NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

LBT IP I LLC,
Appellant

v.

APPLE INC.,
Appellee

2022-1613, 2022-1614, 2022-1615, 2022-1616, 2022-1617

Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2020-01189, IPR2020-01190, IPR2020-01191, IPR2020-01192, IPR2020-01193.

Decided: June 9, 2023

BRIAN SHERWOOD SEAL, Taft Stettinius & Hollister LLP, Washington, DC, argued for appellant. Also argued by SHAUN DARRELL GREGORY.

ADAM PRESCOTT SEITZ, Erise IP, P.A., Overland Park, KS, argued for appellee. Also represented by JENNIFER C. BAILEY, CLIFFORD T. BRAZEN; ABRAN J. KEAN, Greenwood Village, CO.

Before MOORE, *Chief Judge*, LOURIE and STOLL, *Circuit Judges*.

MOORE, *Chief Judge*.

LBT IP I LLC (LBT) appeals five *inter partes* review decisions of the Patent Trial and Appeal Board holding various claims of U.S. Patent Nos. 8,497,774; 8,542,113; 8,102,256; 8,421,618; and 8,421,619 unpatentable. For the following reasons, we affirm in part, reverse in part, vacate in part, and remand in part.

BACKGROUND

LBT's patents relate to improvements in battery power conservation of portable electronic tracking devices. *See, e.g.*, '774 patent at 3:55–4:58. The '113, '256, and '618 patents[1] disclose electronic tracking devices that include location tracking circuitry (e.g., GPS circuitry) and an accelerometer to measure location coordinates without requiring GPS signaling. *See* '618 patent at Fig. 1, 5:4–10. When the strength of the device's GPS signal is below a predetermined threshold value—for example, when the device's access to GPS satellites is partially or fully blocked—portions of the location tracking circuitry may be deactivated to conserve battery power. *Id.* at 5:1–14, 6:66–7:11, 7:62–8:12. The device may subsequently reactivate the location tracking circuitry when the signal level is above the predetermined signal level. *Id.* at 6:66–7:11, 9:48–54.

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[1] LBT raises the same issue on appeal with respect to the '113, '256, and '618 patents. The relevant disclosures in these patents and the Board's relevant analyses in the final written decisions are materially the same. For simplicity, we cite only to the '618 patent and the corresponding final written decision.

The '774 patent discloses an electronic tracking device that, to conserve power, may intermittently deactivate the GPS receiver in response to a low detected battery level. *See* '774 patent at 11:44–53, 13:52–67. The claimed device also permits the user to make certain power level adjustments and select between modes with higher update rates but shorter battery lives and modes with lower update rates but longer battery lives. *Id.* at 13:52–14:57; *see also id.* at Fig. 4. This feature allows the user "to select an appropriate update[d] set of network communication signaling protocols to achieve a desired user defined battery operating environment." *Id.* at 11:58–63.

The '619 patent discloses an electronic tracking device including an accelerometer and GPS receiver. '619 patent at 5:2–6, 5:50–6:17. The accelerometer is used to detect movement and to determine location coordinates when GPS signals are not available. *Id.* at 5:3–6, 8:13–15. If the accelerometer determines the tracking device is stationary for a period of time, a last-known location is sent without accessing the GPS signaling circuitry. *Id.* at 8:13–39. Additionally, the GPS receiver may be activated or deactivated based on that determination. *Id.* at 6:54–65, 8:13–19. This approach conserves battery power by reducing use of the GPS receiver when the device is at rest. *Id.* at 8:29–39.

Apple Inc. (Apple) filed five petitions for *inter partes* review challenging claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent; claims 1–20 of the '113 patent; claims 8–10 of the '256 patent; claims 1–24 of the '618 patent; and claims 1–20 of the '619 patent as unpatentable. The Board instituted each petition and issued final written decisions holding all challenged claims unpatentable. *Apple Inc. v. LBT IP I LLC* (*'774 Decision*), No. IPR2020-01189, 2022 WL 685040 (P.T.A.B. Mar. 2, 2022); *Apple Inc. v. LBT IP I LLC* (*'113 Decision*), No. IPR2020-01190, 2022 WL 685081 (P.T.A.B. Mar. 2, 2022); *Apple Inc. v. LBT IP I LLC* (*'256 Decision*), No. IPR2020-01191, 2022 WL 683992 (P.T.A.B.

Mar. 2, 2022); *Apple Inc. v. LBT IP I LLC* (*'618 Decision*), No. IPR2020-01192, 2022 WL 683994 (P.T.A.B. Mar. 2, 2022); *Apple Inc. v. LBT IP I LLC* (*'619 Decision*), No. IPR2020-01193, 2022 WL 685082 (P.T.A.B. Mar. 2, 2022).

Specifically, the Board determined the challenged claims of the '113, '256, and '618 patents would have been obvious over Japanese Patent Application Publication No. 2004-37116A (Sakamoto) in view of various combinations of secondary references. *'618 Decision*, at *27. The Board determined the challenged claims of the '774 patent would have been obvious over Sakamoto. *'774 Decision*, at *26. Finally, the Board determined the challenged claims of the '619 patent would have been obvious over prior art combinations that all included U.S. Patent No. 6,940,407 (Miranda-Knapp) and U.S. Patent Application Publication No. 2006/0119508A1 (Miller). *'619 Decision*, at *30. LBT appeals. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

LBT raises three distinct challenges on appeal. First, LBT argues the Board's finding that Sakamoto discloses the activation/reactivation limitation in certain claims of the '618, '256, and '113 patents is not supported by substantial evidence. Second, LBT argues the Board improperly construed the term "multitude" in claim 8 of the '774 patent. Finally, LBT argues the Board's finding that a skilled artisan would have been motivated to combine Miranda-Knapp and Miller as claimed in the '619 patent is not supported by substantial evidence. We address each argument in turn.

We review the Board's ultimate determination of obviousness de novo and its underlying findings of fact for substantial evidence. *Pers. Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 991 (Fed. Cir. 2017). What a prior art reference discloses and whether a skilled artisan would have been motivated to combine prior art references are questions of

fact. *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1364 (Fed. Cir. 2015). We review the Board's claim construction de novo and review any necessary subsidiary factual findings based on extrinsic evidence for substantial evidence. *Apple Inc. v. MPH Techs. Oy*, 28 F.4th 254, 259 (Fed. Cir. 2022).

I. THE '113, '256, AND '618 PATENTS

The Board determined claims 1–20 of the '113 patent; claims 8–10 of the '256 patent; and claims 1–24 of the '618 patent would have been obvious over Sakamoto in view of various combinations of secondary references. *'618 Decision*, at *27. Claim 1 of the '618 patent is representative for purposes of this appeal:

> 1. 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*; and
>
> processor circuitry configured to process the at least one portion of the receive communication signal.

'618 patent at claim 1 (emphasis added).

With respect to the activation/reactivation limitation,[2] the Board found Sakamoto discloses activating/reactivating the GPS receiver when it transitions from stop-position mode into normal sensitivity positioning mode or high sensitivity positioning mode in its "cycle set in advance" embodiment. *See '618 Decision*, at *7–12. LBT argues this finding is not supported by substantial evidence. We agree.

Sakamoto discloses a GPS positioning system that includes a portable terminal with a GPS receiver. J.A. 1321 ¶ 18. In one embodiment, the GPS signal level is periodically measured at a "cycle set in advance." J.A. 1323–24 ¶ 37. If the signal level is equal to or lower than a predetermined threshold value, then the system transitions to high sensitivity positioning mode, where the GPS receiver is operated constantly. J.A. 1319 ¶ 4; J.A. 1324 ¶ 38. If the signal level is equal to or higher than a predetermined threshold value, then it transitions to normal sensitivity positioning mode, in which the GPS receiver is operated only when necessary. J.A. 1319 ¶ 4; J.A. 1324 ¶ 38. Finally, if "the positioning cannot be performed when the signal level value is equal to or lower than a predetermined threshold value," then it transitions into stop-position mode, i.e., the GPS receiver stops position searching. J.A. 1324 ¶ 38.

It is undisputed that Sakamoto does not expressly disclose transitioning from stop-position mode into one of the other two positioning modes. *See '618 Decision*, at *11 ("Sakamoto may not explicitly identify moving out of the stop-position mode as a result of the cyclic signal level checking . . . ."); *see also* J.A. 1322 ¶ 27 (disclosing transition

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[2] All of the challenged claims in the '618 and '256 patents recite the activation/reactivation limitation, but only claims 3, 9, and 11 of the '113 patent recite this limitation.

between normal sensitivity positioning mode and high sensitivity positioning mode); J.A. 1324 ¶ 38 (disclosing transition into stop-position mode). The Board and Apple thus relied on Apple's expert Mr. Andrews' testimony to fill in the gap in this disclosure. *'618 Decision*, at *10–12. Mr. Andrews testified that a skilled artisan would have understood that if Sakamoto's receiver is in stop-position mode and the periodically-measured signal level is greater than a predetermined threshold level, the GPS receiver reactivates by transitioning into normal or high sensitivity positioning mode. J.A. 6414–15 ¶ 138 (citing J.A. 1323–24 ¶¶ 37–38); J.A. 3636–37 ¶ 212. He also testified that a skilled artisan would have understood a device that transitioned into stop-position mode and never transitioned into one of the other positioning modes would be useless. J.A. 3637 ¶ 213; *see also* J.A. 1979 at 21:7–15 (Andrews deposition) ("[Sakamoto] doesn't contemplate that once the – once the GPS signal level went below that threshold, the system would turn off and never turn on again. That would be – that wouldn't be very practical."); J.A. 1982 at 24:4–10.

Although Apple does not purport to rely on inherency, its argument regarding Sakamoto's disclosure is substantively one of inherency. Apple concedes there is no explicit disclosure of a transition out of stop-position mode in Sakamoto, but nevertheless argues a skilled artisan would understand this transition is present in the cycle set in advance embodiment. In other words, Apple argues this transition is *inherently disclosed* in Sakamoto. "[T]o rely on inherency to establish the existence of a claim limitation in the prior art in an obviousness analysis," Apple must show the activation/reactivation limitation is "necessarily present" or "the natural result of the combination of elements explicitly disclosed by the prior art." *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1195–96 (Fed. Cir. 2014). Mr. Andrews' testimony fails to meet this standard for inherent disclosure. *See id.* at 1195.

In his deposition, for example, Mr. Andrews repeatedly used qualifying language such as "presumably," "maybe," and "might" when he explained that although the GPS receiver is deactivated when in the stop-position mode, a skilled artisan would understand Sakamoto turns on components of the GPS receiver to cyclically measure the signal level. *See, e.g.*, J.A. 1981–82 at 23:10–24:3 ("Well, Sakamoto doesn't describe how he determines that the signal level is above that threshold. *It's possible* that he periodically turns on the GPS receiver just briefly to check so that it's – most of the time it's off and every now and then he turns it on and looks, and if it's not above the level, he turns it back off, or *maybe* even just turns those components that he needs to use to examine the signal, and *it's possible* that he *might* leave some of the components on . . . . (emphases added)); *'618 Decision*, at *12 (relying on Mr. Andrews' deposition testimony to reject LBT's argument that because Sakamoto's GPS receiver is the only component that receives GPS signals, it cannot obtain the necessary signal required to move into a different mode when it is deactivated in stop-position mode). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *PAR*, 773 F.3d at 1195 (quoting *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981)).

Mr. Andrews provides no testimony explaining why the transition from stop-position mode into one of the other two positioning modes in response to a GPS signal *must necessarily be present* in Sakamoto's cycle set in advance embodiment. He opines that a skilled artisan would understand the device transitions out of stop-position mode because otherwise the device would be useless. *See* J.A. 3637 ¶ 213 (Andrews declaration); J.A. 1982 at 24:4–10 (Andrews deposition). But he fails to explain why this transition is necessarily present considering that Sakamoto teaches its GPS receiver can be *manually* reactivated after it has been placed in stop-position mode. J.A. 1321 ¶ 20. The fact that

the GPS receiver cannot automatically transition out of stop-position mode in the cycle set in advance embodiment does not render Sakamoto's device useless because the receiver can be turned on manually.

We conclude substantial evidence does not support the Board's finding that Sakamoto discloses the activation/reactivation limitation. Accordingly, we reverse the Board's obviousness determinations with respect to claims 1–24 of the '618 patent, claims 8–10 of the '256 patent, and claims 3, 9, and 11 of the '113 patent.[3]

II. THE '774 PATENT

The Board determined claims 1, 4–6, 8, 10, 13, and 15 of the '774 patent would have been obvious over Sakamoto. *'774 Decision*, at *26. On appeal, LBT challenges the Board's construction of "multitude of threshold values" as recited in independent claim 8 and dependent claims 10, 13, and 15. Claim 8 is representative and recites:

> 8. A local charging management device to manage electrical resource capability for

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[3] In a footnote, LBT argues that although independent claims 1, 7, and 17 of the '113 patent do not require activation/reactivation, we should also reverse the Board's obviousness determination with respect to those claims because the reduction of power required by these claims does not eliminate the ability of the invention to receive and measure the signal level for reactivation, as required by dependent claim 3. The Board rejected this argument because it is not commensurate with the scope of the claims—these claims recite reducing or adjusting the power to the primary location tracking circuitry, not reactivating the primary location tracking circuitry. *See '113 Decision*, at *7, *13, *16. We decline to disturb the Board's determination based on LBT's undeveloped footnote argument.

> an electronic tracking device that is tracked by at least one other tracking device comprising:
>
> a battery power level monitor;
>
> a charging unit; and
>
> an electrical power resource management component to adjust cycle timing of at least one of a request rate of location coordinate packets to a target host and a listen rate of the location coordinate packets responsive to an estimated charge level of the charging unit,
>
> wherein the battery power level monitor measures a power level of the charging unit and adjusts a power level applied to location tracking circuitry responsive to one or more signal levels, the power level comprising a *multitude of threshold values* determined by a user or system administrator to intermittently activate or deactivate the location tracking circuitry to conserve power of the charging unit in response to the estimated charge level of the charging unit.

'774 patent at claim 8 (emphasis added).

The Board construed "multitude" to mean two or more. *'774 Decision*, at *4–6. LBT argues the proper construction of "multitude" does not include two. We agree.

Claim terms are generally given their plain and ordinary meaning, which is the meaning one of ordinary skill in the art would ascribe to a term when read in the context of the claim, specification, and prosecution history. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1313–14 (Fed. Cir. 2005) (en banc). "There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts

as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Comput. Ent. Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

The plain and ordinary meaning of multitude in the '774 patent does not encompass two threshold values. The only example of a multitude of threshold values provided in the specification is Figure 4, which depicts 5–7 threshold values. '774 patent at Fig. 4 (threshold values represented by tick marks on active display 432); *id.* at 13:58–67 ("[T]he present invention has the capability of power level (e.g., battery power level 406) adjustments include *multitude of threshold values* (*see active display 432 of FIG. 4*) that is determined by user . . . to intermittently activate or deactivate location tracking circuitry . . . ." (emphasis added)).

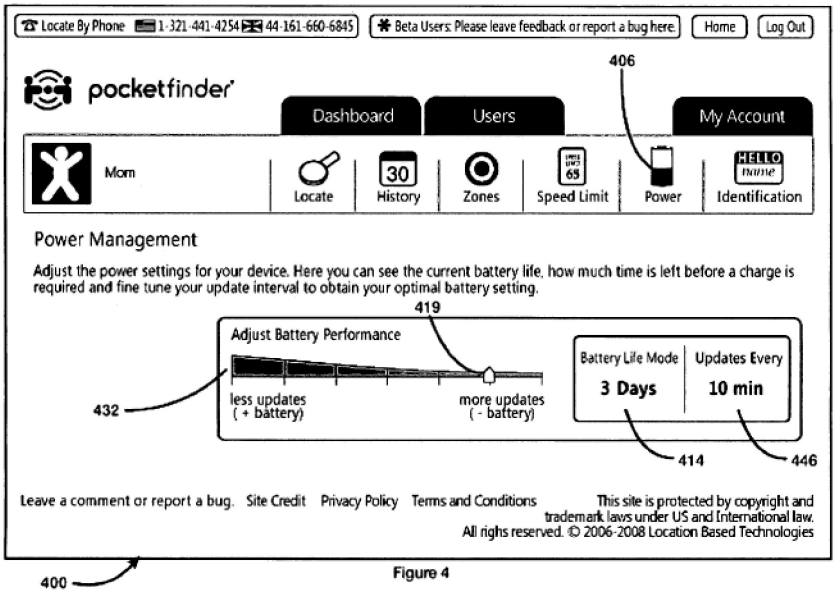

Figure 4

Nowhere does the specification contemplate as few as two threshold values. In concluding otherwise, the Board relied on the following passage: "Advantageously as compared to conventional tracking devices, user input request 430 adjusts value 419 to select an appropriate update set

of network communication signaling protocols to achieve a desired user defined battery operating environment, e.g., *obtain optimal battery life, obtain optimal update rate, tradeoffs between them*." *Id.* at 11:58–67 (emphasis added). According to the Board, this statement shows that "tradeoffs can be made between as few as two points: an endpoint where less updates are traded for better battery life, and an endpoint where worse battery life is traded for more updates." *'774 Decision*, at *5. While the Board may be correct that this isolated sentence is consistent with as few as two threshold values, this sentence must be read in the context in which it is used. This statement appears in column 11 of the specification, all of which discusses Figure 4. *See* '774 patent at 11:2–67 ("Referring to FIG. 4 . . . ."). Figure 4 clearly depicts 5–7 threshold values. Read in context, "optimal battery life" and "optimal update rate" refer to the end points on the active display in Figure 4, while the "tradeoffs between them" refer to the tick marks between the end points. *Id.* at 11:62–63; *see also id.* at 11:64 ("slider 432" can be positioned at "value 419" between the two end points). We therefore do not read this sentence as showing multitude includes two threshold values.

The Board also found certain dictionary definitions supported its construction of multitude as two or more. *'774 Decision*, at *6. To the extent the Board found the dictionaries show the plain and ordinary meaning of multitude is two or more, this finding is not supported by substantial evidence. The dictionaries define multitude as "[t]he condition or quality of being numerous," "[a] very great number," and "a large number." IPR2020-01189, Ex. 3001 at 3; Ex. 3002 at 3. Plurality is defined as "[t]he state or fact of being plural" (i.e., two or more) or "[a] large number or amount; a multitude." Ex. 3001 at 4; *see also* Ex. 3002 at 4. Plurality is only a synonym of multitude in the context of the second definition: a large number or amount. A plurality is two or more; a multitude is a large number.

As part of its obviousness determination with respect to claims 8, 10, 13, and 15, the Board found Sakamoto's two battery power level thresholds disclose the claimed "multitude of threshold values" under its improper construction. *'774 Decision*, at *15–16. We therefore vacate the Board's decision with respect to these claims. Because the Board incorrectly concluded a multitude includes two, it did not address Apple's alternative argument that Sakamoto discloses at least four threshold values—two battery level thresholds and two GPS signal level thresholds. *See* IPR2020-01189, Petitioner's Reply Br. at 15–19. We remand to the Board for it to consider this argument in the first instance under the proper construction. We hold only that multitude does not include two but must include as few as five threshold values. We leave it for the Board on remand to determine whether multitude encompasses three or four threshold values and whether the two sets of threshold values disclosed in Sakamoto teach a multitude of threshold values.

III. THE '619 PATENT

The Board determined claims 1–20 of the '619 patent would have been obvious over prior art combinations including Miranda-Knapp and Miller. *'619 Decision*, at *30. Claim 1 of the '619 patent is representative. It recites:

> 1. A portable electronic tracking device to monitor location coordinates of one or more individuals and 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, wherein the displacements comprise movements of an object or individual associated with the device;

> *a battery power monitor configured to activate and deactivate at least one portion of signaling circuitry in response to the accelerometer circuitry detecting a substantially stationary position of the electronic tracking device since last known location coordinate measurement*; and
>
> processor circuitry configured to process the displacements, to associate the displacements with a specified pattern, and to generate an alert message in response to the specified pattern.

'619 patent at claim 1 (emphasis added).

As relevant on appeal, the Board found Apple's proposed combination of Miranda-Knapp and Miller discloses the claim limitation reciting "a battery power monitor configured to activate and deactivate at least one portion of signaling circuitry in response to the accelerometer circuitry detecting a substantially stationary position of the electronic tracking device." *'619 Decision*, at *8–12. The Board found Miranda-Knapp teaches a battery power monitor configured to *activate* a portion of signaling circuitry (i.e., messaging circuitry) to send an alert message in response to an accelerometer detecting a substantially stationary position. *Id.* at *10. It further found Miller teaches *deactivating* a portion of signaling circuitry (i.e., GPS circuitry) by halting scanning operations on the GPS receiver when the device is stationary. *Id.* The Board found a skilled artisan would have been motivated to add Miller's teachings of deactivating GPS circuitry to Miranda-Knapp's device to increase the device's battery life. *Id.* at *11.

LBT raises several arguments against the Board's motivation-to-combine finding. First, LBT argues the combination of Miranda-Knapp and Miller is improper because it adds redundant elements and functionality already present in Miranda-Knapp's device. For instance, as Apple's expert Mr. Andrews testified, both references disclose

"similar architectures that include receivers, processors, power managers, and accelerometers." J.A. 6980 ¶ 132. According to LBT, a skilled artisan would not be motivated to combine these redundant elements. LBT misunderstands the Board's finding. The Board did not find a skilled artisan would combine every feature of Miller's device with Miranda-Knapp's device. Instead, it found a skilled artisan would be motivated to add certain functionality from Miller to Miranda-Knapp's device, which discloses the claimed transceiver circuitry and accelerometer circuitry. *'619 Decision*, at *7–8, *11. That Miller discloses a similar device with several overlapping elements supports the Board's finding of a motivation to combine. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) ("[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.").

LBT also contends the Board failed to identify the redundant functionality between Miranda-Knapp and Miller, namely, deactivating signaling circuitry in response to the accelerometer detecting a substantially stationary position. Miranda-Knapp teaches that, to conserve battery power, "certain transmissions or phone calls could be inhibited" if the phone is left at rest in a safe zone. J.A. 7057 at 5:13–18. This disclosure relates to the deactivation of Miranda-Knapp's *messaging circuitry*. The proposed combination, however, incorporates Miller's deactivation of its *GPS circuitry,* a different signaling circuitry. *See '619 Decision*, at *11. LBT fails to explain how this functionality is redundant.

Second, LBT argues the proposed combination of Miranda-Knapp and Miller would result in an inoperable device because the two references disclose contradictory approaches. Specifically, Miranda-Knapp teaches *activating* a GPS receiver when a device is stationary, while Miller teaches *deactivating* a GPS receiver when a device is

stationary. This argument, again, is based on LBT's fundamental misunderstanding of the proposed combination. The Board found a skilled artisan would have been motivated to modify Miranda-Knapp's device to deactivate its GPS receiver *after* its location is determined—i.e., after activating a portion of the signaling circuitry—to conserve battery power. *Id.* at *10–11. LBT fails to point to any evidence showing this combination would be inoperable. Instead, substantial evidence supports the Board's finding that a skilled artisan would have been motivated to increase the device's battery life by deactivating the GPS receiver after the location is determined and would have a reasonable expectation of success in doing so. For example, Mr. Andrews testified that a skilled artisan would have been motivated to increase the device's battery life and would have recognized that deactivating the GPS receiver after the stationary device's location has already been determined would accomplish this goal. J.A. 7002–07 ¶¶ 162–168; *see also* J.A. 7056–57 (Miranda-Knapp) at 4:57–5:43 (identifying the need to alert the user "before the battery drains" when the device is at rest but not in a safe zone); J.A. 7079 (Miller) ¶¶ 18, 22 (teaching that when the device is stationary, the scanning operations of receivers are halted in order to conserve battery power).

Finally, LBT argues Miller teaches away from the claimed solution because it discloses using a motion model, rather than an accelerometer alone, to determine whether the device is in motion. Substantial evidence supports the Board's contrary finding. *See '619 Decision*, at *12. Miller states "[a]ccelerometer 114 sends signals to motion model 108 indicating whether or not the mobile device is in motion." J.A. 7079 ¶ 18. That is, Miller teaches that an accelerometer is used to detect a stationary position. While the motion model also uses signals from receivers 102, 104, and 106, in some circumstances, the data from the accelerometer may be the only data relied on by the motion model. J.A. 7079 ¶¶ 21–22.

Substantial evidence supports the Board's finding that a skilled artisan would have been motivated to combine Miranda-Knapp and Miller as claimed. We therefore affirm the Board's obviousness determinations with respect to claims 1–20 of the '619 patent.

CONCLUSION

We have considered the parties' remaining arguments and find them unpersuasive. For the reasons given above, we reverse the Board's decisions with respect to claims 1–24 of the '618 patent, claims 8–10 of the '256 patent, and claims 3, 9, and 11 of the '113 patent. We vacate and remand the Board's decision with respect to claims 8, 10, 13, and 15 of the '774 patent. We affirm the Board's decision with respect to claims 1–20 of the '619 patent.

AFFIRMED IN PART, REVERSED IN PART, VACATED IN PART, AND REMANDED IN PART

COSTS

No costs.