

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

THL HOLDING COMPANY, LLC,
Patent Owner.

IPR2024-00399
Patent 11,350,246 B2

Before CHRISTOPHER M. KAISER, SHEILA F. McSHANE, and
ELIZABETH J. REAGAN, *Administrative Patent Judges*.

KAISER, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background and Summary*

Apple Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1–19 (“the challenged claims”) of U.S. Patent No 11,350,246 B2 (Ex. 1001, “the ’246 patent”). THL Holding Company, LLC (“Patent Owner”) filed a Preliminary Response (Paper 7, “Prelim. Resp.”). Petitioner also filed an explanation of the need to file two petitions challenging the same patent. Paper 3.

We have authority, acting on the designation of the Director, to determine whether to institute an *inter partes* review under 35 U.S.C. § 314 and 37 C.F.R. § 42.4(a). *Inter partes* review may not be instituted unless “the information presented in the petition filed under [35 U.S.C.] section 311 and any response filed under [35 U.S.C.] section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2018). “When instituting *inter partes* review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.” 37 C.F.R. § 42.108(a) (2023).

For the reasons set forth below, upon considering the briefing and the evidence of record, we determine that the information presented in the Petition establishes a reasonable likelihood that Petitioner will prevail with respect to at least one of the challenged claims, and we institute *inter partes* review on all of the challenged claims based on all of the grounds identified in the Petition.

B. *Real Parties in Interest*

Petitioner identifies itself as the real party in interest. Pet. 87. Patent Owner identifies itself as the real party in interest. Paper 6, 1.

C. Related Matters

The parties identify a district court case, *THL Holding Company, LLC v. Apple Inc.* (W.D. Tex.), as a related proceeding. The parties disagree about the case number of the related case, with Petitioner identifying it as Case No. 6:23-cv-00077 and Patent Owner identifying it as Case No. 1:23-cv-00548-OLG. Pet. 87; Paper 6, 1. Petitioner also challenges claims 20–27 of the ’246 patent in a parallel petition filed in IPR2024-00400.¹ *See* Paper 3, 1.

D. The ’246 Patent

The ’246 patent is titled “Wireless Device and Methods for Use Therewith.” Ex. 1001, code (54). The application leading to this patent was filed on January 19, 2022, claiming priority to applications filed as early as February 26, 2010. *Id.* at codes (22), (63).

According to the ’246 patent, “wireless communication devices are commonly used to access long range communication networks as well as broadband data networks,” and “[m]any wireless telephones have operating systems that can run applications that perform additional features and functions.” *Id.* at 2:13–28. “Consequently, the wireless telephone has, in some ways, become an important device for many aspects of the user’s life,” and “[m]isplacing a user’s wireless telephone can be an annoying experience.” *Id.* at 2:35–42.

¹ Patent Owner does not request that we exercise our discretion to deny institution of either parallel petition. On the present record, we find that Petitioner’s explanation of the need for two parallel petitions is sufficient to justify not exercising discretion to deny institution in either case. The parallel petitions challenge different sets of claims of the ’246 patent, and there are a large number of claims challenged collectively between the two petitions.

The '246 patent describes “a location system for use with a handheld wireless communication device.” *Id.* at 4:52–55. The wireless communication device can be “a smart phone, digital book, netbook, personal computer with wireless data communication or other wireless communication device that includes a wireless transceiver for communicating over a long range wireless network . . . and/or a short-range wireless network.” *Id.* at 4:55–64. An adjunct device can be coupled to with wireless communication device. *Id.* at 5:31–34.

A separate wireless device can be attached to an object such as a set of keys, and it communicates with the adjunct device. *Id.* at 7:40–44. In particular, the adjunct device coupled to the wireless communication device has a “short-range wireless receiver” that “is configured to receive [a] paging signal . . . generated by [the] wireless device.” *Id.* at 5:31–40. Upon receiving the paging signal, the wireless device “emits a detectable alert signal that helps the user locate” the object to which the wireless device is attached. *Id.* at 7:47–57, Fig. 6. In addition, the '246 patent describes “a location application that operates under user control to . . . locate . . . [an] object associated with” the adjunct device. *Id.* at 10:49–53. This application uses signal strength, time of flight, or a directional antenna to locate the object associated with the adjunct device. *Id.* at 10:53–11:30.

E. Illustrative Claim

Claims 1 and 11 of the '246 patent are challenged and independent. Claim 1 is illustrative and is reproduced below.

1. [1(p)] A mobile communication device comprising:
[1(a)] a plurality of wireless transceivers including a Bluetooth transceiver, a long-range transceiver configured to send and receive telephone calls via a telephony network and to

communicate Internet data, and one or more ultra-wideband transceivers coupled to two or more antennas;

[1(b)] a memory that stores operational instructions;

[1(c)] a touch screen; and

[1(d)(i)] a processor coupled to the plurality of wireless transceivers, the memory, and the touch screen,

[1(d)(ii)] wherein the processor is configured to execute the operational instructions, which upon execution, cause the processor to:

[1(d)(iii)] present a graphical user interface via the touch screen;

[1(d)(iv)] in response to a pair request from a user received at the graphical user interface, pair the mobile communication device with at least one remote device;

[1(d)(v)] in response to an audio alert request from the user received at the graphical user interface, transmit an audio alert request signal to the at least one remote device via the Bluetooth transceiver;

[1(d)(vi)] estimate a distance between the mobile communication device and the at least one remote device based on ultra-wideband communication between the one or more ultra-wideband transceivers and the at least one remote device and time of flight calculations;

[1(d)(vii)] determine a direction to the at least one remote device based on signal delay of ultra-wideband communications between the two or more antennas and the at least one remote device; and

[1(d)(viii)] output to the graphical user interface the estimated distance to the at least one remote device and an arrow pointing in the direction of the at least one remote device.

Ex. 1001, 37:54–38:22 (reference letters added).

F. Prior Art and Asserted Grounds

Petitioner asserts the following grounds of unpatentability (Pet. 5, 17–85):

Claim(s) Challenged	35 U.S.C.² §	Reference(s)/Basis
1, 11–14	103(a)	Kalliola, ³ Turunen, ⁴ Oswald, ⁵ Vauclair, ⁶ Kalayjian ⁷
2–5, 15–18	103(a)	Kalliola, Turunen, Oswald, Vauclair, Kalayjian, Thorn ⁸
6–10, 19	103(a)	Kalliola, Turunen, Oswald, Vauclair, Kalayjian, Thorn, Sharp ⁹

In support, Petitioner relies on the testimony of Dr. R. Michael Buehrer (Ex. 1003).

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), revised 35 U.S.C. §§ 102 and 103 effective March 16, 2013. The ’246 patent claims priority to an application filed before that date, so we refer to the pre-AIA version of the statute, but our findings and analysis would be the same under the current version of the statute.

³ US 2008/0068265 A1, published Mar. 20, 2008 (Ex. 1004).

⁴ US 6,487,595 B1, issued Nov. 26, 2002 (Ex. 1005).

⁵ US 2008/0204322 A1, published Aug. 28, 2008 (Ex. 1006).

⁶ US 2008/0320587 A1, published Dec. 25, 2008 (Ex. 1007).

⁷ US 2008/0125040 A1, published May 29, 2008 (Ex. 1008).

⁸ US 2009/0058651 A1, published Mar. 5, 2009 (Ex. 1009).

⁹ US 2010/0279652 A1, published Nov. 4, 2010 (Ex. 1010).

II. ANALYSIS

A. Legal Standards

In *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1 (1966), the Supreme Court set out a framework for assessing obviousness under 35 U.S.C. § 103 that requires consideration of four factors: (1) the “level of ordinary skill in the pertinent art,” (2) the “scope and content of the prior art,” (3) the “differences between the prior art and the claims at issue,” and (4) if in evidence, “secondary considerations” of non-obviousness, such as “commercial success, long-felt but unsolved needs, failure of others, etc.” *Id.* at 17–18. “While the sequence of these questions might be reordered in any particular case,” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 407 (2007), the U.S. Court of Appeals for the Federal Circuit has repeatedly emphasized that “it is error to reach a conclusion of obviousness until all those factors are considered,” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1328 (Fed. Cir. 2016). Because Patent Owner does not address objective evidence of non-obviousness, we focus solely on the first three *Graham* factors.

B. Level of Ordinary Skill in the Art

The level of ordinary skill in the pertinent art at the time of the invention is a factor in how we construe patent claims. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). It is also one of the factors we consider when determining whether a patent claim is obvious over the prior art. *See Graham*, 383 U.S. at 17–18.

Factors pertinent to a determination of the level of ordinary skill in the art include “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and

(6) educational level of active workers in the field.” *Envtl. Designs, Ltd. v. Union Oil Co. of Cal.*, 713 F.2d 693, 696–697 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). “Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case.” *Id.*

Petitioner asserts that the level of ordinary skill in the art corresponds to “a bachelor’s degree in computer science, computer engineering, electrical engineering, or a similar technical field and 2-4 years of experience with wireless ranging and positioning systems, wireless communication devices, and associated computer programming.” Pet. 4 (citing Ex. 1003 ¶ 35). Patent Owner does not dispute Petitioner’s assertion on the present record. Prelim. Resp. 1–22.

For purposes of this Decision, we adopt Petitioner’s proposed level of skill, as articulated above. We are satisfied that Petitioner’s proposed definition generally comports with the level of skill necessary to understand and implement the teachings of the ’246 patent and the asserted prior art. This definition is also supported by the testimony of Dr. Buehrer. *See* Ex. 1003 ¶ 35.¹⁰

¹⁰ If Patent Owner disagrees with this formulation of the level of skill in the art, it must raise that disagreement in its Response. If a different level of skill would affect the outcome in this case, the parties must brief that issue as well. The failure of Patent Owner to describe how a different level of skill in the art is determinative will be a forfeiture of that argument. If there is a dispute regarding the level of ordinary skill in the art, then the parties are also encouraged to submit evidence, other than conclusory expert testimony, that supports their position.

C. Claim Construction

We apply the same claim construction standard used in the federal courts, in other words, the claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), which is articulated in *Phillips*. See 37 C.F.R. § 42.100(b). Under the *Phillips* standard, the “words of a claim ‘are generally given their ordinary and customary meaning,’” which “is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1312–13.

Petitioner proposes construing two terms. Pet. 5–6 (citing Ex. 1011, 6–11). First, Petitioner proposes that we construe “[t]ime of flight calculations” as “[d]etermining the amount of time between when a signal is transmitted and when a reply signal is received.” *Id.* at 6. Second, Petitioner proposes that we construe “[s]ignal delay” as “[d]ifference in time between when a signal is received at two or more antennas.” *Id.* On the present record, Patent Owner does not dispute these proposed constructions. Prelim. Resp. 1–22.

For the purposes of this Decision, we adopt the constructions proposed by Petitioner. Those constructions are supported by briefing in the parallel district court case, in which they were proposed by Patent Owner. Ex. 1011, 6–11.

We also determine that we need not expressly construe any additional claim terms in order to decide whether to institute trial. See *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (noting that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”

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

If either party intends to further argue claim construction at trial, including what the plain and ordinary meaning of a term is, they should do so in a clearly designated section of their briefing so as to expressly identify such arguments. *See, e.g.*, 37 C.F.R. § 42.104(b)(3) (content of petition); *see also* Patent Trial and Appeal Board Consolidated Trial Practice Guide, 84 Fed. Reg. 64,280, at 46, 48–45 (Nov. 2019) (available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>). Claim construction arguments should not be relegated to patentability arguments on the facts.

D. Kalliola, Turunen, Oswald, Vauclair, and Kalayjian

Petitioner argues that claims 1 and 11–14 would have been obvious over the combination of Kalliola, Turunen, Oswald, Vauclair, and Kalayjian. Pet. 5, 17–70. Based on the current record, we are sufficiently persuaded that Petitioner has established a reasonable likelihood of prevailing on this asserted obviousness ground with respect to at least claim 1.

1. Overview of Kalliola

According to Kalliola, there was a need for “a directional and/or location finding method and system that allows a user to track or locate a signal beacon.” Ex. 1004 ¶ 11. To satisfy this need, Kalliola discloses an application that “work[s] in conjunction with various resources within the wireless communication device in order to provide a visual representation of the relative direction towards, or location of, an object, place, etc. maintaining a broadcast beacon.” *Id.*

Kalliola’s system includes a wireless communication device (“WCD”) that may be a cellular telephone. *Id.* ¶¶ 34, 37. The wireless communication

device communicates via short-range and long-range wireless networks and protocols. *Id.* ¶¶ 24–36, 46, 48, 49, Fig. 1. The system also includes remotely-activated signal emitters “such as battery-operated transmitters in a keychain, in a wallet, embedded in an ID badge . . . [which] may be activated remotely by a user as needed.” *Id.* ¶ 75. The signal emitters “operate in a lower power or power conservation mode until a message is received instructing a device to activate the position-indicating transmission signal.” *Id.* The position-indicating signal transmitted is received by an antenna array on the WCD, and the WCD determines the direction to the signal emitter, which is displayed for the user as an arrow. *Id.* ¶ 67, Fig. 5.

2. *Overview of Turunen*

Turunen describes “[a] method of transmitting Internet data between a mobile host and a remote host coupled via the Internet and a GSM/GPRS cellular telephone network.” Ex. 1005, code (57). The mobile host “communicates with a Base Transceiver Station (BTS) of a Base Station Subsystem (BSS) of the GSM network.” *Id.* at 5:39–41, Fig. 2.

3. *Overview of Oswald*

Oswald describes “[an] apparatus for determining positional information relating to an object incorporating a transmitter, the apparatus comprising means for receiving a signal transmitted by the transmitter at the object” where “the signals transmitted by the transmitter associated with the object are Ultra Wide Band (UWB) signals.” Ex. 1006 ¶¶ 5, 99. Oswald’s apparatus is depicted in Figure 9, reproduced below:

programmed processor” that “is connected to transceiver (TRX) circuitry 24, which handles radio frequency communications with other electronic devices able to use the same wireless protocol.” *Id.* ¶ 28. Vauclair describes a pairing process between the devices where the host device sends and receives wireless signals from the peripheral device 10. *Id.* ¶ 34, Fig. 2.

5. *Overview of Kalayjian*

Kalayjian describes “[a] method and system for locating objects using a Bluetooth communications protocol.” Ex. 1008, code (57). In Kalayjian, a first device, which “can be, for example, a Bluetooth capable cellular phone,” is used to locate a second device,¹¹ which “can be, for example, a Bluetooth enabled wireless phone headset.” *Id.* ¶¶ 32–34. “When a user wants to locate one of the [second] devices 320, 400 and 500, the user can initiate the location discovery process through [first] device 310.” *Id.* ¶ 38. “[First] device 310 can transmit a signal to a [second] device,” and, “[u]pon receiving the signal, the [second] device can guide a user to its location and/or notify a user of the distance from [first] device 310 to the [second] device.” *Id.* The second devices “guide a user to their location by emitting auditory or visual signals,” which “allows a user to follow the sound or light to the misplaced object.” *Id.* ¶ 39.

The second devices also “transmit[] a return signal to [first] device 310,” which calculates the distance between the devices and determines “the direction towards a [second] device from the [first] device.” *Id.* ¶¶ 40–43. Figure 8 of Kalayjian is reproduced below.

¹¹ Kalayjian sometimes refers to the first device as the “master device” and to the second device as the “slave device.” Ex. 1004 ¶¶ 33–34; *see* Pet. 13 n.3. Where it is possible to do so without sacrificing clarity, we instead refer to Kalayjian’s devices as the first device and the second device.

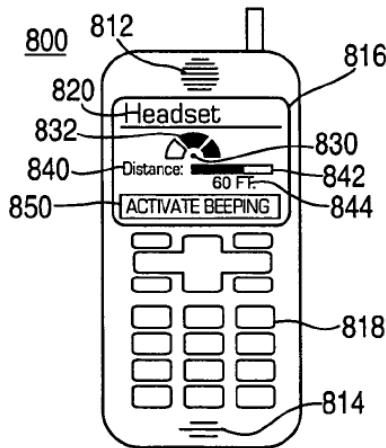


FIG. 8

Id. at Fig. 8. Figure 8 of Kalayjian, reproduced above, depicts user interface 800 of a first device “when the [first] device is attempting to locate a [second] device.” *Id.* ¶ 49. “Screen 816 can include title 820 to identify the selected [second] device,” as well as “directional graphic 830 to indicate to the user the direction where the [second] device should be located” and “distance graphic 840 to identify the distance between the selected [second] device and [first] device 800.” *Id.* In addition, “[s]creen 816 can include graphical button 850 to enable the user to prompt the [second] device to beep, flash or perform a combination of both, or provide some other indication.” *Id.*

6. Analysis of Claim 1

a) Limitation 1(d)(vi)

Limitation 1(d)(vi) of claim 1 recites “estimate a distance between the mobile communication device and the at least one remote device based on ultra-wideband communication between the one or more ultra-wideband transceivers and the at least one remote device and time of flight calculations.” Ex. 1001, 38:10–15. For the reasons set forth below, we are sufficiently persuaded by Petitioner’s argument and evidence that the

combination of Kalayjian and Oswald teaches or suggests limitation 1(d)(vi). *See* Pet. 41–45.

As discussed above, for purposes of the present Decision, we construe “[t]ime of flight calculations” as “[d]etermining the amount of time between when a signal is transmitted and when a reply signal is received.” Kalayjian teaches “method 1100 for locating an object,” shown in Figure 11, which is reproduced below.

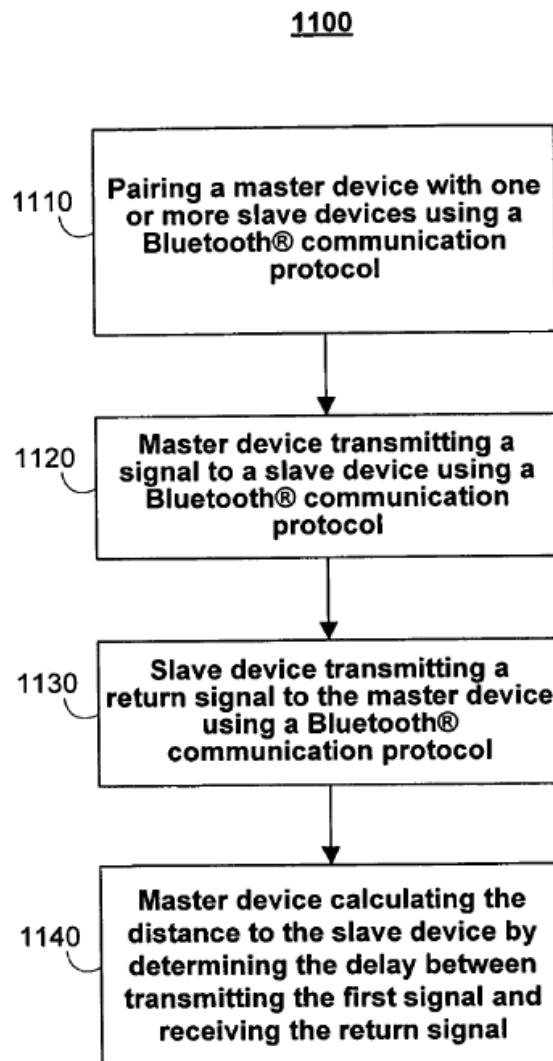


FIG. 11

Ex. 1008, Fig. 11. Figure 11 of Kalayjian “is a flowchart for method 1100 for locating an object.” *Id.* ¶ 55. “At step 1110, a [first] device is paired with one or more [second] devices using a Bluetooth communications protocol.” *Id.* According to Figure 11, in steps 1120 and 1130, “the [first] device transmits a signal to a [second] device” and “the [second] device transmits a return signal to the [first] device.” *Id.* “At step 1140, the [first] device calculates the distance to the [second] device by determining the amount of time delay between transmitting its signal to the [second] device and when it receives a return signal from the [second] device.” *Id.*

Similarly, Kalayjian teaches that “[t]he distance between the devices can be calculated by comparing the amount of time delay between the transmission of the signal sent from the [first] device to the [second] device and the reception of the return signal from the [second] device.” *Id.* ¶ 41. Thus, on the present record, Petitioner has shown sufficiently that Kalayjian teaches “estimat[ing] a distance between the mobile communication device and the at least one remote device based on . . . time of flight calculations.”

Kalayjian’s distance calculation uses “signal[s]” that are “transmit[ted] . . . using a Bluetooth communications protocol.” *Id.* ¶ 55, Fig. 11. Dr. Buehrer testifies that Bluetooth is a type of “narrowband transmission[.]” Ex. 1003 ¶ 233; *see* Ex. 1042, 1652, 1656. Thus, Kalayjian itself does not teach that its distance estimation is “based on ultra-wideband communication between the one or more ultra-wideband transceivers and the at least one remote device.”

Oswald teaches that, “in indoor applications, . . . narrowband pulses can propagate poorly and/or highly unpredictably.” Ex. 1006 ¶ 278. For this reason, Oswald teaches that ultra-wideband signals should be used instead for distance measurement. *Id.* ¶¶ 12, 15, 99, 278, 388. Dr. Buehrer

testifies that a person of ordinary skill in the art “would have . . . understood that the user’s personal items . . . would often be indoors” and that ultra-wideband signals “provide[] high accuracy, even in harsh environments, due to [their] ability to resolve multipath typical of indoor environments.” Ex. 1003 ¶ 233. Accordingly, Dr. Buehrer testifies that a person of ordinary skill in the art “would have understood that utilizing UWB instead of Bluetooth would have been advantageous.” *Id.* Thus, on the present record, Petitioner has shown sufficiently that Oswald teaches distance estimation “based on ultra-wideband communication between the one or more ultra-wideband transceivers and the at least one remote device,” as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of Oswald with those of Kalayjian.

As noted above, we construe “[t]ime of flight calculations” as “[d]etermining the amount of time between when a signal is transmitted and when a reply signal is received.” Patent Owner argues that neither Oswald nor Kalayjian teaches or suggests calculating time of flight in this manner for ultra-wideband signals. Prelim. Resp. 4–8. Patent Owner is correct that Oswald teaches determining distance using ultra-wideband signals but using a different calculation method, as well as that Kalayjian teaches determining distance using the appropriate calculation method but using narrowband signals. *See id.*; *see* Ex. 1006 ¶¶ 286, 288; Ex. 1008 ¶¶ 40, 41, 55, Figs. 3a, 11. But Petitioner does not argue to the contrary. Instead, Petitioner argues that a person of ordinary skill in the art would have had a reason to modify Kalayjian’s distance-estimation method to use Oswald’s ultra-wideband signals. Pet. 44–45. As discussed above, on the present record, Petitioner has supported that argument sufficiently.

Patent Owner also argues that a person of ordinary skill in the art would not have had reason to use Oswald's ultra-wideband signals for distance estimation indoors because Kalliola, on which Petitioner also relies, teaches other ways to solve the indoor multipath propagation problem that Oswald identifies. Prelim. Resp. 17–20. Specifically, Patent Owner notes that Kalliola teaches reducing multipath noise by “‘improving the resolution of the array through increasing its size by adding more antenna elements’ and ensuring the ‘distance between any two antenna elements in the array [does] not exceed half a wavelength.’” *Id.* at 18 (quoting Ex. 1004 ¶ 64). In addition, Patent Owner asserts that Kalliola teaches reducing multipath fading by “‘using a ‘tracking algorithm’ that ‘keep[s] a register of several DoA estimates and choos[es] the one with highest average power to be selected as the actual output.’” *Id.* (quoting Ex. 1004 ¶ 65). According to Patent Owner, these disclosures not only identified the indoor multipath propagation problem that Petitioner argues is identified in Oswald, they also solved that problem, and Petitioner's failure to take them into account renders Petitioner's argument flawed. *Id.* at 18–20.

On the present record, we are not persuaded by Patent Owner's argument. Petitioner argues that a person of ordinary skill in the art would have seen Oswald's ultra-wideband solution to the multipath propagation problem as simpler than Kalliola's solution. Pet. 48–49 (citing Ex. 1003 ¶¶ 243–244). This argument is supported not only by the cited testimony of Dr. Buehrer, but also by a reference cited by Dr. Buehrer. Ex. 1003 ¶ 244 (quoting Ex. 1043, 1863) (noting that “‘it was well-recognized that one of the key motivations for using UWB in multipath environments was ‘the availability of technology to implement and generate UWB signals with relatively low complexity’” (emphasis removed)). Thus, contrary to Patent

Owner's argument, Petitioner addresses the solutions proposed by Kalliola and provides reasons that a person of ordinary skill in the art would have turned to Oswald's solution instead.

Patent Owner also argues that Petitioner engages in hindsight reasoning when it argues that a person of ordinary skill in the art would have adopted Kalayjian's use of Bluetooth communications for the alert request signal recited in claim 1 but simultaneously would have rejected Kalayjian's use of Bluetooth communications for the distance estimation also recited in claim 1. Prelim. Resp. 20–21. On the present record, we are not persuaded by Patent Owner's argument. As discussed above, Petitioner provides a reason to modify Kalayjian's distance-estimation method to use Oswald's non-Bluetooth, ultra-wideband signals. Pet. 44–45, 48–49. Petitioner also provides a reason to modify Kalliola to use Kalayjian's Bluetooth alert request signal. *Id.* at 40–41 (citing Ex. 1003 ¶¶ 219–225; Ex. 1008 ¶ 39). Neither party argues on the present record that a person of ordinary skill in the art would have had a reason to modify Kalayjian's Bluetooth alert request signal to use ultra-wideband signals. Pet. 37–41; Prelim. Resp. 20–21. Because Petitioner provides reasons for the modifications in favor of which it argues, and because those reasons are not contradicted on the present record, we are not persuaded that Petitioner has engaged in hindsight reasoning.

b) Limitation 1(d)(vii)

Limitation 1(d)(vii) of claim 1 recites “determine a direction to the at least one remote device based on signal delay of ultra-wideband communications between the two or more antennas and the at least one remote device.” Ex. 1001, 38:15–18. For the reasons set forth below, we are sufficiently persuaded by Petitioner's argument and evidence that the

combination of Kalliola and Oswald teaches or suggests limitation 1(d)(vii).
See Pet. 45–51.

Both Kalliola and Oswald teach determining a direction based on signal delay. Pet. 45. Kalliola teaches “employ[ing] signals received on multiple antennas in a Direction of Arrival (‘DoA’) signal processing scheme in order to determine a relative direction to a target from [a wireless communication device].” Ex. 1004 ¶ 60. In particular, “the direction of arrival of the incident signal . . . is resolved based on the phase and possibly amplitude differences of signals received by the elements of an antenna array.” *Id.* As Petitioner notes, “signal delay . . . can be measured as phase delay or time delay.” Pet. 46 (quoting Ex. 1012, 4). Of these, Kalliola uses phase delay. Ex. 1004 ¶ 60. But, as discussed above, for purposes of the present Decision, we construe “[s]ignal delay” as “[d]ifference in time between when a signal is received at two or more antennas,” or time delay. Accordingly, Kalliola does not teach “determin[ing] a direction to the at least one remote device based on signal delay . . . between the two or more antennas and the at least one remote device.”

Oswald teaches the reception of an ultra-wideband signal at different antennas at different times, as well as the use of “the time delay between reception of the signal at both antennas” to determine the direction of arrival of the signal. Ex. 1006, ¶¶ 345, 350–351, Figs. 16, 18; *see* Ex. 1003 ¶¶ 238–240. Petitioner argues that a person of ordinary skill in the art would have modified Kalliola according to the teachings of Oswald not only to permit the use of Oswald’s ultra-wideband signals but also “to include Oswald’s *signal delay* teaching.” Pet. 48–51. Dr. Buehrer testifies that this modification “represents use of a known technique . . . [with] a known device . . . to improve similar devices.” Ex. 1003 ¶ 249. Thus, on the

present record, Petitioner has shown sufficiently that the combination of Kalliola and Oswald teaches or suggests “determin[ing] a direction to the at least one remote device based on signal delay of ultra-wideband communications between the two or more antennas and the at least one remote device,” as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of Oswald with those of Kalliola.

Patent Owner argues that a person of ordinary skill in the art would not have modified Kalliola according to the teachings of Oswald in order to arrive at a device using a time-delay process because “Oswald . . . expressly rejects ‘using array data processing or beam forming,’ *i.e.*, the method Kalliola uses to determine direction.” Prelim. Resp. 16–17 (quoting Ex. 1006 ¶ 13) (emphasis removed). This argument disregards Petitioner’s assertions. Petitioner does not argue that a person of ordinary skill in the art, contrary to the teaching of Oswald, would use the direction-finding method of Kalliola. Rather, as discussed above, Petitioner argues that a person of ordinary skill in the art would have modified Kalliola to use Oswald’s direction-finding method. Pet. 45–51. The fact that Oswald, in Patent Owner’s words, “expressly rejects” using Kalliola’s method only strengthens the case for the modification for which Petitioner argues.

c) Undisputed Limitations 1(p), 1(a), 1(b), 1(c), 1(d)(i), 1(d)(ii), 1(d)(iii), 1(d)(iv), 1(d)(v), and 1(d)(viii)

Claim 1 also recites

[1(p)] A mobile communication device comprising:

[1(a)] a plurality of wireless transceivers including a Bluetooth transceiver, a long-range transceiver configured to send and receive telephone calls via a telephony network and to

communicate Internet data, and one or more ultra-wideband transceivers coupled to two or more antennas;

[1(b)] a memory that stores operational instructions;

[1(c)] a touch screen; and

[1(d)(i)] a processor coupled to the plurality of wireless transceivers, the memory, and the touch screen,

[1(d)(ii)] wherein the processor is configured to execute the operational instructions, which upon execution, cause the processor to:

[1(d)(iii)] present a graphical user interface via the touch screen;

[1(d)(iv)] in response to a pair request from a user received at the graphical user interface, pair the mobile communication device with at least one remote device;

[1(d)(v)] in response to an audio alert request from the user received at the graphical user interface, transmit an audio alert request signal to the at least one remote device via the Bluetooth transceiver;

. . . and

[1(d)(viii)] output to the graphical user interface the estimated distance to the at least one remote device and an arrow pointing in the direction of the at least one remote device.

Ex. 1001, 37:54–38:22. Petitioner argues that these additional limitations would have been obvious over the combination of Kalliola, Turunen, Oswald, Vauclair, and Kalayjian. *See* Pet. 17–41, 51–54.

After reviewing Petitioner’s arguments and information regarding the limitations identified immediately above, including the Buehrer Declaration, which are not addressed by Patent Owner at this stage (*see* Prelim. Resp. 1–22), we are persuaded that Petitioner sufficiently demonstrates, on the present record and for purposes of this Decision, that limitations 1(p), 1(a), 1(b), 1(c), 1(d)(i), 1(d)(ii), 1(d)(iii), 1(d)(iv), 1(d)(v), and 1(d)(viii) would

have been obvious to a person having ordinary skill in the art in light of Kalliola, Turunen, Oswald, Vauclair, and Kalayjian.

d) Conclusion Regarding Claim 1

Based on the current record, there is a reasonable likelihood that Petitioner will prevail in demonstrating that claim 1 is unpatentable as obvious in view of Kalliola, Turunen, Oswald, Vauclair, and Kalayjian.

7. Analysis of Claim 11

Limitation 11(e)(vii) of claim 11 recites “determine a direction to the at least one remote device based on signal delay of ultra-wideband communications between the two or more antennas and the at least one remote device and on rotation of the mobile communication device detected by the orientation sensor.” Ex. 1001, 39:33–38. For the reasons set forth below, we are not sufficiently persuaded by Petitioner’s argument and evidence that the combination of Kalliola and Oswald teaches or suggests limitation 11(e)(vii). *See* Pet. 59–64. Petitioner argues that Kalliola teaches or suggests “*determin[ing] direction . . . based on . . . rotation of the mobile communication device detected by the orientation sensor*” for two reasons. *Id.*

First, Petitioner argues that Kalliola teaches that “[t]he DoA estimation may operate in a multitude of modes depending on the physical orientation of the device.” *Id.* at 59–62 (quoting Ex. 1004 ¶ 13). In particular, Petitioner argues that,

[b]ecause Kalliola expressly teaches using orientation sensor information, e.g., the rotation of the flip phone cover is in an open position, to configure an antenna array that is used to determine a direction to a remote device, a POSITA would have understood the step of *determin[ing] direction* to the remote device is *based on . . . rotation of the mobile communication device detected by the orientation sensor*.

Id. at 62 (citing Ex. 1003 ¶ 279). In other words, Petitioner argues that Kalliola’s orientation sensor detects rotation of the mobile communication device. *See id.* at 54–56 (citing Ex. 1003 ¶ 261) (“When determining whether the phone’s flip cover is open/closed, the orientation sensor is detect[ing] rotation of the mobile communication device and specifically, the rotation of the cover relative to the body” (emphasis removed)).

Kalliola teaches a difference in direction-finding operations “depending on the physical orientation of the device.” Ex. 1004 ¶ 13. As an example of a physical orientation, Kalliola teaches that the device may be “closed.” *Id.* Kalliola provides several examples of sensors that detect that the device has been placed “in various mechanical orientations.” *Id.* ¶¶ 78–79, Fig. 9A. These examples include “a sensor . . . integrated into [a] hinge,” “[a] sensor . . . located in a twist joint,” and “a sensor in [a] sliding mechanism.” *Id.* These sensors all “provide information on the relative orientation of two sections of” the wireless communication device. *Id.* ¶ 78. Even to the extent that some of these sensors, such as those located in hinges or twist joints, measure rotation, it is the rotation of one part of the device relative to another part of the device that they measure, not the rotation of the device as a whole. On the present record, where neither party has requested construction of “based on . . . rotation of the mobile communication device,” we read that language in limitation 11(e)(vii) as requiring that the determination of a direction to the remote device is based on information about the rotation of the device as a whole, which Kalliola’s orientation sensors do not teach.

Petitioner’s second argument relies on Kalliola’s “pausing the direction estimation when the WCD is stationary and resuming the estimation when the orientation sensor detects motion (rotation) of the

WCD.” Pet. 63–64 (citing Ex. 1003 ¶ 281). Kalliola teaches “conserv[ing] power by pausing a DoA estimation until the motion of the WCD is detected by the motion sensors,” such that, “[w]hen the WCD is moved, the updating of the DoA estimation may be resumed.” Ex. 1004 ¶ 14. Petitioner does not explain why Kalliola’s detection of movement of the wireless communication device is, or includes, detecting rotation of the device.

Pet. 63–64. Instead, Petitioner merely equates the two concepts. *Id.* at 63. Dr. Buehrer testifies that Kalliola’s detection of movement “includ[es] rotations,” but there is no support cited for this testimony. Ex. 1003 ¶ 281. In addition, Dr. Buehrer testifies that “Kalliola . . . teaches *determin[ing] a direction to the at least one remote device based . . . on rotation of the mobile communication device detected by the orientation sensor*” because Kalliola’s determination of whether to pause, resume, or adjust the speed of DoA estimation is both “based on detected motions of the WCD” and based on “orientation sensors module 932 detect[ing] rotation (i.e., a rotational motion) of the WCD.” *Id.* ¶ 283. As discussed above, however, the present record shows only that Kalliola’s orientation sensors detect rotation of one portion of the wireless communication device relative to another portion of the device, not that those sensors detect rotation of the device as a whole. Thus, we are not persuaded that Petitioner has shown sufficiently that Kalliola teaches basing its determination of direction on the rotation of the mobile communication device.

8. *Analysis of Claims 12–14*

Because Petitioner demonstrates a reasonable likelihood of success in proving that at least one claim of the ’246 patent is unpatentable, we institute review on all grounds and all claims raised in the Petition. *See* 37 C.F.R. § 42.108(a). Therefore, at this stage of the proceeding, it is not necessary for

us to provide an assessment of every challenge raised by Petitioner, especially, as in this case, when Patent Owner does not separately argue those claims. Those challenges, in our view, are best left for trial after full development of the record. We note, however, that claims 12–14 all depend from claim 11, a claim as to which Petitioner does not demonstrate a reasonable likelihood of prevailing at trial. Ex. 1001, 37:43–64.

E. Remaining Grounds

Petitioner also challenges the patentability of claims 2–5 and 15–18 based on the addition of Thorn to the combination discussed above, and challenges the patentability of claims 6–10 and 19 by additionally relying on Sharp. *See* Pet. 5, 70–85. Patent Owner does not separately address the merits of Petitioner’s other prior art challenges. Prelim. Resp. 3.

Because Petitioner meets the threshold for institution by demonstrating a reasonable likelihood that at least claim 1 is unpatentable as obvious, we need not decide whether Petitioner’s other challenges demonstrate the same. Those challenges, in our view, are best left for trial after full development of the record.

III. CONCLUSION

Following 35 U.S.C. § 314, we have determined that the totality of the information presented at this stage shows there is a reasonable likelihood that Petitioner would prevail with respect to at least one of the claims challenged in the Petition, and we institute on all grounds raised and all claims challenged in the Petition.

Our factual findings, conclusions of law, and determinations at this stage of the proceeding are preliminary, and based on the evidentiary record developed thus far. This is not a final decision as to the patentability of

claims for which *inter partes* review is instituted. Our final decision will be based on the record as fully developed during trial.

IV. ORDER

In consideration of the foregoing, it is hereby

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review is instituted for claims 1–19 of the '246 patent on the unpatentability grounds asserted in the Petition; and

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

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