

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
10 August 2006 (10.08.2006)

PCT

(10) International Publication Number
WO 2006/083696 A3

(51) International Patent Classification:

H04Q 7/24 (2006.01)

(21) International Application Number:

PCT/US2006/002850

(22) International Filing Date: 26 January 2006 (26.01.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/648,774 1 February 2005 (01.02.2005) US

(71) Applicant (for all designated States except US): **EXS, INC.** [GB/GB]; Akara Building, 24 De Castro Street, Wickhams Cay 1, Road Town, Tortola (VG).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MIGHANI, Farhad** [US/US]; 6266 Calle Bonita, San Jose, CA 95120 (US). **VUTUKURY, Srinvas** [IN/US]; 10686 Rosewood Drive, Apt. C, Cupertino, CA 95014 (US). **TZAMALOUKAS, Assimakis, F.** [GR/US]; 942 Juliet Avenue, San Jose, CA 95127 (US).

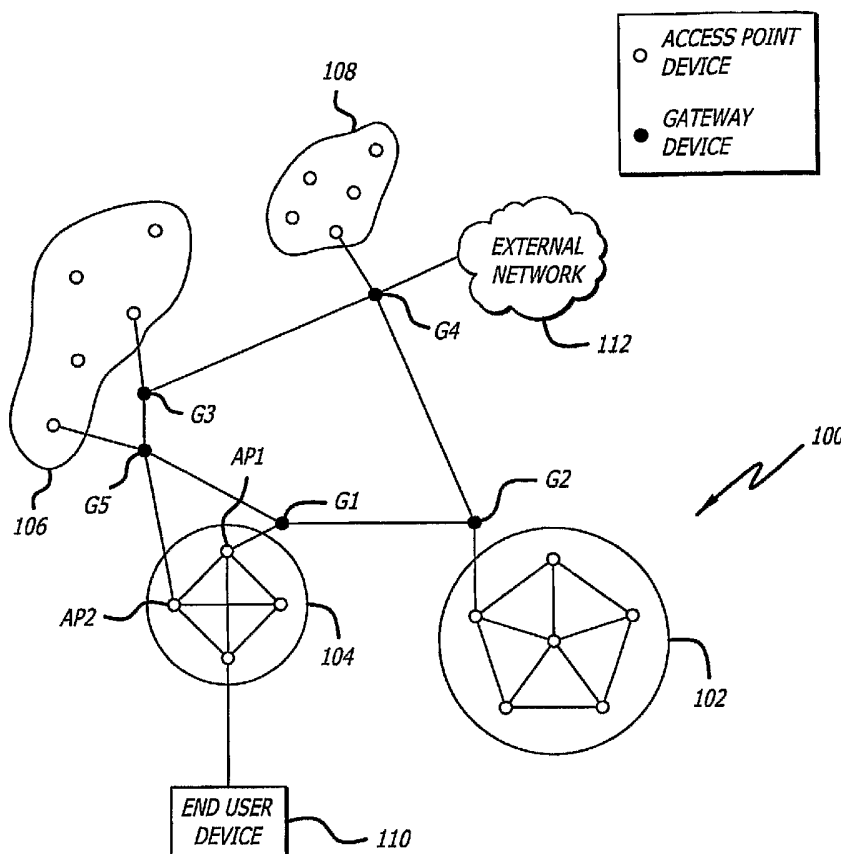
(74) Agents: **GREENBERG TRAURIG, LLP** et al.; 2450 Colorado Avenue Suite 400E, Santa Monica, CA 90404 (US).

(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,

[Continued on next page]

(54) Title: HIERARCHICAL MESH NETWORK FOR WIRELESS ACCESS



(57) Abstract: A wireless mesh network is configured as a multiple-level hierarchical network, with each level of the hierarchy having a plurality of nodes. Several clusters of nodes each acting as access points may be organized in numerous first-level meshes (102, 106, 110, 112), with each of the first-level meshes being coupled to a second-level mesh having several nodes that act as gateways (G1-G5) to the first-level meshes. The number of nodes in each of the first-level and second-level meshes may be limited to a predetermined number of nodes throughout the full topology of the mesh network in order to improve performance of the mesh network.



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

(88) Date of publication of the international search report:
28 September 2006

Published:

— with international search report

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.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US06/02850

A. CLASSIFICATION OF SUBJECT MATTER

IPC: H04Q 7/24(2006.01)

USPC: 370/338

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. : 370/338, 400, 401, 254

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)
EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	US 2005/0074019 A1 (HANDFORTH et al.) 07 April 2005, see figures 2-5, and abstract	1-47
A,P	US 2006/0018303 A1 (SUGIARTO et al.) 26 January 2006, see figures 2 and 6.	1-47
Y,P	US 6,965,575 B2 (SRIKRISHNA et al.) 15 November 2005, see abstract.	1-47
Y,P	US 6,879,574 B2 (NAGHIAN et al.) 12 April 2005, see abstract and figures 1-2.	1-47
Y	US 2003/0152042 A1 (SOINIEN et al.) 14 August 2003, see figures 1-2	1-47



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	"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
"E" earlier application or patent published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

09 May 2006 (09.05.2006)

Date of mailing of the international search report

26 JUN 2006

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

Bob A. Phunkulh

Telephone No. 703-305-4700