IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of:	Billhartz et al.	
U.S. Patent No.:	7,321,777	Attorney Docket No. 50095-0107IP2
Issue Date:	January 22, 2008	
Appl. Serial No.:	11/531,487	
Filing Date:	September 13, 2006	
Title:	WIRELESS COMMUNICATIONS SYSTEM INCLUDING A WIRELESS DEVICE LOCATOR AND RELATED METHODS	

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PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT NO. 7,321,777 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42

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I. INTRODUCTION

Apple Inc. ("Petitioner") requests *inter partes review* of claims 1-3 and 5-25 of U.S. Patent 7,321,777 ("the '777 patent"). The patentability analysis of this Petition mirrors the petition filed on May 27, 2022 by Unified Patents, LLC ("the Unified Petition") in Case No. IPR2022-00987 ("the Unified Proceeding"). The Board instituted review in the Unified Proceeding on November 9, 2022, finding that the Unified Petition "present[s] not only a reasonable likelihood of unpatentability, but also a compelling unpatentability challenge." *Unified Patents, LLC v. Speir Technologies Ltd.*, IPR2022-00987, Paper 9 at 13 (PTAB Nov. 9, 2022). So too does this mirror-image Petition.

Concurrently with this Petition, Petitioner conditionally moves for joinder with the Unified Proceeding **if**, **and only if**, the Board denies institution of Petitioner's Original Petition in Case No. IPR2022-01512 ("the Apple Proceeding"). As discussed below in Sections VII and VIII, Petitioner submits this Petition and seeks conditional joinder with the intent to participate in a **single** *inter partes* review, preferably the Apple Proceeding. Instituting review in either the Apple Proceeding or here (with joinder to the Unified Proceeding) appropriately balances the respective interests of the parties and simultaneously promotes judicial efficiency and consistency between co-pending district court and PTAB proceedings regarding the '777 patent.

II. REQUIREMENTS FOR IPR—37 C.F.R. §42.104

A. Grounds for Standing—37 C.F.R. §42.104(a)

Petitioner certifies that the '777 patent is available for *inter partes* review and that Petitioner is not barred or estopped from requesting an *inter partes* review challenging patent claims on the grounds identified in this Petition.

B. Challenge and Relief Requested—37 C.F.R. §42.104(b)

Petitioner challenges claims 1-3, 5-25 ("challenged claims") of the '777 patent.

The '777 patent ultimately claims priority to U.S. Application 10/767,794, filed January 29, 2004. Petitioner assumes the challenged claims have a priority date of January 29, 2004, without conceding that the challenged claims are entitled to that date.

The following references are pertinent to the grounds of unpatentability explained below:

1. U.S. Patent Application Publication 2003/0174048 (filed December 13, 2002, published September 18, 2003) ("*McCorkle*" (EX1003)).
2. U.S. Patent 7,203,500 (filed August 1, 2003, issued April 10, 2007) ("*Leeper*" (EX1004)).
3. U.S. Patent 5,381,444 (filed October 30, 1992, issued January 10, 1995) ("*Tajima*" (EX1006)).

McCorkle, *Leeper*, and *Tajima* are each prior art under 35 U.S.C. §§ 102(a) and (e). *Tajima* is also prior art under 35 U.S.C. § 102(b).

None of the above prior art was cited during prosecution of the '777 patent.

This Petition, supported by the Declaration of Michael Braasch, Ph.D ("Braasch Declaration" EX1002), requests cancellation of claims 1-3 and 5-25 under the following Grounds.

Ground	'777 Patent Claims	Basis
1	1, 6–9, 12, 16–20, and 23-25	§102: *McCorkle*
2	1, 3, 5–9, 12, 14–20, and 22-25	§103: *McCorkle*
3	1–3 and 5–25	§103: *McCorkle* in view of *Leeper*
4	3, 5, 14, 15, and 22	§103: *McCorkle* in view of *Tajima*
5	3, 5, 11, 14, 15 and 22	§103: *McCorkle* in view of *Leeper* and *Tajima*

C. Claim Construction—37 C.F.R. §42.104(b)(3)

Because the Challenged Claims are obvious under any reasonable interpretation, no express constructions are required in this proceeding. To be clear, Petitioner reserves the right to address any construction proposed by Patent Owner or the Board. Petitioner also reserves the right to pursue constructions in district court that are necessary to decide matters of infringement.

For example, in district court, Petitioner construed the term "known device latency" as "predetermined latency for the given device type of the target wireless communication device." EX1102, 3. Patent Owner opposed this construction and argued that "known device latency" should be given its (presumably broader) plain meaning. *Id.*; EX1103, 1-4. While pertinent to infringement, the parties' dispute has no bearing in this IPR because the prior art obviates the Challenged Claims under either

party's interpretation.

In the recently instituted Unified Proceeding, the Board "determine[d] that no terms require construction at this stage." *Unified Patents, LLC v. Speir Technologies Ltd.*, IPR2022-00987, Paper 9 at 12 (PTAB Nov. 9, 2022). The same approach is warranted here in this Petition, where the unpatentability grounds mirror those from the Unified Petition.

III. THE '777 PATENT

A. Brief Description

The '777 patent is directed to a system and method of using a wireless device locator to location a remote wireless device. EX1001, Abstract. According to a described embodiment, wireless communications system 30 includes a wireless location device (blue) and wireless communications devices 34-36 (orange), as shown in annotated Figure 1 below. *Id.*, 4:56-62, Fig. 1.

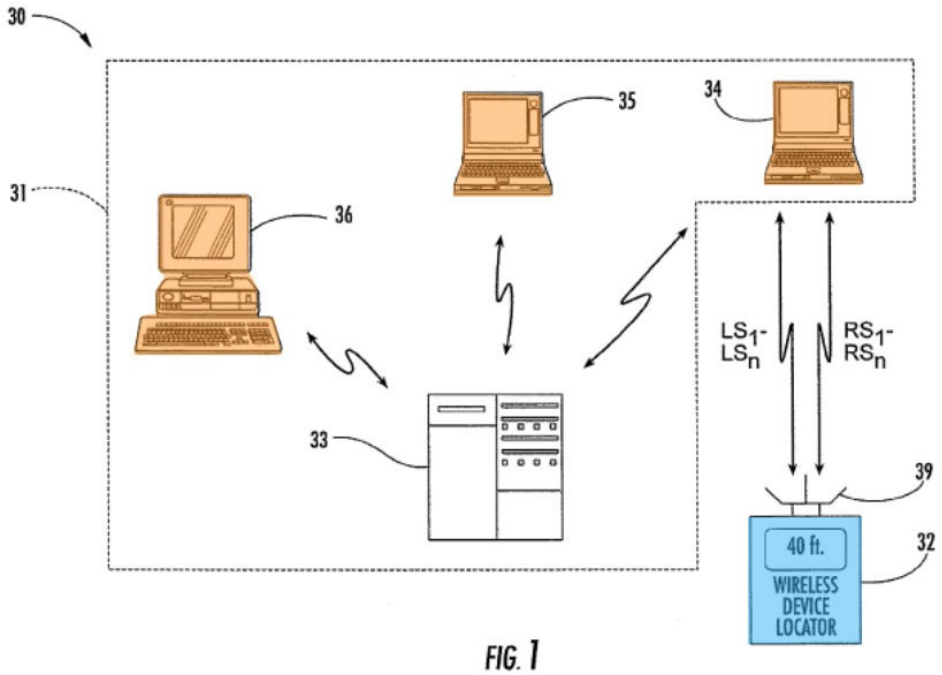


FIG. 1

Wireless device locator 32 includes an antenna 39, transceiver 41 and controller 42. *Id.*, 5:28-30. Controller 42 cooperates with transceiver 41 to send a plurality of location finding signals to a target wireless communications device (e.g., one of devices 34-36). *Id.*, 5:42-48. Controller 42 further cooperates with transceiver 41 to receive a reply signal from the target device via antenna 39. *Id.*, 6:36-38.

Controller 42 determines the propagation delay associated with the transmission of each location finding signal and respective reply. *Id.*, 6:42-59. To determine the propagation delay, controller 42 must consider the device latency of the target device. *Id.*, 6:50-67. The device latency is the time it takes the target device to receive, process, and transmit the reply signal in response to the location finding signal. *Id.*, 6:65-67. Controller 42 has access to a known device latency of the target device based on its device type which provides a close approximation of the actual device latency. *Id.*, 7:13-20. Controller 42 also knows the transmission time t_1 of the location finding signal and the reception time t_4 of the reply to the location finding signal. *Id.*, 6:50-7:12, Fig. 3. Controller 42 calculates the total propagation time by subtracting the known device latency from the time between times t_1 and t_4. *Id.*, 7:21-30.

To determine the range from wireless device locator 32 to the target device, the total propagation delay is divided by two to find the one-way propagation delay from wireless device locator 32 to the target device because both the propagation delays to and from the target device may be considered equal or substantially equal for a

stationary or a slow moving target device. *Id.*, 7:30-33. The one-way propagation delay is then multiplied by the speed of light to give an estimated distance to the target device. *Id.*, 7:33-36. To improve the accuracy of the estimated distance to the target device and mitigate the effects of variations in the actual device latency time, controller may estimate the range based on an average of multiple calculated propagation delays between wireless device locator 32 and the target device. *Id.*, 7:47-65.

Such systems for locating a remote wireless device were well known before the '777 patent, as evidenced by the prior art in this Petition and the Braasch Declaration. *See also*, EX1002, ¶¶35-63 (citing EX1003-EX1007; EX1010-EX1020).

B. Background of the Art

The technology of the '777 patent relates to so-called "two-way ranging" that dates back to World War II. EX1010. Specifically, the development of radar led to the need to be able to distinguish enemy aircraft from one's own forces. *Id.*, 10-11, 18-25. One technique to accomplish this task was called 'identification friend or foe' (IFF) and continues in use to the present day. *Id.* It involves the transmission of specially coded interrogation signals. *Id.*, 24. A transponder on a friendly aircraft will receive and process the interrogation and then transmit a specially coded reply signal. *Id.* The interrogator concludes the aircraft is friendly if it receives a valid reply. *Id.*

Although the technology was originally intended for identification purposes, it soon became apparent that timing circuits could be used to determine the range (distance) from the interrogator to the transponder. After the war, the technology led to

the development of secondary surveillance radar (in use throughout the world by air traffic controllers), tactical air navigation systems (abbreviated as TACAN) and the so-called distance measuring equipment (DME). *See e.g.,* EX1010; EX1011 (US 3,302,199); EX1012 (US 3,728,728); EX1013 (US 4,126,859); EX1014 (US 4,677,441). The principle remains the same. A DME interrogator mounted in an aircraft transmits specially coded interrogation signals. EX1010, 22; EX1014, 3:10-14. Fixed-based ground transponders receive the interrogations, and after a processing delay, transmit a reply signal. EX1014, 2:31-4:63. The airborne interrogator measures the elapsed time from its own transmission to the receipt of the ground transponder reply signal. *Id.* The ground transponder processing delay is subtracted from the elapsed time and the result is divided by 2 to determine the one- way time needed for the transmission. *Id.* The one-way time is then multiplied by the speed of light (i.e., the speed of the radio wave propagation) to determine an estimate of the range. EX1011, 2:17-23. DME technology was developed throughout the 1950s and eventually became an international standard for civil aircraft navigation. EX1010; EX1011; EX1012; EX1013; EX1014.

C. Prosecution History

The ’777 patent issued from U.S. Patent Appl. No. 11/531,487 (“the ’487 application”), which was filed September 13, 2006 as a continuation of U.S. Patent Appl. No. 10/767,794 (now U.S. 7,110,779), which was filed January 29, 2004.

After one Office Action, the claims were allowed. *See generally* EX1008. The Office Action rejected the pending claims on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-24 of U.S. Patent 7,110,779 (the '779 patent) (parent of the '777 patent), provisionally rejected the pending claims on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-25 of U.S. Application 11/058,931 (the '931 application) and rejected the pending claims under 35 U.S.C. § 103 as being obvious over combinations of U.S. Published Application 2004/0266348 ("*Deshpande*"), U.S. Published Application 2003/0191604 ("*Kuwahara*"), and U.S. Published Application 2003/0117320 ("*Kim*"). *Id.*, 103-107. The applicant filed a terminal disclaimer over the '779 patent and argued that the prior art references used in the Office Action do not disclose "determining a propagation delay associated with the transmission of a location finding signal and a respective reply signal based upon a known device latency of a target wireless communications device" because, for example, *Kuwahara* "merely looks at the time of transmission from a transmitting device and the time of reception at a receiving device" and "simply does not take into account any device latency of the transmitting terminal." *Id.*, 88-91. The applicant and the examiner conducted an interview, and the claims were allowed. *Id.*, 18-28. The examiner provided no indication regarding which elements rendered the claims allowable. *Id.*, 23-24.

IV. Level of Ordinary Skill

A person of ordinary skill in the art at and before the priority date for the '777 patent ("POSITA") would have had a bachelor's degree in electrical engineering, computer science, computer engineering, physics, or a related subject, and two to three years of work experience in wireless location determination. A lack of experience can be remedied with additional education (e.g., a Master's degree), and likewise, a lack of education can be remedied with additional work experience (e.g., 5–6 years). EX1002, ¶¶28-31.

V. PRIOR ART REFERENCES

A. McCorkle

Like the '777 patent, *McCorkle* is directed to a system for determining a location of a remote wireless device. EX1003, Abstract, [0098]-[0105], [0118]-[0128], Figs. 4, 7. The reference is analogous art to the '777 patent, as each discloses wireless communication systems in the same field of endeavor (location determination) and are pertinent to the problem of how to locate a remote wireless device. EX1001, Abstract; EX1003, Abstract, [0098]-[0105], [0118]-[0128], Figs. 4, 7; EX1002, ¶¶47, 58. *McCorkle* discloses a wireless network 400, such as a wireless local area network (WLAN) or other wireless network, in which a plurality of wireless devices communicate over. EX1003, [0098]. These wireless devices are shown in annotated Figure 4 below and include a local device 405 (blue) and multiple remote devices 410_1 through 410_N (orange). Each device also includes an ultra-wide band

(UWB) transceiver having at least one antenna 105 for transmitting and receiving UWB signal 420. *Id.*, [0101].

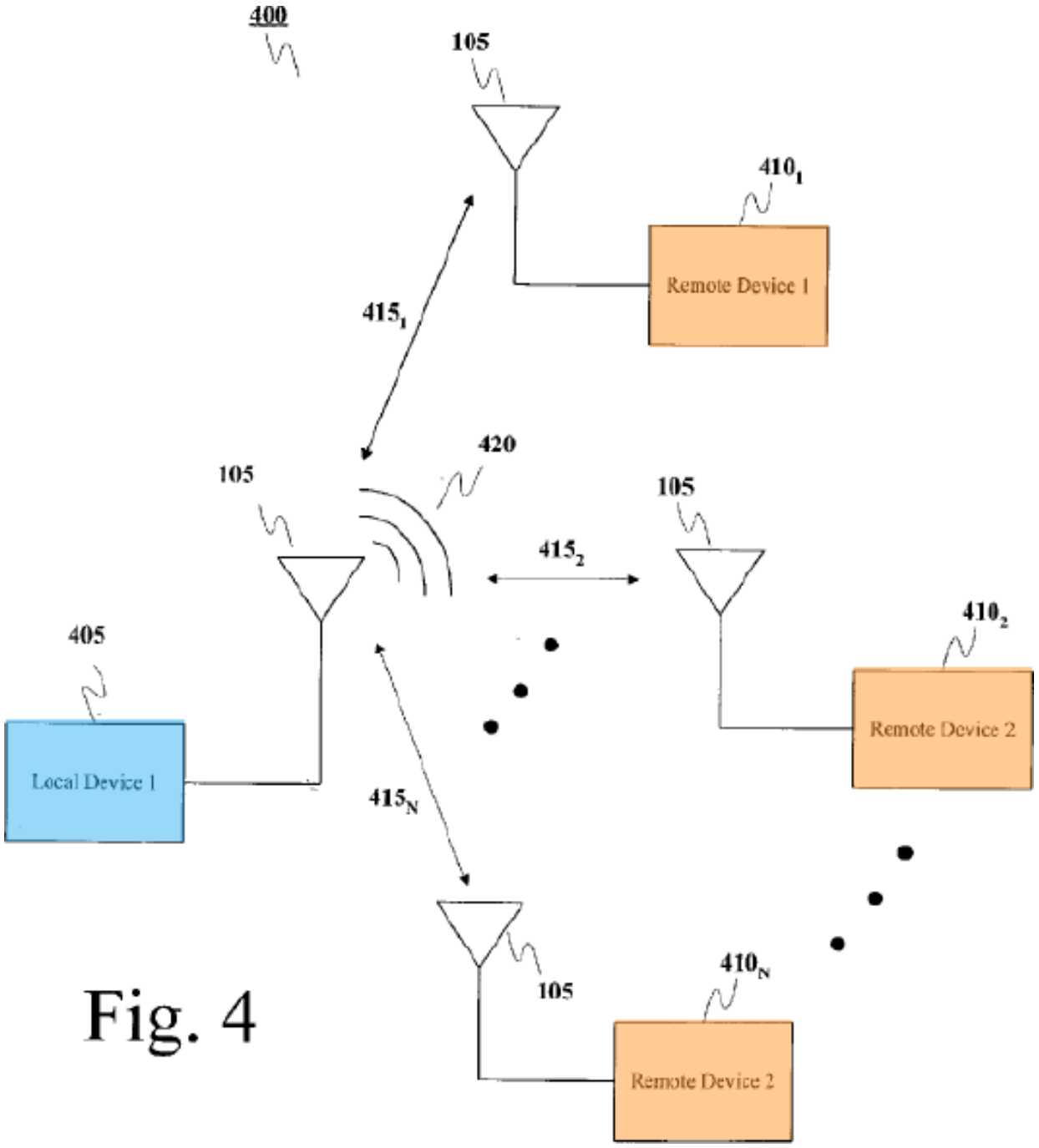


Fig. 4

"Each of the wireless devices 405 and 410_1 through 410_N may be a mobile device such as a mobile telephone, a laptop computer, or personal digital assistant (PDA)." *Id.*, [0100]. Each of the wireless devices includes a processor system having a processor unit 301 such as the one shown annotated in red in Figure 3 below. *Id.,* [0069], [0100], Fig. 3. Processor unit 301 includes, for example, bus 303, processor 305, main memory 307, read only memory 9ROM) 309, storage device 311, and communication interface 313. *Id.*, [0069].

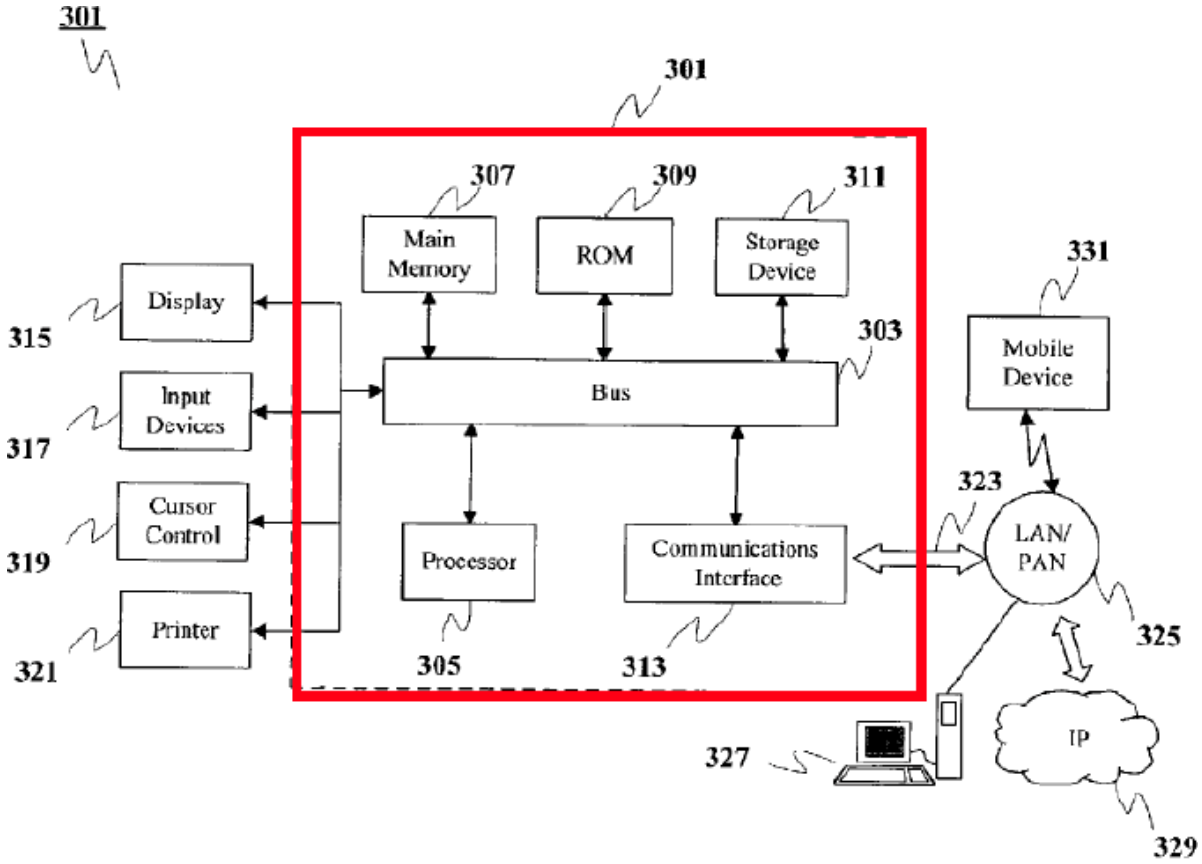


Fig. 3

Local device 405 is linked to remote devices 410_1-410_N via respective UWB links 415_1-415_N, as shown in Figure 6 below. *Id.*, [0098], [0113]-[0116], Fig. 6. To create the UWB links, local device 405 transmits a join message to all unlinked remote devices within the transmission range of the local device 405. *Id.*, [0113]. Each of the unlinked remote devices receives the join message, synchronizes with local device 405, and transmits a reply to the join message. *Id.*, [0113]-[0115]. Each reply is a UWB signal that includes a unique identifier associated with the respective remote device. *Id.*, [0115]. The unique identifier may be a device address or a unique time delay for the remote device. *Id.* Local device 405 receives the replies and establishes the unique links with the remote devices. *Id.*, [0116]. The unique identifiers of the remote devices are stored in memory 307 of local device 405. *Id.*

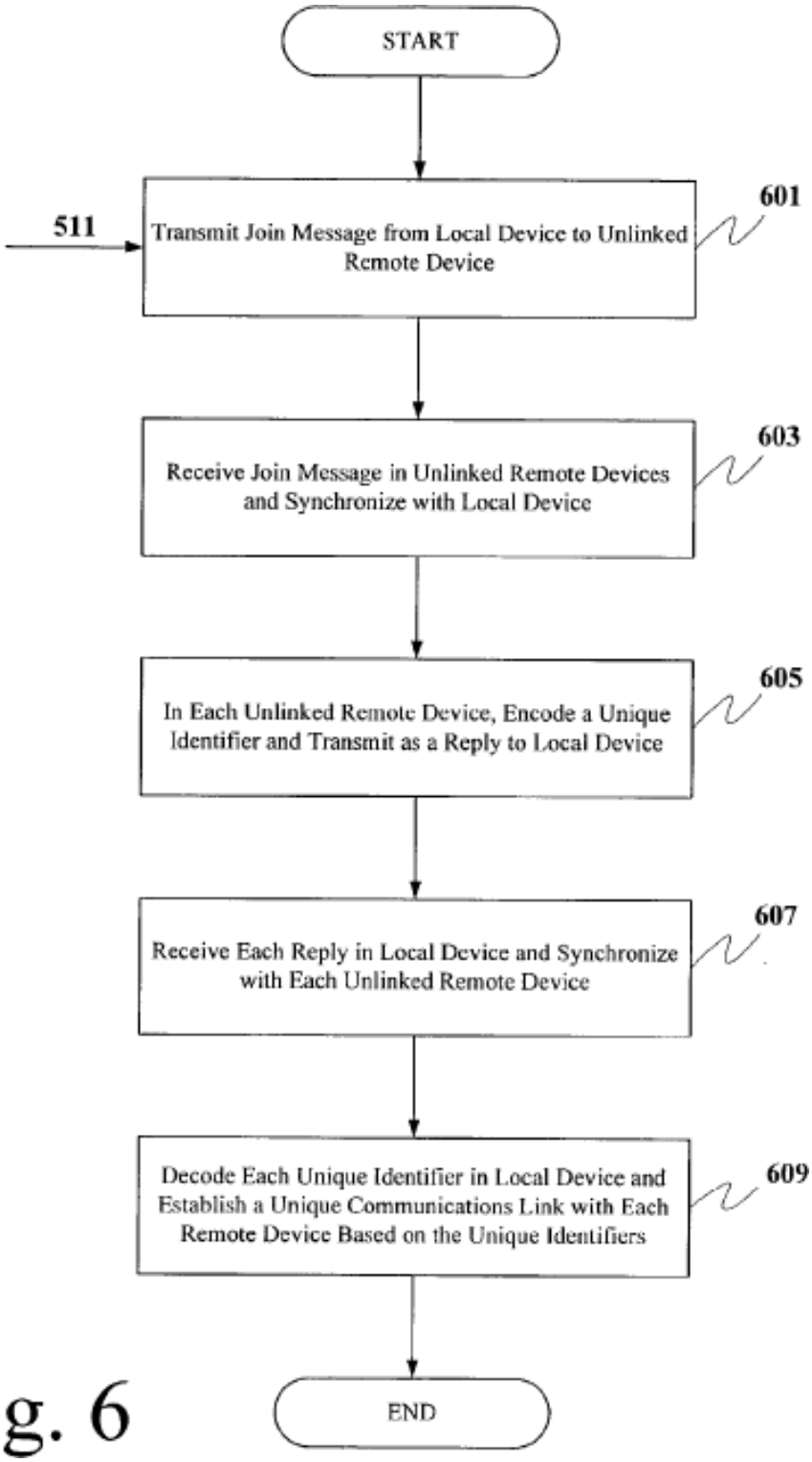

START
511
Transmit Join Message from Local Device to Unlinked Remote Device
601
Receive Join Message in Unlinked Remote Devices and Synchronize with Local Device
603
In Each Unlinked Remote Device, Encode a Unique Identifier and Transmit as a Reply to Local Device
605
Receive Each Reply in Local Device and Synchronize with Each Unlinked Remote Device
607
Decode Each Unique Identifier in Local Device and Establish a Unique Communications Link with Each Remote Device Based on the Unique Identifiers
609
END

Fig. 6

Once the unique link is established, local device 405 calculates a distance to each linked remote device 410_1-410_N, as shown in Figure 7 below. *Id.*, [0118]- [0128], Fig. 7.

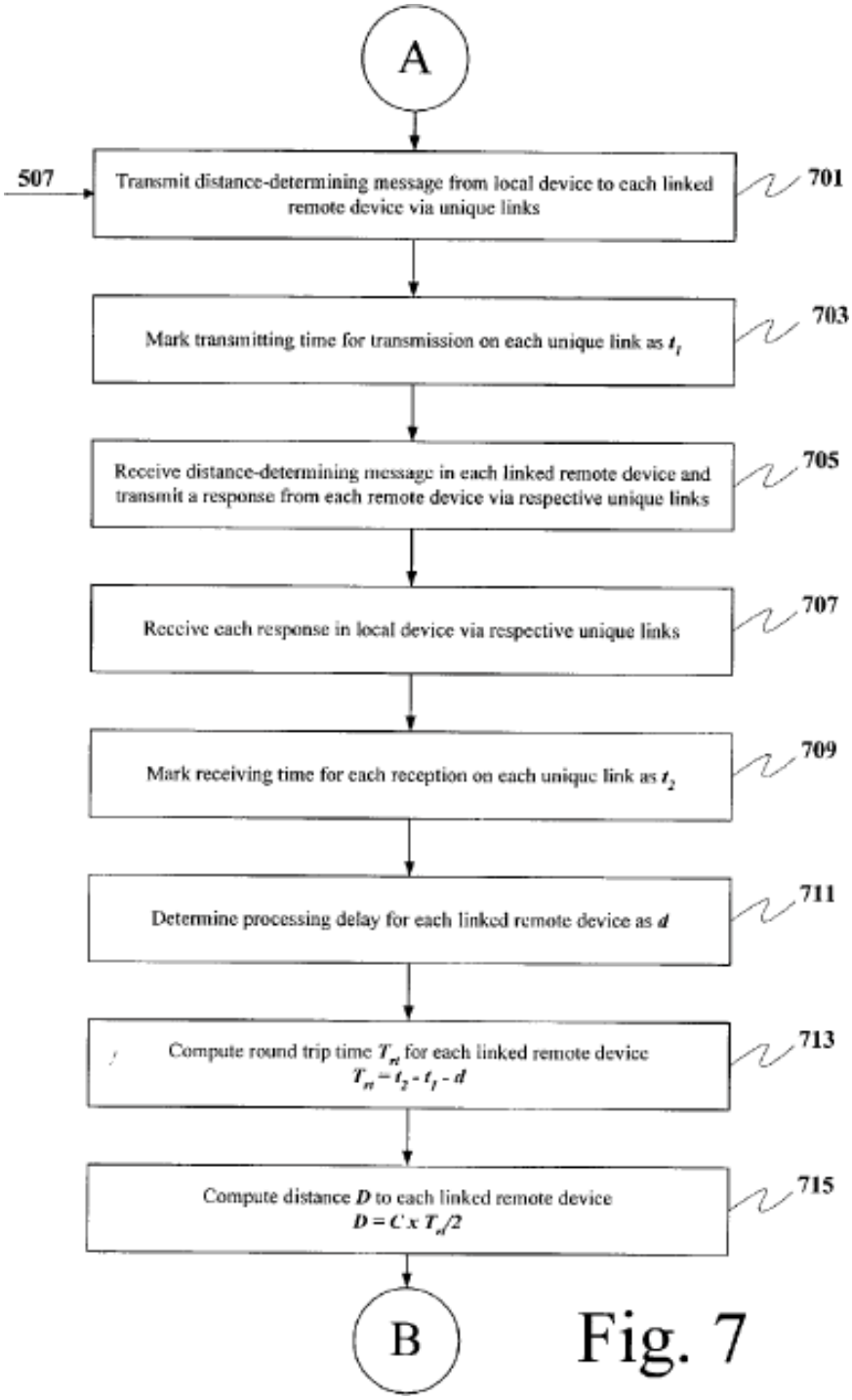


Fig. 7

For example, local device 405 transmits a distance-determining message to linked remote device 410_1 via the unique communication links 415_1. *Id.*, [0118]. Local device 405 determines a transmit time t_1 of the distance-determining message and stores transmit time t_1 in main memory 307 along with the corresponding unique identifier of the corresponding remote device. *Id.*, [0120]. Linked remote device 410_1 receives the distance determining message and transmits a response back to local device 405. *Id.*, [0121]. Local device 405 receives the response, determines a receive time t_2 for the response, and stores the receive time t_2 in main memory 307 along with the corresponding transmit time t_1. *Id.*, [0122].

Local device 405 determines a processing delay d for remote device 410_1. *Id.*, [0123]. The processing delay d is "the times delay between the remote device receiving the distance determining message and transmitting a response and includes at least the amount of time necessary for the remote device to process the distance determining message and form a response." *Id.* To determine the processing delay, local device 405 receives information from remote device 410_1 regarding the radio type of remote device 410_1 as part of the unique identifier received when linking the devices. *Id.*, [0124]. Local device 405 uses the known device type in referring to a look up table (LUT) stored in memory 307 or ROM 309 to determine a predefined processing delay for that radio type. *Id.* Alternatively, the processing delay d itself may be transmitted to local device 405 as part of the unique identifier received when linking the devices. *Id.*, [0125].

Local device 405 then calculates the round trip time T_{rt} for transmitting the distance-determining message to remote device 410_1 and receiving the corresponding response using the following formula in which t_1 is the transmit time of the distance-determining message, t_2 is the receive time of the corresponding response, and d is the processing delay for the remote device:

$$T_{rt}=t_2-t_1-d$$

Id., [0126]. Local device 405 then uses the calculated round trip time T_{rt} to compute the distance D to remote device 410_1 using the following formula in which *c* is the speed of light (e.g., the speed at which an RF signal travels through the wireless medium):

$$D = c \cdot \frac{T_{rt}}{2}$$

Id., [0127]-[0128].

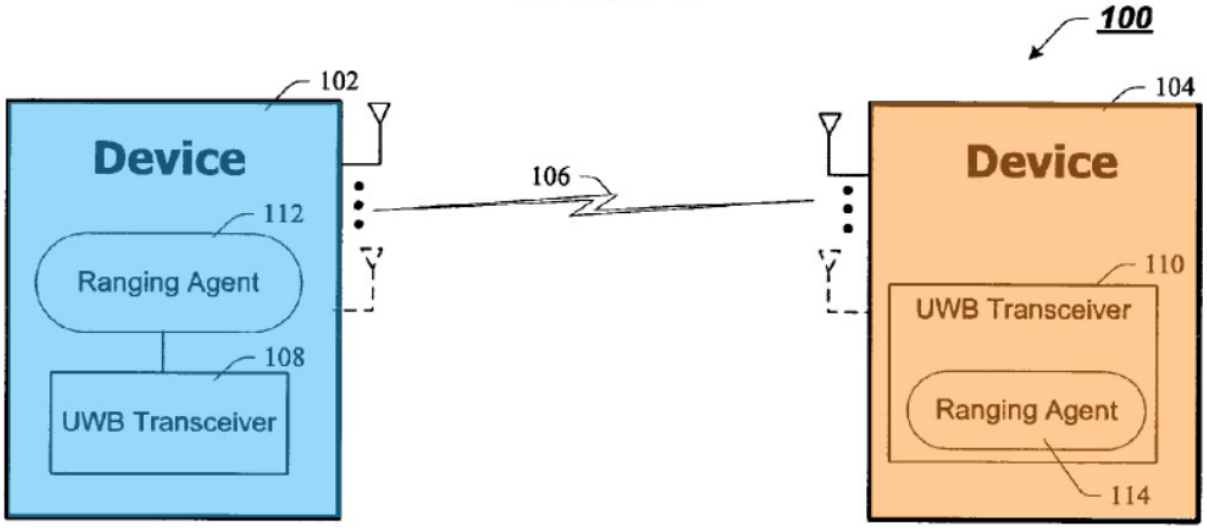
This process may be repeated to continually update the distances to the linked remote devices. *Id.*, [0145], [0152].

B. Leeper

Like the ’777 patent, *Leeper* is directed to a system for determining a location of a remote wireless device. EX1004, Abstract, 2:15-3:9, 4:22-64, 5:29-56, 6:56- 7:59, Figs. 1, 4. The reference is analogous art to the ’777 patent, as each discloses wireless communication systems in the same field of endeavor (location determination) and are pertinent to the problem of how to locate a remote wireless device. EX1001, Abstract; EX1004, Abstract, 2:15-3:9, 4:22-64, 5:29-56, 6:56-7:59, Figs. 1, 4; EX1002, ¶47.

As shown in annotated Figure 1 below, *Leeper* discloses two or more electronic devices 102 (blue), 104 (orange) that are connected through an UWB wireless communication channel 106. EX1004, 2:46-57. Each electronic device 102, 104 includes an UWB transceiver 108 with an associated antenna for transmitting and receiving UWB signals. *Id.*

FIG. 1



Each electronic device 102, 104 includes a ranging agent 112/114/200 for determining a range between the electronic devices 102, 104. *Id.*, 2:46-3:9, 4:22-39, Figs. 1, 2. Electronic device 102 sends and receives ranging messages to/from electronic device 104. *Id.*, 4:22-64. Based on this exchange of messages, a propagation delay is calculated based on the time it takes the messages to propagate between the devices. *Id.*, 6:66-7:7, 7:35-59. This propagation delay is used to calculate the distance between the electronic devices 102, 104. *Id.*, Abstract, 2:15- 3:9, 4:22-64, 6:66-7:7, 7:35-59. The exchanging of messages between the devices may be repeated a number (N) of times and averaged to reduce errors. *Id.*, 5:29-56.

C. Tajima

Like the '777 patent, *Tajima* is directed to a system for determining a location of a wireless mobile apparatus. EX1006, Abstract, Figs. 1, 3. This reference is analogous art to the '777 patent, as each discloses wireless communication systems in the same field of endeavor (location determination) and are pertinent to the problem of how to locate a remote wireless device. EX1001, Abstract; EX1006, Abstract, 5:5-17, 5:28-68, 6:35-39, 7:15-38, 10:37-55, Figs. 1, 3, 4; EX1002, ¶58.

Tajima discloses fixed radio apparatus 1 and mobile radio apparatus 2. *Id.*, 5:5-17. Fixed radio apparatus 1 has a transmission/reception unit 4 for sending and receiving signals from mobile radio apparatus 2. *Id.* Fixed radio apparatus 1 also includes measuring unit 5 for measuring the propagation distance and direction to mobile radio apparatus 2. *Id.*, 5:5-17, 5:43-68.

Transmission/reception unit 4 of fixed radio apparatus 1 has non-directional antenna 11 and directional antenna 12. *Id.*, 5:28-34, 6:35-39, Fig. 4. When the radio wave sent in reply by mobile radio apparatus 2 is received by non-directional antenna 11 and directional antenna 12, fixed radio apparatus uses the reception level from the two antennas to determine the direction to mobile radio apparatus 2. *Id.*, 7:15- 38, 10:37-55, Fig. 4.

VI. THE CHALLENGED CLAIMS ARE UNPATENTABLE[1]

A. Grounds 1-5: Claims 1, 6-9, 12, 16-20, and 23-25 are anticipated by *McCorkle*, claims 1, 3, 5-9, 12, 14-20, and 22-25 are obvious over *McCorkle*, claims 1-3 and 5-25 are obvious over *McCorkle* in view of *Leeper*, claims 3, 5, 14, 15, and 22 are obvious over *McCorkle* in view of *Tajima,* and claims 3, 5, 11, 14, 15, and 22 are obvious over *McCorkle* and *Leeper* in further view of *Tajima*

1. Claim 1

[1.0] A wireless communications system, comprising:

To the extent limiting, *McCorkle* discloses, or at least renders obvious, the preamble. As shown in annotated Figure 4 below, *McCorkle* discloses a wireless network 400 in which a plurality of wireless devices (e.g., local device 405 (blue) and remote devices 410_1-410_N (orange)) may exchange information. EX1003, [0098]. The local and remote devices communicate over a wireless local area network (WLAN)

[1] Unless otherwise specified, all **bold** emphasis below has been added. Text in *italics* is used to signify claim language, while reference names are also *italicized*.

as well as through ultrawideband (UWB) links. *Id.*, [0098]-[0105], [0113]-[0118], [0120]-[0128].

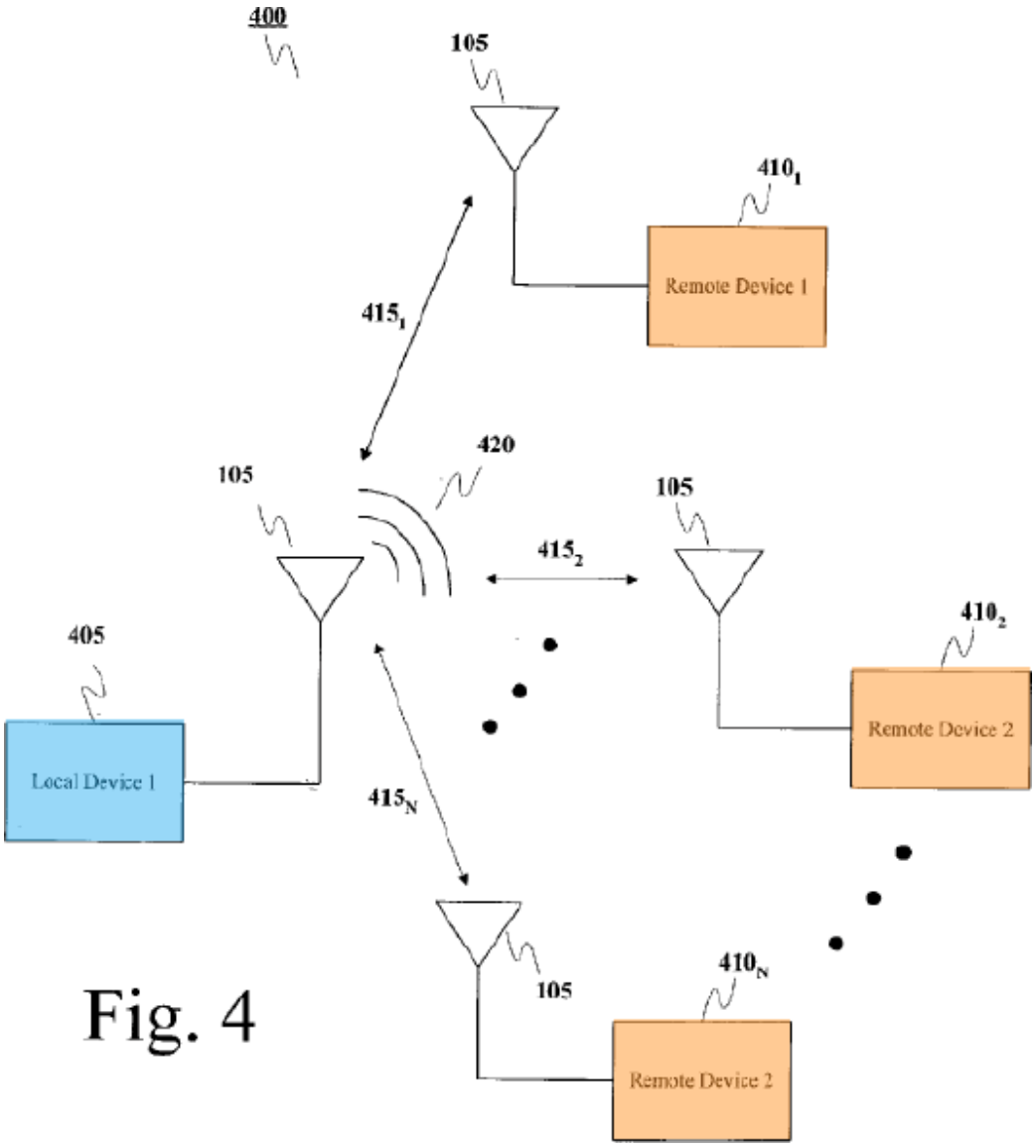


Fig. 4

[1.1] a plurality of wireless communications devices each having a device type associated therewith from among a plurality of different device types, and each device type having a known device latency associated therewith; and

McCorkle discloses, or at least renders obvious, [1.1]. *McCorkle* discloses a *plurality of wireless communications devices* (e.g., remote devices 410_1-410_N (highlighted in orange in Figure 4 above for [1.0])). EX1003, [0098]. For example, remote devices 410_1-410_N may be *wireless communications devices* such as mobile telephones. *Id.*, [0100].

McCorkle discloses that each remote device 410_1-410_N sends "information about the radio type of the remote device" to local device 405. *Id.*, [0124]. Radio types widely used in mobile telephones at the time of the assumed priority date include, for example, CDMA (code division multiple access) and TDMA (time division multiple access)/GSM (global system for mobiles). EX1003, [0103]-[0104] (citing EX1015 (IEEE Standard)); EX1002, ¶42 (citing EX1018). In addition, radio types for laptops and PDAs at the time would have included WiFi (IEEE Standard 802.11b). EX1002, ¶42 (citing EX1019 and EX1020). Thus, a POSITA wouldhave understood, or at least found obvious, that the claimed associated *device type* is taught by *McCorkle's* remote device 410_1-410_N each having an associated radio type (e.g., CDMA devices, TDMA/GSM devices, and/or WiFi devices). EX1002, ¶42.

This received radio type is used by local device 405 to refer to a look up table (LUT) stored in memory to determine a predefined processing delay associated with that radio type. EX1003, [0124]. A POSITA would have understood, or at least found obvious, that *McCorkle* describes *a plurality of different device types* because the LUT would include more than one radio type corresponding to, for example, CDMA devices, TDMA/GSM devices, and/or WiFi devices and each radio type having an associated predefined processing delay. EX1002, ¶43. For example, a POSITA would have considered cell phones as CDMA devices or TDMA/GSM devices and laptops and PDAs as WiFi devices. EX1003, [0103]-[0104] (citing EX1015 (IEEE Standard)); EX1002, ¶43 (citing EX1018; EX1019; EX1020). A POSITA would have understood, or at least found obvious, that a LUT is used where there are multiple radio types to look up. EX1002, ¶43. That is, a table would not be needed if each of the remote devices had the same *device type*. *Id.*

McCorkle further discloses that each of the device types is associated with a known predefined processing delay that is in the LUT. EX1003, [0124]. This processing delay is the "time delay between the remote device receiving the distance determining message and transmitting a response and includes at least the amount of time necessary for the remote device to process the distance determining message and form a response." *Id.*, [0123]. This known processing delay corresponds to the claimed *known device latency*. In particular, the '777 patent describes *latency* as "the time [it takes] to process a received signal and generate an acknowledgement reply

thereto." EX1001, 5:14-19. The '777 patent further describes that the *known device latency* is a "mean latency" for a "given device type" and "provides a close approximation of the actual device latency." *Id.*, 5:13-16.

Thus, *McCorkle* discloses, or at least renders obvious, *that a plurality of wireless communications devices* (e.g., remote devices 410_1-410_N) *each having a device type associated therewith* (e.g., radio type of each of the remote devices 410_1-410_N) *from among a plurality of different device types* (e.g., the plurality of device types listed in the LUT)*, and each device type having a known device latency associated therewith* (e.g., processing delay associated with a particular device type).

[1.2] a wireless device locator comprising

McCorkle discloses, or at least renders obvious, [1.2]. As discussed for [1.1], *McCorkle* discloses a local device 405 (highlighted in blue in Figure 4 above for [1.0]) that communicates with remote devices 410_1-410_N. EX1003, [0098]. Local device 405 is configured to determine a distance to remote devices 410_1-410_N and corresponds to the claimed *wireless device locator*. *Id.*, [0098]-[0105] (describing devices in network), [0113]-[0118] (describing process for establishing unique links between a local device and respective remote devices), [0118]-[0128] (describing process for determining distance between the local device and one of the linked remote devices), Figs. 4, 6. 7.

[1.3] at least one antenna and a transceiver connected thereto, and

McCorkle discloses, or at least renders obvious, [1.3]. As discussed for [1.2], local device 405 corresponds to the claimed *wireless device locator*. *McCorkle* discloses that local device 405 includes a UWB transceiver that transmits and receives a UWB signal 420 via a UWB antenna such as antenna 105. EX1003, [0101], Fig. 4; *see also id.*, [0044]-[0050] (describing antenna and receiving of signal) [0051]-[0059] (describing transceiver in detail), [0060]-[0068] (describing tracking correlators of transceiver).

[1.4] a controller for cooperating with said transceiver for transmitting a plurality of location finding signals to a target wireless communications device from among said plurality of wireless communications devices;

McCorkle discloses, or at least renders obvious, [1.4]. As discussed for [1.2], local device 405 corresponds to the claimed *wireless device locator*. As also discussed for [1.3], local device 405 includes a UWB transceiver that transmits and receives a UWB signal 420 via an UWB antenna such as antenna 105. *McCorkle* discloses that local device 405 includes a processor system/unit 301 (annotated in red in Figure 3 below). EX1003, [0120]. This processor unit corresponds to the claimed *controller*.

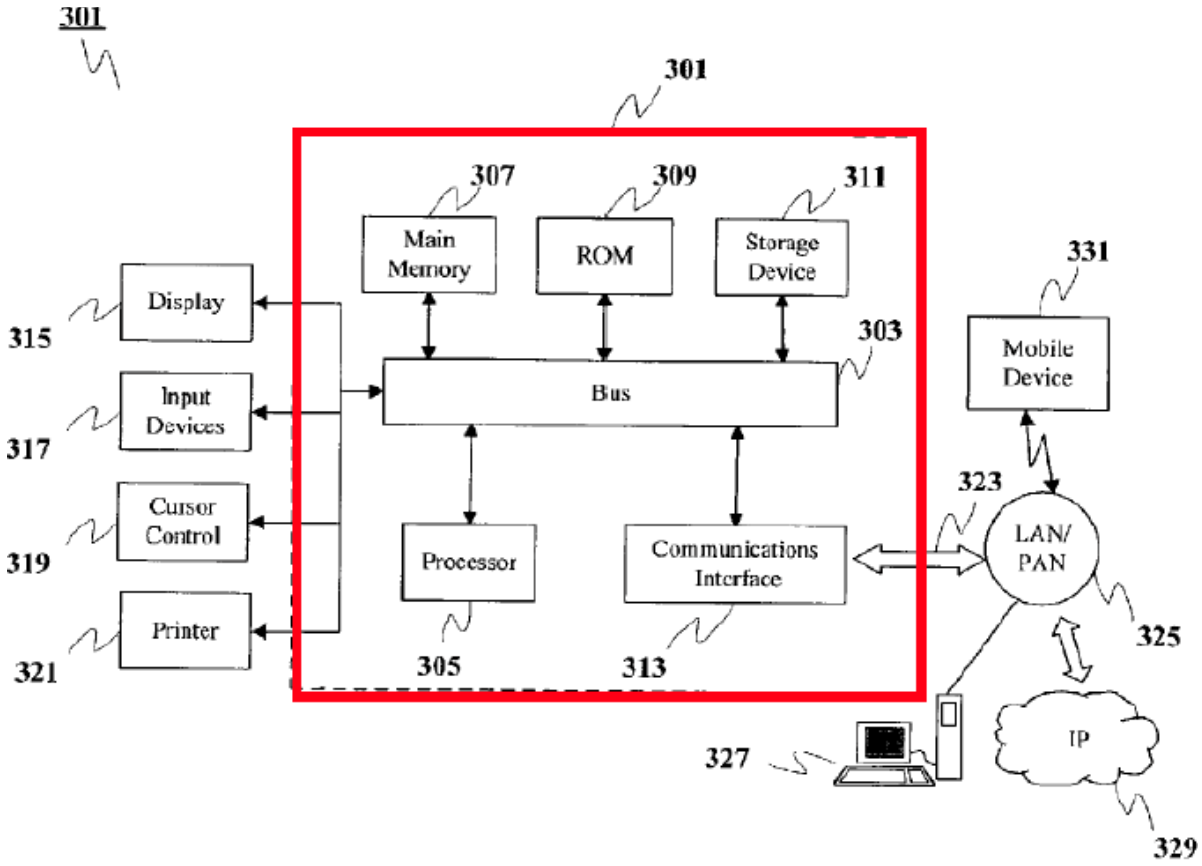


Fig. 3

The processor unit 301 is connected to a communication interface 313 including the UWB transceiver. *Id.*, [0069], [0086]. Processor unit 301 includes software for performing the processing performed in implementing *McCorkle*'s distance measuring system using UWB transmission. *Id.*, [0080]. This processing includes the local device generating a distance-determining message and sending, using its UWB transceiver, the message to each of the linked remote devices 410_1- 410_N, as shown in step 701 (highlighted in green) in Figure 7 below. *Id.*, [0101], [0118].

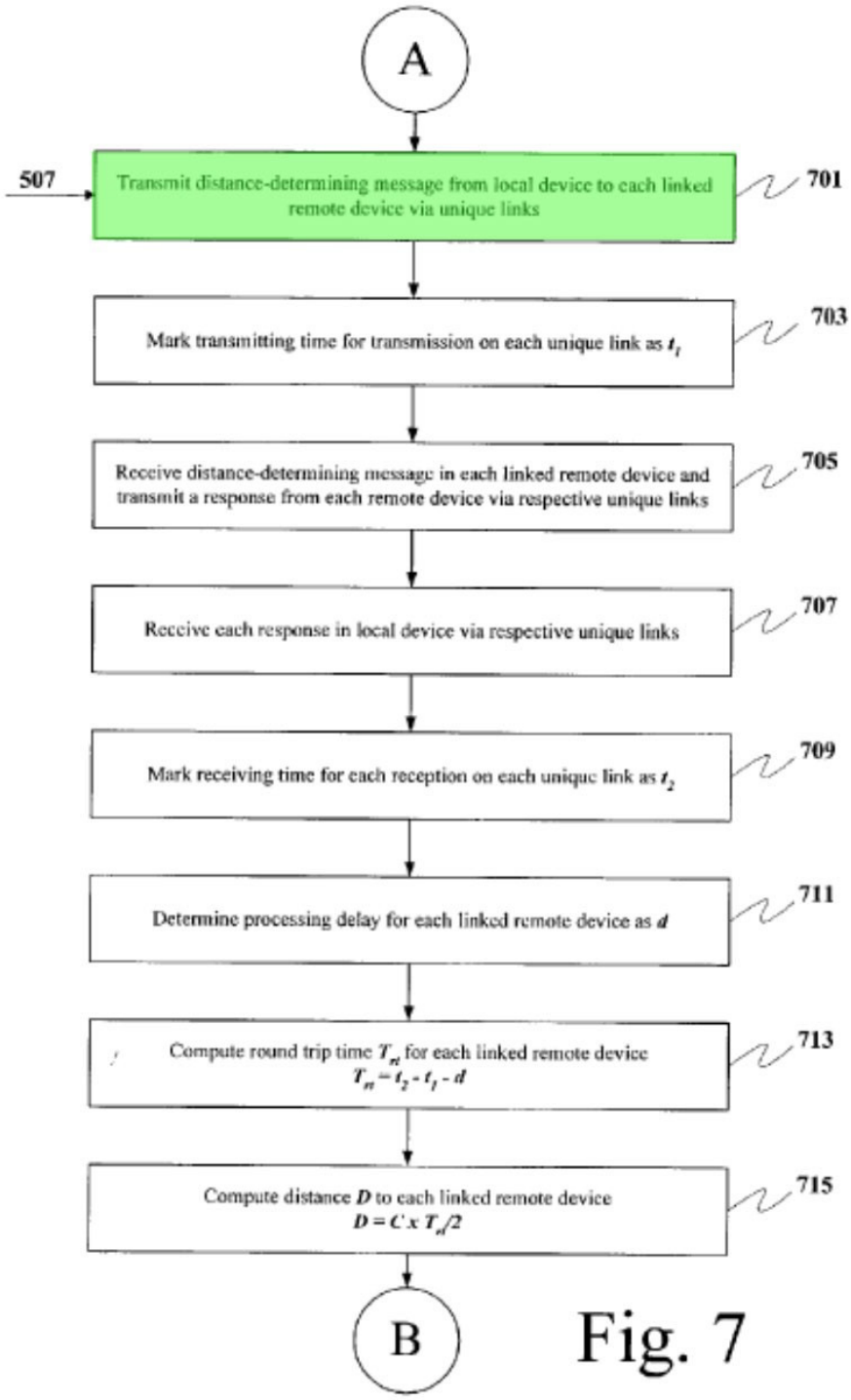

A
507
Transmit distance-determining message from local device to each linked remote device via unique links
701
Mark transmitting time for transmission on each unique link as t_1
703
Receive distance-determining message in each linked remote device and transmit a response from each remote device via respective unique links
705
Receive each response in local device via respective unique links
707
Mark receiving time for each reception on each unique link as t_2
709
Determine processing delay for each linked remote device as d
711
Compute round trip time T_n for each linked remote device
$T_n = t_2 - t_1 - d$
713
Compute distance D to each linked remote device
$D = C \times T_n/2$
715
B

Fig. 7

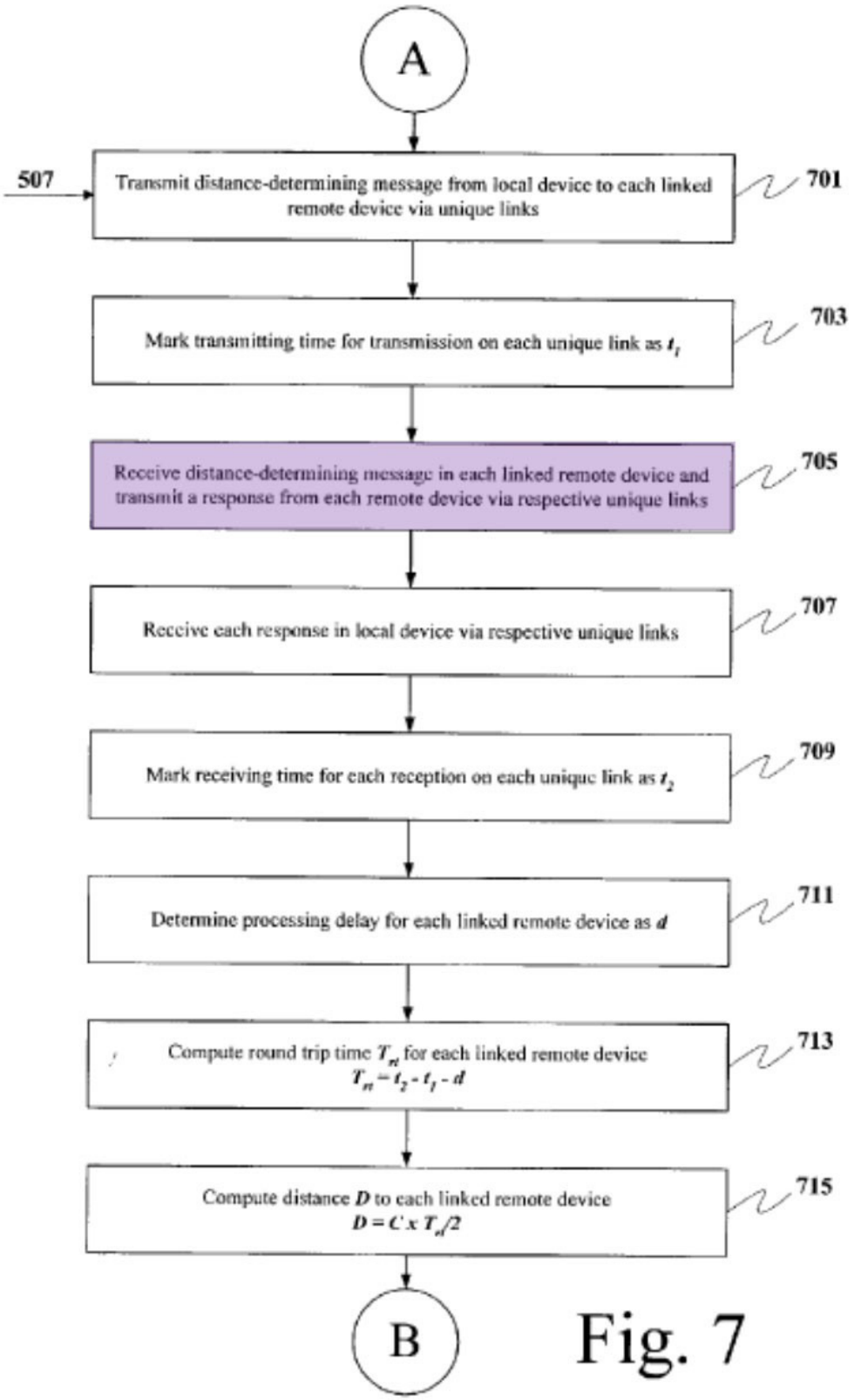
McCorkle discloses that the system continually updates the location of each remote device. *Id.*, [0140], [0145], [0152]. To make these continual updates, *McCorkle* discloses that its distance determining process is repeated as loop 507. *Id.*, [0110]-[0111], [0137], [0140], [0166], Figs. 5, 7. Therefore, a POSITA would have understood, or at least found obvious, that multiple distance-determining messages are sent to each remote device at least so that the location of the remote device can be continually updated. *Id*.; EX1002, ¶¶44-45. In particular, *McCorkle* describes that "a new distance-determining signal is sent to" the corresponding remote device so that the distance can be updated. EX1003, [0140].

Thus, *McCorkle* discloses, or at least renders obvious, *a controller* (e.g., processing unit 301 of local device 405) *for cooperating with said transceiver* (e.g., UWB transceiver of local device 405) *for transmitting a plurality of location finding signals* (e.g., distance-determining messages) *to a target wireless communications device* (e.g., remote device 410_1) *from among said plurality of wireless communications devices* (e.g., remote devices 410_1-410_N).

[1.5] said target wireless communications device transmitting a respective reply signal for each of said location finding signals;

McCorkle discloses, or at least renders obvious, [1.5]. As discussed for [1.4], local device 405 transmits *location finding signals* (e.g., distance-determining messages) to a *target wireless communications device* (e.g., remote device 410_1). *McCorkle* discloses that the remote device 410_1 receives the distance-determining

message and transmits a response to the local device 405, as shown in step 705 (highlighted in purple) in Figure 7 below. EX1003, [0121]. A POSITA would have understood, or at least would have found obvious, that this occurs for each distance-determining message that is received. *Id.*, [0145], [0152]; EX1002, ¶¶44-45. This is because *McCorkle* describes that its distance-determining process (shown in Figure 7) is repeated in loop 507 to update the determined distance to the remote device. EX1003, [0110]-[0111], [0137], [0140], [0166], Figs. 5, 7. In particular, each transmission of a distance-determining message (step 701) begins loop 507 and each transmission of the distance-determining message by local device 405 is followed by receipt of that message by remote device 410_1 (step 705). *Id.*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701
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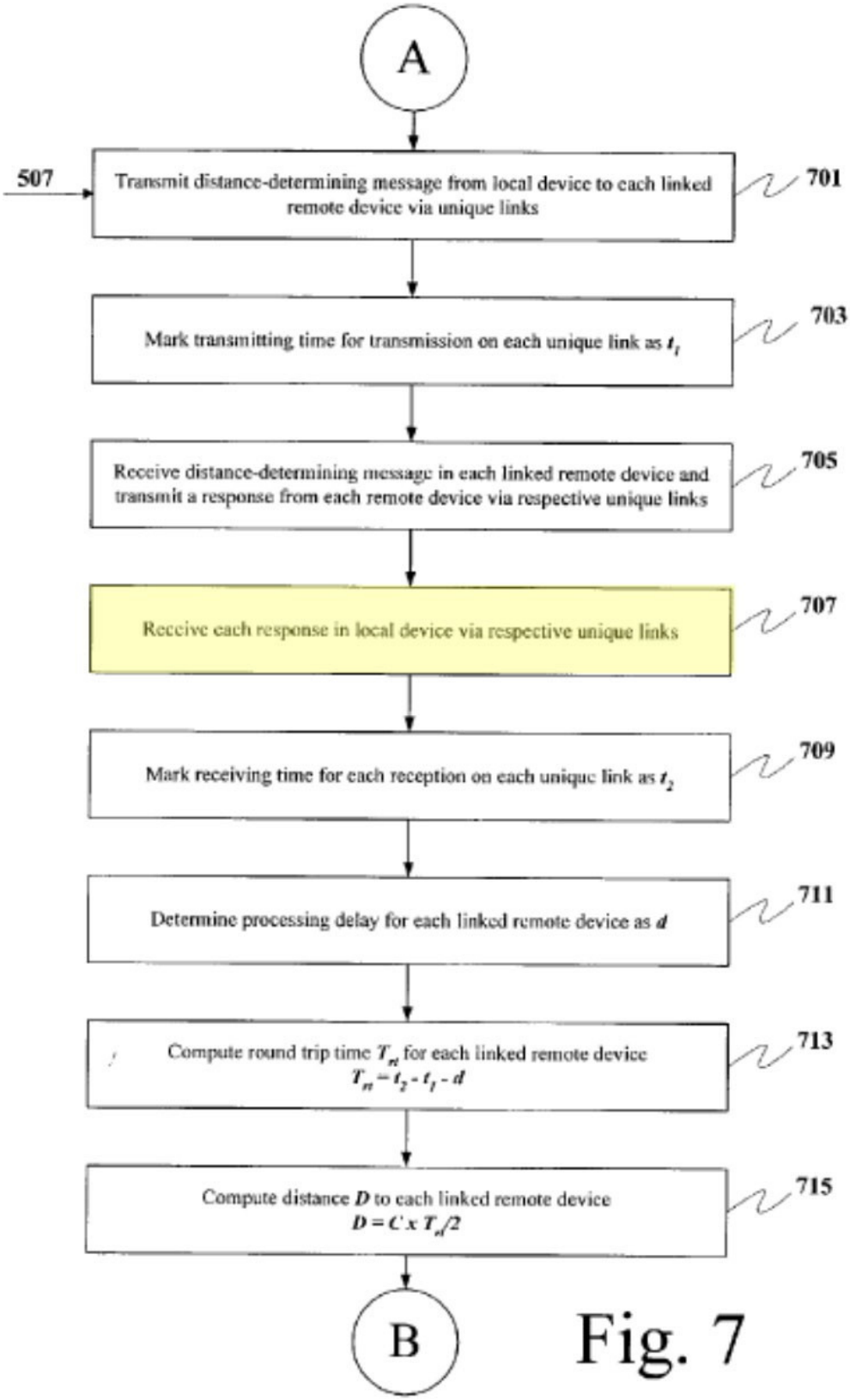
705
Receive each response in local device via respective unique links
707
Mark receiving time for each reception on each unique link as t_2
709
Determine processing delay for each linked remote device as d
711
Compute round trip time T_n for each linked remote device
$T_n = t_2 - t_1 - d$
713
Compute distance D to each linked remote device
$D = C \times T_n/2$
715
B

Fig. 7

Thus, *McCorkle* discloses, or at least renders obvious, *said target wireless communications device* (e.g., remote device 410_1) *transmitting a respective reply signal* (e.g., response) *for each of said location finding signals* (e.g., distance-determining messages).

[1.6] said controller of said wireless device locator also for cooperating with said transceiver for receiving the reply signals,

McCorkle discloses, or at least renders obvious, [1.6]. As discussed for [1.4], processor unit 301 of local device 405 includes software for performing the processing performed in implementing *McCorkle*'s distance measuring system using UWB transmission. *Id.*, [0080]. This processing also includes processor unit 301 receiving the responses, using UWB transceiver, from each of the linked remote devices 410_1-410_N, as shown in step 707 (highlighted in yellow) in Figure 7 below. *Id*., [0101], [0122]-[0125]. In particular, processor unit 301 performs the processing steps described in *McCorkle*, which includes using the received responses to determine the distance to the remote device. *Id.*, [0079]-[0080], [0118]-[0128].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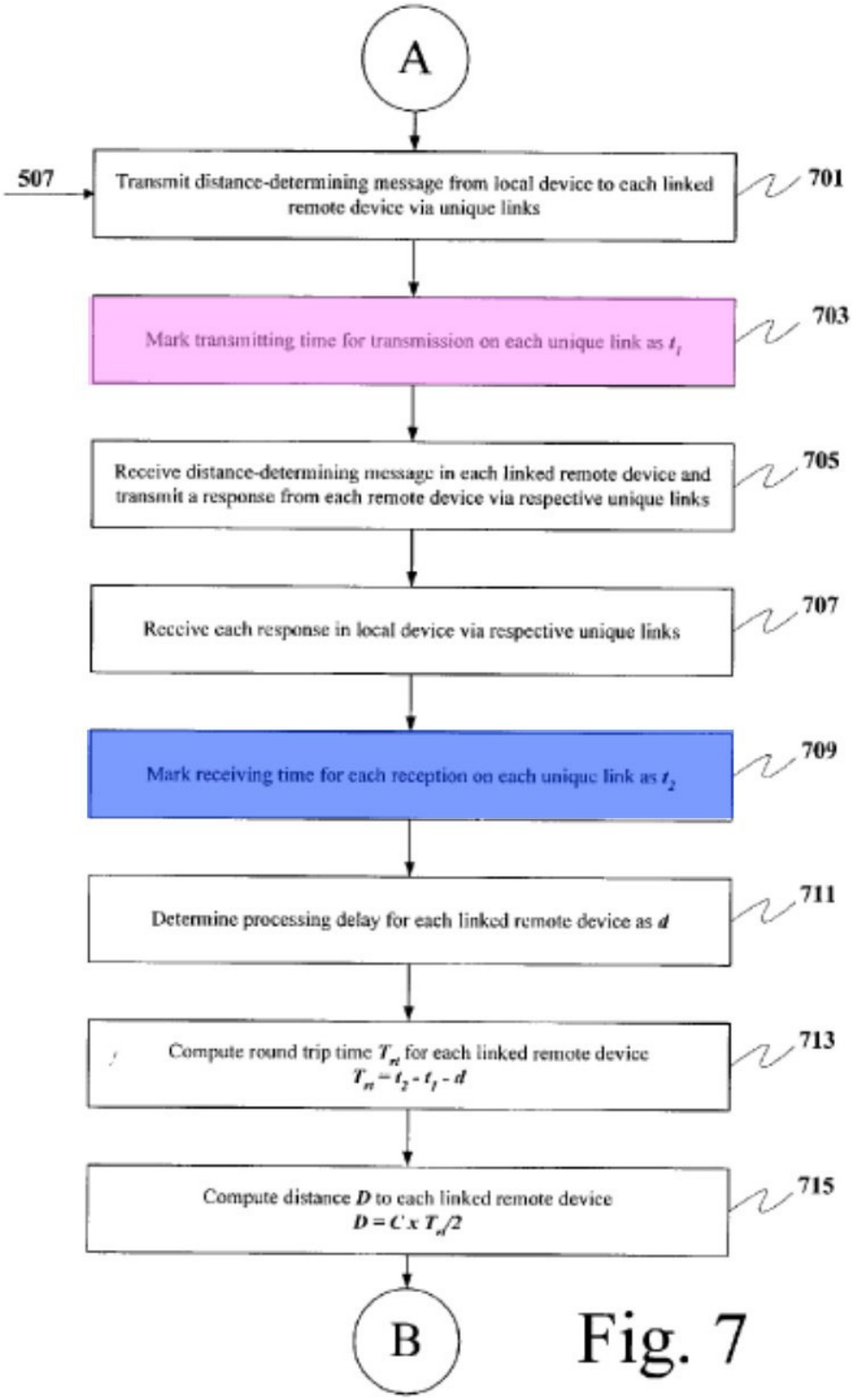
Receive each response in local device via respective unique links
707
Mark receiving time for each reception on each unique link as t_2
709
Determine processing delay for each linked remote device as d
711
Compute round trip time T_n for each linked remote device
$T_n = t_2 - t_1 - d$
713
Compute distance D to each linked remote device
$D = C \times T_n/2$
715
B

Fig. 7

Thus, *McCorkle* discloses, or at least renders obvious, *said controller of said wireless device locator* (e.g., processing unit 301 of local device 405) *also for cooperating with said transceiver* (e.g., UWB transceiver of local device 405) *for receiving the reply signals* (e.g., responses).

[1.7] determining a propagation delay associated with the transmission of each location finding signal and the respective reply signal therefore based upon the known device latency of said target wireless communications device, and

McCorkle discloses, or at least renders obvious, [1.7]. As discussed for [1.4], processor unit 301 of local device 405 includes software for performing the processing performed in implementing *McCorkle*'s distance measuring system using UWB transmission. *Id.*, [0080]. This processing also includes the local device 405 performing the following determinations based on obtained data. *Id.*, [0120]-[0127], Fig. 7. As discussed for [1.5] and [1.6], *McCorkle* discloses sending a distance-determining message from local device 405 to remote device 410_1 and receiving a response back from remote device 410_1. When local device 405 transmits the distance-determining message, the transmit time t_1 is obtained by a system clock in processing unit 301 of local device 405 and is stored in main memory 307 of local device 405, as shown step 703 (highlighted in pink) in Figure 7 below. EX1003, [0120]. When local device 405 receives the response from remote device 410_1, local device 405 similarly obtains and stores the receive time t_2, as shown in step 709 (highlighted in dark blue) in Figure 7 below. *Id.*, [0122].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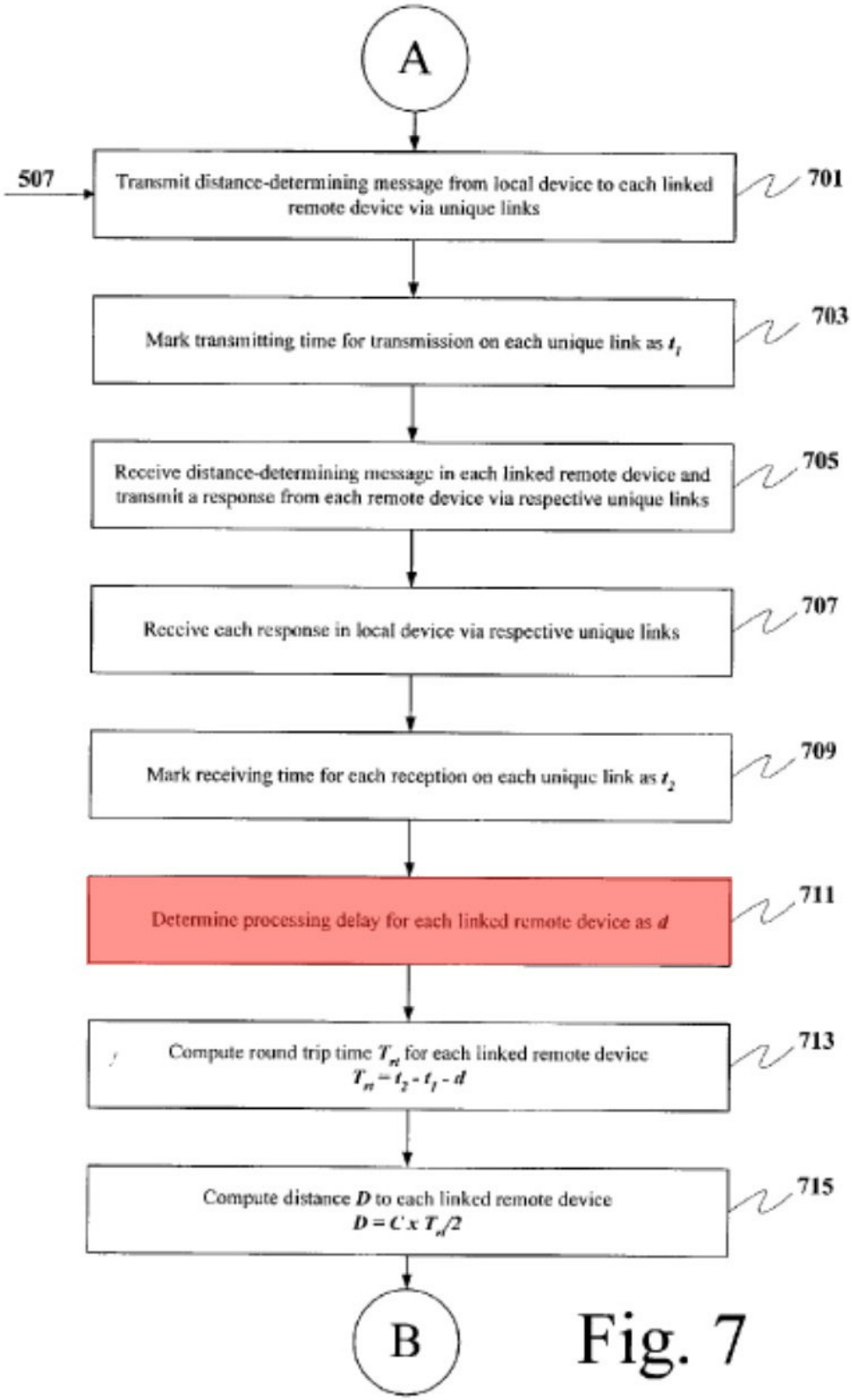
709
Determine processing delay for each linked remote device as d
711
Compute round trip time T_n for each linked remote device
$T_n = t_2 - t_1 - d$
713
Compute distance D to each linked remote device
$D = C \times T_n/2$
715
B

Fig. 7

Local device 405 receives information from remote device 410_1 providing the radio type of remote device 410_1. *Id.*, [0124]. This information may be included in the response or as part of a separate signal sent by remote device 410_1. *Id.* Once local device 405 knows the device type of remote device 410_1, local device 405 refers to the LUT table stored in memory 307 or ROM 309 of known processing delays for particular device types to determine the processing delay d for remote device 410_1, as shown in step 711 (highlighted in red) in Figure 7 below. *Id.*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Determine processing delay for each linked remote device as d
711
Compute round trip time T_n for each linked remote device
$T_n = t_2 - t_1 - d$
713
Compute distance D to each linked remote device
$D = C \times T_n/2$
715
B

Fig. 7

Local device 405 uses the transmit time t_1, receive time t_2, and the processing delay d of remote device 410_1 to determine the round trip time T_{rt} of the signals to remote device 410_1 using the formula $T_{rt} = t_2 - t_1 - d$, as shown in step 713 (highlighted in dark green) in Figure 7 below. *Id.*, [0126].

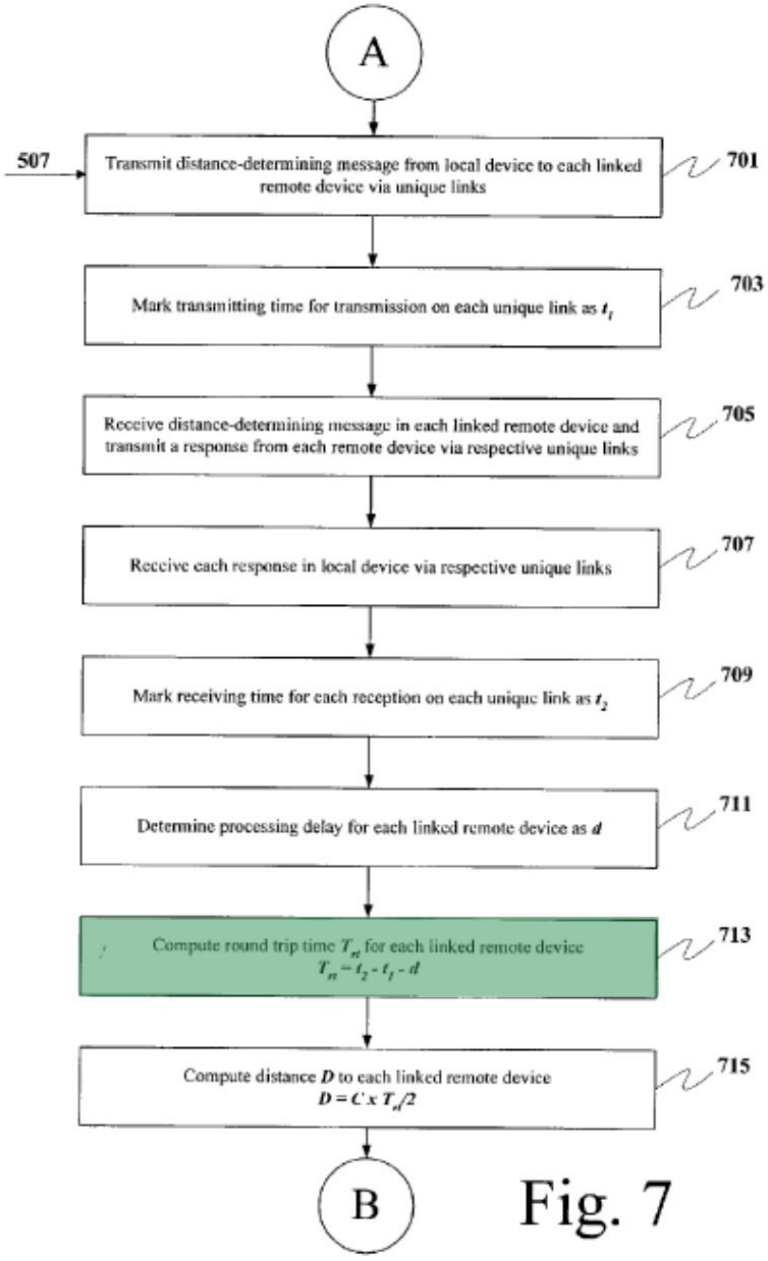
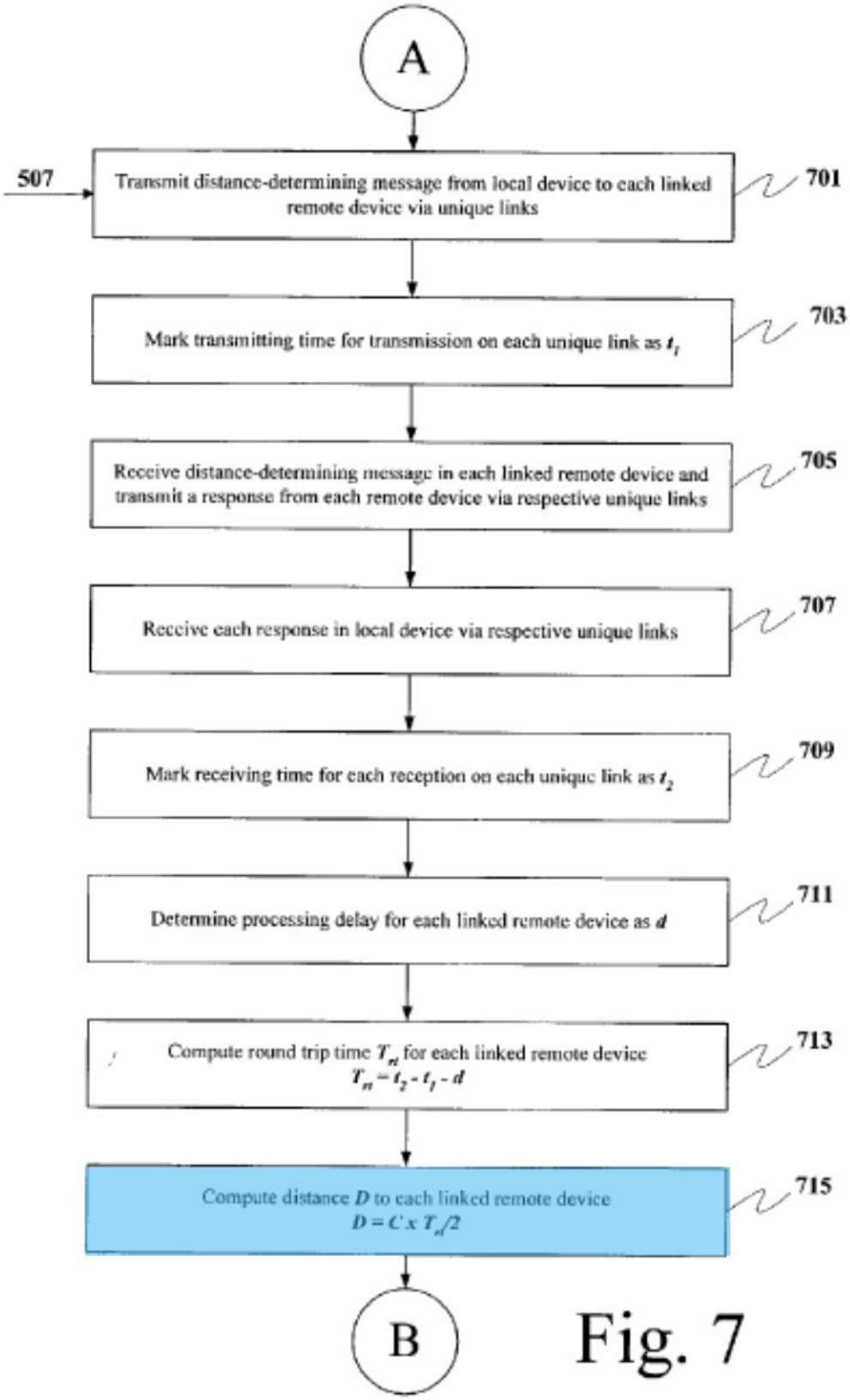


Fig. 7

This round trip time corresponds to the claimed *propagation delay*. For example, the '777 patent describes that the total propagation delay is: t_{PD1} (the time is takes for the location finding signal to travel from the wireless device locator 32 to the target device 34) + t_{PD2} (the time is takes for the reply signal 46 to travel from the target device 34 to the wireless device locator 32). EX1001, 6:60-7:36.

To the extent Speir argues that the claimed *propagation delay* corresponds to half the total propagation delay, *McCorkle* discloses dividing the round trip time, T_{rt}, in half to calculate the distance to the remote device using the formula $D = c \times T_{rt}/2$, as shown in step 715 (highlighted in blue) in Figure 7 below. EX1003, [0127].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Determine processing delay for each linked remote device as d
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$T_n = t_2 - t_1 - d$
713
Compute distance D to each linked remote device
$D = C \times T_n/2$
715
B

Fig. 7

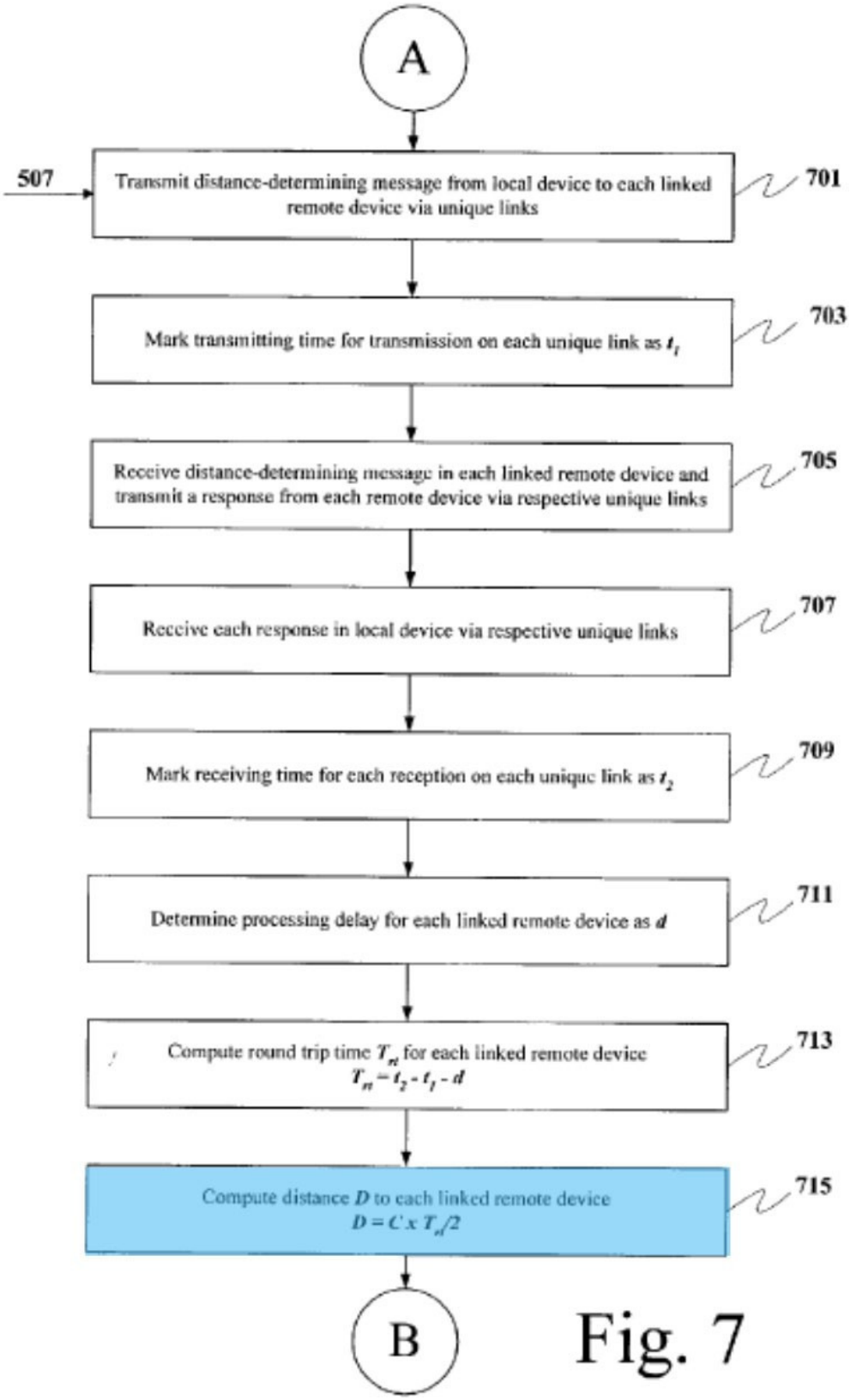
This is similar to the disclosure of the '777 patent which describes "[d]ividing the total propagation delay by two (since both propagation delays may be considered equal or substantially equal for a stationary or relatively slow moving target 34) and multiplying this by the speed of light gives the estimated distance to the target 39, based upon a single propagation delay associated with the signal pair 45, 46." EX1001, 7:21-36.

McCorkle discloses that multiple distance-determining messages are sent to each remote device at least so that the location of the remote device can be continually updated. *Id.*, [0145], [0152]. The process shown in Figure 7 is repeated as loop 507 such that the propagation delay is calculated for each distance- determining message transmitted and corresponding response received so that the distance can be continually calculated. *Id.*, [0110]-[0111], [0137], [0140], [0166], Figs. 5, 7.

Thus, *McCorkle* discloses, or at least renders obvious, that the *controller* (e.g. processing unit 301) *determin[es] a propagation delay* (e.g., T_{rt} or $T_{rt}/2$) *associated with the transmission of each location finding signal* (e.g., distance-determining messages) *and the respective reply signal* (e.g., respective response) *therefore based upon the known device latency of said target wireless communications device* (e.g., known processing delay d determined from LUT based on radio type of the remote device is used in the calculation to determine T_{rt} or $T_{rt}/2$).

[1.8] estimating a range to the target wireless communications device based upon a plurality of determined propagation delays.

McCorkle alone discloses, or at least renders obvious, [1.8], or, in the alternative, *McCorkle* in view of *Leeper* renders obvious [1.8]. As discussed for [1.4], processor unit 301 of local device 405 includes software for performing the processing performed in implementing *McCorkle*'s distance measuring system using UWB transmission. *Id.*, [0080]. This processing also includes the local device 405 performing the following determinations based on obtained data. *Id.*, [0120]-[0127], Fig. 7. As discussed for [1.7], *McCorkle* discloses determining a propagation delay for each of the distance-determining messages and corresponding responses sent between local device 405 and remote device 410_1. *McCorkle* further discloses using these propagation delays to calculate distances to remote device 410_1 from local device 405 using the formula $D = c \times T_{rt}/2$, as shown in step 715 (highlighted in blue) in Figure 7 below. EX1003, [0127].


A
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Transmit distance-determining message from local device to each linked remote device via unique links
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Determine processing delay for each linked remote device as d
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Compute round trip time T_n for each linked remote device
$T_n = t_2 - t_1 - d$
713
Compute distance D to each linked remote device
$D = C \times T_n/2$
715
B

Fig. 7

Thus, *McCorkle* discloses, or at least renders obvious, that the *controller* (e.g., processing unit 301) *estimate[es] a range to the target wireless communications device* (e.g., distance to remote device 410_1) *based upon a plurality of determined propagation delays* (e.g., distance is calculated for each of the determined round trip times, T_{rt}).

To the extent Speir argues that the claimed *estimating* requires that a single range be determined based on multiple calculated propagation delay, this would have been rendered obvious over *McCorkle* as modified by *Leeper*. Like *McCorkle*, *Leeper* discloses determining a distance or range between two wireless communication devices by sending and receiving signals between the devices and determining a propagation delay of the signals. EX1004, 2:15-3:9 (describing computation of ranging agent), 4:22-64, (describing operation of ranging agent) 6:66-7:7 (describing ranging message), 7:35-59 (describing propagation delay calculation), Fig. 1. Furthermore, *Leeper* also discloses that "the process of exchanging messages between the devices may be repeated a number (N) of times and averaged" to reduce errors. *Id.*, 5:34-52.

A POSITA would have been motivated to combine the teachings of *McCorkle* with those of *Leeper* with a reasonable expectation of success. First, the references are analogous art to the '777 patent (and each other), as each discloses wireless communication systems in the same field of endeavor (location determination) and

are pertinent to the problem of how to locate a remote wireless device. EX1001, Abstract; EX1003, Abstract, [0098]-[0105], [0118]-[0128], Figs. 4, 7; EX1004, Abstract, 2:15-3:9, 4:22-64, 6:66-7:7, 7:35-59, Fig. 1; EX1002, ¶¶46-47.

Second, combining the teachings of *McCorkle* with *Leeper* would have been no more than the combination of prior art elements according to known methods to yield predictable results. A POSITA reading *McCorkle* would have looked for known ways to make the distance determinations between its wireless devices more accurate. EX1002, ¶48. A POSITA would have understood that using *Leeper*'s averaging of multiple calculated propagation delays would have been a beneficial modification to *McCorkle*'s distance-determining system because *Leeper* describes that using the average of multiple calculated propagation delays reduces errors that may occur in the distance calculation. EX1004, 5:34-52; EX1002, ¶48. A POSITA would have understood that it would have been beneficial to send multiple distance- determining messages to calculate an averaged distance between the wireless communications devices based on the averaged propagation delay. EX1002, ¶48. This modification allows for an effective way of reducing errors that may occur from a single distance calculation that is inaccurate. *Id.* A POSITA would have been motivated to implement *Leeper*'s use of averaging with *McCorkle*'s distance- determining system to create a more accurate solution for distance determination between two wireless communications devices. *Id.*

Third, combining the teachings of *McCorkle* with *Leeper* would have been the use of a known technique to improve similar devices in the same way. The devices disclosed in *McCorkle* and *Leeper* are comparable systems. EX1003, Abstract, [0098]-[0105], [0118]-[0128], Figs. 4, 7; EX1004, Abstract, 2:15-3:9, 4:22-64, 6:66-7:7, 7:35-59, Fig. 1. A POSITA would have had a reasonable expectation of success at least because using averages in calculations was well known, and *Leeper* describes the process that would have been beneficial to repeat and average. EX1002, ¶49; EX1004, 5:34-52. *Leeper* describes to a POSITA how to implement averaging in a distance-determining system like *McCorkle*'s. EX1002, ¶49. Both *McCorkle* and *Leeper* disclose calculating propagation delays of signals sent between electronic devices to determine a distance between those devices. EX1003, Abstract, [0098]-[0105], [0118]-[0128], Figs. 4, 7; EX1004, Abstract, 2:15-3:9, 4:22-64, 6:66-7:7, 7:35-59, Fig. 1.

To the extent *Leeper* is interpreted as disclosing averaging the calculated distances instead of the calculated propagation delays that is a difference from the claim, but both in the claim and specification of the '777 patent as well as in *Leeper* the end result is that an average distance is calculated. EX1001, 7:47-65, 11:9-14; EX1003; EX1002, ¶¶50-52. A POSITA would have understood that both calculations (i.e., (1) calculating multiple distances based on the calculated propagation delays and then averaging the calculated distances and (2) averaging the calculated propagation delays and then calculating the average distance based on the averaged propagation

delays) would obtain the same end result (i.e., an average distance). EX1002, ¶¶50-52. Because there are limited options to try to average in the equation, it would have at least been obvious to try averaging the calculated propagation delays before calculating the distance with a reasonable expectation of success. *Id.*; *KSR Int'l. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007). Here, *Leeper*'s disclosure at least renders obvious averaging the calculated propagation delays because mathematically a POSITA would have recognized that one equation is equivalent to the other and there are a finite number of ways to calculate an average distance. EX1002, ¶¶50-52. The Supreme Court has held that a patent claiming a process having a step completed at a particular time during the process is rendered invalid by prior art that completes that same step at a different time during the process. *Miller v. Foree*, 116 U.S. 22, 27-28 (1885). The Federal Circuit has similarly held claims invalid when the prior art does steps in a different order, but results in the same product. *In re Aspen Aerogels, Inc.*, 835 Fed. Appx. 587, 589 (Fed. Cir. 2020).

Thus, *McCorkle*'s system as modified by *Leeper* to include taking an average of multiple propagation delay determinations to estimate the distance renders obvious that the *controller* (e.g., processing unit 301) *estimat[es] a range to the target wireless communications device* (e.g., average distance to remote device 410_1) *based upon a plurality of determined propagation delays* (e.g., multiple determined round trip times T_{rt} from repeated message exchanges between local device 405 and remote device 410_1).

2. Claim 2

[2.0] The wireless communications system of claim 1 wherein said controller estimates the range based upon an average of the propagation delays.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 1. *McCorkle* in view of *Leeper* renders obvious the additional elements of [2.0], for the reasons discussed for [1.8] where it was demonstrated that *McCorkle* system as modified by *Leeper* to include taking an average of multiple propagation delay determinations to estimate the distance renders obvious that the *controller* (e.g., processing unit 301) *estimates the range* (e.g., average distance to remote device 410_1) *based upon an average of the propagation delays* (e.g., an average of multiple determined round trip times T_{rt} from repeated message exchanges between local device 405 and remote device 410_1).

3. Claim 3

[3.0] The wireless communications system of claim 1 wherein said at least one antenna comprises a plurality of antennas; and

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 1. *McCorkle* alone, or in view of *Tajima*, renders obvious the additional elements of [3.0]. *McCorkle* discloses that antenna 105 may include separate transmitting and receiving antennas (e.g., *a plurality of antennas*). EX1003, [0045], [0052]. In addition, it would have been obvious to a POSITA that antenna 105 may include multiple antennas for determining a distance and a direction from local device 405 to remote device 410_1. EX1002, ¶53; EX1003, [0002], [0153]-[0157], Fig. 11;

EX1005, 31:19-47, Fig. 9. *McCorkle* discloses determining both a direction and a distance to remote device 410_1, as shown in Figure 11 below. EX1003, [0002], [0153]-[0157], Fig. 11. Local device 405 corresponds to the X indicating device 1101 and remote devices 410_1 to 410_N correspond to the remaining Xs indicating devices shown in Figure 11. *Id.*, [0153]-[0157], Fig. 11.

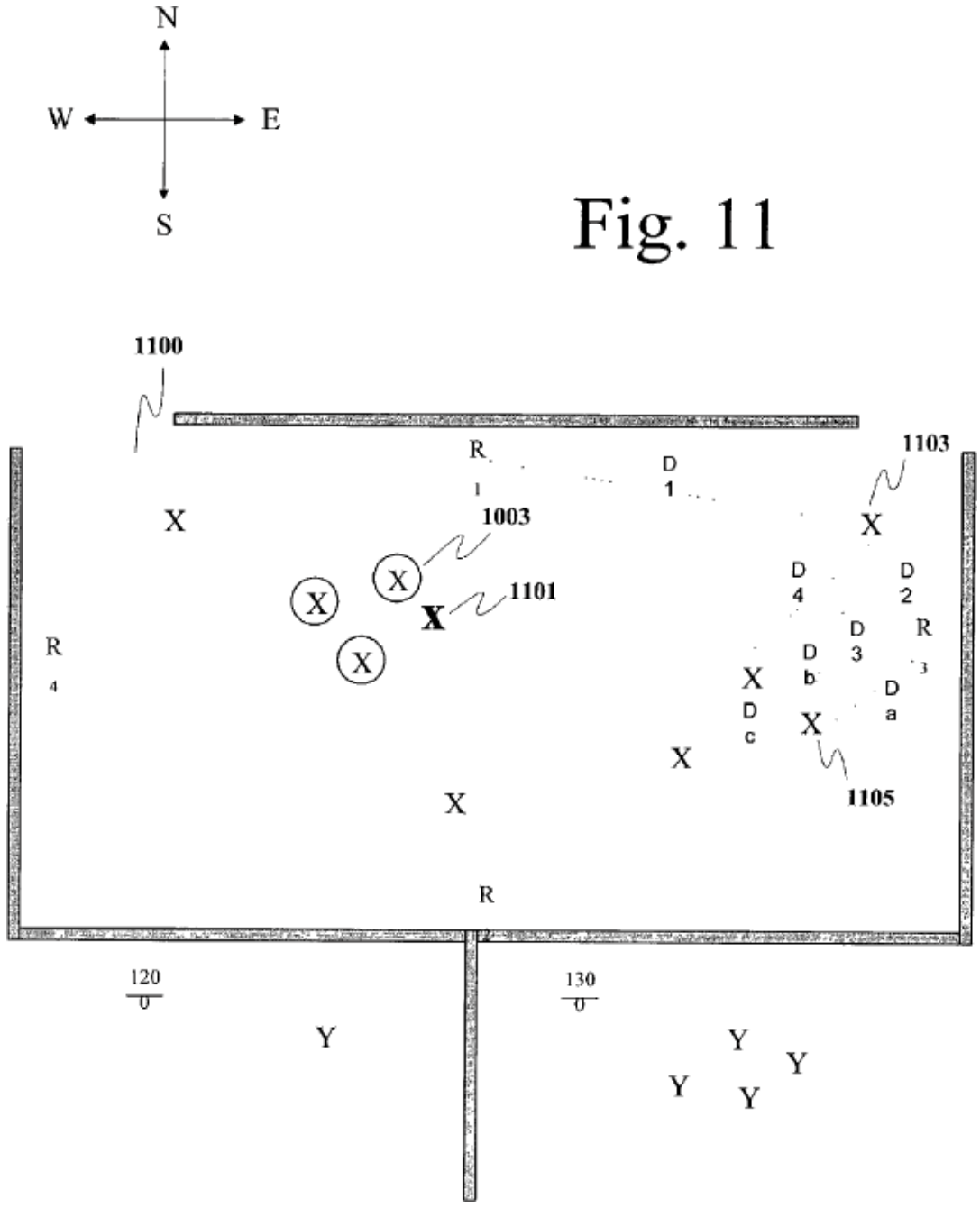

Fig. 11

It would have been obvious for a POSITA to look to related patents to *McCorkle* for determining what type and number of antennas to use for determining the distance and direction to the remote device. EX1002, ¶¶54-55. For example, it would have been obvious for a POSITA to look to U.S. Patent 7,058,414

("*Rofheart*") which is a parent to *McCorkle* and includes Figure 9 that corresponds to Figure 11 of *McCorkle*. *Compare* EX1005, Fig. 9 *with* EX1003, Fig. 11. *Rofheart* is also incorporated by reference into *McCorkle*. EX1003, [0001]. *Rofheart* describes multiple antennas on the local device that may be used to provide the relevant special information and resolve the distance. EX1005, 31:19-47, Fig. 9. For example, *Rofheart* discloses that this may be accomplished by using multiple antennas to receive the reply signal that produce a directional antenna pattern. *Id.* Thus, it would have been obvious to a POSITA to use multiple directional antennas to determine the distance and direction of remote devices from a local device as shown in Figure 11 of *McCorkle*. Thus, *McCorkle* renders obvious that *said at least one antenna* (e.g., antennas 105) *comprises a plurality of antennas* (e.g., multiple directional antennas).

To the extent Speir argues that *McCorkle* alone does not disclose or render obvious that *said at least one antenna comprises a plurality of antennas*, it would have been obvious to modify *McCorkle*'s local device 405 to include a plurality of antennas based on the teachings of *Tajima*. EX1002, ¶¶56-57. Like *McCorkle*, *Tajima* discloses determining a distance and direction to a remote wireless device. EX1003, Abstract, 5:5-17, Figs. 1, 3, 4. *Tajima* also discloses that its local device includes both a non-directional antenna and a directional antenna for determining the direction to the remote device. *Id.*, 5:28-34, 6:35-39, 7:15-38, 10:37-55, Fig. 4.

A POSITA would have been motivated to combine the teachings of *McCorkle* with those of *Tajima* with a reasonable expectation of success. First, the references are analogous art to the '777 patent (and each other), as each discloses wireless communication systems in the same field of endeavor (location determination) and are pertinent to the problem of how to locate a remote wireless device. EX1001, Abstract; EX1003, Abstract, [0098]-[0105], [0118]-[0128], Figs. 4, 7; EX1006, Abstract, 5:5-17, 5:28-68, 6:35-39, 7:15-38, 10:37-55, Figs. 1, 3, 4; EX1002, ¶58.

Second, combining the teachings of *McCorkle* with *Tajima* would have been no more than the combination of prior art elements according to known methods to yield predictable results. A POSITA reading *McCorkle* would have looked for known ways to determine the direction that a signal is coming from. EX1002, ¶59. A POSITA would have understood that using *Tajima*'s non-directional antenna and directional antenna would have been a beneficial modification to *McCorkle*'s distance-determining system because *Tajima* describes how to use the antennas for determining the direction of the signal in addition to the distance to the remote device. EX1006, 5:28-68, 6:35-39, 7:15-38, 10:37-55, Figs. 1, 3, 4; EX1002, ¶59. A POSITA would have understood that it would have been beneficial to use both a non-directional antenna and a directional antenna for determining the direction to remote device. EX1002, ¶59. This modification allows for an effective way of determining a direction to the remote device. *Id.* A POSITA would have been motivated to implement *Tajima*'s use of both a non-directional antenna and a directional antenna

with *McCorkle*'s distance-determining system to determine the direction to the remote device. *Id.*

Third, combining the teachings of *McCorkle* with *Tajima* would have been the use of a known technique to improve similar devices in the same way. The devices disclosed in *McCorkle* and *Tajima* are comparable systems. EX1003, Abstract, [0098]-[0105], [0118]-[0128], Figs. 4, 7; EX1006, Abstract, 5:28-68, 6:35-39, 7:15-38, 10:37-55, Figs. 1, 3, 4. A POSITA would have had a reasonable expectation of success at least because *McCorkle* discloses that local device 405 may use "any known UWB antenna." EX1003, [0102]. A POSITA would have understood that UWB uses radio signals for transmitting information. EX1002, ¶¶60-61; EX1003, [0002], [0067]-[0068], [0124]. *Tajima* describes to a POSITA how to implement using radio antennas to determine a distance and direction to a remote device. EX1006, 5:28-68, 6:35-39, 7:15-38, 10:37-55, Figs. 1, 3, 4.

Thus, *McCorkle*'s system as modified by *Tajima* to include to include a non-directional antenna and a directional antenna renders obvious that *said at least one antenna* (e.g., antennas 105) *comprises a plurality of antennas* (e.g., a non- directional antenna and a directional antenna).

[3.1] wherein said controller cooperates with said plurality of antennas to determine a bearing to said target wireless communications device based upon at least one of the received reply signals.

McCorkle alone, or in view of *Tajima*, renders obvious, [3.1]. As discussed for [3.0], a POSITA would have found it obvious to use multiple directional antennas to determine a direction to remote device. EX1002, ¶¶53-61; [0153]-[0157], Fig. 11; EX1005, 31:19-47, Fig. 9.

The processor unit 301 is connected to a communication interface 313 including the UWB transceiver and antennas 105. EX1003, [0069], [0086], [0101]. Processor unit 301 includes software for performing the processing performed in implementing *McCorkle*'s distance measuring system using UWB transmission. *Id.*, [0080]. *McCorkle* discloses that the local device processes reply signals received from each of the linked remote devices 410_1-410_N using its UWB transceiver and antennas to determine both the distance and direction to each of the linked remote devices 410_1-410_N. *Id.*, [0101], [0126]-[0128], Figs. 7, 11.

As discussed for [3.0], *Rofheart*, a parent of *McCorkle*, was incorporated by reference in *McCorkle*, and a POSITA would have looked to *Rofheart* to further understand the well-known routine details regarding the type of antennas (e.g., directional antennas) and how a multiple antenna system would work when utilizing multiple directional antennas. EX1002, ¶54. Similar to *McCorkle*, *Rofheart*'s processing system 201 also includes a communication interface 219 for receiving wireless communications from remote devices. EX1005, 15:22-63, 31:19-38, Figs. 2-

3. Processor system 201 includes software for performing the processing performed in implementing *Rofheart*'s distance measuring system using UWB transmission. *Id.*, 14:14-41. *Rofheart* describes multiple antennas on the local device that may be used to provide the relevant special information and resolve the distance to the remote devices. EX1005, 31:19-47, Fig. 9. In particular, *Rofheart* discloses that the local device processes reply signals received from each of the linked remote devices using its UWB transceiver and directional antennas to determine both the distance and direction to each of the linked remote devices. *Id.*, 23:59-25:31, 27:46- 28:38, 31:19-38, Figs. 7, 9.

Thus, *McCorkle* renders obvious that *said controller* (e.g., processor unit 301) *cooperates with said plurality of antennas* (e.g., receives signal information from antennas 105) *to determine a bearing* (e.g., direction) *to said target wireless communications device* (e.g., remote device 410_1) *based upon at least one of the received reply signals* (e.g., reply signal sent from remote device 410_1 to local device 405).

To the extent Speir argues that *McCorkle* alone does not disclose or render obvious that *said controller cooperates with said plurality of antennas to determine a bearing to said target wireless communications device based upon at least one of the received reply signals*, *McCorkle*'s local device 405 as modified above by the teachings of *Tajima* to include a non-directional antenna and a directional antenna for

determining a direction to the remote device renders this element obvious. EX1002, ¶¶56-61.

McCorkle's processor unit 301 is connected to a communication interface 313 including the UWB transceiver and antennas 105. EX1003, [0069], [0086], [0101]. Processor unit 301 includes software for performing the processing performed in implementing McCorkle's distance measuring system using UWB transmission. *Id.*, [0080]. *McCorkle* discloses that the local device processes reply signals received from each of the linked remote devices 410_1-410_N using its UWB transceiver and antennas to determine both the distance and direction to each of the linked remote devices 410_1-410_N. *Id.*, [0101], [0126]-[0128], Fig. 11. Similarly, the reply signals in *Tajima* are used to determine the distance and direction to the remote device. EX1006, 5:18-34, 7:15-38. Thus, a POSITA would have understood that *McCorkle*'s processor unit 301 would similarly use the reply signals obtained through the non- directional and directional antennas to determine the distance and direction to the remote device. EX1002, ¶57.

Thus, *McCorkle*'s local device 405 as modified by the teachings of *Tajima* to include both a non-directional antenna and a directional antenna renders obvious that *said controller* (e.g., processor unit 301) *cooperates with said plurality of antennas* (e.g., non-directional antenna and directional antenna) *to determine a bearing* (e.g.,

direction) *to said target wireless communications device* (e.g., remote device 410_1) *based upon at least one of the received reply signals* (e.g., determination of direction is made based on the signal received by local device 405 from remote device 410_1).

4. Claim 5

[5.0] The wireless communications system of claim 1 wherein said at least one antenna comprises at least one directional antenna.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 1. *McCorkle* alone, or in view of *Tajima*, renders obvious the additional elements of [5.0] for the reasons discussed for [3.0] and [3.1]. In particular, as discussed for [3.0], *McCorkle* renders obvious that antennas 105 may include multiple directional antennas. EX1002, ¶¶53-55.

To the extent Speir argues that *McCorkle* alone does not disclose or render obvious that said at least one antenna comprises at least one directional antenna, *McCorkle*'s local device 405 as modified above by the teachings of *Tajima* to include a non-directional antenna and a directional antenna for determining a direction to the remote device (see discussion for [3.0] and [3.1]) renders this element obvious. *Id.*, ¶¶56-61.

5. Claim 6

[6.0] The wireless communications system of claim 1 wherein said wireless device locator further comprises a portable housing carrying said at least one antenna, said transceiver, and said controller.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 1. *McCorkle* discloses, or at least renders obvious the additional elements of

[6.0]. As discussed for [1.3] and [1.4], *McCorkle* discloses that local device 405 (*wireless device locator*) includes an antenna, a transceiver, and a controller. *McCorkle* further discloses that local device may be a mobile device such as a mobile telephone, a laptop computer, or a personal digital assistant (PDA) which a POSITA would have understood has a *portable housing* because by 2004, it was common for these devices to have a housing having a size and weight that allows the device to be handheld by a person. EX1003, [0100]; EX1002, ¶62 (citing EX1017, Abstract, 7:21-22, Figs. 1, 3).

Thus, *McCorkle* discloses, or at least renders obvious, *wherein said wireless device locator* (e.g., local device 405) *further comprises a portable housing* (e.g., external portable housing of a mobile telephone, laptop computer, or PDA) *carrying said at least one antenna* (antenna 105)*, said transceiver* (e.g., UWB transceiver)*, and said controller* (e.g., processing unit 301).

6. Claim 7

[7.0] The wireless communications system of claim 1 wherein said wireless communications devices comprise wireless local area network (WLAN) devices.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 1. *McCorkle* alone discloses, or at least renders obvious, the additional elements of [7.0]. As discussed for [1.1], remote devices 410_1-410_N correspond to the claimed *wireless communications devices*. *McCorkle* further discloses that remote devices 410_1-410_N communicate on wireless network 400 which may with a wireless

local area network (WLAN). EX1003, [0098]. Thus, remote devices 410_1-410_N include *wireless local area network (WLAN) devices*.

7. Claim 8

[8.0] The wireless communications system of claim 1 wherein said wireless communications devices comprise mobile ad-hoc network (MANET) devices

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 1. *McCorkle* alone discloses, or at least renders obvious, the additional elements of [8.0]. As discussed for [1.1], remote devices 410_1-410_N correspond to the claimed *wireless communications devices*. *McCorkle* further discloses that remote devices 410_1-410_N communicate on wireless network 400 which may be a wireless network in which the wireless devices make point-to-point connections or point-to-multipoint connections on the shared channel of a piconet. EX1003, [0098]. A POSITA would have understood that this type of network corresponds to a mobile ad-hoc network (MANET). EX1002, ¶63 (citing EX1007, 5; [US8625481], 2:36-48). In a MANET, "the user's mobile devices are the network, and they must cooperatively provide the functionality usually provided by the network infrastructure (e.g., routers, switches, servers)." EX1007, 5; *see also* EX1002, ¶63 (citing EX1016, 2:36-48). The devices may communicate with each other via various well known wireless data transfer protocols. *See, e.g.,* EX1007, Abstract, 8-11; EX1002, ¶63 (citing EX1016, 2:40-45). For example, similar to the network disclosed in *McCorkle*, one type of MANET occurs when wireless devices communication with one another via the Bluetooth protocol known as a piconet. EX1007, 10-11; EX1002, ¶63 (citing EX1016,

2:45-48). Thus, remote devices 410_1- 410_N include *mobile ad-hoc network (MANET) devices*.

8. Claim 9

[9.0] The wireless communications system of claim 1 wherein said wireless communications devices comprise cellular communications devices.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 1. *McCorkle* alone discloses, or at least renders obvious, the additional elements of [9.0]. *McCorkle* discloses that remote devices 410_1-410_N (*wireless communications devices*) may be mobile devices such as mobile telephones, which is a *cellular communications device*. EX1003, [0100].

9. Claim 10

[10.0] A wireless communications system comprising:

To the extent limiting, *McCorkle* discloses, or at least renders obvious, the preamble for the same reasons discussed for [1.0].

[10.1] a plurality of wireless local area network (WLAN) devices each having a device type associated therewith from among a plurality of different device types, and each device type having a known device latency associated therewith; and

McCorkle discloses, or at least renders obvious, [10.1] for the same reasons discussed for [1.1] and [7.0].

[10.2] a wireless device locator comprising

McCorkle discloses, or at least renders obvious, [10.2] for the same reasons discussed for [1.2].

[10.3] at least one antenna and a transceiver connected thereto, and

McCorkle discloses, or at least renders obvious, [10.3] for the same reasons discussed for [1.3].

[10.4] a controller for cooperating with said transceiver for transmitting a plurality of location finding signals to a target WLAN device from among a plurality of WLAN devices;

McCorkle discloses, or at least renders obvious, [10.4] for the same reasons discussed for [1.4] and [7.0].

[10.5] said target WLAN device transmitting a respective reply signal for each of said location finding signals;

McCorkle discloses, or at least renders obvious, [10.5] for the same reasons discussed for [1.5] and [7.0].

[10.6] said controller of said wireless device locator also for cooperating with said transceiver for receiving the reply signals,

McCorkle discloses, or at least renders obvious, [10.6] for the same reasons discussed for [1.6].

[10.7] determining a propagation delay associated with the transmission of each location finding signal and the respective reply signal therefor based upon the known device latency of said target WLAN device, and

McCorkle discloses, or at least renders obvious, [10.7] for the same reasons discussed for [1.7] and [7.0].

[10.8] estimating a range to said target WLAN device based upon an average of a plurality of determined propagation delays.

McCorkle in view of *Leeper* renders obvious [10.8] for the same reasons discussed for [1.8], [2.0], and [7.0].

10. Claim 11

[11.0] The wireless communications system of claim 10 wherein said at least one antenna comprises a plurality of antennas;

McCorkle in view of *Leeper* renders obvious the elements of claim 10. *McCorkle* alone, or in view of *Tajima*, renders obvious the additional elements as discussed for [3.0].

[11.1] and wherein said controller cooperates with said plurality of antennas to determine a bearing to said target WLAN device based upon at least one of the received reply signals.

McCorkle alone, or in view of *Tajima*, renders obvious [11.1] for the same reasons discussed for [3.1] and [7.0].

11. Claim 12

[12.0] A wireless device locator for locating a target wireless communications device comprising:

McCorkle discloses, or at least renders obvious, [12.0] for the same reasons discussed for [1.2]-[1.8].

[12.1] at least one antenna and a transceiver connected thereto, and

McCorkle discloses, or at least renders obvious, [12.1] for the same reasons discussed for [1.3].

[12.2] a controller for cooperating with said transceiver for transmitting a plurality of location finding signals to the target wireless communications device and receiving a respective signal therefrom for each of said location finding signals,

McCorkle discloses, or at least renders obvious, [12.2] for the same reasons discussed for [1.4] and [1.6].

[12.3] determining a propagation delay associated with the transmission of each location finding signal and the respective reply signal therefor based upon a known device latency of the target wireless communications device, and

McCorkle discloses, or at least renders obvious, [12.3] for the same reasons discussed for [1.1] and [1.7].

[12.4] estimating a range to the target wireless communications device based upon a plurality of determined propagation delays.

McCorkle alone discloses, or at least renders obvious, [12.4], or, in the alternative, *McCorkle* in view of *Leeper* renders obvious [12.4] for the same reasons discussed for [1.8].

12. Claim 13

[13.0] The wireless device locator of claim 12 wherein said controller estimates the range based upon an average of the propagation delays.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 12. *McCorkle* in view of *Leeper* renders obvious the additional elements of [13.0] for the same reasons discussed for [2.0].

13. Claim 14

[14.0] The wireless device locator of claim 12 wherein said at least one antenna comprises a plurality of antennas; and

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the limitations of claim 12. *McCorkle* alone, or in view of *Tajima*, renders obvious the additional limitations of [14.0] for the reasons discussed for [3.0].

[14.1] wherein said controller cooperates with said plurality of antennas to determine a bearing to the target wireless communications device based upon at least one of the received reply signals.

McCorkle alone, or in view of *Tajima*, renders obvious, [14.1] for the same reasons discussed for [3.1].

14. Claim 15

[15.0] The wireless device locator of claim 12 wherein said at least one antenna comprises at least one directional antenna.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 12. *McCorkle* alone, or in view of *Tajima*, renders obvious the additional limitations of [15.0] for the reasons discussed for [5.0].

15. Claim 16

[16.0] The wireless device locator of claim 12 wherein said wireless device locator further comprises a portable housing carrying said at least one antenna, said transceiver, and said controller.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 12. *McCorkle* alone discloses, or at least renders obvious, the additional elements of [16.0], for the reasons discussed for [6.0].

16. Claim 17

[17.0] The wireless device locator of claim 12 wherein the target wireless communications device comprises a wireless local area network (WLAN) device.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 12. *McCorkle* alone discloses, or at least renders obvious, the additional elements of [17.0] for the reasons discussed for [7.0].

17. Claim 18

[18.0] The wireless device locator of claim 12 wherein the target wireless communications device comprises a mobile ad-hoc network (MANET) device.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 12. *McCorkle* alone discloses, or at least renders obvious the additional elements of [18.0] for the reasons discussed for [8.0].

18. Claim 19

[19.0] The wireless device locator of claim 12 wherein the target wireless communications device comprises a cellular communications device.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 12. *McCorkle* alone discloses, or at least renders obvious, [19.0] for the reasons discussed for [9.0].

19. Claim 20

[20.0] A method for locating a target wireless communications device from among a plurality of wireless communications devices, each wireless communications device having a device type associated therewith from among a plurality of different device types, and each device type having a known device latency associated therewith, the method comprising:

To the extent limiting, *McCorkle* discloses, or at least renders obvious, the preamble for the same reasons discussed for [1.0]-[1.8].

[20.1] using a controller for cooperating with a transceiver for transmitting a plurality of location finding signals to the target wireless communications, and receiving a respective reply signal for each of the location finding signals therefrom;

McCorkle discloses, or at least renders obvious, [20.1] for the same reasons discussed for [1.2]-[1.6].

[20.2] using the controller for determining a propagation delay associated with the transmission of each location finding signal and the respective reply signal therefor based upon the known device latency of the target wireless communications device; and

McCorkle discloses, or at least renders obvious, [20.2] for the same reasons discussed for [1.7].

[20.3] further using the controller for estimating a range to the target wireless communications device based upon a plurality of determined propagation delays.

McCorkle alone discloses, or at least renders obvious, [20.3], or, in the alternative, *McCorkle* in view of *Leeper* renders obvious [20.3] for the same reasons discussed for [1.8].

20. Claim 21

[21.0] The method of claim 12 wherein the controller estimates the range based upon an average of the propagation delays.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 20. *McCorkle* in view of *Leeper* renders obvious the additional elements of [21.0] for the same reasons discussed for [2.0].

21. Claim 22

[22.0] The method of claim 20 further comprising determining a bearing to the target wireless communications device based upon at least one of the received reply signals.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 20. *McCorkle* alone, or in view of *Tajima*, renders obvious the additional elements of [22.0] for the same reasons discussed for [3.1].

22. Claim 23

[23.0] The method of claim 20 wherein the target wireless communications device comprises a wireless local area network (WLAN) device.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 20. *McCorkle* alone discloses, or at least renders obvious, the additional elements of [23.0] for the reasons discussed for [7.0].

23. Claim 24

[24.0] The method of claim 20 wherein the target wireless communications device comprises a mobile ad-hoc network (MANET) device.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 20. *McCorkle* alone discloses, or at least renders obvious the additional elements of [24.0] for the reasons discussed for [8.0].

24. Claim 25

[25.0] The method of claim 20 wherein the target wireless communications device comprises a cellular communications device.

McCorkle alone, or in view of *Leeper*, discloses or renders obvious the elements of claim 20. *McCorkle* alone discloses, or at least renders obvious, [25.0] for the reasons discussed for [9.0].

VII. DISCRETION SHOULD NOT PRECLUDE INSTITUTION

On May 27, 2022, Unified Patents, LLC ("Unified") petitioned for IPR of the '777 patent ("the Unified Petition") in IPR2022-00987 ("the Unified Proceeding"). The Board instituted review in that proceeding on November 9, 2022. On September 9, 2022, Petitioner petitioned for IPR of the '777 patent ("the Original Petition") in IPR2022-01512 ("the Apple Proceeding"). The Board has yet to render an institution decision based on the Original Petition. Petitioner presently submits this Petition ("the Joinder Petition") with a conditional motion to join Petitioner to the Unified Proceeding **if**, **and only if**, the Board declines to institute the Original Petition in the Apple Proceeding.

The purpose of this Joinder Petition and its accompanying conditional motion for joinder is twofold: **(1)** to avoid the unnecessary cost of duplicative litigation in different forums on the same printed publication prior art grounds; and **(2)** to avoid potentially inconsistent decisions from different forums addressing the same prior art grounds. If the Board were to deny both Apple's Original Petition and this Joinder Petition, Apple would have no choice but to pursue its printed publication invalidity defenses in district court, separate and apart from the already-instituted Unified Proceeding. Against that outcome, institution of one petition or the other **in the alternative** would promote judicial efficiency and consistency by confining adjudication of certain invalidity grounds to the PTAB. *See infra* Section VIII.B (discussing the breadth of § 315(e)(2) estoppel based on Petitioner's Original Petition and this Joinder Petition).

A. The *General Plastic* Factors Favor Institution—§314(a)

The Board's "intent in formulating the [*General Plastic*] factors was to take undue inequities and prejudices to Patent Owner into account" when evaluating second-in-time petitions. *General Plastic Indus. Co. v. Cannon Kabushiki Kaisha*, IPR2016-01357, Paper 19 at 16 (PTAB Sept. 6, 2017)(precedential). The Board has applied this framework to the joinder petition of a petitioner that previously filed its own petition. *Apple Inc., v. Uniloc 2017 LLC*, IPR2020-00854, Paper 9 (PTAB Oct. 28, 2020)(precedential). And while the Board denied institution in *Apple v. Uniloc*, the seven *General Plastic* factors do not expose "undue inequities and

prejudices" when applied to the facts at hand. Quite the opposite. "[A] balanced assessment of all relevant circumstances" reveals institution as the course that serves the Board's stated goals of promoting fairness and efficiency for both parties. *See* November 2019 Consolidated Trial Practice Guide ("CTPG") at 58; *General Plastic* at 18 (the articulated list of factors is non-exclusive).

The unique circumstances in this case provide a unique opportunity. As noted above and explained further below, institution would promote adjudication of certain printed publication prior art grounds by the PTAB alone. *See infra* Section VIII.B (discussing the breadth of § 315(e)(2) estoppel based on Petitioner's Original Petition and this Joinder Petition). The prospect of conserving significant judicial resources is obvious. Less obvious, but equally important, is the substantial benefit to Patent Owner. Institution will avoid a situation where Patent Owner must expend resources defending against the same prior art grounds in two different forums at the same time. Denial would instead bring this unfavorable hypothetical into reality. Unlike the fact patterns presented in *General Plastic* and *Apple v. Uniloc*, the facts here support a conclusion that institution will maximize efficiency and fairness. *Cf. Code200, UAB v. Bright Data, Ltd*., IPR2022-00861, Paper 9 (PTAB Oct. 28, 2020)(precedential) (detailing an exemplary fact pattern where a second-filed joinder petition "best balances" the Board's policy goals).

1. Factor 1: Petitioner's Multiple Petitions Do Not Prejudice Patent Owner

The fact that Petitioner previously filed a petition (the Original Petition) against overlapping claims of the '777 patent does not reveal prejudice to Patent Owner. Indeed, it is not uncommon for petitioners to submit more than one petition against the same patent with an understanding that the Board will typically institute no more than one of them. *See* CTPG at 59-61 (discussing "parallel petitions"). Given the unique circumstances here, Petitioner is similarly situated to a typical "parallel petitioner" that submitted parallel petitions. Like a parallel petitioner, **(i)** Petitioner is not barred or estopped from requesting IPR; **(ii)** Petitioner has not seen a preliminary response or institution decision regarding its primary, first ranked petition (the Original Petition); and **(iii)** Petitioner could not reasonably leverage any of the filings or decisions regarding any other petition against Patent Owner. Just as a parallel petitioner does not introduce prejudice by requesting institution of multiple petitions **in the alternative**, Petitioner also does not introduce prejudice by filing this Joinder Petition with a conditional request for joinder if (and only if) the Original Petition is denied.

2. Factor 2: Petitioner's Knowledge of the Prior Art in the Unified Petition Did Not Prejudice Patent Owner

Petitioner learned of the prior art in the Unified Petition after Unified filed it. Entirely independent of Unified, Apple was concurrently preparing the Original Petition based on different prior art. Apple filed the Original Petition **before** Patent

Owner submitted its preliminary response to the Unified Petition. Given the timing and distinctive prior art, Apple could not have reasonably leveraged its knowledge of the Unified Petition's prior art against Patent Owner in the Apple Proceeding. Moreover, given that this Joinder Petition mirrors the prior art grounds from the Unified Petition without alteration, Petitioner also has not gained any advantage over Patent Owner here in this proceeding. To be clear, Petitioner was not intentionally and tactically holding back prior art.

3. Factor 3: This Petition Does Not Implicate Road-Mapping or Playbooking Concerns

Unlike the petitioners in *General Plastic* and *Apple v. Uniloc*, Petitioner has not received the Board's institution decision on its first petition (Original Petition). Petitioner also has not received a preliminary response to the Original Petition. Moreover, the patentability analysis of this Joinder Petition was not modified in any way to account for the Board's analysis and/or Patent Owner's arguments made in the Unified Proceeding. Petitioner's impetus for filing this Joinder Petition was the Board's institution of the Unified Petition and Petitioner's aspiration to promote fairness and efficiency by confining adjudication of certain printed publication prior art grounds to the PTAB alone.

4. Factors 4 and 5: Petitioner Diligently Prepared This Joinder Petition at the Appropriate Time

Petitioner learned of the prior art in the Unified Petition after its filing. Entirely independent of Unified, Petitioner was concurrently preparing the Original

Petition based on different prior art. Petitioner's independent efforts on the Original Petition were already underway and continued for months. Petitioner spent the remaining time awaiting the Board's decision on institution of the Unified Petition.

As a matter of statutory law, under 35 U.S.C. § 315(c), Petitioner could not have been joined to the Unified Proceeding any earlier than the Board's institution of the Unified Petition. And the filing date of this Joinder Petition is within the one-month timeline set by the Board's rules. It would have been wasteful for Petitioner to expend the substantial resources required to pursue joinder any earlier. Again, the facts here are unique and in stark contrast to *General Plastic* and *Apple v. Uniloc*. In each of those cases, the petitioner "provided no explanation…for the delay." *General Plastic* at 10-11; *see also Apple v. Uniloc* at 10-11. Not so here.

5. Factors 6 and 7: Institution Efficiently Promotes Patent Quality

The Board's finite resources are well spent here. Careful vetting of the '777 patent's claims did not occur during prosecution, and it is fully consistent with the AIA's goals for the Board to review the validity of the overly broad claims Patent Owner presently asserts against Petitioner. *General Plastic*, p.16. Equally significant, institution will allow *inter partes* review to serve its intended function as a true alternative to district court litigation on the subject of validity over certain printed publication prior art grounds. *See*, *e.g.*, *General Plastic* at 16 ("In exercising discretion…we are mindful of the goals of the AIA–namely, to improve

patent quality and make the patent system more efficient by the use of post-grant review procedures"); *OpenSky Industries, LLC v. VLSI Technology LLC*, IPR2021-01064, Paper 102 at 28 (PTAB Oct. 17, 2022) (precedential) ("Congress intended AIA proceedings to be a less-expensive alternative to district court litigation to resolve certain patentability issues.").

Both parties will benefit from confining adjudication on certain invalidity grounds to a single forum. As to the capacity of the Board to issue a final written decision within one year, Petitioner's willingness to serve as an "understudy" in the Unified Proceeding is fully consistent with the Board's statutory goal.

B. The *Fintiv* Factors Favor Institution—§314(a)

Institution is consistent with the Director's recent guidance on applying the *Fintiv* Factors. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential); *Memorandum: Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation* (June 21, 2022) ("*Director's Memo*"). First and foremost, the merits of the Petition are "compelling," and this "alone demonstrates that the PTAB should not discretionarily deny institution under *Fintiv*." *Director's Memo*, 3-5. Grounds 1-5 present theories of anticipation and obviousness which, "if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence." *Id*., 4. The Board acknowledged as much when it granted institution of the Unified Petition that this Joinder Petition mirrors. *Unified Patents, LLC v. Speir Technologies Ltd.*, IPR2022-

00987, Paper 9 at 13 (PTAB Nov. 9, 2022) ("[W]e determine that Petitioner's arguments present not only a reasonable likelihood of unpatentability, but also a compelling unpatentability challenge.").

Additionally, the Board's final written decision on the grounds of this Joinder Petition will likely issue in advance of any foreseeable trial. The projected final written decision date of November 2023 for the Unified Petition (and accordingly this Joinder Petition) is well before the estimated jury trial date of April 2024.[2] *See* EX1100, 37 (the District Court's median time from filing to trial is 28.3 months). The Board's earlier projected final written decision will bind Petitioner via the § 315(e)(2) estoppel before a jury trial, and thereby promote judicial efficiency.

[2] Note that the District Court's scheduling order lists "Jury Selection/Trial" on October 3, 2023 (EX1101, 5). That said, the *Markman* hearing and significant discovery deadlines from the original scheduling order are now delayed by multiple months. *E.g.*, EX1104 (delaying *Markman* until mid-December 2022), EX1105 (extending the final contentions deadlines).

VIII. PETITIONER'S RANKING OF PETITIONS

A. The Original Petition and the Joinder Petition Are Materially Different

In materially different ways, Petitioner's Original Petition and this Joinder Petition each demonstrate that the '777 patent's claims are unpatentable.

The Original Petition raises two distinct sets of grounds based on two different primary references—McCrady (US 6,453,168) and Rofheart (US 7,058,414)—while the Joinder Petition relies on a single primary reference in McCorkle (US 2003/0174048).[3] By diversifying its grounds with different primary references, the Original Petition presents an even more robust case of unpatentability against the '777 patent than the Joinder Petition.

The Original Petition and the Joinder Petition further diverge by applying materially different secondary references. Where the Original Petition relies on Raphaeli (US 7,511,604) and Kuwahara (US 6,070,079), the Joinder Petition advances Leeper (US 7,203,500) and Tajima (US 5,381,444). The petitions diverge even further by raising different arguments for why a POSITA would have been motivated to combine the distinct sets of primary and secondary art references.

Finally, the Joinder Petition leaves claim 4 unchallenged, while the Original Petition challenges all 25 claims of the '777 patent. This distinction is particularly

[3] Rofheart and McCorkle are related references with different disclosures applied differently in the respective petitions.

salient given Patent Owner's active infringement allegations against Petitioner in district court.

In all these ways, the Original Petition and the Joinder Petition offer non-redundant, non-duplicative, and substantially dissimilar challenges to the '777 patent.

B. Petitioner Ranks the Original Petition Ahead of the Joinder Petition

Petitioner ranks its Original Petition ahead of this Joinder Petition. That is, Petitioner prefers and requests initial consideration of the Original Petition before the Board considers this Joinder Petition and its accompanying conditional motion for joinder. As discussed, the Original Petition includes two distinct sets of grounds against all 25 of the '777 patent's claims, where the Joinder Petition leaves claim 4 unchallenged and relies on a single primary reference. Each ground of Petitioner's Original Petition provides a compelling case of obviousness based on prior art and arguments that the Office has not yet considered. The '777 patent's claims—allowed without a single narrowing amendment—were not examined thoroughly during prosecution, and Patent Owner asserted these unvetted claims against Petitioner. Accordingly, Petitioner has a strong interest in prosecuting a case of unpatentability at the PTAB on its preferred grounds.

Even setting aside Petitioner's interests, instituting review in the Apple Proceeding would promote efficiency for all—the parties, the Board, and the District Court. For one, institution of the Apple Proceeding would trigger Petitioner's

contingent stipulation stated in the Original Petition:

> Petitioner will not pursue in the Litigation invalidity challenges against the '777 patent that are the same as Grounds 1-5 in this [Original] Petition or the same as Grounds 1-[5] in the Unified Petition."[4]

Moreover, institution could preclude or abridge a jury trial on validity by encouraging a stay and/or leading to a final written decision that estops Petitioner under 35 U.S.C. § 315(e)(2) from asserting printed publication grounds in the Litigation. The scope of the estoppel would be broader if the Apple Proceeding is instituted and proceeds to a final decision than if Petitioner is merely joined to the Unified Proceeding. *See Network-1 Techs., Inc. v. Hewlett-Packard Co.*, 981 F.3d 1015, 1026-28 (Fed. Cir. 2020) (finding the scope of estoppel narrowed when a petitioner was limited to joining an instituted proceeding).

Notably, the pace of the Litigation has slowed since Petitioner filed its Original Petition. The *Markman* hearing and significant discovery deadlines are now delayed by multiple months, increasing the likelihood that the Board's statutory deadline for issuing a final written decision in the Apple Proceeding will precede any jury trial. *See* EX1104, EX1105. Finally, Petitioner sought to conserve resources for all by challenging a related patent[5]—U.S. Patent No. 7,110,779 in Case No. IPR2023-

[4] *Speir Technologies Ltd. v. Apple Inc.*, Case 6:22-cv-00077-ADA (WDTX).

[5] Patent Owner amended its complaint in the Litigation to include this patent.

00151—using similar prior art and arguments from its Original Petition against the '777 patent. Given the substantive overlap between these related patents and parallel *inter partes* review proceedings, it would be most efficient for them to proceed on aligned schedules.

If the Board were to decline to institute review on the Original Petition in the Apple Proceeding, the next best course of action would be to institute review on this Joinder Petition and grant Petitioner's conditional motion for joinder with the Unified Proceeding. As with the Apple Proceeding (albeit to a lesser extent), institution and joinder would promote efficiency in the Litigation, at least with respect to the grounds of this Joinder Petition, and would do so at no expense or prejudice to Patent Owner.

IX. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8

A. Real Party-in-Interest—37 C.F.R. §42.8(b)(1)

Petitioner Apple Inc. is the only real party-in-interest. No other party had access to or control over the filing of this Petition, and Petitioner did not file this Petition for the benefit of any other party or entity.

B. Related Matters—37 C.F.R. §42.8(b)(2)

Petitioner is not aware of any disclaimers, reexamination certificates, or petitions for *inter partes* review for the '777 patent except for the below-identified IPR petitions.

The '777 patent is the subject of an IPR petition filed by Apple in IPR2022-01512. Further, the '777 patent is the subject of an IPR petition filed by Unified Patents, LLC in IPR2022-00987. Apple is not a real party-in-interest to IPR2022-00987. Unified Patents is not a real party-in-interest in IPR2022-01512 or this proceeding. Apple and Unified Patents are not privies.

The '777 patent is a subject of civil actions captioned: *Speir Technologies Ltd. v. Apple Inc.*, Case 6:22-cv-00077-ADA (WDTX), filed on January 10, 2022; and *Speir Technologies Ltd. v. Samsung Electronics Co., Ltd. et al.*, Case 2:21-cv-00474 (EDTX), filed on December 30, 2021.

C. Lead and Back-up Counsel and Service Information

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W. Karl Renner, Reg. No. 41,265 Fish & Richardson P.C. 60 South Sixth Street, Suite 3200 Minneapolis, MN 55402 Tel: 202-783-5070 Fax: 877-769-7945 Email: IPR50095-0107IP2@fr.com	David Holt, Reg. No. 65,161 Kenneth Darby, Reg. No. 65,068 John-Paul Fryckman, Reg. No. 62,880 Fish & Richardson P.C. 60 South Sixth Street, Suite 3200 Minneapolis, MN 55402 Tel: 202-783-5070 Fax: 877-769-7945 Email: IPR50095-0107IP2@fr.com

Please address all correspondence to lead and back-up counsel. Petitioner consents to electronic service by email at IPR50095-0107IP2@fr.com.

X. FEES—37 C.F.R. §42.103

Petitioner authorizes the USPTO to charge Deposit Account No. 06-1050 for the fee set in 37 C.F.R. § 42.15(a) for this Petition and authorizes payment for any additional fees to be charged to this Account.

Respectfully submitted,

Dated December 9, 2022

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(Control No. IPR2023-00305)

CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,273 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated December 9, 2022

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on December 9, 2022, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided via Federal Express, to the Patent Owner by serving the correspondence address of record as follows:

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