

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.

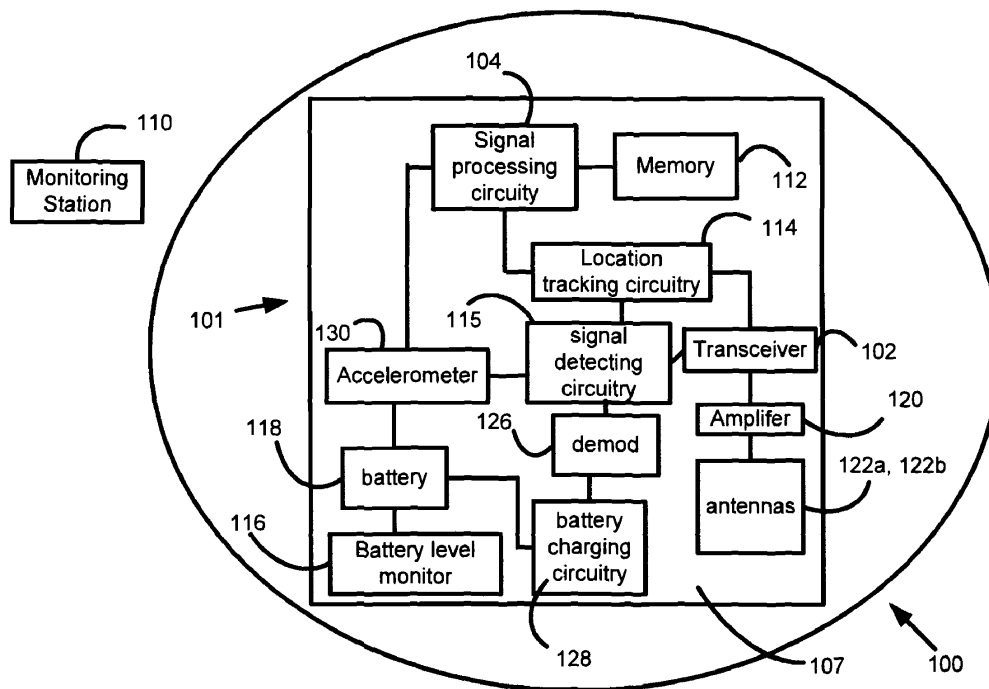


Figure 1

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.

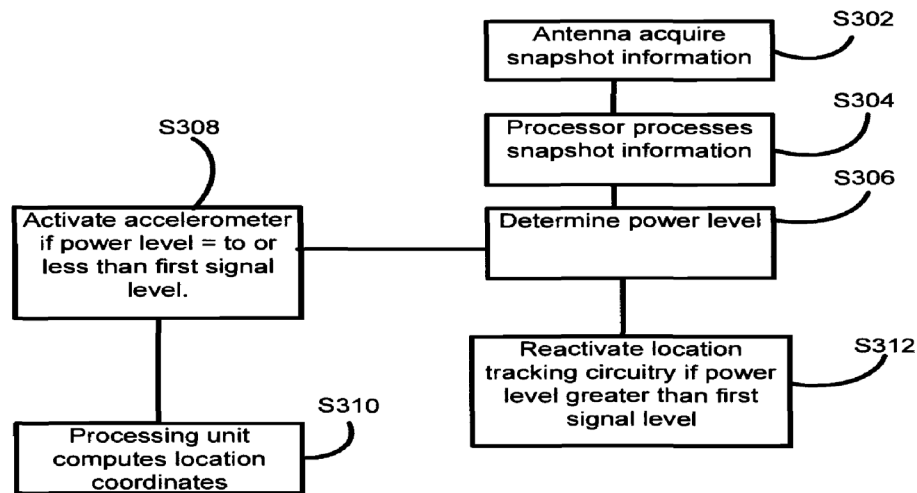


Figure 3

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.

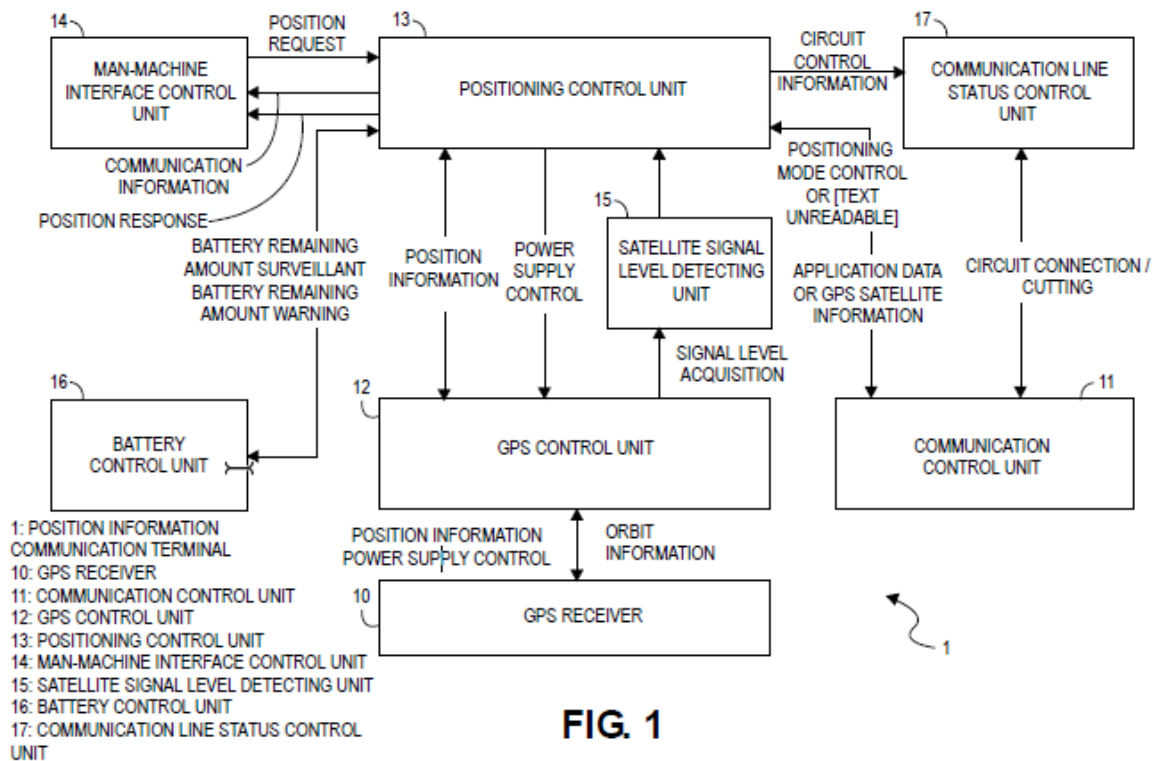


FIG. 1

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.

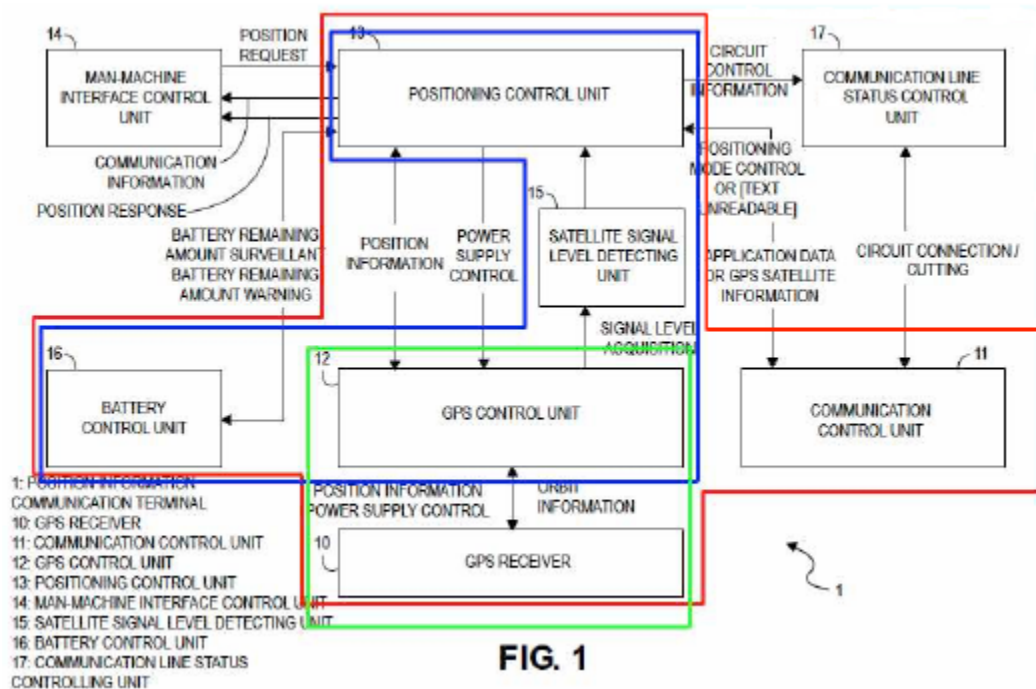


FIG. 1

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 preamble⁹ 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.

¹¹ Mr. Andrews testifies that, in order to check the signal level, at least the radio part of the GPS receiver would 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.

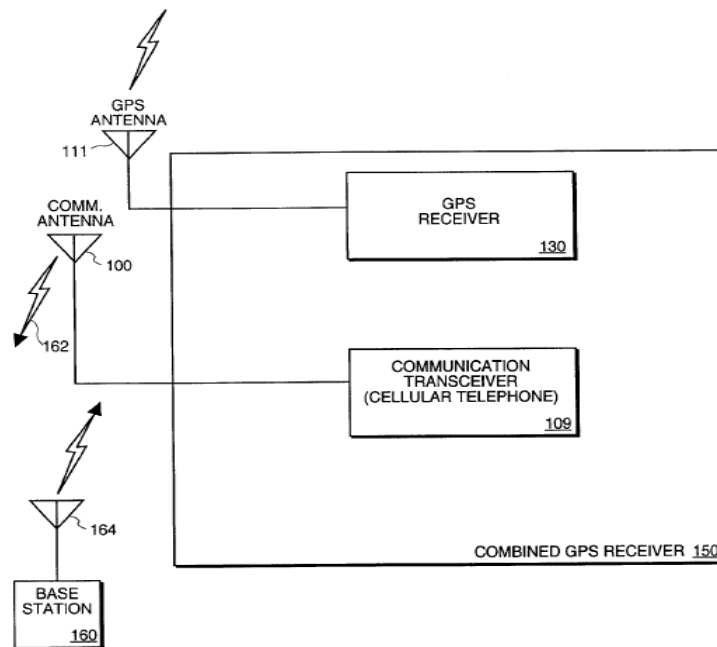


FIG. 1

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, 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

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,

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

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.

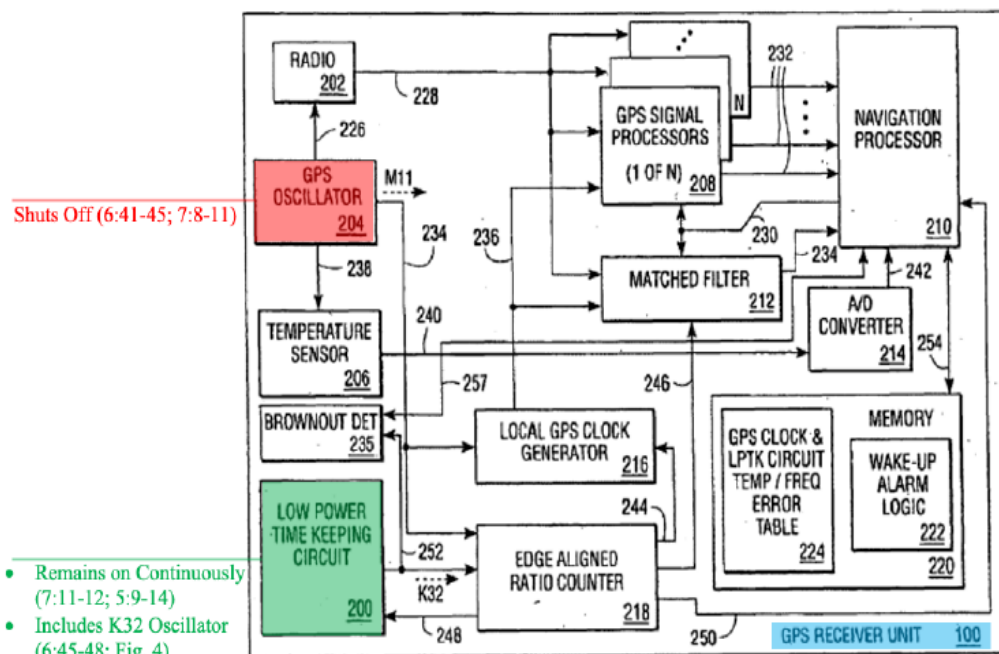
We agree with Petitioner that the combination of Sakamoto, Levi, and Gronemeyer discloses deactivating a portion of the electronic tracking device to place it in a low power mode with that portion (specifically, the low power clock and K32 oscillator in the LPTK circuit) continuing to consume power. Further, Petitioner provides persuasive evidence that one

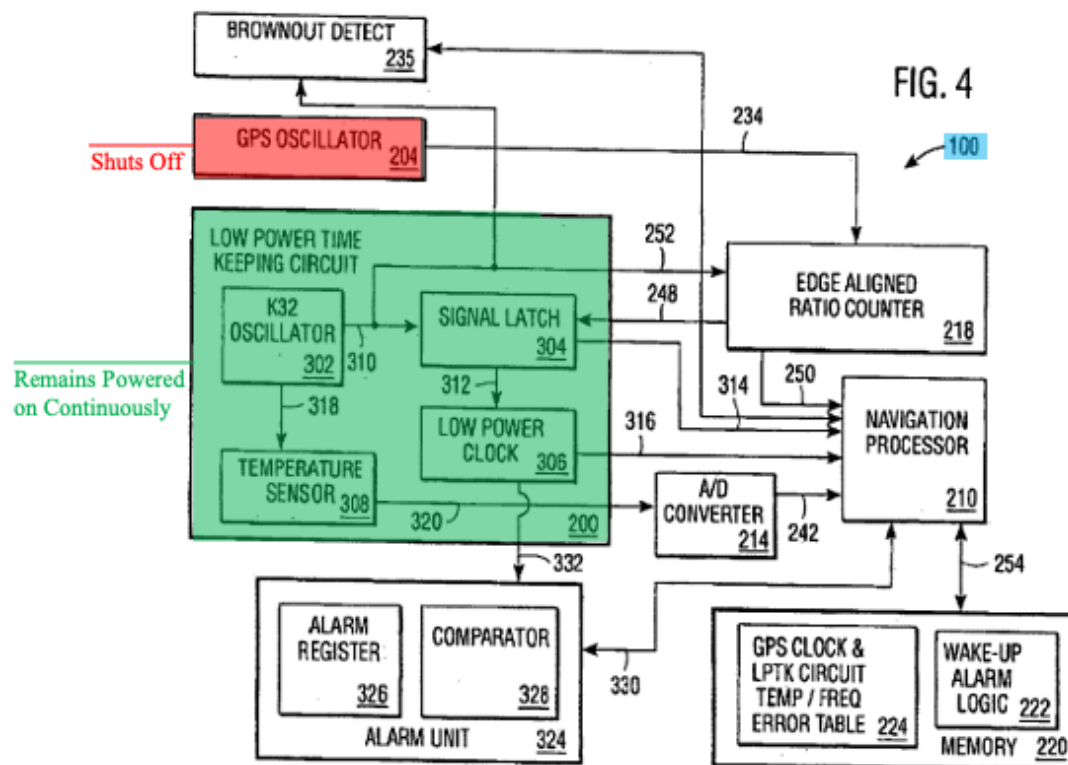
of ordinary skill in the art would have been motivated to modify the Sakamoto–Levi combination to include Gronemeyer’s low power operation.

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).





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 circuitry 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).

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Patent 8,421,618 B2

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