

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
20 February 2003 (20.02.2003)

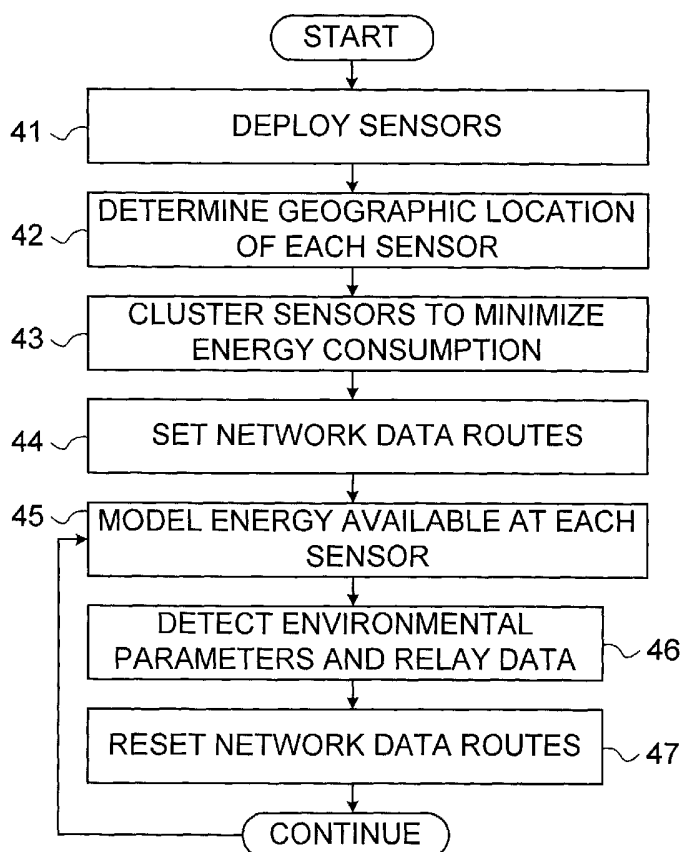
PCT

(10) International Publication Number
WO 03/015452 A3

- (51) International Patent Classification⁷: **G08B 25/00**, 25/10, H04L 12/56
- (21) International Application Number: PCT/US02/24547
- (22) International Filing Date: 1 August 2002 (01.08.2002)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/309,949 3 August 2001 (03.08.2001) US
10/208,666 30 July 2002 (30.07.2002) US
- (71) Applicant (for all designated States except US): **HONEYWELL INTERNATIONAL INC.** [US/US]; 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07960 (US).
- (72) Inventors; and
(75) Inventors/Applicants (for US only): **YOUNIS, Mo-hamed, F.** [EG/US]; 8516 Timber Hill Court, Ellicott City, MD 21043 (US). **ARISHA, Khaled, A.** [EG/US]; 8480 Greystone Lane #2C, Columbia, MD 21045 (US). **YOUSSEF, Moustafa, A.** [EG/US]; Apt. 101, 4323 Rowalt Drive, College Park, MD 20740 (US).
- (74) Agents: **BREMER, Dennis, C.** et al.; Honeywell International Inc., 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07960 (US).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

[Continued on next page]

(54) Title: ENERGY AWARE NETWORK MANAGEMENT



(57) Abstract: A method of managing a network of sensors in an energy aware manner includes the steps of clustering the sensors to minimize energy consumption, routing the network (step 44), modeling the energy available at each sensor (step 45), and re-routing the network (step 47) when the sensor battery level drops to a predetermined value, or when the energy model is adjusted because it deviates from a sensor's actual energy state.

WO 03/015452 A3



(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (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*

(88) Date of publication of the international search report:
30 May 2003

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/US 02/24547

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G08B25/00 G08B25/10 H04L12/56

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 7 G08B H04L

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WENLI CHEN ET AL: "ANMP: ad hoc network management protocol" IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, IEEE INC. NEW YORK, US, vol. 17, no. 8, 1 August 1999 (1999-08-01), pages 1506-1531, XP002163743 ISSN: 0733-8716 page 1506, right-hand column, line 39 -page 1507, left-hand column, line 5 page 1507, left-hand column, line 6 -page 1507, right-hand column, line 38 figures 1-3 --- -/--	1-5



Further documents are listed in the continuation of box C.



Patent family members are listed in 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 document 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

10 March 2003

Date of mailing of the international search report

19/03/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Schneider, G

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/24547

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SOHRABI K ET AL: "PROTOCOLS FOR SELF-ORGANIZATION OF A WIRELESS SENSOR NETWORK" IEEE PERSONAL COMMUNICATIONS, IEEE COMMUNICATIONS SOCIETY, US, vol. 7, no. 5, October 2000 (2000-10), pages 16-27, XP000966620 ISSN: 1070-9916 page 16, right-hand column, line 33 -page 17, left-hand column, line 32 page 24, left-hand column, line 25 -left-hand column, line 18 ---	3,4
X	ESTRIN D ET AL: "NEXT CENTURY CHALLENGES: SCALABLE COORDINATION IN SENSOR NETWORKS" MOBICOM '99. PROCEEDINGS OF THE 5TH ANNUAL ACM/IEEE INTERNATIONAL CONFERENCE ON MOBILE COMPUTING AND NETWORKING. SEATTLE, WA, AUG. 15 - 20, 1999, ANNUAL ACM/IEEE INTERNATIONAL CONFERENCE ON MOBILE COMPUTING AND NETWORKING, NEW YORK, NY: ACM, US, vol. CONF. 5, 15 August 1999 (1999-08-15), pages 263-270, XP000896093 ISBN: 1-58113-142-9 the whole document ---	4,5
A	US 6 208 247 B1 (LOEFFELHOLZ CHRISTIAN J ET AL) 27 March 2001 (2001-03-27) column 2, line 30 -column 4, line 21 column 11, line 29 -column 12, line 60 -----	1-5

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 02/24547

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6208247	B1	27-03-2001	NONE