



- (51) International Patent Classification:
H04W 84/20 (2009.01)
- (21) International Application Number:
PCT/US2016/036459
- (22) International Filing Date:
8 June 2016 (08.06.2016)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
62/173,692 10 June 2015 (10.06.2015) US
- (71) Applicant: **3M INNOVATIVE PROPERITES COMPANY** [US/US]; 3M Center, P.O. Box 33427, St. Paul, Minnesota 55133-3427 (US).
- (72) Inventors: **KIHLBERG, Roger**; Bollstanäsvägen 3, 19189 Sollentuna (SE). **JOELSSON, Martin V.**; Bagaregatan 96, 56633 Habo (SE). **APELQVIST, Stefan M.**; Bollstanäsvägen 3, 19189 Sollentuna (SE). **HANSSON, Henric L. O.**; Bollstanäsvägen 3, 19189 Sollentuna (SE).
- (74) Agents: **DEVRIES SMITH, Katherine M.** et al.; 3m Innovative Properites Company, 3M Center, P.O.Box 33427, St. Paul, Minnesota 55133-3427 (US).
- (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, BN, 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, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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.
- (84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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,

[Continued on next page]

(54) Title: COMMUNICATION DEVICE AND NETWORK USING TDMA RADIO COMMUNICATION PROTOCOL

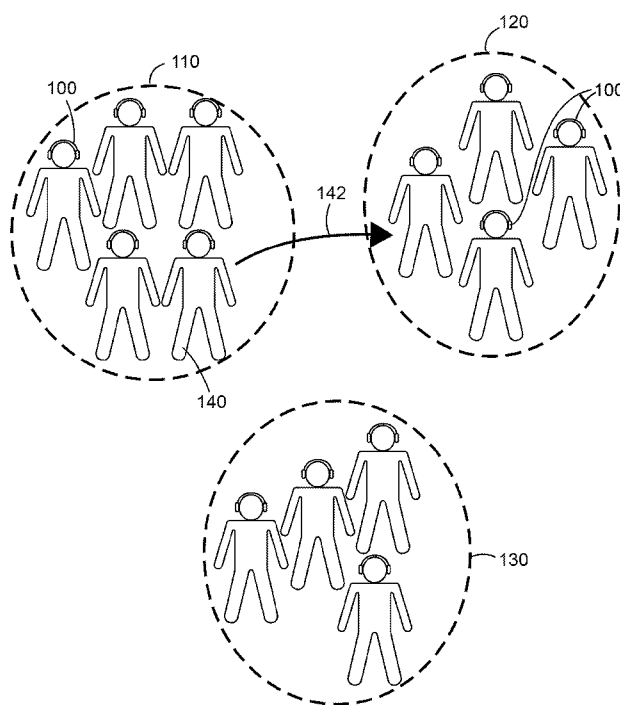


FIG. 1

(57) Abstract: A plurality of communication devices form a network, including a first communication device configured to send and receive communication data to and from other communication devices within the network using time division multiple access protocol; wherein the first communication device is configured to store data indicating whether another communication device is in a master state; wherein in advance of sending communication data, if another communication device is not in the master state, then the first communication device will enter the master state; wherein in advance of sending communication data, if another communication device is in the master state, then the first communication device will enter a lowest available time slot; and wherein all of the communication devices in the network synchronize to the communication device in the master state. Other embodiments are also included herein.



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

Published:

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

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

— 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))

— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

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

26 January 2017

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2016/036459

A. CLASSIFICATION OF SUBJECT MATTER
 INV. H04W84/20
 ADD.

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)
 H04W

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)

EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2014/198778 A1 (FRASER RONALD [US]) 17 July 2014 (2014-07-17)	1-13
Y	paragraph [0004] paragraph [0026] - paragraph [0031] paragraph [0044] - paragraph [0050] figures 1a-1e; 4a	14,15
Y	----- US 2015/043568 A1 (COULON DENIS [FR] ET AL) 12 February 2015 (2015-02-12) paragraph [0046] - paragraph [0051] paragraph [0064] - paragraph [0074] figure 2	14,15
X	----- US 8 718 301 B1 (JOUPII NORMAN PAUL [US] ET AL) 6 May 2014 (2014-05-06) column 1, line 10 - column 3, line 52 column 6, line 37 - line 58 claim 1; figures 1,2 ----- -/-	16-23



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 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

28 November 2016

Date of mailing of the international search report

02/12/2016

Name and mailing address of the ISA/

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

Authorized officer

Larcinese, Annamaria

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2016/036459

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2011/069841 A1 (ANGELOFF DREW [US] ET AL) 24 March 2011 (2011-03-24) paragraph [0002] - paragraph [0040] -----	16-23
A	KR 2009 0032582 A (LG ELECTRONICS INC [KR]) 1 April 2009 (2009-04-01) abstract -----	16-23

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/036459

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-15

A plurality of devices that form a network comprising a first communication device configured to determine whether it is acting as a master or as a slave.

2. claims: 16-23

Communication device comprising a receiver, a speaker configured to output a sound wave based on an output from a processor, wherein the processor determines a distance from another communication device and wherein a volume of the sound wave is reduced in proportion to the distance between the communication devices.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2016/036459

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2014198778 A1	17-07-2014	US 2014198778 A1	17-07-2014
		US 2016088447 A1	24-03-2016
US 2015043568 A1	12-02-2015	EP 2829149 A1	28-01-2015
		FR 2988549 A1	27-09-2013
		US 2015043568 A1	12-02-2015
		WO 2013140070 A1	26-09-2013
US 8718301 B1	06-05-2014	NONE	
US 2011069841 A1	24-03-2011	BR 112012002985 A2	19-04-2016
		CN 102577433 A	11-07-2012
		EP 2481222 A2	01-08-2012
		JP 5677439 B2	25-02-2015
		JP 2013505668 A	14-02-2013
		KR 20120068875 A	27-06-2012
		RU 2012110603 A	27-09-2013
		US 2011069841 A1	24-03-2011
		WO 2011034706 A2	24-03-2011
KR 20090032582 A	01-04-2009	NONE	