

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
17 November 2011 (17.11.2011)

(10) International Publication Number
WO 2011/142807 A1

(51) International Patent Classification:
H04W 24/00 (2009.01)

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(21) International Application Number:
PCT/US2011/000817

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(22) International Filing Date:
10 May 2011 (10.05.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/344,021 10 May 2010 (10.05.2010) US

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(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,

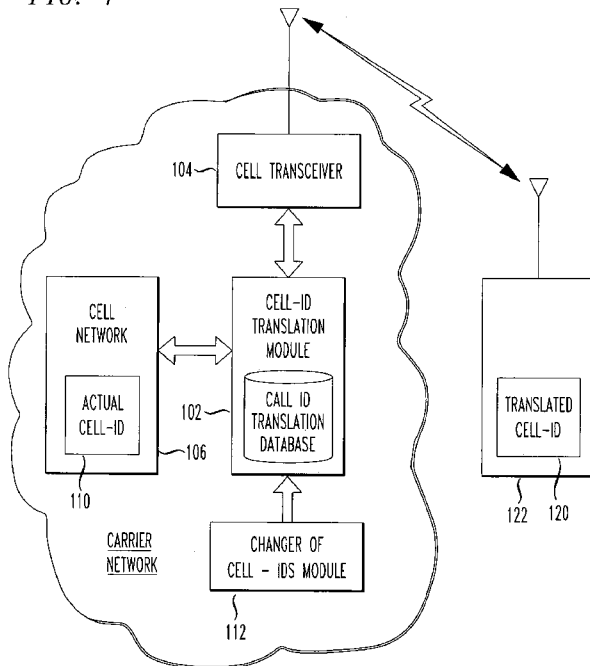
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[Continued on next page]

(54) Title: CELL-ID TRANSLATION IN A LOCATION BASED SYSTEM (LBS)

(57) Abstract: A Cell-ID translation module accesses a Cell-ID translation database to associate original Cell-ID information with new or changed (i.e., translated) Cell-ID information received by a handset. A Cell-ID database is effectively regularly changed rendering useless any third party databases previously collected without authorization by the relevant mobile operators. Cell-IDs collected by unauthorized third parties will either not be found in the third party database, or not match up to the correct location.

FIG. 1



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SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

Published:

— *with international search report (Art. 21(3))*

CELL-ID TRANSLATION IN A LOCATION BASED SYSTEM (LBS)

This patent application claims priority from U.S. Provisional No. 5 61/344,021, filed May 10, 2010, entitled "CELL ID IDENTIFICATION IN A LOCATION BASED SYSTEM (LBS)" to Elliott Hamilton, the entirety of which is expressly incorporated herein by reference.

BACKGROUND OF THE INVENTION

10 1. Field of the Invention

This invention relates generally to wireless telecom, and in particular to location based systems (LBS).

2. Background of Related Art

15 The current location of wireless devices at any given time, or even past locations of wireless devices, is commercially valuable information. However, while it provides an important tool to commercial enterprises (e.g., for use in marketing), it also raises privacy concerns. Significant rules and standards have been established in the wireless device industry to protect a user's privacy, e.g., a user of a wireless device typically may choose to enable or 20 disable location of that wireless device giving the user an ability to choose to permit location of their device in the first place. With permitted use of location technology, a mobile operator or carrier then has the ability to make use of such location information, including sale of such location information, subject to 25 respective permissions of its subscribers. As a result, mobile operators and carriers enjoy significant revenue from the sale or license of location information of its subscribers, thus defraying the cost of the network, ultimately benefitting the subscribers.

A cell site in a particular mobile operator's network has a unique 30 identifier code associated with the cell site – referred to as a Cell-ID. This Cell-ID is usually provided by the Radio Network Controller (RNC). Depending upon the operator, Cell-IDs transmitted to proximate mobile devices are associated with an

area ID or Cell Name to form a unique identifier. However, a phone in range of a given cell site can receive the Cell-ID, the Area ID and the Operator ID.

5 Third parties such as Google(TM) have devised techniques to sniff out and record Cell-ID information, and cross-referencing that sniffed Cell-ID information to known locations, to identify a general location of mobile operators
Cell-IDs. Google(TM), for example, has collected a Cell-ID database that it provides to developers so applications on handsets can determine the approximate location of the user. In addition, Google(TM) uses the database to
10 provide more precise location technology in conjunction with its own Assisted GPS server. This provides a technique that determines a general location based on the Cell-ID that the wireless device receives from the network. This bypasses the mobile operator, and deprives them of an important source of revenue, ultimately putting pressure on the mobile operator resulting in raised costs to the subscriber.

15 In particular, third parties such as Google(TM) have independently mapped operators' cell site information by associating a location (longitude and latitude) with a Cell Site identifier code – Cell-ID. Each mobile operator's cell site provides a unique identifier code that is received by a handset, sometimes in conjunction with an Area ID code as well. Thus, knowing the Cell-ID and Area ID
20 for a particular mobile operator, a third party can associate an approximate location with the Cell-ID. This is usually accomplished by having a client in a GPS enabled handset that receives the Cell-ID information, and associating the Cell-ID information to the GPS location of the handset. As a result, third party providers can then provide location information to applications, handsets, etc.
25 without the direct involvement of the mobile operator, making a revenue stream for themselves previously enjoyed by mobile operators. Perhaps more importantly, the location information is obtained by such third parties who may not have a contractual obligation to those users to maintain a privacy in that location information.

30 Cell-ID information may be used to provide precise location information when used in conjunction with assisted GPS servers. The location of

a given wireless device, whether imprecise or precise, may be determined without the direct assistance of the relevant mobile operator.

Without the need to rely on mobile operators for provision of location of given wireless devices, third parties need not pay the relevant mobile operators for location data. Thus, mobile operators are excluded from the value chain for location information, missing out on significant revenue. And perhaps more important to the users themselves, private information of the user, i.e., their location, cannot be controlled as third parties have the ability to determine a location of subscribers who are not their subscribers, thus raising serious privacy concerns.

SUMMARY OF INVENTION

In accordance with the principles of the present invention, a method of securing Cell-ID information in a wireless network comprises translating a unique static Cell-ID of a node in a wireless network into a unique, regularly changed, translated Cell-ID. The translated Cell-ID and not the static Cell-ID is transmitted to a wireless device communicating with the node of the wireless network.

In accordance with another aspect of the invention, a network Cell-ID translation apparatus comprises a Cell-ID translation database containing a plurality of translations between respective unique static Cell-IDs of nodes in a wireless network, and temporarily corresponding unique, regularly changed, translated Cell-IDs. A changer of Cell-IDs module, in communication with the Cell-ID translation database, occasionally affects a change in the value of the translated Cell-IDs. A translated Cell-ID and not the static Cell-ID, is transmitted to a wireless device communicating with an assigned node in the wireless network.

BRIEF DESCRIPTION OF THE DRAWINGS

Features and advantages of the present invention will become apparent to those skilled in the art from the following description with reference to the drawings, in which:

5 Fig. 1 shows an exemplary carrier network including a Cell-ID translation module accessing a Cell-ID translation database, in accordance with the principles of the present invention.

10 Fig. 2 shows a Cell-ID translation database associating an original or previous Cell-ID with a new Cell-ID, in accordance with the principles of the present invention.

15 Fig. 3 shows a Cell-ID translation database in a network providing mapping between a previous Cell-ID and a new Cell-ID, for use by a radio network controller to provide a new Cell-ID to a relevant mobile device, in accordance with the principles of the present invention.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

Fig. 1 shows an exemplary carrier network including a Cell-ID translation module accessing a Cell-ID translation database, in accordance with the principles of the present invention.

20 In particular, as shown in Fig. 1, a Cell-ID Translation Module **102** resides on a suitable server. The Cell-ID translation module **102** accesses a Cell-ID translation database **100** to associate original Cell-ID information with new or changed (i.e., translated) Cell-ID information **120** received by a handset **122**.

25 The Cell-ID translation database **100** may be changed by the mobile operator on a periodic, intermittent, or otherwise occasional basis of the mobile operator's choosing. The mobile operator changes the Cell-ID translation database using an appropriate changer of translated Cell-IDs module **112**. Via the changer of translated Cell-IDs module **112**, an authorized mobile operator
30 may change any or all translation values of Cell-IDs as they are presented to wireless devices **122**, thus rendering useless any previous third party databases

associating conventional static Cell-IDs with a general location as were collected in the past.

The Cell-ID translation database **100** may be contained on a server, and function to associate new (i.e., translated) Cell-IDs with the previous or original Cell-IDs. In one embodiment, the mobile operator can change the translated Cell-ID information **120** that is received by the handset **122** on a periodic or other occasional basis of the mobile operator's choosing. The Cell-ID translation database **100** may be established on an entire network basis, or on a regional or specific geographic area basis.

The changer of translated Cell-IDs module **112** may change the translation of the Cell-IDs based on a known method or algorithm, or otherwise methodical fashion thus permitting a mobile operator the ability to again gain revenue by selling translated Cell-ID information to third parties or partners of its own choosing. This not only defrays costs to the mobile operator, but also permits the mobile operator to hold such third parties to privacy standards via contractual or other methods.

Fig. 2 shows a Cell-ID translation database associating an original or previous Cell-ID with a new Cell-ID, in accordance with the principles of the present invention.

In particular, as shown in Fig. 2, the Cell-ID translation database **100** contains entries translating an original, otherwise conventional, previous or otherwise static Cell-ID database **202** to an effectively translated Cell-ID database **204**. As shown in Fig. 2, translated Cell-IDs are shown for an exemplary mobile operator identified as "023".

Fig. 3 shows a Cell-ID translation database in a network providing mapping between a previous Cell-ID and a new Cell-ID, for use by a radio network controller to provide a new Cell-ID to a relevant mobile device, in accordance with the principles of the present invention.

In particular, as shown in Fig. 3, mobile operator "023" has its Cell-IDs masked, thus protecting not only a significant source of revenue but also control of the privacy of its subscribers' locations, using the Cell-ID Translation

database **100**. Translated Cell-IDs, not the static Cell-IDs permanently assigned to respective cells, are passed to wireless devices 122 via the mobile operator's radio network controller **300**.

5 Using the present invention which effectively regularly changes the Cell-ID database, any third party databases previously collected without authorization by the relevant mobile operators are rendered useless because Cell-IDs collected by unauthorized third parties will be changed such that the previously sniffed Cell-IDs will either not be found in the third party database, or not match up to the correct location.

10 The present invention may also be applied to other wireless networks such as WiFi networks that may be managed or controlled by an operator. The present invention has applicability to the mobile operator market in general. Moreover, companies that maintain a database that matches location of a WiFi device with a WiFi identification code – typically called a Media Access
15 Control (MAC) address – will also benefit from the invention.

While the invention has been described with reference to the exemplary embodiments thereof, those skilled in the art will be able to make various modifications to the described embodiments of the invention without departing from the true spirit and scope of the invention.

20

CLAIMS

What is claimed is:

1. A method of securing Cell-ID information in a wireless network, comprising:
5 translating a unique static Cell-ID of a node in a wireless network into a unique, changeable, translated Cell-ID; and
transmitting said translated Cell-ID and not said static Cell-ID to a wireless device communicating with said node of said wireless network;
- 10 2. The method of securing Cell-ID information in a wireless network according to claim 1, wherein:
said changeable, translated Cell-ID is changed periodically.
- 15 3. The method of securing Cell-ID information in a wireless network according to claim 1, wherein:
said changeable, translated Cell-ID is changed intermittently.
- 20 4. A network Cell-ID translation apparatus, comprising:
a Cell-ID translation database containing a plurality of translations between respective unique static Cell-IDs of nodes in a wireless network, and temporarily corresponding unique, changeable, translated Cell-IDs; and
a changer of Cell-IDs module, in communication with said Cell-ID translation database, to occasionally affect a change in the value of said translated Cell-IDs;
25 wherein a translated Cell-ID and not said static Cell-ID, is transmitted to a wireless device communicating with an assigned node in said wireless network.

5. The network Cell-ID translation apparatus according to claim 4,
wherein:

said changer of Cell-IDs module affects said change in value of
said translated Cell-IDs periodically.

5

6. The network Cell-ID translation apparatus according to claim 4,
wherein:

said changer of Cell-IDs module affects said change in value of
said translated Cell-IDs intermittently.

10

FIG. 1

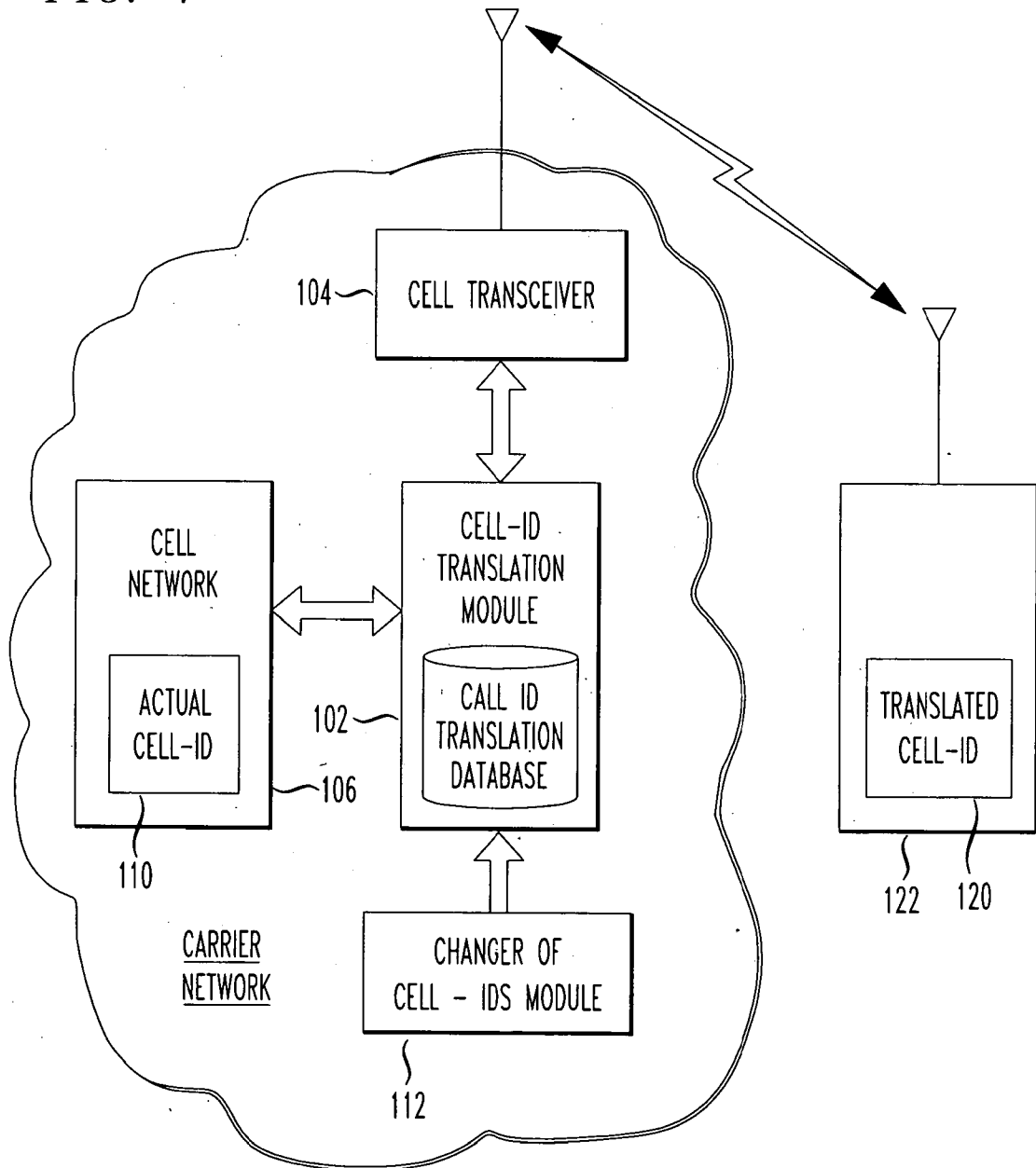


FIG. 2

CELL-ID TRANSLATION DATABASE

100

ORIGINAL OR PREVIOUS CELL-ID DATABASE

TRANSLATED CELL-ID DATABASE

OPERATOR CODE	AREA CODE	CELL-ID
023	0045	00125
023	0045	00126
023	0045	00127
023	0045	00128
023	0045	00129
023	0066	00018
023	0066	00019

202

OPERATOR CODE	AREA CODE	CELL-ID
023	0045	00456
023	0045	00457
023	0045	00458
023	0045	00459
023	0045	00460
023	0066	00125
023	0066	00126

204

MOBILE OPERATOR 023

CELL-ID TRANSLATION DATABASE

100

OPERATOR CODE	AREA CODE	PREVIOUS CELL-ID	TRANSLATED CELL-ID
023	0045	00125	00456
023	0045	00126	00457
023	0045	00127	00458
023	0045	00128	00459
023	0045	00129	00460
023	0066	00018	00125
023	0066	00019	00126

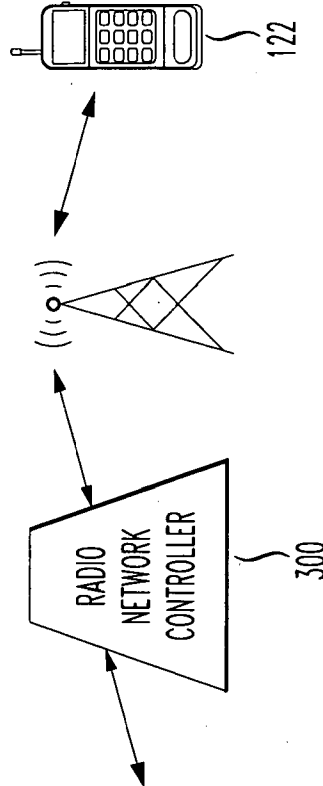


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/000817

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H04W 24/00 (2011.01)
USPC - 455/456.1
 According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
 Minimum documentation searched (classification system followed by classification symbols)
 IPC(8) - H04W 24/00, 40/00; H04K1/00 (2011.01)
 USPC - 455/449, 456.1; 380/258, 270

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 USPTO WEST System (US-PGPUB; USPAT; USOCR; EPO; JPO), Google Patents, PatBase, ProQuest

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — Y	WO 2010/005363 A1 (WILLARS et al) 14 January 2010 (14.01.2010) entire document	1, 2, 4, 5 3, 6
Y	US 2007/0191013 A1 (GUNNARSSON et al) 16 August 2007 (16.08.2007) entire document	3, 6
A	US 2008/0200182 A1 (SHIM) 21 August 2008 (21.08.2008) entire document	1-6
A	US 2010/0093358 A1 (CHEONG et al) 15 April 2010 (15.04.2010) entire document	1-6

Further documents are listed in the continuation of Box C.

* Special categories of cited documents:
 "A" document defining the general state of the art which is not considered to be of particular relevance
 "E" earlier application or patent but published on or after the international filing date
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 "O" document referring to an oral disclosure, use, exhibition or other means
 "P" document published prior to the international filing date but later than the priority date claimed
 "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
 "&" document member of the same patent family

Date of the actual completion of the international search 25 August 2011	Date of mailing of the international search report 12 SEP 2011
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