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Patent 10,341,811

Samsung Electronics Co., Ltd., Petitioner
v.
Broadphone LLC, Patent Owner

Patent Owner's Demonstratives

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Patent 10,341,811

U.S. Patent 10,341,811 (Ex. 1001)



US010341811B2

(12) **United States Patent**
Shkedi

(10) **Patent No.:** **US 10,341,811 B2**
(45) **Date of Patent:** ***Jul. 2, 2019**

(54) **SIGNAL COMPARISON-BASED LOCATION DETERMINING METHOD**

(71) Applicant: **Broadphone, LLC**, New York, NY (US)

(72) Inventor: **Roy Shkedi**, Forest Hills, NY (US)

(73) Assignee: **Broadphone, LLC**, New York, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 906 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/085,603**

(22) Filed: **Nov. 20, 2013**

(65) **Prior Publication Data**

US 2014/0073353 A1 Mar. 13, 2014

Related U.S. Application Data

(63) Continuation of application No. 13/448,309, filed on Apr. 16, 2012, now Pat. No. 8,594,698, which is a (Continued)

(51) **Int. CL**
H04W 24/00 (2009.01)
H04W 4/02 (2018.01)
G01S 5/02 (2010.01)

(52) **U.S. CL**
CPC **H04W 4/023** (2013.01); **G01S 5/0252** (2013.01)

(58) **Field of Classification Search**
CPC .. **H04W 4/02; H04W 64/00; H04L 29/08657; H04L 29/08108; H04L 29/0836;**
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,674,403 B2 1/2004 Gray et al.
6,972,717 B2 12/2005 Sollenberger et al.
(Continued)

FOREIGN PATENT DOCUMENTS

EP 12419093 9/2002
WO 00/18148 A1 3/2000
WO 01/28272 A1 4/2001

OTHER PUBLICATIONS

Krumm, et al.; LOCADIO: Inferring Motion and Location from Wi-Fi Signal Strengths; 1st Annual International Conference on Mobile and Ubiquitous Systems: Networking and Services; Aug. 22-26, 2004.

(Continued)

Primary Examiner — Dai Phuong

(74) *Attorney, Agent, or Firm* — Louis J. Hoffman

(57) **ABSTRACT**

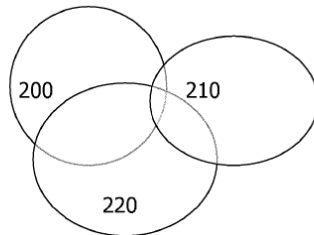
At least one portable RF communications device in conjunction with at least two fixed-location service-area antenna stations respectively capable of RF communication with the at least one device performs the steps of: (I) using a portable device at a selected location to measure RF communications signals from the plurality of local fixed-location service-area antenna stations and electronically storing at least two of the respective reception signal strength measurements; and (II) monitoring a portable device location by causing the device to measure reception signal strength associated with local fixed-location service-area antenna stations signals, and to electronically compare these measurements with the stored at least two measurements.

28 Claims, 1 Drawing Sheet

Related U.S. Application Data

(63) Continuation of application No. 13/448,309, filed on Apr. 16, 2012, now Pat. No. 8,594,698, which is a continuation of application No. 12/720,362, filed on Mar. 9, 2010, now Pat. No. 8,170,583, which is a continuation of application No. 11/533,238, filed on Sep. 19, 2006, now Pat. No. 7,706,811.

“The ’811 patent issued from an application filed 9/19/2006, which Petitioner assumes (without conceding such entitlement) is the effective date of the ’811 patent.”



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(Continued)

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Primary Examiner — Dai Phuong

(74) *Attorney, Agent, or Firm* — Louis J. Hoffman

(57) **ABSTRACT**

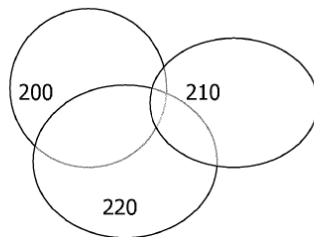
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28 Claims, 1 Drawing Sheet

(57)

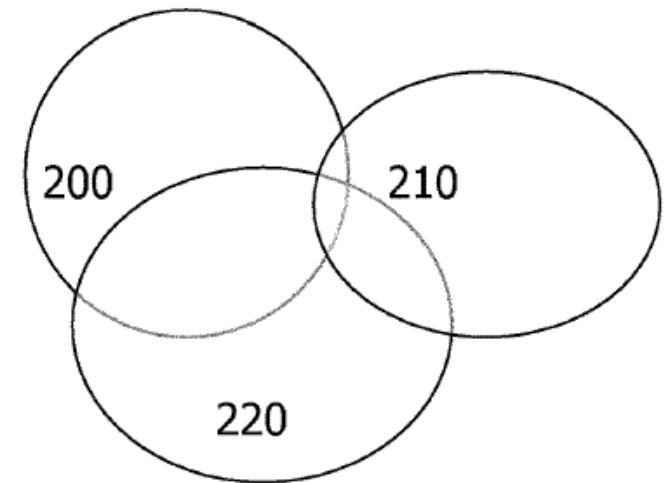
ABSTRACT

At least one portable RF communications device in conjunction with at least two fixed-location service-area antenna stations respectively capable of RF communication with the at least one device performs the steps of: (I) using a portable device at a selected location to measure RF communications signals from the plurality of local fixed-location service-area antenna stations and electronically storing at least two of the respective reception signal strength measurements; and (II) monitoring a portable device location by causing the device to measure reception signal strength associated with local fixed-location service-area antenna stations signals, and to electronically compare these measurements with the stored at least two measurements.



Specification

Simply stated, if a mobile telephone (at a user selected location) measures a plurality of service antenna signals and stores these with their respective service antenna identifications, then that mobile telephone (or an equivalent unit) upon observing an identical list of service antennas with substantially identical respective signal strengths—can reasonably conclude that it is within a predetermined proximity of the original user selected location. We will call the coordinate of the user selected location a “fingerprint”—because we believe that each such location has (associated with it) a substantially unique combination of service antenna identifications with respective distance equivalent measurements (e.g. service antenna signal strength as measured at the mobile device, arrival times or phases of signals arriving from surrounding cells as measured by the mobile device, or the likes).



Claims 1, 14 (representative of 28)

1. A method of determining whether a portable RF communications device is present at **a device-specific target location**, the method comprising:

with the portable RF communications device automatically:

- (a) **receiving a first plurality of communications signals**, each received from one of a first plurality of antenna stations within range of the portable RF communications device, wherein the antenna stations are fixed-location service-area antenna stations and are substantially continuously operating;
- (b) **causing a determination** of whether the portable RF communications device is within proximity of **the device-specific target location** by electronically comparing at least one number based on signal strengths of each of the first plurality of communications signals with at least one number based on corresponding signal strengths of each of a second plurality of communication signals from a second plurality of antenna stations that have been identified as being within range of the same location as the device-specific target location,

which signal strengths have been determined for the same location as the **device-specific target location**; and

- (c) as a result of the determination that the portable RF communications device is within proximity of **the device-specific target location**, **initiating, on the portable RF communications device, a location-based action** associated with the device-specific target location.

14. The method of claim 1 wherein **the determination** of whether the portable RF communications device is within proximity of **the device-specific target location is performed at a location remote from the portable RF communications device**.

Proposed Combinations

Ground	Claim(s)	References
1	1, 8, 14-15, 22, 28	<i>Spain-I</i> in view of <i>Hunzinger</i> and <i>Nanda</i>
2	4, 18	<i>Spain-I</i> in view of <i>Hunzinger</i> , <i>Nanda</i> , and <i>Blomqvist</i>
3	5, 19	<i>Spain-I</i> in view of <i>Hunzinger</i> , <i>Nanda</i> , and <i>Tiwari</i>
4	24	<i>Spain-I</i> in view of <i>Hunzinger</i> , <i>Nanda</i> , and <i>Othmer</i>
5	25	<i>Spain-I</i> in view of <i>Hunzinger</i> , <i>Nanda</i> , and <i>Bates</i>

Claim Construction

“device specific-target location”

Petitioner’s Proposal	Patent Owner’s Proposal
“no special constructions are necessary . . . Petitioner applies their plain meanings” – Petition at 5.	A target location “specific to a particular device” - Paper 15 (POR) at 5.
“appears to simply refer to a user-selected location” – Paper 18 (Pet. Reply) at 4–5.	

Claim Construction

Claims 1 and 15 of the '811 patent require, not just a generalized determination of the location of the claimed portable RF communications device, but specifically “determination of whether the portable RF communications device is within proximity of *the device-specific target location*.” Ex. 1001, cls. 1, 15. As explained by Dr. Cooklev, the plain meaning requires a target location that is specific to a particular device, not a location that is generally applicable to numerous devices (the relevance of which will become apparent in the following section). Ex. 2003 ¶ 34.

Claim Construction

VII. OPINIONS

34. Claims 1 and 15 of the '811 patent require, not just a generalized determination of the location of the claimed portable RF communications device, but specifically “determination of whether the portable RF communications device is within proximity of *the device-specific target location*.” Ex. 1001, cls. 1, 15. Based on my review of the patent and intrinsic record, this term has a plain and ordinary meaning and is used by the claims with that meaning, which requires a target location that is specific to a particular device. For example, I see no lexicography or disclaimer in the intrinsic record indicating that “device-specific target meaning” refers to a location that is generally applicable to numerous devices, or that the term otherwise has a meaning broader than its plain and ordinary meaning.

Disclosed Embodiments

An example of the above suggested implementation will be—a location is identified to the cell phone as a desired location by the cell phone owner.

The cell phone measures the signal strengths of surrounding cells. The cell phone measures 10 signals from 10 surrounding cells. The cell phone chooses the 4 cells with the strongest signals as neighboring cells (cells #1, 4, 6, 9). The cell phone calculates the ratio between the chosen 4 signals by dividing the 3 less strong signals by the strongest signal (assuming that cell #4 has the strongest signal). The cell phone records the 3 relations (cell #1 signal/cell #4 signal, cell #6 signal/cell #4 signal and cell #9 signal/cell #4 signal). The cell phone may further record the measured signal strengths of the 4 chosen cells.

From that point in time onward, the cell phone checks to see if signals from unique cells #1, 4, 6 and 9 can be measured by the cell phone. If the cell phone can measure signals from cells #1, 4, 6 and 9, the cell phone calculates the relations between cells #1, 6 and 9 to cell #4. If the calculated relations at the current location are identical to the recorded relations the cell phone determines that it has returned to the desired location. The cell phone can determine that it has returned to the desired location or to an area close enough to be considered the desired location by subtracting each of the relations at the current location from each of the corresponding relations at the desired location and demanding that the each of the subtraction for each of the relations does not exceed a certain threshold or that the sum of the subtractions does not exceed a certain threshold or alternatively any other formula.

Proposed Combination: Ground I

400	Fingerprint Structure					
401	Time of Capture:					
403	Station ID:	I1	I2	I3	...	In
405	Frequency:	F1	F2	F3	...	Fn
407	Tuning Parameters:	P1	P2	P3	...	Pn
409	Transmitter Location:	L1	L2	L3	...	Ln
411	Signal Strength 1:	S11	S12	S13	...	S1n
413	Signal Strength 2:	S21	S22	S23	...	S2n
415	...	...	...	...	...	...
417	Signal Strength m:	Sm1	Sm2	Sm3	...	Smn

Fig. 9

Modification NOT Proposed:

400	Fingerprint Structure					
401	Time of Capture:					
403	Station ID:	I1	I2	I3	...	In
405	Frequency:	F1	F2	F3	...	Fn
407	Tuning Parameters:	P1	P2	P3	...	Pn
409	Transmitter Location:	L1	L2	L3	...	Ln
411	Signal Strength 1:	S11	S12	S13	...	S1n
413	Signal Strength 2:	S21	S22	S23	...	S2n
415	...	...	...	...	...	...
417	Signal Strength m:	Sm1	Sm2	Sm3	...	Smn
Specific to Device:		(device identifier)				

Proposed Combination: Ground I

3A-3B, 2:43-51, 6:12-66, 7:6-13, 8:29-55.) For example, *Nanda* discloses storing previously monitored location information (signal strength) like the table below.

WAN ID	WLAN SSID	WLAN BSS ID	Signal Strength	Phase
A	I1	A ₁	s ₁ (A ₁) . . . s _n (A ₁)	p ₁ (A ₁) . . . p _n (A ₁)
		A ₂	s ₁ (A ₂) . . . s _n (A ₂)	p ₁ (A ₂) . . . p _n (A ₂)
		A ₃	s ₁ (A ₃) . . . s _n (A ₃)	p ₁ (A ₃) . . . p _n (A ₃)
B	I1	B ₁	S ₁ (B ₁) . . . s _n (B ₁)	
	I2	B ₂	S ₁ (B ₂) . . . s _n (B ₂)	

Modification NOT Proposed

3A-3B, 2:43-51, 6:12-66, 7:6-13, 8:29-55.) For example, *Nanda* discloses storing previously monitored location information (signal strength) like the table below.

WAN ID	WLAN SSID	WLAN BSS ID	Signal Strength	Phase
A	I1	A ₁	$s_1(A_1) \dots s_n(A_1)$	$p_1(A_1) \dots p_n(A_1)$
		A ₂	$s_1(A_2) \dots s_n(A_2)$	$p_1(A_2) \dots p_n(A_2)$
		A ₃	$s_1(A_3) \dots s_n(A_3)$	$p_1(A_3) \dots p_n(A_3)$
B	I1	B ₁	$S_1(B_1) \dots s_n(B_1)$	
	I2	B ₂	$S_1(B_2) \dots s_n(B_2)$	

Specific to
Device:

(Device
ID's)

Petitioner's Proposed Theory:

Additionally, such a remote database/server configuration would have enabled the use of “fingerprints from multiple mobiles devices,” which would have allowed for a “much larger database of available access points than would be found in a single mobile device.” (Ex-1006, 12:14-31.) Such teachings would have motivated a POSITA to consider/configure the modified *Spain-I* system/processes such that the remote server receives signal strength data from multiple MUs to build a robust remote fingerprint database, consistent with features contemplated by *Spain-I-Nanda*. (*Supra*; Ex-1002, ¶215.) Such features would have allowed the modified *Spain-I* system/processes (§IX.A.1) to create/maintain a remote database of fingerprints using signal strength data from multiple MUs (Ex-1006, 12:26-29), thus beneficially expanding applications of the modified *Spain-I* system/processes. (Ex-1002, ¶215.) A POSITA would have had similar rationale for considering such features from *Nanda* (and *Spain-I*) as those explained above for claim 1 (§IX.A.1(b)), as well as had similar capabilities/expectation of success/state-of-art knowledge, that would have led to such alternate modifications. (Ex-1002, ¶215;

The Cooklev Deposition

Q What is a device-specific target location?

A It's a target location specific to a device.

Q And when you say that it is "specific to a device," what do you mean?

MR. CONKLE: Objection. Form.

A I'm not sure how I can rephrase that. A target location specific to a device.

Q Would you agree that a user-selected location is a device-specific target location?

The Cooklev Deposition

A In paragraph 34 of my declaration, I'm saying something that's consistent with what I testified a moment ago, that the term "device-specific target location" has a plain and ordinary meaning. I think these words are individually, the words of this term are -- or were, at the time, clear to a person of skill, and in combination, they were clear.

And as I said, it's a target location that is specific to -- I said a device, or a particular device, as I write in paragraph 34.

And so, it seems to be your question whether this could be this or that, is -- at least it's difficult to answer in the abstract.

So, if you have a specific system or a specific prior art, maybe I'll -- I will consider that and try to give you an answer.

The Cooklev Deposition

Q So, it is your opinion that a user-selected location may or may not be a device-specific target location, depending on the system in which it's implemented?

A I think this seems, to me, correct; that whether a location is device-specific target location, in the context of the '811 patent, yeah, it would depend on -- it'll depend on the system.

Q What aspect of the system would you look to, to determine whether a user-selected location is a device-specific target location?

MR. CONKLE: Objection. Form.

A For example, I state in paragraph 34, that a location that is generally applicable to numerous devices is not a device-specific target location. Very likely, it's not a device-specific --

The Cooklev Deposition

existed before the world got cellular telephone.
So in this sense, locations, yeah, they could
exist without any cell phones.

But, a device-specific target location
is a location that is specific to a particular
device.

Q But you're not saying that two
different devices can't share the same
device-specific target location, are you?

A I think the answer is, it depends.

Q So there are situations where two
different devices can share the same
device-specific target location, correct?

A I think I haven't said it here, but I
think it depends.

Q So I asked you whether there are
situations where that could be true.

What do you mean by "it depends"?

A I mean, the context of the '811 patent,
I think that there could be situations in which
that could be true.

Q When you say, in paragraph 34, that a