We have reviewed the evidence and argument presented and, on the full trial record, we find that Petitioner has provided persuasive evidence that the combination of Sakamoto, Levi, and Cervinka teaches the limitations of claims 7 and 17. Additionally, we determine that Petitioner has provided persuasive evidence of the rationale to combine the prior art.

Accordingly, Petitioner has established by a preponderance of the evidence that claims 7 and 10 would have been obvious over the combination of Sakamoto, Levi, and Cervinka.

b. Claims 12 and 22

Claim 12 depends from claim 9 and further recites: "wherein the battery power monitor is configured to deactivate the accelerometer circuitry when the at least one portion of the receive communication signal is above the predefined level." Ex. 1001, 11:21–24. Claim 22 depends from claim 15 and recites a similar limitation. *Id.* at 12:32–34.

Petitioner refers to Cervinka's disclosure of "energiz[ing]" the dead reckoning module, including an accelerometer, and "starting" dead reckoning acquisition when the tracking device no longer receives GPS position data. Pet. 60–61 (quoting Ex. 1009, 7:1–9, 7:18–20; citing *id.* at Figs. 3, 6 (step 114)). Mr. Andrews testifies that "[a person of ordinary skill] would not expect the device . . . to energize the accelerometer and *never* de-energize it – and the natural, straightforward situation in which the accelerometer should be de-energized would have been the opposite of the situation it was energized – i.e., when it becomes less necessary because GPS signals are again reliably available." Ex. 1003 ¶ 178; *see also* Ex. 1009, 7:20–21 (stating that dead reckoning data is erased if GPS reception resumes). Mr. Andrews further testifies that a person of ordinary skill in the art would have found it obvious to deactivate Cervinka's accelerometer when the GPS signal is above a certain level. Ex. 1003 ¶ 178. Petitioner refers to Sakamoto's disclosure of setting thresholds for deactivating the GPS receiver in response to a satellite signal level when the signal level is below a predetermined threshold value. Pet. 61 (citing Ex. 1004 ¶¶ 27, 38). Mr. Andrews testifies that a person of ordinary skill in the art would have expected an inverse behavior is performed, i.e., de-energizing the accelerometer when GPS signals again rise, and further, in view of Cervinka, a person of skill would have found it obvious to modify the device taught by Sakamoto to deactivate its accelerometer when the GPS satellite signal is above a predetermined threshold value. Ex. 1003 ¶ 178.

We have reviewed the evidence and argument presented and, on the full trial record, we find that Petitioner has provided persuasive evidence that the combination of Sakamoto, Levi, and Cervinka teaches the limitations of claims 12 and 22. Additionally, we determine that Petitioner has provided persuasive evidence of the rationale to combine the prior art.

Accordingly, Petitioner has established by a preponderance of the evidence that claims 12 and 22 would have been obvious over the combination of Sakamoto, Levi, and Cervinka.

c. Claims 13 and 23

Claim 13 depends from claim 9 and further recites: "wherein the battery power monitor is configured to activate the accelerometer circuitry when the at least one portion of the receive communication signal is below the predefined level." Ex. 1001, 11:25–28. Claim 23 depends from claim 15 and recites a similar limitation. *Id.* at 12:35–37.

Petitioner asserts that Cervinka teaches energizing the dead reckoning module, which includes the accelerometer, when the tracking device "no longer receives GPS position data." Pet. 60–61 (citing Ex. 1009, 7:1–9, 7:18–20, Figs. 3, 6 (step 114)). In light of this teaching, Mr. Andrews testifies that it would have been obvious to a person of ordinary skill in the art to program Sakamoto's battery power monitor to activate the accelerometer when the GPS satellite signal is below a predetermined value. Ex. 1003 ¶ 179.

We have reviewed the evidence and argument presented and, on the full trial record, we find that Petitioner has provided persuasive evidence that the combination of Sakamoto, Levi, and Cervinka teaches the limitations of claims 13 and 23. Additionally, we determine that Petitioner has provided persuasive evidence of the rationale to combine the prior art.

Accordingly, Petitioner has established by a preponderance of the evidence that claims 13 and 23 would have been obvious over the combination of Sakamoto, Levi, and Cervinka.

G. Alleged Obviousness of Claim 2 Over Sakamoto, Levi, and Krasner

Petitioner contends that claim 2 would have been obvious over the combination of Sakamoto, Levi, and Krasner. Pet. 65–66. To support its contentions, Petitioner provides explanations as to how Sakamoto, Levi, and Krasner teach each claim limitation and why there is a motivation to combine the references. *Id*. Petitioner also relies upon the Andrews Declaration (Ex. 1003) and the Supplemental Andrews Declaration (Ex. 1080) to support its positions. Patent Owner does not present any arguments specific to this ground. *See generally* PO Resp.

We begin our discussion with a brief summary of Krasner, and then address the evidence and arguments presented.

1. Krasner (Ex. 1010)

Krasner teaches a mobile device including a GPS receiver and a communication system, as depicted in Figure 1, reproduced below. Ex. 1010, 2:29–33.

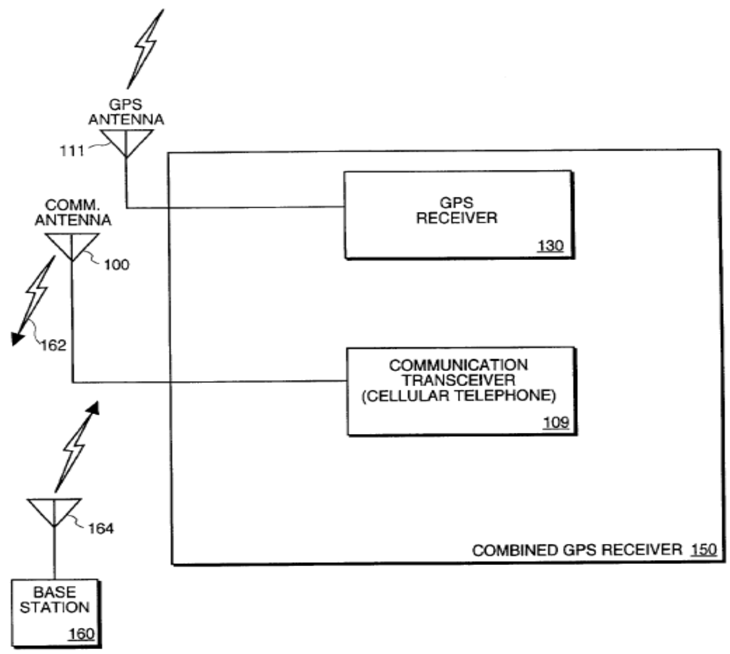

FIG. 1

As shown in Figure 1, above, Krasner's system includes mobile device 150 with GPS receiver 130. Ex. 1010, 3:16–17. Mobile device 150 also includes communication transceiver section 109. *Id.* at 3:31–32. Communication transceiver 109 transmits navigational data processed by GPS receiver 130 to remote base station 160. *Id.* at 3:33–36. Krasner's system determines position information using GPS. *Id.* at 3:5–16, 6:1–9. Krasner's mobile device reduces cross-interference between the communication transceiver and GPS receiver using signal gating. *Id.* at code (57), 6:37–62, 7:10–39.

2. Analysis

Claim 2 recites the device of claim 1, "wherein the at least one portion of the receive communication signal comprises a snapshot of the receive communication signal." Ex. 1001, 10:34–36.

Petitioner asserts that Krasner teaches a mobile device including GPS receiver 130 that "receives GPS signals transmitted from orbiting GPS satellites and determines the times-of-arrival" of the signals. Pet. 65 (citing Ex. 1010, 3:17–30). Petitioner contends that Krasner also teaches that its GPS signal processing circuitry includes a digital snapshot memory coupled to the analog-to-digital (A/D) converter of the GPS signal processing circuitry, which is used to process the GPS signals. *Id*. (citing Ex. 1010, 4:10–34). Mr. Andrews testifies that a person of ordinary skill in the art would have understood from Krasner that that the GPS satellite signal would have included a snapshot of the signal. Ex. 1003 ¶ 183. Mr. Andrews further testifies that "[i]t was well-known to a POSITA to record a snapshot of a receive communication signal for subsequent processing, and (as shown by (*Krasner*) it was known . . . that GPS satellite signals include a 'snapshot.'" *Id.*

Petitioner asserts that because Krasner, like the '618 patent, discloses a portable electronic tracking device including a GPS receiver, it is in the same field of endeavor and is pertinent to a problem to be solved by the claimed invention in the '618 patent. Pet. 11–12. Mr. Andrews further testifies that a person of skill "would have found it obvious that the received GPS satellite signal taught by Sakamoto would have included a 'snapshot' of the receive communication signal per the explanation of Krasner." Ex. 1003 ¶ 184.

We have reviewed the evidence and argument presented and, on the full trial record, we find that Petitioner has provided persuasive evidence that the combination of Sakamoto, Levi, and Krasner teaches the limitations of claim 2. Additionally, we determine that Petitioner has provided persuasive evidence of the rationale to combine the prior art.

Accordingly, Petitioner has established by a preponderance of the evidence that claim 2 would have been obvious over the combination of Sakamoto, Levi, and Krasner.

H. Alleged Obviousness of Claim 8 and 18 Over Sakamoto, Levi, Cervinka, and Krasner

Petitioner contends that claims 8 and 18 would have been obvious over the combination of Sakamoto, Levi, Cervinka, and Krasner. Pet. 66–68. To support its contentions, Petitioner provides explanations as to how Sakamoto, Levi, Cervinka, and Krasner teach each claim limitation and why there is a motivation to combine the references. *Id*. Petitioner also relies upon the Andrews Declaration (Ex. 1003) and the Supplemental Andrews Declaration (Ex. 1080) to support its positions. Patent Owner does not present any arguments specific to this ground. *See generally* PO Resp.

Claim 8 depends from claim 7 and recites "wherein the battery power monitor is configured to deactivate the location tracking circuitry while the displacements are transmitted to the monitoring station." Ex. 1001, 11:6–9. Claim 18 depends from claim 17 and recites a similar limitation. *Id.* at 12:20–22.

Petitioner contends that claims 8 and 18 would have been obvious over the combination of Sakamoto, Levi, Cervinka, and Krasner. Pet. 66–68. Petitioner asserts that Krasner teaches reducing cross-interference between a GPS receiver and a cellular transceiver by performing signal gating to power up/down a GPS receiver based on the cellular transceiver transmission status. *Id*. at 66 (citing Ex. 1010, 6:37–62). Petitioner argues that a person of ordinary skill in the art "would have found it obvious and been motivated to combine Krasner's gating functionality to reduce cross-interference between cellular transceivers and GPS receivers with Sakamoto's GPS positioning system." *Id*. at 67 (citing Ex. 1003 ¶¶ 185–186).

We have reviewed the evidence and argument presented and, on the full trial record, we find that Petitioner has provided persuasive evidence that the combination of Sakamoto, Levi, Cervinka, and Krasner teaches the limitations of claims 8 and 18. Additionally, we determine that Petitioner has provided persuasive evidence of the rationale to combine the prior art.

Accordingly, Petitioner has established by a preponderance of the evidence that claims 8 and 18 would have been obvious over the combination of Sakamoto, Levi, Cervinka, and Krasner.

III. CONTINGENT MOTION TO AMEND

On a contingent basis, Patent Owner filed a Motion to Amend to substitute original claims 1–24 and with proposed substitute claims 25–48. Mot. 1–2. We have determined that original claims 1–24 of the '618 patent have been shown to be unpatentable by a preponderance of the evidence. Accordingly, we proceed to address Patent Owner's Motion to Amend.

Although the proposed substitute claims must meet the requirements of 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121, Petitioner "bears the burden of persuasion to show, by a preponderance of the evidence, that any proposed substitute claims are unpatentable." 35 U.S.C. § 316(d); 37 C.F.R. § 42.121(d)(2); *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4 (PTAB Feb. 25, 2019) (precedential) (citing *Aqua Prods. Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017); *Bosch Auto. Serv. Sols. LLC v. Iancu*, 878 F.3d 1027 (Fed. Cir. 2017)).

Before considering the patentability of any substitute claims, we first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. Patent Owner is required to show that: (1) the amendment responds to a ground of unpatentability involved in the trial; (2) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter; (3) the amendment proposes a reasonable number of substitute claims; and (4) the proposed claims are supported in the original disclosure. 37 C.F.R. § 42.121(d)(1); *Lectrosonics*, Paper 15.

Proposed substitute claims 25 and 39, which are illustrative of the proposed substitute claims, are reproduced below with underlining to indicate added text.

> 25. A portable electronic tracking device to monitor location coordinates of one or more individuals or objects, the device comprising:
>
> > transceiver circuitry to receive at least one portion of a receive communication signal comprising location coordinates information;
> >
> > accelerometer circuitry to measure displacements of the portable electronic tracking device;
> >
> > a battery power monitor configured to selectively activate and deactivate at least one portion of the transceiver circuitry and location tracking circuitry to conserve battery power in response to a signal level of the at least one portion of the receive communication signal, <u>wherein the at least one portion of the transceiver circuitry and the location tracking circuitry is deactivated by placing the at least one portion of the transceiver circuitry and the location tracking circuitry in a low power mode in which the at least one portion of the transceiver circuitry and the location tracking circuitry consumes at least reduced power</u>; and

processor circuitry configured to process the at least one portion of the receive communication signal.

39. A method to monitor location coordinates of one or more individuals or objects, the method comprising:

receiving at transceiver circuitry of a portable electronic tracking device at least one portion of a receive communication signal comprising location coordinates information;

measuring displacements of the portable electronic tracking device;

activating and deactivating at least one portion of the transceiver circuitry and location tracking circuitry to conserve battery power in response to a signal level of the at least one portion of the receive communication signal, wherein the at least one portion of the transceiver circuitry and the location tracking circuitry is deactivated by placing the at least one portion of the transceiver circuitry and the location tracking circuitry in a low power mode in which the at least one portion of the transceiver circuitry and the location tracking circuitry consumes at least reduced power; and

processing the at least one portion of the receive communication signal using processor circuitry.

Mot. 26–27, 30–31 (Claims Appendix).

A. Requirements Under 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121

Patent Owner asserts that its motion to amend proposes a reasonable number of substitute claims, is not broadening, and is responsive to the grounds of unpatentability involved in the proceeding. Mot. 2–4. Patent Owner proposes a single substitute claim for each challenged claim (i.e., one-for-one), and, therefore, meets the requirement for a reasonable number of proposed substitute claims. *See* 37 C.F.R. § 42.121(a)(3); *see also* *Lectrosonics*, Paper 15 at 4 ("There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim.”). Patent Owner also proposes narrowing limitations in direct response to the grounds of unpatentability involved in this proceeding. *See* Mot. 2–3. Petitioner does not dispute Patent Owner’s contentions as to these requirements. *See generally* Pet. Mot. Opp. We determine that Patent Owner has met these statutory and regulatory requirements for a motion to amend.

As to whether the proposed substitute claims are supported in the original disclosure, Patent Owner contends that the original disclosure supports the proposed substitute claims, and in support, Patent Owner includes a table that identifies supporting passages for each proposed limitation of these claims.[12] Mot. 4–18 (citing Ex. 2004). Petitioner

[12] The ’618 patent issued from Application Ser. No. 13/356,599 (“the ’599 application”), which is a division of Application Ser. No. 11/969,905 (“the ’905 application”). Ex. 1001, code (21), (62); *see also* Mot. 4. In its Motion to Amend, Patent Owner cites the published version of the ’905 application—U.S. Pub. No. 2009/0174603 A1 (“the ’603 publication”)—rather than the ’905 application, to show support for the substitute claims. *See* Mot. 4 (citing Ex. 2004). Petitioner’s Opposition similarly cites to the ’603 publication. *See* Pet. Mot. Opp. 1–2. In our Preliminary Guidance on the Motion to Amend, we noted that Patent Owner was required to cite the ’905 application, as well as the ’599 application. Paper 28, 4 (citing *Lectrosonics* for the requirement that a motion to amend must set forth written description support in the originally filed disclosure of the subject patent). In its Reply, Patent Owner correctly refers to the ’905 application. *See* PO Mot. Reply 1–3 (citing Ex. 2015). Herein, we refer to the disclosures of the ’905 application, except when we refer to the cites from the Motion to Amend and Petitioner’s Opposition, which reference the ’603 publication. We note that the content of the ’603 publication is substantially similar to the ’905 application and Petitioner does not assert that there are any differences between the publication and the original application that

disputes whether Patent Owner has identified adequate written description in the original disclosure to support the "battery power monitor" recited in substitute claim 25 and the dependent claims therefrom, *i.e.*, proposed substitute claims 26–38, which are limitations recited in original claims 1–14, respectively. Pet. Mot. Opp. 1–2. More specifically, Petitioner contends that one of the paragraphs identified by Patent Owner states that battery level monitor 116 detects a battery level, but it does not disclose battery level monitor 116 as performing any of the claimed functions. *Id*. at 2 (citing Ex. 2004 ¶ 29). Petitioner further contends that the other cited paragraphs merely describe certain elements being placed in "a sleep or standby mode or low power mode," but they do not disclose that it is the battery monitor that places the components in any of the modes. *Id*. (citing Ex. 2004 ¶¶ 31, 32, 36).

We are persuaded that Patent Owner has shown that proposed substitute claims 25–38 do not add new matter. The '905 application states that "[b]attery level detection circuitry (e.g., battery level monitor 116) detects a battery level of battery 118." Ex. 2015, 9:9–10; *accord* Ex. 2004 ¶ 29. In addition, it states that, "[i]n response to measured signal strength level, a power management circuitry (e.g., battery monitor) controls power levels associated with [a] tracking device to reduce or increase power consumption of transceiver and its associated circuitry." Ex. 2015, 4:30–5:2; *accord* Ex. 2004 ¶ 14. This disclosure provides support that a battery monitor controls power levels associated with a tracking device to reduce or increase power consumption of a transceiver and its associated circuitry,

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affect consideration of the merits. As such, we determine the earlier citations to the '603 publication are harmless error.

which is sufficient disclosure to support the battery power monitor limitation of claim 25. Thus, we do not agree with Petitioner's argument that the battery power monitor limitation lacks written description support.

Accordingly, we determine that Patent Owner has shown that the original disclosure of the '618 patent supports the limitations recited in proposed substitute claims 25–38. Moreover, after considering the written support identified by Patent Owner, we also determine that the original disclosure of the '618 patent supports the limitations recited in proposed substitute claims 39–48.

We next analyze whether Petitioner shows that proposed substitute claims 25–48 are unpatentable by a preponderance of the evidence based on the entirety of the record.

B. Challenge to Proposed Substitute Claims Under § 35 U.S.C. § 112, First Paragraph

As described in *supra* Section III.A, Petitioner contends proposed substitute claims 25–38 fail to comply with the written description requirement. Pet. Mot. Opp. 1–3. For the reasons previously discussed, we determine that the '905 application sets forth sufficient written description support for the proposed substitute claims under 35 U.S.C. § 112, first paragraph.

C. Challenges to the Proposed Substitute Claims under § 103

Patent Owner and Petitioner address the patentability of proposed substitute claims 25–48 on the following grounds:

Claim(s)	35 U.S.C. §	References/Basis
25, 27, 33–35, 38–40, 43–45, 48	103(a)	Sakamoto, Levi, Gronemeyer[13]
28–30	103(a)	Sakamoto, Levi, Vaganov, Gronemeyer
31, 36, 37, 41, 46, 47	103(a)	Sakamoto, Levi, Cervinka, Gronemeyer
26	103(a)	Sakamoto, Levi, Krasner, Gronemeyer
32, 42	103(a)	Sakamoto, Levi, Cervinka, Krasner, Gronemeyer
25, 27, 33–35, 38–40, 43–45, 48	103(a)	Sakamoto, Levi, Alberth[14]
28–30	103(a)	Sakamoto, Levi, Vaganov, Alberth
31, 36, 37, 41, 46, 47	103(a)	Sakamoto, Levi, Cervinka, Alberth
26	103(a)	Sakamoto, Levi, Krasner, Alberth
32, 42	103(a)	Sakamoto, Levi, Cervinka, Krasner, Alberth

Pet. Mot. Opp. 5–23; PO Mot. Reply 4–10.

We address the patentability of the proposed substitute claims below in view of these challenges.

1. Claim Construction

Patent Owner asserts that the added limitations of proposed substitute claims 25 and 39, "require[] that the at least one portion of the transceiver circuitry and the location tracking circuitry continues to consume power while in a low power mode." Mot. 19. Patent Owner further contends that

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[13] U.S. Patent 6,985,811 B2, filed June 20, 2003, issued January 10, 2006. Ex. 1077.
[14] U.S. Patent 6,438,381 B1, filed June 8, 2000, issued August 20, 2002. Ex. 1076.

"although the at least one portion of the transceiver circuitry and the location tracking circuitry is deactivated, power is not eliminated and the at least one portion of the transceiver circuitry and the location tracking circuitry is not shut off." *Id*. Patent Owner argues that this claim interpretation is consistent with the language of the claims (*id*.) and is supported by the written description of the '905 application (PO Mot. Reply 2–3).

Petitioner contends that "[t]he plain and ordinary meaning of the amended claims requires deactivating the at least one portion of the transceiver circuitry and the location tracking circuitry by placing them in a low power mode consuming at least reduced power." Pet. Mot. Opp. 2. Petitioner argues that Patent Owner's proposed construction imports negative limitations, that is, the limitations that the power "is not shut off" or "not eliminated." *Id*.

As discussed further below, we need not expressly construe the claim terms related to power consumption because the challenged claims are unpatentable over the asserted prior art, even under Patent Owner's proposed construction. *See Nidec Motor Corp.*, 868 F.3d at 1017; *Vivid Techs.,* 200 F.3d at 803.

2. Patentability of Proposed Substitute Claims 25, 27, 33–35, 38–40, 43–45, and 48 in View of Challenge Based on Sakamoto, Levi, and Gronemeyer

The parties address whether the combined disclosures of Sakamoto, Levi, and Gronemeyer render proposed substitute claims 25, 27, 33–35, 38–40, 43–45, and 48 obvious. Pet. Mot. Opp. 17–20; PO Mot. Reply 7–10; Pet. Mot. Sur-reply 7–12.

Gronemeyer describes a low power real time clock (RTC) operated continuously in a GPS receiver unit while some receiver components are powered down. Ex. 1077, code (57). More specifically, power is conserved in the GPS receiver unit by shutting down selected components, including a GPS oscillator, during periods when the GPS receiver unit is not actively acquiring satellite information used to calculate its location. *Id.* at 6:41–45.

As explained above, Petitioner has shown by a preponderance of the evidence that the combination of Sakamoto and Levi teaches each limitation of claims 1, 3, 9–11, 14–16, 19–21, and 24. *See supra* Section II.D. For the same reasons provided there, we find the combination of Sakamoto and Levi teaches the limitations of proposed substitute claims 25, 27, 33–35, 38–40, 43–45, and 48 that are identical to those of claims 1, 3, 9–11, 14–16, 19–21, and 24. We focus on the amendments in proposed substitute claim 25, with claim 39 having a similar amendment. In particular, proposed substitute claim 25 recites "wherein the at least one portion of the transceiver circuitry and the location tracking circuitry is deactivated by placing the at least one portion of the transceiver circuitry and the location tracking circuitry in a low power mode in which the at least one portion of the transceiver circuitry and the location tracking circuitry consumes at least reduced power." Mot. 26 (Claims Appendix).

Petitioner argues that the combination of Sakamoto, Levi, and Gronemeyer teaches all limitations of proposed substitute claim 25. Pet. Mot. Opp. 17–20. More specifically, Petitioner asserts that Gronemeyer discloses conserving power in a GPS receiver unit by shutting down select components "during periods when the GPS receiver unit is not actively acquiring satellite information used to calculate the location of the GPS receiver unit." *Id*. at 17 (citing Ex. 1077, 6:41–45, 5:11–14, 14:13–23). Petitioner refers to Gronemeyer's disclosure that "powering down these components is very desirable in a portable GPS receiver unit to conserve power resources." *Id*. (citing Ex. 1077, 4:1–5, 4:66–5:3, 14:16–21).

Petitioner contends that Gronemeyer discloses that the GPS receiver unit consumes at least reduced power in the low power mode because the low power time keeping ("LPTK") circuit 200 "remains on" and consumes power, even when "[s]elected components residing on the GPS receiver unit" are "shut down (deactivated) to conserve power" during Gronemeyer's sleep mode. Pet. Mot. Opp. 18 (citing Ex. 1077, 7:8–11, 14:13–23, Figs. 3, 4). Petitioner contends that the LPTK circuit in Gronemeyer includes K32 oscillator 302 that "resid[es] in a low power time keeping circuit [and] accurately preserves GPS time when the selected components are shut off." *Id*. (citing Ex. 1077, 5:14–17, 6:45–48, 12:9–13). Mr. Andrews provides supporting testimony that, even during Gronemeyer's sleep mode, "the low power components of low power time keeping circuit 200 remain on" and "'low power' components that operate continuously consume at least some power continuously." Ex. 1080 ¶¶ 32–33.

Petitioner additionally contends a person of ordinary skill in the art would have been motivated to modify the Sakamoto-Levi combination to include a portion of Gronemeyer's components, that is, low power clock 306 and oscillator 302, that would remain powered in a low power mode. Pet. Mot. Opp. 19–20. Specifically, Petitioner contends that a person of ordinary skill in the art would have been motivated to make such a modification to achieve the advantages expressly taught by Gronemeyer, including saving power and more quickly reacquiring GPS satellite signals. *Id*. (citing Ex. 1077, 3:25–28, 14:3–12, 14:45–48). Mr. Andrews testifies that a person of ordinary skill in the art "would have recognized that Gronemeyer teaches advantages over conventional systems that do not maintain the accuracy of various clocking signals because said conventional systems power down components that consume significant power, including a GPS oscillator and associated timing system." Ex. 1080 ¶ 37. Mr. Andrews testifies that a person of ordinary skill "would have been motivated to include Gronemeyer's low power time keeping circuit (including low power clock 306 and K32 oscillator 302) in the modified Sakamoto system" in order to save battery power and for faster signal acquisition by avoiding cold starts. *Id.* ¶ 38. Mr. Andrews further testifies that a person of ordinary skill in the art "would have understood that a combination with Gronemeyer would have advantageously allowed Sakamoto's at least one portion of the electronic tracking device, including GPS receiver 10, to consume reduced power in a low power mode, such as the stop-position search mode, thus saving battery resources in a mobile device with a limited power supply as taught by Gronemeyer." *Id.* Mr. Andrews additionally testifies that a person of ordinary skill in the art would have understood that there would have been a reasonable expectation of success in the combination because Sakamoto and Gronemeyer teach similar portable devices with a GPS receivers and combining components would have been within the skillset of a person of ordinary skill for implementation. *Id.* ¶ 39.

We agree with Petitioner that the combination of Sakamoto, Levi, and Gronemeyer discloses deactivating a portion of the electronic tracking device to place it in a low power mode with that portion (specifically, the low power clock and K32 oscillator in the LPTK circuit) continuing to consume power. Further, Petitioner provides persuasive evidence that one of ordinary skill in the art would have been motivated to modify the Sakamoto–Levi combination to include Gronemeyer's low power operation.

Patent Owner asserts that "Petitioner does not, and cannot, assert that Gronemeyer's oscillator 302 and low power clock 306 are the at least one portion of GPS receiver 100 that is 'deactivated by placing the at least one portion in a low power mode in which the at least one portion of the transceiver circuitry and the location tracking circuitry in a low power mode in which the at least one portion of the transceiver circuitry and the location tracking circuitry consumes at least reduced power' as recited." PO Mot. Reply 7–8. Patent Owner argues that, although Gronemeyer discloses that GPS circuitry, that is, its GPS receiver, is powered off, a distinct time circuit, which is a separate portion of the GPS receiver, is utilized to maintain GPS time. *Id*. at 8 (citing Ex. 1077, 6:36–48, Figs. 3, 4). More specifically, Patent Owner asserts that "[a]lthough the GPS oscillator and K32 oscillator are both located in a GPS receiving unit, the K32 oscillator is not part of the GPS circuitry." *Id*. Patent Owner contends that because Gronemeyer discloses that "[a] K32 . . . oscillator residing in a low power time keeping circuit accurately preserves GPS time when the selected components are shut off," "Gronemeyer clearly discloses that the deactivated portion (i.e., GPS circuitry) is 'shut off.'" *Id*. at 8–9 (citing Ex. 1077, 5:13–16, 6:45–48). Patent Owner asserts that "Gronemeyer discloses that GPS circuitry, of which the K32 oscillator is not a portion, is deactivated," so "Gronemeyer also does not disclose that at least one portion that consumes at least reduced power is a portion of the transceiver circuitry and the primary location tracking circuitry." *Id*. at 9 (citing See Ex. 1077, 5:13–16, 6:36–48, 14:13–16, Figs. 3, 4) . Patent Owner further asserts that

Petitioner relies solely on Gronemeyer for disclosing the claim limitation. *Id*.

We do not agree with Patent Owner's arguments. As an initial matter, although Patent Owner argues that the K32 oscillator is not part of the GPS circuitry, Patent Owner does not explain why that is so. As shown in Petitioner's annotated Figures 3 and 4, reproduced below, LPTK circuit 200 includes K32 oscillator 302 and is depicted to be part of GPS receiver unit 100 (transceiver and location tracking circuitry).

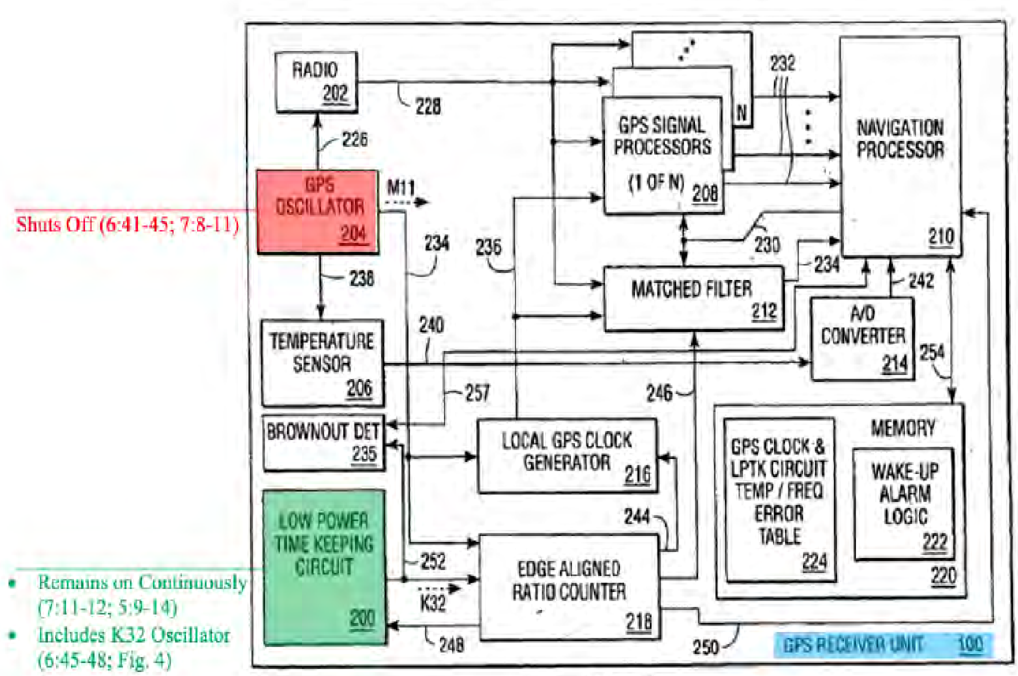
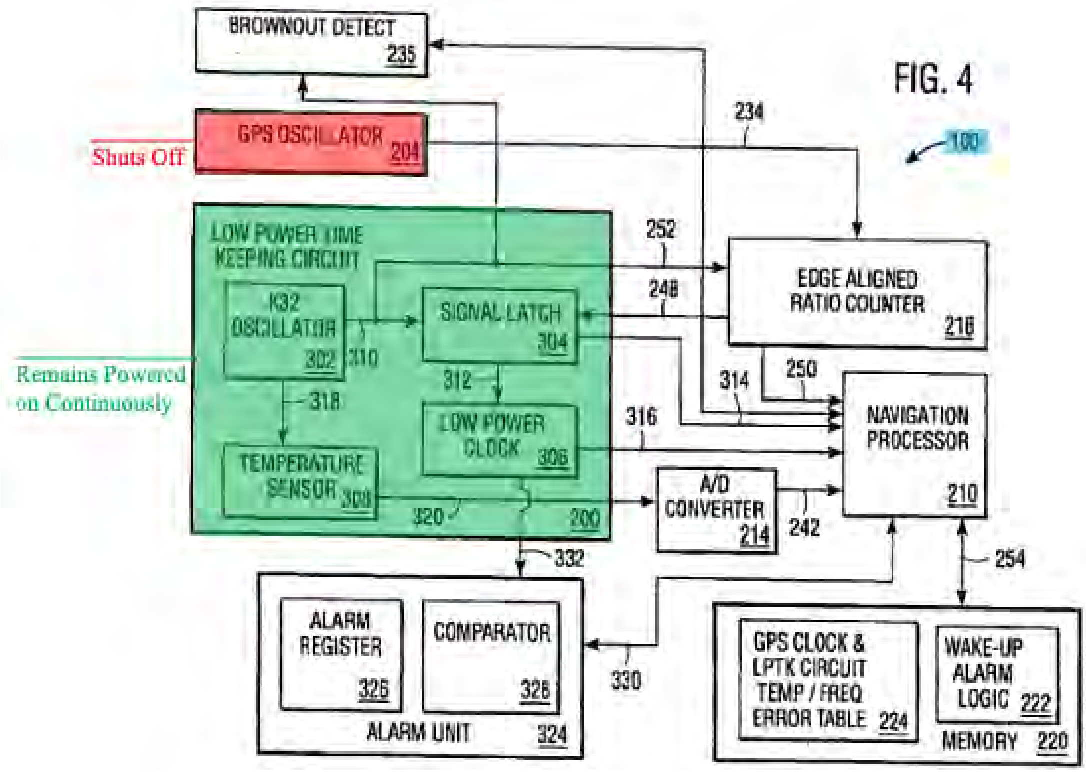


FIG. 3



Referring to Petitioner's annotated Figures 3 and 4 of Gronemeyer, above, Petitioner contends, and we agree, that GPS receiver unit 100 includes LPTK circuit 200, which includes K32 oscillator 302. Pet. Mot. Sur-reply 9. Further, Gronemeyer explicitly discloses that "selected components of the GPS receiver unit 100, includ[e] a low power time keeping circuit 200." Ex. 1077, 8:3–5.

We also do not agree with Patent Owner's argument that Petitioner relies solely on Gronemeyer for disclosing the claim limitation "at least one portion of the electronic tracking device is deactivated by placing the at least one portion in a low power mode in which the at least one portion consumes at least reduced power." Instead, Petitioner contends, and Mr. Andrews testifies, that a person of ordinary skill in the art would have been motivated to modify Sakamoto's GPS receiver to include Gronemeyer's LPTK circuit (including low power clock 306 and K32 oscillator 302). Pet. Mot. Opp.

19–20; Ex. 1080 ¶¶ 37–38. Mr. Andrews additionally testifies that Gronemeyer's LPTK circuit advantageously would have been included to save battery power and to allow for faster signal reacquisition in a low power mode, such as the stop-position search mode. Ex. 1080 ¶ 37. Accordingly, we agree that the combination of Sakamoto, Levi, and Gronemeyer teaches that when the GPS receiver is placed in the stop-position mode with position searching stopped (deactivated), a portion of the transceiver circuity and the location tracking circuitry would be in a low power mode, with the LPTK circuit continuing to consume reduced power. Thus, we determine that Petitioner's proposed combination of Sakamoto, Levi, and Gronemeyer teaches the amended limitation in proposed substitute claims 25 and 39, even under Patent Owner's proposed construction, that is, "at least one portion of the transceiver circuitry and the location tracking circuitry continues to consume power while in a low power mode." Mot. 19.

Also, we note that Patent Owner's arguments appear to try to draw a distinction between the components of GPS receiver unit 100 and "GPS circuitry." *See* PO Mot. Reply 8. Patent Owner does not provide a basis for any alleged distinction. Further, we agree with Petitioner that the only reference to "GPS circuitry" in Gronemeyer indicates that that GPS units continuously power on some components (e.g., a clock), while others are powered down. Pet. Mot. Sur-reply 11 (citing Ex. 1077, 3:54–56 ("Typically, a conventional real time clock (RTC) circuit may be used to maintain rough GPS time while the rest of the GPS circuitry is off.")). Additionally, Patent Owner only presents attorney argument in support of its interpretation of Gronemeyer's disclosures, and this argument does not undermine Petitioner's persuasive showing based on the evidence described above.

We have analyzed all other aspects of proposed substitute claims 25 and 39 above with respect to original claims 1 and 15. *See supra* § II.D.3.a, b. Thus, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 25 and 39 would have been obvious over the combination of Sakamoto, Levi, and Gronemeyer.

Patent Owner presents no arguments specific to Petitioner's assertions directed to proposed substitute claims 27, 33–35, 38, 40, 43–45, and 48. *See generally* PO Mot. Reply. These proposed substitute claims depend from either proposed substitute claims 25 or 39 and are the same as the original parallel claims, except that the claim dependencies have been updated. We have analyzed all limitations of proposed substitute claims 27, 33–35, 38, 40, 43–45, and 48 above. *See supra* § II.D.3.c. Thus, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 27, 33–35, 38, 40, 43–45, and 48 would have been obvious over the combination of Sakamoto, Levi, and Gronemeyer.

3. Patentability of Proposed Substitute Claims 26, 28–32, 36, 37, 41, 42, 46, and 47 in View of Challenge Based on Sakamoto, Levi, Gronemeyer, with Additional Prior Art

Petitioner contends that: (1) proposed substitute claims 28–30 would have been obvious over the combination of Sakamoto, Levi, Vaganov, and Gronemeyer; (2) proposed substitute claims 31, 36, 37, 41, 46, and 47 would have been obvious over the combination of Sakamoto, Levi, Cervinka, and Gronemeyer; (3) proposed substitute claim 26 would have been obvious over the combination of Sakamoto, Levi, Krasner, and Gronemeyer; and (4) proposed substitute claims 32 and 42 would have been obvious over the combination of Sakamoto, Levi, Cervinka, Krasner, and Gronemeyer. Pet. Mot. Opp. 22–23. These proposed substitute claims depend from either proposed substitute claims 25 or 39 and are the same as the original parallel claims (claims 2, 4–8, 12, 13, 17, 18, 22, and 23), except that the claim dependencies have been updated. We have analyzed all the limitations of proposed substitute claims 26, 28–32, 36, 37, 41, 42, 46, and 47 above. *See supra* § II.D–H. For the same reasons provided for claims 2, 4–8, 12, 13, 17, 18, 22, and 23, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 26, 28–32, 36, 37, 41, 42, 46, and 47 would have been obvious over the combination of Sakamoto, Levi, and Gronemeyer in combination with other asserted prior art as noted.

4. Patentability of Proposed Substitute Claims 25–48 in View of Challenges Based on Sakamoto, Levi, and Alberth, with or without Additional Prior Art

Because we have determined that substitute claims 25–48 would have been unpatentable in view of the combinations of Sakamoto, Levi, and Gronemeyer, we need not reach Petitioner's other grounds for unpatentability of these proposed substitute claims. *Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App'x 984, 990 (Fed. Cir. 2020) (nonprecedential) (stating that the "Board need not address issues that are not necessary to the resolution of the proceeding," such as "alternative arguments with respect to claims [the Board] found unpatentable on other grounds").

IV. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has shown by a preponderance of the evidence that claims 1–24 of the ’618 patent are unpatentable. The Motion to Amend is denied as to proposed substitute claims 29–48. In summary:

Claim(s)	35 U.S.C. §	References/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 3, 9–11, 14–16, 19–21, 24	103(a)	Sakamoto, Levi	1, 3, 9–11, 14–16, 19–21, 24	
4–6	103(a)	Sakamoto, Levi, Vaganov	4–6	
7, 12, 13, 17, 22, 23	103(a)	Sakamoto, Levi, Cervinka	7, 12, 13, 17, 22, 23	
2	103(a)	Sakamoto, Levi, Krasner	2	
8, 18	103(a)	Sakamoto, Levi, Cervinka, Krasner	8, 18	
Overall Outcome			1–24	

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	29–48
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	29–48
Substitute Claims: Not Reached	

V. ORDER

Accordingly, it is

ORDERED that claims 1–24 of U.S. Patent 8,421,618 B2 have been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Amend is denied as to proposed substitute claims 29–48; and

FURTHER ORDERED that, because this is a Final Written Decision, the parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.[15]

[15] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16654 (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).

FOR PETITIONER:

Jennifer C. Bailey
Adam P. Seitz
ERISE IP, P.A.
Jennifer.bailey@eriseip.com
adam.seitz@eriseip.com

FOR PATENT OWNER:

Shaun D. Gregory
TAFT STETTINIUS & HOLLISTER LLP
sgregory@taftlaw.com

Trials@uspto.gov
Tel: 571-272-7822

Paper 41
Date: March 2, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

LBT IP I LLC,
Patent Owner.

IPR2020-01193
Patent 8,421,619 B2

Before JOHN A. HUDALLA, SHEILA F. McSHANE, and
JULIET MITCHELL DIRBA, *Administrative Patent Judges*.

DIRBA, *Administrative Patent Judge.*

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

On March 4, 2021, we instituted an *inter partes* review of claims 1–20 of U.S. Patent No. 8,421,619 B2 (Ex. 1001, "the '619 patent"). Paper 9 ("Institution Decision" or "Inst. Dec."). Having considered the full record at trial, we determine that challenged claims 1–20 the '619 patent are unpatentable under 35 U.S.C. § 103(a). We also deny Patent Owner's Revised Motion to Amend.

I. BACKGROUND

A. History of this Proceeding

Apple Inc. ("Petitioner") filed a Petition seeking institution of an *inter partes* review of claims 1–20 of the '619 patent (Paper 1 ("Pet.")), and Petitioner submitted a declaration from Mr. Scott Andrews in support (Ex. 1003). LBT IP I LLC ("Patent Owner") filed a Preliminary Response. Paper 8 ("Prelim. Resp."). After reviewing the preliminary record, we determined that Petitioner had demonstrated a reasonable likelihood that it would prevail in establishing the unpatentability of all challenged claims, and we instituted an *inter partes* review of all challenged claims on all grounds asserted in the Petition. Inst. Dec.

During trial, Patent Owner filed a Response (Paper 16, "PO Resp."), Petitioner filed a Reply (Paper 24, "Pet. Reply"), and Patent Owner filed a Sur-reply (Paper 29, "PO Sur-reply").

In addition, Patent Owner filed a contingent Motion to Amend proposing to substitute claims 21–40 for claims 1–20, respectively, if we are to find any original claims unpatentable. Paper 17 ("MTA"). Petitioner filed an Opposition to the Motion to Amend (Paper 25 ("MTA Opp.")), along with a supplemental declaration by Mr. Andrews (Ex. 1077). We then issued Preliminary Guidance on Patent Owner's Motion to Amend (Paper 27 ("PG")), pursuant to Patent Owner's request (*see* MTA 2).

After receiving our Preliminary Guidance, Patent Owner filed a Revised Motion to Amend in which it proposed revised substitute claims 21–40 for claims 1–20, respectively, if we were to find any original claims unpatentable. Paper 30 ("RMTA"). Petitioner opposed Patent Owner's Revised Motion to Amend (Paper 33 ("RMTA Opp.")) and submitted a second supplemental declaration by Mr. Andrews (Ex. 1081). Patent Owner filed a reply (Paper 38 ("RMTA Reply")), and Petitioner filed a sur-reply (Paper 39 ("RMTA Sur-reply")).

An oral hearing in this proceeding was held on January 7, 2022, and a transcript of the hearing is included in the record. Paper 40 ("Tr.").

B. Related Matters

The parties identify a district court proceeding that involves the '619 patent: *LBT IP I LLC v. Apple Inc.*, 1:19-cv-01245 (D. Del.). Pet. 75; Paper 3, 2 (Patent Owner Mandatory Notices).

In addition, Petitioner filed petitions challenging the following four patents, which are related to the '619 patent: (1) U.S. Patent No. 8,497,774 (IPR2020-01189); (2) U.S. Patent No. 8,542,113 (IPR2020-01190); (3) U.S. Patent No. 8,102,256 (IPR2020-01191); and (4) U.S. Patent No. 8,421,618 (IPR2020-01192). *See* Pet. 75. Contemporaneously with this Decision, the Board enters final written decisions in each of those proceedings.

C. The Grounds

We instituted trial on the following grounds of unpatentability:

Claim(s) Challenged	35 U.S.C. §[1]	Reference(s)/Basis
1, 5, 6, 8–11, 15–16, 18–20	103(a)	Miranda-Knapp,[2] Miller[3]
2	103(a)	Miranda-Knapp, Miller, Vaganov[4]
3, 4, 12–14	103(a)	Miranda-Knapp, Miller, Cervinka[5]
7, 17	103(a)	Miranda-Knapp, Miller, Herrero[6]

D. Summary of the '619 Patent

The '619 patent is titled "Apparatus and Method for Determining Location and Tracking Coordinates of a Tracking Device." Ex. 1001, code (54). The '619 patent issued from Application No. 13/356,643 ("the '643 application"), filed on January 23, 2012, which is a divisional of Application No. 11969,905 ("the '905 application"), filed on January 6, 2008. *Id.* at codes (22), (62).

The '619 patent is directed to an apparatus to monitor location coordinates of an electronic tracking device. Ex. 1001, Abst. Figure 1, reproduced below, depicts a schematic of the electronic tracking device.

[1] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), revised 35 U.S.C. §§ 102, 103, 112 effective March 16, 2013. Because the challenged patent was filed before March 16, 2013, we refer to the pre-AIA versions of §§ 102, 103, and 112.

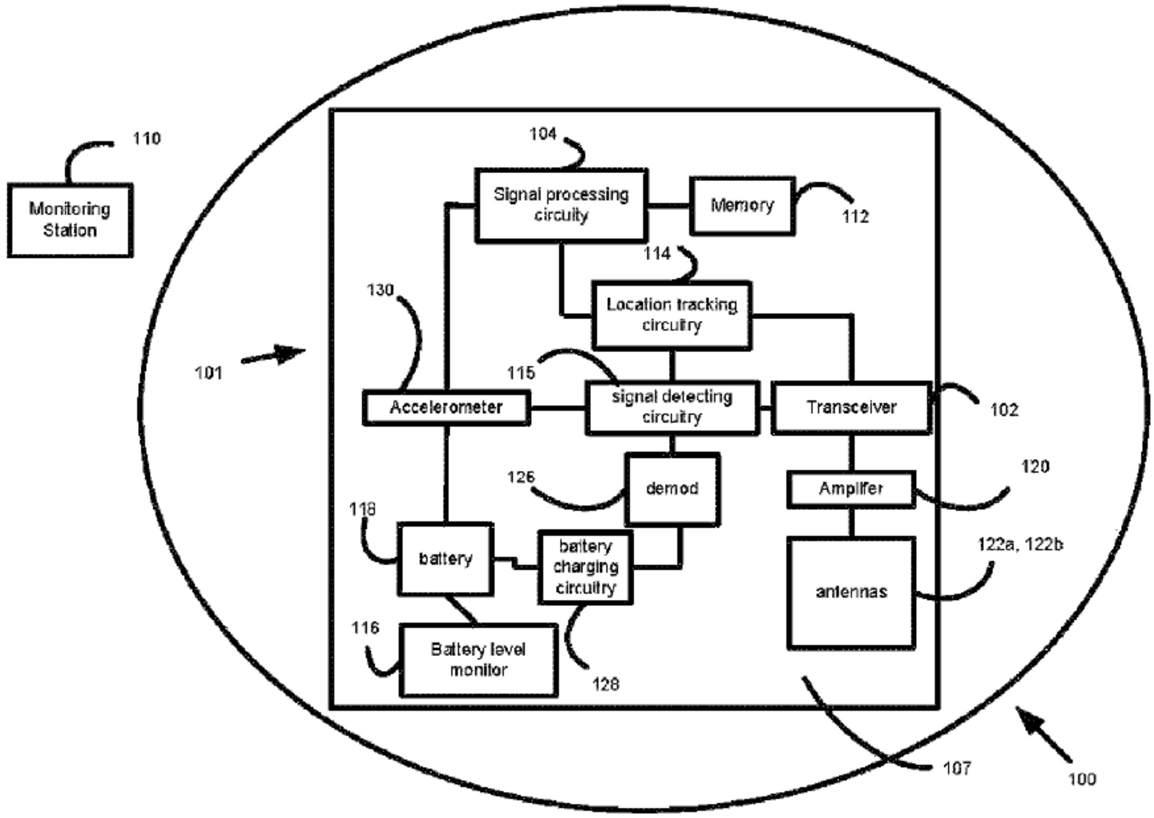
[2] US 6,940,407 B2, issued September 6, 2005 (Ex. 1004).

[3] US 2006/0119508 A1, published June 8, 2006 (Ex. 1011).

[4] US 2006/0272413 A1, published December 7, 2006 (Ex. 1008).

[5] US 7,053,823 B2, issued May 30, 2006 (Ex. 1009).

[6] US 2008/0266174 A1, published October 30, 2008 (Ex. 1010).



As depicted in the schematic of Figure 1, reproduced above, tracking device 100 contains electronic components 101 such as transceiver 102, signal processing circuitry 104 (e.g., a microprocessor or other signal logic circuitry), and accelerometer 130. *Id.* at 5:50–53. Tracking device 100 also includes location tracking circuitry 114—for example, global positioning system (GPS) logic circuitry—that "calculates location data received and sends the data to signal processing circuitry." *Id.* at 6:12–14, 6:16–17; *see id.* at 5:62–66 (signal processing circuitry 104 determines location coordinates).

Accelerometer 130 may determine if tracking device 100 is stationary for a period of time (Ex. 1001, 8:13–19), and using such a determination, tracking device 100 may transmit its last known location without activating location tracking circuitry 114 (*id.* at 8:19–29). "Advantageously, in this embodiment, when electronic tracking device 100 does not utilize and require GPS circuitry, e.g., location tracking circuitry 114, or functionality, the power resources are preserved of battery 118 in contrast to many conventional GPS communication systems, which continue powering-on GPS circuitry." *Id.* at 8:29–34.

In addition, tracking device 100 may include circuitry (e.g., processing circuitry 104) that recognizes "programmed motions received by accelerometer . . . and transmits an alert message . . . upon receiving a recognized motion pattern." Ex. 1001, 8:45–51. For example, tracking device 100 may detect tapping against the device in an "SOS tap cadence" (*id.* at 8:51–57), spins, turns, or flips of the device (*id.* at 8:59–67), or physical impacts that indicate the device has fallen (*id.* at 9:6–30).

E. Challenged Claims

The Petition challenges all claims of the '619 patent. Claims 1, 11, and 20 are independent and recite similar subject matter. Claims 2–10 depend (directly or indirectly) from claim 1, and claims 12–19 depend (directly or indirectly) from claim 11.

Independent claim 1 is illustrative:

> 1. [pre] A portable electronic tracking device to monitor location coordinates of one or more individuals and objects, the device comprising:
>
> [a] transceiver circuitry to receive at least one portion of a receive communication signal comprising location coordinates information;
>
> [b] accelerometer circuitry to measure displacements of the portable electronic tracking device, wherein the displacements comprise movements of an object or individual associated with the device;

> [c] a battery power monitor configured to activate and deactivate at least one portion of signaling circuitry in response to the accelerometer circuitry detecting a substantially stationary position of the electronic tracking device since last known location coordinate measurement; and
>
> [d] processor circuitry configured to process the displacements, to associate the displacements with a specified pattern, and to generate an alert message in response to the specified pattern.

Ex. 1001, 10:21–40 (reference letters added).

II. ANALYSIS OF PATENTABILITY

In an *inter partes* review, the petitioner has the burden of proving unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e). That burden never shifts to the patentee. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are "such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The legal 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) when in evidence, objective evidence of obviousness or nonobviousness.[7] *Graham v. John*

[7] The record does not include allegations or evidence of objective indicia of obviousness or nonobviousness.

Deere Co. of Kansas City, 383 U.S. 1, 17–18 (1966). One seeking to establish obviousness based on more than one reference also must articulate sufficient reasoning with rational underpinnings to combine teachings. *See KSR*, 550 U.S. at 418.

A. The Level of Ordinary Skill in the Art

The Petition states that the level of ordinary skill in the art corresponds to "(i) a Bachelor degree (or higher degree) in Electrical Engineering, Computer Engineering, Computer Science, or an equivalent degree and (ii) at least one year of experience working in the field of with at least two years of experience in GPS navigation, dead reckoning, portable tracking devices, or related technologies." Pet. 5–6 (citing Ex. 1003 ¶¶ 29–31).

Relying on Petitioner's proposal, the Institution Decision states:

> [A] person of ordinary skill in the art would have: (1) a bachelor's degree in electrical engineering, computer engineering, computer science, or an equivalent degree, and (2) two years of experience in or with GPS navigation, dead reckoning, portable tracking devices, or related technologies.

Inst. Dec. 7; *see id.* at 6–7 (identifying and explaining differences from Petitioner's proposal). At trial, "Patent Owner adopts the Board's definition of the person of ordinary skill in the art" (PO Resp. 4; *see* RMTA 20), and Petitioner did not further address it (*see* Pet. Reply).

Accordingly, we adopt the level of ordinary skill articulated in the Institution Decision. This level of skill is supported by the testimony of Mr. Andrews and is consistent with the '619 patent specification and the asserted prior art. *See Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 666–67 (Fed. Cir. 2000) (identifying factors); *see also Okajima v. Bourdeau*, 261 F.3d

1350, 1355 (Fed. Cir. 2001) (The "level of skill in the art is a prism or lens through which a judge, jury, or the Board views the prior art and the claimed invention.").

B. Claim Construction

We interpret claim terms 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) (2019).

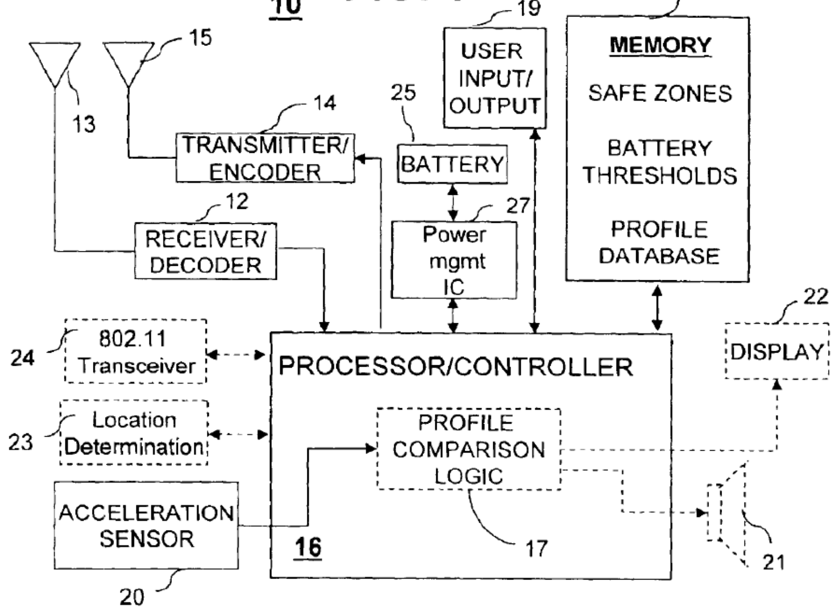
The Petition states that "no claim terms require express construction to resolve the grounds presented." Pet. 9. In the Institution Decision, we determined that no terms required express construction at that stage of the proceeding. Inst. Dec. 7–8. At trial, neither Patent Owner nor Petitioner advanced any express construction of any term or phrase in the challenged claims. *See* PO Resp.; Pet. Reply.

We determine that we need not expressly construe any claim terms or phrases given the issues presented in this proceeding. *See*, *e.g.*, *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe 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))).

C. Summary of Prior Art

1. Miranda-Knapp (Ex. 1004)

Miranda-Knapp describes a method of detecting when a portable communication device (such as a cell phone) has been dropped or misplaced and then notifying the user of the device's location. Ex. 1004, 1:12–32, 2:33–51, code (54), Abst. Miranda-Knapp's exemplary device 10 is illustrated in Figure 1, shown here:



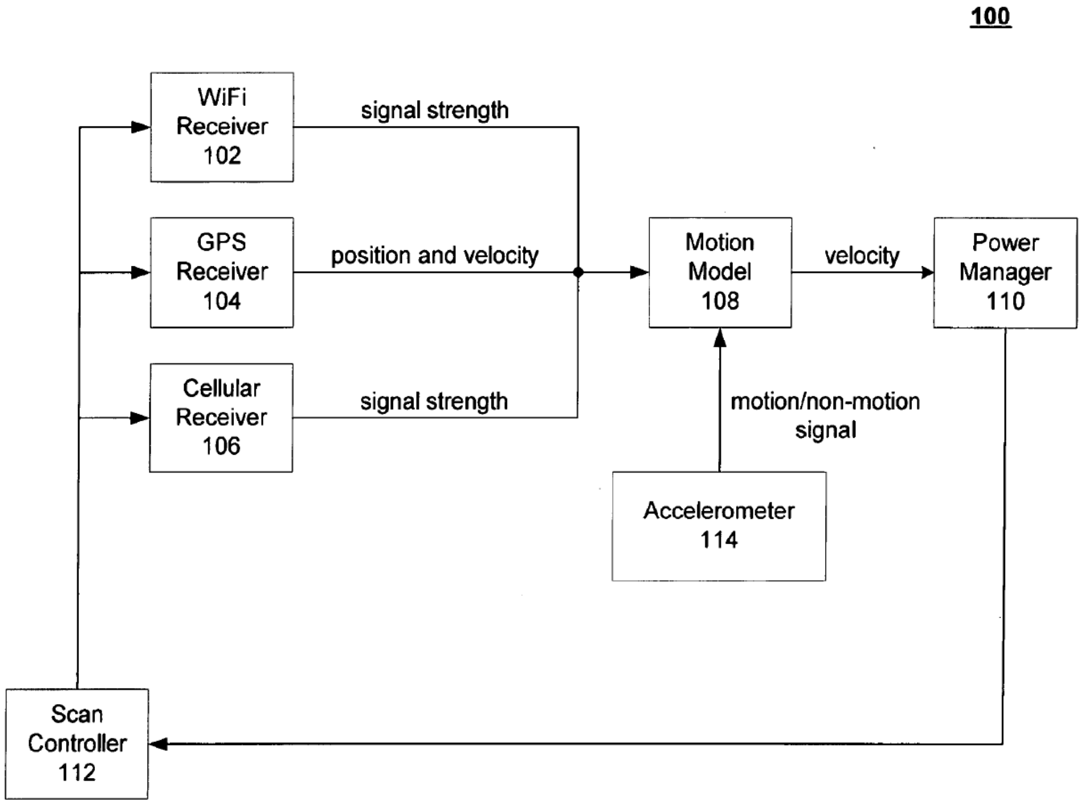
As shown above, Figure 1 is a block diagram of device 10 (e.g., a phone) that shows its basic components. Ex. 1004, 2:16–18, 2:52–55, Fig. 1. Device 10 includes a transceiver (i.e., receiver/decoder 12 and transmitter/encoder 14) and may optionally include a second transceiver for shorter range communications (i.e., 802.11 transceiver 24). *Id.* at 2:57–63. It also includes processor 16 (and associated logic module 17), memory 18, and acceleration sensor 20 (e.g., an accelerometer). *Id.* at 2:56–57, 3:4–16. Device 10 further includes location module 23, which can use GPS technology to determine the location of device 10 (*id.* at 3:21–23, 4:47–50), and power management integrated circuit (IC) 27 to monitor battery voltage (*id.* at 2:67–3:2).

In operation, Miranda-Knapp's device monitors the accelerometer's output: if the acceleration remains below a threshold for a period of time (such as 48 hours), then the device concludes that "the phone has not been moved and thus likely [has been] misplaced." Ex. 1004, 4:57–65, Fig. 3 (steps 32–36). In this situation, the phone determines and records its location and a time stamp. *Id.* at 5:1–3, Fig. 3 (steps 40, 42). If the device is not in a "safe zone" (such as the user's home), the device sends an alert message to the user with the recorded location and time stamp when: (1) the battery level is below a threshold, or (2) an inactivity period has expired. *Id.* at 5:3–39, Fig. 3 (subroutine A, step 44), Fig. 5 (steps 202–208); *see id.* at 5:11–14 (explaining that the battery could drain while waiting for the rest period to expire).

If, on the other hand, the phone detects motion exceeding the threshold, then the accelerometer's data is processed to determine if the data matches a drop profile or signature. Ex. 1004, 5:44–47, Fig. 3 (steps 32–34, 46); *see id.* at Fig. 2, 4:4–32 (explaining that accelerometer data indicates when a phone is dropped, stationary, or picked up). "If the acceleration profile is indicative of the phone being dropped" and the phone is not promptly picked up, "then the phone can immediately alert the user." *Id.* at 5:50–58, Fig. 3 (steps 48–58); *see also id.* at 5:59–63 (phone can emit an alert ringtone and/or send an alert message to the user with its location).

2. Miller (Ex. 1011)

Miller discloses a method for reducing power consumption in a mobile device by halting the scanning of its receivers when the device is stationary. Ex. 1011 ¶ 12, Abst. A block diagram of Miller's exemplary apparatus is shown in Figure 1, reproduced below:



As shown above, apparatus 100 includes Wi-Fi receiver 102, GPS receiver 104, cellular receiver 106, and accelerometer 114. *Id.* ¶ 13. The receivers scan for radio signals to determine the mobile device's location: GPS receiver 104 "receive[s] GPS satellite data to compute and track the mobile device's current location"; Wi-Fi receiver 102 identifies nearby access points; and cellular receiver 106 identifies nearby cell towers. *Id.* ¶¶ 13–16. Accelerometer 114 measures the acceleration of the mobile device. *Id.* ¶¶ 17–18. This data is sent to a motion model, which "utilizes all signals from receivers 102, 104, 106, and accelerometer 114 to determine the velocity of the mobile device." *Id.* ¶¶ 20–21; *see also id.* ¶ 26.

A scanning rate for receivers 102, 104, and/or 106 is determined based on the velocity of the mobile device. Ex. 1011 ¶ 22. In particular, if "the mobile device is not in motion, then the scanning rate may be set at zero[,] . . . halt[ing] the scanning of receivers 102, 104, and/or 106," so these components "utilize little or no power." *Id.*; *see also id.* at Fig. 2 (steps 210, 214). *But see id.* ¶ 28 (describing another embodiment where the receivers "continue scanning, but at a much lower scanning rate"). Moreover, when the mobile device starts to move, "accelerometer 114 knows instantaneously" and provides an appropriate signal to motion model, which resumes the receivers' scanning operations. *Id.* ¶¶ 18, 29; *see also id.* at Fig. 2 (steps 216, 204).

3. Vaganov (Ex. 1008)

Vaganov describes a three dimensional (3D) three-axis accelerometer for measuring three components of acceleration with respect to an orthogonal coordinate system. Ex. 1008 ¶¶ 3, 20, Abst. The accelerometer includes four beams, each of which is attached to a different side of a central proof mass and a surrounding frame. *Id.* ¶ 150; *see id.* at Fig. 6 (illustrating mechanical microstructure of the accelerometer). Vaganov contemplates use of the accelerometer in portable devices such as cell phones. *Id.* ¶ 40.

4. Cervinka (Ex. 1009)

Cervinka teaches a device for tracking cargo. Ex. 1009, Abst. Cervinka's tracking device receives GPS position data from an access point; if that data is not received, the tracking device starts acquiring data from its internal dead reckoning sensors (including a 3D accelerometer). *Id.* at 4:41–55, 7:1–9; *see id.* at 3:53–61, Fig. 3. The tracking device sends "the last received GPS position data and the acquired dead reckoning data" to a central server so that the central server can determine the current location of the tracking device. *Id.* at 7:22–30, 7:50–55; *see id.* at 9:33–50 (suggesting "pre-process[ing] the dead reckoning data directly in the controller 24 of the tracking device before sending it to the central server 10").

According to Cervinka, a person of ordinary skill in the art would have understood that the current position of the tracking device (and its associated cargo) could be determined using the most recent GPS position data and the acquired dead reckoning data. Ex. 1009, 7:50–55; *see id.* at 3:62–64 (explaining that dead reckoning techniques are not described in detail because they "are believed well known in the art"), 7:56–62 (explaining that "many methods for the determination of the current position of the cargo exist and generally depend at least on the type of dead reckoning data received").

5. Herrero (Ex. 1010)

Herrero discloses a method of locating a portable device using "Assisted GPS" (or "A-GPS") technology. Ex. 1010 ¶ 12. According to Herrero, A-GPS technology improves the sensitivity, speed, and power consumption of a GPS receiver. *Id.* ¶¶ 5, 7; *see id.* ¶¶ 2–7 (explaining that conventional GPS systems generally have limited efficiency in interior spaces, where satellite signals may be not be received). Specifically, Herrero's device calculates its location using both a GPS signal received from a satellite as well as "GPS assistance information" received via a "wireless communication network" from a server. *Id.* ¶ 13, Abst.; *see id.* ¶ 50 (stating the wireless communication network may be WiFi). The device includes a transmission/receiving module and an A-GPS positioning module that receives these signals. *Id.* ¶¶ 51–52, Figs. 1–2.

D. Obviousness Grounds Based on Miranda-Knapp and Miller

Petitioner contends that the subject matter of independent claims 1, 11, and 20 and dependent claims 5, 6, 8–10, 15, 16, 18, and 19 would have been obvious over the combination of Miranda-Knapp and Miller. Pet. 12–58. Petitioner further contends that the subject matter of dependent claims 2–4, 7, 12–14, and 17 would have been obvious over the combination of Miranda-Knapp and Miller with Vaganov, Cervinka, or Herrero. *Id.* at 58–74; *see also id.* at 8 (listing grounds).

Patent Owner contends that the proposed combination of Miranda-Knapp and Miller is improper. PO Resp. 4–10. Patent Owner does not otherwise dispute Petitioner's contentions. *See* PO Resp.;[8] PO Sur-reply.

1. Independent Claims 1, 11, and 20

Petitioner contends that the subject matter of independent claims 1, 11, and 20 would have been obvious over the combination of Miranda-Knapp and Miller. Pet. 13–50, 54–58. We begin our analysis with claim 1.

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[8] At institution, we cautioned Patent Owner that "any arguments not raised in the response may be deemed waived." Paper 10 (Scheduling Order), 9; *see also In re NuVasive, Inc.*, 842 F.3d 1376, 1379–82 (Fed. Cir. 2016) (holding patent owner waived an argument addressed in the preliminary response by not raising it in the patent owner response). Thus, Patent Owner has waived all arguments for patentability not raised in Patent Owner Response. This includes all arguments raised in the Preliminary Response (Paper 8) but not presented in the Response (Paper 16).

a. "A portable electronic tracking device to monitor location coordinates of one or more individuals and objects, the device comprising"

Petitioner asserts that, if the preamble is limiting,[9] Miranda-Knapp teaches it. Pet. 13–16 (citing Ex. 1004, 1:12–15, 2:33–39,[10] 2:52–3:27, 3:37–46, 3:55–57, 3:61–4:6, 4:33–56, 5:6–29, 5:54–60, 6:24–30, Fig. 3 (step 40), Fig. 4 (step 108); citing Ex. 1003 ¶¶ 112–120). According to Petitioner, Miranda-Knapp's device 10 (the claimed "portable electronic tracking device") determines whether a phone has been dropped or misplaced and determines the phone's location by attempting a GPS fix so that the owner can be notified of the status of the phone. *Id.*

Patent Owner does not dispute these contentions. *See* PO Resp.

We are persuaded that Miranda-Knapp teaches the preamble. As noted above, Miranda-Knapp describes a method of detecting when a portable communication device (such as a cell phone) has been dropped or misplaced and then notifying the user of the device's location. Ex. 1004, 1:12–32, 2:33–51, code (54), Abst. Miranda-Knapp teaches that device 10 can monitor location coordinates of a cell phone using GPS. *E.g.*, *id.* at 3:21–27, 4:47–50, 5:19–28; Ex. 1003 ¶¶ 117–118, 120.

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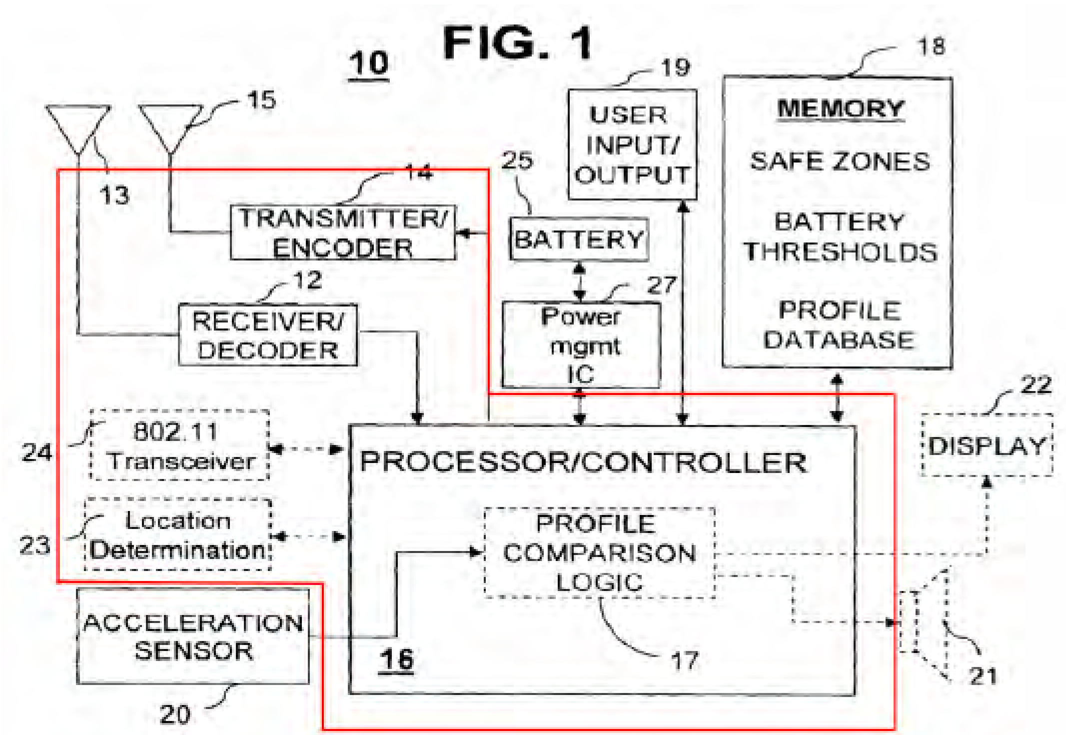
9 "Generally, the preamble does not limit the claims." *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). However, we need not resolve whether the claim's preamble is limiting because Petitioner shows that Miranda-Knapp teaches it. *See Nidec Motor*, 868 F.3d at 1017.

10 This citation includes a typographical error (*see* Pet. 14 (citing "2:33-3")); we understand the citation to refer to lines 33 to 39.

b. *"transceiver circuitry to receive at least one portion of a receive communication signal comprising location coordinates information"*

Petitioner contends that Miranda-Knapp teaches this limitation, or that it would have been obvious in light of Miranda-Knapp.[11] Pet. 16–18. Petitioner provides an annotated version of Miranda-Knapp's Figure 1 (reproduced below) in support of its analysis.



In this annotated Figure 1, Petitioner outlines transmitter/encoder 14, receiver/decoder 12, transceiver 24, location module 23, and processor/controller 16 in red to identify "transceiver circuitry." Pet. 16–17

[11] Petitioner also contends that it would have been obvious to combine Miller's GPS receiver 104 with Miranda-Knapp to teach this claim limitation. Pet. 18–20. We do not address that alternative contention in this Decision because we need not (and do not) rely upon it. *Accord* Inst. Dec. 18–19 (similarly relying on Miranda-Knapp alone for this limitation "because we perceive no deficiencies in Miranda-Knapp itself").

(citing Ex. 1004, 2:52–63, 3:21–4:3; Ex. 1003 ¶¶ 121–132; Ex. 1001, 8:2–4). Petitioner contends that Miranda-Knapp's location module 23 determines its location using GPS technology. *Id.* (citing Ex. 1004, 3:21–27, 3:64–67, 4:41–50, 7:53–57 (claim 12), Fig. 3 (step 40), Fig. 4 (step 108)). Petitioner contends that an ordinary artisan would have understood that module 23 "determines its position with the location coordinates information from a GPS satellite signal including location coordinates information, as well-known in the art." *Id.* at 17–18 (citing Ex. 1003 ¶¶ 124, 126; Ex. 1004, 1:62–66).

Patent Owner does not dispute these contentions. *See* PO Resp. In fact, Patent Owner agrees that Miranda-Knapp "explicitly discloses a location module which may be a GPS receiver" (*id.* at 7), and Patent Owner appears to also agree that Miranda-Knapp's location module receives radio signals from GPS satellites to determine the device's location (*see id.* at 6–7). *Accord* Inst. Dec. 17–18 (articulating the same understanding of identical statements in the Preliminary Response).

We are persuaded that Miranda-Knapp teaches this limitation. Miranda-Knapp's device 10 includes transmitter/encoder 14, receiver/decoder 12, transceiver 24, location module 23, and processor/controller 16. Ex. 1004, Fig. 1, 2:52–63, 3:21–27. Miranda-Knapp teaches that location determination module 23 uses GPS technology to determine the phone's location. *Id.* at 3:31–27, 4:47–50, Fig. 3 (step 40). A person of ordinary skill would have understood this to mean that location determination module 23 receives GPS coordinates from GPS satellite signals. Ex. 1003 ¶¶ 126–127; *see also id.* ¶¶ 122, 124.

c. *"accelerometer circuitry to measure displacements of the portable electronic tracking device, wherein the displacements comprise movements of an object or individual associated with the device"*

Petitioner asserts that Miranda-Knapp teaches this limitation. Pet. 20–23. According to Petitioner, Miranda-Knapp's accelerometer (i.e., acceleration sensor 20) teaches the claimed "accelerometer circuitry." *Id.* at 20–21 (citing Ex. 1004, 4:52–57, Abst., Fig. 1). Petitioner contends that a person of ordinary skill in the art would have understood Miranda-Knapp's accelerometer "to measure displacements of the portable electronic tracking device" because an accelerometer measures the accelerations associated with the phone's movement. *Id.* at 21–23 (citing Ex. 1003 ¶¶ 133–138; Ex. 1004, 4:4–33, 5:44–47, Fig. 2; comparing Ex. 1001, 8:47–51 with Ex. 1004, 2:52–57, 3:2–3). Petitioner explains that, "by measuring acceleration with an accelerometer, the displacement of the object, i.e., the movement of the object, is also measured." *Id.* at 21–22. Petitioner also contends that Miranda-Knapp's "device 10 may be included in a cell phone, [so] the accelerometer 20 is measuring the movements of the cell phone associated with the portable communication device (e.g., carrying the portable communication device)." *Id.* at 23 (citing Ex. 1003 ¶¶ 137–138).

Patent Owner does not dispute these contentions. *See* PO Resp.

We are persuaded that Miranda-Knapp teaches this limitation. Miranda-Knapp discloses an accelerometer 20, and we are persuaded that a person of ordinary skill in the art would have understood Miranda-Knapp to disclose that this accelerometer measures accelerations associated with movement and displacements of device 10 and its associated cell phone. *E.g.*, Ex. 1004, 2:52–57, 3:2–10, 4:4–32; Ex. 1003 ¶¶ 135–137.

d. "a battery power monitor configured to activate and deactivate at least one portion of signaling circuitry in response to the accelerometer circuitry detecting a substantially stationary position of the electronic tracking device since last known location coordinate measurement"

(1) Petitioner's Contentions

Petitioner contends that Miranda-Knapp in combination with Miller teaches this limitation. Pet. 23–43. Petitioner relies primarily on Miranda-Knapp (*see id.*), asserting that Miranda-Knapp teaches a battery power monitor and Miranda-Knapp's device *activates* signaling circuitry, such as a cellular transceiver, to send an alert message with its location when left stationary outside of its safe zone (*id.* at 24–25), and that Miller teaches *deactivating* signaling circuitry, such as a GPS receiver, by halting its scanning operations (or, alternatively, *activating and deactivating* the GPS receiver at a lower scanning rate) when the device is stationary (*id.* at 25–26).

More specifically, Petitioner asserts that Miranda-Knapp teaches that power management IC 27 and processor 16 (the "battery power monitor") activates transmitter/encoder 14 or transceiver 24 ("signaling circuitry") in response to the accelerometer detecting a substantially stationary position. Pet. 26–33 (citing Ex. 1004, 2:65–3:2, 3:4–8, 3:21–36, 3:51–55, 4:57–65, 5:5–43, 6:57–61, Figs. 1, 3, 5; Ex. 1003 ¶¶ 141–153). Petitioner contends that "*Miranda-Knapp* teaches detecting a substantially stationary position, referred to as an 'inactivity period' where the device is 'at rest' or 'sitting idle (no movement),' and taking actions such as alerting the user responsive to the stationary position." *Id.* at 29 (citing Ex. 1004, 3:32–36, 4:57–65, 5:13–17, 5:35–39, Fig. 5; Ex. 1003 ¶¶ 148–153). According to Petitioner, an ordinary artisan would have understood that processor 16 instructs transceivers 14 and/or 24 to send the alert via voice, SMS, or email notification, which activates signaling circuitry. *Id.* at 27–28 (citing Ex. 1004, 3:21–36, 3:51–55, 5:39–43; Ex. 1003 ¶¶ 143–147), 33 (citing Ex. 1003 ¶ 151). Petitioner also contends that this activation is in response to a substantially stationary position "since last known location coordinate measurement," as claimed, because Miranda-Knapp performs subroutine A, which monitors the inactivity period (Figure 5, step 208), after determining its position (Figure 3, step 40). *Id.* at 33–34 (citing Ex. 1004, 4:57–5:5, Figs. 3, 5; Ex. 1003 ¶ 152).

Petitioner further contends that Miller teaches deactivating signaling circuitry because it halts scanning operations for receivers, including GPS receiver 104, when the device is stationary in order to conserve battery power. Pet. 34–36 (citing Ex. 1011 ¶¶ 13, 15, 18, 20, 22, 28–30, Abst., Figs. 1–2; Ex. 1003 ¶¶ 154–156). Petitioner asserts that, in an alternative embodiment, Miller teaches both activating and deactivating its receivers according to a lower scanning rate (or duty cycle) when the device is stationary. *Id.* at 38–39 (citing Ex. 1011 ¶¶ 12, 18, 24, 28; Ex. 1003 ¶ 168).

Petitioner contends that, in light of Miller's teachings, it would have been obvious to modify Miranda-Knapp's device to deactivate location module 23 when the device is stationary, specifically after its location is determined (Figure 3, step 40) and during the processing of subroutine A (Figure 5), to conserve battery power. Pet. 36–37, 39–42 (citing Ex. 1004, 5:13–17, 5:29–39; Ex. 1011 ¶ 18; Ex. 1003 ¶¶ 69–79, 130–132, 160–168). Petitioner further contends that it would have been obvious to use Miller's reduced duty cycle activation/deactivation of the GPS receiver in Miranda-

Knapp's device to periodically obtain a GPS fix while still conserving power. *Id.* at 42–43 (citing Ex. 1011 ¶ 28; Ex. 1003 ¶ 168).

(2) Patent Owner's Contentions

Patent Owner contends that Petitioner's proposed combination of Miranda-Knapp and Miller is improper. PO Resp. 4–10. Patent Owner first argues that "[t]he proposed combination, as articulated by the Petitioner, would impermissibly add an element or functionality"—namely, a GPS receiver—"already present in the primary reference." *Id.* at 7; *see id.* at 6–7 (providing additional explanation); *see also* PO Sur-reply 2–5. Patent Owner also argues that Miranda-Knapp and Miller "disclose contradictory teachings with regard to an essential limitation"—namely, what happens in response to a substantially stationary position—and thus "teach away from the proposed combination." PO Resp. 7–9; *see also* PO Sur-Reply 8–9.

In its Sur-reply, Patent Owner presents new arguments.[12] In particular, Patent Owner argues that Miller "explicitly discredits and

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[12] Each of these additional arguments are untimely: they were not presented in the Patent Owner Response, and they are not fairly responsive to Petitioner's Reply. *See* PO Resp.; Pet. Reply. Specifically, we disagree with Patent Owner's assertion that the Reply "clearly articulates Petitioner's interpretation" "[f]or the first time" (PO Sur-reply 7), as the Institution Decision clearly articulated this same interpretation of the Petition's contentions (*see* Inst. Dec. 23–25). As a result, these arguments are waived. *See* Paper 10 at 9 ("Patent Owner is cautioned that any arguments not raised in the response may be deemed waived."); *see also* Consolidated Trial Practice Guide 73–74 (Nov. 2019), *available at* https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf ("Generally, a reply or sur-reply may only respond to arguments raised in the preceding brief," which "does not mean proceed in a new direction with a new approach as compared to the positions taken in a prior filing."). However, we address these arguments in

criticizes the use of an accelerometer to detect a stationary position." PO Sur-reply 5–6 (citing Ex. 1011 ¶ 21). Patent Owner also argues that Petitioner "misconstrues 'signaling circuity'" by pointing to some components in the claimed "transceiver circuitry" and contending that one circuit is activated while another is deactivated. *Id.* at 7–8. Further, Patent Owner argues that the references teach away from the claimed invention because Miranda-Knapp *activates* the GPS when the device is stationary, where Miller *deactivates* the GPS when the device is stationary. *Id.* at 8.

Patent Owner does not otherwise dispute Petitioner's contentions regarding this limitation. *See* PO Resp.; PO Sur-reply.

(3) Analysis

Having considered the parties' arguments and evidence, we are persuaded that this claim limitation is taught by the proposed combination of Miranda-Knapp and Miller, and a person of ordinary skill in the art would have been motivated and able to combine these references as proposed.

Miranda-Knapp teaches "a battery power monitor configured to activate . . . at least one portion of signaling circuitry in response to the accelerometer circuitry detecting a substantially stationary position of the electronic tracking device since last known location coordinate measurement," as required by the claim. Miranda-Knapp describes operations that are performed in response to an accelerometer detecting a substantially stationary position for a period of time. Ex. 1004, Fig. 3 (steps 32–44, subroutine A), 4:57–5:43. In Miranda-Knapp, accelerometer

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this Decision to explain why they would not have been persuasive even if they had been timely raised.

20 detects the substantially stationary position (*id.* at 4:57–60), and operations are performed "in response to" this detection, as shown by the flowcharts (*id.* at Figs. 3, 5). These operations include, for example, recording the "last known position" of device 10 (or determining position with a "GPS fix") and monitoring the battery and an inactivity period. *Id.* at 4:67–5:43, Fig. 3 (steps 40–44, subroutine A), Fig. 5 (showing subroutine A). Specifically, when the battery is below a threshold or an inactivity period expires, an alert message is sent to the user via a phone number or email account. *Id.* at 5:5–43, Fig. 5 (steps 204–208). A person of ordinary skill in the art would have understood that this alert message is sent by activating transmitter/encoder 14 (and/or transceiver 24), and the described operations are controlled by Miranda-Knapp's processor 16 (with power management IC 27). Ex. 1003 ¶¶ 142, 144, 151, 153; Ex. 1004, 2:65–3:2, 3:4–8, Fig. 1.

In addition, Miranda-Knapp suggests—and Miller teaches—the remainder of this claim limitation (i.e., "deactivating" signaling circuitry in response to the accelerometer detecting a substantially stationary position). Miranda-Knapp states that it is beneficial to "inhibit[]" "certain transmissions or phone calls" to conserve battery life when the device has been stationary. Ex. 1004, 5:11–18. This suggests the deactivation of signaling circuitry. Moreover, Miller expressly teaches that, when the device is stationary, the scanning operations of GPS receiver 104 (and/or other receivers) are halted in order to conserve battery power. *E.g.*, Ex. 1011 ¶¶ 18, 22, 28. Petitioner proposes modifying Miranda-Knapp based on Miller's teaching so that Miranda-Knapp's location module 23 is deactivated after a GPS fix (or other position data) is determined in step 40 of Figure 3. *See* Pet. 36–37. This proposed combination teaches this claim limitation.

Further, Miller teaches "activating and deactivating" signaling circuitry in response to a stationary position. Miller describes an alternative embodiment in which the scan controller instead "cause[s] the receivers to continue scanning, but at a much lower scanning rate, thereby consuming a great deal less power of the mobile device's battery" when the device is stationary. Ex. 1011 ¶ 28. As Mr. Andrews testifies, a person of ordinary skill in the art would have understood the lower scanning rate to mean that a receiver is intermittently activated and deactivated. Ex. 1003 ¶ 159. Petitioner proposes an alternative combination of Miranda-Knapp and Miller where Miranda-Knapp's location module 23 is activated and deactivated at a lower scanning rate when the device is stationary, as taught by Miller. *See* Pet. 38–39. This alternative proposed combination also teaches this claim limitation.

We are also persuaded that a person of ordinary skill in the art would have been motivated to combine the references as proposed. *See* Pet. 39–43. Specifically, a person of ordinary skill in the art would have been motivated to increase a mobile device's battery life, and the artisan would have recognized that deactivating the GPS receiver (or using a lower scanning rate for the GPS receiver) would accomplish this goal. Ex. 1003 ¶¶ 162–163; *see also* Ex. 1004, 5:11–18 (suggesting inhibiting "certain transmissions" to preserve battery power), 5:29–39 (monitoring battery level); Ex. 1011 ¶¶ 18, 22, 28 (turning off receivers to conserve battery). Consequently, a person of ordinary skill in the art would have found it desirable to deactivate the GPS receiver (or use a lower scanning rate for the

GPS receiver) when the device has been in a stationary position, for example, after the device's location has been determined and recorded. Ex. 1003 ¶ 160; *see also id.* ¶¶ 165–166 (explaining that the receiver would be reactivated when the device begins moving, as also taught by Miller), 168 (addressing additional benefits of lower scanning rate alternative). Finally, Mr. Andrews testifies that a person of ordinary skill in the art would have had a reasonable expectation of success. *Id.* ¶¶ 77–79, 164 (testifying that deactivating of a GPS when the device was stationary was "well-known" at the time and referring to supporting prior art), 167–168 (testifying that modifications to the references "would have been straightforward and well within the skillset of a[n ordinary artisan]"). We credit this testimony because it is logical and supported by persuasive rationale and evidence.

Patent Owner's arguments are unavailing. In particular, we disagree with Patent Owner's argument that the combination "impermissibly add[s] an element or functionality already present in the primary reference." PO Resp. 7; *see also* PO Sur-reply 2–5. As explained above, Miranda-Knapp discloses location module 23 that may use GPS technology and suggests inhibiting "certain transmissions" when the device is stationary, and to this, Petitioner proposes adding the functionality of deactivating the GPS receiver (or activating and deactivating the GPS receiver at a lower duty cycle) from Miller's disclosure. Thus, contrary to Patent Owner's argument, the proposed combination does *not* add Miller's GPS receiver,[13] and the added functionality is *not* "already present" in Miranda-Knapp. PO Resp. 7.

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[13] Patent Owner appears to misunderstand Petitioner's contention. *See* PO Sur-reply 3 (citing Pet. 28–29); *see also* Tr. 98:21–99:16. The Petition includes an alternative argument that the claimed "transceiver circuitry" is taught by Miller's GPS receiver (*see supra* note 11), and the Petition

We also disagree with Patent Owner's argument that Miranda-Knapp and Miller teach away from the combination. PO Resp. 7–9. Patent Owner is correct that, when the device is stationary, Miranda-Knapp activates circuitry to transmit an alert message (*see id.* at 8), and Miller halts one or more of its receivers to conserve power (*see id.* at 9); however, from these facts, Patent Owner then concludes that the references describe "opposite solutions" and "teach away from the proposed combination" (*see id.*). These conclusions are not justified.

First, Patent Owner provides no analysis and cites no evidence to support either conclusion. We accord no weight to conclusory assertions by counsel. *See In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997).

Second, we do not agree that Miranda-Knapp and Miller describe opposite solutions. *See* PO Resp. 9; PO Sur-reply 8. Miranda-Knapp *transmits* an alert message, yet expressly states that "certain transmissions" could be inhibited to save battery power (Ex. 1004, 5:1–18), and Miller turns off one or more unused *receivers* (*e.g.*, Ex. 1011 ¶ 18). There is no conflict, for example, between turning off a device's GPS receiver and activating its cellular transmitter. Likewise, both references recognize that some circuitry may be activated while other circuitry is deactivated (with a goal of saving power), and both references indicate flexibility in the circuits involved and timing of deactivation. *See*, *e.g.*, Ex. 1004, 5:1–18 (stating that "certain transmissions or phone calls" could be inhibited to save power), 5:54–65 (describing different ways of alerting the user); Ex. 1011 ¶¶ 18 (noting that

explains why that mapping would also satisfy this limitation (*see* Pet. 28–29). But, because we do not rely on (or address) that alternative contention, those portions of the Petition are not germane to this analysis.

"one or more receivers" can be halted), 28 (noting that lower scanning rate can instead be used). Consequently, we find that these references describe compatible and complimentary solutions. But, in any event, there is no conflict between Miranda-Knapp's teaching of acquiring a final "GPS fix" (in step 40) and Miller's use of a lower duty cycle when the device is stationary. *See* Ex. 1011 ¶ 28 ("In one embodiment of the invention, the scan controller may cause the receivers to continue scanning, but at a much lower scanning rate, thereby consuming a great deal less power of the mobile device's battery."). Thus, at a minimum, Miller's lower duty cycle is compatible with Miranda-Knapp, and Patent Owner's argument does not apply to this alternative combination (which also teaches the claim limitation, as addressed above).

Third, even if the references did describe opposite solutions, this alone would not constitute a teaching away. *See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) ("[M]ere disclosure of alternative designs does not teach away."). Patent Owner identifies (and we perceive) nothing in either reference that criticizes, discredits, or otherwise discourages the claimed solution. *See* PO Resp. 9; *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994) ("A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant."). In addition, Patent Owner identifies (and we perceive) no evidence to suggest that an ordinary artisan would be discouraged from making the combinations proposed by Petitioner.

We also disagree with Patent Owner's belated argument that Miller teaches away from the combination because, according to Patent Owner, Miller "explicitly discredits and criticizes the use of an accelerometer to detect a stationary position." PO Sur-reply 5–6 (citing Ex. 1011 ¶ 21). This argument is flatly contradicted by Miller's express disclosure. Miller states that "[a]ccelerometer 114 sends signals to motion model 108 indicating whether or not the mobile device is in motion." Ex. 1011 ¶ 18. Motion model 108 can also use signals from receivers 102, 104, 106 "because in some instances there may be an apparent motion of zero indicated by the accelerometer when there is no acceleration, yet the mobile device may be . . . moving at a constant speed." *Id.* ¶ 21. But the fact that additional data is also used does not undercut Miller's disclosure that *an accelerometer is used* to detect a stationary position. Notably, we discern no claim limitation that prohibits the use of other components, and Petitioner's proposed combination does not rely on Miller's position determination technique.

Finally, Patent Owner's belated arguments regarding "signaling circuitry" are also unavailing. PO Sur-reply 7–8. Patent Owner appears to erroneously assume that the "transceiver circuitry" cannot share components with the "signaling circuitry" (*see id.* at 9); however, we discern no basis for such a conclusion. Also, Patent Owner assumes that this claim language requires the same component to be both activated and deactivated; however, Patent Owner does not support its assumption with any evidence or analysis. *See id.* at 7. The intrinsic record does not appear to support Patent Owner's assumption. *See*, *e.g.*, Ex. 1001, 8:13–39 (stating that, when the device is stationary, the last known position is communicated without activating GPS circuitry).[14] But even if Patent Owner were correct, Petitioner's alternative contention (*see* Pet. 38–39 (relying on Miller's use of a lower duty cycle)) would still teach this limitation because Miller's GPS receiver is the component that is both activated and deactivated. *See* Ex. 1011 ¶ 28.

Accordingly, we are persuaded that this limitation is taught by the combination of Miranda-Knapp and Miller, and that it would have been obvious to combine these references as proposed.

e. "processor circuitry configured to process the displacements, to associate the displacements with a specified pattern, and to generate an alert message in response to the specified pattern"

Petitioner asserts that Miranda-Knapp teaches this limitation. Pet. 43–50. According to Petitioner, processor 16 and profile comparison logic 17 teach "processor circuitry" configured to perform the three recited operations. *Id.* at 43–44 (Ex. 1004, 3:4–10, 4:4–43, 5:44–60, Fig. 1). Petitioner contends that, in Miranda-Knapp, these components determine whether the phone was dropped by processing data from the accelerometer and evaluating whether it matches a drop signature (or profile). *Id.* at 44–49 (citing Ex. 1004, 3:4–16, 4:4–16, 4:25–28, 4:33–42, 5:44–55, 8:15–23 (claim 18), Fig. 2, Fig. 3 (step 46); Ex. 1003 ¶¶ 172–176). According to Petitioner, Miranda-Knapp generates an alert if the phone was dropped and

[14] Of note, Patent Owner points to this portion of the disclosure when identifying written description support for this claim limitation. *See* RMTA 6–7 (citing Ex. 2015, 12:6–8, 12:12–17; Ex. 2018 ¶ 36).

not promptly picked up. *Id.* at 49–50 (citing Ex. 1004, 4:51–60, 5:45–60, Fig. 3 (steps 46, 54–60);[15] Ex. 1003 ¶¶ 177–179).

Patent Owner does not dispute these contentions. *See* PO Resp.

We are persuaded that Miranda-Knapp teaches this limitation. Miranda-Knapp's device 10 includes processor 16 and profile comparison logic 17 that "process the sensor signal from the motion sensing device 20 [i.e., accelerometer 20] to determine if it matche[s] a signature stored in memory 18 indicating that the phone had been dropped." Ex. 1004, 3:4–10, Fig. 1; *see id.* at 3:15–16 (noting that logic module 16 can be embedded in processor 16), 4:39–43 (identifying alternative signatures/profiles), Fig. 2 (showing exemplary acceleration profile). "[U]pon determining the acceleration profile matches the predetermined profile," an alert may be generated to notify the user. *Id.* at 4:51–56. For example, Miranda-Knapp's device 10 alerts the user if it determines that the phone was dropped and not promptly picked-up. *Id.* at 5:44–60, Fig. 3 (steps 46–60).

f. Claims 11 and 20 recite commensurate limitations

For claims 11 and 20, Petitioner largely refers back to its analysis of the corresponding limitations in claim 1. Pet. 54–55, 57–58 (citing *id.* at 13–50; Ex. 1003 ¶¶ 193–197, 211–215). In addition, Petitioner further explains that Miranda-Knapp teaches processing the claimed "at least one portion of the receive communication signal," as recited by claim 11, because device 10 (specifically, processor 16 and location determination module 23)

[15] We correct the Petition's typographical error, which referred to Figure 2 rather than Figure 3. *Accord* Inst. Dec. 26 n.11 (making same correction).

determines its location from the received signal. *Id.* at 55–56 (citing Ex. 1003 ¶¶ 198–200; Ex. 1004, 1:12–15, 3:21–27, 5:1–5, Fig. 3 (step 42)).

Patent Owner does not dispute these contentions, other than as discussed above with respect to claim 1. *See* PO Resp.

We are persuaded that each limitation of claims 11 and 20 is taught by Miranda-Knapp or the combination of Miranda-Knapp and Miller, for the reasons explained above with the corresponding limitations of claim 1. Also, we are persuaded that it would have been obvious to combine these references in the manner proposed by Petitioner (and Patent Owner's arguments to the contrary are unavailing), for the reasons previously explained. *See supra* § II.D.1.d.

g. Conclusion

For the reasons provided above, we are persuaded that each limitation of independent claims 1, 11, and 20 is taught by Miranda-Knapp or the combination of Miranda-Knapp and Miller. In addition, we are persuaded that a person of ordinary skill in the art would have been motivated to combine Miranda-Knapp and Miller as proposed, and that the ordinary artisan would have had a reasonable expectation of success in doing so.

Accordingly, we conclude that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claims 1, 11, and 20 would have been obvious over the combination of Miranda-Knapp and Miller.

2. Dependent Claim 2

Claim 2 depends from claim 1 and recites: "the accelerometer comprises a multi-beam structure having at least one beam, of the multi-beam structure comprising a directional orientation substantially orthogonal to at least one other beam of the multi-beam structure." Ex. 1001, 10:41–45.

Petitioner contends that claim 2 would have been obvious over the combination of Miranda-Knapp, Miller, and Vaganov. Pet. 58–61. In particular, Petitioner contends that Vaganov describes a three-axis accelerometer, and an ordinary artisan would have recognized that Vaganov's accelerometer includes multiple beams that are each substantially orthogonal to at least one of the other beams. *Id.* at 58–60 (citing Ex. 1003 ¶¶ 216–220; Ex. 1008 ¶¶ 20, 26, 40, 150, Abst., Fig. 6). Petitioner argues that a person of ordinary skill in the art would have found it obvious to combine Vaganov with Miranda-Knapp as modified by Miller to yield the limitations of claim 2. *Id.* at 60–61 (citing Ex. 1003 ¶¶ 219–220; Ex. 1004, 4:18–25; Ex. 1008 ¶ 40).

Patent Owner does not dispute these contentions. *See* PO Resp.

We are persuaded that Vaganov teaches the additionally-recited limitations of claim 2. Specifically, Vaganov describes a 3D, three-axis accelerometer that includes four beams, with two beams disposed orthogonally to the other two. Ex. 1008 ¶¶ 3, 20, 150, Fig. 6 (illustrating beams 90 and 94 disposed orthogonally to beams 92 and 96); *see also* Ex. 1003 ¶ 218. Moreover, we are persuaded that it would have been obvious to add Vaganov's accelerometer to Miranda-Knapp's device 10. *See* Ex. 1003 ¶¶ 219–220 (testifying that an ordinary artisan would have been motivated to, and able to, combine these references). Indeed, Miranda-Knapp indicates that its accelerometer may be a "3 axis accelerometer" (Ex. 1004, 4:18–25), and Vaganov specifically states that its three-axis accelerometer can be used in cell phones (Ex. 1008 ¶ 40). Finally, as explained above, we are persuaded that it would have been obvious to combine Miranda-Knapp and Miller, and we are persuaded that the limitations of independent claim 1 are taught by the combination of Miranda-Knapp and Miller.

Accordingly, we conclude that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 2 would have been obvious over the combination of Miranda-Knapp, Miller, and Vaganov.

3. Dependent Claims 3 and 12

Claim 3 depends from claim 1 and recites: "the processor circuitry is further configured to compute the location coordinates of the device from the at least one portion of the receive communication signal and the displacements of the electronic tracking device." Ex. 1001, 10:46–50. Claim 12 depends from claim 11 and recites commensurate limitations. *Id.* at 11:32–36.

Petitioner contends that claims 3 and 12 would have been obvious over the combination of Miranda-Knapp, Miller, and Cervinka. Pet. 61–65, 67. In particular, Petitioner argues that Cervinka teaches determining a device's current location using a last known position and displacements from that position, which "is the very old and well-known technique of dead reckoning." *Id.* at 61–62 (citing Ex. 1003 ¶¶ 40–56, 221–231; Ex. 1009, 3:32–39, 3:53–59, 3:62–64, 6:44–47, 7:1–9, 7:26–30, 7:48–62, Fig. 3, Abst.). Petitioner further contends that it would have been obvious to modify Miranda-Knapp's method of determining the phone's position, which uses a signal from location module 23 (e.g., a GPS signal), to incorporate subsequent displacements using dead reckoning techniques, as disclosed by Cervinka. *Id.* at 62–65 (citing Ex. 1003 ¶¶ 226, 229–231;

Ex. 1004, 5:55–60, Fig. 3 (step 40), Fig. 4 (step 108); Ex. 1011 ¶ 26; Ex. 1009, 3:53–62, Fig. 3).

Patent Owner does not dispute these contentions. *See* PO Resp.

We are persuaded that Cervinka teaches the additionally-recited limitations of these claims. Cervinka's device has a "dead reckoning module" with sensors including, for example, "a 3D accelerometer." Ex. 1009, 3:55–61. Cervinka teaches that a device's location can be determined from its "last known position . . . , as determined by the GPS position data, and the dead reckoning data." *Id.* at 7:50–55. A person of ordinary skill in the art would have understood this to disclose determining a device's current position from the last known GPS coordinates and the device's subsequent displacements. *See* Ex. 1003 ¶¶ 223, 226; *see also* Ex. 1009, 3:62–64 (stating that dead reckoning techniques are not discussed in detail because they are "well known in the art"), 7:56–59 (stating that methods of calculating position from dead reckoning data are known in the art).

In addition, we are persuaded that a person of ordinary skill in the art would have been motivated to add well-known dead reckoning functionality (described in Cervinka) to the combination of Miranda-Knapp and Miller so that the device's position can be calculated when GPS signals are not available. *See* Ex. 1003 ¶¶ 223, 226, 228–230. We are also persuaded that an ordinary artisan would have had a reasonable expectation of success. *See id.* ¶¶ 228, 231; Ex. 1009, 3:62–64, 7:56–59. Furthermore, as explained above, we are persuaded that it would have been obvious to combine Miranda-Knapp and Miller, and we are persuaded that the limitations of the respective independent claims are taught by the combination of Miranda-Knapp and Miller.

Accordingly, we conclude that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claims 3 and 12 would have been obvious over the combination of Miranda-Knapp, Miller, and Cervinka.

4. Dependent Claims 4 and 13

Claim 4 depends from claim 1 and recites: "the displacements are transmitted to a monitoring station to determine current location coordinates information of the portable electronic tracking device based in part on the displacements and at least one of last known location coordinates of the electronic tracking device, last known location coordinates of another electronic tracking device, and landmark location coordinates." Ex. 1001, 10:51–57. Claim 13 depends from claim 11 and recites commensurate limitations. *Id.* at 11:37–12:2.

Petitioner contends that claims 4 and 13 would have been obvious over the combination of Miranda-Knapp, Miller, and Cervinka. Pet. 65–68. Petitioner contends that Cervinka's tracking device sends the last received GPS position data and the acquired dead reckoning data to a central server so that the server can determine the device's current location. *Id.* at 65–66 (citing Ex. 1003 ¶¶ 232–238; Ex. 1009, 3:53–61, 7:1–9, 7:26–30, 7:50–55, 9:33–50). Petitioner further contends that a person of ordinary skill in the art would have found it obvious to combine these teachings of Cervinka with the combination of Miranda-Knapp and Miller. *Id.* at 66–67 (citing Ex. 1003 ¶¶ 58–60, 235–238; Ex. 1004, 3:51–55, 5:29–33, 6:14–33, Fig. 5; Ex. 1009, 9:33–50).

Patent Owner does not dispute these contentions. *See* PO Resp.

We are persuaded that Cervinka teaches that "the displacements are transmitted to a monitoring station to determine current location coordinates information of the portable electronic tracking device based in part on the displacements and . . . [the] last known location coordinates of the electronic tracking device," as recited by these claims. In particular, Cervinka teaches that, "with the last known position of the cargo, as determined by the GPS position data, and the dead reckoning data received from the tracking device 14, the central server 10 may determine the current position of the cargo." Ex. 1009, 7:50–55; *see also*, *e.g.*, *id.* at 7:26–30. We are also persuaded that a person of ordinary skill in the art would have been motivated to add this functionality to the combination of Miranda-Knapp and Miller and would have had a reasonable expectation of success. *See* Ex. 1003 ¶¶ 235–238; Ex. 1009, 9:33–50 (recommending that dead reckoning data be sent to the server "to improve accuracy and/or certainty"); *see also supra* § II.D.3 (addressing rationale to add Cervinka's dead reckoning functionality to the combination). Furthermore, as explained above, we are persuaded that it would have been obvious to combine Miranda-Knapp and Miller, and we are persuaded that the limitations of the respective independent claims are taught by the combination of Miranda-Knapp and Miller.

Accordingly, we conclude that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claims 4 and 13 would have been obvious over the combination of Miranda-Knapp, Miller, and Cervinka.

5. Dependent Claims 5 and 15

Claim 5 depends from claim 1 and recites: "the battery power monitor is configured to deactivate at least one portion of the signaling circuitry when the accelerometer circuitry detects a substantially stationary position of the electronic tracking device." Ex. 1001, 10:58–62. Claim 15 depends from claim 11 and recites commensurate limitations. *Id.* at 12:6–9.

Petitioner contends that the subject matter of claims 5 and 15 would have been obvious over the combination of Miranda-Knapp and Miller. Pet. 50, 57. In particular, Petitioner contends that the proposed combination of Miranda-Knapp and Miller teaches deactivating Miranda-Knapp's location module 23 when accelerometer 20 detects a stationary position. *Id.* (citing Pet. 23–43; Ex. 1003 ¶¶ 180–181, 203–204).

Patent Owner does not dispute these contentions. *See* PO Resp.

We are persuaded that the combination of Miranda-Knapp and Miller teaches the additionally-recited limitations of these claims. *See supra* § II.D.1.d (finding that the combination teaches these claimed aspects). Moreover, as explained above, we are persuaded that it would have been obvious to combine these references as proposed by Petitioner, and that the limitations of the respective independent claims are taught by the proposed combination.

Accordingly, we conclude that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claims 5 and 15 would have been obvious over the combination of Miranda-Knapp and Miller.

6. Dependent Claims 6 and 16

Claim 6 depends from claim 1 and recites: "the battery power monitor is configured to activate at least one portion of the signaling circuitry when the accelerometer circuitry detects that the electronic tracking device is not in a substantially stationary position." Ex. 1001, 10:63–67. Claim 16 depends from claim 11 and recites commensurate limitations. *Id.* at 12:10–13.

Petitioner contends that the subject matter of claims 6 and 16 would have been obvious over the combination of Miranda-Knapp and Miller. Pet. 51–52, 57. In particular, Petitioner contends that Miller teaches reactivating its receivers when the accelerometer detects that the device is no longer stationary, and a person of ordinary skill in the art would have found it obvious to also include this feature in the proposed combination. *Id.* (citing Ex. 1003 ¶¶ 182–184, 205–206; Ex. 1011 ¶¶ 18, 29).

Patent Owner does not dispute these contentions. *See* PO Resp.

We are persuaded that Miller teaches the additionally-recited limitations of these claims. In particular, Miller teaches that, when "it is determined that the mobile device has resumed movement, the process . . . enable[s] the receivers to resume or start scanning again." Ex. 1011 ¶ 29; *see also id.* ¶ 18 (explain that accelerometer detects the movement). We are also persuaded that it would have been obvious to include this feature in the proposed combination. *See* Ex. 1003 ¶ 184; *see also supra* § II.D.1.d (addressing motivation to combine the references). In addition, as explained above, we are persuaded that it would have been obvious to combine Miranda-Knapp and Miller as proposed by Petitioner, and that the limitations of the respective independent claims are taught by the proposed combination.

Accordingly, we conclude that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claims 6 and 16 would have been obvious over the combination of Miranda-Knapp and Miller.

7. Dependent Claims 7 and 17

Claim 7 depends from claim 1 and recites: "the transceiver is configured to receive the at least one portion of the receive communication signal from a GPS satellite and from a wireless communication network." Ex. 1001, 11:1–4. Claim 17 depends from claim 11 and recites commensurate limitations. *Id.* at 12:15–17.

Petitioner contends that claims 7 and 17 would have been obvious over the combination of Miranda-Knapp, Miller, and Herrero. Pet. 69–74. In particular, Petitioner asserts that Herrero's A-GPS device calculates its location using signals received from both a GPS network and a wireless communication network. *Id.* at 69–70 (citing Ex. 1010 ¶¶ 1, 12–13, 34, 51, 74–75, 93, Abst.). Petitioner argues that a person of ordinary skill in the art would have found it obvious to combine Herrero with Miranda-Knapp as modified by Miller to yield the limitations of these claims. *Id.* at 70–74 (citing Ex. 1003 ¶¶ 254–259; Ex. 1004, 2:57–63, 3:21–27, 3:61–67; Ex. 1011 ¶¶ 13, 25; Ex. 1010 ¶¶ 5, 7, 93).

Patent Owner does not dispute these contentions. *See* PO Resp.

We are persuaded that Herrero teaches the additionally-recited limitations of these claims. Herrero's A-GPS device receives GPS assistance information (from a wireless communication network) and GPS signals (from a GPS network) to calculate the device's location. *E.g.*, Ex. 1010 ¶¶ 13, 34, 51. In addition, we are persuaded that a person of ordinary skill in the art would have been motivated to add Herrero's A-GPS technology to the combination of Miranda-Knapp and Miller to improve GPS position determination. *See* Ex. 1003 ¶¶ 254–256; Ex. 1010 ¶¶ 5–7, 93 (explaining that A-GPS technology improves the speed and sensitivity of a GPS receiver). We are also persuaded that an ordinary artisan would have had a reasonable expectation of success in making the combination. *See* Ex. 1003 ¶¶ 257–259; *see also* Ex. 1010 ¶¶ 12–14, 34–35 (similarly deactivating GPS components when the device is stationary to conserve battery). Furthermore, as explained above, we are persuaded that it would have been obvious to combine Miranda-Knapp and Miller, and we are persuaded that the limitations of the respective independent claims are taught by the combination of Miranda-Knapp and Miller.

Accordingly, we conclude that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claims 7 and 17 would have been obvious over the combination of Miranda-Knapp, Miller, and Herrero.

8. Dependent Claims 8–10, 18, and 19

Claim 8 depends from claim 1 and recites: "the accelerometer is configured to measure a physical impact to the device." Ex. 1001, 11:5–6. Claim 9 depends from claim 8 and recites: "user is alerted of the physical impact based in part on a magnitude value of the physical impact." *Id.* at 11:7–9. Claim 10 depends from claim 9 and recites "the accelerometer is further configured to measure a pattern or characteristic of physical impacts to the device." *Id.* at 11:10–12. Claims 18 and 19 depend from claim 11 and recite limitations commensurate with those recited in claims 8 and 9. *Id.* at 12:18–22.

Petitioner contends that the subject matter of these claims would have been obvious over the combination of Miranda-Knapp and Miller. Pet. 52–54, 57. In support, Petitioner contends that Miranda-Knapp teaches the additionally-recited limitations of these claims. *Id.* Specifically, according to Petitioner, in Miranda-Knapp: if the output of an accelerometer exceeds a threshold (a "magnitude value"), then the accelerometer's measurements are compared to a profile to determine whether a phone has been dropped (a "physical impact"); and if the phone has been dropped and is not promptly picked up, then an alert is provided to the user. *Id.* (citing Ex. 1004, 3:2–3, 3:8–10, 4:4–32, 4:57–5:17, 5:44–63, Figs. 2, 3; Ex. 1003 ¶¶ 185–192, 207–210).

Patent Owner does not dispute these contentions. *See* PO Resp.

We are persuaded that Miranda-Knapp teaches the additionally-recited limitations of these claims. Miranda-Knapp's accelerometer 20 measures physical impacts to the mobile phone (such as being dropped). *E.g.*, Ex. 1004, 3:2–3, 4:4–32, Fig. 2 (showing example acceleration profile); *see also* Ex. 1003 ¶ 186. If the magnitude of the impact exceeds "a predetermined threshold," Miranda-Knapp's device determines whether the acceleration "data matches a drop profile or signature" and then may, as a result, provide an alert to the user. Ex. 1004, 5:44–47, 5:55–64; *see also* Ex. 1003 ¶¶ 188–189. Specifically, this alert is provided if the acceleration profile indicates that the device was dropped but not promptly picked up. Ex. 1004, 4:4–32, 5:50–64; *see also* Ex. 1003 ¶ 192. Moreover, as explained above, we are persuaded that it would have been obvious to combine Miranda-Knapp and Miller as proposed by Petitioner, and that the limitations of the respective independent claims are taught by the proposed combination.

Accordingly, we conclude that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claims 8–10, 18, and 19 would have been obvious over the combination of Miranda-Knapp and Miller.

9. Dependent Claim 14

Claim 14 depends from claim 11 and recites: "calculating location data based on at least one of the at least one portion of the receive communication signal and the displacements." Ex. 1001, 12:3–5.

Petitioner contends that claim 14 would have been obvious over the combination of Miranda-Knapp, Miller, and Cervinka.[16] Pet. 68 (citing Ex. 1003 ¶¶ 245–248). Petitioner contends that Miranda-Knapp calculates the phone's location (e.g., obtains a GPS fix) based on the signal received from location module 23, which teaches "calculating location data based on . . . the receive communication signal." *Id.* (citing Ex. 1003 ¶ 247; Ex. 1004, 3:21–27, Fig. 3 (step 40)). Petitioner also contends that Cervinka calculates location data using dead reckoning techniques, as discussed above with respect to claims 3, 4, 12, and 13. *Id.*

Patent Owner does not dispute these contentions. *See* PO Resp.

[16] As we previously noted, we determine that Petitioner's only ground asserted against claim 14 is based on the combination of Miranda-Knapp, Miller, and Cervinka. *See* Inst. Dec. 30 n.12 (citing Pet. 8, 68).

As explained above, we are persuaded that Cervinka teaches calculating location data using the last known GPS location and the subsequent displacements of the device, which satisfies the additionally-recited limitations of this claim, and that it would have been obvious to combine Miranda-Knapp, Miller, and Cervinka as proposed. *See supra* § II.D.3 (addressing claims 3 and 12). Moreover, we are persuaded that Miranda-Knapp teaches the additionally-recited limitations of this claim because it calculates the phone's location based on the GPS signal received by location module 23. *E.g.*, Ex. 1004, 3:21–27, 4:47–50, Fig. 3 (step 40).

Accordingly, we conclude that Petitioner has shown, by a preponderance of the evidence, that the subject matter of claim 14 would have been obvious over the combination of Miranda-Knapp, Miller, and Cervinka.

III. MOTION TO AMEND

Pursuant to 35 U.S.C. § 316(d)(1) and 37 C.F.R. § 42.121(a), Patent Owner filed a contingent Motion to Amend seeking to replace claims 1–20 of the '619 patent with proposed substitute claims 21–40, respectively, if any of the original claims are found unpatentable. *See* MTA. After receiving Preliminary Guidance from the Board (*see* PG), Patent Owner filed a Revised Motion to Amend proposing revised substitute claims 21–40 if the corresponding original claims are found unpatentable. *See* RMTA.

Because we have determined that all challenged claims are unpatentable (*see supra* §§ II.D.1–II.D.9), we proceed to address all proposed substitute claims in Patent Owner's Revised Motion to Amend.

A. Proposed Substitute Claims

In the Revised Motion to Amend, Patent Owner proposes: substitute claim 21 to replace claim 1, claim 31 to replace claim 11, and claim 40 to replace claim 20. RMTA 26–32. These claims are reproduced below, with underlining to indicate added text and strikethrough to indicate deleted text. For clarity, we have added emphasis to each amendment, and for ease of reference, we add Petitioner's reference identifiers (*see* RMTA Opp. 16–19).

> 21. [pre] A portable electronic tracking device to monitor location coordinates of one or more individuals and objects, the device comprising:
>
> [a] transceiver circuitry to receive at least one portion of a receive communication signal comprising location coordinates information;
>
> [b] accelerometer circuitry to measure displacements of the portable electronic tracking device, wherein the displacements comprise movements of an ~~**object or**~~ individual associated with the device;
>
> [c] a battery power monitor configured to activate and deactivate at least one portion of signaling circuitry in response to the accelerometer circuitry detecting a substantially stationary position of the electronic tracking device since last known location coordinate measurement; and
>
> [d] processor circuitry configured to process the displacements, to associate the displacements with a specified pattern, and to generate an alert message in response to the specified pattern.

> 31. [pre] A method to monitor location coordinates of one or more individuals or objects, the method comprising:
>
> [a] receiving at transceiver circuitry of a portable electronic tracking device at least one portion of a receive

communication signal comprising location coordinates information;

[b] measuring displacements of the portable electronic tracking device, wherein the displacements comprise movements of an ~~**object or**~~ individual associated with the device;

[c] associating the displacements with a specified pattern and generating an alert message in response to the specified pattern;

[d] activating and deactivating at least one portion of signaling circuitry in response to detecting**, by the accelerometer circuitry,** a substantially stationary position of the electronic tracking device since last known location coordinate measurement; and

[e] processing the at least one portion of the receive communication signal using processor circuitry.

40. [pre] A portable electronic tracking device to monitor location coordinates of one or more individuals and objects, the device comprising:

[a] transceiver circuitry to receive at least one portion of a receive communication signal comprising location coordinates information;

[b] accelerometer circuitry to measure displacements of the portable electronic tracking device and to measure a pattern or characteristic of physical impacts **by an individual** to the device;

[c] a battery power monitor configured to activate and deactivate at least one portion of signaling circuitry in response to the accelerometer circuitry detecting a substantially stationary position of the electronic tracking device since last known location coordinate measurement; and

[d] processor circuitry configured to process the displacements.

RMTA 26, 28–29, 31–32 (emphases and reference identifiers added). In addition, Patent Owner proposes substitute claims 22–30 and 32–39 to replace dependent claims 2–10 and 12–19. *Id.* at 27–31. Each of these proposed substitute claims are identical to the dependent claims they would replace, except for a revision to depend from the corresponding substitute independent claim. *Id.*

B. Procedural History of Motion to Amend

We provide a summary of the motion to amend briefing because this background is relevant to some of Petitioner's arguments. *See infra* § III.C (analyzing whether the contents of Patent Owner's revised motion to amend are proper).

Patent Owner filed a first contingent Motion to Amend proposing substitute claims 21–40 to replace claims 1–20, respectively. *See* MTA. In particular, this motion proposed: replacing the reference to displacements of "an object or individual" with "an individual" in independent claims 1 and 11, adding the phrase "by an individual" to independent claim 20, and revising the dependent claims so that they depend from the substitute independent claims. *Id.* at 26–31.

Petitioner opposed the motion. MTA Opp. Petitioner argued that the proposed claims lacked written description support for three phrases: "transceiver circuitry" (*id.* at 3–4), "activat[ing] and deactivat[ing] at least one portion of signaling circuitry in response to . . . detecting a substantially stationary position of the electronic tracking device since last known location coordinate measurement" (*id.* at 4–7), and "battery power monitor" (*id.* at 7–8). In addition, Petitioner argued that the subject matter of the proposed substitute claims would have been obvious over the combination of the Petition's asserted references and a new reference (Zhou), which teaches the newly added limitation. *Id.* at 8–25.

We issued Preliminary Guidance on Patent Owner's original Motion to Amend (*see* PG), at Patent Owner's request (*see* MTA 2), as contemplated by the MTA Pilot Program. *See also* Notice Regarding a New Pilot Program Concerning Motion to Amend Practice and Procedures in Trial Proceedings under the America Invents Act before the Patent Trial and Appeal Board, 84 Fed. Reg. 9497 (Mar. 15, 2019) ("MTA Pilot Program Notice") ("The first option is that a patent owner may choose to receive preliminary guidance from the Board on its MTA."). In the Preliminary Guidance, we determined that Patent Owner had satisfied the statutory and regulatory requirements. PG 3–7. We disagreed with most of Petitioner's written description arguments (*id.* at 4–7), but "we question[ed]" the sufficiency of the disclosure for "activating and deactivating signaling circuitry 'in response to detecting a substantially stationary position since last known location coordinate measurement,'" as recited in proposed substitute claims 21, 31, and 40 (*id.* at 6–7 (referencing MTA Opp. 6–7)). Regarding Petitioner's patentability arguments, we determined that Petitioner had established a reasonable likelihood of showing that proposed substitute claims 21–40 are unpatentable as obvious. *Id.* at 9–12.

Patent Owner, again electing to use a pilot program option, then filed a Revised Motion to Amend. *See* RMTA; *see also* MTA Pilot Program Notice 9497 ("The second option is that a patent owner may choose to file a revised MTA after receiving petitioner's opposition to the original MTA and/or after receiving the Board's preliminary guidance."); *see also* 35 U.S.C. § 316(d)(2) ("Additional motions to amend may be permitted . . .

by regulations prescribed by the Director.”). Like the original Motion to Amend, the Revised Motion to Amend proposes substitute claims 21–40. RMTA 26–32. In fact, the new proposed substitute claims are identical to the old proposed substitute claims except for one difference in proposed substitute claim 31. *Compare id.*, *with* MTA 26–31. Specifically, the Revised Motion proposes adding “by the accelerometer circuitry” to claim language that requires “detecting . . . a substantially stationary position of the electronic tracking device since last known location coordinate measurement.” RMTA 29. The other independent claims (i.e., claims 1 and 20) already included this requirement, and both versions of the corresponding proposed substitute claims (i.e., claims 21 and 40) likewise included this requirement. *See* Ex. 1001, 10:33–36 (requiring “detecting a substantially stationary position” to be performed by “the accelerometer circuitry” in claim 1), 12:34–37 (same for claim 20); *see also* MTA 26, 31; RMTA 26, 31–32.

In addition, the Revised Motion addresses the statutory and regulatory requirements of a motion to amend (RMTA 2–19), but does not address whether it satisfies the requirements of a *revised* motion to amend. The Revised Motion also argues that the Petition’s references (Miranda-Knapp and Miller) are not properly combined and fail to teach “an accelerometer detecting whether the device is in a substantially stationary position.” *Id.* at 21–24 (citing Pet. 20–23, 29–34; Ex. 1004, 4:58–5:10, 5:18–43, Fig. 5; Ex. 1011 ¶ 21)). The Revised Motion, however, does not address the teachings of the Opposition’s new reference (Zhou) or Petitioner’s proposed combination of that reference with the other references. *See id.*

Petitioner opposes the Revised Motion to Amend. RMTA Opp. In addition to disputing the substance of Patent Owner's arguments (*see id.* at 2–11), Petitioner argues that Patent Owner's Revised motion fails to comply with the Board's MTA Pilot Program Notice (*id.* at 11–15) because "Patent Owner's amendment to Claim 31 is unrelated to issues raised in either the Board's Preliminary Guidance or Petitioner's Opposition, as are Patent Owner's arguments" (*id.* at 11–12).

Patent Owner filed a reply in support of its Revised Motion arguing that the amendment to claim 31 is responsive to the Preliminary Guidance. RMTA Reply 1–3, 9–10. Patent Owner also addresses the teachings and combinability of Miranda-Knapp and Miller (*see id.* at 3–9), but does not address the propriety of this line of argument (*see id.*).

Petitioner filed a sur-reply opposing the Revised Motion, which maintains that Patent Owner's amendment and arguments are improper (RMTA Sur-reply 9–10) and responds to Patent Owner's substantive arguments (*id.* at 1–9).

C. Improper Contents of Revised Motion to Amend

We begin by addressing Petitioner's contention that certain aspects of Patent Owner's Revised Motion to Amend are improper. *See* RMTA Opp. 11–15; RMTA Sur-reply 9–10.

For the reasons below, we determine that Patent Owner's proposed amendment and written description arguments are proper, but that Patent

Owner's arguments regarding obviousness are not. As a result, we do not consider the improper obviousness arguments.[17]

1. Allowed Contents of Revised Motion to Amend

In the MTA Pilot Program, a patent owner may elect to file a revised motion to amend. *See* MTA Pilot Program Notice 9499–9502; *see also* Paper 14 (Order), 3–4 (instructing parties to consult the MTA Pilot Program Notice); Consolidated Trial Practice Guide 67 (same). This revised motion is permitted so that the patent owner can address issues identified in the preliminary guidance and/or the petitioner's opposition to the motion to amend. *See* MTA Pilot Program Notice 9499–9500; *see also id.* at 9501 (stating that these papers provide "good cause," allowing authorization of an additional motion to amend (quoting 37 C.F.R. § 42.121(c))).

"A revised MTA includes one or more new proposed substitute claims in place of previously presented substitute claims to address issues identified in the preliminary guidance and/or the petitioner's opposition." MTA Pilot Program Notice 9499. It may also include new arguments and evidence that are related to issues identified in those papers:

> A revised MTA must provide amendments, arguments, and/or evidence in a manner that is responsive to issues raised in the preliminary guidance and/or petitioner's opposition to the MTA. A revised MTA may not include amendments, arguments, and/or evidence that are unrelated to issues raised in the preliminary guidance and/or petitioner's opposition to the MTA.

Id. at 9498.

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[17] Although we decline to consider these arguments because they are procedurally improper, Petitioner nevertheless bears the burden to show that the proposed substitute claims are unpatentable. *See infra* § III.F.

2. *Amendment to Proposed Substitute Claim 31 & Written Description Arguments*

We are persuaded that Patent Owner's amendment to proposed substitute claim 31 and its written description arguments (*see* RMTA 4–19) are responsive to the Preliminary Guidance and, thus, are properly included in the Revised Motion to Amend.

The Preliminary Guidance notes a potential written description issue:

> [W]e question whether there is sufficient disclosure to inform a person of ordinary skill in the art ("POSITA") of activating and deactivating signaling circuitry "<u>in response to</u> detecting a substantially stationary position since last known location coordinate measurement," as the limitation also requires. There appears to be no record evidence or testimony about this issue, and Patent Owner has not had an opportunity to respond to Petitioner's contentions. Thus, in subsequent papers, the parties should address whether a POSITA would have understood paragraphs 32 and 37 (and other relevant paragraphs) of the '905 application[18] to disclose these aspects of the proposed substitute claims.

PG 7. In its Revised Motion, Patent Owner states:

> Of note, claim 21 of the '905 application recites, in part, "a battery power monitor configured to activate and deactivate at least one portion of signaling circuitry in response to the accelerometer circuitry detecting a substantially stationary position of the electronic tracking device since last known location coordinate measurement." Ex. 2015 at p. 20. It is well known that an originally filed claim may be fully self-supporting for § 112 purposes.

[18] The '619 patent issued from Application No. 13/356,643 ("the '643 application"; Ex. 2018), and it claims priority to Application No. 11969,905 ("the '905 application"; Ex. 2015). Ex. 1001, codes (21), (62).

RMTA 4–5. In addition, in its table identifying written description support, Patent Owner adds the corresponding quotation from the ’905 application and also adds a quotation from a similar portion of the ’643 application. *Compare* MTA 6, 12, 17, *with* RMTA 6–7, 13, 19; *see also infra* § III.E.4 (addressing written description support). These arguments are directly responsive to the concern identified by the Preliminary Guidance.

Also, Patent Owner amends claim 31 to add a limitation specifying that the claimed "detecting" is performed "by the accelerometer circuitry." RMTA 29. Patent Owner explains that the relied-upon language from the priority documents includes this requirement, and Patent Owner states that the amendment is made "[i]n order to ensure written description support." RMTA Reply 9–10.

Petitioner argues that the amendment is not "provided in a manner responsive to the Board's § 112 issues," as required by the MTA Pilot Program Notice. RMTA Sur-reply 9–10. Petitioner observes that "[n]ot once in its RMTA did Patent Owner refer to the Board's Preliminary Guidance or the written description issue raised by the Board." *Id.* at 9.

Although we would have preferred it if Patent Owner had directly addressed the propriety of this amendment in its Revised Motion to Amend (*see* RMTA), we are nonetheless persuaded by Patent Owner's reply argument that the amendment was made in a manner responsive to the Preliminary Guidance. In particular, Patent Owner persuasively argues that the amendment to proposed substitute claim 31 is designed to address a potential written description issue in this claim. *See* RMTA Reply 9–10.

Accordingly, we are persuaded that the amendment to proposed substitute claim 31 and Patent Owner's written description arguments are proper.

3. *Obviousness Arguments*

In the Revised Motion to Amend, Patent Owner argues that the Petition's original references (Miranda-Knapp and Miller) are not properly combined and also fail to teach elements 21[c], 31[d], and 40[c] of the proposed substitute claims. *See* RMTA 21–24. These elements of the proposed substitute claims are substantially the same as elements found in original claims 1 and 20. *Compare id.* (arguing that the references do not teach an accelerometer detecting whether the device is in a substantially stationary position), *with* Ex. 1001, 10:31–36 (original claim 1 recites "accelerometer circuitry detecting a substantially stationary position of the electronic tracking device"), 12:33–38 (same in original claim 20); *see also* RMTA 26, 31–32 (not amending this claim language). Petitioner contends that these arguments are improper. RMTA Opp. 11–12, 14–15 (citing MTA Pilot Program Notice); *see also* RMTA Sur-reply 9–10.

We determine that these obviousness arguments are not properly included in the Revised Motion to Amend because they are not responsive to any issue raised in either the Preliminary Guidance or Petitioner's original Opposition to the Motion to Amend. *See* MTA Pilot Program Notice 9498.

First, the arguments in the Revised Motion to Amend are not responsive to any issue raised in Petitioner's original Opposition. That paper does not discuss elements 21[c], 31[d], and 40[c] or the combinability of Miranda-Knapp and Miller; rather, it simply refers back to the Petition for these topics. Specifically, for elements 21[c] and 31[d], the original Opposition only states:

> As set forth in the Petition, *Miranda-Knapp* and *Miller* render obvious Claims 1 and 11 of the ’619 Patent. *Petition* (Paper 1), 13-20, 23-43, 54-58. For the same reasons set forth in the Petition, the *Miranda-Knapp/Miller/Zhou* combination renders obvious claims 21[P], [21(a)], [21(c)], 31[P], [31(a)], [31(d)], and 31(e) of the ’619 Patent. *Id.*; *Suppl. Dec.*, ¶ 26.

MTA Opp. 9. For element 40[c], the original Opposition only states:

> As set forth in the Petition, the *Miranda-Knapp/Miller* combination renders obvious the original limitations of Claim 20. *Petition*, 57-58. For the same reasons set forth in the Petition, the *Miranda-Knapp/Miller/Zhou* combination renders obvious claims 40[P], [40(a)], and [40(c)]. *Id.; Suppl. Dec.*, ¶ 52.

Id. at 21. In fact, Patent Owner’s obviousness arguments similarly refer to the same cited portions of the Petition, not Petitioner’s original Opposition. RMTA 21–23 (citing Pet. 29–39); *see also* RMTA Reply 3–9.[19]

Second, these arguments are not responsive to the Preliminary Guidance. That paper includes no reference to the teachings or combinability of Miranda-Knapp and Miller, aside from a passing reference to a contention in Patent Owner’s Motion to Amend. *See* PG 10. At the hearing, Patent Owner contended that its arguments are responsive to the Preliminary Guidance because the Preliminary Guidance found that Petitioner had established a reasonable likelihood of success on its obviousness grounds. Tr. 108:23–109:19. We disagree with that overly generalized assertion. Arguments must be made “in a manner that is

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[19] In the RMTA Reply, Patent Owner cites “*Opp.*,” but this refers to Petitioner’s Opposition *to the Revised Motion* (Paper 33)), not the original Opposition to the Motion to Amend (Paper 25).

responsive to issues raised in the preliminary guidance" or opposition. MTA Pilot Program Notice 9498. Patent Owner identifies no "issue[] raised in the preliminary guidance" to which it is responding, and we do not agree that Patent Owner's arguments are "in a manner responsive" to the Preliminary Guidance's determination of a reasonable likelihood of success. *Id.* Indeed, the relevant portion of the briefing makes no reference to the Preliminary Guidance. *See* RMTA 21–24; RMTA Reply 3–9. Moreover, Patent Owner identifies no other potential justification for these arguments (*see* RMTA Reply; *see also* RMTA), and we discern none.

Accordingly, we determine that the obviousness arguments presented by Patent Owner in the Revised Motion to Amend (*see* RMTA 21–24) are improper, so we decline to consider them. As a result, we also do not consider Petitioner's responses to those improper arguments or Patent Owner's reply on this topic. *See* RMTA Opp. 2–11; RMTA Reply 3–9; RMTA Sur-reply 1–9.[20]

D. Claim Construction

Patent Owner contends that the terms in the proposed substitute claims do not require construction. RMTA 20. *But see* MTA 18–20 (addressing the construction of newly added limitations). Petitioner does not propose a construction of any term or phrase in these claims. *See* MTA

[20] Moreover, even if the obviousness arguments presented in the Revised Motion were considered proper, Patent Owner also presents arguments in its Reply that were not advanced in the Revised Motion and are not fairly responsive to Petitioner's Opposition. *See* RMTA Reply 3–4 (arguing that Miranda-Knapp fails to teach activating circuitry), 6–7 (distinguishing substantially stationary from true rest). These arguments are untimely.

Opp.; RMTA Opp. We need not expressly construe any claim terms or phrases to resolve the parties' dispute. *See Nidec Motor*, 868 F.3d at 1017; *accord* PG 9 (making same determination).

E. Statutory and Regulatory Requirements

"Before considering the patentability of any substitute claims, . . . the Board first must determine whether the Motion to Amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121." *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15, 4–8 (PTAB Feb. 25, 2019) (precedential). Specifically, Patent Owner must demonstrate: (1) the amendment proposes a reasonable number of substitute claims; (2) the amendment responds to a ground of unpatentability involved in the trial; (3) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter; and (4) the proposed claims are supported in the original disclosure. *See* 35 U.S.C. § 316(d); 37 C.F.R. § 42.121.

We are persuaded that Patent Owner has satisfied these requirements.

1. Reasonable Number of Substitute Claims

Patent Owner contends that its motion proposes a reasonable number of substitute claims because it proposes one substitute claim for each challenged claim. RMTA 4. Petitioner does not dispute Patent Owner's contention. *See* RMTA Opp.; *see also* MTA Opp.

We are persuaded that Patent Owner proposes a reasonable number of substitute claims because it proposes one substitute claim for each challenged claim. *See Lectrosonics*, Paper 15 at 4 ("There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim."); *see also* 37 C.F.R. § 42.121(a)(3).

2. *Respond to a Ground of Unpatentability*

Patent Owner contends that its motion responds to a ground of unpatentability. RMTA 3; *see also* MTA 21–25 (addressing why added limitations distinguish over cited references). Petitioner does not dispute Patent Owner's contention. *See* RMTA Opp.; *see also* MTA Opp.

We determine that the proposed amendments are responsive to a ground of unpatentability involved in this trial because the amendments specify that the claimed displacements are associated with an *individual's* movements, whereas the original claims were found to be unpatentable over the combination of Miranda-Knapp and Miller based on its teaching of displacements associated with an *object's* movements (*e.g.*, Pet. 23). Also, as discussed above, we are persuaded that the additional amendment to claim 31 (adding "by the accelerometer circuitry") is permissible to address a potential written description issue. *See Lectrosonics*, Paper 15 at 5–6 ("[O]nce a proposed claim includes amendments to address a prior art ground in the trial, a patent owner also may include additional limitations to address potential § 101 or § 112 issues, if necessary.").

3. *Scope of the Claims*

Patent Owner asserts that the proposed substitute claims are narrower than the corresponding original claims because the amendments "retain all features of the original claims" and "add only narrowing features." RMTA 2–3. Petitioner does not dispute Patent Owner's contention. *See* RMTA Opp.; *see also* MTA Opp.

The amendments replace claim language reciting "movements of an object or individual" with "movements of an individual" (RMTA 26, 29), or otherwise add new limitations in the proposed substitute claims (*id.* at 29, 31). Accordingly, we are persuaded that the proposed substitute claims do not enlarge the scope of the claims.

4. Support in the Original Disclosure

A motion to amend may not introduce new matter. 35 U.S.C. § 316(d); 37 C.F.R. § 41.121(a)(2)(ii). "New matter is any addition to the claims without support in the original disclosure." *Lectrosonics*, Paper 15 at 7 (citing *TurboCare Div. of Demag Delaval Turbomach. v. Gen. Elec. Co.*, 264 F.3d 1111, 1118 (Fed. Cir. 2001)). To this end, the motion to amend must "set forth written description support in the originally filed disclosure of the subject patent for each proposed substitute claim, and also set forth support in an earlier filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought." *Id.* (citing 37 C.F.R. § 42.121(b)(1)–(2)).

Patent Owner contends that the proposed substitute claims are supported by the '643 application and the '905 application (RMTA 4), and Patent Owner provides a table identifying each claim limitation and the corresponding support in both applications by paragraph or by page and line number (*id.* at 5–19).

Petitioner does not dispute Patent Owner's contentions in its Opposition to the Revised Motion to Amend. *See* RMTA Opp. Previously, Petitioner argued that the proposed substitute claims lacked written description support for three phrases: "transceiver circuitry" (MTA Opp. 3–4), "activat[ing] and deactivat[ing] at least one portion of signaling circuitry in response to . . . detecting a substantially stationary position of the electronic tracking device since last known location coordinate measurement" (*id.* at 4–7), and "battery power monitor" (*id.* at 7–8). In our Preliminary Guidance, we explained why we do not agree with these arguments (*see* PG 4–7), except that we "question[ed]" the sufficiency of the disclosure for "activating and deactivating signaling circuitry 'in response to detecting a substantially stationary position since last known location coordinate measurement,'" as recited in proposed substitute claims 21, 31, and 40 (*id.* at 6–7 (referencing MTA Opp. 6–7)). Patent Owner's Revised Motion to Amend addresses this concern by pointing to a claim in the original '905 application that recites a commensurate limitation. RMTA 4–5 (stating that "[i]t is well known that an originally filed claim may be fully self-supporting for § 112 purposes"); *see also id.* at 7, 13, 19 (citing Ex. 2015, 20:20–23; Ex. 2018, 21). This argument is persuasive. Petitioner does not respond to our analysis in the Preliminary Guidance or to Patent Owner's additional written description arguments. *See* RMTA Opp.

Accordingly, we are persuaded that Patent Owner has shown that the '643 and '905 applications each provide written description support for the proposed substitute claims.

F. Petitioner's Challenges to the Proposed Substitute Claims

"A petitioner bears the burden of persuasion to show, by a preponderance of the evidence, that any proposed substitute claims are unpatentable." 37 C.F.R. § 42.121(d)(2); *see also Lectrosonics*, Paper 15 at 4 (citing *Aqua Prods. Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017); *Bosch Auto. Serv. Sols. LLC v. Iancu*, 878 F.3d 1027 (Fed. Cir. 2017)). In determining whether a petitioner has proven unpatentability of the proposed substitute claims, the Board focuses on "arguments and theories raised by the petitioner in its petition or Opposition to the Motion to Amend." *Nike, Inc. v. Adidas AG*, 955 F.3d 45, 51 (Fed. Cir. 2020).

We are persuaded that Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 21–40 would have been obvious; however, Petitioner has not shown that the proposed substitute claims 21–40 lack written description support.

1. Written Description

As noted above (*see supra* § III.E.4), in its original Opposition, Petitioner contended that proposed substitute claims 21–40 fail to comply with the written description requirement. MTA Opp. 3–8. In our Preliminary Guidance, we stated that "it does not appear, on this record, that Petitioner has shown a reasonable likelihood that the Specification lacks adequate written description" for the identified claim limitations, except that "we [did] not take a position on Petitioner's contention that the Specification lacks adequate written description support for activating and deactivating 'in response to the accelerometer circuitry detecting a substantially stationary position of the electronic tracking device since last known location coordinate measurement,' as the substitute claims also require." PG 8 (citing *id.* at 5–7). In its Revised Motion to Amend, Patent Owner identifies written description support for that remaining issue. *See supra* § III.E.4 (citing RMTA 4–5, 7, 13, 19 (citing Ex. 2015, 20:20–23; Ex. 2018, 21)). And, in its Opposition to the Revised Motion to Amend, Petitioner does not respond to our analysis in the Preliminary Guidance or Patent Owner's additional arguments regarding written description support. *See* RMTA Opp.

Accordingly, for the reasons previously explained in the Preliminary Guidance, and given the additional support identified by the Patent Owner in the Revised Motion to Amend, we determine that Petitioner has not shown, by a preponderance of the evidence, that any of proposed substitute claims 21–40 are unpatentable for failing to comply with 35 U.S.C. § 112 ¶ 1.

2. Obviousness

Petitioner contends that proposed substitute claims 21–40 are unpatentable as obvious based on the following grounds (*see* MTA Opp. 8–25; PG 9; *see also* RMTA Opp. 2–3):

Claim(s) Challenged	**35 U.S.C. §**	**Reference(s)/Basis**
21, 25, 26, 28–31, 35, 36, 38–40	103(a)	Miranda-Knapp, Miller, Zhou[21]
22	103(a)	Miranda-Knapp, Miller, Vaganov, Zhou
23, 24, 32–34	103(a)	Miranda-Knapp, Miller, Cervinka, Zhou
27, 37	103(a)	Miranda-Knapp, Miller, Herrero, Zhou

In particular, Petitioner relies upon its contentions from the Petition, argues that the newly-added limitations are taught by Zhou, and contends that it would have been obvious to add Zhou to the combinations of Miranda-Knapp and Miller. MTA Opp. 8–24.

As explained below, we are persuaded, by a preponderance of the evidence, that the subject matter of the proposed substitute claims would have been obvious over the asserted combinations of references.

[21] US 6,847,892 B2, issued Jan. 25, 2005 (Ex. 1076).

a. Summary of Zhou (Ex. 1076)

Zhou describes a device that locates and monitors an individual or object using a GPS system and sensors. *E.g.*, Ex. 1076, 2:62–67. In one embodiment, Zhou's device is worn by an individual. *Id.* at 4:62–5:2; *see also id.* at 6:25–40 (device may also be a single component rather than separate watch and belt components), 48:7–32 (contemplating monitoring an Alzheimer patient or a child with the device), 49:16–31 (contemplating monitoring athlete with device). Zhou teaches that its device includes an accelerometer whose output that can "indicate[] a fall." *Id.* at 5:24–32; *see also id.* at 3:12–15 (describing accelerometer), 27:66–28:23 (describing fall detection). The device also includes a GPS receiver to track the location of the individual wearing the device. *Id.* at 5:36–40.

b. Proposed Substitute Independent Claim 21

(1) Elements 21[pre], 21[a], and 21[c]

Petitioner contends that the combination of Miranda-Knapp and Miller teaches the preamble of proposed substitute claim 21, as well as elements 21[a] and 21[c], for the reasons explained for original claim 1. MTA Opp. 9 (citing Pet. 13–20, 23–43).

Patent Owner argues that the Miranda-Knapp and Miller are not properly combined and fail to teach element 21[c]. *See* RMTA 21–24; *see also* RMTA Sur-reply 3–9. However, as explained above, these arguments are not properly presented in a revised motion to amend. *See supra* § III.C.3. Thus, we do not consider them. Moreover, to the degree these arguments were properly presented with respect to claim 1, those arguments are not persuasive for the reasons explained above. *See supra* § II.D.1.d.

For the reasons explained above with respect to claim 1, we are persuaded that Miranda-Knapp teaches the language of the preamble and element 21[a], and that the combination of Miranda-Knapp and Miller teaches element 21[c]. *See supra* §§ II.D.1.a (preamble of claim 1), II.D.1.b (transceiver circuitry), II.D.1.d (battery power monitor). We note that this claim language has not been amended.

(2) Element 21[b] and Rationale to Combine

Element 21[b] recites: "accelerometer circuitry to measure displacements of the portable electronic tracking device, wherein the displacements comprise movements of an individual associated with the device." Petitioner points to Miranda-Knapp and Zhou for this claim language. MTA Opp. 10–17. Specifically, Petitioner relies on the Petition's showing that a person of ordinary skill in the art would have understood Miranda-Knapp to disclose an accelerometer 20 that measures accelerations associated with the movement and displacements of device 10. *Id.* at 10 (citing Pet. 20–23). Petitioner contends that Zhou teaches a portable device that includes an accelerometer used to detect movements of an individual wearing the portable tracking device "such as, for example, a human falling." *Id.* at 10–12 (citing Ex. 1076, 2:62–67, 3:12–15, 5:24–31, 6:25–41).

In addition, Petitioner contends that a person of ordinary skill in the art would have been motivated to modify the Miranda-Knapp–Miller combination to detect human falls, as taught by Zhou, in order to enhance the functionality of the system. MTA Opp. 12–17 (citing Ex. 1077 ¶¶ 31–39). Specifically, Petitioner points to Zhou's disclosure of using its device to monitor elderly individuals, children, and athletes engaging in extreme sports. *Id.* at 12–13 (citing Ex. 1076, 48:7–32, 49:16–31; Ex. 1077 ¶ 32). Mr. Andrews testifies that "the use of portable devices to measure displacements comprising human movement (including fall detection) was a well-known and common concept." Ex. 1077 ¶ 39 (citing *id.* ¶¶ 4–9 (identifying evidence in support)). Mr. Andrews further testifies that an ordinary artisan "would have recognized that, with the exception of potentially slightly different acceleration levels, there is no meaningful difference between using accelerometer measurements for detecting a device fall in comparison to using accelerometer measurements for detecting the fall of an individual wearing the device." *Id.* ¶ 35. In addition, Mr. Andrews testifies that the ordinary artisan would have had a reasonable expectation of success in making the proposed modification. *Id.* ¶ 36; *see also id.* ¶¶ 33–34, 37 (identifying similar components and function in Zhou and either Miranda-Knapp or Miller).

Patent Owner does not dispute Petitioner's contentions for this claim element, or Petitioner's proposed combination of Zhou with the other references. *See* RMTA; RMTA Reply; *see also* Tr. 109:20–110:7.

We are persuaded that Petitioner has shown that the combination of Miranda-Knapp and Zhou teaches element 21[b]. In particular, as explained in the context of claim 1 (*see supra* § II.D.1.c), we are persuaded that a person of ordinary skill in the art would have understood Miranda-Knapp to disclose that accelerometer 20 measures accelerations associated with displacements of portable device 10. *See, e.g.*, Ex. 1004, 2:52–57, 3:2–10, 4:4–32; Ex. 1003 ¶¶ 135–137. Zhou describes an embodiment where "belt unit 204 includes a fall-down sensor comprising a two-axis accelerometer, the output of which is interpreted by the belt unit's microprocessor."

Ex. 1076, 5:24–27. "[T]he accelerometer output indicates a fall (or sudden change in posture) when based on the user's sudden change in acceleration and sudden deceleration or stop." *Id.* at 5:28–31. Accordingly, we are persuaded that Zhou discloses an accelerometer that measures displacements of a tracking device, wherein the displacements comprise movements of an individual associated with the device. *See also, e.g.*, *id.* at 3:12–15, 4:62–5:6, 6:25–41, 27:66–28:23; Ex. 1077 ¶ 29.

In addition, Mr. Andrews testifies that a person of ordinary skill in the art would have been motivated to add Zhou's detection of human falls to the combination of Miranda-Knapp and Miller, and that the ordinary artisan would have had a reasonable expectation of success in doing so. Ex. 1077 ¶¶ 31–39. We credit his testimony because it is logical, substantiated with analysis, and supported by the cited evidence. Accordingly, we are persuaded that a person of ordinary skill in the art would have been motivated to combine Miranda-Knapp, Miller, and Zhou as proposed by Petitioner.

(3) Element 21[d]

Finally, element 21[d] recites: "processor circuitry configured to process the displacements, to associate the displacements with a specified pattern, and to generate an alert message in response to the specified pattern." Petitioner contends that the proposed combination of Miranda-Knapp, Miller, and Zhou also teaches associating displacements comprising human movement with a specified pattern, generating an alert message in response to specified pattern, and processing the displacements. Opp. 17–21. Petitioner also contends that a person of ordinary skill in the art would have been motivated to combine Miranda-Knapp, Miller, and Zhou for the same reasons as discussed in element 21[b]. *Id.* at 18–19.

Patent Owner does not dispute Petitioner's contentions for this claim element. *See* RMTA; RMTA Reply.

Petitioner explains why, in the proposed combination including Zhou, Miranda-Knapp would still teach this claim limitation. Thus, for the reasons explained above and with respect to claim 1, we are persuaded that Petitioner has shown that the proposed combination of Miranda-Knapp, Miller, and Zhou teaches element 21[d] and that a person of ordinary skill in the art would have been motivated to combine Miranda-Knapp, Miller, and Zhou. *See supra* §§ II.D.1.e (addressing "processor circuitry" element of claim 1), III.F.2.b.2 (addressing rationale to combine references). We note that this claim language has not been amended.

(4) Conclusion

Petitioner has shown that each limitation of proposed substitute claim 21 is taught by the proposed combination of Miranda-Knapp, Miller, and Zhou, and that it would have been obvious to combine Miranda-Knapp, Miller, and Zhou in the manner proposed. Accordingly, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claim 21 would have been obvious over Miranda-Knapp, Miller, and Zhou.

c. Proposed Substitute Independent Claims 31 and 40

The analysis of proposed substitute independent claims 31 and 40 is substantially the same as the analysis of proposed substitute independent claim 21.

In particular, Petitioner contends that the combination of Miranda-Knapp and Miller teaches the preamble of claims 31 and 41, as well as elements 31[a], 31[d], 31[e], 40[a] and 40[c] for the reasons explained in the Petition. MTA Opp. 9 (citing Pet. 54–58), 21 (citing Pet. 57–58). Further, Petitioner contends that the proposed combination of Miranda-Knapp, Miller, and Zhou teaches the remaining limitations of these claims—i.e., elements 31[b], 31[c], 30[b], and 40[d]—and that that it would have been obvious to combine these references. *Id.* at 10–24. Petitioner's analysis of these claims relies on substantially the same analysis and contentions as that provided for proposed substitute claim 21 and the original independent claims.

Patent Owner does not dispute these contentions, other than as noted for proposed substitute claim 21. *See* RMTA; RMTA Reply.

For the reasons explained above with respect to the original independent claims[22] and proposed substitute claim 21, we are persuaded that the combination of Miranda-Knapp, Miller, and Zhou teaches each limitation of proposed substitute claims 31 and 40, and that that it would have been obvious to combine these references. *See supra* §§ II.D.1.f (claims 11 and 20), III.E.2.b (claim 21). Accordingly, we determine that Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 31 and 40 would have been obvious over Miranda-Knapp, Miller, and Zhou

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[22] In element 31[d], Patent Owner adds a requirement that the detection of a substantially stationary position be performed "by accelerometer circuitry." Original independent claims 1 and 20 already include this requirement, so we rely on our prior analysis of those limitations.

d. Proposed Substitute Dependent Claims 22–30 and 32–39

Proposed substitute claims 22–30 depend from proposed substitute claim 21 and are the same as original claims 2–10 except that the claim dependencies have been updated. Proposed substitute claims 32–39 depend from proposed substitute claim 31 and are the same as original claims 12–19 except that the claim dependencies have been updated.

We have analyzed all limitations of proposed substitute claims 22–30 and 32–39 above, and we find that Petitioner has shown that the limitations recited by these claims are taught by the proposed combination of references. *See supra* §§ II.D.2–9. In addition, we have explained why we are persuaded that a person of ordinary skill in the art would have been motivated to combine Miranda-Knapp and Miller with Vaganov (*see supra* §§ II.D.2), Cervinka (*see supra* §§ II.D.3–4), Herrero (*see supra* §§ II.D.7), and Zhou (*see supra* § III.E.2.b).

Patent Owner does not separately address the patentability of any of these dependent claims. *See* RMTA; RMTA Reply.

We are persuaded that the subject matter of these substitute dependent claims would have been obvious over the identified combination of references. In particular, we determine that Petitioner has shown, by a preponderance of the evidence: the subject matter of proposed substitute claims 25, 26, 28–30, 35, 36, 38, and 39 would have been obvious over the combination of Miranda-Knapp, Miller, and Zhou; the subject matter of proposed substitute claim 22 would have been obvious over the combination of Miranda-Knapp, Miller, Vaganov, and Zhou; the subject matter of proposed substitute claims 23, 24, and 32–34 would have been obvious over the combination of Miranda-Knapp, Miller, Cervinka, and Zhou; and the subject matter of proposed substitute claims 27 and 37 would have been obvious over the combination of Miranda-Knapp, Miller, Herrero, and Zhou.

IV. CONCLUSION[23]

Based on the evidence presented with the Petition, the evidence introduced during the trial, and the parties' respective arguments, Petitioner has shown by a preponderance of the evidence that claims 1–20 are unpatentable. In addition, Patent Owner's Revised Motion to Amend is denied because Petitioner has shown by a preponderance of the evidence that proposed substitute claims 21–40 would have been obvious.

In summary:

[23] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*, 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).

Claim(s)	**35 U.S.C. §**	**References/ Basis**	**Claims Shown Unpatentable**	**Claims Not Shown Unpatentable**
1, 5, 6, 8–11, 15–16, 18–20	103(a)	Miranda-Knapp, Miller	1, 5, 6, 8–11, 15–16, 18–20	
2	103(a)	Miranda-Knapp, Miller, Vaganov	2	
3, 4, 12–14	103(a)	Miranda-Knapp, Miller, Cervinka	3, 4, 12–14	
7, 17	103(a)	Miranda-Knapp, Miller, Herrero	7, 17	
Overall Outcome			1–20	

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	21–40
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	21–40
Substitute Claims: Not Reached	

V. ORDER

Accordingly, it is

ORDERED that claims 1–20 of U.S. Patent No. 8,421,619 B2 are determined to be unpatentable;

FURTHER ORDERED that Patent Owner's Revised Motion to Amend (Paper 30) is *denied*; and

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

FOR PETITIONER:

Jennifer Bailey
Adam Seitz
Kelly Hughes
ERISE IP, P.A.
jennifer.bailey@eriseip.com
adam.seitz@eriseip.com
kelly.hughes@eriseip.com

FOR PATENT OWNER:

Shaun Gregory
Brian S. Seal
TAFT STETTINIUS & HOLLISTER LLP
sgregory@taftlaw.com