

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,

Petitioner

v.

THL HOLDING COMPANY, LLC,

Patent Owner

Case No. IPR2024-00399

Patent No. 11,350,246 (Claims 1-19)

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
II.	CLAIM CONSTRUCTION FOR “ROTATION OF THE MOBILE COMMUNICATION DEVICE”.....	2
A.	The Board’s and THL’s Constructions Should Be Rejected	2
1.	Federal Circuit Law Mandates the Plain and Ordinary Meaning Applies When the Patentee Did Not Act as Its Own Lexicographer and the Claim Term Is Not Ambiguous	2
2.	The Plain and Ordinary Meaning	4
3.	The Board’s and THL’s Constructions Improperly Import a Negative Limitation into the Claim	5
4.	The ’246 Patent Does Not Describe the Claimed Embodiment	7
5.	THL’s Relied-Upon Embodiments in the ’246 Patent Specification Do Not Mandate THL’s Construction.....	8
6.	THL’s Construction Creates Ambiguity	12
B.	Dr. Feuerstein’s Opinions Are Legally Deficient.....	16
III.	KALLIOLA’S FIRST EMBODIMENT TEACHES CLAIMS 11(D) AND 11(E)(VII)	17
A.	Kalliola Teaches “rotation of the mobile communication device”	18
B.	Kalliola Teaches Determining Direction “based...on rotation of the mobile communication device”	20
IV.	KALLIOLA’S GYROSCOPE SENSOR DETECTS ROTATION.....	23
A.	Gyroscopes Detect Rotation	23
B.	Kalliola Teaches Determining Direction “based...on rotation of the mobile communication device” as Detected by a Gyroscope.....	24
V.	CONCLUSION	27

TABLE OF AUTHORITIES

Cases

<i>Axonics, Inc. v. Medtronic, Inc.</i> , 75 F.4th 1375 (Fed. Cir. 2023).....	4
<i>Cadence Pharms. Inc. v. Exela PharmSci Inc.</i> , 780 F.3d 1364 (Fed. Cir. 2015).....	8
<i>CCS Fitness, Inc. v. Brunswick Corp.</i> , 288 F.3d 1359 (Fed. Cir. 2002)	3
<i>DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.</i> , 469 F.3d 1005 (Fed. Cir. 2006)	6
<i>DSW, Inc. v. Shoe Pavilion, Inc.</i> , 537 F.3d 1342 (Fed. Cir. 2008).	3
<i>Everstar Merchandise Co. Ltd. v. Willis Electric Co., Ltd.</i> , Case No. 2021-1882, 2022 WL 1089909 (Fed. Cir. Apr. 12, 2022)	24
<i>Flo Healthcare Sols., LLC v. Kappos</i> , 697 F.3d 1367 (Fed. Cir. 2012).....	8
<i>Gart v. Logitech, Inc.</i> , 254 F.3d 1334 (Fed. Cir. 2001)	2
<i>Google LLC v. IPA Techs. Inc.</i> , IPR2019-00744, Paper 54 (PTAB Oct. 15, 2020)18	
<i>Google LLC v. Ji-Soo Lee</i> , 759 992 (Fed. Cir. 2019)	24
<i>Johnson Worldwide Assoc., Inc. v. Zebco Corp.</i> , 175 F.3d 985 (Fed. Cir. 1999).....	3
<i>Masimo Corp. v. Sotera Wireless, Inc.</i> , Case No. 2022-1415, 2023 WL 6307959 (Fed. Cir. Sept. 28, 2023).....	22
<i>Novartis Pharm. Corp. v. Accord Healthcare, Inc.</i> , 38 F.4th 1013 (Fed. Cir. 2022)5	
<i>Phillips v. AWH Corp.</i> , 415 F.3d 1303 (Fed. Cir. 2005).....	17
<i>Rembrandt Diagnostics, LP v. Alere, Inc.</i> , 76 F.4th 1376 (Fed. Cir. 2023).....	24
<i>Rovi Guides, Inc. v. Vidal</i> , Case No. 2022-1994, 2022 WL 1152311 (Fed. Cir. Apr. 19, 2022)	23
<i>Santarus, Inc. v. Par Pharm., Inc.</i> , 694 F.3d 1344 (Fed. Cir. 2012).....	5

<i>Seabed Geosolutions (US) Inc. v. Magseis FF LLC</i> , 8 F.4th 1285 (Fed. Cir. 2021)	6
<i>Thorner v. Sony Computer Entertainment America LLC</i> , 669 F.3d 1362 (Fed. Cir. 2012)	2, 3, 8
<i>Toshiba Corp. v. Imation Corp.</i> , 681 F.3d 1358 (Fed. Cir. 2012)	8
<i>Uniloc 2017 LLC v. Sling TV, L.L.C.</i> , No. 2023-1156, 2024 WL 4038034 Cir. Sept. 4, 2024)	7

Regulations

37 C.F.R. § 42.24	2
37 C.F.R. § 42.6(e)	3

I. INTRODUCTION

The only matter in dispute for the remaining Challenged Claims 11-19 is whether Kalliola teaches an orientation sensor to detect rotation of the mobile communication device (Claim 11(d)) and determining a direction to at least one remote device based on rotation of the mobile communication device detected by the orientation sensor (Claim 11(e)(vii)). (Claim terms shown in underlined italics throughout). The Petition presents two bases for how Kalliola (Ex. 1004) teaches Claims 11(d), 11(e)(vii).

The first-mapped basis relies on Kalliola’s “orientation sensor” detecting rotation of the two sections of the mobile communication device. *Petition* (Paper 1), 54-56, 59-62. In dismissing this mapping, the Board construed rotation of the mobile communication device as requiring rotation of the device “as a whole.” *Decision* (Paper 8), 24. The Board provided no factual or legal basis for its construction. *Id.* The Board’s construction implicitly imports a negative limitation into the claim by excluding “rotation of one part of the device relative to another part of the device[,]” contrary to Federal Circuit precedent. *Id.*

THL adopts the Board’s construction with the express importation of the Board’s negative limitation, contending Claim 11(e)(vii) means “rotation of the mobile communication device as a whole, rather than the rotation of a specific component of the device relative to another component.” *Response* (Paper 14), 15.

The second-mapped basis relies on Kalliola's disclosed gyroscope chip to detect motion of the mobile communication device. *Petition*, 56-57, 63-64. The Board stated that Petitioner did not explain "why Kalliola's detection of movement...is, or includes, detecting rotation of the device." *Decision*, 25. THL, however, does not dispute that a gyroscope detects rotation, and Dr. Buehrer opines a POSITA would have understood gyroscopes detect rotational motion. *See* Section IV.

II. CLAIM CONSTRUCTION FOR "ROTATION OF THE MOBILE COMMUNICATION DEVICE"

A. The Board's and THL's Constructions Should Be Rejected

1. Federal Circuit Law Mandates the Plain and Ordinary Meaning Applies When the Patentee Did Not Act as Its Own Lexicographer and the Claim Term Is Not Ambiguous

Federal Circuit law requires applying the plain and ordinary meaning when the patentee did not act as its own lexicographer and when the claim term is not ambiguous. *Thorner v. Sony Computer Entertainment America LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012) (stating claim terms are given their "ordinary and customary meaning" unless "a patentee sets out a definition and acts as his own lexicographer" or "the patentee disavows the full scope of a claim term either in the specification or during prosecution."); *Gart v. Logitech, Inc.*, 254 F.3d 1334, 1341 (Fed. Cir. 2001) ("However, we perform this consultation [consulting the specification and the prosecution history] to determine if the patentee has chosen to be his or her own

lexicographer [internal citations omitted] or when the language itself lacks sufficient clarity such that there is no means by which the scope of the claim may be ascertained from the language used....”); *DSW, Inc. v. Shoe Pavilion, Inc.*, 537 F.3d 1342, 1347 (Fed. Cir. 2008).

THL does not argue that it acted as its own lexicographer. There is also no “clearly set forth [] definition of the disputed claim term” in either the specification or prosecution history. *Thorner*, 669 F.3d at 1365 (citing *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1365 (Fed. Cir. 2002)). A specific definition for a claim term must be set forth in the specification with “reasonable clarity, deliberateness, and precision[.]” *Johnson Worldwide Assoc., Inc. v. Zebco Corp.*, 175 F.3d 985, 990-91 (Fed. Cir. 1999) (citing *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994)). In the absence of a deliberate and precise definition, the plain and ordinary meaning applies.

Claim 11(e)(vii)’s plain and ordinary meaning is also not ambiguous. (Ex. 1047, ¶14). Nor does THL argue the claim language is ambiguous. As discussed in the following section, the plain and ordinary meaning of the claim scope can be ascertained, further indicating the claim is not ambiguous.

Because THL did not act as its own lexicographer and because the claim term is not ambiguous, the Federal Circuit requires the plain and ordinary meaning apply.

2. *The Plain and Ordinary Meaning*

The plain and ordinary meaning of rotation of the mobile communication device encompasses any rotation of the mobile communication device relative to any object, including itself. (Ex. 1047, ¶4; *Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1375, 1384 (Fed. Cir. 2023) (holding petitioner must be given an opportunity to present new arguments and evidence responsive to patent owner’s new construction)). The claim does not require rotation of the “whole” device, as THL’s construction requires, or the “entirety” of the device, as THL’s expert contends. (Ex. 1046, 102:22–103:1). The term requires detecting rotation of the device, which encompasses any component of the device. (Ex. 1047, ¶5). A POSITA would have understood the term encompasses *any* rotation of the mobile communication device relative to any object, including itself, because there are no claim limitations requiring any specific type of rotation. *Id.*, ¶¶4-5. The claim places no limitations on the device’s housing or structural configuration. *Id.*, ¶5.

Additionally, Claim 11 does not recite determining any rotation or orientation information of the device, e.g., a direction or orientation to which the device is pointing. *Id.* If the direction is determined based on any rotation of the device detected by the orientation sensor, then Claim 11(e)(vii) is met.

As discussed in Section II.A.4, the ’246 specification does not describe any embodiment matching the claim language and, consequently, does not describe

anything that would constrain the otherwise broad claim language encompassing any rotation of the mobile device.

3. *The Board’s and THL’s Constructions Improperly Import a Negative Limitation into the Claim*

“While a negative limitation need not be recited in the specification *in haec verba*, there generally must be something in the specification that conveys to a skilled artisan that the inventor intended the exclusion[.]” *Novartis Pharm. Corp. v. Accord Healthcare, Inc.*, 38 F.4th 1013, 1017 (Fed. Cir. 2022). For example, “[n]egative claim limitations are adequately supported when the specification describes a reason to exclude the relevant limitation.” *Santarus, Inc. v. Par Pharm., Inc.*, 694 F.3d 1344, 1351 (Fed. Cir. 2012). A reason to exclude an element could be found in “statements in the specification expressly listing the disadvantages of using” that element. *Id.* “Another reason could be that the specification ‘distinguishes among’ the element and alternatives to it.” *Novartis*, 38 F.4th at 1016-17 (citations omitted).

Here, THL reads in a limitation that *excludes* an orientation sensor that detects “the rotation of a specific component of the device relative to another component.” *Response*, 15-18. Yet, there is nothing in the ’246 specification supporting the negative limitation, as required by Federal Circuit law.

THL argues the “plain language” “when read in context with the rest of claim 11, makes clear that the orientation sensor detects the rotation of ‘the’ mobile

communication device, i.e., as a whole.” *Response*, 15-16. But THL does not identify any specific claim language that allegedly provides this “context.” Rather, THL contends “[t]here is **no indication** that the claim language refers to detecting the rotation of only a part or component of the mobile communication device, as that would be something other than ‘the’ mobile communication device for which rotation is detected.” *Id.*, 16 (emphasis added), 18 (arguing figures do not depict multi-section bodies).

THL provides no legal authority supporting the notion that silence in the plain language of the claim justifies *excluding* “the rotation of a specific component of the device relative to another component.” *Response*, 15; *cf. Seabed Geosolutions (US) Inc. v. Magseis FF LLC*, 8 F.4th 1285, 1288 (Fed. Cir. 2021) (“[S]ilence does not support reading the claims to exclude gimbaled geophones.”) (citations omitted).

In the absence of an express exclusion of claim scope, a broad claim term will not be narrowed. *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (rejecting construction that the claimed “pressed against” a spherically-shaped portion requires pressing against the *entire* spherically-shaped portion, noting the claim broadly encompasses pressing against an *edge* of the spherically-shaped portion); *Uniloc 2017 LLC v. Sling TV, L.L.C.*, No. 2023-1156, 2024 WL 4038034, *Slip Op.*, at 4-5 (Fed. Cir. Sept. 4, 2024) (“[W]e decline to import a negative limitation into the claim that cannot be found in the

claim language itself.”) (not reported in Fed. Rptr.). Because neither the plain and ordinary meaning nor the intrinsic record supports THL’s negative limitation or indicates the patentee intended to exclude rotation of any component of the device, adopting THL’s construction would be reversible error.

4. The ’246 Patent Does Not Describe the Claimed Embodiment

THL requests the Board forgo the plain and ordinary meaning in favor of a construction having no support in the ’246 specification. Nothing in the specification describes an embodiment encompassing Claim 11(e)(vii). (Ex. 1047, ¶¶15-38). Claim 11(e)(vii) recites determining a *direction* to the remote device based on both signal *delay* and rotation of the mobile communication device detected by the orientation sensor. In contrast, the embodiment in the ’246 Patent describing determining *direction* based on rotation of the mobile communication device detected by the orientation sensor uses signal *strength* – not signal *delay* as claimed. ’246 Patent, 11:43-52. Determining direction based on signal *strength* is not the same as using signal *delay*. (Ex. 1047, ¶19) (discussing difference). Specifically, signal strength is well-known as a measure of power, while signal delay is construed to mean a difference in time. *Id.* The ’246 Patent does not describe using signal delay to determine direction at all, let alone using signal delay in combination with rotation of the device. *Id.*, ¶¶35-38. The only mentions of signal delay in the ’246 Patent

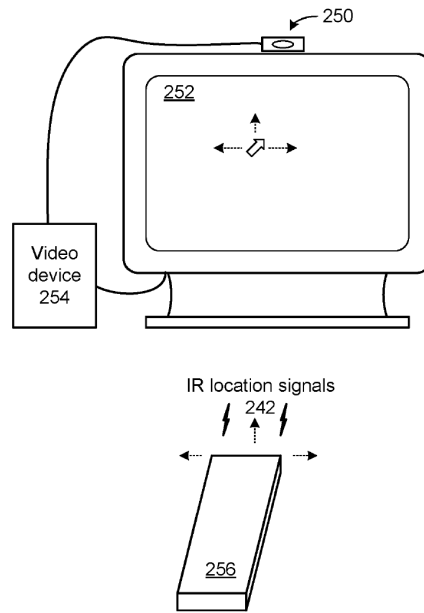
relate to determining distance—not direction—and do not describe an orientation sensor. *Id.* (citing '246 Patent, 15:45-52, 34:38-40, 36:45-48).

5. *THL's Relied-Upon Embodiments in the '246 Specification Do Not Mandate THL's Construction*

The *only* justification THL provides for its claim construction is three disclosures in the '246 specification. *Response*, 16-17. “[E]ven if ‘all of the embodiments discussed in the patent’ included a specific limitation, it would not be ‘proper to import from the patent’s written description limitations that are not found in the claims themselves.’” *Cadence Pharms. Inc. v. Exela PharmSci Inc.*, 780 F.3d 1364, 1369 (Fed. Cir. 2015) (quoting *Flo Healthcare Sols., LLC v. Kappos*, 697 F.3d 1367, 1375 (Fed. Cir. 2012)). “It is ‘not enough that the only embodiments, or all of the embodiments, contain a particular limitation.’” *Toshiba Corp. v. Imation Corp.*, 681 F.3d 1358, 1369 (Fed. Cir. 2012) (citing *Thorner*, 669 F.3d at 1366) (further stating a patentee “cannot overcome the plain meaning...by pointing to an embodiment disclosed in the specification or prosecution history”). Here, there is no evidence that the “patentee distinguished [the] term from [the] prior art on the basis of a particular embodiment, expressly disclaimed subject matter, or described a particular embodiment as important to the invention.” *CCS Fitness*, 288 F.3d at 1366-67; Ex. 1046, 102:8-15 (Dr. Feuerstein agreeing the '246 Patent’s file history does not inform his construction); Ex. 1047, ¶39.

None of THL's relied-upon embodiments from the '246 specification justifies THL's construction. For example, THL cites the '246 Patent, 11:43-52, as the primary support for its construction. *Response*, 16-17. This embodiment relates to a short-range wireless transceiver and antenna in adjunct device that "generates signal **strength** in response to the location signal 114 from wireless device 120." '246 *Patent*, 11:21-26, FIG. 5. "The signal **strength** data can be analyzed in conjunction with one or more orientation sensors of the handheld wireless communication device 110, to determine a direction to the wireless device 120." *Id.*, 11:44-48. Thus, this embodiment relates to determining the direction to a remote device based on the signal **strength** (again, not signal **delay** as claimed). Per Dr. Buehrer, a POSITA would have understood that determining direction based on signal strength is a different technique than determining direction based on signal delay at two or more antennas; therefore, this embodiment does not apply to Claim 11's requirement to determine direction based on signal delay. (Ex. 1047, ¶¶16-20).

THL next cites the FIG. 30 embodiment, which describes a "screen pointing system" including "a handheld device 256, such as handheld wireless communication device 110 equipped with adjunct device 100 [that] emits IR location signals 242, that are viewed by video camera 250." *Response*, 17; '246 *Patent*, 25:7-12.



'246 Patent, FIG. 30.

THL alleges that “changes of orientation, *such as the rotation of the handheld device 256* about roll, pitch or yaw axes can be detected and used to adjust the orientation of the screen pointer” and concludes that “the orientation sensor is implemented to help locate the orientation of handheld device 256 *as a whole* relative to the remote display screen 252.” *Response*, 17 (emphases in original). THL’s characterization is misleading because there is no orientation sensor used in this embodiment. '246 Patent, 25:7–26:12; Ex. 1047, ¶¶22-27. THL omits the portion of the disclosure that confirms “video device 254 receives the video signal from video camera 250 and **analyses the video signal to determine the position and/or orientation of the IR emitters 240 in the video image.**” *Id.*, 25:26-29. Thus, the *video device 254* determines the orientation of the device 256 based on video

signals—not an orientation sensor as required by Claim 11(e)(vii). (Ex. 1047, ¶¶24-26).

Because there is no orientation sensor in device 256, and because Claim 11 requires an orientation sensor to detect the rotation of the mobile device, the FIG. 30 embodiment is irrelevant to and does not otherwise support THL’s construction. (Ex. 1047, ¶27). This embodiment also does not relate to determining the direction to a remote device as required by Claim 11. Given this embodiment has nothing to do with Claim 11, there can be no reason to exclude any element from Claim 11 based on this disclosure.

THL also cites an embodiment where “an ‘internal compass’ of the wireless communication device 110 assists to provide ‘absolute directional information’” “to triangulate the location of the mobile paging device[.]” *Response*, 17 (citing ’246 *Patent*, 28:32-38). However, this embodiment relates to a system where multiple fixed paging devices in a building determine their relative directions to the mobile device, i.e., the opposite of what is claimed. (Ex. 1047, ¶¶28-30 (citing ’246 *Patent*, 27:11–28:38, FIG. 32)). This disclosure also does not provide any reason to exclude any element from Claim 11.

Finally, THL alleges the ’680 Patent’s figures do not illustrate multi-section bodies. *Response*, 18. THL cites no legal authority supporting the notion that the claims are limited to what is depicted in the figures. Additionally, the ’246

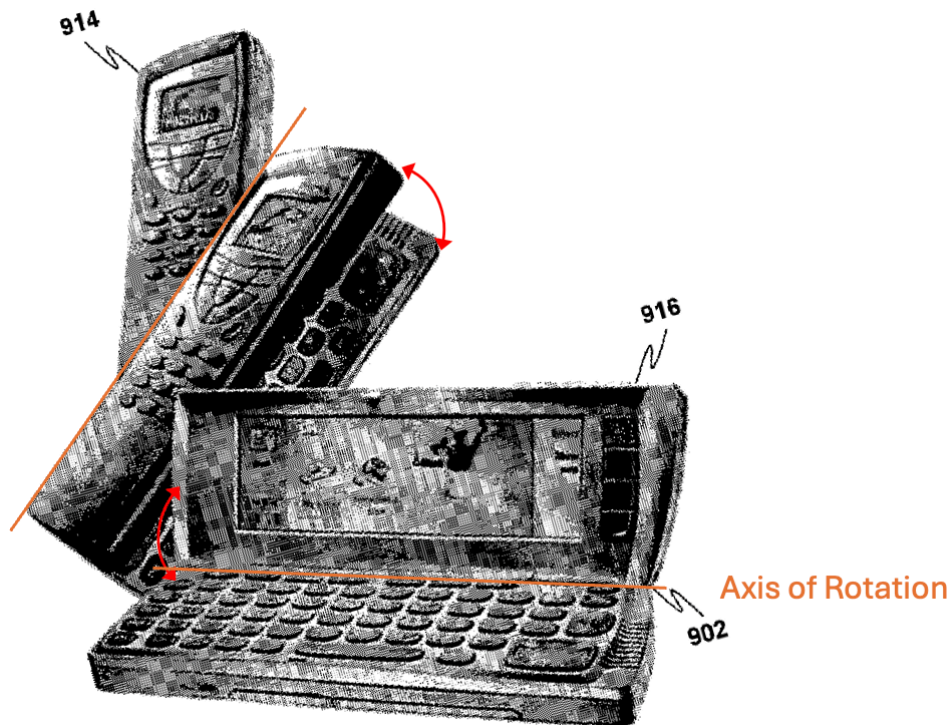
specification expressly contemplates an embodiment where the device has “a multi-section body with hinges, folds, slides, and/or twist joints that rotate relative to one another[,]” namely “a smart phone, digital book, **netbook**, personal computer with wireless data communication or other wireless communication device....” *Response*, 18; '246 *Patent*, 4:55-58. Per Dr. Buehrer, a POSITA would have understood that a netbook is a small laptop computer typically having two halves connected via a hinge that rotate into open/closed positions. (Ex. 1047, ¶¶32-34). THL provides no support for excluding described embodiments from the claim.

6. THL’s Construction Creates Ambiguity

The insertion of the “as a whole” limitation creates ambiguity where there is none in the plain and ordinary meaning of Claim 11. Per Dr. Buehrer, the added phrase “as a whole” could reasonably be interpreted in multiple ways, thus indicating the added phrase creates ambiguity. (Ex. 1047, ¶¶6-13).

First, per Dr. Feuerstein’s testimony, the phrase could be interpreted to mean the mobile device rotates by “spinning about its own axis...relative to other objects.” *Id.*, ¶7 (citing Ex. 2002, ¶¶51-52). Kalliola teaches the limitation applying this interpretation. Kalliola’s FIG. 9A depicts two sections of the mobile communication device rotating between closed and open positions “about its own axis.” *Id.* As explained by Dr. Buehrer, neither of the two sections of the mobile communication device is fixed, which means “a POSITA would have understood that both halves of

the mobile communication device are rotating freely about hinge 902, both relative to the device's axis of rotation and relative to an inertial frame of reference, such as the Earth." *Id.*, ¶8. Thus, both sections of the mobile communication device rotate relative to each other and "relative to other objects" and yet, per THL, this does not qualify as rotation "as a whole." *Id.*, ¶9.



Id., ¶7 (citing *Kalliola*, FIG. 9A).

Second, "as a whole" could be interpreted "to mean requiring a 'whole' 360° rotation of the device about an axis." (Ex. 1047, ¶10). This is consistent with the '246 embodiment relied on by THL, which requires the user to "turn around" to gather 360 degrees of directional data" so that "[t]he signal strength data can be analyzed in conjunction with one or more orientation sensors of the handheld

wireless communication device 110, to determine a direction to the wireless device 120.” ’246 Patent, 11:43-48; Response, 16-17; Ex. 1047, ¶20 (explaining why 360 degrees of rotation is required to identify the null pattern). Importantly, however, Dr. Feuerstein disagreed with this interpretation and testified “[t]here’s nothing that a POSITA, at the time of the invention, would read into that to require the detected rotation to be any particular value, such as 360 degrees or greater.” (Ex. 1046, 107:22–108:1, 107:14-16). Per Dr. Feuerstein, even 0.5° of rotation would qualify “as sort of the lowest permissible amount of rotation that would meet the claim limitation.” *Id.*, 108:9-12. Therefore, Dr. Feuerstein’s opinion that Claim 11(e)(vii) does not require 360° of rotation is contradictory to THL’s reliance on the ’246 embodiment at 11:43-48 that does require 360° of rotation and that THL otherwise uses to support its “as a whole” construction.

Third, “as a whole” could be interpreted to mean rotating “the entirety of the mobile communication device’s housing.” (Ex. 1047, ¶11). Dr. Feuerstein would not agree to this interpretation and testified that he “didn’t give an opinion...about housing or the entirety of the housing.” (Ex. 1046, 98:14-20, 102:18–103:1). Dr. Feuerstein refused during his deposition to provide any opinions on what constitutes “the” mobile communication device, the “entirety” of the device, or a housing of the mobile communication device that may otherwise be rotated. *Id.*, 26:3-5, 26:17-19, 98:18-20. Despite many opportunities, Dr. Feuerstein also refused to provide

exemplary orientation sensors, other than a compass, satisfying the claimed *orientation sensor*. *Id.*, 27:20–39:16. Dr. Feuerstein thus refused to opine regarding the metes and bounds of the “as a whole” constraint relative to a mobile communication device’s housing.

Regardless, as shown in Kalliola’s FIG. 9A above, the *entirety* of Kalliola’s mobile communication device’s housing (i.e., both section halves) is rotating about the same axis along hinge 902, thereby meeting the third possible interpretation of “as a whole.” (Ex. 1047, ¶11).

Fourth, “as a whole” could also be interpreted to mean only rotating the mobile device in the azimuthal plane. (Ex. 1047, ¶12). However, this conflicts with THL’s reliance on embodiments in the ’246 specification describing detecting rotation “about roll, pitch or yaw axes,” which does not limit rotation to the azimuthal plane. *Response*, 17. Further, this interpretation is contradictory to Dr. Feuerstein’s testimony that “multiple axis rotation could meet the claim.” (Ex. 1046, 110:9-10).

Given that the claim limitation is not ambiguous, the Board should not attempt a construction where there is no need for one. Moreover, the multiple possible interpretations of “as a whole,” most of which still encompass Kalliola, demonstrate that the meaning of “as a whole” is ambiguous. (Ex. 1047, ¶13). Reading in the requirement for the orientation sensor to detect the rotation of the mobile

communication device “as a whole” to overcome Kalliola would be reversible error, and the Board should decline to do so.

B. Dr. Feuerstein’s Opinions Are Legally Deficient

Dr. Feuerstein’s opinions should be given no weight because they apply the incorrect legal standard for claim construction. Dr. Feuerstein admitted his opinions were based on construing the claim to meet the “purpose” or the “use” of the orientation sensor and rotation as described in the ’246 Patent’s embodiments. (Ex. 1046, 98:18–99:2). Dr. Feuerstein opined that (1) “[Kalliola’s] orientation sensor wouldn’t perform the function that the ’246 specification describes”; and (2) he did not “believe [Dr. Buehrer’s interpretation] would be compatible with or conform with how Howard [’246 Patent], in the ’246 spec and claims, [] use[s] the orientation sensor information and related rotation.” *Id.*, 97:1-3, 98:9-13. Dr. Feuerstein thus repeatedly opined that his construction was based on the claim meeting an undefined “purpose” of the ’246 specification or being “compatible with or conform[ing]” with the ’246 Patent’s described embodiments (as opposed to what is claimed).

Dr. Feuerstein’s opinions based on “a purpose” of the rotation of the device or a requirement that the rotation of the device match what is described in the ’246 specification are without any legal support and should be given no weight. *Toshiba*, 681 F.3d at 1360, 1369 (rejecting district court’s construction that inserted a purpose

requirement into the claimed “identifying information”); *CCS Fitness*, 288 F.3d at 1366 (rejecting a construction conforming to the described embodiments).

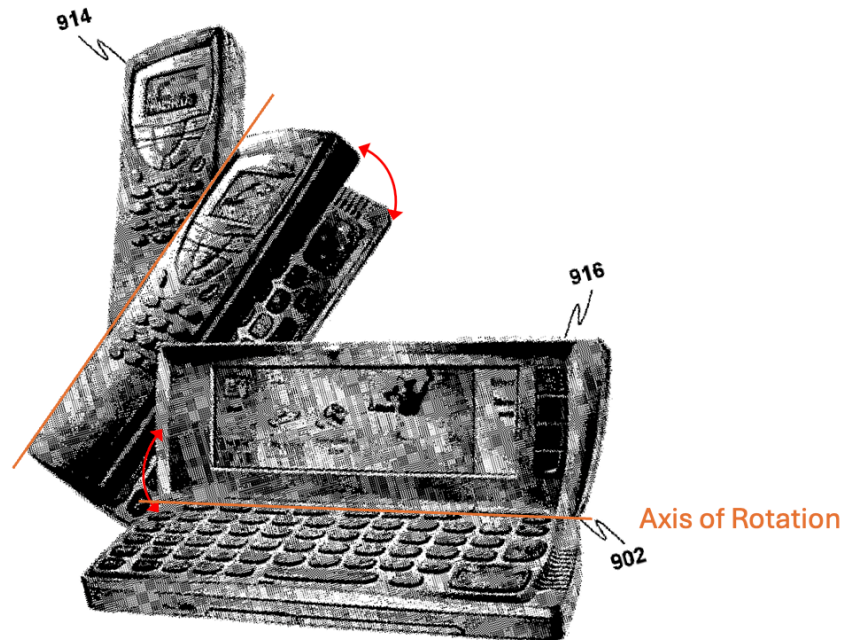
Dr. Feuerstein’s opinions in his declaration are also legally deficient, as they merely parrot (often verbatim) the arguments in the Patent Owner’s Response and without any additional underlying factual basis. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1318 (Fed. Cir. 2005) (*en banc*) (“[C]onclusory, unsupported assertions by experts as to the definition of a claim term are not useful to a court.”); *cf. Response*, 15-18, *with* Ex. 2002, ¶¶49-57.

III. KALLIOLA’S FIRST EMBODIMENT TEACHES CLAIMS 11(d) AND 11(e)(vii)

For the Petition’s first mapping relying on Kalliola’s first embodiment for teaching Claims 11(d), 11(e)(vii) (*Petition*, 55-56, 59-62), THL argues Kalliola fails to teach the limitations because Kalliola’s rotation of the housing sections of the mobile device relative to each other is not rotation of the device “as a whole.” *Response*, 19-21. THL’s argument fails applying either THL’s claim construction or the plain and ordinary meaning. THL also argues the “orientation sensor data described in Kalliola” is not used to “‘determine the direction’ from the mobile communication device to the remote device[.]” *Response*, 19-21, 26-27. THL’s argument fails because it incorrectly interprets the based on claim language.

A. Kalliola Teaches “rotation of the mobile communication device”

Kalliola teaches orientation sensor 932 “provide[s] information on the relative orientation of two sections of WCD 100.” *Kalliola*, [0078], [0081], FIGs. 9A-9B; *Petition*, 54-55. Even THL admits that Kalliola’s orientation sensor is “monitoring the movement ‘of the cover relative to the body[.]’” *Response*, 23. Per Dr. Buehrer, the WCD’s two housing sections freely rotate about a hinge relative to each other and relative to other objects. (Ex. 1047, ¶¶7-8, 43; Ex. 1003, ¶261). A POSITA would have understood Kalliola, FIG. 9A illustrates both sections of the device (i.e., the *whole* device) rotating about hinge 902, which THL does not dispute. (Ex. 1047, ¶45; Ex. 1003, ¶261).



(Ex. 1047, ¶45 (citing *Kalliola*, FIG. 9A)).

THL's only rebuttal regarding Kalliola's housing sections rotating is that Kalliola "does not use the word 'rotation[.]'" *Response*, 21. It is not necessary for Kalliola's written description to use the word "rotation" for Kalliola to disclose rotation of the mobile device. *Google LLC v. IPA Techs. Inc.*, IPR2019-00744, Paper 54 at 32-33 (PTAB Oct. 15, 2020) ("To the extent that Patent Owner requires the prior art to use the exact terminology as the claim, an obviousness determination is not an *ipsissimis verbis* test.") (cited Federal Circuit law omitted).

Even if the Board adopts THL's construction (although it should not), Kalliola still teaches rotation of the mobile communication device under Dr. Feuerstein's explanation of the construction. Dr. Feuerstein opined that to a POSITA, "the plain meaning of an object rotating involves the object as a whole spinning around its own axis." (Ex. 2002, ¶51). Per Dr. Buehrer, because neither of the two sides of Kalliola's device is fixed, a POSITA would have understood that both halves of the device are rotating freely via hinge 902, both relative to the device's axis of rotation and relative to other objects. (Ex. 1047, ¶¶8, 45). Because both sections (i.e., the *entirety*) of Kalliola's device are rotating, i.e., spinning, about the axis of rotation, Kalliola teaches rotation of the mobile device "as a whole" applying THL's construction.

The Board's Institution Decision did not consider the scope of the plain and ordinary meaning, nor did the Board yet have the parties' experts' understanding of what encompasses the claimed rotation. Petitioner respectfully requests

reconsideration of how Kalliola teaches the claims, even applying the Board’s and THL’s “as a whole” construction.

B. Kalliola Teaches Determining Direction “based...on rotation of the mobile communication device”

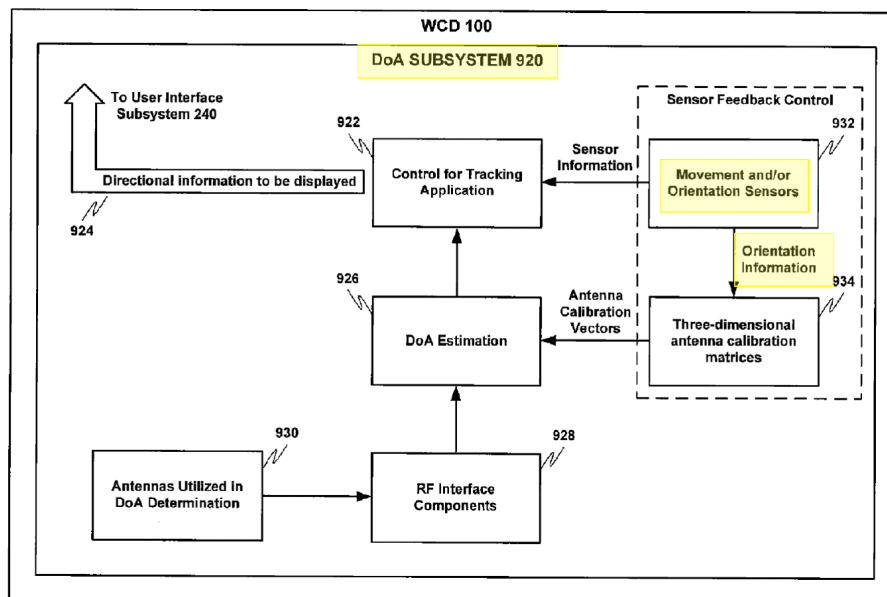
THL’s second argument that Kalliola’s first embodiment does not teach Claims 11(d), 11(e)(vii) is that Kalliola’s determination that the two WCD sections have been rotated to the open position does not “‘determine’ the ‘direction from the mobile communication device to the remote device’ as claimed.” *Response*, 24-25, 26-27¹ (again including attorney argument with no explanation and only verbatim expert support at Ex. 2002, ¶71). THL’s argument is facially incorrect and unsupported, as Kalliola extensively discusses the steps for determining direction beginning with detecting the WCD is in the open position. *Petition*, 59-62.

Contrary to THL’s assertion, Kalliola’s DoA (Direction of Arrival) subsystem does use the orientation information (e.g., the WCD sections are rotated to open) to determine “a relative direction towards a target beacon.” *Petition*, 59 (citing

¹ THL states the “Petition does not address” Kalliola’s FIG. 12 flow chart. This is incorrect. *See* *Petition*, 61-62 (discussing FIG. 12’s steps). THL also argues that Kalliola does not sense the rotation of the WCD as a whole. *Response*, 24-25, 26-27. Petitioner addressed this argument in the preceding section.

Kalliola, [0080]). The orientation sensor information is used to select the antenna configuration, which determines “how the measurements from the active antennas will be interpreted in order to determine direction.” *Kalliola*, [0081]; *Petition*, 60-62; Ex. 1003, ¶¶272-279, pinpoint at ¶279 (providing detailed explanation of how *Kalliola* teaches Claims 11(e)(vii)); Ex. 1047, ¶¶52-53. The *Petition* extensively explains how “[t]he [*Kalliola*] DoA estimation may operate in a multitude of modes **depending on the physical orientation of the device.**” *Kalliola*, [0013]; *Petition*, 59. The orientation sensor information (detecting WCD sections are rotated to open) is used “to determine the appropriate antenna calibration vectors[,]” where the antenna configuration includes “how the measurements from the active antennas will be interpreted **in order to determine direction.**” *Kalliola*, [0081]; *Petition*, 59-62.

FIG. 9B



(Ex. 1003, ¶272 (citing *Kalliola*, FIG. 9B)).

The claim does not recite *how* the orientation sensor information is used nor require any particular use of the information to determine the direction. For example, the claim does not require using the orientation sensor to determine a particular orientation and then using that orientation to determine direction. The claim language of based on merely requires the claimed condition of detecting rotation of the device be met before the direction is determined. *Masimo Corp. v. Sotera Wireless, Inc.*, No. 2022-1415, 2023 WL 6307959, *Slip Op.*, at 7 (Fed. Cir. Sept. 28, 2023) (agreeing with the Board that the plain meaning of “based on” is “broad” and “require[s] a condition to be met before an alarm is triggered, not that the condition actually trigger the alarm”); *Rovi Guides, Inc. v. Vidal*, No. 2022-1994, 2022 WL 1152311, *Slip Op.*, at 6 (Fed. Cir. Apr. 19, 2022) (finding that an availability check must occur before a display step because the claim recited the display “based on” the availability check) (neither reported in Fed. Rptr.).

Thus, Kalliola’s first embodiment teaches Claim 11(e)(vii) because the direction is determined based on the antenna configuration, which is selected based on the rotation of the WCD sections detected by the orientation sensor.

IV. KALLIOLA'S GYROSCOPE SENSOR DETECTS ROTATION

A. Gyroscopes Detect Rotation

Kalliola's second embodiment mapped in the Petition discloses a semiconductor gyroscope chip, where information from the gyroscope chip indicating movement of the device triggers direction finding. *Petition*, 56-57, 63-64.

Notably, neither THL nor Dr. Feuerstein disputes that Kalliola's semiconductor gyroscope chip detects rotation of the Kalliola WCD or that gyroscopes detect rotation. *See also* Ex. 1046, 49:18-20 (testifying that gyroscopes "can be used to detect angular velocity"). Indeed, if THL contended that a gyroscope does not detect rotation, THL would be contradicting its previous contentions that mapped a gyroscope to "an orientation sensor to detect rotation of the mobile communication device[.]" (Ex. 1013, 38; *Petition*, 56-57 (citing same)). But, THL has submitted **no** contradicting argument or evidence otherwise.

Additionally, per Dr. Buehrer, it is well-known to POSITAs that a gyroscope detects rotational motion. (Ex. 1047, ¶47 (citing Ex. 1051, 170, Ex. 1053, 9)); *Axonics*, 75 F.4th at 1380 ("petitioner is entitled to respond to new arguments made in a patent owner response."); *Everstar Merchandise Co. Ltd. v. Willis Electric Co., Ltd.*, No. 2021-1882, 2022 WL 1089909, *Slip Op.*, at 7-9 (Fed. Cir. Apr. 12, 2022) (not reported in Fed. Rptr.) (reversing, as an abuse of discretion, the Board's decision

refusing to consider argument presented by petitioner responsive to the POR); *Rembrandt Diagnostics, LP v. Alere, Inc.*, 76 F.4th 1376, 1382-85 (Fed. Cir. 2023).

Because THL does not dispute that gyroscopes detect rotation, and because Dr. Buehrer explains that a POSITA would readily understand that gyroscopes detect rotation, the substantial evidence supports finding that Kalliola's gyroscope chip detects rotation as required by Claim 11. *Google LLC v. Ji-Soo Lee*, 759 F. App'x 992, 996-97 (Fed. Cir. 2019) (finding art teaches a limitation where the patent owner did not dispute the teaching and provided no rebuttal evidence).

B. Kalliola Teaches Determining Direction “based...on rotation of the mobile communication device” as Detected by a Gyroscope

Kalliola teaches using “a semiconductor gyroscope chip” as a motion sensor “to detect when WCD 100 is being moved.” *Kalliola*, [0084]; *Petition*, 56. THL alleges that this disclosure has “nothing to do with ‘an orientation sensor to detect rotation of the mobile communication device’ because it ‘pertains to managing or conserving ‘battery life’ by *suspending* tracking calculations if a sensor indicates the WCD (and the target) are not moving, and *resuming* tracking calculations if the sensor indicates the WCD/target have moved.” *Response*, 21, 25 (emphasis in original).

As shown in Kalliola, FIG. 9B (reproduced above), the “sensor information,” including the movement sensor/gyroscope, is provided to the tracking application 922, which controls the DoA determination process. *Kalliola*, [0083] (disclosing

tracking application scanning continuously), [0081] (disclosing movement and/or orientation sensors module 932 collecting information and conveying to tracking application), FIG. 9B; *Petition*, 63-64, 56-57; Ex. 1003, ¶¶281-283. Regarding this embodiment, THL argues “the cited paragraphs address ‘motion sensors’ that are ‘used to detect when WCD 100 is being moved’ or when it ‘is stationary’ (i.e., sensing moving versus stationary status) for purposes of ‘power management’ to ‘conserve battery life.’” *Response*, 25 (citing *Kalliola*, [0014], [0084]). It is unclear what THL is criticizing. As discussed above, *Kalliola* teaches using a gyroscope to detect motion, and gyroscopes specifically detect rotational motion (which THL does not dispute). *Supra*. To the extent THL is arguing that starting/stopping the direction-finding process based on detected rotation via a gyroscope does not meet the claim, there is nothing in the plain language of the claim dictating *how* the detection of the rotation of the mobile communication device must be used to determine the direction to the at least one remote device.

Per Dr. Buehrer, *Kalliola*’s disclosure of starting/stopping the DoA estimation based on whether the device has rotated falls within the scope of Claim 11(e)(vii). (Ex. 1047, ¶55). Based on the gyroscope output, the DoA subsystem determines if the device has rotated since the last DoA measurement. *Id.* (citing Ex. 1003, ¶281). If the device has rotated, the orientation of the mobile communication device with respect to the remote device has changed, and the previous DoA estimation is no

longer accurate. *Id.* In other words, Kalliola uses the gyroscope to detect when the mobile communication device has rotated relative to the remote device. *Id.* THL does not dispute this understanding of Kalliola's operation. Thus, determining the direction to the remote device is based on rotation of the mobile communication device detected by the orientation sensor because Kalliola's DoA subsystem will not perform the direction determination unless rotation of the device has been detected by the gyroscope.

In related disclosure, Kalliola also teaches that “[i]ncreased activity detected by motion sensors in WCD 100 may trigger a configuration that increases the speed of the DoA estimation[.]” *Petition*, 64 (citing *Kalliola*, [0086]). THL alleges “[t]he sensor described in this embodiment...does not determine ‘rotation’ of the mobile communication device for the claimed purpose of ‘determine[ing] [*sic*] a direction to the at least one remote device’ as recited in limitation [11(e)(vii)].” *Response*, 26. The Board similarly alleges that “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.” *Decision*, 25. To the contrary, the sensors in this embodiment include “a semiconductor gyroscope chip” (*Kalliola*, [0084]), which measures the rotation of the WCD “as a whole” relative to the remote device to determine how often to perform the DoA process. (Ex. 1047, ¶56). Again, Claim

11(e)(vii) merely requires determining direction based on rotation of the device. Because how quickly the device is rotated triggers the speed of direction determination, Kalliola's separate disclosure at [0086] of using the gyroscope chip to detect the movement speed also teaches Claim 11(e)(vii).

V. CONCLUSION

Petitioner respectfully requests the Board find the remaining Challenged Claims unpatentable.

Dated: January 23, 2025

BY: /s/ Jennifer C. Bailey
Jennifer C. Bailey, Reg. No. 52,583
COUNSEL FOR PETITIONER

UPDATED EXHIBIT LIST

Previously Filed by Petitioner

Exhibit 1001	U.S. Patent No. 11,350,246 to Howard et al.
Exhibit 1002	File History of U.S. Patent No. 11,350,246
Exhibit 1003	Declaration of R. Michael Buehrer, Ph.D.
Exhibit 1004	U.S. Patent Publication No. 2008/0068265A1 to Kalliola et al.
Exhibit 1005	U.S. Patent No. 6,487,595 to Turunen et al.
Exhibit 1006	U.S. Patent Publication No. 2008/0204322A1 to Oswald et al.
Exhibit 1007	U.S. Patent Publication No. 2008/0320587A1 to Vauclair et al.
Exhibit 1008	U.S. Patent Publication No. 2008/0125040A1 to Kalayjian
Exhibit 1009	U.S. Patent Publication No. 2009/0058651 to Thorn
Exhibit 1010	U.S. Patent Publication No. 2010/0279652 to Sharp et al.
Exhibit 1011	THL's Opening Claim Construction Brief dated September 14, 2023
Exhibit 1012	Expert Report of Dr. Martin J. Feuerstein Rebutting Apple's Proposed Construction of "Signal Delay"
Exhibit 1013	THL's Infringement Contentions
Exhibit 1014	ISO/IEC 24730-2:2006(E) <i>Information technology – Real-time locating systems (RTLS) – Part 2: 2,4 GHz air interface protocol</i> . International Organization for Standardization and the International Electrotechnical Commission (2006)
Exhibit 1015	Hui Liu, Houshang Darabi, Pat Banerjee, and Jing Liu, <i>Survey of Wireless Indoor Positioning Techniques and Systems</i> , IEEE Transactions on Systems, Man, and Cybernetics-Part C: Applications and Reviews, Vol. 37, No. 6 (November 2007)
Exhibit 1016	<i>A Comprehensive Look into the RTLS System</i> , https://www.mokosmart.com/look-into-rtls-system/ (August 2021, retrieved August 25, 2023)
Exhibit 1017	Roy Want, Andy Hopper, Veronica Falcão, and Jonathan Gibbons, <i>The Active Badge Location System</i> , ACM Transactions on Information Systems, Vol. 10, No. 1 (January 1992)

Exhibit 1018	Paramvir Bahl and Venkata N. Padmanabhan, <i>RADAR: An In-Building RF-based User Location and Tracking System</i> , Proceedings IEEE INFOCOM 2000. Conference on Computer Communications. Nineteenth Annual Joint Conference of the IEEE Computer and Communications Societies pp. 775-784 vol.2, (March 2000)
Exhibit 1019	Bob Paddock, <i>A Guide to online information about: Radio Frequency Identification (RFID)</i> , https://web.archive.org/web/20060513161655/http://archive.chipcenter.com/circuitcellar/october00/c1000rp52.htm (August 2001, retrieved September 7, 2023)
Exhibit 1020	Gwen Moritz, <i>Larry W. Fullerton: World Class Innovator, Arkansas Business</i> , https://www.arkansasbusiness.com/article/58921/larry-w-fullerton-world-class-innovator (Apr. 15, 2002)
Exhibit 1021	IEEE Standard for Information technology– Local and metropolitan area networks– Specific requirements– Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (WPANs): Amendment 1: Add Alternate PHYs, IEEE Std 802.15.4a-2007 (Amendment to IEEE Std 802.15.4-2006) (2007)
Exhibit 1022	Kaveh Pahlavan, Xinrong Li, and Juha-Pekka Mäkelä, <i>Indoor Geolocation Science and Technology</i> , IEEE Communications Magazine (March 2002)
Exhibit 1023	Jeffrey Hightower and Gaetano Borriello, <i>A Survey and Taxonomy of Location Systems for Ubiquitous Computing</i> , Technical Report UW-CSE 01-08-03 (August 2001)
Exhibit 1024	<i>PARC History – A Legacy of Innovation and Inventing the Future</i> , https://www.parc.com/about-parc/parc-history/ (retrieved June 26, 2023)
Exhibit 1025	Guifx, <i>Touchscreens That Changed the World</i> , https://www.guifx.com/touchscreens-that-changed-the-world/ (retrieved June 26, 2023)
Exhibit 1026	<i>iPhone User's Guide</i> , Apple Inc. (2007)

Exhibit 1027	<i>Majority of smart phones now have touch screens</i> , https://www.canalys.com/newsroom/majority-smart-phones-now-have-touch-screens 2/7 (February 8, 2010, retrieved October 11, 2023)
Exhibit 1028	Steve Kolokowsky and Trevor Davis, <i>Touchscreens 101: Understanding Touchscreen Technology and Design</i> , Cypress Semiconductor Corp. (June 2009)
Exhibit 1029	U.S. Patent Publication No. 2006/0026521A1 to Hotelling et al.
Exhibit 1030	<i>The History of Bluetooth</i> , The History of Bluetooth - Auris, Inc (theauris.com) Auris, Inc. (retrieved June 26, 2023)
Exhibit 1031	<i>Ericsson T39 User's Guide First Edition</i> , Ericsson Mobile Communications AB (March 2001)
Exhibit 1032	<i>How does Bluetooth work?</i> , Scientific American https://www.scientificamerican.com/article/experts-how-does-bluetooth-work/#:~:text=Bluetooth%20technology%20uses%20the%20principles,devices%20that%20are%20actively%20inquiring , (November 5, 2007, retrieved September 8, 2023)
Exhibit 1033	IEEE Std. 802.15.1-2005, entitled “IEEE Standard for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements—Part 15.1: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Wireless Personal Area Networks (WPANs)”
Exhibit 1034	<i>Specification of the Bluetooth System</i> , Bluetooth Core Specification version 1.2 (05 November 2003) (“Bluetooth Specification)
Exhibit 1035	Varun Almaulu and David Cheng, <i>Bluetooth Triangulator</i> , Department of Computer Science and Engineering, University of California, San Diego, (2006)
Exhibit 1036	Josef Hallberg, Marcus Nilsson, Kåre Synnes, <i>Positioning with Bluetooth</i> , 10 th International Conference on Telecommunications (April 2003)
Exhibit 1037	Julie A. Kientz, Shwetak N. Patel, Arwa Z. Tyebkhan, Brian Gane, Jennifer Wiley, and Gregory D. Abowd, <i>Where's My Stuff? Design and Evaluation of a Mobile System for Locating Lost Items for the</i>

	<i>Visually Impaired</i> , Proceedings of the 8 th international ACM SIGACCESS conference on Computers and accessibility (October 2006)
Exhibit 1038	Harry Newton, <u>Newton's Telecom Dictionary</u> (20th updated and expanded edition ed. 2004)
Exhibit 1039	P. Orsatti, F. Piazza & Q. Huang, <i>A 20-mA-Receive, 55-mA-Transmit, Single-Chip GSM Transceiver in 0.25-/Spl Mu/m CMOS</i> , 34 IEEE Journal of Solid-State Circuits 1869 (1999)
Exhibit 1040	Aaron Beach, Mike Gartrell & Richard Han, <i>Solutions to Security and Privacy Issues in Mobile Social Networking</i> , 4 in 2009 International Conference on Computational Science and Engineering 1036 (2009)
Exhibit 1041	Christian Bettstetter, Hans-Jorg Vogel & Jorg Eberspacher, <i>GSM Phase 2+ General Packet Radio Service GPRS: Architecture, Protocols, and Air Interface</i> , 2 IEEE Communications Surveys 2 (1999)
Exhibit 1042	J.C. Haartsen & S. Mattisson, <i>Bluetooth-A New Low-Power Radio Interface Providing Short-Range Connectivity</i> , 88 Proceedings of the IEEE 1651 (2000)
Exhibit 1043	T.Q.S. Quek & M.Z. Win, <i>Analysis of UWB Transmitted-Reference Communication Systems in Dense Multipath Channels</i> , 23 IEEE Journal on Selected Areas in Communications 1863 (2005)
Exhibit 1044	S. Venkatesh and R. M. Buehrer, <i>Multiple-access insights from bounds on sensor localization</i> , 2006 International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM'06), Buffalo-Niagara Falls, NY, USA, (2006)
Exhibit 1045	Christian Gehrmann, Joakim Persson & Ben Smeets, <u>Bluetooth Security</u> (2004)

Currently Filed by Petitioner

Exhibit 1046	Deposition Transcript of Dr. Martin Feuerstein dated December 11, 2024
Exhibit 1047	Supplemental Declaration of Dr. Michael Buehrer
Exhibit 1048	Tony Atkins & Marcel Escudier, <u>Oxford Dictionary of Mechanical Engineering</u> (2013)
Exhibit 1049	Chun-Wang Tsou & Chun-Hsiung Liao, <i>Investigating the Antecedents of Intentions to Purchase a Netbook as a Second Laptop</i> , in 2010 International Conference on Education and Management Technology 285 (2010)
Exhibit 1050	Dan Ackerman, <i>Asus Eee PC 1005HA Review: Asus Eee PC 1005HA</i> , CNET, https://www.cnet.com/reviews/asus-eee-pc-1005ha-review/ (June 22, 2009; retrieved Jan 7, 2025)
Exhibit 1051	José L. Pons, <u>Wearable Robots: Biomechatronic Exoskeletons</u> (2008)
Exhibit 1052	Harry Newton, <u>Newton's Telecom Dictionary</u> (20th updated and expanded edition ed. 2004)
Exhibit 1053	<i>The History of Gyroscopes – From Humble Beginnings to Hyper Technology</i> , Advanced Navigation (2023), https://www.advancednavigation.com/tech-articles/the-history-of-gyroscopes-from-humble-beginnings-to-hyper-technology/ (last visited Jan 22, 2025)

CERTIFICATION OF WORD COUNT

The undersigned certifies pursuant to 37 C.F.R. § 42.24 that the foregoing *Petitioner's Reply to Patent Owner's Response*, excluding any table of contents, certificates of service or word count, or appendix of exhibits, contains 5,599 words according to the word-processing program used to prepare this document (Microsoft Word) and is within the 5,600 word limit for replies to patent owner responses to petitions.

Dated: January 23, 2025

BY: /s/ Jennifer C. Bailey
Jennifer C. Bailey, Reg. No. 52,583

COUNSEL FOR PETITIONER

CERTIFICATE OF SERVICE ON PATENT OWNER
UNDER 37 C.F.R. § 42.6

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that on January 23, 2025 the foregoing *Petitioner's Reply to Patent Owner's Response* and Exhibits were served via electronic filing with the Board and via Electronic Mail on the following counsel of record for Patent Owner:

John S. LeRoy (jleroy@brookskushman.com)

Frank A. Angileri (fangileri@brookskushman.com)

Marc Lorelli (mlorelli@brookskushman.com)

THLC0104IPR1@brookskushman.com

Respectfully submitted,

BY: /s/ Jennifer C. Bailey
Jennifer C. Bailey, Reg. No. 52,583

COUNSEL FOR PETITIONER