

Inter Partes Review U.S. Patent No. 11,350,246

Oral Argument: April 29, 2025

Apple Inc. v. THL Holding Company, LLC
Case No. IPR2024-00399

Petitioner's Demonstrative Exhibits – Not Evidence

Petitioner's DX-I

Remaining Challenged Claims

- ▶ Two Petitions filed against the '246 Patent
- ▶ IPR2024-00399: Challenged Claims 1-19
- ▶ Patent Owner disclaimed Claims 1-10
 - ▶ See Paper 10, p. 3
- ▶ Remaining Challenged Claims: 11-19
 - ▶ Claim 11 independent
 - ▶ Claims 12-19 depend, directly or indirectly from Claim 11
 - ▶ THL does not separately argue patentability of any dependent claim
- ▶ Claim 11, Ground 1
 - ▶ Kalliola (Ex. 1004), Turunen (Ex. 1005), Oswald (Ex. 1006), Vauclair (Ex. 1007), and Kalayjian (Ex. 1008)

Claim 11 of the '246 Patent

► Relevant Claim Language:

Claim Designation	Claim Language
Claim 11 [P]	A mobile communication device comprising:
Claim 11(d)	an orientation sensor to detect rotation of the mobile communication device; and
Claim 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

'246 Patent, Claim 11 (selected limitations)

Petition's Mappings for Claim 11(e)(vii)

Claim 11(e)(vii): “determine a direction to the at least one remote device based on...rotation of the mobile communication device detected by the orientation sensor”

Claim 11(e)(vii) Disputed Requirement 1:
Detecting rotation of the mobile device
by the orientation sensor

Claim 11(e)(vii) Disputed Requirement 2:
Determining direction *based on* the
rotation of the mobile device

First Mapping: Kalliola’s “movement and/or orientation sensors 932” provide “relative orientation of two sections of WCD 100”



Rotation of housing sections determines antenna calibration vectors provided to DoA module 926

Second Mapping: Kalliola’s “motion and/or orientation sensor” is a semiconductor gyroscope chip detecting rotational motion of the WCD



(1) Pausing/resuming direction estimation based on rotation of the device

(2) Speeding up direction estimation based on the device being moved (i.e., rotated per the gyroscope) more quickly

Remaining Disputes

Petition's Mappings	Disputes
First Mapping: detecting rotation of the mobile device met by rotation of Kalliola's WCD section halves?	THL Disputes: requires claim construction for "rotation of the...device"
First Mapping: determining direction encompasses selecting antennas for direction determination <i>based on</i> detected rotation of Kalliola's WCD housing sections?	THL Disputes
Second Mapping: detecting rotation of the mobile device met by Kalliola's gyroscope chip?	THL Does Not Dispute
Second Mapping: determining direction encompasses pausing/resuming direction determination <i>based on</i> rotational motion detected by gyroscope?	THL Disputes
Second Mapping: determining direction encompasses speeding up/slowing down direction determination <i>based on</i> speed of rotational motion detected by gyroscope?	THL Disputes



**Second Mapping:
Kalliola's Gyroscope
Detects Rotational Motion**

Second Mapping: Kalliola's Rotation of the WCD Detected Using a Gyroscope

- ▶ Kalliola's semiconductor gyroscope chip:

Kalliola, [0084]

However, motion sensors integrated in WCD 100 (e.g., in the form of a semiconductor gyroscope chip, micro motion sensor, etc.) may further be used to detect when WCD 100 is being moved. If WCD 100 is motionless, and the target is also not moving, then updated directional information would not be necessary until the position of WCD 100 changes. Therefore, as disclosed in the example, the tracker application halts the DoA estimation when motion sensors determine that WCD 100 is stationary. At a time when motion resumes, the DoA application control 902 may resume the DoA estimation in order to provide updated directional information through a display on WCD 100.

Kalliola's Gyroscope Teachings: Institution Decision

▶ Institution Decision

Petitioner does not

explain why Kalliola's detection of movement of the wireless communication device is, or includes, detecting rotation of the device.

Pet. 63–64. Instead, Petitioner merely equates the two concepts. *Id.* at 63.

Dr. Buehrer testifies that Kalliola's detection of movement “includ[es] rotations,” but there is no support cited for this testimony. Ex. 1003 ¶ 281.

Institution Decision (Paper 8), p. 25

Unrebutted Evidence Is that Gyroscopes Detect Rotational Motion

► Unrebutted opinions from Apple's expert (Dr. Buehrer):

47. As noted in *Kalliola*, the gyroscope is “used to detect when WCD 100 is being moved.” *Kalliola* at [0084]. A POSITA would understand that gyroscopes are well-known inertial sensors that specifically detect *rotational* motion. *See e.g., Pons* at 170 (“Gyroscopes are rate sensors that commonly use vibrating mechanical elements (proof-mass) to sense **rotation**.”) (emphasis added).

Ex. 1047 (Buehrer Dec.), ¶ 47; see also *id.*, ¶ 49

Apple's Evidence that Kalliola's Gyroscope Detects Rotational Motion Must Be Considered

- ▶ Apple's arguments and evidence are a legitimate reply to the Board's institution determination

Any ambiguity as to whether a reply constitutes a new argument is eliminated when the reply is a legitimate reply to arguments introduced in a patent owner's response or the Board's institution determination.

Everstar Merchandise Co. Ltd. v. Willis Elec. Co., Ltd., No. 2021-1882, *Slip Op.*, at pp. 7-9 (Fed. Cir. 2022)

“As we have regularly held, the petitioner in an inter partes review proceeding may introduce new evidence after the petition stage if the evidence is a legitimate reply to evidence introduced by the patent owner.”

Axonics, Inc. v. Medtronic, Inc., 75 F.4th 1375, 1380 (Fed. Cir. 2023)

THL Does Not Rebut that Gyroscopes Detect Rotational Motion

▶ THL's Sur-Reply Argument:

While a gyroscope can be used to detect rotational motion, Kalliola does not disclose using its gyroscope to detect rotation of the WCD for the purpose of determining a direction to a remote device as recited in limitation 11(e)(vii).

PO Sur-Reply, pp. 13-14

THL's Infringement Contentions Map Gyroscopes to the Claimed Orientation Sensor

▶ THL's Infringement Contentions:

a **memory** that stores operational instructions;
a **touch screen**;
an **orientation sensor** to detect rotation of the mobile communication device; and
a **processor** coupled to the plurality of wireless transceivers, the memory, the touch screen and the orientation sensor, wherein the processor is configured to execute the operational instructions, which upon execution, cause the processor to:

	<u>iPhone 11</u>	<u>iPhone 12</u>	<u>iPhone 13</u>	<u>iPhone 14</u>
touchscreen				
memory	• 64GB • 128GB • 256GB 4 GB RAM	64GB 128GB 256GB 4/6 GB RAM	128GB 256GB 512GB 4/6 GB RAM	128GB 256GB 512GB 6 GB RAM
orientation sensor	Three-axis gyro	Three-axis gyro	Three-axis gyro	Dynamic High Range Gyro

Ex. 1013, p. 38

Substantial Evidence Supports Kalliola's Gyroscope Detects Rotational Motion

- ▶ Because:
 - ▶ Apple's evidence establishes Kalliola's gyroscope detects rotational motion; and
 - ▶ THL does not dispute that Kalliola's gyroscope detects rotational motion nor provide any rebuttal evidence,
- ▶ Then:
 - ▶ “[T]he only conclusion supported by the evidence is that [the reference] teaches the disputed limitation.”
 - ▶ See *Google LLC v. Ji-Soo Lee*, 759 F.App’x 992, 996-97 (Fed. Cir. 2019)
 - ▶ Reversing the Board’s decision where Patent Owner did not dispute nor provide rebuttal evidence that the reference failed to teach a limitation

Second Mapping:
Direction Determination *Based on* Rotation of
Kalliola's WCD Detected by the Gyroscope

Claim 11(e)(vii)'s Broad Language

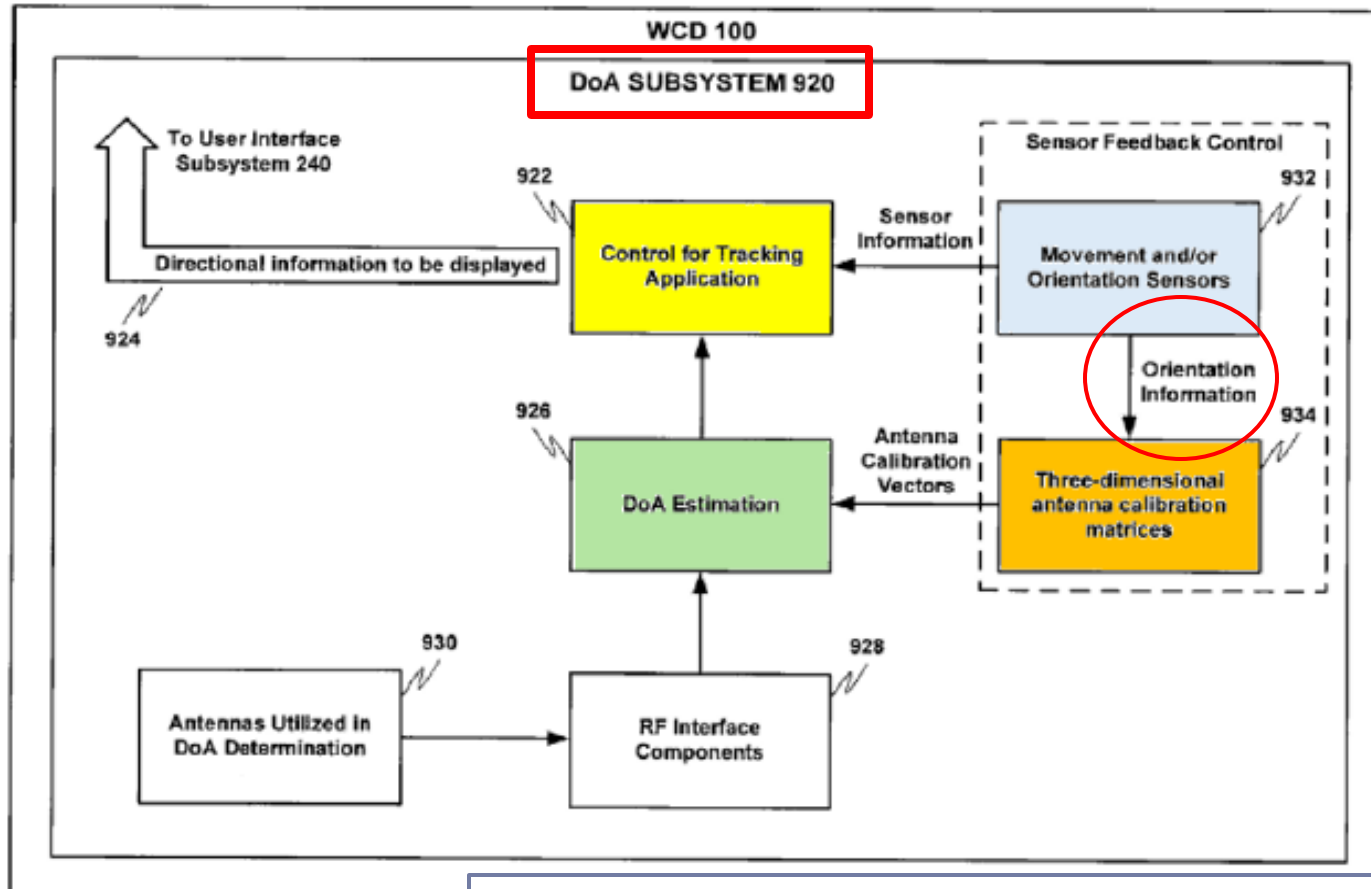
Second Mapping: Kalliola's "motion and/or orientation sensor" is a semiconductor gyroscope chip detecting rotational motion of the WCD

(1) Pausing/resuming direction determination *based on* the device's rotational motion

(2) Speeding up/slowing down direction determination *based on* the device's rotational motion

- ▶ Plain language of Claim 11(e)(vii) does not recite:
 - ▶ *How* the detected rotation must be used to determine direction
 - ▶ Using a *measure* of the orientation for direction determination, other than whether the device is rotated
- ▶ Plain language met when rotation is a condition or trigger for determining direction
- ▶ "Based on" is a "broad" claim term
 - ▶ Does not require direction determination be based *directly* on rotation
 - ▶ Does not exclude use of other information/conditions for determining direction
 - ▶ See *Masimo Corp. v. Sotera Wireless, Inc.*, No. 2022-1415, *Slip Op.* at 7 (Fed. Cir. 2023) (agreeing that "based on" is "broad")

Kalliola's DoA Subsystem



Kalliola's
Direction of
Arrival (DoA)
Subsystem 920

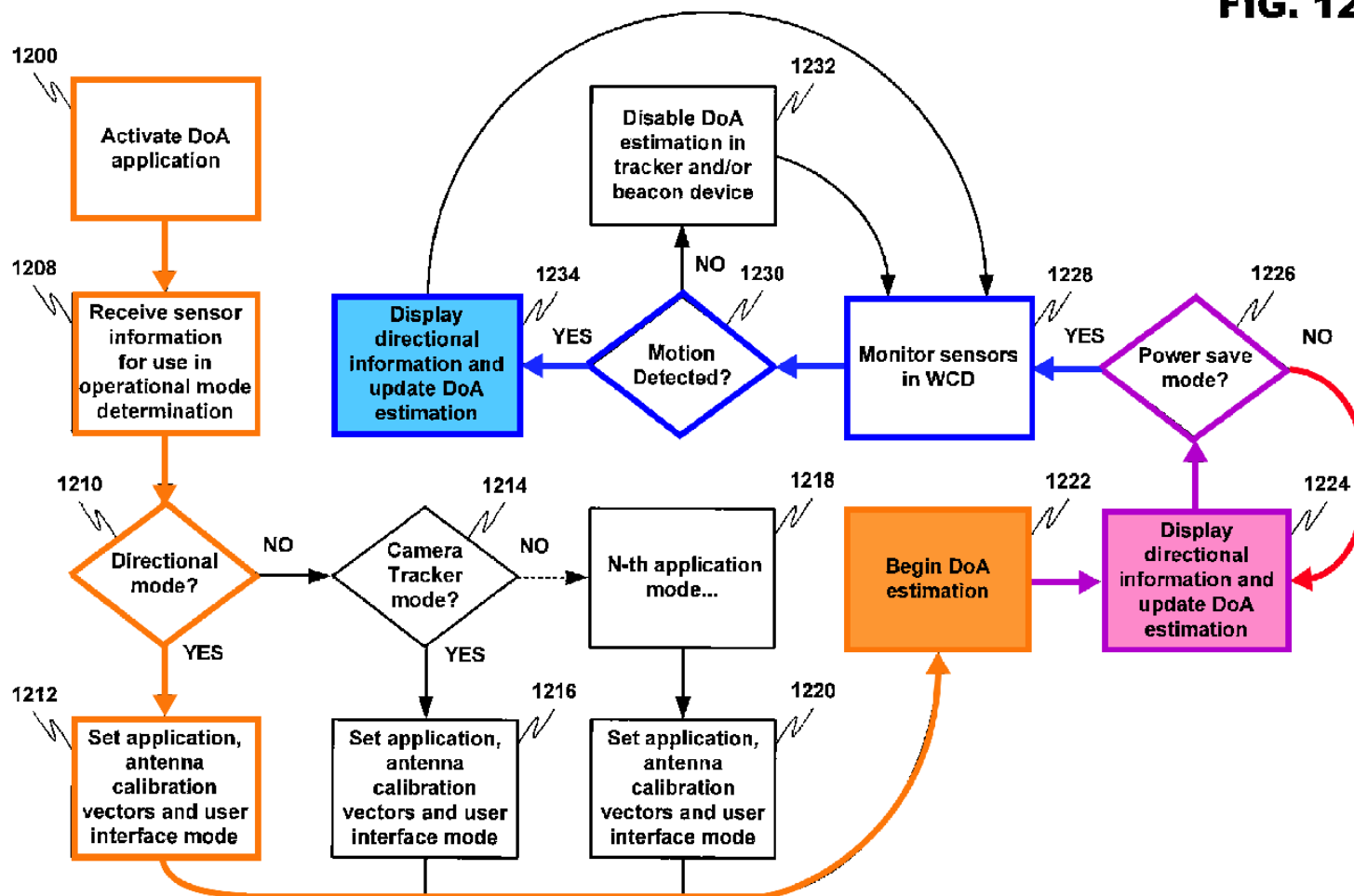
Kalliola, Fig. 9B

Kalliola, [0080]

These modules making up DoA subsystem 920 may work together in order to provide a relative direction towards a target beacon.

Kalliola's DoA Estimation Process

FIG. 12



Kalliola, Fig. 12,
[0085]-[0087]

Direction Determination Resumed or Sped Up Based on WCD Rotational Motion

- ▶ Kalliola Expressly Teaches Its DoA Estimation Is Based on WCD Rotational Motion Detected by the Gyroscope

If WCD 100 is motionless, and the target is also not moving, then updated directional information would not be necessary until the position of WCD 100 changes. Therefore, as disclosed in the example, the tracker application halts the DoA estimation when motion sensors determine that WCD 100 is stationary. At a time when motion resumes, the DoA application control 902 may resume the DoA estimation in order to provide updated directional information through a display on WCD 100.

Kalliola, [0084]

Increased activity detected by motion sensors in WCD 100 may trigger a configuration that increases the speed of the DoA estimation,

Kalliola, [0086]

Direction Determination Based on WCD Rotational Motion

- ▶ Additional Kalliola Teachings:
 - ▶ Describing the power management embodiment:

[0014] In addition, the WCD, in at least one embodiment of the present invention, may continue to use collected sensor information during the execution of a DoA estimation in order to enhance the performance of the WCD.

Kalliola, [0014]

1. A method, comprising:
sensing, using one or more sensors in a wireless communication device, information related to a state and/or alignment of the wireless communication device;
configuring the wireless communication device based on the information sensed by the one or more sensors;
determining a direction of arrival estimate of a received signal in the wireless communication device, wherein sensed conditions relating to the state and/or alignment of the wireless communication device are utilized to affect the behavior of the wireless communication device while determining the direction of arrival estimate; and

Kalliola, Claim 1

THL's Rebuttal Arguments Re the “based on” Claim Language

► THL's Rebuttal Arguments:

PO Sur-Reply, p. 9

Apple essentially argues that the mode and antenna calibration selections described in Kalliola resulting from the relative component orientation determination are *prerequisites* to the described DoA estimation, and therefore, the DoA estimation described in Kalliola is “based on” the relative component orientation. That is incorrect, as Kalliola expressly describes how the DoA determination is made, and it is not “based on” input from the orientation sensor, let alone a detected orientation of the WCD as a whole.

Because Kalliola does not disclose determining direction to the remote device based on a determined orientation of anything, let alone the orientation of the WCD as a whole, Kalliola does not teach nor suggest claim limitation 11(e)(vii).

PO Sur-Reply, pp. 10-11

THL's “based on” Arguments Should Be Rejected

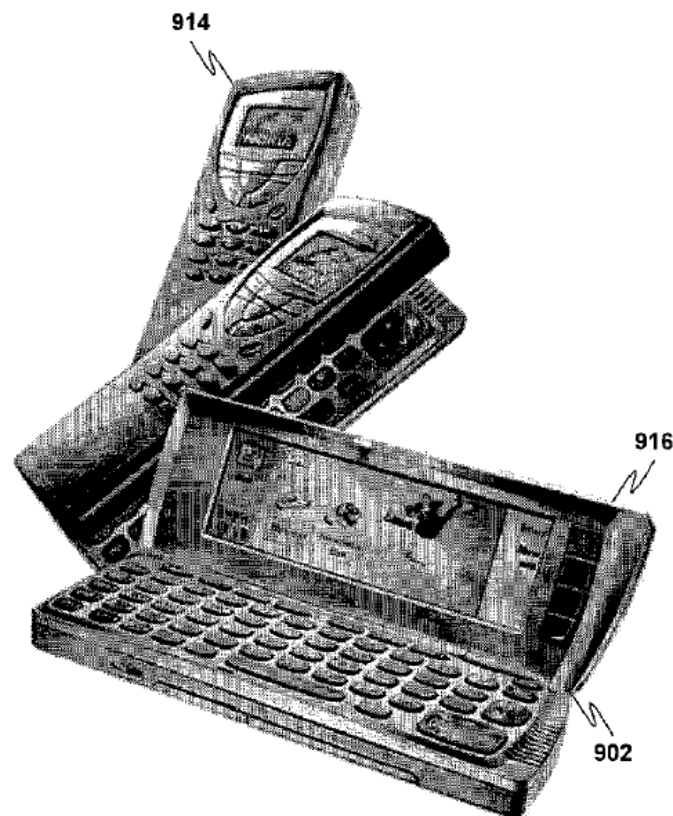
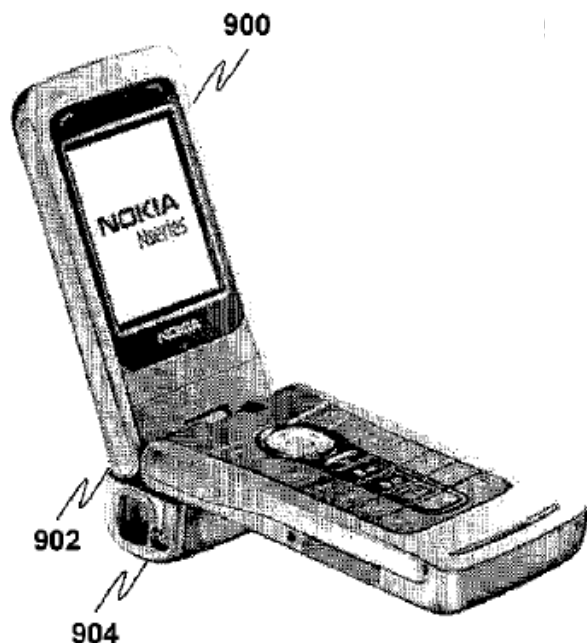
- ▶ THL's arguments that Kalliola's direction determination is not *based on* detected WCD rotational motion should be rejected because they:
 - ▶ Improperly require determining direction based on *orientation information* (e.g., a *measure* of orientation to which the device is pointing), rather than whether the device is rotated or not
 - ▶ Require an unclaimed *use* of orientation information, rather than merely determining direction based on detected rotation
 - ▶ Require an unclaimed *purpose* for detecting rotation, other than merely determining direction based on detected rotation



First Mapping: Rotation of Kalliola's WCD Sections

First Mapping: Kalliola's Rotation of the WCD's Housing Sections

- ▶ Kalliola's Rotation of the WCD Housing Sections:



*Kalliola, Fig. 9A
(excerpts), [0078]*

First Mapping: Kalliola's DoA Estimation Process “based on” WCD Rotation

STEP 1:

Orientation sensor module 932 detects rotation of the WCD: “DoA estimation may operate in a multitude of modes depending on the physical orientation of the device”



STEP 2:

Orientation sensor module 932 outputs information to 3-D antenna calibration matrices module 934

STEP 3:

3-D antenna module 934 uses the orientation sensor information to “determine the appropriate antenna calibration vectors to provide to DoA Estimation module 926”



STEP 4:

DoA Estimation module 926 determines direction using the antenna configuration, which “may include how the measurements from the active antennas will be interpreted in order to determine direction”

Kalliola, [0013], [0081]

**First Mapping:
Claim Construction for
“rotation of the mobile communication device”**

Claim Construction

▶ Board's Construction in Institution Decision

On the present record, where neither party has requested construction of “based on . . . rotation of the mobile communication device,” we read that language in limitation 11(e)(vii) as requiring that the determination of a direction to the remote device is based on **information about the rotation of the device as a whole**, which Kalliola’s orientation sensors do not teach.

Institution Decision, p. 24

Claim Construction

▶ **THL's Construction**

Based on the language of claim 11 and the examples provided in the specification of the '246 Patent, a POSITA would have interpreted “rotation of the mobile communication device” to mean the rotation of the mobile communication device as a whole, rather than the rotation of a specific component of the device relative to another component. (Ex. 2002, ¶¶ 49-50).

POR, p. 15

Claim Construction

► Plain and Ordinary Construction

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

Pet. Reply, p. 4

THL's Claim Construction Is Improper

- ▶ THL's construction should be rejected because it:
 - ▶ Is not supported by the intrinsic record and does not match any embodiment in the '246 Specification
 - ▶ Imports a negative limitation into the claim (excludes “rotation of a specific component of the device relative to another component”)
 - ▶ Improperly defines the claim scope by what is excluded rather than what is encompassed
 - ▶ Is ambiguous and creates uncertainty of what the claim limitation encompasses
 - ▶ Improperly imports a type of rotation of the device into the claim

Even if Adopt “as a whole” Construction, Kalliola Teaches Claim 11(e)(vii)

▶ Dr. Feuerstein’s (THL’s Expert) Opinion:

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.

Ex. 2002, ¶ 51

▶ Dr. Buehrer’s (Apple’s Expert) Opinion:

Both halves of the mobile communication device rotate relative to each other **and** “relative to other objects,” including the Earth. This qualifies as rotation of the device “as a whole” per Dr. Feuerstein’s testimony cited above because the whole device (i.e., both halves) is “spinning about its own axis” and rotating “relative to other objects.”

Ex. 1047, ¶ 9; see also *id.*, ¶ 45

Federal Circuit Precedent Requires Applying Plain & Ordinary Construction

Plain & ordinary meaning
applies

UNLESS

PO acted as its own lexicographer
(specific, precise definition)

OR

Claim is ambiguous
(no means for ascertaining scope)

THL's Argument:

No lexicographer:
“While Apple is correct that the
'246 Patent does not provide an
express definition for the
disputed clam [sic] language...”

AND

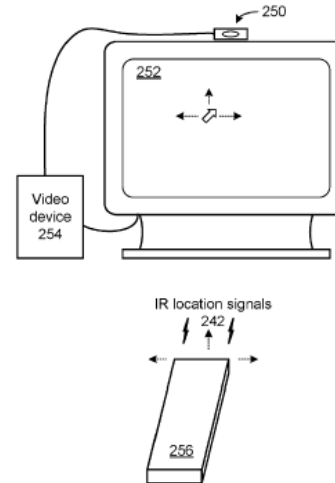
Does not address ambiguity

PO Sur-Reply, p. 2

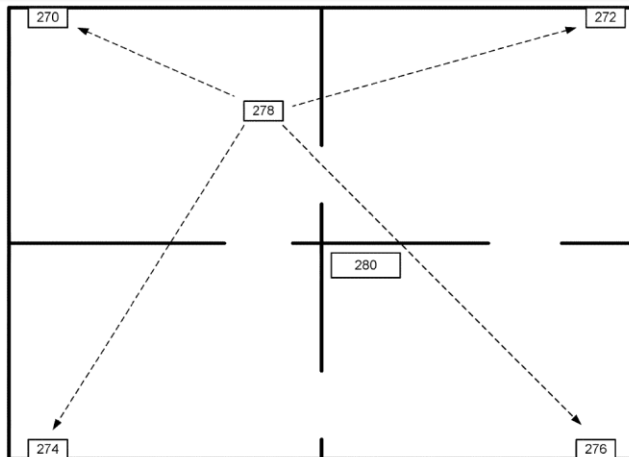
'246 Patent's Intrinsic Evidence Does Not Support THL's Construction

- ▶ No embodiment that describes any type of device rotation matches Claim 11(e)(vii)

FIG. 30 Embodiment: no orientation sensor used and does not relate to determining direction; instead, video device 254 determines orientation of remote device based on video signals
'246 Patent, 25:7–26:12



'246 Patent, Fig. 30



'246 Patent, Fig. 32

Internal Compass Embodiment: fixed paging devices determine relative directions to mobile device – opposite of what is claimed
'246 Patent, 28:21-38

'246 Patent's Intrinsic Evidence Does Not Support THL's Construction

Signal Strength Embodiment: determining direction based on signal strength—not signal delay—and 360° rotation of the device
'246 Patent, 11:43-53

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.

'246 Patent, 11:43-53