

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 GARTH
D. BAER, *Administrative Patent Judges*.

KAISER, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. *Background and Summary*

Apple Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1–19 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.”).

On July 25, 2024, we instituted *inter partes* review of claims 1–19 of the ’246 patent on all grounds set forth in the Petition. Paper 8 (“Inst. Dec.”). After institution of trial, Patent Owner disclaimed claims 1–10, leaving only claims 11–19 (“the challenged claims”) in the trial. Ex. 2001. Later, Patent Owner filed a Response (Paper 14, “PO Resp.”), Petitioner filed a Reply (Paper 16), and Patent Owner filed a Sur-Reply (Paper 17). At the request of both parties, we held an oral hearing, the transcript of which has been entered into the record. Paper 23 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the challenged claims of the ’246 patent. For the reasons discussed below, we determine Petitioner has established by a preponderance of the evidence that claims 11–19 of the ’246 patent are unpatentable.

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. Petitioner identifies the case as Case No. 6:23-cv-00077, and Patent Owner identifies it as Case No. 1:23-cv-00548-OLG. Pet. 87; Paper 6, 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.

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 attached to an object such as a set of keys, and it communicates with the wireless communication device. *Id.* at 7:40–44. In particular, the adjunct 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 adjunct device “emits a detectable alert signal that helps the user locate” the object to which the adjunct 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 uses signal strength, time of flight, or a directional antenna. *Id.* at 10:53–11:30.

E. Illustrative Claim

Petitioner originally challenged claims 1–19 of the '246 patent. Patent Owner subsequently disclaimed claims 1–10, leaving only claims 11–19 in this proceeding. Of the remaining claims, only claim 11 is independent. That claim is illustrative and is reproduced below.

11. [11(P)] A mobile communication device comprising:

[11(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;

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

[11(c)] a touch screen;

[11(d)] an orientation sensor to detect rotation of the mobile communication device; and

[11(e)(i)] a processor coupled to the plurality of wireless transceivers, the memory, the touch screen and the orientation sensor,

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

[11(e)(iii)] present a graphical user interface via the touch screen;

[11(e)(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;

[11(e)(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;

[11(e)(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;

[11(e)(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 on rotation of the mobile communication device detected by the orientation sensor; and

[11(e)(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, 39:4–42 (reference letters added).

F. Prior Art and Asserted Grounds

The following grounds of unpatentability remain in the trial following Patent Owner’s disclaimer of claims 1–10 of the ’246 patent (Pet. 5, 17–85):

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

In support, Petitioner relies on the testimony of Dr. R. Michael Buehrer (Ex. 1003; Ex. 1047). Patent Owner relies on the testimony of Dr. Martin J. Feuerstein (Ex. 2002).

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), revised 35 U.S.C. §§ 102 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.

² This ground originally also challenged claim 1. Pet. 5.

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 This ground originally also challenged claims 2–5. Pet. 5.

⁹ US 2009/0058651 A1, published Mar. 5, 2009 (Ex. 1009).

¹⁰ This ground originally also challenged claims 6–10. Pet. 5.

¹¹ 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 agrees that this description reasonably represents the level of ordinary skill required to understand and implement the teachings of the ’246 Patent, as well as the prior art cited in the Petition.” PO Resp. 14 (citing Ex. 2002 ¶ 22). Accordingly, we adopt Petitioner’s proposed level of skill.

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.

The parties dispute the proper construction of “rotation of the mobile device.” This term appears twice in claim 11, once in the phrase “an orientation sensor to detect rotation of the mobile communication device,” and once in the phrase “rotation of the mobile communication device detected by the orientation sensor.” Ex. 1001, 39:13–14, 39:36–38. Patent Owner argues that we should construe this term as limited to “detecting the rotation of the mobile communication device as a whole, not the movement of individual components.” PO Resp. 15–18. Petitioner disputes this, arguing that “rotation of the mobile communication device” should be construed not only to cover rotation of the device as a whole but also should “encompass[] **any** rotation of the mobile communication device relative to any object, including itself,” which would extend to rotation of “any component of the device.” Reply 4–5. We need not resolve this dispute to determine the outcome of Petitioner’s asserted challenges to the ’246 patent. As discussed more fully below, under either party’s proposed construction of “rotation of the mobile communication device,” Petitioner has shown by a preponderance of the evidence that the challenged claims are unpatentable. *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))).

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

Petitioner argues that claims 11–14 would have been obvious over the combination of Kalliola, Turunen, Oswald, Vauclair, and Kalayjian. Pet. 5, 17–70.

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 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 . . . 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:

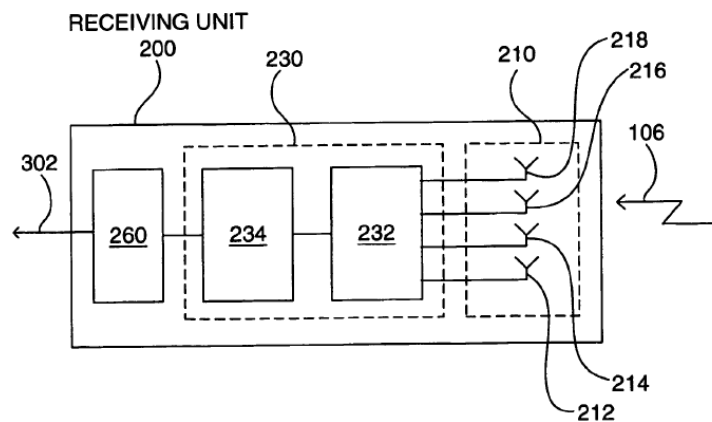


Figure 9

Id. at Fig. 9. Figure 9 of Oswald, reproduced above, “is a schematic showing . . . receiving unit” 200. *Id.* ¶ 260. “The receiver component 210 in the receiving unit 200 comprises four antennas 212, 214, 216, 218 for receiving the transmitted signal 106 at carefully chosen spaced apart locations, and the detector component 230 in turn comprises a transceiver unit 232 coupled to the antennas 212, 214, 216, 218.” *Id.* “[D]ifferential timing techniques are used to compute the angular position of transmitting objects whose signals are received at the receiving unit, which requires the analysis of a plurality of received signals.” *Id.* ¶ 261.

4. Overview of Vauclair

Vauclair describes a pairing process between “a peripheral device,” such as “a mobile telephone handsfree kit,” and “a host device,” such as a

“mobile telephone.” Ex. 1007 ¶ 22. These devices “communicate according to any wireless or wired protocol” including “Bluetooth.” *Id.* The peripheral device includes “control circuitry 12, in the form of a suitably programmed processor” that “is connected to transceiver (TRX) circuitry 14, which handles radio frequency communications with other electronic devices able to use the same wireless protocol.” *Id.* ¶ 24. Likewise, “host . . . device 20 has control circuitry 22, in the form of a suitably 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,¹² 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]

¹² 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.

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 the [second] device from the [first] device.” *Id.* ¶¶ 40–42. Figure 8 of Kalayjian is reproduced below.

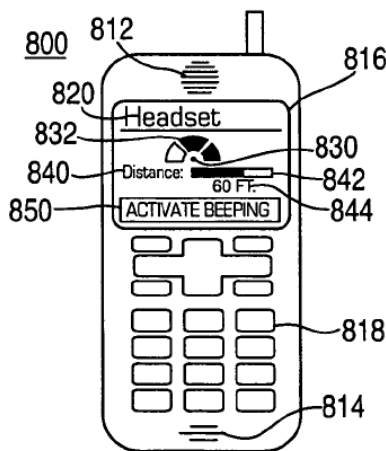


FIG. 8

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 11*

a) *Preamble 11(P)*

Claim 11 recites “[11(P)] A mobile communication device.” Ex. 1001, 39:4. Petitioner argues that “Kalliola teaches a ‘wireless **communication device**’ (WCD) 100 that ‘may be anything from a basic cellular handset to a more complex device such as a wirelessly enabled palmtop or laptop computer.’” Pet. 17 (quoting Ex. 1004 ¶¶ 4, 34). In addition, Petitioner argues that, “[b]ecause the WCD may be a ‘cellular telephone or other handheld wireless device[,]’ Kalliola teaches a mobile communication device.” *Id.* (quoting Ex. 1004 ¶ 37, Figs. 1, 9A, 10). Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Kalliola teaches a mobile communication device, because it discloses a “wireless communication device” that “may be . . . a basic cellular handset,” or may be “[an]other handheld wireless device[.]” Ex. 1004 ¶¶ 4, 34, 37.

b) *Limitation 11(a)*

Claim 11 recites “[11(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.” Ex. 1001, 39:5–10. Petitioner argues that Kalliola teaches a plurality of wireless transceivers, including Bluetooth and ultra-wideband transceivers; that the combination of Kalliola and Turunen teaches a long-range transceiver configured to send and receive telephone calls via a telephony network and to communicate Internet data; that the combination of Kalliola and Oswald teaches one or more ultra-wideband transceivers coupled to two or more antennas; and that a person of ordinary skill in the

art would have had a reason to combine the teachings of Kalliola, Turunen, and Oswald. Pet. 54 (citing Pet. 18–25). Patent Owner does not dispute these arguments. PO Resp. 18–28.

On the record developed at trial, Petitioner has supported its arguments by a preponderance of the evidence. First, Kalliola teaches a wireless communication device with a “long-range communications module” and a “short-range communications module, each of which “provide[s] for the transmission and reception of signals.” Ex. 1004 ¶¶ 40, 46, 48, 52, Fig. 2. According to Kalliola, short-range communications modules can include “BluetoothTM, WLAN, [ultra-wideband] and Wireless USB connections.” *Id.* ¶ 48, Fig. 3. Second, Kalliola teaches that the “[l]ong-range communications [module]” sends and receives “basic voice communications (e.g., via GSM)” as well as data via GPRS, and Turunen teaches “transmitting Internet data between a mobile host and a remote host coupled via the Internet and a GSM/GPRS cellular telephone network.” Ex. 1004 ¶ 46; Ex. 1005, code (57). Third, Kalliola teaches coupling its Bluetooth transceiver to an array of six antennas, and Oswald teaches coupling its ultra-wideband transceiver to an array of four or five antennas. Ex. 1004 ¶¶ 70–71, Fig. 6; Ex. 1006 ¶¶ 15, 99, 345–346, 388, Figs. 16–17. Finally, Dr. Buehrer testifies that a person of ordinary skill in the art would have combined the teachings of Kalliola, Turunen, and Oswald “[b]ecause GPRS was specifically designed to handle Internet communications and had been in use for nearly a decade” and because replacing Kalliola’s Bluetooth with Oswald’s ultra-wideband system, using multiple antennas, would allow for locating objects indoors within a multipath environment. Ex. 1003 ¶¶ 171, 181–184.

c) Limitation 11(b)

Claim 11 recites “[11(b)] a memory that stores operational instructions.” Ex. 1001, 39:11. Petitioner argues that Kalliola teaches this limitation. Pet. 54 (citing Pet. 25–26). Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Kalliola teaches this limitation because it discloses “software components stored by memory 330 [that] include instructions that can be executed by processor 300.” Ex. 1004 ¶ 45.

d) Limitation 11(c)

Claim 11 recites “[11(c)] a touch screen.” Ex. 1001, 39:12. Petitioner argues that Kalliola teaches this limitation. Pet. 54 (citing Pet. 26–28). Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Kalliola teaches this limitation because it discloses “user interface 350 that “includes a user input 360” that “may include one or more components that allow a user to input information,” including “keypads, touch screens, and microphones.” Ex. 1004 ¶ 50.

e) Limitation 11(d)

Claim 11 recites “[11(d)] an orientation sensor to detect rotation of the mobile communication device.” Ex. 1001, 39:13–14. Petitioner argues that Kalliola teaches this limitation. Pet. 54–57. Patent Owner disagrees. PO Resp. 18–28. In particular, according to Petitioner, Kalliola’s “semiconductor gyroscope chip” is an orientation sensor that detects the rotation of the mobile communication device as a whole. Ex. 1004 ¶ 84; *see* Pet. 56–57. Patent Owner argues that the sensor in Kalliola’s paragraph 84 is a “motion sensor[]” that [is] “used to detect when WCD 100 is being

moved’ or when it ‘is stationary,’” which “is in no way equivalent to, nor even related to the uses of, the ‘rotation’ in the ’246 patent.” PO Resp. 25 (quoting Ex. 1004 ¶¶ 14, 84; Ex. 2002 ¶ 72).

On the record developed during trial, we are persuaded that Petitioner has shown by a preponderance of the evidence that Kalliola teaches “an orientation sensor to detect rotation of the mobile communication device,” where “rotation of the mobile communication device” includes rotation of the device as a whole, regardless of whether it also includes rotation of one portion of the device relative to another. Kalliola teaches “motion sensors integrated in WCD 100” that are “used to detect when WCD 100 is being moved,” as well as to detect “when user 110 moves WCD 100 too quickly for an accurate DoA estimation.” Ex. 1004 ¶¶ 84, 86. Although Patent Owner argues that Kalliola’s motion sensors do not detect rotation of the device, this is incorrect on the record as developed at trial. Kalliola teaches that the motion sensor may take “the form of a semiconductor gyroscope chip.” *Id.* ¶ 84. There is ample evidence that gyroscopes detect rotation. Ex. 1013, 38 (identifying as an “orientation sensor” a “[t]hree-axis gyro” and a “[d]ynamic [h]igh [r]ange [gyro]”); Ex. 1046, 49:18–20 (Dr. Feuerstein testifying that gyroscopes “can be used to detect angular velocity”); Ex. 1047 ¶ 47 (citing Ex. 1051, 170; Ex. 1053, 9) (Dr. Buehrer testifying that a person of ordinary skill in the art “would understand that gyroscopes are well-known inertial sensors that specifically detect *rotational* motion”). Thus, by a preponderance of the evidence, Petitioner has shown that Kalliola teaches the “orientation sensor to detect rotation of the mobile communication device” of this limitation.

f) Limitation 11(e)(i)

Claim 11 recites “[11(e)(i)] a processor coupled to the plurality of wireless transceivers, the memory, the touch screen and the orientation sensor.” Ex. 1001, 39:15–17. Petitioner argues that Kalliola teaches this limitation. Pet. 28–29, 57–58. Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Kalliola teaches this limitation because it discloses “coupling separate hardware components corresponding to processor 300, communications sections 310, 312, and 320, memory 330, . . . [and] user interface 350” as well as that “orientation sensors module 932 may . . . convey . . . information to at least the control for the tracking application 922,” which “may . . . consist of an application in memory 330 executing on the main processor 300.” Ex. 1004 ¶¶ 53, 80–81.

g) Limitation 11(e)(ii)

Claim 11 recites “[11(e)(ii)] wherein the processor is configured to execute the operational instructions.” Ex. 1001, 39:17–18. Petitioner argues that Kalliola teaches this limitation. Pet. 58 (citing Pet. 29–30). Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Kalliola teaches this limitation because it discloses that “[p]rocessor 300 may be implemented with one or more microprocessors that are each capable of executing software instructions stored in memory 330.” Ex. 1004 ¶ 43.

h) Limitation 11(e)(iii)

Claim 11 recites “[11(e)(iii)] present a graphical user interface via the touch screen.” Ex. 1001, 39:20. Petitioner argues that Kalliola teaches this

limitation. Pet. 58 (citing Pet. 30–32). Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Kalliola teaches this limitation because it discloses outputting directional information to a user interface module that is implemented by user interface 350, which includes a touchscreen displaying a graphical user interface. Ex. 1004 ¶¶ 41, 43, 50, 80, Fig. 5.

i) Limitation 11(e)(iv)

Claim 11 recites “[11(e)(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.” Ex. 1001, 39:21–23. Petitioner argues that the combination of Kalliola and Vauclair teaches this limitation and that a person of ordinary skill in the art would have had a reason to combine the teachings of Kalliola and Vauclair. Pet. 58 (citing Pet. 32–37). Patent Owner does not dispute these arguments. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that the combination of Kalliola and Vauclair teaches or suggests this limitation, as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of the two references. First, Kalliola teaches that, when a user selects “[t]he ‘KEYS’ target object,” the WCD “will attempt to define the relative direction towards the target designated as keys,” which may be “a keychain connected to a set of keys,” where a “Bluetooth™ Low End Extension . . . chipset [is] incorporated into [the] keychain.” Ex. 1004 ¶¶ 69, 71, Fig. 5. Second, Vauclair teaches a Bluetooth pairing process that is initiated by a “user . . . select[ing] a pairing option from a menu, using the user input 28.” Ex. 1007 ¶¶ 30, 34–37, 39–40, 47–49, 51–52, 54, 56, Fig. 2. Finally, Dr. Buehrer testifies that a person

of ordinary skill in the art would have understood that Vauclair’s detailed Bluetooth pairing process could be used to effectuate Kalliola’s teaching of pairing a WCD and a target object using Bluetooth. Ex. 1003 ¶¶ 212–214.

j) Limitation 11(e)(v)

Claim 11 recites “[11(e)(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.” Ex. 1001, 39:24–27. Petitioner argues that Kalayjian teaches this limitation and that a person of ordinary skill in the art would have had a reason to combine the teachings of Kalayjian with those of Kalliola. Pet. 59 (citing Pet. 37–41). Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Kalayjian teaches this limitation, as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of Kalayjian with those of the other references. First, Kalayjian teaches that a remote device “can have speaker 324 to emit sounds operable to guide a user to its location” and that “[s]creen 816 can include graphical button 850 to enable the user to prompt the [remote] device to beep.” Ex. 1008 ¶¶ 34, 49, Figs. 3a, 8. In addition, Dr. Buehrer testifies that “Kalayjian expressly teaches a motivation that would have prompted a POSITA to modify Kalliola’s object-finding system to incorporate Kalayjian’s audio alert feature,” which is supported by Kalayjian’s teaching “that ‘[s]mall items get lost’ and that ‘[t]hese items, such as keys or remote controls, often are close by, but can be out of sight,’” as well as that “causing the slave device to emit a sound ‘allows a user to follow the sound....to the misplaced object.’” Ex. 1003 ¶ 220 (quoting Ex. 1008 ¶¶ 2, 39).

k) Limitation 11(e)(vi)

Claim 11 recites “[11(e)(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.” Ex. 1001, 39:28–32. Petitioner argues that Kalayjian teaches this limitation and that a person of ordinary skill in the art would have had a reason to combine the teachings of Kalayjian with those of Kalliola. Pet. 59 (citing Pet. 41–45). Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Kalayjian teaches this limitation, as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of Kalayjian with those of the other references. First, Kalayjian teaches that “the master device calculates the distance to the slave device by determining the amount of time delay between transmitting its signal to the slave device and when it receives a return signal from the slave device,” as well as that “[t]he master device can use the known speed of radio waves and the known response time of the slave device when calculating the distance.” Ex. 1008 ¶¶ 40, 55. In addition, Dr. Buehrer testifies that a person of ordinary skill in the art “would have understood that providing the estimated distance to the signal emitter in addition to the direction (e.g., 10 feet at 90° to the left) would provide additional data to further assist the user in locating the object,” which would improve Kalliola’s device. Ex. 1003 ¶ 232.

l) Limitation 11(e)(vii)

Claim 11 recites “[11(e)(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 on rotation of the mobile communication device detected by the orientation sensor.” Ex. 1001, 39:33–38. Petitioner argues that the combination of Kalliola and Oswald teaches this limitation and that a person of ordinary skill in the art would have had a reason to combine the teachings of Kalliola and Oswald. Pet. 59–64. Patent Owner disagrees. PO Resp. 18–28.

(1) Kalliola’s Teachings

The parties’ dispute with respect to this limitation is grounded in whether Kalliola’s teaching of pausing and resuming its DoA estimation based on detected rotational motion, or Kalliola’s teaching of speeding up its DoA estimation based on detected rotational motion, amounts to determining direction based on rotation. Pet. 63–64; PO Resp. 25–27; Reply 24–27; Sur-Reply 11–14. On the record developed during trial, we are persuaded that the preponderance of the evidence supports a finding that Kalliola teaches determining direction based on rotation. First, Kalliola discloses “pausing a DoA estimation until the motion of the WCD is detected by the motion sensors,” then resuming “the updating of the DoA estimation” when motion is detected. Ex. 1004 ¶¶ 14, 84. Second, Kalliola discloses a “correction or compensation mode” that is “employed when user 110 moves WCD 100 too quickly for an accurate DoA estimation,” with this “increase[d] speed of the DoA estimation” being triggered by the “[i]ncreased activity detected by motion sensors in WCD 100.” *Id.* ¶ 86. As discussed above with respect to limitation 11(d), the detected motion that triggers either of these modes can be rotational motion of the WCD detected by a gyroscope.

Patent Owner argues that neither Kalliola’s pausing and resuming direction finding based on detected rotational motion nor Kalliola’s

increasing the speed of direction finding based on detected rotational motion amounts to determining direction based on rotation. PO Resp. 25–27; Sur-Reply 11–14. According to Patent Owner, the purpose of Kalliola’s detection of rotational motion “is merely . . . to suspend or reactivate the DoA estimation altogether, to preserve battery life,” rather than to use as an input to Kalliola’s direction calculations. Sur-Reply 12. But the evidence of record shows otherwise. Kalliola teaches that its “DoA Estimation” is based on “Antenna Calibration Vectors” that are themselves based on “Orientation Information” provided by the “Movement and/or Orientation Sensors.” Ex. 1004 ¶ 81, Fig. 9B. Kalliola also teaches “updat[ing] DoA estimation” based on the detection of motion by “sensors in [the] WCD.” *Id.* at Fig. 12; *see id.* ¶ 87 (“If the movement of WCD 100 is detected in step 1230, then in step 1234 the DoA estimation is resumed”); Tr. 46:12–23 (stating that Kalliola teaches updating its direction estimation when motion is detected by the gyroscope). In addition, Kalliola teaches changing its direction-estimation algorithm to use a “correction or compensation mode . . . when user 110 moves WCD 100 too quickly for an accurate DoA estimation.” Ex. 1004 ¶ 86. This change may “increase[] the speed of the DoA estimation, possibly at the cost of other characteristics such as direction resolution.” *Id.* Given that Kalliola teaches the involvement of the detection of rotational motion by the gyroscope in multiple ways in the direction-finding process, we are persuaded that the preponderance of the evidence shows that Kalliola teaches that its direction estimation is based on the detected rotation of the device.

(2) Oswald’s Teachings

Petitioner argues that “Oswald teaches a method of determining a direction to a remote transmitter based on the time difference between when

a UWB pulse is received at two or more antennas.” Pet. 62, 64 (citing Pet. 46–48). Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Oswald teaches such a method because it discloses determining the azimuth and elevation angles of a remote device based on “the signal arriv[ing] at the antennas 272, 274, 276, 278 at different times dependent on the transmitting object’s three-dimensional location with respect to the receiving unit.” Ex. 1006 ¶¶ 350–351, Fig. 18.

(3) Reason to Combine

Petitioner argues that a person of ordinary skill in the art would have had reason to combine “Kalliola’s teaching of determining signal delay (DoA)” with “Oswald’s [teaching of] UWB signals.” Pet. 62, 64 (citing Pet. 48–51). Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that a person of ordinary skill in the art would have had reason to make this combination. Kalliola teaches that “[t]he DoA estimation accuracy decreases in the presence of multipath propagation or noise,” and it proposes solving this problem by choosing the DoA estimate with the highest average power from among several DoA estimates that it generates. Ex. 1004 ¶¶ 64–65. Oswald also teaches solving the problem of multipath signals, which “can propagate poorly and/or highly unpredictably.” Ex. 1006 ¶ 278. Oswald teaches solving this problem by using ultra-wideband signals instead of narrowband signals such as Bluetooth. *Id.* Dr. Buehrer testifies that a person of ordinary skill in the art “would have understood that using [Oswald’s] UWB instead of [Kalliola’s] Bluetooth would have removed the need for Kalliola’s tracking algorithm,” simplifying Kalliola’s process. Ex. 1003 ¶ 244.

Thus, on the record developed during trial, we are persuaded that Petitioner has shown by a preponderance of the evidence that the combination of Kalliola and Oswald teaches limitation 11(e)(vii) and that a person of ordinary skill in the art would have had a reason to combine the teachings of the two references.

m) Limitation 11(e)(viii)

Claim 11 recites “[11(e)(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, 39:39–42. Petitioner argues that the combination of Kalliola and Kalayjian teaches this limitation and that a person of ordinary skill in the art would have had a reason to combine the teachings of Kalliola and Kalayjian. Pet. 64 (citing Pet. 51–54). Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that the combination of Kalliola and Kalayjian teaches or suggests this limitation, as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of the two references. First, Kalliola teaches that “the display shows both a list of possible target objects and an arrow pointer” that “is pointing in the direction of the [selected target object].” Ex. 1004 ¶ 69, Fig. 5. Second, Kalayjian teaches that the screen “include[s] distance graphic 840 to identify the distance between the selected slave device and master device 800.” Ex. 1008 ¶ 49, Fig. 8. Finally, Dr. Buehrer testifies that “providing the user distance information [as taught by Kalayjian] in addition to directional information [as taught by Kalliola] would have improved Kalliola’s WCD because it would have made it easier for the user to locate the signal emitter.” Ex. 1003 ¶ 252.

7. *Analysis of Claims 12–14*

a) *Claim 12*

(1) *Limitation 12(a)*

Claim 12 depends from claim 11 and recites, in part, “wherein the at least one remote device includes a plurality of remote devices.” Ex. 1001, 39:43–46. Petitioner argues that Kalliola teaches this limitation. Pet. 64–65. Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Kalliola teaches this limitation, because it discloses that “[t]here can be one or multiple active signal emitters 500 within one area at the same time.” Ex. 1004 ¶ 69.

(2) *Limitation 12(b)*

Claim 12 also recites “wherein the operational instructions further cause the processor to (i) output to the touch screen a representation of the plurality of remote devices.” Ex. 1001, 39:46–47. Petitioner argues that Kalliola teaches this limitation. Pet. 65. Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Kalliola teaches this limitation, because it discloses that “the display shows both a list of possible target objects and an arrow pointer.” Ex. 1004 ¶ 69, Fig. 5.

(3) *Limitation 12(c)*

Claim 12 also recites “wherein the operational instructions further cause the processor to . . . (ii) receive user input from the touch screen selecting one of the plurality of remote devices.” Ex. 1001, 39:47–49. Petitioner argues that Kalliola teaches this limitation. Pet. 65–66. Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence

that Kalliola teaches this limitation, because it discloses the selection of a target remote device from its touchscreen. Ex. 1004 ¶ 69, Fig. 5.

(4) Limitation 12(d)

Claim 12 also recites “wherein the operational instructions further cause the processor to . . . (iii) output to the touch screen the estimated distance to the selected one of the plurality of remote devices and the direction to the selected one of the plurality of remote devices.” Ex. 1001, 39:49–52. Petitioner argues that the combination of Kalliola and Kalayjian teaches or suggests this limitation and that a person of ordinary skill in the art would have had a reason to combine the teachings of Kalliola and Kalayjian. Pet. 66 (citing Pet. 51–54). Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that the combination of Kalliola and Kalayjian teaches or suggests this limitation, as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of the two references. First, Kalliola teaches that “the display shows both a list of possible target objects and an arrow pointer” that “is pointing in the direction of the [selected target object].” Ex. 1004 ¶ 69, Fig. 5. Second, Kalayjian teaches that the screen “include[s] distance graphic 840 to identify the distance between the selected slave device and master device 800.” Ex. 1008 ¶ 49, Fig. 8. Finally, Dr. Buehrer testifies that “providing the user distance information [as taught by Kalayjian] in addition to directional information [as taught by Kalliola] would have improved Kalliola’s WCD because it would have made it easier for the user to locate the signal emitter.” Ex. 1003 ¶ 252.

b) Claim 13

Claim 13 depends from claim 12 and recites “wherein the operational instructions, upon execution, further cause the processor to receive input from the touch screen defining names for one or more of the plurality of remote devices.” Ex. 1001, 39:53–57. Petitioner argues that the combination of Kalliola and Kalayjian teaches or suggests this limitation and that a person of ordinary skill in the art would have had reason to combine the teachings of these references. Pet. 66–68. Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that the combination of Kalliola and Kalayjian teaches or suggests this limitation, as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of the two references. First, Kalliola teaches that each remote device has a name that is displayed on the user interface. Ex. 1004, Fig. 5. Second, Kalayjian teaches that “[a] user can be given the ability to create unique names or other identifiers for the slave devices through the master device’s user interface.” Ex. 1008 ¶ 37. Finally, Dr. Buehrer testifies that “a POSITA would have been motivated to combine Kalayjian’s teachings of assigning names to remote devices with Kalliola’s touch screen that displays a list of names of target objects” because such functionality would enable a user to assign user-friendly names rather than the “random identifier[s]” that “the signal emitter’s manufacturer[]” would assign. Ex. 1003 ¶¶ 296–297.

c) Claim 14

Claim 14 depends from claim 13 and recites

wherein the operational instructions, upon execution, further cause the processor to determine the direction to one or more of

the plurality of remote devices based on a strength of a signal received from the one or more of the plurality of remote devices at one or more of the plurality of wireless transceivers.

Ex. 1001, 39:58–64. Petitioner argues that the combination of Kalliola and Oswald teaches or suggests this limitation and that a person of ordinary skill in the art would have had reason to combine the teachings of these references. Pet. 68–70 (citing Pet. 59–64). Patent Owner does not dispute this argument. PO Resp. 18–28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that the combination of Kalliola and Oswald teaches or suggests this limitation, as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of the two references. First, Kalliola teaches that “a unidirectional antenna on tracking device 420 may be used to measure the strength of each received signal,” where “[t]he direction of strongest signal reception is deemed to be the direction towards the target.” Ex. 1004 ¶ 58. Second, Oswald teaches determining direction based on receipt of ultra-wideband pulses. Ex. 1006 ¶¶ 345, 351, Fig. 18. Finally, Kalliola teaches that using its signal-strength method of determining direction instead of Oswald’s time-delay method would be simpler and more cost-effective. Ex. 1004 ¶¶ 58–59; *see* Ex. 1003 ¶¶ 301, 306.

E. Kalliola, Turunen, Oswald, Vauclair, Kalayjian, and Thorn

Petitioner argues that claims 15–18 would have been obvious over the combination of Kalliola, Turunen, Oswald, Vauclair, Kalayjian, and Thorn. Pet. 5, 70–80.

1. Overview of Thorn

Thorn relates to “providing location information associated with moveable objects.” Ex. 1009 ¶ 4. In Thorn, a “cellular radiotelephone”

“periodically receives unique Identification (ID) Information from RFID tags coupled to moveable objects, such as a wallet, a briefcase, a set of keys, rental equipment, etc.” *Id.* ¶¶ 28, 30. Bluetooth-enabled tags can be used instead of RFID tags. *Id.* ¶ 32. “The first terminal can then send the ID information to a database to determine if the moveable object is associated with the first terminal.” *Id.* ¶ 30. “If the moveable object is not associated with the first terminal, the first terminal can determine location information, using for example GPS and/or location information that is available through a network in which the first terminal communicates.” *Id.*

2. *Analysis of Claims 15–18*

a) *Claim 15*

Claim 15 depends from claim 14 and recites “wherein the operational instructions, upon execution, further cause the processor to output to the touch screen an estimated position of the one or more of the plurality of remote devices based on information received at one of the plurality of wireless transceivers from a wireless network.” Ex. 1001, 39:65–40:3. Petitioner argues that Thorn teaches this limitation and that a person of ordinary skill in the art would have had reason to combine Thorn’s teachings with those of the other references. Pet. 80 (citing Pet. 70–75). Patent Owner does not dispute this argument. PO Resp. 28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Thorn teaches this limitation, as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of Thorn with those of the other references. First, Thorn teaches that, when a first terminal locates a lost object, it sends location information that “correspond[s] to the location of the movable object” to a second terminal, and “the location information message includes a map including the location information on a display of

the [second] terminal.” Ex. 1009 ¶¶ 13, 53, 62. In addition, Dr. Buehrer testifies that a person of ordinary skill in the art “would have recognized that Kalliola’s object-finding system would only be able to find objects located within range of the WCD’s short-range transceivers” and that “[c]onfiguring Kalliola’s system to also utilize Thorn’s long-range method would have predictably enabled Kalliola’s system to locate the signal emitter over a wide geographical area, thereby eliminating the need for the user to be within Bluetooth/UWB range of the signal emitter,” which “would have predictably improved the system’s flexibility and robustness, thereby increasing user satisfaction.” Ex. 1003 ¶ 317.

b) Claim 16

Claim 16 depends from claim 15 and recites “wherein the operational instructions, upon execution, further cause the processor to output on the touch screen an estimated position of the one or more of the plurality of remote devices based on information received from a second mobile communication device.” Ex. 1001, 40:4–9. Petitioner argues that Thorn teaches this limitation. Pet. 80 (citing Pet. 76–77). Patent Owner does not dispute this argument. PO Resp. 28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Thorn teaches this limitation because Thorn teaches that “location and ID information may be sent to [one] terminal 170 . . . from [another] terminal 150 via the communications network.” Ex. 1009 ¶ 53.

c) Claim 17

Claim 17 depends from claim 16 and recites “wherein the second mobile communication device is paired with the at least one remote device.” Ex. 1001, 40:10–12. Petitioner argues that the combination of Thorn and Kalayjian teaches this limitation and that a person of ordinary skill in the art

would have had reason to combine the teachings of these two references with those of the other references. Pet. 80 (citing Pet. 77–79). Patent Owner does not dispute this argument. PO Resp. 28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that the combination of Thorn and Kalayjian teaches this limitation, as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of Thorn and Kalayjian with those of the other references. First, Thorn teaches that “multiple traveling companions shar[e] a common resource, such as, for example a travel book,” and that, “[i]n the case when one of the travelers wishes to use the resource, the location may be determined relative to which of the travelers is in possession of the resource.” Ex. 1009 ¶ 57. Second, Kalayjian teaches “determining a slave device’s relative location . . . using more than one master device and determining the distance of the slave device to each master device,” as well as that each “master device” must be paired with a “slave device” in order to communicate with it. Ex. 1008 ¶¶ 46, 54, 55. Finally, Dr. Buehrer testifies that a person of ordinary skill in the art

would have been motivated to combine the prior art elements of Kalliola’s object-finding system with Thorn’s teaching of multiple users sharing a common resource and determining the location of the resource relative to which of the users is in possession of it and Kalayjian’s teaching of pairing multiple mobile communication devices to the same remote device to yield the predictable result of an object finding system where multiple users are able to track the location of a shared object.

Ex. 1003 ¶ 324.

d) Claim 18

Claim 18 depends from claim 16 and recites “wherein the second mobile communication device is not paired with the at least one remote

device.” Ex. 1001, 40:13–15. Petitioner argues that Thorn teaches this limitation. Pet. 80. Patent Owner does not dispute this argument. PO Resp. 28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Thorn teaches this limitation because Thorn teaches that, under some circumstances, “the moveable object is not associated with the first terminal.” Ex. 1009 ¶ 30.

F. Kalliola, Turunen, Oswald, Vauclair, Kalayjian, Thorn, and Sharp

Petitioner argues that claim 19 would have been obvious over the combination of Kalliola, Turunen, Oswald, Vauclair, Kalayjian, Thorn, and Sharp. Pet. 5, 81–85.

1. Overview of Sharp

According to Sharp, “[b]ecause mobile devices are sized for portability, they easily can be misplaced,” and, “because mobile devices often are carried to many different locations, they can be forgotten or lost.” Ex. 1010 ¶ 4. Sharp suggests solving this problem with a mobile device that “can be remotely contacted and commanded to perform one or more operations, such as through the transmission of a message to the device.” *Id.* ¶ 7. These commands include those “used to present a message or sound on the mobile device . . . or [to] locate the mobile device.” *Id.* ¶ 9.

2. Analysis of Claim 19

Claim 19 depends from claim 16 and recites “wherein the operational instructions, upon execution, further cause the processor to transmit an audio alert request signal to the at least one remote device via the wireless network.” Ex. 1001, 40:16–20. Petitioner argues that Sharp teaches this limitation and that a person of ordinary skill in the art would have had reason to combine Sharp’s teachings with those of the other references. Pet. 85 (citing Pet. 81–83). Patent Owner does not dispute this argument.

PO Resp. 28. On the record developed at trial, Petitioner has shown by a preponderance of the evidence that Sharp teaches this limitation, as well as that a person of ordinary skill in the art would have had a reason to combine the teachings of Sharp with those of the other references. First, Sharp teaches that a user can “select a mobile device that has been misplaced” and send “[a] remote command to be executed by the mobile device,” including “a sound command” that “indicat[es] that an audible alert is to be output,” which causes the remote device to emit “one or more sounds representing the audible alert.” Ex. 1010 ¶¶ 53–56, 68, 70, Figs. 3, 5. In addition, Dr. Buehrer testifies that a person of ordinary skill in the art “would have recognized that the signal emitter could be mistakenly left in a location outside the range of Kalliola’s short-range transceivers” and would have been motivated to improve Kalliola’s system by incorporating Sharp’s method of “remotely activat[ing] the signal emitter’s audio alert via the cellular network to increase the chances of the signal emitter being noticed.” Ex. 1003 ¶ 338.

III. CONCLUSION¹³

After considering the briefs, evidence, and oral arguments in this case, we determine that Petitioner has proven by a preponderance of the evidence that each of claims 11–19 of the ’246 patent is unpatentable.

¹³ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

The following table summarizes the outcome for the challenged claims of this Final Written Decision:

Claim(s)	35 U.S.C. §	Reference(s) /Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
11–14 ¹⁴	103(a)	Kalliola, Turunen, Oswald, Vauclair, Kalayjian	11–14	
15–18 ¹⁵	103(a)	Kalliola, Turunen, Oswald, Vauclair, Kalayjian, Thorn	15–18	
19 ¹⁶	103(a)	Kalliola, Turunen, Oswald, Vauclair, Kalayjian, Thorn, Sharp	19	

IV. ORDER

In consideration of the foregoing, it is hereby
ORDERED that Petitioner has demonstrated, by a preponderance of the evidence, that claims 11–19 of the '246 patent are unpatentable; and
FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

¹⁴ This ground originally also challenged claim 1, but we do not reach that challenge because Patent Owner statutorily disclaimed claim 1. Pet. 5; Ex. 2001.

¹⁵ This ground originally also challenged claims 2–5, but we do not reach those challenges because Patent Owner statutorily disclaimed claims 2–5. Pet. 5; Ex. 2001.

¹⁶ This ground originally also challenged claims 6–10, but we do not reach those challenges because Patent Owner statutorily disclaimed claims 6–10. Pet. 5; Ex. 2001.

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