

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Martin Alles et al.
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Title: METHOD TO MODIFY CALIBRATION DATA USED TO
LOCATE A MOBILE UNIT

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PETITION FOR *INTER PARTES* REVIEW OF
UNITED STATES PATENT NO. 8,786,494

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EXHIBITS

APPLE-1001	U.S. Patent No. 8,786,494 to Alles et al. (“the ’494 patent”)
APPLE-1002	Excerpts from the Prosecution History of the ’494 patent (“the Prosecution History”)
APPLE-1003	Declaration and Curriculum Vitae of Dr. Karthikeyan Sundaresan
APPLE-1004	Complaint, <i>Geoscope Technologies PTE. LTD. v. Apple Inc.</i> , 1-22-cv-01373 (E.D. Va.), Dec. 1, 2022
APPLE-1005	U.S. Pat. App. Pub. No. 2006/0211376 (“Bhattacharya”)
APPLE-1006	U.S. Pat. App. Pub. No. 2006/0240843 (“Spain”)
APPLE-1007	U.S. Pat. App. Pub. No. 2005/0130677 (“Meunier”)
APPLE-1008	U.S. Pat. No. 6,799,047 (“Bahl”)
APPLE-1009	U.S. Patent No. 7,783,299 (“Anderson”)
APPLE-1010	Special Mobile Group (SMG) Technical Committee (TC), European Telecommunications Standards Institute, <i>GSM Technical Specification - Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification (GSM 04.08)</i> (Dec. 1995)
APPLE-1011	U.S. Patent No. 6,560,442 (“Yost”)
APPLE-1012	Nico Deblauwe, “GSM-based Positioning: Techniques and Applications, 2008, IBSN: 9789054874942 (“Deblauwe”)
APPLE-1013- APPLE-1049	RESERVED
APPLE-1050	Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (USPTO June 21, 2022) (“Interim Procedure”)
APPLE-1051	Memorandum Opinion dated Sept. 18, 2023, <i>Geoscope Technologies PTE. LTD. v Apple Inc.</i> , 1:22-cv-01373, (E.D. VA.)

- APPLE-1052 Stipulation Regarding Agreed Upon Claim Constructions, *Geoscope Technologies PTE. LTD. v Apple Inc.*, 1:22-cv-01373, (E.D. VA. May 23, 2023)
- APPLE-1053 Notice of Appeal dated Sept. 25, 2023, *Geoscope Technologies PTE. LTD. v Apple Inc.*, 1:22-cv-01373, (E.D. VA.)
- APPLE-1054 Memorandum Opinion & Order, *Geoscope Technologies PTE. LTD. v Apple Inc.*, 1:22-cv-01373, (E.D. VA. Jul. 19, 2023)

CHALLENGED CLAIMS

Claim	Identifier	Claim Language
1	[1.1]	A method for determining a location of a mobile station, comprising:
	[1.2]	providing a database of previously-gathered calibration data for a predetermined region in a wireless network;
	[1.3]	collecting observed network measurement data;
	[1.4]	the observed network measurement data collected by the mobile station and transmitted to the network or collected by the network;
	[1.5]	modifying said observed network measurement data; and
	[1.6]	comparing said modified network measurement data with said database of calibration data to thereby determine the location of the mobile station.
2	[2]	The method of claim 1 wherein said database comprises previously-gathered calibration data at one or more predetermined calibration points within said region.

Claim	Identifier	Claim Language
3	[3]	The method of claim 2 wherein said previously-gathered calibration data at one or more predetermined calibration points is combined to form previously-gathered calibration data for one or more non-uniform grid points within said region.
4	[4]	The method of claim 1 wherein said database comprises previously-gathered calibration data for one or more non-uniform grid points within said region.
5	[5]	The method of claim 1 wherein said previously-gathered calibration data includes signal strength information measured at a predetermined calibration point within said region for a signal transmitted from a known location within or in proximity to said region.
9	[9]	The method of claim 1 wherein said previously-gathered calibration data includes information identifying a serving cell of a transmitter transmitting a signal received at a predetermined calibration point within said region.

Claim	Identifier	Claim Language
11	[11]	The method of claim 1 wherein said previously-gathered calibration data includes information regarding a state of said wireless network.
12	[12]	The method of claim 1 wherein said previously-gathered calibration data includes calibration data gathered at a predetermined calibration point within said region wherein said predetermined calibration point is not located within a structure.
14	[14.1]	A method for determining a location of a mobile station, comprising:
	[14.2]	providing a database of previously-gathered calibration data for a predetermined region in a wireless network,
	[14.3]	wherein said network includes a serving transmitter;
	[14.4]	collecting observed network measurement data including a first signal characteristic from said serving transmitter,
	[14.5]	the observed network measurement data collected by the

Claim	Identifier	Claim Language
		mobile station and transmitted to the network or collected by the network;
	[14.6]	modifying said observed network measurement data using said first signal characteristic; and
	[14.7]	comparing said modified network measurement data with said database of calibration data to thereby determine the location of the mobile station.
15	[15]	The method of claim 14 wherein said database comprises previously-gathered calibration data for one or more non-uniform grid points within said region.
16	[16]	The method of claim 14 wherein said previously-gathered calibration data includes calibration data gathered at a predetermined calibration point within said region wherein said predetermined calibration point is not located within a structure.
18	[18]	The method of claim 14 wherein said first signal characteristic is signal strength.

Claim	Identifier	Claim Language
19	[19]	The method of claim 18 wherein said collecting observed network measurement data further includes collecting a second signal characteristic from a neighboring transmitter wherein said second signal characteristic is signal strength.
20	[20]	The method of claim 19 wherein the modifying of said calibration data uses a difference between said first and second signal characteristics.
21	[21]	The method of claim 14 wherein said first signal characteristic is signal strength of a control channel transmitted by said serving transmitter and received by said mobile station.
22	[22]	The method of claim 21 wherein said collecting observed network measurement data further includes collecting a second signal characteristic from a neighboring transmitter wherein said second signal characteristic is signal strength of a control channel transmitted by said neighboring transmitter and received

Claim	Identifier	Claim Language
		by said mobile station.
25	[25.1]	A method for determining a location of a mobile station, comprising:
	[25.2]	providing a database of previously-gathered calibration data for a predetermined region in a wireless network;
	[25.3]	collecting observed network measurement data from each of a plurality of transmitters including a signal characteristic from each one of said plural transmitters,
	[25.4]	the observed network measurement data collected by the mobile station and transmitted to the network or collected by the network;
	[25.5]	determining an average value for select ones of said signal characteristics;
	[25.6]	modifying said observed network measurement data using said average value; and
	[25.7]	comparing said modified network measurement data with said database of calibration data to thereby

Claim	Identifier	Claim Language
		determine the location of the mobile station.
27	[27]	The method of claim 25 wherein said previously-gathered calibration data includes calibration data gathered at a predetermined calibration point within said region wherein said predetermined calibration point is not located within a structure.
29	[29]	The method of claim 25 wherein said signal characteristic is signal strength.
31	[31]	The method of claim 25 wherein said signal characteristic is signal strength of a control channel.
32	[32]	The method of claim 25, wherein the observed network measurement data includes received signal strength of said transmitters as said mobile station.
35	[35]	The method of claim 25 wherein at least one of said plurality of transmitters is not a member of said wireless network.

Apple Inc. (“Petitioner” or “Apple”) petitions for *Inter Partes* Review (“IPR”) of claims 1-5, 9, 11, 12, 14-16, 18-22, 25, 27, 29, 31, 32, and 35 (“the Challenged Claims”) of U.S. Patent No. 8,786,494 (“the ’494 patent”).

I. REQUIREMENTS FOR IPR

A. Standing

Apple certifies that the ’494 patent is available for IPR. Apple is not barred or estopped from requesting this review. Apple was served with a complaint of infringement of the ’494 patent less than one year ago. APPLE-1004.

B. Challenge and Relief Requested

Apple requests an IPR of the Challenged Claims on the grounds noted below, supported by a declaration from Dr. Karthikeyan Sundaresan. APPLE-1003, ¶¶[1]-[191].

Ground	Claims	Basis
1A	1, 2, 5, 9, 12, 14, 16, 18-22	§102: Bhattacharya
1B	1-5, 9, 11, 12, 14-16, 18-22	§103: Bhattacharya, Spain
1C	25, 27, 29, 31, 32, 35	§103: Bhattacharya, Meunier
1D	25, 27, 29, 31, 32, 35	§103: Bhattacharya, Spain, Meunier

The ’494 patent was filed on 2/20/2013 and claims priority to a number of

earlier applications including U.S. Provisional Application No. 60/899,379, filed on 2/5/2007 (“**Critical Date**”). While Apple does not concede that the Challenged Claims are entitled to the claimed priority, each of the references (below) qualify as prior art:

Reference	Date(s)	Basis
Bhattacharya	9/21/2006	§102(a)
Spain	10/26/2006	§102(a)
Meunier	6/16/2005	§102(a)

C. Claim Construction

Claim terms should be construed according to the Phillips standard. *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005); 37 C.F.R. §42.100. In general, “claim terms need only be construed to the extent necessary to resolve the controversy.” *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011).

A claim construction order issued in a district court proceeding involving the ’494 patent on July 19, 2023. APPLE-1054. The Court issued constructions for the following terms recited in the Challenged Claims:

Claim Term	Court’s Construction
“calibration data”	“modified or unmodified network measurement

Claim Term	Court's Construction
	data associated with a geographic location”
“observed network measurement data”	“measurement data from a network measurement report (i.e., a report used in cellular networks which provides the results of a measurement from a mobile device on one or more cells)”
“grid point”	“a point associated with representative calibration data for an area”

Both parties jointly stipulated that the “collecting” (feature [1.3]) has to occur before the “modifying” (feature [1.5]), and that the modifying has to occur before the “comparing” (feature [1.6]). APPLE-1052, 1.

In this proceeding, the Challenged Claims are anticipated and obvious under any reasonable interpretation.¹ The applied prior art references disclose and/or render obvious all of the elements of the Challenged Claims under any of the above-noted constructions. *See infra* §III; APPLE-1003, ¶¶[25]-[28].

¹ Apple is not conceding that each of the Challenged Claims satisfies all statutory requirements, such as 35 U.S.C. §112. Apple is not waiving any arguments concerning other grounds that can only be raised in district court.

Apple reserves the right to address any construction proposed by Geoscope or the Board.

II. OVERVIEW OF THE '494 PATENT

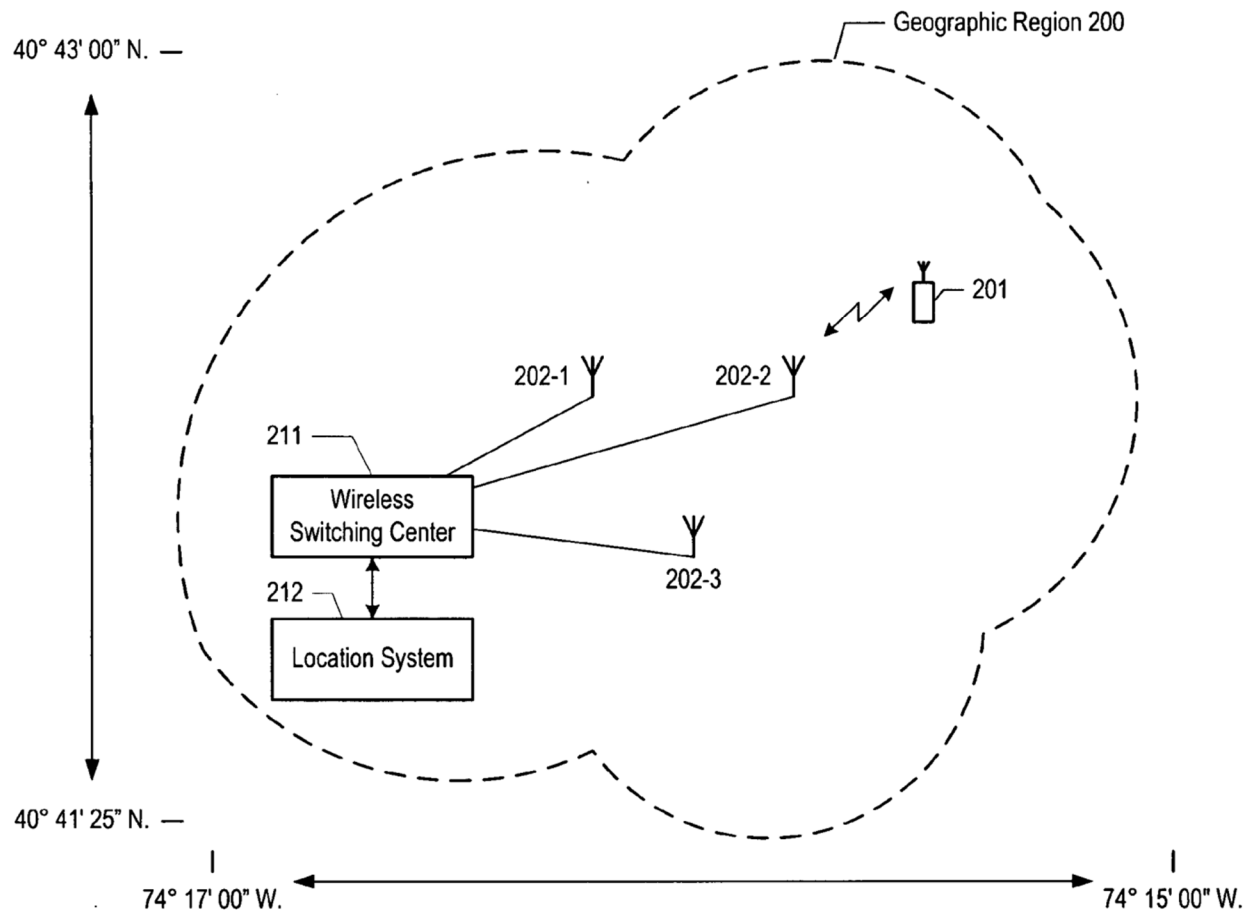
The '494 patent describes location estimation techniques that generally involve providing a database of “calibration data” and collecting “network measurement data” observed by a mobile device to determine the location of the mobile device. APPLE-1001, Abstract, 3:47-51, 1:40-2:4; APPLE-1003, ¶¶[22]-[24].

III. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. [GROUND 1A] – Bhattacharya Anticipates Claims 1, 2, 5, 9, 12, 14, 16, 18-22

1. Bhattacharya

Bhattacharya is focused on estimating the location of a wireless terminal. APPLE-1005, Abstract. Figure 2 (below) shows an example of the Bhattacharya system. APPLE-1003, ¶¶[29]-[30].



APPLE-1005, FIG. 2.

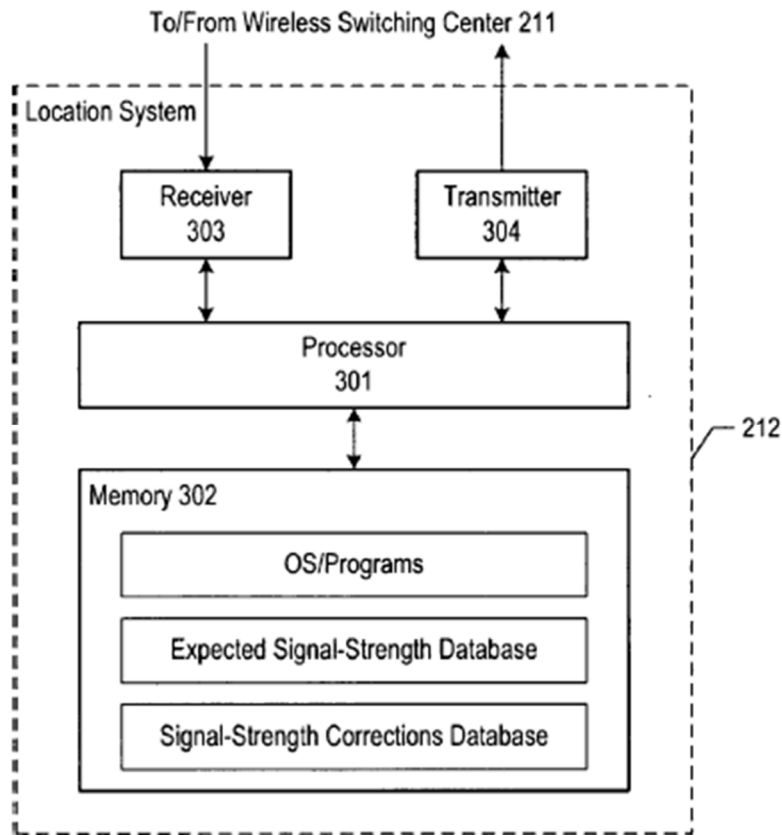
Telecommunications service is provided in geographic region 200 through base stations 202-1, 202-2, 202-3 and wireless terminal 201 through several well-known mobile communication protocols, such as Global System for Mobile Communications (GSM), General Packet Radio Service (GPRS), and Universal Mobile Telephone System (UTMS). APPLE-1005, [0051]. Wireless terminal 201 is equipped “with the software and hardware necessary to report to location system 212” information, such as signal-strength measurements. *Id.*, [0057]. Location system 212 then “calibrate[s] the reported signal-strength measurements” in

determining a location of the wireless terminal. *Id.*; APPLE-1003, ¶[31].

Location system 212 is a “data processing system that is capable of estimating the location of wireless terminal 201.” APPLE-1005, [0059]. Location estimation involves “receiving reports” that “contain reported signal-strength measurements from wireless terminal 201 for the base station that are on wireless terminal 201’s list of neighboring base stations.” *Id.*, [0060]. In some embodiments, “[t]he reported signal-strength measurements in a report are made at substantially the same time, and the signal-strength measurements in different reports are made at substantially different times[,]” while in others, “a single report comprises reported signal-strength measurements made at substantially different, but documented, times.” *Id.* A person of ordinary skill in the art (“POSITA”)² would have understood that Bhattacharya contemplates generating signal-strength measurement reports in different ways, e.g., by wireless terminal 201 or wireless switching center 211, and at various times. APPLE-1003, ¶[32].

Figure 3 (below) depicts Bhattacharya’s location system 212.

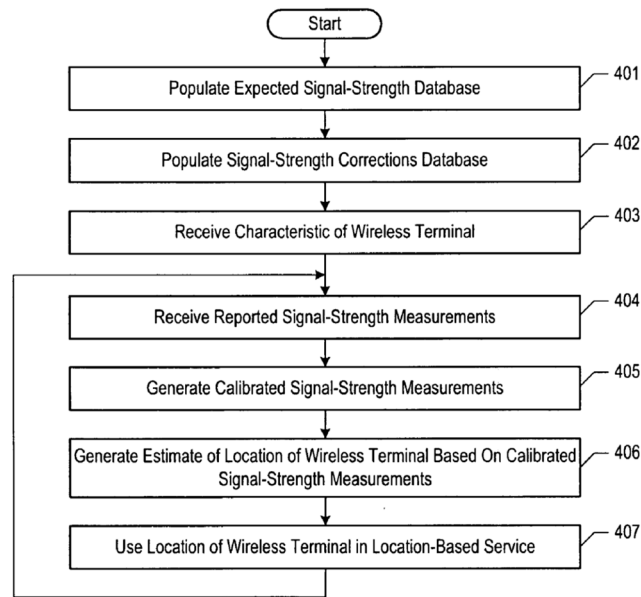
² See APPLE-1003, ¶¶[8], [10], [25] (describing “POSITA”).



APPLE-1005, FIG. 3.

Location system 212 includes processor 301, memory 302, receiver 303, and transmitter 304. APPLE-1005, [0064]-[0065]. Processor 301 “execut[es] the operating system and user programs in memory 302” and “populat[es], amend[s], access[es], and generally manag[es] [a] Expected Signal-Strength Database and [a] Signal-Strength Corrections Database in memory 302.” *Id.*; APPLE-1003, ¶¶[33]-[34].

Figure 4 (below) shows an example of a location detection technique performed by location system 212.



APPLE-1005, FIG. 4.

At task 401, “the Expected Signal-Strength Database is populated with the expected signal strengths of three signals at each location in geographic region 200[,]” including “Signal 1, Signal 2, and Signal 3.” APPLE-1005, [0085]. Each signal represents an “expected signal strength at location x, y at time t,” and “[f]or a given x, y location and time, these three functions together yield a 3-tuple of expected signal strengths designated as {E(1), E(2), E(3)}.” *Id.*, [0086]. Each expected signal-strength function is generated based on “a plurality of theoretical radio-frequency propagation models” and/or “plurality of empirical signal-strength measurements.” *Id.*, [0120]. This may involve “taking empirical measurements at various locations and by interpolating for the locations in between the sampled locations.” *Id.*, [0119]. Further, tasks 402 and 403 also involve calibrations to accommodate for “the make and model of wireless terminal.” APPLE-1005,

[0087]-[0090]; APPLE-1003, ¶¶[35]-[37].

At task 404, “location system 212 periodically receives a Signal-Strength Measurement Report from wireless terminal 202 at [a] discrete relative time[.]”. APPLE-1005, [0091]. Each “Signal-Strength Measurement Report” (SSMR) includes “a tuple of reported signal-strength measurements $\{R(1,n), R(2,n), R(3,n)\}$,” “the real time, t , at which the signal-strength measurements were made,” and “a value of n , which indicates the relative order in which the signal-strength measurements are made.” *Id.*, [0092]-[0094]. Further, “wireless terminal 201 provides a temporal series ($n, n+1, n+2, \dots$, etc.)” of SSMRs “as part of the GSM protocol and the mobile-assisted hand-off process.” *Id.*, [0095]. Location system 212 calibrates the signal-strength measurements in the SSMRs based on the “calibration function for the make and model of wireless terminal 201,” to “correct—or compensate for—the signal strength measurement errors made by wireless terminal 201.” *Id.*, [0097]. The received tuple of reported signal-strength measurements ($\{R(1,n), R(2,n), R(3,n)\}$) from the wireless terminal 201 becomes a tuple of calibrated signal-strength measurements ($\{S(1,n), S(2,n), S(3,n)\}$), which is a function of $\{R(1,n), R(2,n), R(3,n)\}$ and the values in the calibration database created in step 402 for the make and model of wireless terminal 201. *See* APPLE-1005, [0097], [0168]-[0169]; APPLE-1003, ¶[38].

By the Critical Date, various wireless standards/protocols (including

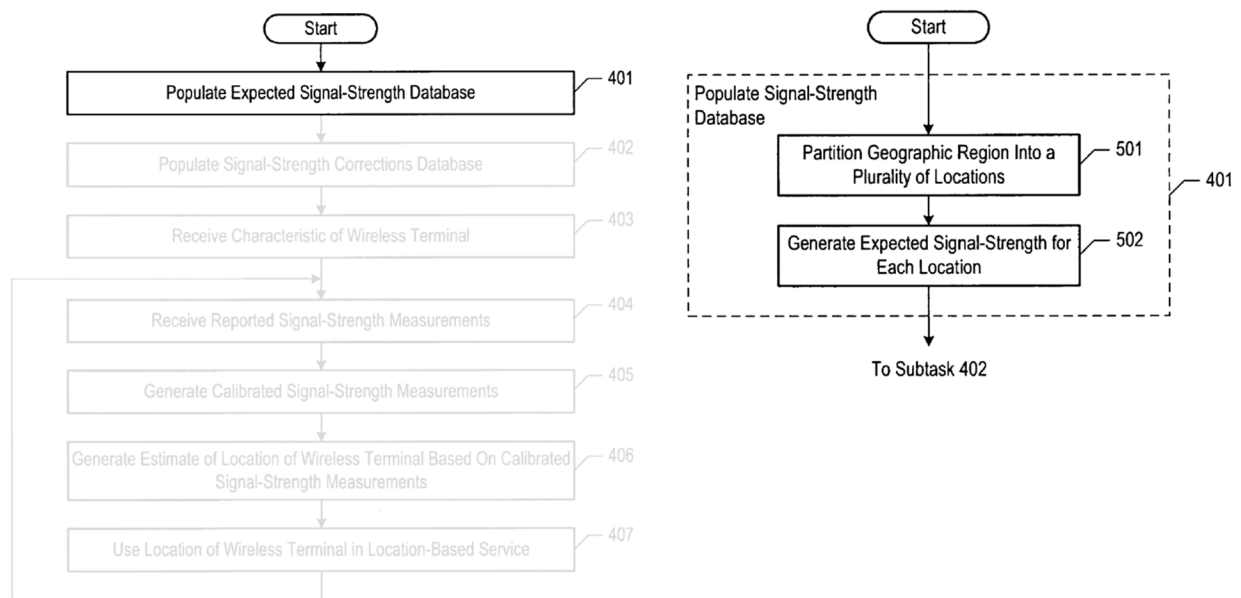
Bhattacharya's preferred GSM protocol) utilized "Network Measurement Reports (NMRs)" to report signal strengths for nearby base stations, and such NMRs were synonymous with Bhattacharya's "Signal-Strength Measurement Reports."

APPLE-1009, 16:19-23, 20:11-20; APPLE-1010, 43. A POSITA would have understood that the "signal-strength measurements" contained in Bhattacharya's "Signal-Strength Measurement Reports" would have been received, at least in part, from the well-known reception of NMRs standard in cellular radio networks (e.g., GSM). APPLE-1003, ¶[39]. Because NMRs are sent as a part of these various wireless standards (APPLE-1005, [0095]; APPLE-1009, 20:11-20; APPLE-1010, 43), a POSITA would have utilized the signal-strength measurements contained in these NMRs, because they would provide the information required by Bhattacharya without the need to further add data or messages to the existing cellular radio networks. APPLE-1003, ¶[39].

At task 406, "location system 212 generates a current estimate of the location of wireless terminal 201" based on "the tuple of calibrated signal-strength measurements $\{S(1,n), S(2,n), S(3,n)\}$," "expected signal-strength tuples for all locations $\{E(1,x,y,t), E(2,x,y,t), E(3,x,y,t)\}$ at the time when the measurements underlying $\{S(1,n), S(2,n), S(3,n)\}$ were made," and "the cumulative probability distribution for the location of wireless terminal 201...based on all of the [SSMRs] up to and including Report n-1." APPLE-1005, [0098]-[0101]. At task 407,

location system 212 “transmits the location estimated in task 406 to another entity” for “use in a location-based served (e.g., Emergency 911 Service, etc.).” *Id.*, [0103]; APPLE-1003, ¶[40].

Figure 5 (below, right) provides additional detail on task 401 (below, left).

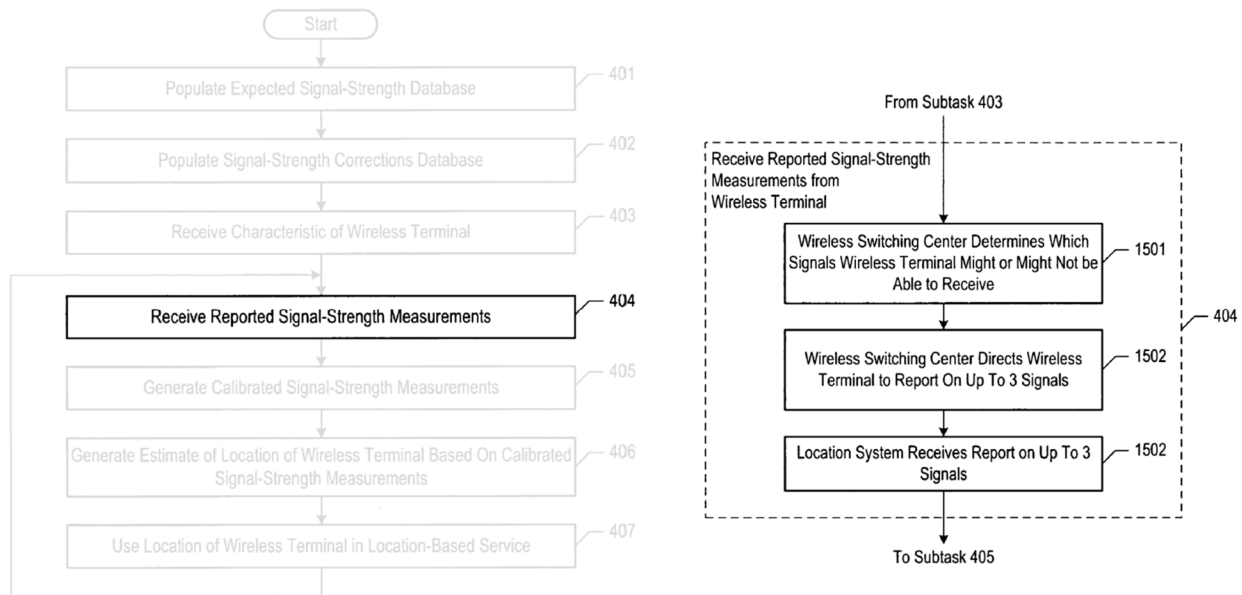


APPLE-1005, FIG. 4 (left), FIG. 5 (right).

At subtask 501, “a rectangular grid of X by Y tessellated squares is overlaid onto geographic region 200” where “each square represents a location.” APPLE-1005, [0106]. At subtask 502, “expected signal-strength functions $E(1,x,y,t)$, $E(2,x,y,t)$, $E(3,x,y,t)$ ” are generated based on a combination of “a plurality of theoretical radio-frequency propagation models” and “a plurality of empirical signal-strength measurements.” *Id.*, [0112]-[0117]; APPLE-1003, ¶¶[41]-[42]. The expected signal strength functions are “a function of x and y” since “the topography of [a] region and the presence of buildings, trees, and other radio-

frequency obstacles severely alter” signal propagation. *Id.*, [0113]. Further, “expected signal strength at each location is dynamic and changes,” e.g., “with time as the atmospheric and meteorological conditions change[,]” which is why “expected signal-strength functions are a function of time.” *Id.*, [0014];³ APPLE-1003, ¶¶[42]-[43] (citing APPLE-1008).

Figure 15 (below, right) provides additional detail on task 404 (below, left).

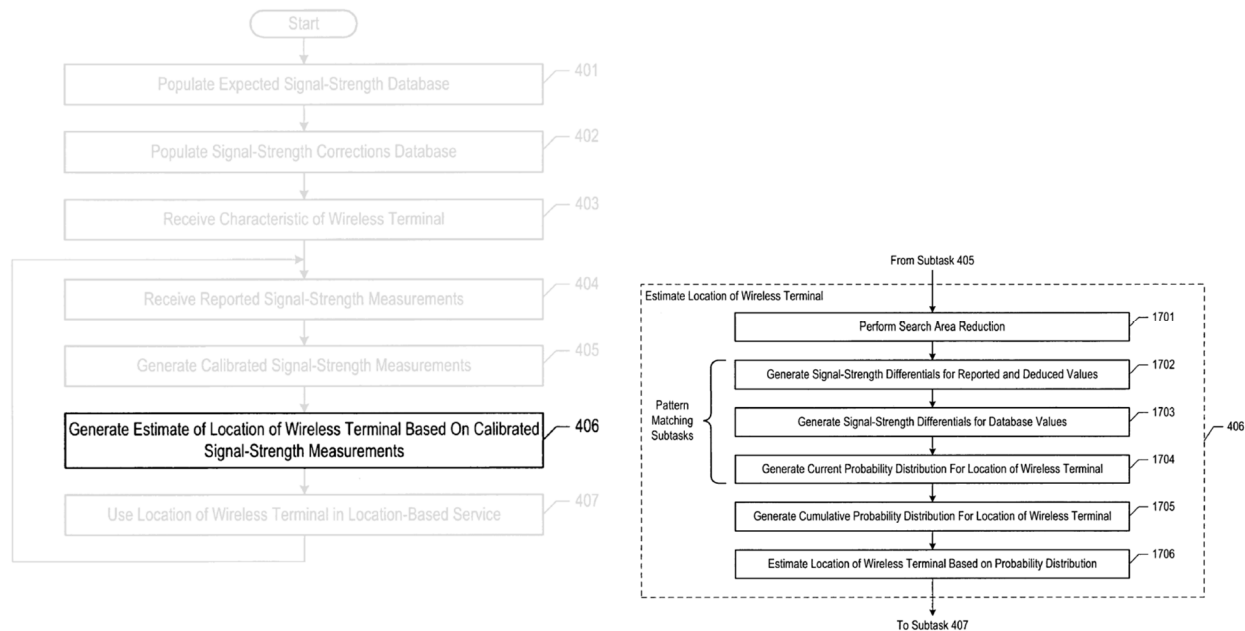


APPLE-1005, FIG. 4 (left), FIG. 15 (right).

³ Bhattacharya does not address storage of expected signal-strength functions to accommodate time-dependent atmospheric and meteorological changes, but such storage configurations were known in the art as of the Critical Date. APPLE-1003, ¶[43]; APPLE-1005, [0085], [0105]-[0127]; APPLE-1006, [0076], [0086], [0102], [0202]; *see infra* §III.B.1(a)-(b).

Subtasks 1501 and 1502 relate to coordination between wireless switching center 211 and wireless terminal 201, which permits wireless terminal 201 “to attempt to receive and to report back a signal-strength value for the signals that wireless terminal 201 is able to receive and distinguish.” APPLE-1005, [0159]. At subtask 1503, location system 212 receives an SSMR that includes “a tuple of reported signal-strength measurements $\{R(1,n), R(2,n), R(3,n)\}$,” “the time, t , at which the signal-strength measurements were made,” and “a value of n , which indicates the relative order in which the signal-strength measurements are made.” *Id.*, [0160]-[0163]; APPLE-1003, ¶¶[44]-[45].

Figure 17 (below, right) provides additional detail on task 406 in Figure 4 (below, left).



APPLE-1005, FIG. 4 (left), FIG. 17 (right).

At subtask 1701, processor 301 (of location system 212) uses “search area reduction” to “reduce the number of candidate locations that must be processed” by excluding candidates with a probability “calculated to be very close to zero.” APPLE-1005, [0173]. The reduction is dictated by Equation 6, which a POSITA would have understood is a direct comparison of a given received calibrated signal tuple (e.g., $\{S(1, n), S(2, n), S(3, n)\}$), as well as a discrete number Ω of the previously received calibrated signal tuples, against each of the expected signal tuples in the entire search area. APPLE-1003, ¶¶[46]-[47]; APPLE-1005, [0173]-[0174]. If the difference between all Ω of the recently received calibrated signal tuples and the expected signal value E for a given location (x, y) is greater than a threshold value Ψ , then it is assumed that the probability that the mobile terminal is at location (x, y) is very low. *Id.*; APPLE-1003, ¶[47].

After reducing the number of candidate locations in subtask 1701, processor 301 begins the subtasks related to generating the probability that the received signals are associated with each of the remaining locations within the geographic area. APPLE-1005, [0179]-[0207], APPLE-1003, ¶[48]. In subtasks 1702 and 1703, processor 301 converts the received calibrated signal tuple S and the expected signal tuples E for each of the candidate locations into a set of differentials ΔN and ΔE that are comparisons of adjusted signals within each

tuple.⁴ APPLE-1005, [0179]-[0188]; APPLE-1003, ¶[48].

In Bhattacharya, the purpose of generating and comparing signal-strength differentials ΔN and ΔE (as opposed to directly comparing received calibrated signal tuple S and the expected signal tuples E), is that “various factors including the condition of the wireless terminal’s antenna, the state of its battery, and whether the terminal is inside a vehicle” can affect the reported signals for a wireless terminal, even when it is the same make and model and at the same location. APPLE-1003, ¶[49]; APPLE-1005, [0021]-[0023]. By comparing signal-strength differentials (ΔN , ΔE), these biases owing to the state of the wireless terminal can be ameliorated. *Id.*

Generation of the signal-strength differentials (ΔN , ΔE) is provided in equations 7 and 8. APPLE-1005, [0181]-[0188]. An example of a differential ΔN for received calibrated signal tuple S and a differential ΔE for an expected signal

⁴ A POSITA would have understood and found obvious that embodiments of Bhattacharya that use GPRS packets for communication are not subject to saturation, and therefore would not require removal prior to computing signal-strength differential. APPLE-1005, [0164], [0179], [0180]; APPLE-1003, footnote 1. For simplicity, the description of Bhattacharya that follow assumes there are no saturated values.

tuples E at location x_1, y_1 is shown below:

$$\Delta N = [\{S(2, n) - S(1, n)\}, \{S(2, n) - S(3, n)\}]$$

$$\Delta E = [\{E(2, x_1, y_1, t) - E(1, x_1, y_1, t)\}, \{E(2, x_1, y_1, t) - E(3, x_1, y_1, t)\}]$$

where “t” is the time when the measurements underlying $\Delta N(k, n)$ were made.

APPLE-1005, [0181]-[0188]; APPLE-1003, ¶[50]. In this example, each of the signal strength differentials ($\Delta N, \Delta E$) has two elements (m-1), instead of the three (m) in associated signal tuples S and E, respectively. APPLE-1005, [0181].

At subtasks 1704 and 1705, processor 301 generates probability distributions for the “location of wireless terminal 201” (in subtask 1704, a probability distribution is based on the “most recently received reported signal-strength measurements; in subtask 1705, a probability distribution is based on “all of the received reported signal-strength measurements”). APPLE-1005, [0189].

As described above, the probabilities are based on statistical comparisons of signal strength differentials ($\Delta N, \Delta E$), instead of received calibrated signal tuples S and expected signal tuples E, though the signal strength differentials ($\Delta N, \Delta E$) are simply functions of the tuples (S, E). See APPLE-1005, [0189]-[0206]; APPLE-1003, ¶[51].

At subtask 1706, the probability distributions are evaluated to estimate the location of wireless terminal 201. APPLE-1005, [0207]. The estimation is accomplished by “pattern matching the pair-wise differentials of the calibrated

signal strengths to the pair-wise differentials of the expected signal strengths.” *Id.*, [0023], [0024], [0127]; APPLE-1003, ¶[52]. In essence, the probability distribution for the most recently received signal strength report (generated in subtask 1704) are combined with “aged” versions of the probability distribution for previously-received signal-strength reports from the same wireless terminal 201 (generated in subtask 1705), and then selecting the location associated with the greatest probability. *See* APPLE-1005, [0195]-[0207]; APPLE-1003, ¶[52].

Bhattacharya’s location estimation techniques and the ’494 patent specification each involve similar types of processing operations. The operations are performed in a similar order and for a similar purpose, and further results in a similar location estimation outcome. APPLE-1003, ¶[53]. For example, each technique involves the same type of data (signal strength values, network reports) and the same type of data modification (difference calculations). APPLE-1001, 5:15-31; APPLE-1005, [0182]; APPLE-1003, ¶[53].

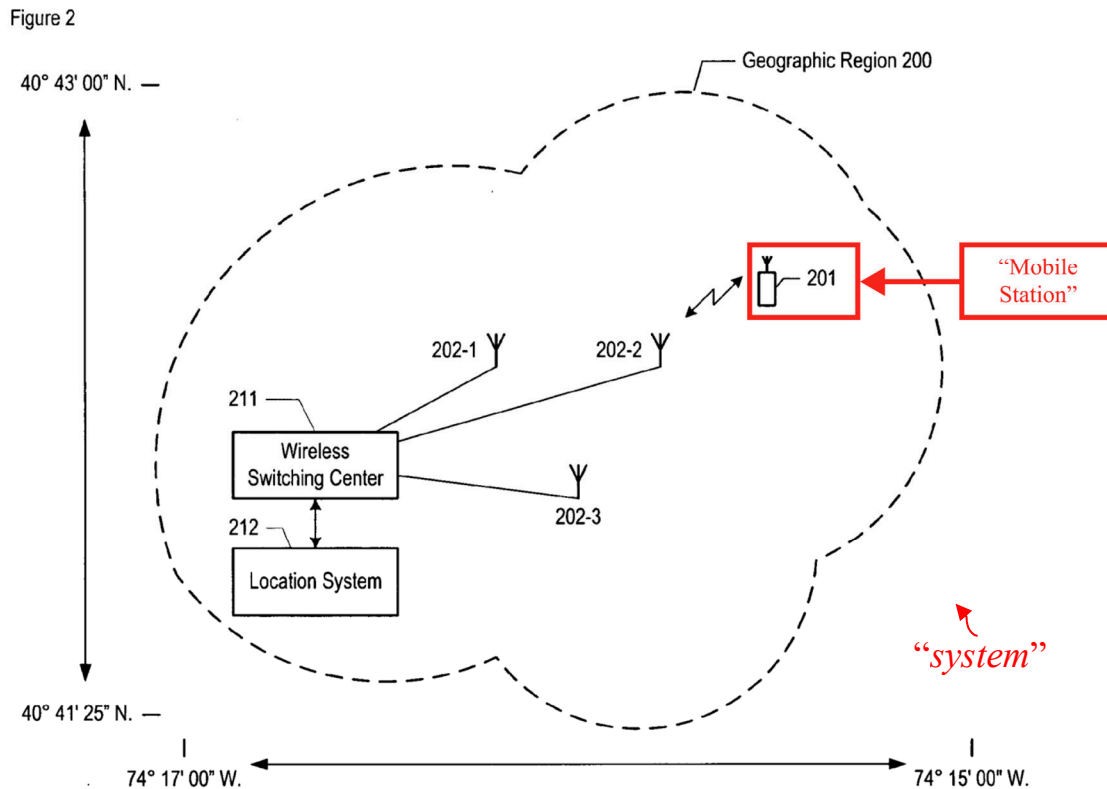
2. Claim 1

[1.1]

To the extent the preamble is limiting, Bhattacharya’s system includes a wireless terminal 201 (“*mobile station*”) that is a “GSM-compliant wireless terminal with GPRS packet data capability,” and can “operate in accordance with other protocols.” APPLE-1005, [0056]. As shown in Bhattacharya’s Figure 2

below, the system can include other components, such as wireless switching system center 211, location system 212, and base stations 202-1, 202-2, 202-3.

APPLE-1005, [0051]; APPLE-1003, ¶[63].

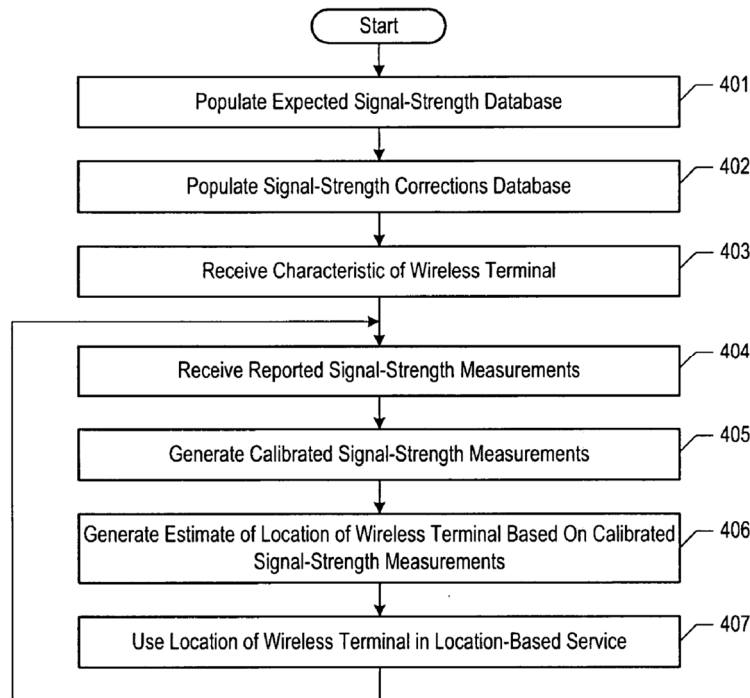


APPLE-1005, FIG. 2⁵.

Bhattacharya “estimate[es] the location of a wireless terminal.” APPLE-1005, Abstract. The location is estimated based on signal strength measurements and, in particular, “by comparing the signal strength [the wireless terminal 201] currently observes against a map or a database that correlates locations to signal

⁵ Annotations to the figures throughout this Petition are shown in color.

strengths.” *Id.*; APPLE-1003, ¶[64]. Figure 4 (below) shows Bhattacharya’s location estimation technique:

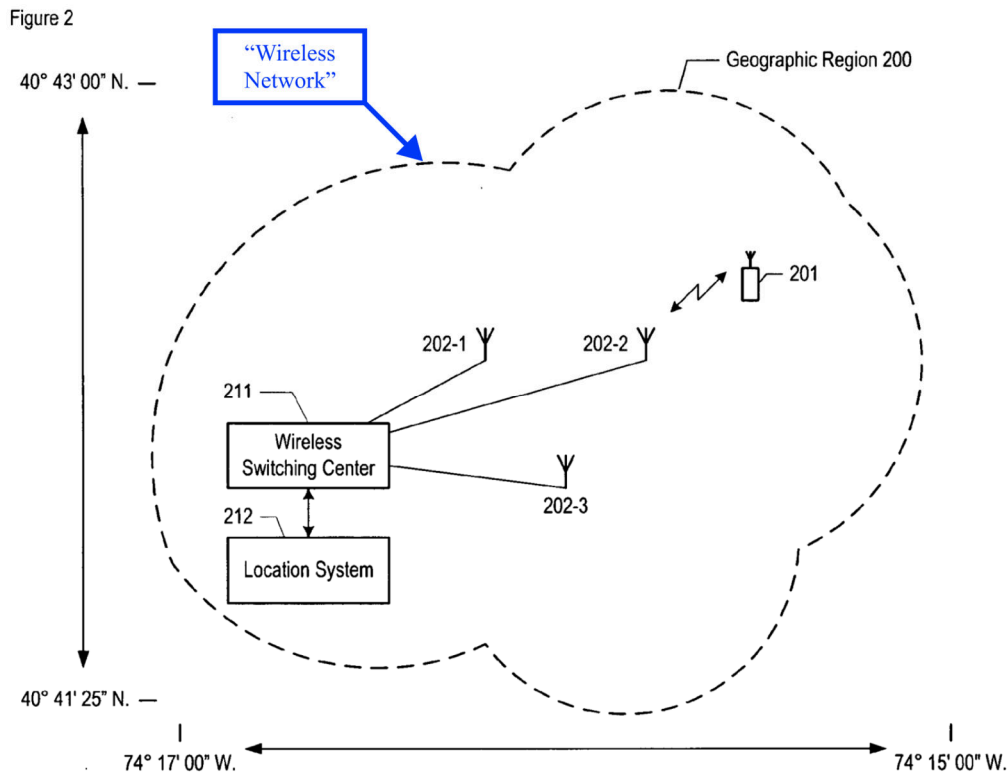


APPLE-1005, FIG. 4.

[1.2]

Bhattacharya discloses providing wireless telecommunications services for a geographic region 200 (“*predetermined region*”) in a network (“*wireless network*”). APPLE-1005, [0051]. A POSITA would have understood that region 200 is predetermined at least because the expected signal strength of signals at particular locations are stored in an expected signal strength database indicating that region 200 and locations therein would have been predetermined. APPLE-1003, ¶[65]; APPLE-1005, [0085].

Figure 2 (below) shows the wireless network including wireless terminal 201, wireless switching center 211, location system 212, and base stations 202-1, 202-2, 202-3. APPLE-1005, [0061]-[0063]; APPLE-1003, ¶[66].

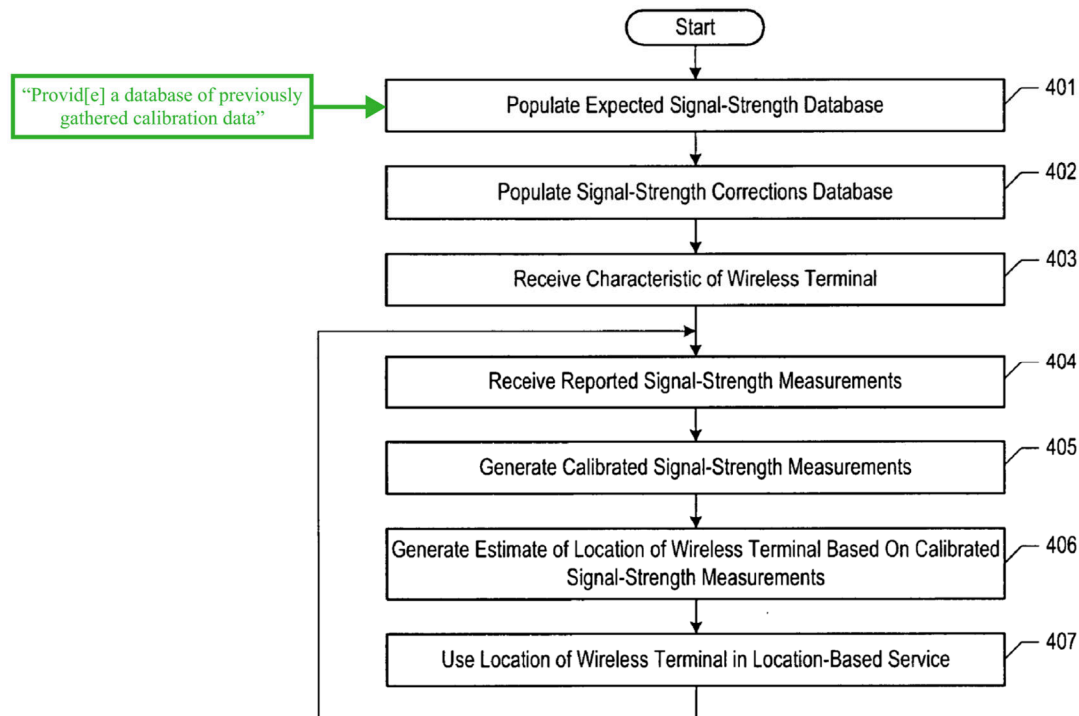


APPLE-1005, FIG. 2.

As shown in Bhattacharya's FIG. 4 below, at task 401, the expected signal-strength database ("**database**"), an example of which is shown below in Bhattacharya's FIG. 3, is populated to store data representing expected values later

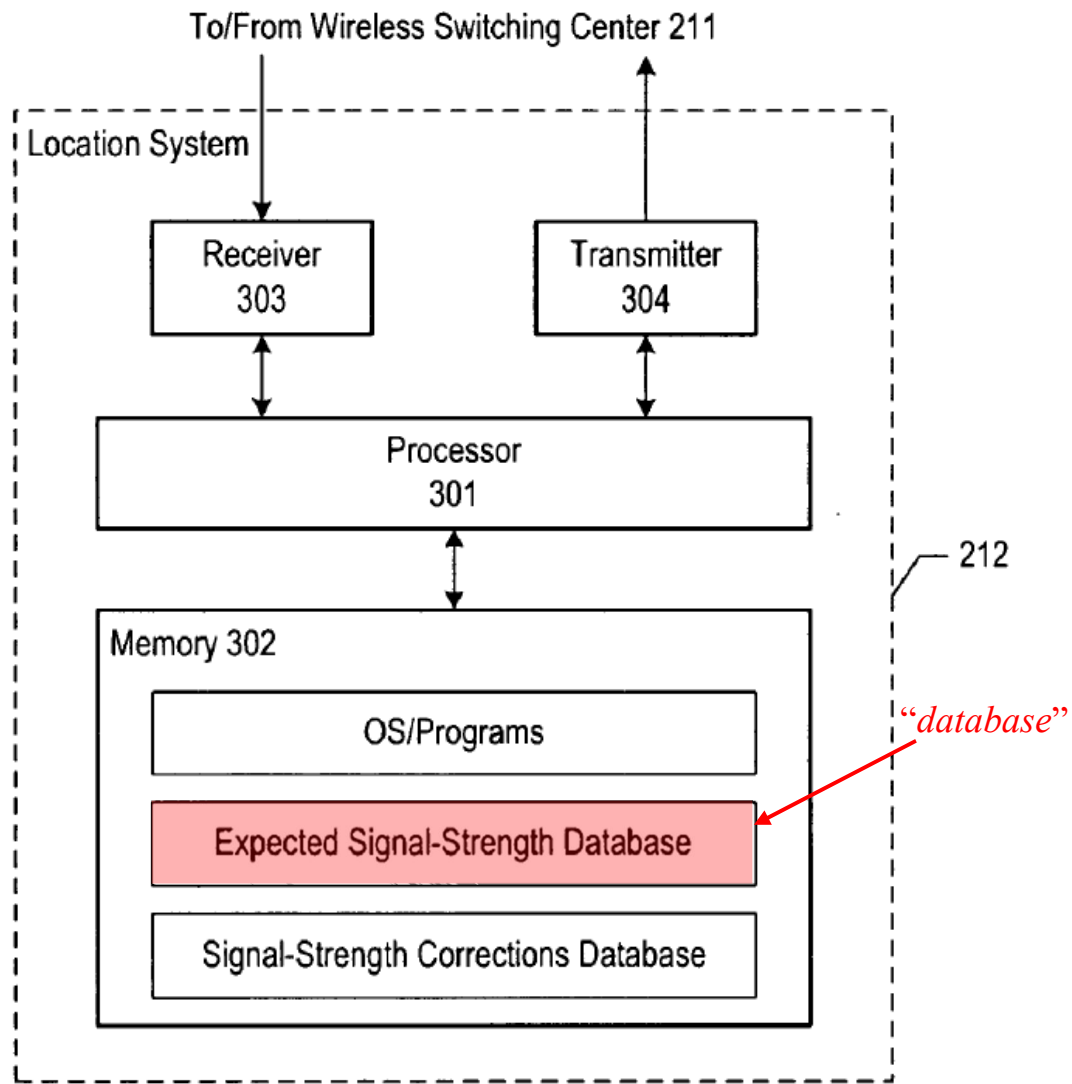
used for location estimation within geographic region 200 (“*calibration data*”).⁶

APPLE-1005, [0085]-[0087], [0064]-[0068], [0039]; APPLE-1003, ¶[67].



APPLE-1005, FIG. 4.

⁶ Data stored in Bhattacharya’s expected signal-strength database is an example of network measurement data associated with a defined geographic location. APPLE-1003, ¶[68]. As discussed for [5], *infra*, the stored data includes expected signal-strength measurements of known locations of base stations within a geographic region. APPLE-1005, [0086]. Further, since base station locations of a geographic region are known when populated in the database, each base station location is a known location. APPLE-1003, ¶[68].



APPLE-1005, FIG. 3.

Once the database is populated, the data includes expected signal-strengths ($E(1,x,y,t)$, $E(3,x,y,t)$, $E(3,x,y,t)$ (*id.*, [0086]), e.g., expected signal-strengths for locations in region 200 (Signal 1, Signal 2, Signal 3) (APPLE-1005, [0085]), which, in certain embodiments, is based on “one or more empirical signal-strength measurements” (*id.*, [0120]). APPLE-1003, ¶[69].

Moreover, Bhattacharya indicates that data stored in the expected signal-strength database represents “*previously-gathered calibration data*” under its plain meaning.⁷ APPLE-1003, ¶[70]. For example, through the ordering of tasks depicted in Figure 4, the expected signal-strength database is populated (i.e., data is stored in the database) at task 401, prior to the generation of signal-strength measurements by wireless terminal 201 and/or the collection of an SSMR (which includes the signal-strength measurements) by the location system 212 from a wireless terminal by computing signal-strength differentials in task 406. APPLE-1005, [0098]-[0101], [0179], FIG. 17 (subtask 1702), FIG. 4. Further, occurrence of intermediate tasks, e.g., population of signal-strength corrections database in task 402, receipt of the characteristics of wireless terminal in task 403, confirms that data to be stored in the database is populated (e.g., gathered) prior to receipt of

⁷ The phrase “previously-gathered” is a relative term requiring a gathering of “calibration data” prior to a reference time point. Through antecedent basis, reference to “database of calibration data” in a subsequent claim limitation ([1.6]) indicates that, under plain meaning, the “previously-gathered” requirement may be met at least by data that exists in the “expected signal-strength database” (“*database*”) prior to execution of any one or more steps of subsequently-recited claim limitations (e.g., [1.3]-[1.6]). APPLE-1003, ¶[70].

at least some of the signal-strength measurements in task 404 and modification of the signal-strength measurements in task 406. APPLE-1005, [0089]-[0101], [0179], FIG. 17 (subtask 1702). Thus, Bhattacharya's expected signal-strength database is populated prior to modification of reported signal-strength measurements in an SSMR to generate signal-strength differentials. APPLE-1003, ¶[71]. Indeed, in other alternative embodiments, "some of these tasks" occur "together in one task," confirming that Bhattacharya also contemplates sequential execution of tasks other than the order depicted in its Figure 4 process. APPLE-1003, ¶[71]; APPLE-1005, [0072].

Finally, collection of expected values for storage in the database before modification of observed network data is consistent with disclosure in the '494 patent specification corresponding to the "*previously-gathered calibration data.*" APPLE-1003, ¶[72]. In the '494 patent specification, "calibration data is typically collected in an outdoor environment" for "greater ease of performing automated calibration procedures." APPLE-1001, 1:27-38. Further, "calibration data may be obtained from data collection devices during field test operations, and/or from [mobile stations] or other communication devices within the general area of the [non-uniform grid points]." *Id.*, 4:1-14. Like these examples of calibration data, Bhattacharya's expected signal-strength measurements may be "generated by taking empirical measurements at various locations," specific examples of which

were well-known by the Critical Date. APPLE-1005, [0119]; APPLE-1003, ¶¶[72]-[73] (citing APPLE-1011, 5:12-27, 5:50-60, 7:6-21).

[1.3]

In Bhattacharya, wireless terminal 201 measures (“*collect[s]*”) signal-strength measurements (“*observed network measurement data*”) included in an SSMR. APPLE-1005, [0091]. Each SSMR includes “a tuple of reported signal-strength measurements {R(1,n), R(2,n), R(3,n)},” and specifies “real time, *t*, at which the signal-strength measurements were made” and “the relative order in which the signal-strength measurements are made.” *Id.*, [0091]-[0094]. In the Figure 2 example, the SSMR includes three signals, “Signal 1, Signal 2, and Signal 3” measured by the wireless terminal 201. APPLE-1005, [0158]-[0160]; *see also* [91], [70], FIG. 4; APPLE-1003, ¶[74].

[1.4]

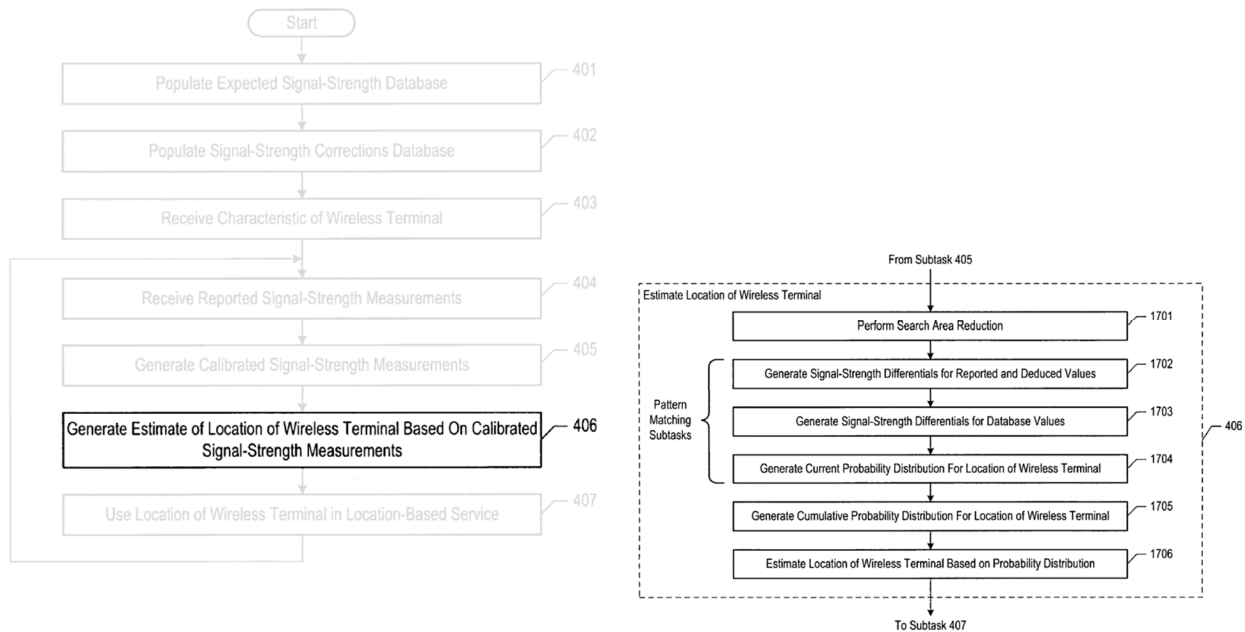
As discussed for [1.3], in Bhattacharya, an SSMR includes signal-strength measurements, e.g., “a tuple of reported signal-strength measurements R(1,n), R(2,n), R(3,n).” APPLE-1005, [0091]. In the example, “R(1,n)” is “signal-strength measurement of Signal 1 as measured by wireless terminal 201 at time *t*,” “R(2,n)” is “signal-strength measurement of Signal 2 as measured by wireless terminal 201 at time *t*,” and “R(3,n) is the *n*th reported signal-strength

measurement of Signal 3 as **measured by wireless terminal 201** at time t.” *Id.*, [0092]-[0094]. Thus, signal-strength measurements (“*observed network measurement data*”) are measured by wireless terminal 201 (“*collected by the mobile station*”). APPLE-1003, ¶[75]. Further, the wireless terminal 201 provides signal-strength measurements in an SSMR to the location system 212 for location estimation, and thus, the signal-strength measurements are “*transmitted to the network.*” APPLE-1005, [0057]-[0060]; APPLE-1003, ¶[75].

[1.5]

As noted above in [1.3]-[1.4], the wireless terminal 201 collects signal-strength measurements (“*observed network measurement data*”). APPLE-1005, [0091], [0064], [0120]-[0123]. As shown below in FIG. 4, after collecting or receiving the reported signal strength measurements in task 404, the “reported signal-strength measurements $\{R(1,n), R(2,n), R(3,n)\}$ from task 404 and the calibration function for the make and model of wireless terminal 201 [are used] to generate a tuple of calibrated signal-strength measurements $S(1,n), S(2,n), S(3,n)\}$. The purpose of task 405 is to correct—or compensate for the signal-strength measurement errors made by wireless terminal 201.” APPLE-1005, [0097], FIG. 4. By calibrating the signal strength measurements using the calibration function for the make and model of wireless terminal 201, Bhattacharya discloses [1.5].

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APPLE-1005, FIG. 4 (left), FIG. 17 (right).

Task 406 includes a set of pattern matching subtasks, including sets of signal-strength differentials for reported and expected data in subtasks 1702 and 1703, respectively. APPLE-1005, [0179]-[0188]. The “idea” behind using signal-strength differentials is to “ensure that ‘apples are compared with apples’ in subtask 1704...” *Id.*, [0187]. The equation below is used to compute signal-strength differentials. APPLE-1003, ¶[78].

$$\Delta N(k,n)=N(k+1,n)-N(k,n) \quad (\text{Eq. 7})$$

wherein $k=1, 2, 3, \dots, m-1$, and $\Delta N(k,n)$ is the k th signal-strength measurement differential for Report n .

APPLE-1005, [0182].

The above-referenced computation techniques involve subtraction of two signal strength measurements, $N(k+1,n)$ and $N(k,n)$. APPLE-1003, ¶[79]. For example,

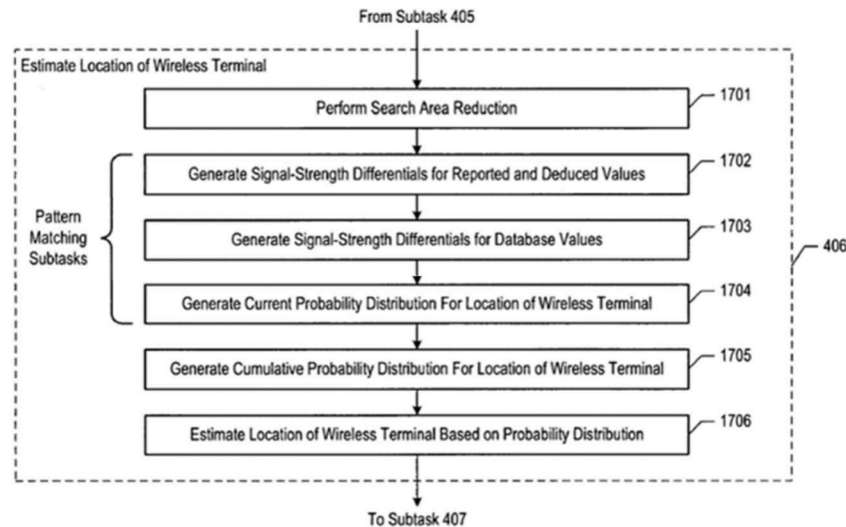
in equation 7 above, the signal measurement of $N(k+1,n)$ is modified by $N(k,n)$ to yield a “***modified said observed network measurement data***.” APPLE-1003, ¶[79].

Indeed, Bhattacharya’s modification of “***said observed network measurement data***” is similar to an example provided by the ’494 patent of how network measurement (NM) data are modified. APPLE-1001, 5:15-19 (“NM data may also be modified to adjust the power levels received from the serving and/or neighboring cell (NC) base stations[,]” e.g., “**differences in parameters** between the serving cell and the NC may be calculated and the quantities used to **modify** the original NM data”) (emphasis added). Elsewhere, the ’494 patent specification describes that “[m]odifying the original NMR components” includes “***subtracting*** or adding to existing NMR power components” using different examples of amounts, including “various known functions.” *Id.*, 6:63-7:10. The ’494 patent specification also provides non-limiting disclosure of several types of “NMR modification procedures.” *Id.*, 7:42-56; APPLE-1003, ¶[79].

[1.6]

As discussed for [1.5], in Bhattacharya’s location estimation technique, signal-strength data are compared against “a map or database that correlates locations to signal strengths.” APPLE-1005, [0014]; APPLE-1003, ¶[80]. For

example, in task 406, the comparison involves several “pattern matching” subtasks shown in Bhattacharya’s Figure 17 process:

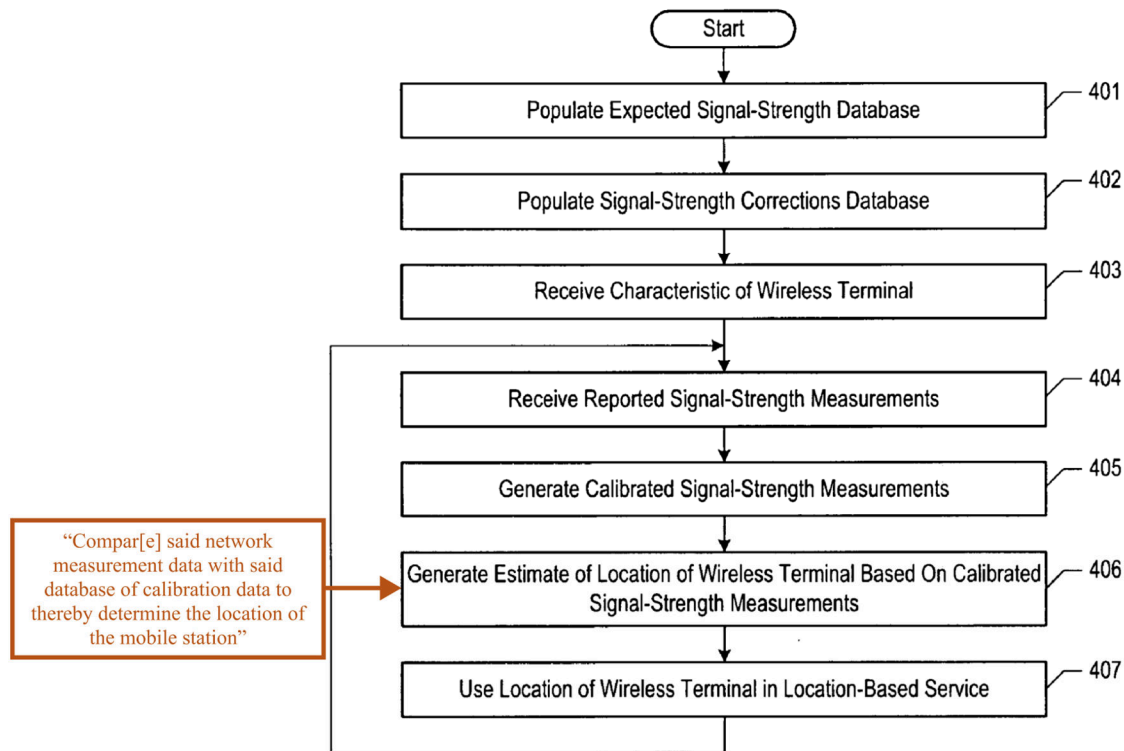


APPLE-1005, FIG. 17.

Subtasks 1702, 1703, 1704 involves pattern matching (“*comparing*”) signal-strength differentials (“*said modified network measurement data*”) and expected signal-strength differentials, which are generated based on data stored in the expected signal-strength database (“*said database of calibration data*”). APPLE-1005, [0179]-[0189]. The comparison is used to generate “current probability distribution” based on “the most recently received reported signal-strength measurements” and “cumulative probability distribution” based on “all of the received signal-strength measurements.” *Id.*, [0190]; APPLE-1003, ¶[81].

Further, the above-referenced pattern matching techniques are used to estimate a location of wireless terminal 201 (“*to determine the location of the*

mobile station”). Specifically, the system begins with “candidate locations that must be considered as the location for wireless terminal 201[,],” and “reduce[s] the number of candidate locations that must be processed” using “search area reduction,” which involves excluding candidate locations with probabilities “calculated to be very close to zero.” APPLE-1005, [0172]-[0173]. Use of the signal-strength differentials discussed above “ensure[s] that ‘apples are compared with apples,’” in other words, that the same types of values from reported data and calibration data are compared. *Id.*, [0187]. As noted above, the comparison is used to generate “current probability distribution” based on “the most recently received reported signal-strength measurements” and “cumulative probability distribution” based on “all of the received signal-strength measurements.” *Id.* Using both types of distributions enable location system 212 to “generate an estimate of the location of wireless terminal 201 that is more accurate than the estimate that is derivable from signal-strength measurements made at one time alone.” *Id.*, [0190]; APPLE-1003, ¶[82].



APPLE-1005, FIG. 4.

Moreover, location estimation in Bhattacharya and the '494 patent specification each involve the same type of data (signal strength values) and the same type of modification of such data (difference calculations). APPLE-1003, ¶[83]. In the '494 patent specification, the “modified network measurement data” may be generated by computing “differences in parameters between the serving cell and the [neighboring cells],” e.g., “[i]f an original NMR received at the [position determining equipment 50] had the form $NMR1=[P1, P2, P3, TA1]$ ” where P1, P2, and P3 are base station power levels, then “the modified NMR may be represented by: $NMR_modified=[0, P1-P2, P1-P3, TA1]$.” APPLE-1001, 5:20-

31. Bhattacharya similarly describes generation of “signal-strength measurement differentials” between “different pairs of signal-strength measurements {N(1,n),...N(m,n)}.” APPLE-1005, [0182].

3. Claim 14

Bhattacharya anticipates claim 14 in the same manner as explained above for the corresponding claim 1 limitations below. APPLE-1003, ¶[91].

Claim 1 Limitation	Corresponding Limitation
[1.1]	[14.1]
[1.2]	[14.2]
[1.4]	[14.5]
[1.5]	[14.6]
[1.6]	[14.7]

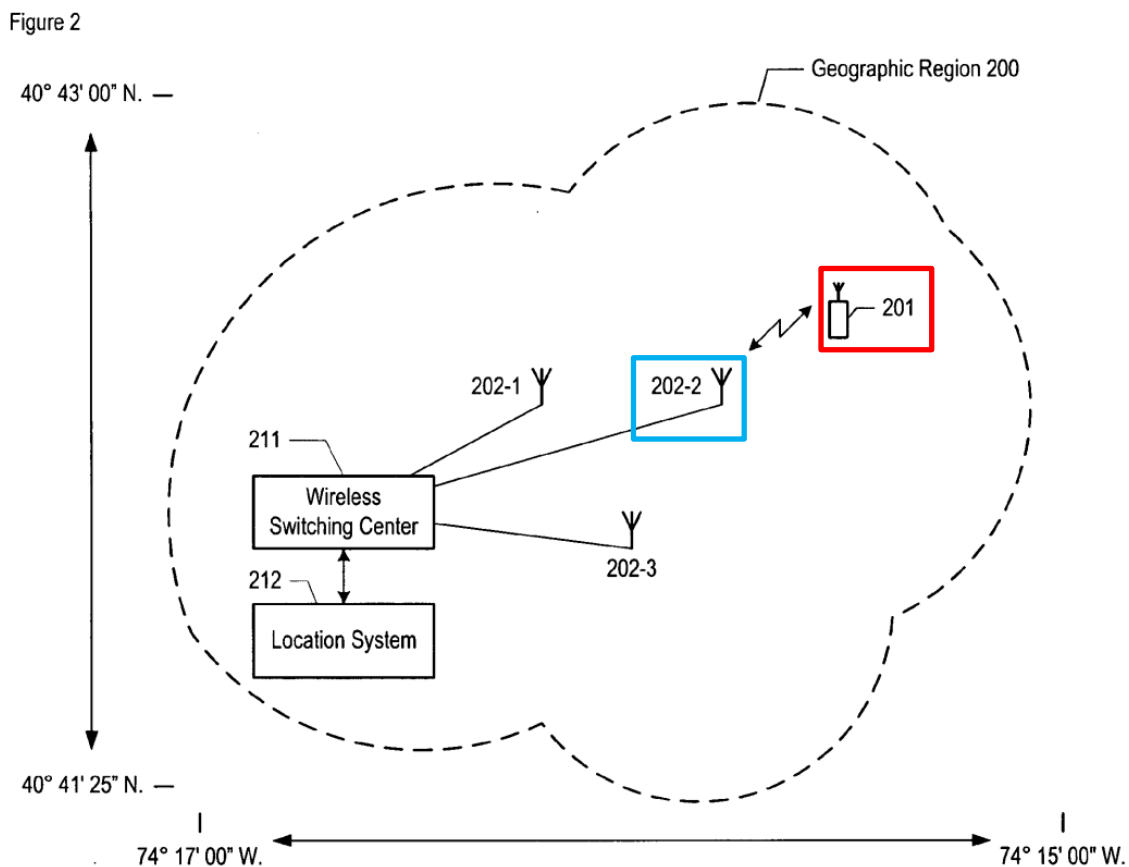
Features uniquely recited in claim 14 are addressed below. APPLE-1003, ¶[92].

[14.3], [14.4], [14.6]

Claim 14 recites a method for determining a location of a mobile station that involves nearly identical steps as those recited in claim 1, but further recites additional features of “**first signal characteristic**” and “**serving transmitter**.” As discussed below, Bhattacharya discloses these additional features through the location estimation techniques discussed in §III.A.1. APPLE-1003, ¶[93].

Bhattacharya provides a base station acting as a “**serving transmitter**” through examples of base station arrangements with a serving base station. In the

arrangement shown in Bhattacharya's Figure 1, "base station 102-2 serves wireless terminal 101" and therefore represents a serving base station for geographic region 100. APPLE-1005, [0003]. Further, Figure 2 (reproduced below) shows a similar arrangement of base stations in a geographic region 200 where "wireless terminal 201 is *serviced* by base station 202-2." APPLE-1005, [0055]. Base station 202-2 (which coincides with base station 102-2 in a similar arrangement) represents a transmitter that includes "*serving cell*" in the exemplary network of geographic region 200. APPLE-1003, ¶[94].



APPLE-1005, FIG. 2.

Further, as discussed for [1.3] and [1.4], wireless terminal 201 measures (“*collect[s]*”) signal-strength measurements (“*observed network measurement data*”) included in an SSMR, such as “a tuple of reported signal-strength measurements {R(1,n), R(2,n), R(3,n)}.” APPLE-1005, [0091]. For example, “R(2,n)” is “the nth reported signal-strength measurement of Signal 2 as measured by wireless terminal 201 at time t” where Signal 2 is the signal associated with base station 202-2. APPLE-1005, [0091], [0086]. Thus, since R(2,n) is associated with base station 202-2 as the serving base station, R(2,n) is the “*first signal characteristic from said serving transmitter*.” APPLE-1003, ¶[95]. Further, since signal-strength measurement values included in the SSMR (which includes “R(2,n)”) are used to generate signal-strength differentials, the generation (“*modifying*”) involves using “R(2,n)” to compute at least some of the signal-strength differentials (“*modifying...using said first signal characteristic*”). APPLE-1005, [0179].

4. Claims 2, 5, 9, 12, 18-22

[2]

As discussed for [1.2], Bhattacharya’s expected signal-strength database (“*said database*”) is populated to store data representing expected signal-strength measurements (“*previously-gathered calibration data*”). APPLE-1005, [0085]-[0090], [0115]. The expected signal-strength database “correlates location to

expected signal strength.” APPLE-1005, [0015]. For example, the database is “populated with the expected signal strengths of three signals at each location in geographic region 200.” *Id.*, [0085]. Each measurement is associated with “its expected signal strength at location x, y at time t.” *Id.*, [0086]. Since each expected signal-strength measurement are for a known location coordinate (e.g., x, y coordinates) when populated in the database, the locations associated with the location coordinates are “*one or more predetermined calibration points within said region.*” APPLE-1003, ¶[84].

[5]

As discussed for [1.2], Bhattacharya’s expected signal-strength database is populated to store data representing expected signal-strength measurements (“*previously-gathered calibration data*”). APPLE-1005, [0085]-[0090], [0115]. Further, since each expected signal-strength measurement has a known location coordinate (e.g., x, y coordinates) when populated in the database, each measurement (“*signal strength information*”) is “*measured at a predetermined calibration point within said region.*” APPLE-1005, [0085], [0086]; APPLE-1003, ¶[85].

Moreover, in one example described in Bhattacharya, expected signal strengths of three signals (“Signal 1,” “Signal 2,” “Signal 3”) are broadcasted by

respective base stations (base stations 202-1, 202-2, 202-3) also located at known locations within geographic region 200. APPLE-1005, [0086]. In this example, since expected signal-strength measurements are of signals transmitted by base stations at known locations within geographic region 200, each expected signal-strength measurement is of “*a signal transmitted from a known location within or in proximity to said region.*” *Id.*; APPLE-1003, ¶[86].

[9]

As discussed for [1.2], Bhattacharya’s expected signal-strength database is populated to store expected signal-strength measurements (“*previously-gathered calibration data*”). APPLE-1005, [0085]-[0090], [0115]. Further, the database is “populated with the expected signal strengths of three signals at each location in geographic region 200” such that that data stored in the database includes “Signal 1, Signal 2, and Signal 3.” APPLE-1005, [0085]; APPLE-1003, ¶[87].

Bhattacharya discusses the existence of a well-known location estimation technique in which “the location of a wireless terminal is estimated to be at the center of the cell in which the wireless terminal is located,” and further indicates that this technique can be “inexpensively implemented in legacy systems.” APPLE-1005, [0009]. Elsewhere, Bhattacharya indicates that embodiments of its invention are “ideally suited for use with legacy systems.” *Id.*, [0013]. A POSITA

would have understood that, in certain implementations of Bhattacharya, a serving base station is assigned to a single cell. APPLE-1003, ¶[88]; APPLE-1009, 5:1-12; APPLE-1006, [0239]. In such implementations, a POSITA would have understood that the wireless terminal 201 uses base station identification information (e.g., “base station identity code”) to identify the serving base station, and thus, the base station identification information is “*information identifying a serving cell of a transmitter*”. APPLE-1005, [0087]; APPLE-1003, ¶[88]. For example, as a “GSM-compliant wireless terminal,” wireless terminal 201 would have received control channel signals sent by a base station, where the base station identification information includes a “cell identifier,” which denotes the unique identifier of a cell. APPLE-1012, 51-52; APPLE-1005, [0052].

Moreover, Figure 9 shows “the expected signal strength, $E(2, t=0)$, of Signal 2 at each location” in region 200. APPLE-1005, [0036]. Thus, since expected signal-strength values at each of the locations shown in Figure 9 are associated with the serving base station (base station 202-2), each expected signal-strength value represents a “*signal received at a predetermined calibration point.*” APPLE-1005, [0125]; APPLE-1003, ¶[89].

[12]

See supra [1.2]. Bhattacharya’s expected signal-strength database is

populated to store expected signal-strength measurements (“*previously-gathered calibration data*”). APPLE-1005, [0085]-[0090], [0115]. In addition, it would have been understood by a POSITA that, in Bhattacharya, the locations where expected signal-strength values are collected (“*said predetermined calibration point*”) would have included indoor and outdoor (“*not located within a structure*”) locations. APPLE-1003, ¶[90]; APPLE-1005, [0055], [0057], [0058], [0063], FIG. 2, [0002] (explaining that base stations are “dispersed throughout [a] geographic area serviced by the system”), [0009] (explaining that accuracy of legacy location estimation systems was within several kilometers), [0010]. Because the expected signal-strength values are collected from various locations associated with locations of wireless terminals within a region that spans kilometers, such locations (“*said predetermined calibration point*”) would have included points that are “not located within a structure.” APPLE-1003, ¶[90].

[18]

As discussed for [1.3] and [14.3], the signal-strength measurements collected by wireless terminal 201 includes “R(2,n)” (“*said first signal characteristic*”). In this example, “R(2,n)” is a “signal-strength measurement of Signal 2,” and thus, is “*signal strength*.” APPLE-1005, [0091]-[0094], [0158]-[0160]; APPLE-1003, ¶[96].

[19]

As discussed for [1.3] and [1.4], wireless terminal 201 measures (“*collect[s]*”) signal-strength measurements (“*observed network measurement data*”) included in an SSMR. The measurements include “a tuple of reported signal-strength measurements {R(1,n), R(2,n), R(3,n)}.” APPLE-1005, [0091]. In the SSMR, “R(1,n)” is “the nth reported signal-strength measurement of Signal 1 as measured by wireless terminal 201 at time t” where Signal 1 is the signal associated with base station 202-1. APPLE-1005, [0091], [0086]. As explained for Claim 14 (§III.A.3), base station 202-2 is an example of a serving transmitter, and thus, base stations 202-1 and 202-3 are each an example of a “*neighboring transmitter*.” APPLE-1003, ¶[97]; APPLE-1005, [0003], [0055]. Thus, since “R(1,n)” is associated with a base station that acts as a neighboring transmitter, “R(1,n)” is the “*second signal characteristic from a neighboring transmitter wherein said second signal characteristic is signal strength*.” APPLE-1005, [0091]-[0094], [0158]-[0160].

[20]

As discussed for [1.6], Bhattacharya’s location estimation technique involves “pattern matching” subtasks in which signal-strength differentials determined using SSMRs are compared to expected signal-strength differentials in the expected signal-strength database. APPLE-1005, [0179]-[0189]. Specifically,

“expected signal-strength differentials” are computed “for all of the locations not excluded from consideration” in a prior search area reduction step. *Id.*, [0184].

Further, generation of expected signal-strength differentials is to “ensure that ‘apples are compared with apples’” in the comparison of expected signal-strength values and signal-strength values in estimating the location of a wireless terminal.

Id. Based on these disclosures, in some circumstances, expected signal-strength differentials are generated for comparison against signal-strength differentials computed from Signal 1 (“R(1,n)”) and Signal 2 (“R(2,n)”) such that generation of the expected signal-strength differentials “***uses a difference between said first and second signal characteristics.***” APPLE-1003, ¶[98].

[21]

As discussed for Claim 14, base station 202-2 represents an example of a “***serving transmitter***” in the network of geographic region 200 since “wireless terminal 201 is serviced by base station 202-2.” APPLE-1003, ¶[99]; APPLE-1005, [0003], [0055]. Further, signal-strength measurement, “R(2,n)” (or Signal 2) is associated with base station 202-2 and thereby the “***first signal characteristic.***” APPLE-1005, [0086]. Further, since “Signal 2 is the overhead control channel broadcast by base station 202-2,” “R(2,n)” (or Signal 2) is the “***signal strength of a control channel transmitted by said serving transmitter and received by said***

mobile station.” Id.; APPLE-1003, ¶[99].

[22]

As discussed for Claim 14, base station 202-2 is an example of a serving transmitter, and thus, base stations 202-1 and 202-3 are examples of a “*neighboring transmitter.*” APPLE-1005, [0003], [0055]. Further, signal-strength measurement, R(1,n) (or Signal 1) is associated with a base station 202-1 and thereby the “*second signal characteristic.*” APPLE-1005, [0086]. Further, since “Signal 1 is the control channel broadcast by base station 202-1,” R(1,n) (or Signal 1) is the collected “*signal strength of a control channel transmitted by said neighboring transmitter and received by said mobile station.*” *Id.*; APPLE-1003, ¶[100].

5. Claim 16

Bhattacharya anticipates claim 16 in the same manner as explained above in [12]. APPLE-1005, [0055], [0057], [0058], [0063], FIG. 2; APPLE-1003, ¶[101].

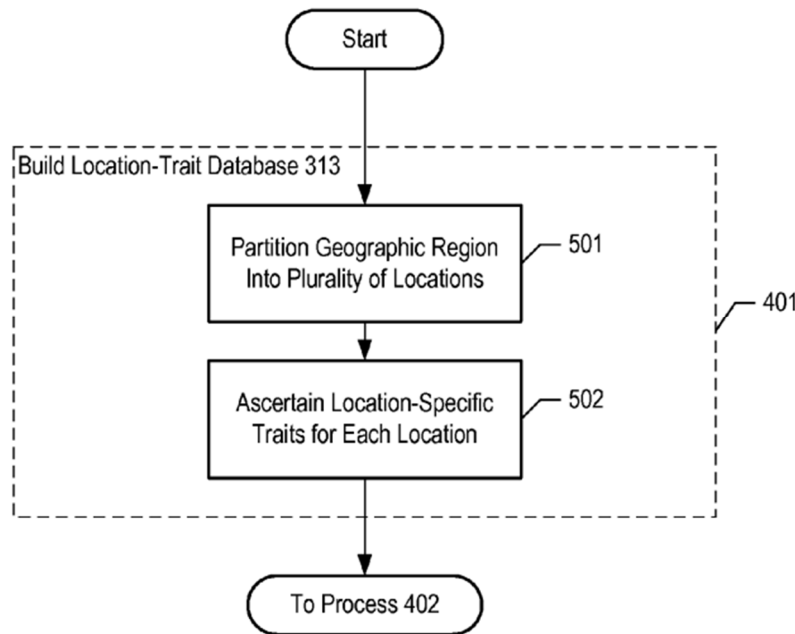
**B. [GROUND 1B] – Bhattacharya-Spain Renders Claims 1-5,
9, 11, 12, 14-16, 18-22 Obvious**

1. Bhattacharya-Spain

(a) Spain⁸

Spain describes techniques for populating a database (e.g., location-trait database 313) with expected values for traits to use for comparison against measured values in location estimation of a wireless terminal at an unknown location. APPLE-1006, [0006]. Spain discloses a “location-trait database 313” “that maps each of a plurality of locations to one or more expected traits associated with a wireless terminal at that location.” APPLE-1006, [0066]. Spain’s Figure 5 (below) shows a technique for building a location-trait database 313. APPLE-1003, ¶¶[54]-[55].

⁸ Spain is a publication of a U.S. patent application filed on 5/22/2006 by the same original applicant as Bhattacharya (Polaris Wireless, Inc.) and roughly fourteen months after Bhattacharya’s 3/15/2005 filing date. APPLE-1006, cover; APPLE-1005, cover. Spain’s first-named inventor (David Stevenson Spain, Jr.) is also an inventor listed on Bhattacharya.



APPLE-1006, FIG. 5.

At process 501, “geographic region 220 is partitioned into $B(T,N)$ locations,” where “ $B(T,N)$ varies as a function of calendrical time T and the environmental conditions N .” APPLE-1006, [0072]. For instance, “calendrical time” is defined as “the time as denominated in one or more measures (e.g., seconds, minutes, hours, time of day, day, day of week, month, month of year, year, etc.).” *Id.*, [0035]. Further, “environmental conditions” are defined to “include one or more physical aspects of the environment,” e.g., “the astronomical conditions, atmospheric conditions, the quantity and density of radio traffic, the quantity and density of vehicular traffic, road and sidewalk construction, etc.” *Id.*; APPLE-1003, ¶[56].

Further, “the number of locations that geographic region 220 is partitioned into is static.” APPLE-1006, [0072]; APPLE-1003, ¶[57]. Each “location” also includes various types of information, including “a unique identifier,” “coordinates” that “define its scope (e.g., position, area, volume, etc.),” “expected value $E(b, T, N, W, Q)$ for each trait, Q , when wireless terminal W is at location b at calendrical time T given environmental conditions, N ,” among others. APPLE-1006, [0076]-[0082]. A POSITA would have understood and found obvious that the examples of information specified for each location are stored in location-trait database 313. APPLE-1003, ¶[57].

(b) Combination

As discussed in §III.A.1, Bhattacharya discloses leveraging the expected signal-strength functions that are “a function of time” to account for time-dependent changes based on “atmospheric and meteorological conditions.” APPLE-1005, [0114]. Bhattacharya also describes “pattern matching the calibrated signal-strength measurements $\{S(1,n), S(2,n), S(3,n)\}$ against the expected signal-strength functions $E(1,x,y,t)$, $E(2,x,y,t)$, and $E(3,x,y,t)$ that correspond in time to when the signal-strength measurements underlying $\{R(1,n), R(2,n), R(3,n)\}$ are based.” *Id.*, [0127]. But Bhattacharya does not specifically address how its expected signal-strength database is populated to account for time-dependent changes based on “atmospheric and meteorological conditions.”

APPLE-1003, ¶[102]. Bhattacharya also does not specifically define the terms “time” and “conditions.” The absence of such detail would have led a POSITA looking to implement Bhattacharya’s teachings to look to well-known techniques—including those published by the same inventors or the same assignee relatively close in time to Bhattacharya—for generating and using expected values to account for time-dependent changes based on atmospheric and meteorological conditions. APPLE-1003, ¶[102].

A POSITA would have thereby discovered Spain—a publication of a U.S. application filed on 5/22/2006 by the same original applicant as Bhattacharya (Polaris Wireless, Inc.) and multiple overlapping inventors (David Spain, Martin Feuerstein). APPLE-1005, 1; APPLE-1006, 1; APPLE-1003, ¶[103]. Spain describes techniques for estimating the location of a wireless terminal, but, additionally, offers implementation details for expected values stored in a database and used for pattern matching in location estimation. APPLE-1006, [0006], [0072], [0076]. Spain offers specific examples of “calendrical time” and “environmental conditions,” each of which are relevant to the “time” and “conditions” terms referenced in Bhattacharya. *Compare* APPLE-1005, [0114], [0127] *and* APPLE-1006, [0035].

In combining Bhattacharya and Spain, a POSITA would have found obvious that Bhattacharya’s expected signal-strength measurements (stored in an expected

signal-strength database) correspond to Spain's expected values (stored in location-trait database 313). APPLE-1003, ¶[104]. Like Bhattacharya, Spain's location-trait database 313 is populated using expected values for traits of a location, which interrelate among others, signal strength, location (b), and time (t). APPLE-1006, [0076]; APPLE-1005, [0086], [0115]. Expected values of traits used in Spain are similarly determined through theoretical models and/or empirical measurements. APPLE-1006, [0126]-[0128]; APPLE-1005, [0120].

A POSITA would have also understood and found obvious that implementing the database of Bhattacharya-Spain involves collecting expected values and populating the database during a pre-processing step that occurs prior to the measurement of values for location estimation. APPLE-1003, ¶[105]. Such a pre-processing step is consistent with each of Bhattacharya and Spain. In Bhattacharya, generating expected values is "generally complex and potentially expensive, and it is, therefore, performed only when necessary." APPLE-1005, [0087]. Likewise, in Spain, "[t]he process for generating [a] multi-dimensional probability distribution can be computationally intensive" and "when the number of locations that must be considered is large, the process can often take too long." APPLE-1006, [0215]. A POSITA, therefore, would have recognized that prior generation of expected values and storage of those values in the database (as distinguished from generating these values at the same time point as measurement

by a wireless terminal of values for estimating its location) ensures that the location system is not slowed down in performing location estimation. APPLE-1003, ¶[105].

Further, Spain's location-trait database 313 stores "environmental conditions" as one of the traits associated with each location. APPLE-1006, [0076], [0086], [0102]. The generation of expected values at roughly the same time point as values are measured by the wireless terminal would have obviated the need for location-trait database 313 to store expected values as a function of environmental conditions. APPLE-1003, ¶[106]. Indeed, the correspondence in measurement times would have led to substantially the same environmental conditions associated with each measurement (e.g., if it is raining in a given location, both the expected values and the measured values already account for rain due to their time correspondence at collection). *Id.* Spain's location estimation technique instead accounts for environmental conditions in that the "set of measurements" provided by wireless terminal 201 to location server 214 includes "an indication of the environmental conditions, N," thereby expressly accounting for environment as a separate parameter. The location server 214 uses this information to identify appropriate expected values stored in the location-trait database 313 for comparison. APPLE-1006, [0202]; APPLE-1003, ¶¶[106]-[107]. Spain therefore contemplates gathering and storage of expected values prior to any

measurement being performed by a wireless terminal. *Id.*

A POSITA would have also reasonably expected to succeed in combining Bhattacharya and Spain since the combination would have required only routine knowledge well within the skill of a POSITA prior to the earliest effective filing date. APPLE-1003, ¶[108]. Bhattacharya describes generation of expected signal-strength functions as “well-known,” confirming that leveraging Spain’s teachings of its location-trait database 313 to implement Bhattacharya would have been capable of being performed by a POSITA without invention. *Id.*; APPLE-1005, [0112]. In this manner, the Bhattacharya-Spain combination would have merely involved combining prior art elements according to known methods to yield predictable results.

Furthermore, the elements of Bhattacharya-Spain would each perform functions they had been known to perform prior to the combination—a location system would apply functions interrelating time, location, and environmental conditions to generate expected signal-strength values for pattern matching against reported values for estimating the location of a wireless terminal (as described in Bhattacharya and Spain). APPLE-1005, [0112]-[0117]; APPLE-1006, [0035]; APPLE-1003, ¶[109]; *KSR v. Teleflex*, 550 U.S. 398, 417 (2007). Indeed, given the similarities of inventors, assignee, and described subject matter, the combination would also have been predictable given that a POSITA would have

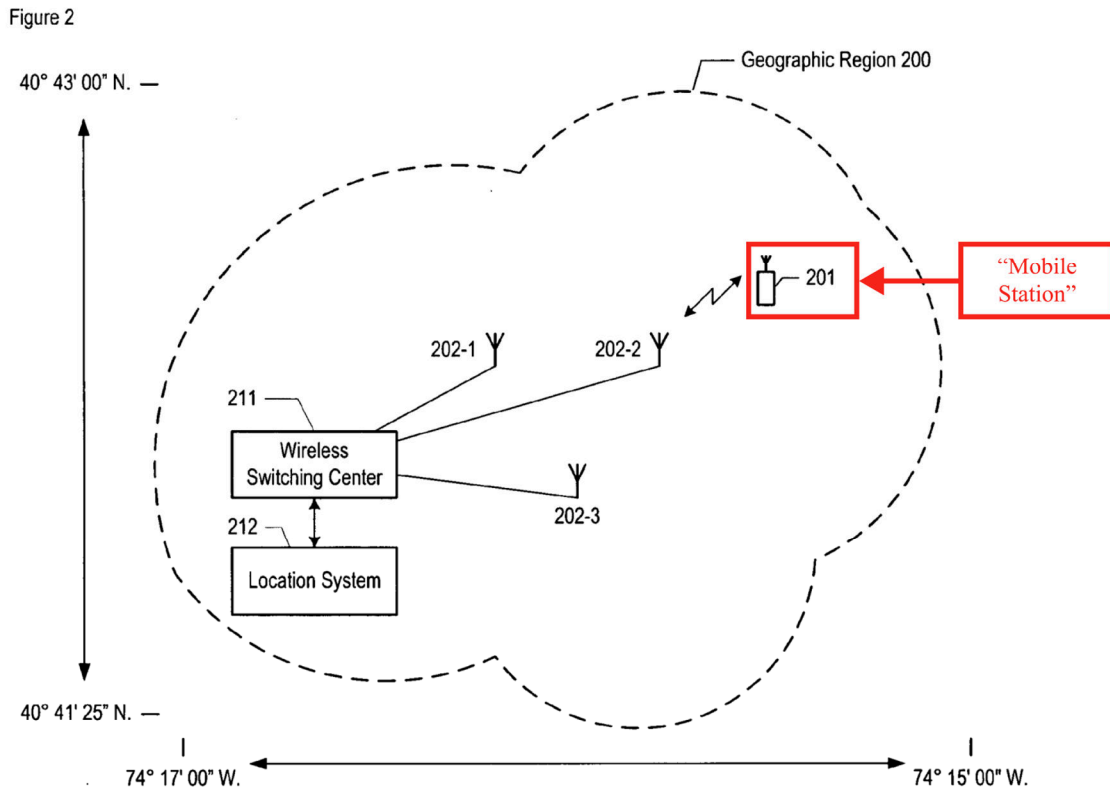
looked to similar systems to better understanding the teachings and implementations of Bhattacharya. APPLE-1003, ¶[109].

2. Claim 1⁹

[1.1]

To the extent the preamble is limiting, the Bhattacharya-Spain system includes a wireless terminal (“*mobile station*”). APPLE-1005, [0056]; APPLE-1003, ¶¶[110], [112]; *see supra* §III.A.2.

⁹ Bhattacharya-Spain incorporates the teachings of Bhattacharya, which, as discussed in §§III.A.2-5, disclose aspects of this limitation. Ground 1B incorporates the prior art disclosures referenced in Ground 1A.



APPLE-1005, FIG. 2.

As discussed below, the combined system implements a method that “*determine[s] a location of the wireless terminal.*” See also §III.A.2.[1.1]; APPLE-1003, ¶[111].

[1.2]

Bhattacharya-Spain render obvious [1.2] for the reasons described in §III.A.2.[1.2]. APPLE-1005, [0115], FIGS. 2, 4; APPLE-1003, ¶[113].

In addition, Bhattacharya-Spain would have operated within geographic region 200 (“*predetermined region*”) and provided wireless telecommunications services through a network (“*wireless network*”) associated with region 200.

APPLE-1005, [0051]. The combination would have provided an expected signal-strength database (“*database*”) that is populated to store various types of data representing expected values (“*calibration data*”). APPLE-1005, [0085]-[0087]. A POSITA would have found it obvious that data representing expected values that is stored in a database provided by Bhattacharya-Spain is an example of information based on prior network measurements. APPLE-1003, ¶¶[114]-[115]. As discussed in §III.B.1(b), Spain indicates scenarios in which at least some of expected values already exist in the database (i.e., are preexisting calibration data) when values are measured by a wireless terminal at a later time point. APPLE-1006, [0070], [0173], [0174].

Based on the disclosures in Bhattacharya and Spain, a POSITA would have understood and found obvious that data representing expected values stored in the expected signal-strength database represents “*previously-gathered*” data. APPLE-1003, ¶[116]; APPLE-1005, [0089]-[0090]. As explained (in §§III.B.1(a)-(b)), a POSITA would have implemented Bhattacharya-Spain such that expected values are collected and populated in a database as a calibration data gathering step that occurs prior to wireless terminals later measuring values for comparison to this previously gathered calibration data for location estimation. APPLE-1005, [0087]; APPLE-1006, [0105], [0215]; APPLE-1003, ¶[116]. Prior generation of expected values and storage of those values in the database ensures that the location server is

not slowed down in performing location estimation by having to engage in a laborious and computationally-intensive process of generating and storing the expected values each and every time a location estimate is desired for a given wireless terminal. *Id.*

Further, based on Spain, a POSITA would have also implemented the database of Bhattacharya-Spain to store “environmental conditions” as one of the traits associated with each location. APPLE-1006, [0076], [0086], [0102], [0105]; APPLE-1003, ¶[117]. Spain’s location estimation technique accounts for environmental conditions in that a “set of measurements” provided by wireless terminal 201 to location server 214 includes “an indication of the environmental conditions, N,” thereby expressly accounting for environment as a separate parameter. The location server 214 uses this information to identify appropriate expected values stored in the location-trait database 313 for comparison. APPLE-1006, [0202]; APPLE-1003, ¶[117]. By accounting for environment as a separate parameter, Spain’s disclosure contemplates gathering and storage of expected values prior to any measurement being performed by a wireless terminal for estimating its location. *Id.* Thus, the Bhattacharya-Spain database is populated with “*previously-gathered calibration data*” insofar as the stored data was collected and populated in the database during a pre-processing step that occurs prior to measurement of values by wireless terminals for comparison to the stored

expected values as part of location estimation. *Id.*

Moreover, Spain's maintenance techniques for location-trait database 313 further indicate scenarios in which at least some of the expected values already exist in the database (i.e., are preexisting calibration data) at time points when values are measured by a wireless terminal. APPLE-1006, [0070], [0173], [0105], [0174]. An exemplary configuration of such a maintenance technique is one in which existing content in location-trait database 313 is appended with newly collected data such that the preexisting calibration data (e.g., data collected during a prior calibration operation) remains in the database for a specified time period. *Id.*, [0070]; APPLE-1003, ¶[118]. In such scenarios, the database is populated with “***previously-gathered calibration data***” insofar as data previously gathered for location estimations performed at prior time points are available in the database (i.e., are preexisting calibration data) at a later time point when values are measured by a wireless terminal. *Id.*

Finally, implementation of Bhattacharya-Spain to collect and store expected values in a database prior to a wireless terminal later measuring values for comparison for location estimation, as discussed above, is consistent with disclosure in the '494 patent specification corresponding to the “***previously-gathered calibration data***.” APPLE-1003, ¶[119]. In the '494 patent specification, “calibration data is typically collected in an outdoor environment”

for “greater ease of performing automated calibration procedures.” APPLE-1001, 1:27-38. Further, “calibration data may be obtained from data collection devices during field test operations, and/or from [mobile stations] or other communication devices within the general area of the [non-uniform grid points.” *Id.*, 4:1-14. Like the examples of calibration data described in the ’494 patent specification, expected signal-strength measurements in Bhattacharya-Spain may be “generated by taking empirical measurements at various locations,” examples of which were well-known by the Critical Date. APPLE-1006, [0105], [0119]; APPLE-1003, ¶¶[119]-[120] (citing APPLE-1011, 5:12-27, 5:50-60, 7:6-56).

[1.3], [1.4], [1.5], [1.6]

Bhattacharya-Spain renders these limitations obvious for the same reasons discussed above in Ground 1A. *See supra* §III.A.2; APPLE-1003, ¶¶[121]-[125].

3. Claim 14

Bhattacharya-Spain renders claim 14 obvious in the same manner as explained above for the corresponding claim 1 limitations below. APPLE-1003, ¶¶[143]-[144].

Claim 1 Limitation	Corresponding Limitations
[1.1]	[14.1]
[1.2]	[14.2]
[1.4]	[14.5]

Claim 1 Limitation	Corresponding Limitations
[1.5]	[14.6]
[1.6]	[14.7]

Features uniquely recited in claim 14 are addressed below.

[14.3], [14.4], [14.6]

As discussed in §III.A.3, claim 14 recites a method for determining a location of a mobile station that involves nearly identical steps as those recited in claim 1, but further recites additional features of “**first signal characteristic**” and “**serving transmitter.**” As discussed below, Bhattacharya-Spain renders these additional features obvious. APPLE-1003, ¶[145].

Bhattacharya-Spain provides a base station acting as a “**serving transmitter.**” APPLE-1005, [0003], [0055]. A POSITA would have found obvious that base station 202-2 represents a transmitter that includes “**serving cell**” in the exemplary network of geographic region 200. APPLE-1003, ¶[146]. Further, as discussed for [1.3], in Bhattacharya-Spain, a wireless terminal measures (“**collect[s]**”) signal-strength measurements (“**observed network measurement data**”) included in an SSMR. *Id.* The measurements include “a tuple of reported signal-strength measurements {R(1,n), R(2,n), R(3,n)}.” APPLE-1005, [0091]. Since R(2,n) is associated with base station 202-2 (the serving base station), R(2,n) is the “**first signal characteristic from said serving transmitter.**” Reported signal-

strength measurement values included in the SSMR (which includes “R(2,n)”) are used to generate signal-strength differentials, and thus, their generation (“*modifying*”) involves using “R(2,n)” to compute at least some of the signal-strength differentials (“*modifying...using said first signal characteristic*”). APPLE-1005, [0179]; APPLE-1003, ¶[146].

4. Claims 2, 3, 5, 9, 11, 12, 18-22

[2]

As described above in §III.B.2.[1.2], Bhattacharya-Spain would have provided a database (“*said database*”) that a POSITA would have found obvious, based on Spain, to implement to store data representing expected values collected at a pre-processing or prior measurement step (“*previously-gathered calibration data*”). APPLE-1005, [0085]-[0090], [0115]; APPLE-1006, [0006], [0070], [0072], [0076]; APPLE-1003, ¶[126]. As discussed in §§III.B.1(a)-(b), Spain discloses that “a drive-test regimen is developed that periodically makes empirical measurements throughout geographic region 220 with highly-accurate equipment to ensure the accuracy, freshness, and completeness of the information contained in Location-Trait Database 313...” APPLE-1006, [0173]. A natural implementation of this disclosure is that the “drive-test regimen” enables use of “highly-accurate equipment” for calibration, i.e., the highly accurate equipment periodically collects empirical measurements representing expected values, which are then used to

update location-trait database 313. APPLE-1003, ¶[126]. Since each expected signal-strength measurement has a known location coordinate (e.g., x, y coordinates) when populated in the database, the locations associated with the location coordinates are “*one or more predetermined calibration points within said region.*” *Id.*

[3]

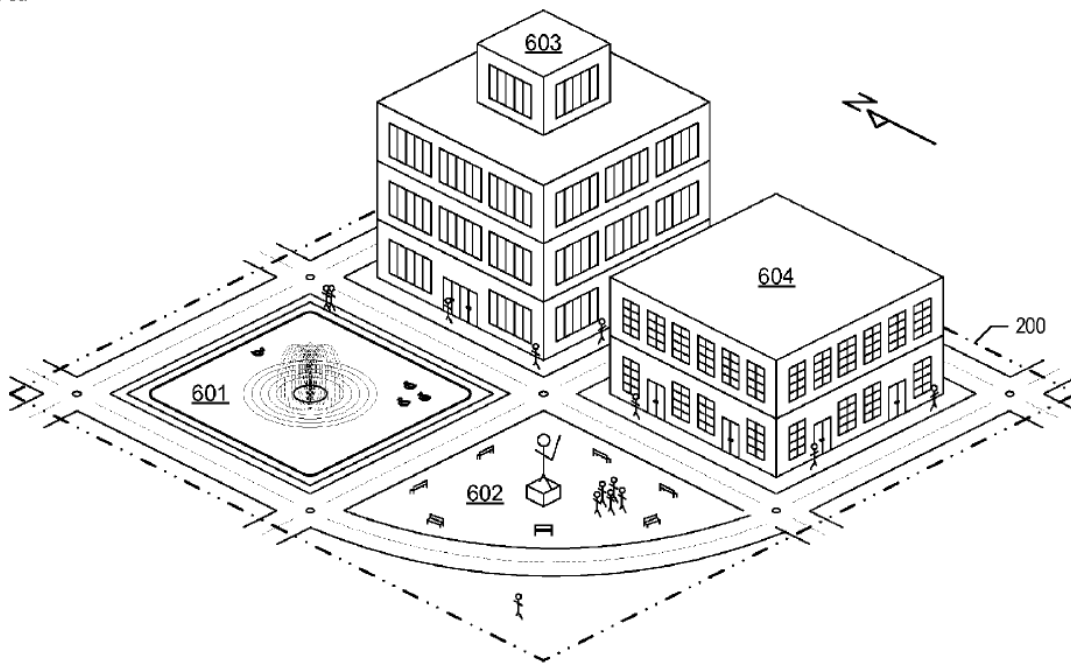
In the '494 patent specification, a term “*non-uniform grid point*” can “represent the signal characteristics and/or calibration data over a given region.” APPLE-1001, 3:57-67.¹⁰ Bhattacharya-Spain renders this feature obvious through Spain’s techniques for partitioning a geographic region. APPLE-1003, ¶[127]. Specifically, a location system of Bhattacharya-Spain includes requisite hardware for “populating, amending, using, and managing Location-Trait Database 313.” APPLE-1006, [0058]. Location-Trait Database 313 is “a database that maps each of a plurality of locations to one or more expected traits associated with a wireless terminal at that location.” *Id.*, [0066]. Further, in generating the Location-Trait

¹⁰ While the '494 patent specification states that “[a]s illustrated in FIG. 1, a set of NUGs (NUG1, NUG2 and NUG3) are shown as being a part of a larger geographical region (R),” these features are absent from Figure 1.

Database 313, the location system partitions a geographic region 220 “into B(T,N) locations.” *Id.*, [0072]. Thus, expected values for partitioned locations are combined into the Location-Trait Database 313 (“*combin[ed] to form said previously-gathered calibration data at one or more predetermined calibration points*”). APPLE-1003, ¶[127].

For example, Spain’s Figure 6A (below) depicts “an isometric drawing of geographic region 220.” APPLE-1006, [0098].

Figure 6a

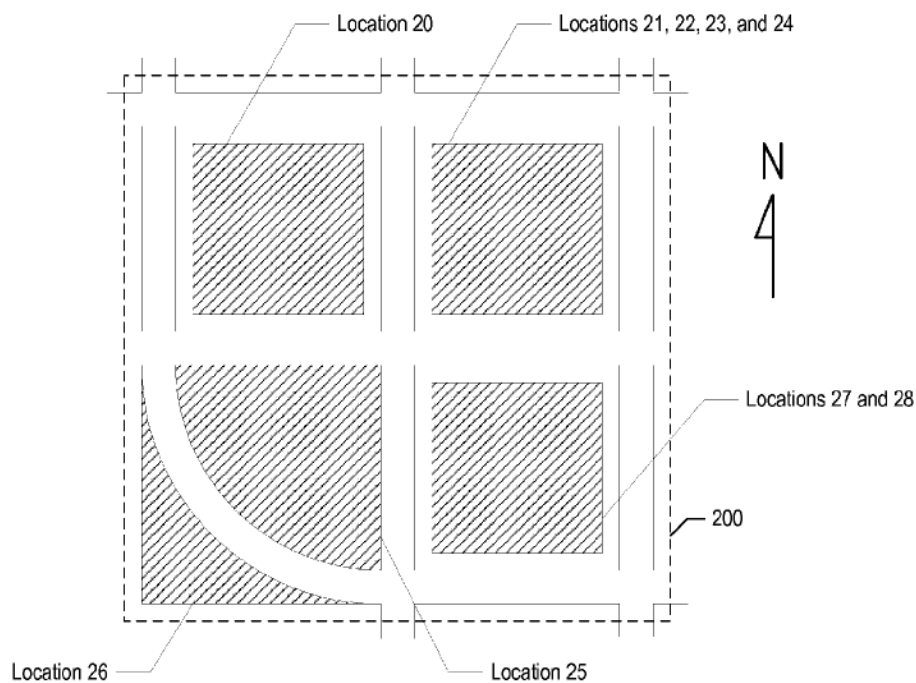


APPLE-1006, FIG. 6A¹¹.

¹¹ Spain’s FIGS. 6A (above) and FIG. 6E (below) include a typographical error in that label “200” should be “220.”

Geographic region 220 includes multiple locations, including “water fountain 601, park 602, four-story building 603, two-story building 604,” among others.

APPLE-1006, [0098]. Region 220 can be partitioned into “any number of locations of any size and shape.” *Id.*, [0099]. Locations 20-26 of geographic region 220 are shown in Figure 6E below. APPLE-1003, ¶¶[128]-[129].



APPLE-1006, FIG. 6E.

As discussed in §III.B.1, in Spain, each location is described by various information, e.g., “unique identifier,” and “coordinates” that “define its scope (e.g., position, area, volume, etc.” APPLE-1006, [0076]-[0082]. Further, in the FIG. 6E example, locations 20, 25, and 26 have different shapes and sizes, and represent different areas of region 220. Thus, in this example, region 220 is partitioned such

that the locations represent “*one or more non-uniform grid points within said region.*” APPLE-1003, ¶[130].

Moreover, as noted in §III.B.2.[1.2], Bhattacharya-Spain would have provided a database, and a POSITA would have found obvious, based on Spain, to implement the database to be populated with data representing expected signal-strength measurements collected at a pre-processing or prior measurement step (“*previously-gathered calibration data*”). APPLE-1003, ¶[131]; APPLE-1005, [0085]-[0090], [0115]; APPLE-1006, [0006], [0070]. Since the database also specifies an “expected value $E(b, T, N, W, Q)$ for each trait, Q , when wireless terminal W is at location b at calendrical time T given environmental conditions, N ” for each location, the data stored in the database is “*combined*” from expected values at each location (“*one or more predetermined calibration points*”). *Id.*; APPLE-1003, ¶[131].

[5]

See §III.A.4.[5]; APPLE-1003, ¶¶[132]-[134].

[9]

See §III.A.4.[9]; APPLE-1003, ¶¶[135]-[139].

[11]

See supra §III.A.2.[1.2], §III.B.2.[1.2]. In Bhattacharya-Spain, an expected

signal-strength database is populated to store expected values collected at a pre-processing or prior measurement step (“*previously-gathered calibration data*”).

APPLE-1005, [0085]-[0090], [0115]. In Spain, examples of expected values include values for various traits of signals measured by a wireless terminal, such as “expected received delay spread,” “expected received relative arrival times,” “expected received relative arrival times,” and “expected round-trip time,” and “handover state” of a wireless terminal. APPLE-1006, [0103]-[0116]. Thus, a POSITA would have understood and found obvious that expected values of Bhattacharya-Spain includes “*information regarding a state of said wireless network.*” APPLE-1003, ¶[140]. Indeed, the examples of expected values in Bhattacharya-Spain coincide with examples of calibration data described in the ’494 patent specification, such as “round trip time, time difference of arrival.” *Id.*; APPLE-1001, 1:28-39.

[12]

See §III.A.4.[12]; APPLE-1003, ¶¶[141]-[142].

[18]

See §III.A.4.[18]; APPLE-1003, ¶¶[147]-[148].

[19]

See §III.A.4.[19]; APPLE-1003, ¶¶[149]-[150].

[20]

See §III.A.4.[20]; APPLE-1003, ¶¶[151]-[152].

[21]

See §III.A.4.[21]; APPLE-1003, ¶¶[153]-[154].

[22]

See §III.A.4.[22]; APPLE-1003, ¶¶[155]-[156].

5. Claims 4, 15, 16

Bhattacharya-Spain renders these claims obvious for the same reasons discussed above in the corresponding claim addressed in §IV.B.4. APPLE-1003, ¶[157].

Claim	Corresponding Claim	Corresponding Evidence
[4], [15]	[3]	APPLE-1001, 3:57-67; APPLE-1005, [0085]-[0090], [0115]; APPLE-1006, [0006], [0070], [0076]-[0082], [0098], [0099], FIGS. 6A, 6E
[16]	[12]	APPLE-1005, [0051], [0055], [0057], [0058], [0063], FIG. 2; APPLE-1006, [0076], [0086], [0102], [0202]

**C. [GROUND 1C] – Bhattacharya-Meunier Renders Claims
25, 27, 29, 31, 32, 35 Obvious**

1. Bhattacharya-Meunier

(a) Meunier

Meunier is directed to “detecting the proximity of mobile devices in a wireless network.” APPLE-1007, [0001]. One example is the “use of a wireless local-area network to detect the location of a device within [an] area covered by the network.” *Id.*, [0002]. Like Bhattacharya, Meunier’s location estimation technique “relies on characterizing each place by the received signal strength of the wireless access points that cover an area.” *Id.* After calibration, Meunier leverages well-known techniques for estimating a location of a mobile device, e.g., by “compar[ing] measured wireless signal strength to a table of wireless signal strengths and known locations” to “find[] the table entry with the closest signal strength to the measured signal strength and determine[] its location by reference to the found table entry.” *Id.*; APPLE-1003, ¶[58].

To address reliability issues in location estimation techniques using signal strength measurements, Meunier proposes pre-processing steps where “statistical correction algorithms” may be employed to “chang[e] how the raw signal strength measurements is used” using “additional information” prior to location estimation. APPLE-1003, ¶¶[59]-[60]; APPLE-1007, [0003], [0013]. This additional

information includes, for example, movement detected by a motion sensor¹² in a mobile device and using the device movement to determine whether to further process raw signal strength measurements. *Id.*¹³ To evaluate device movement, “a cut off threshold” is used to determine “a Boolean value indicating if movement is above the threshold,” which allows use of “less expensive” sensors. APPLE-1007, [0014]; APPLE-1003, ¶[61]. Further, an example of a statistical correction algorithm is to “use a moving window of N signal strength samples” to compute an “average value and standard deviation of the signal strength” for each base station.” APPLE-1007, [0016]. Thus, where additional information (e.g., device movement) indicates use of raw signal-strength measurements may be changed, statistical correction algorithms are applied to change raw values (e.g., by computing average values for each base station based on raw signal strength values) and using the changed values (e.g., average values) in location estimation.

¹² One example of a motion detector is an accelerometer. APPLE-1007, [0012]. In Meunier, motion detector can also be a “simple binary motion detector.” *Id.*, [0017].

¹³ Meunier’s Device movement monitoring is “concerned only with whether the mobile device is moving more than a certain amount (some predetermined threshold) or not.” APPLE-1007, [0014].

APPLE-1003, ¶[61].

Meunier accounts for two specific scenarios that each leverage monitoring device movement (e.g., using a Boolean value from the motion detector) to “determine the manner in which the raw location information is treated by [a] location detection module.” APPLE-1007, [0015]. In a first scenario, device movement is below the cut off threshold, which permits use of “statistical correction algorithms” to change raw signal strength values (e.g., computing average signal strength values) and then using the changed values for location estimation to “improve accuracy of the location detection.” *Id.*, [0016], [0006], [0007]. In the second scenario, device movement is above the cut off threshold, and the location is estimated “based solely on the instantaneous signal strength” information. *Id.*, [0017]; APPLE-1003, ¶[62]. While these two scenarios involve selection of different types of values (average signal strength values, instantaneous signal strength values) for use in location estimation, a POSITA would have understood and found obvious that the selection of values does not meaningfully impact the comparison technique contemplated to be used by Meunier for location estimation. *Id.*; *see, e.g.*, APPLE-1007, [0002] (“compar[ing] measured wireless signal strength to a table of wireless signal strengths and known locations” to “find[] the table entry with the closest signal strength to the measured signal strength” and “determine[] its location by reference to the found table entry”).

Indeed, because computed average values are base station-specific, an average value computed for a particular base station would provide similar signal strength information as instantaneous value for that particular base station. APPLE-1003, ¶[62].

(b) Combination

As discussed above, Bhattacharya and Meunier each focus on systems that detect a location of a mobile device in a certain region. APPLE-1005, Abstract; APPLE-1007, Abstract. The location is determined based on signal-strength measurements of wireless communications with nearby base stations. APPLE-1005, FIG. 2; APPLE-1007, [0012], [0016]; APPLE-1003, ¶[158].

While Bhattacharya indicates “signal-strength measurement errors” may be made by wireless terminal 201, its contemplated technique to correct (or compensate for) such errors is primarily through device-specific calibration. APPLE-1005, [0097]. Bhattacharya’s calibration function “enables location system 212 to calibrate [] reported signal-strength measurements from wireless terminal 201 based on the make and model of the wireless terminal.” APPLE-1005, [0088]. This is accomplished using a “distortion function” based on “make and model” of the terminal 201. *Id.*, [0136]. Yet Bhattacharya’s distortion function does not address other types or measurement errors that are not necessarily tied to make and model of the terminal 201, such as measurement

errors relating to device movement during time points where signal-strength measurements are collected and reported. APPLE-1003, ¶[159]. Indeed, Bhattacharya is silent on how its location estimation technique may be impacted by the lack of measurement reliability in using signal-strength measurements for location estimation. This would have led a POSITA looking to implement its teachings to search for reasonable solutions beyond its disclosure. *Id.*

In conducting this search, a POSITA would have discovered Meunier, which further discloses techniques to improve aspects of location detection based on signal-strength measurements of wireless communications. APPLE-1003, ¶[160]. Although Meunier purports to address problems in WiFi networks, its solution is applicable more generally to various wireless networks, including wireless LANs that use base stations, as indicated by no mention of WiFi in its detailed description disclosure and claims. *See generally*, APPLE-1007. A POSITA would have perceived Meunier to be pertinent to improving the reliability of Bhattacharya's system, e.g., to take into account environmental factors (e.g., movement of people or large objects) and signal strength data that varies with device orientation. APPLE-1007, [0003], [0012]-[0014], [0019]-[0021]; APPLE-1003 ¶[160]. And since Meunier addresses how device movement impacts location estimation accuracy and reliability, a POSITA would have understood and found obvious that similar impacts may also implicate the Bhattacharya system. *Id.*; APPLE-1007,

[0006], [0016], [0019]-[0021].

A POSITA would have looked to incorporate Meunier's use of "statistical correction algorithms" in improving location detection performance, such as measuring signal strength values, applying statistical correction to the wireless signal strength values if the mobile device is moving less than a threshold amount, and using the resulting values in location estimation. APPLE-1007, [0006], [0007]; APPLE-1003, ¶[161]. Meunier explains that "[v]arious statistical correction algorithms may be used." APPLE-1007, [0007]. One example of a statistical correction algorithm is to "use a moving window of N signal strength samples" to compute an "average value and standard deviation of the signal strength" for each base station." APPLE-1007, [0007], [0016].

As discussed in §III.C.1(a), average signal-strength measurements are used to "improve accuracy of the location detection if the user is stationary [,]" (*id.*, [0016]), e.g., device movement is below a "cut off threshold" where "small movements" are ignored (*id.*, [0014]). Given these teachings, a POSITA would have been motivated to incorporate Meunier's techniques into Bhattacharya to thereby impart similar advantages to Bhattacharya's location estimation techniques in similar scenarios. APPLE-1003, ¶[162]; APPLE-1007, [0016].

As discussed below, Bhattacharya-Meunier would have offered two new capabilities to a combined terminal (relative to Bhattacharya's wireless terminal

201) that each would have improved Bhattacharya's underlying location estimation technique. First, the combined terminal would have leveraged conventional motion sensors (e.g., accelerometer) to monitor device movements and compare the monitored movements to a cut-off threshold (as taught in Meunier). Second, the combined terminal would have computed average signal strength values (modified through statistical correction algorithms) for each base station within a geographic region in scenarios when device movement is below the cut off threshold, and then provided the average signal strength values for use in computing signal-strength differentials. APPLE-1007, [0012]; APPLE-1003, ¶[163].

(i) Device Movement

A POSITA would have configured the Bhattacharya-Meunier terminal to monitor device movement, e.g., through the use of “a motion detector (such as an accelerometer) for detecting motion of the mobile device,” while collecting signal-strength measurements from nearby base stations, and comparing the monitored device movement to a predetermined threshold. APPLE-1003, ¶[164]. This would have allowed the terminal to differentiate between the two scenarios addressed in Meunier. As discussed in §III.C.1(a), in the first scenario, where device movement is below the cut-off threshold, statistical correction algorithms are applied to subsequently compute average signal strength values for each base station and

“improve[s] accuracy of the location detection.” APPLE-1007, [0016]. In the second scenario, device movement is above the cut-off threshold and thus, location estimation should “fall back on guessing location based on solely on the instantaneous signal strength,” consistent with techniques already described in Bhattacharya. *Id.*, [0017]; *see* APPLE-1005, [0091]. Moreover, a POSITA would have understood and found obvious that either scenario involves using similar signal strength information for a set of base stations, and thus, would not have necessitated additional functionality to differentiate between the two scenarios. APPLE-1003, ¶[164].

(ii) Average Signal Strength

As discussed above, a POSITA would have also implemented the Bhattacharya-Meunier terminal to monitor signal-strength measurements from nearby base stations, and in certain scenarios, perform statistical correction (e.g., by computing average signal strength values for the nearby base stations), and then use the computed average signal strength values to subsequently perform location estimation.¹⁴ APPLE-1005, [0091]-[0094]; APPLE-1007, [0012], [0015], [0006]-

¹⁴ A POSITA would have understood and found obvious that Meunier may be readily combined with location detection systems using well-known wireless

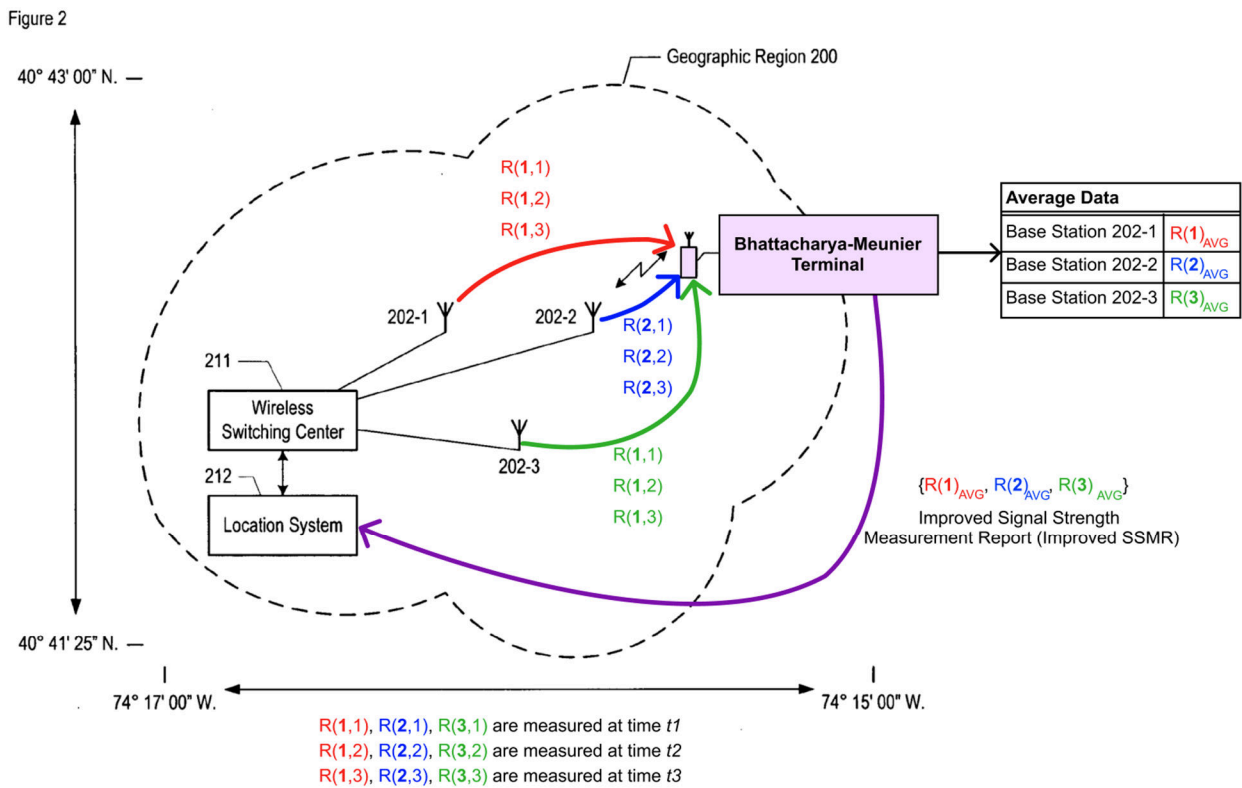
[0008]; APPLE-1003, ¶[165]. Specifically, the terminal would have computed “the average value and standard deviation of the signal strength...for each base station” from signal-strength values for various base stations. APPLE-1007, [0016]. This would have enabled the terminal to provide the average values in a modified SSMR to a location system. *Id.*; APPLE-1005, [0091]; APPLE-1003, ¶[167].

Upon receiving the modified SSMR, the location system of Bhattacharya-Meunier would have performed calibration and computed signal-strength differentials using the average values and the same mathematical techniques described in Bhattacharya. APPLE-1003, ¶[168]. As discussed above, because average signal strength values represent the same signal strength information as that described in Bhattacharya, use of average values (in place of instantaneously-measured values) in computing signal-strength differentials would not have meaningfully changed the functionality of Bhattacharya’s location system 212 in location estimation. *Id.*; APPLE-1007, [0014]. Such a configuration would have enjoyed the benefits associated with using averaging for statistical correction (per

network radio signals, such as the Bhattacharya system. APPLE-1003, ¶[166] (citing APPLE-1007, Abstract, [0002], [0006]; APPLE-1010, 22:63-23:2). *See also supra* footnote 8.

Meunier), while also maintaining the ability to compute signal-strength differentials for location estimation (per Bhattacharya). APPLE-1003, ¶[168].

Below is a visual depiction of the modified location estimation technique provided by Dr. Sundaresan based on the teachings of Bhattacharya and Meunier, as discussed above. APPLE-1003, ¶[169].



Bhattacharya-Meunier

Finally, a POSITA would have reasonably expected to succeed in incorporating Meunier into Bhattacharya since the combination required only routine knowledge well within the skill of a POSITA prior to the earliest effective filing date. APPLE-1003, ¶[170]. Meunier states that “addition of small low-cost

motion detectors (such as accelerometers) and electric compasses to the mobile device should not appreciably increase the mobile device's size, price or power consumption.” APPLE-1007, [0021]. APPLE-1005, [0140].

2. Claims 25, 32, 35

Bhattacharya-Meunier renders claim 25 obvious in the same manner as explained above in Ground 1A for the corresponding claim 1 limitations below. APPLE-1003, ¶¶[171]-[172].

Claim 1 Limitation	Corresponding Limitations
[1.1]	[25.1]
[1.2]	[25.2]
[1.4]	[25.4]
[1.6]	[25.7]

Features uniquely recited in claim 25 are addressed below.

[25.3]

This limitation is similar to [1.3], but further requires the “***observed network measurement data***” to (i) be collected from “***each of a plurality of transmitters***” and (ii) include “***a signal characteristic from each one of said plural***

transmitters.”¹⁵ APPLE-1003, ¶[173].

As explained in §III.C.1(b), Bhattacharya-Meunier provides a location estimation technique in which a wireless terminal measures signal-strength measurements. Signal strength values or statistically-corrected values (e.g., average signal strength values) of the signal-strength measurements are determined and provided in a modified SSMR for subsequent use in computing signal-strength differentials (in a similar manner as described in Bhattacharya). APPLE-1005, [0091]; APPLE-1007, [0007], [0016]. A POSITA would have understood that the computing, storing, and subsequent transmission of the average signal strength values (“*observed network measurement data*”) in a modified SSMR encompasses “*collecting observed network measurement data.*” APPLE-1003, ¶[174]. Details for determining the average signal strength value for each station are provided in [25.5] below.

In addition, because the Bhattacharya-Meunier terminal would have collected signal-strength measurements (“*signal characteristic*”) from nearby base stations, e.g., base stations 202-1, 202-2, and 202-3 (“*plurality of transmitters*”),

¹⁵ The “signal characteristic” feature encompasses a signal-strength measurement value, consistent with the ’494 patent’s claims and specification. APPLE-1003, ¶[172] (citing 2:21-26, 10:21-35, claim 18).

and the average signal strength values are collected for each station, Bhattacharya-Meunier renders obvious [25.3]. APPLE-1005, [0091]-[0094], [0158]-[0160]; APPLE-1007, [0012]; APPLE-1003, ¶[175]. Each of the signal-strength measurements for each of base stations 202-1, 202-2, 202-3 corresponds to a “*signal characteristic from each one of said plural transmitters.*” APPLE-1005, [0091]-[0094], [0158]-[0160].

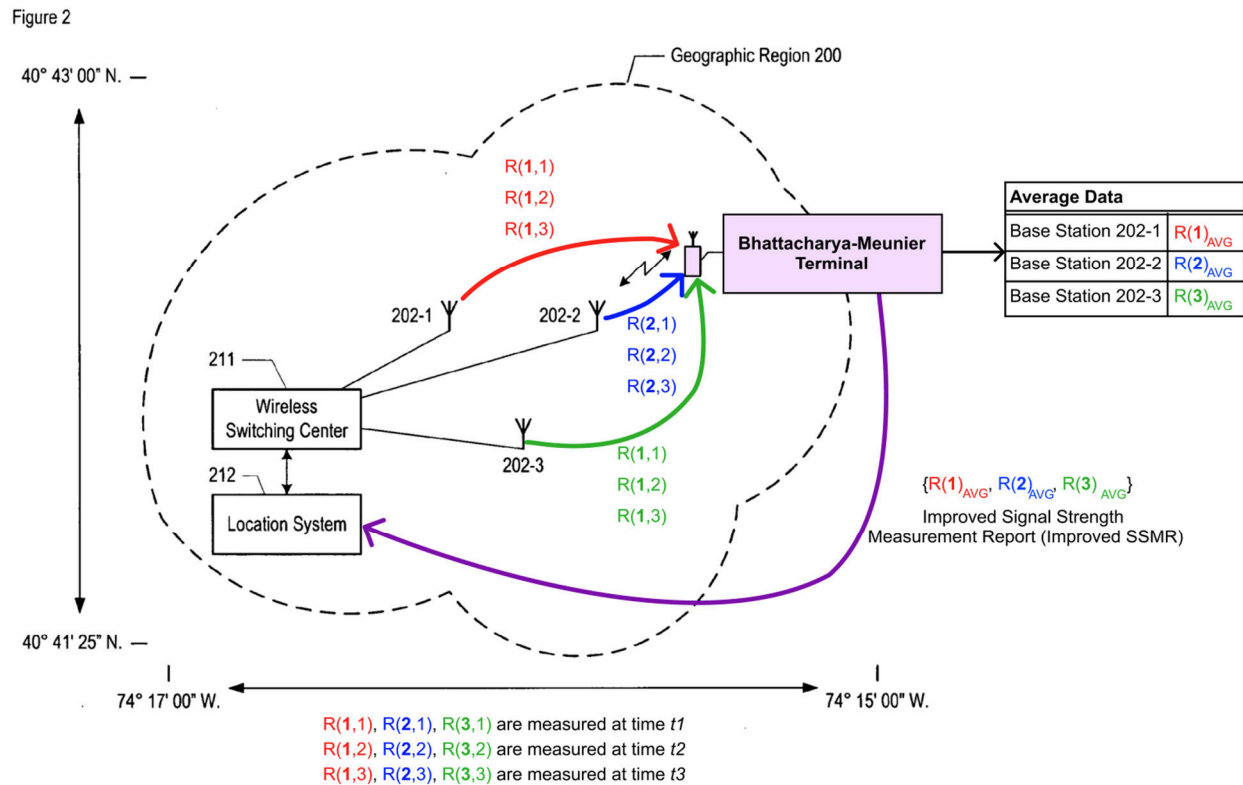
[25.5]

The term “*average value*” recited in in this limitation represents a value computed as an arithmetic mean of “*select ones*” of the “*said signal characteristics*” (which, through antecedent basis, refers to the “*signal characteristic from each one of said plural transmitters*” recited in [25.3]).

APPLE-1003, ¶[176]. Absent claim language to indicate the contrary, generic recitation of “*select ones*” leaves open the possibility of any selection of two or more signal characteristics amongst the signal characteristics. This includes, for example, (i) an average value determined for a selection of signal characteristics for a single base station, and (ii) an average value determined for a selection of signal characteristics across multiple base stations. *Id.* As explained below, Bhattacharya-Meunier renders this limitation obvious through disclosures that satisfy the plain meaning of “average value” under example (i). *Id.*

As discussed in §III.C.1(b), a POSITA would have configured Bhattacharya-Meunier to perform statistical correction of measured signal values by computing average values for signal-strength measurements for a particular base station in scenarios where device movement is below a cut off threshold. APPLE-1007, [0016]; APPLE-1003, ¶[177]. Thus, in such scenarios, the Bhattacharya-Meunier terminal would have provided a modified SSMR that includes average values for selected signal strengths measured for each base station (*“an average value”*). *Id.*; APPLE-1005, [0091]. Further, average values determined by Bhattacharya-Meunier in these scenarios satisfy the plain meaning of “average value” (explained above). As discussed in [25.3], in one example of Bhattacharya-Meunier, the modified SSMR includes average signal-strength values derived from signal strength measurements for each of base stations 202-1, 202-2, 202-3. APPLE-1005, [0091]-[0094], [0158]-[0160]. In this example, each average value determined by Bhattacharya-Meunier is an arithmetic mean of multiple signal strength values measured for a single base station (e.g., base station 202-1). Because the average value is computed based on a selection of signal characteristics (i.e., measured signal strengths) that are specific to that single base station, the average value is determined for the selection of base station-specific signal characteristics (*“select ones”*) amongst signal characteristics for all base stations for which values are provided in the SSMR (*“said signal characteristics”*).

APPLE-1003, ¶[178]. For instance, if the mobile terminal measures/collects nine signal characteristics (three signal-strength measurements for each of three base stations), then, in this instance, Bhattacharya-Meunier would have determined three average values (each of which is based on the signal characteristics unique to each individual base station). *Id.* Moreover, each average value would be determined for three of nine signal characteristics measured/collected by the mobile terminal, and thus, “*select ones*” of all signal characteristics. *Id.* An example of a modified or improved SSMR including the average signal strength values for each base station is shown in the figure below. *Id.*



Bhattacharya-Meunier (annotated and modified FIG. 2 of Bhattacharya).

Further, the plain meaning of “*select ones of said signal characteristics*” does not require a specific selection of a subset of signal characteristics for a particular base station. APPLE-1003, ¶[179]. Instead, the claim language is broad enough to encompass selection of some or all of that information for a particular base station. Still, to the extent that this limitation is narrowly interpreted, a POSITA would have found it obvious to select, in the Bhattacharya-Meunier terminal, a subset of signal-strength measurements for a particular base station by leveraging Meunier’s technique of “us[ing] a moving window of the last N signal strength samples” over a time window and then compute average values “[i]f at least M samples within the window are of sufficient quality (signal received from a minimum X number of wireless base stations).” APPLE-1005, [0016]; APPLE-1003, ¶[179]. Such a configuration would have enjoyed the benefits of Meunier’s teaching while maintaining the ability to compute signal-strength differentials for use in estimating a location of a mobile device (per Bhattacharya). *Id.*; APPLE-1005, [0012].

[25.6]

As noted in §III.C.1(b), [25.3], and [25.5] above, Bhattacharya-Meunier’s terminal would have provided the average values in a modified SSMR to a location system. APPLE-1005, [0091]; APPLE-1007, [0016]. The modified SSMR

includes three sets of an “average value” with each set corresponding to a particular base station. APPLE-1003, ¶[180].

After receiving a SSMR, the location system calibrates the reported signal strengths and calculates signal-strength differentials for reported and expected data in subtasks 1702 and 1703, respectively. *See supra* §III.A.2.[1.5]; APPLE-1005, [0179]-[0188]. In the Bhattacharya-Meunier process, the “***observed network measurement data***,” which includes the three average values for the three base stations, is modified through use of Bhattacharya’s distortion function and the average values of each of the base stations, with the distortion function adjusting the average values prior to subtracting the adjusted average values to compute the signal strength differentials. APPLE-1005, [0023]-[0026], [0057], [0081]-[0088], [0168]-[0170]. For instance, using serving cell 2 and base station 2 as the reference, the observed network measurement data would be calibrated and modified by the average signal strength value associated with the second base station using Bhattacharya’s Equation 7 such that the calibrated average signal strength values of the first and third base stations, respectively, would be subtracted, as shown below, from the calibrated average signal strength value of the second base station. APPLE-1005, [0182], [0097], [0127]; APPLE-1003, ¶[181].

$$\Delta N(2,n) = [\{S_{\text{avg}}(2, n) - S_{\text{avg}}(1, n)\}, \{S_{\text{avg}}(2, n) - S_{\text{avg}}(3, n)\}]$$

A POSITA would have understood that, combining the teachings of Meunier with Bhattacharya in the above-noted matter, is consistent with Bhattacharya's method. APPLE-1003, ¶[182]. Instead of using measured signal strength values at a particular time, the Bhattacharya-Meunier system uses average signal strength values for purposes of location estimation. *Id.*

[32]

As in [25.3]-[25.6] and [1.4], Bhattacharya-Meunier's "observed network measurement data" includes average values of the signal strengths measured at a wireless terminal and thus includes "*received signal strength of said transmitters at said mobile station.*" APPLE-1005, [0091]-[0094], [0158]-[0160]; APPLE-1007, [0012], [0016]; APPLE-1003, ¶[183].

[35]

As discussed for [25.4], a POSITA would have configured the Bhattacharya-Meunier terminal to collect signal-strength measurements from nearby base stations, e.g., base stations 202-1, 202-2, and 202-3. APPLE-1005, [0091]-[0094]; APPLE-1007, [0012]; APPLE-1003, ¶[184]. In some embodiments, "signal strength measurements that have nothing to do with providing telecommunications service to wireless terminal 201," and other signal strength measurements are provided "in addition to" the measurements from base stations 202-1, 202-2, and

202-3 (“{R(1,n), R(2,n), R(3,n)}”). APPLE-1005, [0166]. In such embodiments, a base station that provides the additional signal strength data may not be associated with a telecommunications network (“*wireless network*”) serviced by base stations 202-1, 202-2, 202-3, and thus are “*not a member of said wireless network.*” APPLE-1003, ¶[184].

Separately, it would also have been obvious to a POSITA that Bhattacharya-Meunier incorporate hardware and software to communicate with cellular base stations (e.g., Bhattacharya’s base stations 202-1, 202-2, 202-3) and WLAN base stations (e.g., Meunier’s base stations) and thereby collect signal strength measurements from each for location estimation. APPLE-1007, [0002], [0006]; APPLE-1003, ¶[185]. In such implementations, a WLAN base station is not associated with a telecommunications network (“*wireless network*”) serviced by base stations 202-1, 202-2, and 202-3, and thus, is “*not a member of said wireless network.*” *Id.*, APPLE-1007, [0005].

3. Claims 27, 29, 31

Bhattacharya-Meunier renders these claims obvious for reasons discussed above for the corresponding claims in §III.A.4. APPLE-1003, ¶[186].

Claim	Corresponding Claim(s)	Corresponding Evidence
[27]	[12]	APPLE-1005, [0055], [0057], [0058], [0063], FIG. 2

Claim	Corresponding Claim(s)	Corresponding Evidence
[29]	[18]	APPLE-1005, [0091]-[0094], [0158]-[0160]
[31]	[21]	APPLE-1005, [0003], [0055], [0086]

D. [GROUND 1D] – Bhattacharya-Spain-Meunier Renders Claims 25, 27, 29, 31, 32, 35 Obvious

The Bhattacharya, Spain, Meunier combination would have obvious to a POSITA for the reasons discussed in §III.B.1(b) and §III.C.1(b) and renders the claims below obvious for reasons noted in §§III.C.(2)-(3). APPLE-1003, ¶[187].

Claim	Corresponding Evidence
[25]	APPLE-1005, [0091]-[0094]; APPLE-1007, [0012], [0016]
[27]	APPLE-1005, [0055], [0057], [0058], [0063], FIG. 2
[29]	APPLE-1005, [0091]-[0094], [0158]-[0160]
[31]	APPLE-1005, [0003], [0055], [0086]
[32]	APPLE-1005, [0003], [0055], [0086]
[35]	APPLE-1005, [0091]-[0094], [0166]; APPLE-1007, [0002], [0006], [0005], [0012]

IV. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION

A. Discretionary Denial under 35 U.S.C. §325(d) is not Warranted

Discretionary denial under the §325(d) *Advanced Bionics* analysis is not warranted. IPR2019-01469, Pap. 6 (PTAB Feb. 13, 2020) (“*Advanced Bionics*”) (precedential); IPR2017-01586, Pap. 8 (PTAB Dec. 15 2017) (“*Becton*”) (precedential).

During prosecution, no IDS was filed by the applicant or considered by the Examiner. *See generally*, APPLE-1002. No prior art-based rejection was issued during prosecution other than a double patenting rejection. APPLE-1002, 39-44; APPLE-1003, ¶[24]. As explained above in §III, the asserted references (Bhattacharya, Spain, Meunier) anticipate or render obvious the Challenged Claims. The Examiner committed an error by not examining the application against pertinent prior art, such as the asserted references in this petition.

Consequently, the same or substantially the same issues raised by this IPR petition were never considered during prosecution, and there could be no overlap between the arguments made before the Office and remarks in this petition. For these reasons, neither condition of the first prong of the *Advanced Bionics* framework is met, and there is no need to reach the second prong to resolve against

discretionary denial under Section 325(d). *See* IPR2019-00975, Pap. 15, 20 (PTAB Oct. 16, 2019) (precedential)).

B. The *Fintiv* Factors favor Institution and No Denial under 35 U.S.C. §314(a)

Consistent with Congressional intent, the goals of *Fintiv*, and the interim guidance issued by Director Vidal on June 21, 2022 (“Director’s Guidance” or APPLE-1050), Apple asks the Board to consider the challenges raised in this Petition. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Pap. 11, at 6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”). As explained in more detail below, the asserted claims in co-pending litigation have been invalidated and a notice of appeal has recently been filed by Patent Owner. APPLE-1051; APPLE-1053. Even if Patent Owner is successful in appeal, a decision of any remanded district court proceeding would not issue until after the Final Written Decision (FWD). For this and other reasons noted below, a holistic analysis of the *Fintiv* factors favors institution.¹⁶

¹⁶ Apart from Apple’s showing that *Fintiv* favors institution, the *Fintiv* framework should not be followed because it is legally invalid. The framework (1) exceeds the Director’s authority, (2) is arbitrary and capricious, and (3) was adopted without notice-and-comment rulemaking.

1. Factor 1

Factor 1 is neutral because neither Apple nor Geoscope have requested a stay in co-pending litigation, and the Board does “not attempt to predict” how an appeals or district court might adjudicate a future motion to stay. *Fintiv*, 12; IPR2019-01393, Pap. 24, at 7 (PTAB June 16, 2020) (“*Sand Revolution*”) (informative); IPR2020-01019, Pap. 12, at 14 (PTAB Dec. 1, 2020) (“*Sotera*”) (precedential).

2. Factor 2

The proceedings in the Eastern District of Virginia (*Geoscope Technologies PTE. LTD. v Apple Inc.*, 1:22-cv-01373, (E.D. VA.) (the “District Court”) have concluded and claims 1, 4, 25, 26, and 35 of the ’494 patent were invalidated under 35 U.S.C. §101. APPLE-1051, 1-18. Geoscope has filed an appeal. APPLE-1053. No hearing date has been set and it is unclear if the case will ever be remanded to the District Court. Because there is no trial date in co-pending litigation, Factor 2 favors institution.

3. Factor 3

As noted above, the District Court proceedings have concluded because the asserted ’494 patent claims were found invalid under 35 U.S.C. §101. APPLE-1051, 1-18. In fact, the District Court proceedings never went to trial or even a pre-trial conference because they were concluded in response to the granting of

Apple's Motion for Judgement on the Pleadings. APPLE-1051, 1-3. Indeed, even the final claims and grounds to be asserted at trial were still to be determined.

Geoscope subsequently filed an appeal, and with the appeal process just beginning, significant investment is still needed in parallel litigation. APPLE-1053.

In contrast, in this IPR proceeding, from the time Geoscope asserted five patents against Apple, Apple has diligently worked on addressing the validity of the asserted patents. For example, Apple hired counsel (Fish & Richardson), conducted prior art searches to identify relevant prior art and multiple invalidity grounds, reviewed Geoscope's infringement contentions, engaged with an expert to assess the '494 patent/prior art references preparing an expert declaration, and drafted this petition along with several others to challenge the asserted patents.

In view of the significant investment still required in the parallel litigation proceedings and, in contrast, the amount of investment already made in this IPR proceeding, factor 3 favors institution or at worst is neutral.

4. Factor 4

As noted above, the District Court held that claims 1, 4, 25, 26, and 35 of the '494 patent were invalid under 35 U.S.C. §101. APPLE-1051, 1-18. Because any appeal of the District Court holding would be limited to §101 issues and §101 grounds cannot and are not raised in this IPR petition, there is no overlap of issues

in this IPR proceeding and parallel litigation. Thus, factor 4 favors institution.

5. Factor 5

Apple's status as a defendant/appellee in parallel litigation proceedings is at worst neutral under *Fintiv* Factor 5. Indeed, the *Fintiv* decision "says nothing about situations in which the petitioner is the same as, or is related to, the district court defendant." *Cisco Systems, Inc. v. Ramot at Tel Aviv University Ltd.*, IPR2020-00122, Pap. 15, 10 (Crumbley, dissenting); *Fintiv*, 13-14. At worst, where the parties are the same, Factor 5 is neutral. *Cisco Sys., Inc. v. Ramot at Tel Aviv Univ. Ltd.*, IPR2020-00122, Paper 15 at *10 (May 15, 2020) (APJ Crumbley, dissenting).

6. Factor 6

Director Vidal has explained that "the PTAB will not deny institution...under *Fintiv*...when a petition presents compelling evidence of unpatentability...." Director's Guidance, 3-5, 9; *see also Fintiv*, 14-15.

The merits of this Petition are compelling. As demonstrated in the Petition with reference to Dr. Sundaresan's testimony and additional evidence, institution would result in a finding of unpatentability of the Challenged Claims, which are obvious based on prior art references that materially differ from those considered by the Examiner during prosecution. *See generally* APPLE-1003.

Even if the District Court Litigation may be relevant, the strength of the

merits alone is enough to outweigh any inefficiencies born of parallel litigation.

Director's Guidance, 3-5, 9; *Fintiv*, 14-15 ("if the merits of a ground raised in the petition seem particularly strong...institution of a trial may serve...overall system efficiency and integrity").

Accordingly, *Fintiv* Factor 6 strongly favors institution.

V. CONCLUSION AND FEES

The Challenged Claims are unpatentable. Apple authorizes charge of fees to Deposit Account 06-1050.

VI. MANDATORY NOTICES UNDER 37 C.F.R §42.8(a)(1)

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

Apple Inc. ("Apple") is the real party-in-interest.

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

The '494 patent is the subject of the following proceedings:

- *Geoscope Technologies Pte. Ltd. v. Apple Inc.*, 1-22-cv-01373, E.D. Va., filed Dec. 01, 2022 (now on appeal)
- *Geoscope Technologies Pte. Ltd. v. Google LLC f/k/a Google Inc.*, 1-22-cv-01331, E.D. Va., filed Nov. 22, 2022
- *Google LLC v. Geoscope Technologies Pte. Ltd.*, IPR2023-01211 (PTAB)

Apple is not aware of any other disclaimers, reexamination certificates, or IPR

petitions addressing the '494 patent.

C. Lead And Back-Up Counsel Under 37 C.F.R. §42.8(b)(3)

Apple provides the following designation of counsel.

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D. Service Information

Please address all correspondence and service to the address listed above.

Apple consents to electronic service by email at IPR50095-0139IP1@fr.com.

Respectfully submitted,

Dated: October 31, 2023

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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 13,955 words, which is less than the 14,000 allowed under 37 CFR §42.24.

Dated: October 31, 2023

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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 October 31, 2023, 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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