

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.
Petitioner,

v.

THL HOLDING COMPANY, LLC,
Patent Owner.

U.S. Patent No. 11,350,246 to Howard, et al.

Case No.: IPR2024-00399

DECLARATION OF DR. MARTIN J. FEUERSTEIN

I, Martin J. Feuerstein of Woodinville, Washington, declare that:

I. INTRODUCTION

1. In view of my engineering and technical knowledge relating to wireless technology, I have been retained by THL Holding Company, LLC. (“Patent Owner” or “THL”) in this inter partes review (“IPR”).

2. I understand that this IPR involves U.S. Patent No. 11,350,246 (“’246 Patent”) titled “Wireless Device and Methods for Use Therewith” (Ex. 1001), which THL currently owns.

3. I have been retained as a technical expert by THL to study and provide my opinions on the technology claimed in, and the patentability of, certain claims of the ’246 Patent. I understand that Apple Inc. (“Apple” or “Petitioner”) filed a petition for IPR in this proceeding regarding claims 1-19 of the ’246 Patent (Paper No. 1), and that on July 25, 2024, the Board instituted an IPR proceeding on all challenged claims (Paper No. 8).

4. I understand that on August 7, 2024, THL disclaimed claims 1-10 (and 20-27) pursuant to 35 U.S.C. § 253(a) and 37 C.F.R. § 1.321(a) (Ex. 2001). Because THL disclaimed claims 1-10 at issue in this IPR, my analysis in this proceeding focuses on the patentability of claims 11-19 of the ’246 Patent.

5. I am familiar with the technology described in the '246 Patent as of its earliest possible priority date of February 26, 2010. I understand the Petitioner has adopted February 26, 2010, as the priority date for the challenged claims in this IPR. (Pet. 1.)

6. THL has asked me to provide my technical review, analysis, insights, and opinions regarding the '246 Patent and the prior art references identified in the Board's Decision on Institution ("DI") (Paper No. 8).

7. I am more than eighteen years of age, and I am a citizen of the United States, currently residing in the State of Washington.

8. I am being compensated by THL at my standard hourly rate of \$590 for the time I spend in connection with this proceeding. My compensation is not dependent in any way on the substance of my opinions or on the outcome of this proceeding.

II. QUALIFICATIONS

9. My academic credentials include a Bachelor of Engineering, a Master of Science, and a Doctor of Philosophy, each in Electrical Engineering specializing in wireless communications.

10. I have over 30 years of experience in the field of wireless technology.

11. In formulating my opinions in this matter, I have relied upon my knowledge, training, and experience in relevant technologies and art. My qualifications are stated more completely in my curriculum vitae, which is attached as Exhibit #2003. My litigation summary lists the legal cases in which I have provided expert reports, been deposed and/or testified. Below, I provide a brief summary of my applicable qualifications.

12. I am currently Principal at Jade Martin Consulting LLC, where my responsibilities include technology consulting with a focus on wireless systems, smart antennas, Internet of Things, location technology, data analytics, safety and security systems. As a wireless researcher, my experience includes network evolution strategy, standards, and planning next generation technologies, such as 5G, GPS/GNSS, Wi-Fi, Bluetooth, Zigbee and UWB. As a consultant, I have served as an expert witness in domestic and international patent cases related to wireless technologies and products, including position location applications and remote provisioning.

13. From 2018 until July of 2024, I served as Chief Operating Officer of Ossia Inc., where my responsibilities included research and development of wireless technologies, such as wireless charging, sensors, Internet of Things, and location tracking systems using Bluetooth, Zigbee, GPS, mmWave UWB radar and AoA.

Previously, I was the Chief Executive Officer and Chief Technology Officer at Recon Dynamics from 2011 to 2016, where my responsibilities included guiding the development of wireless asset location tracking and safety-of-life access points and devices, using wireless technologies such as 4G/5G, Wi-Fi, Bluetooth, Zigbee. Prior to that, I was the Chief Technology Officer at Polaris Wireless from 2003 to 2011, where I lead research and development of wireless position location products for mission-critical and safety-of-life applications, such as E-911 emergency call systems. My research focus at Polaris was on wireless location approaches, such as Received Signal Strength Indicator (RSSI), RF Pattern Matching (RFPM), Network Measurement Reports (NMR), Time Difference of Arrival (TDOA), Time of Flight (ToF), Angle of Arrival (AoA), Direction of Arrival (DoA), Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS), Wi-Fi, Bluetooth and Hybrid location systems.

14. Earlier in my career, I was the Chief Technical Officer, Senior VP and General Manager of Metawave Communications. As part of my roles there, I invented and developed one of the industry's first smart antenna systems for 2G/3G CDMA, which is a beamforming antenna array for cellular signals. I was a Technical Manager in CDMA Optimization and Applications at AT&T Bell Laboratories (as it was then known, it later became Lucent Bell Laboratories and now Nokia). I was

a Member of Technical Staff at Verizon Wireless (predecessor companies USWEST and AirTouch at that time), where I performed research on technologies for wireless location and zone-based billing. Prior to joining industry, I was an Assistant Professor with the Mobile & Portable Radio Research Group (MPRG) at Virginia Tech, performing research on wireless technologies, radio location and signal propagation. Prior to graduate school, I was a telecom systems engineer at Nortel (Northern Telecom as it was known then) performing research in expert systems and robotics.

15. I am a named inventor on more than forty-five U.S. patents and patent applications, many of which relate to wireless communications and position location, such as smart antennas and array antennas. Based on my experience in wireless location technologies for public safety, I was nominated for and served on the FCC's Communications Security, Reliability, and Interoperability Council (CSRIC) advisory committee. I have authored and coauthored many technical journal articles, books, book chapters, conference presentations and magazine articles on topics including wireless position location.

16. I received a Ph.D. from Virginia Tech in 1990 with a dissertation on spread spectrum methods for wireless location and communications. My research focus was real-world network performance evaluation and optimization of

broadband methods, such as direct sequence code division (eventually used in IS-95 cdmaOne, IS-2000 CDMA2000, UMTS WCDMA) and frequency hopping (eventually employed in GSM, Bluetooth, Wi-Fi, LTE and NR) spread spectrum. I graduated from Northwestern University in 1987 with an M.S. thesis on microwave antenna structures. My undergraduate degree is a B.E. magna cum laude in Electrical Engineering and Mathematics from Vanderbilt University in 1984.

17. Throughout my career, I have been a representative to a number of standard setting organizations (SSOs) and/or managed a group of representatives to SSOs, including the following: TIA in relation to cdmaOne IS-95; ESTI in relation to GSM; 3GPP in relation to GSM, GPRS/EDGE, UMTS, HSPA, LTE; 3GPP2 in relation to CDMA2000; IEEE in relation to Wi-Fi and WiMax; Open Mobile Alliance (OMA) for Secure User Plane Location (SUPL); T1P1 and ATIS in relation to various wireless standards. My involvement as a representative, and managing teams of standards representatives, in these SSOs was to make contributions to the committees for advances in standards. This typically involved conceptualizing, simulating, documenting and presenting proposed changes to the appropriate working groups. Often there are collaborative efforts with other participating companies to harmonize contributions, resulting in the eventual acceptance and approval of proposed standards documents or modifications to existing documents.

My standards activities have spanned physical layer, medium access control layer, control plane, user plane and network architecture.

III. SCOPE OF WORK

18. I have been asked to consider and provide my opinions on claims 11-19 of the '246 Patent, including the technical subject matter and the application of various references. In particular, I have been asked to consider what a person of ordinary skill in the art would have understood from the claims and specifications of the '246 Patent, whether certain references disclose or suggest the features recited in the claims of the '246 Patent, and whether a person of ordinary skill in the art would have had reason to combine certain references to arrive at the subject matter recited in claims 11-19 of the '246 Patent.

19. In forming my opinions, I have reviewed the '246 Patent (Ex. 1001), and the following references:

<u>Exhibit</u>	<u>Description</u>
Ex. #1004	KALLIOLA US 2008/0068265 A1
Ex. #1005	TURUNEN US 6,487,595 B1
Ex. #1006	OSWALD US 2008/0204322 A1
Ex. #1007	VAUCLAIR US 2008/0320587 A1

Ex. #1008	KALAYJIAN US 2008/0125040 A1
Ex. #1009	THORN US 2009/0058651 A1
Ex. #1010	SHARP US 2010/0279652 A1

IV. BASIS FOR MY OPINIONS

A. Level of Ordinary Skill in the Art

20. My opinions are provided based on what a person of ordinary skill in the art (“POSITA”) in the technical field of the claimed subject matter would have understood as of the priority date for ’246 Patent, which I understand is February 26, 2010. I have been informed and understand that the content of a patent and prior art should be interpreted the way a POSITA would have interpreted those references as of that date. I understand that the person of ordinary skill is a hypothetical concept referring to one who thinks along the lines of conventional wisdom at the time.

21. The basis for my familiarity with the level of ordinary skill is my personal technical experience in the field and my interaction with large numbers of workers in the wireless field who were at this level of skill. I have supervised teams of people that I would consider to be persons of ordinary skill in the art at the relevant time. In reaching this opinion as to the hypothetical person of ordinary skill in the art, I have considered the types of problems encountered in the art, the prior art

solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level and professional capabilities of workers in the field.

22. I have reviewed the level of ordinary skill in the art proposed in the petition for IPR and the supporting declaration of Dr. Buehrer: “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; Ex. 1003, ¶ 35). I agree that this description of the level of ordinary skill in the art generally comports with the level of skill necessary to understand and implement the teachings of the ’246 Patent and the asserted prior art.

B. Relevant Legal Standards

23. Though I am not an attorney, my understanding of the legal standards relevant to this IPR is based on discussions with Patent Owner’s counsel. I understand that a patent or other publication must qualify as prior art before it can be used to invalidate a patent claim.

1. Prior Art

24. I understand that a U.S. patent has an effective prior art date under 35 U.S.C. §102(e) based on the filing date of an earlier-filed patent application if the

patent's relevant subject matter is described in the earlier-filed application, and at least one of the patent's claims is supported by the written description of the earlier-filed application in compliance with 35 U.S.C. §112, first paragraph.

2. Obviousness

25. I understand a patent is invalid if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious to a POSITA at the time the invention was made.

26. I have been informed and understand that subject matter claimed in a patent is obvious under 35 U.S.C. § 103 if a person of ordinary skill in the art at the time the alleged invention was made would have had reason to combine or modify the disclosures of one or more prior art references to arrive at the claimed subject matter. A claim may be unpatentable even if each and every claim limitation is not present or disclosed in a single prior-art item.

27. I have been informed and understand that, under the doctrine of obviousness, a claim is unpatentable if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. A person of ordinary skill in the art is presumed to have knowledge of the relevant prior art at the time of the claimed invention.

28. I have been informed and understand that obviousness is based on the scope and content of the prior art, the differences between the prior art and the claim, the level of ordinary skill in the art and secondary indicia of non-obviousness to the extent such indicia exist.

29. I have been informed and understand the determination of whether the asserted claims would have been obvious to a person of ordinary skill in the art and, therefore, unpatentable, is not governed by any rigid test or formula. A determination that a claim is obvious is, instead, based on a determination that the claimed invention is merely a combination of known limitations to achieve predictable results.

30. I have been informed and understand that an analysis of whether a claimed invention is obvious must not rely on a hindsight combination of prior art. The analysis must proceed in the context of the time of the invention or claimed priority date and consider whether the invention as a whole would have been obvious to a person of ordinary skill in the art, taking into consideration any interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an

apparent reason to combine any known elements in the fashion claimed by the patent at issue.

31. I understand that, to render a patent claim invalid as obvious, the proposed combination or modification of the prior art must teach or suggest to a POSITA at the time of the invention every limitation of the claim.

V. OVERVIEW OF THE '246 PATENT

32. The '246 Patent is titled “Wireless Device and Methods for Use Therewith.” (Ex. 1001.)

33. The '246 Patent describes “a location system for use with a handheld wireless communication device[.]” (*Id.* at 4:52–54.) The wireless communication device (110) 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 4:56–62.) In one example, an adjunct device (100) can be coupled to wireless communication device (110). (*Id.* at 5:30–33.) The adjunct device (100) together with the wireless communication device (110) cooperate to assist as user in wirelessly locating a remotely-located wireless device (120).

34. Figure 1 below illustrates an example of adjunct device 100 coupled to a wireless communication device 110, locating remotely wireless device 120.

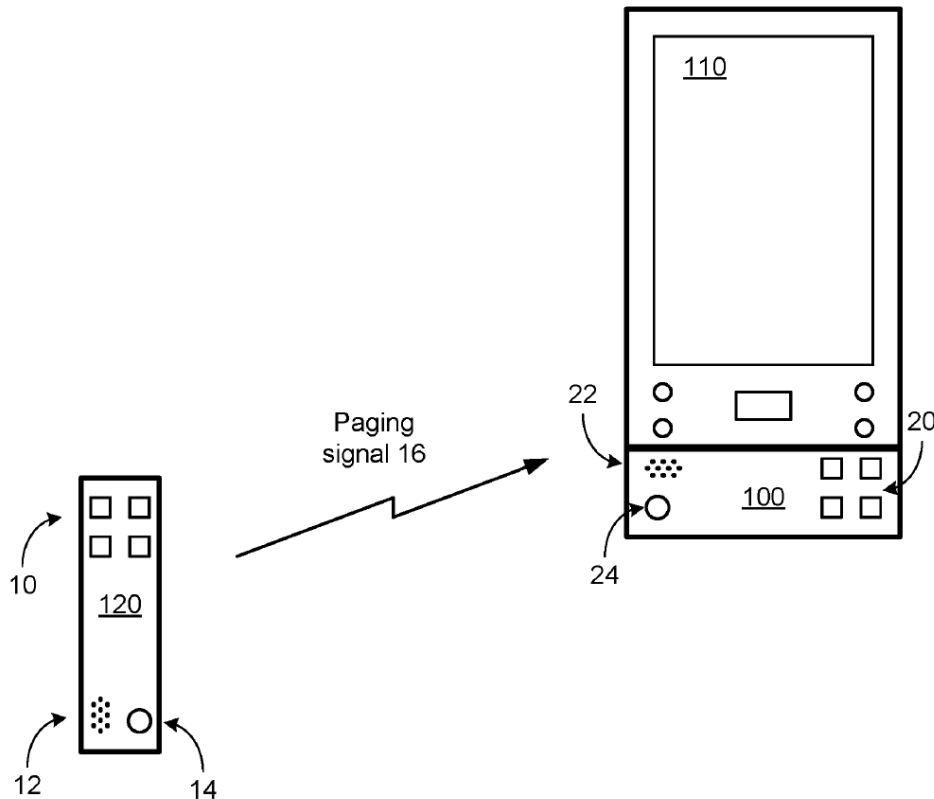


FIG. 1

35. The '246 Patent describes the adjunct device 100 and the remote wireless device 120 as follows.

Wireless device 120 is shown that includes a user interface that includes push buttons 10, a light emitter 14 such as a light emitting diode (LED) or other emitter, and sound emitter 12 such as a beeper, buzzer, speaker or other audio device. While particular user interface devices are shown, the wireless device can similarly include other devices such as

a touch screen or other display screen, a thumb wheel, trackball, and/or other input or output devices. The user interface of the wireless device 120 generates a location request signal in response to an indication from a user by for instance, pushing one of the push buttons 10.

Wireless device 120 further includes a short-range wireless transmitter that transmits an RF paging signal, such as paging signal 16 in response to the location request signal. The short-range wireless transmitter can be part of a transceiver that operates in conjunction with a communication standard such as 802.11, Bluetooth, ZigBee, ultra-wideband, Wimax or other standard short or medium range communication protocol, or other protocol.

Adjunct device 100 includes a housing that is coupleable to the handheld wireless communication device 110 via a communication port of the handheld wireless communication device 110. The adjunct device 100 includes a short-range wireless receiver that receives the RF paging signal, such as paging signal 16. The short-range wireless receiver of adjunct 100 can also be part of a transceiver that operates in conjunction with a communication standard such as 802.11, Bluetooth, ZigBee, ultra-wideband, Wimax or other standard short or medium range communication protocol, or other protocol. In particular, the short-range wireless receiver of adjunct device 100 is configured to receive the paging signal 16 generated by wireless device 120.

Adjunct device includes its own user interface having push buttons 20, sound emitter 22 and light emitter 24 that emit audio and/or visual alert signals in response to the paging signal 16 to assist the user in locating the handheld wireless communication device. As with the user interface of wireless device 120, the user interface of adjunct device 100 can similarly include other devices such as a touch screen or other display screen, a thumb wheel, trackball, and/or other input or output devices.

(*Id.*, 5:11-53.)

36. The '246 Patent explains that the features and functions of the wireless communication device 110 and the adjunct device 100 may be integrated into an “enhanced handheld wireless communication device” that adds the components necessary to provide the additional functions and features of the adjunct device.

While many of the descriptions of the present invention contained herein focus on functions and features ascribed to an adjunct device operating in conjunction with a handheld wireless communication device, the functions and features of the adjunct device handheld wireless communication device combination can be implemented in an enhanced handheld wireless communication device that includes structure and functionality drawn from an adjunct device, such as adjunct devices 100, 100', 101 and 103. Handheld wireless communication device 300 presents such a device that includes a handheld wireless communication device portion having the standard components of a handheld wireless communication device and an

adjunct portion that adds the components necessary to provide the additional functions and features of the adjunct device 100, 100', 101 and 103. In summary, handheld wireless communication device 300 includes the structure and functionality of any of the embodiments of handheld wireless communication device 110 and adjunct device 100, 100', 101 and 103, within a single housing, and without the external connections required to couple adjunct device 100, 100', 101 or 103 to handheld wireless communication device 110.

(*Id.*, 29:59-30:14.)

37. The '246 Patent explains that the adjunct device 100 and/or the wireless communication device 110 are paired with one or more remote wireless devices 120.

(*Id.*, 15:53-16:3.)

38. The '246 Patent teaches that the adjunct device may send a “paging signal” to the short-range wireless receiver on the remote wireless device 120, causing the remote device to flash a light or emit a sound to help a user locate the remote device:

[T]he wireless device 120 includes its own short-range wireless receiver that receives a paging signal 112 transmitted by adjunct device 110. In response to the paging signal 112, a light or sound emitter of wireless device 120 emits a detectable alert signal that helps the user locate the personal object. In an embodiment of the present invention, the adjunct device 100 operates in a similar fashion to wireless device

120 to initiate the paging signal 112. In particular, the transmission of paging signal 112 can be initiated by pressing a button or otherwise interacting with the user interface of adjunct 100. In a further embodiment, handheld wireless communication device 100 includes an interactive application that generates application data that is passed to adjunct device 100 via the communication port of the handheld wireless communication device 100. Adjunct device 100 responds to such application data by initiating the transmission of the paging signal 112. In either case, a user of handheld wireless communication device 110 that wishes to locate his or her key 30, or other object coupled to wireless device 120, initiates the paging signal 112. The user can then locate the wireless device 120 and corresponding object by homing in on the visual and/or audio emissions of the wireless device 120.

(*Id.*, 7:47-8:2.)

39. The '246 Patent describes multiple approaches for estimating or calculating the distance or direction to the remote wireless device 120. In one embodiment, illustrated in Figures 6 through 8, a directional antenna and signal strength are used to determine the direction from the handheld wireless device 110 to the remote device 120.

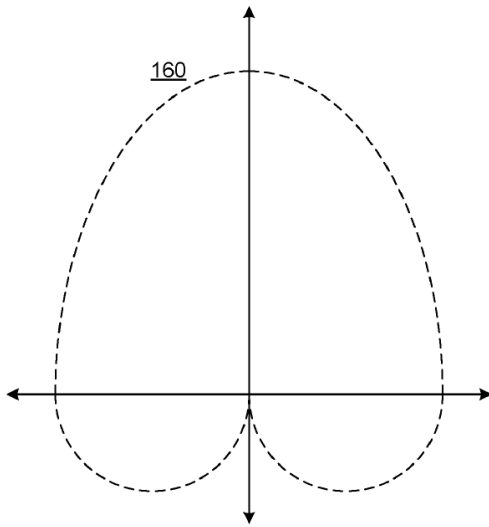


FIG. 7

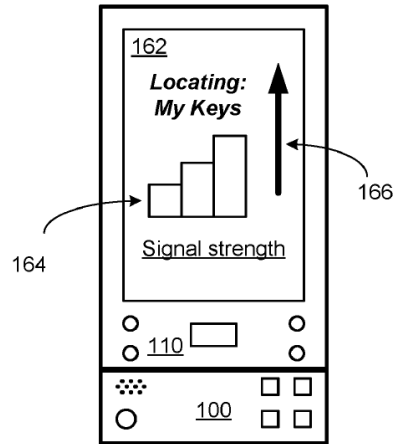


FIG. 8

40. The '246 Patent explains that, separate from or in addition to signal strength, “time of flight” calculations may be implemented to determine the distance to the remote device.

In an embodiment of the present invention, a time of flight can be used instead of or in addition to signal strength to determine the distance to a remote device. In particular, the time can be measured from the transmission of the paging signal to the reception of the location signal. This time delay (round trip flight time) can indicate the distance to the remote device. The time delay, T_d , can be represented as follows:

$$T_d = T_{f1} + T_{f2} + T_p$$

where, T_p represents the processing time to generate the location signal in response to the paging signal and to recognize the location signal, T_{f1} represents the flight time for the paging signal to travel to the remote device and T_{f2} represents the flight time for the location signal to travel from the remote device to the adjunct device. Considering the processing time T_p to be fixed, the distance to a remote device, D_{ft} , can be approximated based on the following:

$$D_{ft} = C(T_f) = c(T_d - T_p)$$

where c is a proportionality constant that is based on the speed of light in air and $T_f = (T_{f1} + T_{f2})$.

(*Id.*, 34:34-55.)

41. The '246 Patent also discloses locating the remote wireless device 120 in two and three-dimensional space using signal strength and/or round trip signal delay.

While the foregoing description has focused on location in a two dimensional sense, three-dimensional location can be accomplished in a similar fashion. In particular, directional antennas can be employed in both the x-y and x-z or y-z planes to distinguish z-axis, as well as x and y axis, coordinates. It should be noted that multiple directional antennas can be employed that are arranged orthogonally or non-orthogonally as long as the null directions span either all or

substantially all of three dimensional space or a portion of three dimensional space that is of interest. Further more complex antenna designs with three-dimensional antenna patterns can likewise be employed in a similar fashion to determine directionality in three-dimensions. Three dimensional location can be useful, for example, in locating objects on different floors of a building or other structure such as a mine or a ship, determining of a person with a remote device has fallen overboard, as well as other three-dimensional applications. In addition or alternative to providing three dimensional direction finding, multiple antennas can be employed in a diversity receiver that, for example includes two or more receivers. Such configurations can be employed to mitigate the effects of fading, multipath interference and other path losses to provide more stable reception of signals, and more stable measurement of signal strength, round trip signal delay, etc.

(*Id.*, 15:28-52.)

42. In some embodiments in the '246 Patent, an orientation sensor is implemented to determine the rotation direction of the handheld wireless device (110) relative to the remote wireless device (120). With respect to Figure 7, for example, the specification explains:

In an alternative embodiment, the user is instructed to “turn around” to gather 360 degrees of directional data. 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. In particular, the location application can determine the particular orientation of the device corresponding to the point where the null of antenna pattern 160 is aligned with the direction to the wireless device 120, and feedback that direction to the user via a directional indicator.

(*Id.*, 11:43-53.)

43. Figure 15 illustrates a display screen indicating a direction 166' to the remote wireless device. As the user rotates the handheld wireless communication device 110, indicator 166' varies based on the updated direction. (*Id.*, 14:47-62.)

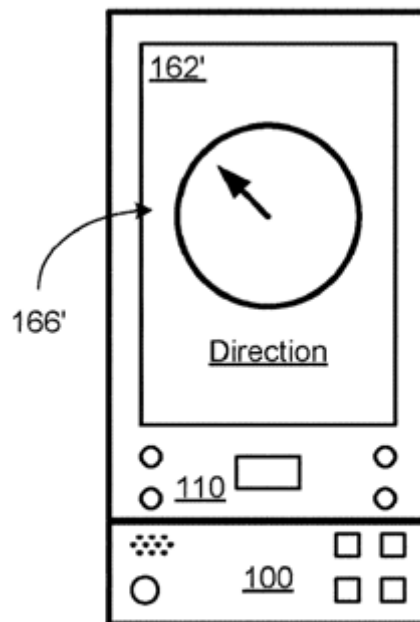


FIG. 15

44. Claim 11 of the '246 Patent recites the following limitations, each numbered in the manner presented in the petition:

[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.

VI. PETITION GROUNDS

45. The Petition asserts the following grounds of unpatentability, each on the basis of obviousness under 35 U.S.C. §103(a):

<u>Ground</u>	<u>Claims</u>	<u>Combination of References</u>
1	1, 11–14	Kalliola, Turunen, Oswald, Vauclair and Kalayjian
2	2–5, 15–18	Kalliola, Turunen, Oswald, Vauclair, Kalayjian and Thorn
3	6–10, 19	Kalliola, Turunen, Oswald, Vauclair, Kalayjian, Thorn and Sharp

(Pet., 5.)

46. Because THL disclaimed claims 1-10 on August 7, 2024 (Ex. 2001), my opinions below address only the remaining claims 11-19.

VII. CLAIM CONSTRUCTION

47. I have been informed that claim terms are generally given their ordinary and customary meaning as understood by one of ordinary skill in the art in light of the claims themselves, the specification and the prosecution history pertaining to the patent.

48. I understand that the Patent Owner proposed claim constructions in the underlying district court litigation for the terms “time of flight calculations” and “signal delay,” and that Petitioner and the Board applied those constructions in the Petition and the Decision on Institution (Pet., 6; DI, 9).

49. A claim term relevant to my opinion in this IPR is “rotation of the mobile communication device” recited in claim limitations [11(d)] and [11(e)(vii)].

50. The Petitioner did not propose a claim construction of this term. Based on the language of claim 11, and specification examples provided in the ’246 Patent describing the operation and function of the orientation sensor, and my knowledge and experience of the language as used in the art, I believe that a person of ordinary skill in the art at the time of the invention would have interpreted the claim term “rotation of the mobile communication device” to refer to the rotation of the mobile communication device as a whole, as distinct from the rotation of one component of the mobile communication device relative to a different component of the same device.

51. Claim 11 recites “an orientation sensor to detect rotation of the mobile communication device” and “rotation of the mobile communication device detected by the orientation sensor.” These claim limitations, and the remaining language of claim 11, make clear to a POSITA that the “rotation” being “detected” by the “orientation sensor” is of “the” mobile communication “device,” *i.e.*, the device as a whole. Indeed, to a person skilled in the art, the plain meaning of an object rotating involves the object as a whole spinning around its own axis. The claim language

does not refer to detecting the movement of a “component” or “part” of the mobile communication device relative to another component or part of the device.

52. This interpretation is consistent with the ’246 specification, which describes determining the rotation of the mobile communication device as a whole relative to other objects and does not describe determining the movement of one mobile communication component relative to another device component. My interpretation is evident because the ’246 Patent specification uses the resulting rotation information “to determine a direction to the wireless device 120[]” and “feedback that direction to the user via a directional indicator.” (Ex. 1001, 11:43-52.)

53. With respect to Figure 7, for example, the specification explains:

In an alternative embodiment, the user is instructed to “turn around” to gather 360 degrees of directional data. 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.*** In particular, the location application can ***determine the particular orientation of the device corresponding to the point where the null of antenna pattern 160 is aligned with the direction to the wireless device 120,*** and feedback that direction to the user via a directional indicator.

(*Id.*, 11:43-52) (emphasis added.)

54. In this example, the orientation sensor is implemented to help locate the remote wireless device 120 relative to the handheld wireless communication device 110 *as a whole*.

55. In another example, the '246 specification explains, with reference to Figure 30, 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.” (*Id.*, 25:34-37) (emphasis added.) In this example, the orientation sensor is implemented to help locate the orientation of handheld device 256 *as a whole* relative to the remote display screen 252.

56. In another example, the '246 specification explains that an “internal compass” of the wireless communication device 110 assists to provide “absolute directional information.”

It should be noted that the handheld wireless communication device 110 can include an internal compass that generates an indication of its own orientation. This orientation information can also be used in conjunction with the received directions θ_1 , to triangulate the location of the mobile paging device 278 or provide absolute directional information.

(*Id.*, 28:32-38.)

57. Further, no example of the mobile communication device shown in the figures of the '246 Patent illustrate a device having a multi-section body with hinges, folds, slides, and/or twist joints that rotate relative to one another. The specification examples from the '246 Patent confirm that a person of ordinary skill in the art at the time of the invention would have interpreted the claimed “orientation sensor to detect rotation of the mobile communication device” as referring to detecting the rotation of the mobile communication device *as a whole*, and not to detecting the orientation of one *component* of the mobile communication device to another *component* of the device. This claim construction is consistent with the construction the Board used in its decision on institution. (DI, 24.) Therefore, I use that interpretation in my analysis below.

VIII. ANALYSIS OF ASSERTED GROUNDS

A. Ground #1: The proposed combination fails to teach limitations [11(d)] and [11(e)(vii)].

58. In Ground #1, the petition asserts that claims 11-14 are obvious over the combination of Kalliola, Turunen, Oswald, Vauclair and Kalayjian. (Pet., 17-70.)

59. This combination fails to teach or suggest limitation [11(d)], which recites “an orientation sensor to detect rotation of the mobile communication device,” and related limitation [11(e)(vii)], which recites “determine a direction to

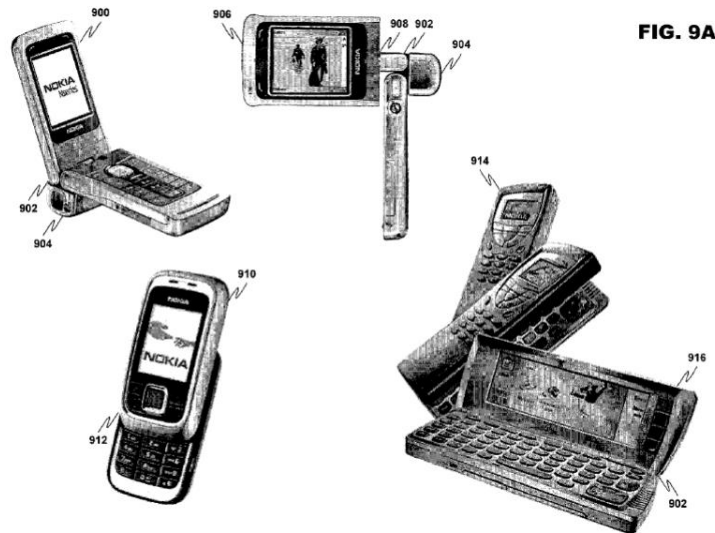
the at least one remote device based ... on rotation of the mobile communication device detected by the orientation sensor.”

60. As explained in the claim construction section above, a person of ordinary skill in the art at the time of the invention would have interpreted the claimed “orientation sensor to detect rotation of the mobile communication device” as referring to detecting the rotation of the mobile communication device *as a whole*, being distinct from detecting the relative orientation or rotation of a *component* of the mobile communication device relative to another component of the same device.

61. Petitioner asserts that Kalliola (alone) discloses claim limitations [11(d)] and [11(e)(vii)]. With respect to limitation [11(d)], the Petition cites Kalliola paragraphs [0078], [0079], [0081] and [0084], and Figs. 9A and 9B. (Pet., 54-57.)

62. None of the cited paragraphs or figures disclose an orientation sensor to determine the rotation of “the” mobile communication “device,” *i.e.*, the device as a whole.

63. Fig. 9A of Kalliola below shows a number of Wireless Communications Devices (WCD), each having multi-section bodies with hinges, folds, slides, and/or twist joints by which one portion of the WCD can move relative to another portion of the WCD.



64. Kalliola explains at paragraph [0078] (emphasis added):

In each of these examples, mechanical sensors may provide information on the ***relative orientation of two sections*** of WCD 100. In at least one case, an exemplary WCD 100 is pictured at 900, wherein a sensor may be integrated into ***hinge 902***. This sensor may provide information to a controller in WCD 100 regarding the orientation of the device, such as shown at 900, ***as to whether a flip cover of the device is open or closed***.

Kalliola provides further examples at paragraph [0079] (emphasis added):

The WCD 100 shown at 910 is divided into at least two sections that slide laterally with respect to one another. ... However, ***a sensor in the sliding mechanism 912 may detect when the device is opened*** (e.g., when the two sections are moved so that they are no longer aligned).

Continuing, Kalliola explains at paragraph [0079] (emphasis added), “[i]n the example at 916, a cellular telephone mode may be implemented at 914 when a ***hinge sensor 902 ... provides that the device is in a closed orientation.***” My interpretation is further confirmed by Kalliola at paragraph [0013], “... may operate in a multitude of modes depending on the physical orientation of the device. For example, a closed device ...”, again at paragraph [0082] “orientation of WCD 100 in a ‘flip-phone open’ mode”, and in addition to the multiple open/closed descriptions taught in paragraphs [0078]-[0079].

65. Clearly, repeatedly and consistently in Kalliola orientation refers to determining whether sections of the WCD are open or closed. Kalliola fails to disclose any sensors detecting “rotation”, but to the degree rotation is implied, Kalliola discloses only rotation of one section of the WCD body relative to another section (e.g., a folding or twisting action to open or close) for assessing open or closed states. Kalliola thus fails to disclose limitation [11(d)], which recites an orientation sensor to detect rotation of “the” mobile communication “device,” *i.e.*, as a whole.

66. The petition also refers to the description of a “gyroscope” at Kalliola paragraph [0084]. (Pet., 56-57.) But that disclosure 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. (Ex. 1004, ¶ [0084].) Kalliola's proposed use of a gyroscope to detect moving versus stationary status of the WCD and/or target is not at all synonymous with detecting rotation. This paragraph discloses nothing about "an orientation sensor to detect rotation of the mobile communication device" as recited in limitation [11(d).]

67. I have reviewed Dr. Buehrer's declaration with respect to limitation [11(d)]. He generally repeats the assertions provided in the Petition, which I address above. He acknowledges the technical operation of Kalliola's orientation sensor, explaining (emphasis added) that "when the orientation sensor is **determining** whether the flip cover of a flip phone is **open/closed**, the orientation sensor is detect[ing] ... **specifically, rotation of the cover relative to the body.**" (Ex. 1003, ¶ 261) (citing Ex. 1004, ¶ [0078].)

68. I specifically dispute Dr. Buehrer's assertion that Kalliola's "orientation sensor is detect[ing] rotation of the mobile communication device" (Ex. 1003, ¶ 261) (citing Ex. 1004, ¶ [0078].) The orientation sensor described in Kalliola paragraph [0078] is monitoring the position "of the cover relative to the body" as Dr. Buehrer acknowledges. But that is not the claimed orientation sensor to detect rotation of the mobile communication device *as a whole*.

69. I also dispute Dr. Buehrer’s assertion that Kalliola’s disclosure of a “gyroscope” in paragraph [0084] discloses “an orientation sensor to detect rotation of the mobile communication device.” (Ex. 1003, ¶ 262.) As explained, this embodiment discloses a gyroscope for an entirely different and unrelated purpose, which does not include determining rotation of the mobile communication device.

70. As quoted above, related claim limitation [11(e)(vii)] requires among other things to: “determine a direction to the at least one remote device based ... on rotation of the mobile communication device detected by the orientation sensor.” For this limitation, the Petition incorrectly asserts “Kalliola teaches at least two embodiments using the rotation of the WCD as detected by the orientation sensor to determine a direction of the WCD to the at least one remote device (target).” (Pet., p. 59.) I separately address these two purported embodiments.

71. In what the Petition calls “Kalliola’s First Embodiment,” the Petition asserts (emphasis added) “Kalliola teaches one use of the orientation information disclosed in Fig. 10, RN 1000, is *to determine [if] the phone is in a flip-phone open mode*, which triggers the 3-D antenna module to set an antenna configuration for use in ‘direction finding.’” (Pet., p. 60) (citing Ex. 1004, Fig. 10, ¶¶ [0082], [0085], Fig. 12.) In this context, the Petition acknowledges that the alleged orientation sensor merely senses whether the “flip-phone” is “open” or closed (Pet., 60); it does *not*

sense the “rotation” of the WCD as a whole, and is **not** used to “determine” the “direction from the mobile communication device to the remote device” as claimed. Thus, for these reasons, as well those expressed above with respect to limitation [11(d)], this “First Embodiment” of Kalliola fails to teach or suggest limitation [11(e)(vii)].

72. In what the Petition calls “Kalliola’s Second Embodiment,” the Petition cites the paragraph [0084] disclosure addressed above, in which “motion” of the WCD is monitored for “pausing a DoA estimation until the motion of the WCD is detected by the motion sensors[,]” and “resum[ing] the DoA estimation” when motion is detected again. (Pet., p. 63) (citing Ex. 1004, ¶¶ [0014], [0084].) Petitioner repeatedly asserts, incorrectly, that the cited paragraphs relate to Kalliola’s “orientation sensor.” (Pet., 63.) Yet the cited paragraphs instead 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.” (Ex. 1004, ¶¶ [0014], [0084].) Therefore, the “motion” in the context of Kalliola is in no way equivalent to, nor even related to the uses of, the “rotation” in the ’246 patent.

73. Next, also in the context of Kalliola’s “Second Embodiment,” the Petition addresses Kalliola paragraph [0086], which describes a “correction or

compensation mode” that may be employed when user moves the WCD “too quickly for an accurate DoA estimation.” (Pet., 64.) This occurrence, according to Kalliola, “may trigger a configuration that increases the speed of the DoA estimation[.]” (Ex. 1004, ¶ [0086].) The sensor described in this embodiment, like the others the Petition cites, does not determine “rotation” of the mobile communication device, let alone for the claimed purpose of “determine[ing] a direction to the at least one remote device” as recited in limitation [11(e)(vii)].

74. I have reviewed Dr. Buehrer’s declaration with respect to limitation [11(e)(vii)]. He addresses many of the same paragraphs and figures of Kalliola that I address above.

75. Dr. Buehrer also addresses Kalliola’s Figure 12 flow chart, which the Petition does not address. (Ex. 1003, ¶¶ 278-279.) Dr. Buehrer acknowledges that the “sensor information” received in connection with step 1208 is, as stated in the flow chart, “for use in operational mode determination.” (*Id.*, ¶ 278.) He acknowledges that the sensor data is used to set “the antenna calibration vectors” and the “user interface” for the detected “mode” as reflected in steps 1210 and 1212 of the flowchart. (*Id.*) Kalliola explains “appropriately configur[ing] an operational mode[.]” as setting “a compass directional mode,” a “user interface mode,” or alternately “a camera tracking mode.” (Ex. 1004, ¶ [0085].) Furthermore, Dr.

Buehrer admits that the “DoA estimation [process] ***begins***” “[*t*]***hereafter***,” *i.e.*, after the sensor data is collected and used for its intended mode-setting purpose. (Ex. 1003, ¶ 278.) This concession confirms my view that that the orientation sensor data described in Kalliola is not used to determine the “rotation” of the mobile communication device, nor to “determine the direction” from the mobile communication device to the remote device, as recited in limitation [11(e)(vii)].

76. In paragraph 279 of his declaration, Dr. Buehrer acknowledges that the two described determinations made based on information collected from the orientation sensor disclosed in Kalliola are (1) “to determine whether a flip phone cover is opened or closed[],” and (2) “to set ‘antenna calibration vectors” Neither is the claimed function of “detect[ing] rotation of the mobile communication device” [11(d)], nor the claimed function of “determin[ing] a direction to the at least one remote device based ... on rotation of the mobile communication device” [11(e)(vii)].

77. For the reasons expressed above, I specifically disagree with Dr. Buehrer’s stated conclusion in paragraph 283, based on the above-addressed embodiments, that Kalliola teaches “orientation sensors module 932 detects rotation (*i.e.*, a rotational motion) ***of the WCD***,” and “determin[ing] a direction to the at least

one remote device based...on *rotation of the mobile communication device detected by the orientation sensor.*” (Emphasis added.)

78. For the above reasons, it is my opinion that a POSITA would not consider claim 11 obvious in view of the proposed combination of Kalliola, Turunen, Oswald, Vauclair and Kalayjian because that combination fails to teach or suggest limitations [11(d)] and [11(e)(vii)].

79. Dependent claims 12-14 address limitations unrelated to limitations [11(d)] and [11(e)(vii)]. Because Ground #1 fails to establish obviousness of claim 11 from which claims 12-14 depend, that Ground fails to demonstrate the obviousness of dependent claims 12-14 by virtue of at least their dependence from claim 11 for the reasons explained above.

B. Grounds #2 and #3 fail to demonstrate that the challenged claims are obvious.

80. In Grounds #2 and #3, the Petition does not further address independent claim 11, and addresses only claims 15–19, which are dependent from claim 11 and therefore include limitations [11(d)] and [11(e)(vii)].

81. Thus, for the same reasons that I believe claim 11 is not obvious over the proposed combination of Ground #1, dependent claims 15-19 are nonobvious for at least their dependence from claim 11.

IX. CONCLUSION

For the reasons expressed above, it is my opinion that the Petition and its supporting materials fail to demonstrate that challenged claims 11-19 would have been obvious to a POSITA at the time of the invention.

I declare under penalty of perjury that the foregoing is true and accurate to the best of my ability.

Executed on: 10/31/2024



DR. MARTIN J. FEUERSTEIN