

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
19 July 2007 (19.07.2007)

PCT

(10) International Publication Number
WO 2007/081356 A3

- (51) International Patent Classification:
H04Q 7/20 (2006.01)
- (21) International Application Number:
PCT/US2006/006041
- (22) International Filing Date:
22 February 2006 (22.02.2006)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/654,811 22 February 2005 (22.02.2005) US
11/261,988 28 October 2005 (28.10.2005) US
- (71) Applicant (for all designated States except US): **SKY-HOOK WIRELESS, INC.** [US/US]; 332 Congress St., 3rd Floor, Boston, MA 02210 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **MORGAN, Edward, James** [US/US]; 736 Highland Avenue, Needham, XX 02494 (US). **SHEAN, Michael, George** [US/US]; 504 Beacon Street, Boston, MA 02215 (US). **AL-IZADEH-SHADIZ, Farshid** [IR/US]; 5 Cole Road, Wayland, MA 01778 (US). **JONES, Russel, Kipp** [US/US]; 1175 Lyndhurst Way, Roswell, GA 30075 (US).
- (74) Agents: **DICHIARA, Peter, M.** et al.; Wilmer Cutler Pickering Hale And Dorr LLP, 60 State Street, Boston, MA 02109 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: CONTINUOUS DATA OPTIMIZATION IN POSITIONING SYSTEM

AP	MAC address	RSS
1	00:11:93:0d:a9:50	-75
2	00:11:93:0d:ae:10	-83
3	00:0c:41:0c:24:1f	-96
4	00:11:93:0d:aa:d0	-85
5	00:06:25:e8:c4:bb	-87
6	00:40:96:34:a6:23	-85
7	00:11:93:1f:24:d0	-71
8	00:06:25:e8:d3:55	-79
9	00:40:96:31:46:c6	-94

Access Point Evaluation: Data Flows

Observed APs compared against database

All observed Access Points 501

AP	MAC address	RSS	Status	Latitude	Longitude
1	00:11:93:0d:a9:50	-75	Known	42.67754	-71.24573
3	00:0c:41:0c:24:1f	-96	Known	42.67675	-71.24500
4	00:11:93:0d:aa:d0	-85	Known	42.67720	-71.24499
5	00:06:25:e8:c4:bb	-87	Known	42.67650	-71.24580
7	00:11:93:1f:24:d0	-71	Known	42.67745	-71.24540
9	00:40:96:31:46:c6	-94	Known	42.67777	-71.24510

Suspect Access Point 504

Bad data filtered

Known Access Points 502

AP	MAC address	RSS	Status	Latitude	Longitude
2	00:11:93:0d:ae:10	-83	New		
6	00:40:96:34:a6:23	-85	New		
8	00:06:25:e8:d3:55	-79	New		

Newly Found Access Points 503

New access points added to database

(57) Abstract: Methods and systems of continuously optimizing data in WiFi positioning systems (figure 1). For example, data is monitored to infer whether a WiFi access point (figure 1, 102) has moved or is new. In this fashion, data is continuously optimized. Likewise, suspect data may be avoided when determining the position of the WiFi-enabled device using such a system.

WO 2007/081356 A3



Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(88) Date of publication of the international search report:

10 January 2008

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US06/06041

A. CLASSIFICATION OF SUBJECT MATTER

IPC: **H04Q 7/20**

USPC: 455/456.1, 456.5, 456.6; 709/203; 701/201

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)

U.S. : 455/456.1, 456.5, 456.6; 709/203; 701/201

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2004/0068364 A1 (ZHAO et al) 08 April 2004 (08.04.2004), see entire reference.	1-19
A	US 2004/0204063 (VAN ERLACH) 14 October 2004 (14.10.2004), see entire reference.	1-19
A	US 6,757,518 B2 (SPRATT et al) 29 June 2004 (29.06.2004), see entire reference.	1-19
A	US 6,789,102 B2 (GOTOU et al) 07 September 2004 (07.09.2004), see entire reference.	1-19

Further documents are listed in the continuation of Box C.

See patent family annex.

* 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 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

11 September 2007 (11.09.2007)

Date of mailing of the international search report

16 NOV 2007

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Authorized officer

QUANH LE

Telephone No. 571-272-7868