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(71) Applicant: **QUALCOMM INCORPORATED** [US/US];
Attn: International IP Administration, 5775 Morehouse Drive,
San Diego, CA 92121-1714 (US).

(72) Inventors: **CHERIAN, George**; 5775 Morehouse Drive,
San Diego, CA 92121-1714 (US). **ZHOU, Yan**;
5775 Morehouse Drive, San Diego, CA 92121-1714 (US).
ASTERJADHI, Alfred; 5775 Morehouse Drive, San
Diego, CA 92121-1714 (US). **PATIL, Abhishek, Pramod**;
5775 Morehouse Drive, San Diego, CA 92121-1714

(US). **VENKATACHALAM JAYARAMAN, Venkata Ramanan**; 5775 Morehouse Drive, San Diego, CA
92121-1714 (US). **MERLIN, Simone**; 5775 Morehouse
Drive, San Diego, CA 92121-1714 (US).

(74) Agent: **HASHEMI, Payton et al.**; Patterson & Sheridan,
L.L.P., 24 Greenway Plaza, Suite 1600, Houston, TX
77046-2472 (US).

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CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
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(54) Title: COORDINATED BEAMFORMING (COBF) PROTOCOL FOR UNMANAGED NETWORKS

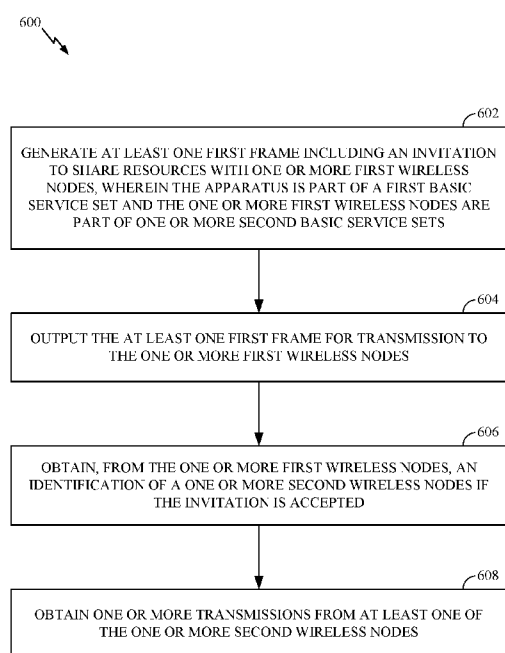


FIG. 6

(57) Abstract: Certain aspects of the present disclosure are directed to apparatus and techniques for performing coordinated beamforming (CoBF) transmissions. The apparatus generally includes a processing system configured to generate at least one first frame including an invitation to share resources with one or more first wireless nodes, wherein the apparatus is part of a first basic service set and the one or more first wireless nodes are part of one or more second basic service sets, a first interface configured to output the at least one first frame for transmission to the one or more first wireless nodes, and a second interface configured to obtain, from the one or more first wireless nodes, an identification of one or more second wireless nodes if the invitation is accepted, wherein the second interface is configured to obtain one or more transmissions from at least one of the one or more second wireless nodes.

MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
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A. CLASSIFICATION OF SUBJECT MATTER
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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)
H04B H04L 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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2015/288427 A1 (WANG XIAOFEI [US] ET AL) 8 October 2015 (2015-10-08)	1-8,10, 11, 13-28, 30-37, 39,40, 42-57, 59-66, 68,69, 71-86, 88-93
Y	paragraph [0094] - paragraph [0212] figures 2-16 tables 1-11	12,29, 41,58, 70,87
A	----- -/--	9,38,67



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

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

Authorized officer

Kokkinos, Titos

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2015/288428 A1 (CHOI JEE YON [KR] ET AL) 8 October 2015 (2015-10-08)	12,29, 41,58, 70,87
A	paragraph [0069] - paragraph [0097] figures 3-12	1-11, 13-28, 30-40, 42-57, 59-69, 71-86, 88-93
A	----- US 2017/026853 A1 (ABOUL-MAGD OSAMA [CA] ET AL) 26 January 2017 (2017-01-26) paragraph [0022] - paragraph [0031] figures 1-7	1-93
A	----- ISHIHARA KOICHI ET AL: "Selective beamforming for inter-cell interference mitigation in coordinated wireless LANs", 2013 16TH INTERNATIONAL SYMPOSIUM ON WIRELESS PERSONAL MULTIMEDIA COMMUNICATIONS (WPMC), NICT, 24 June 2013 (2013-06-24), pages 1-5, XP032493950, ISSN: 1347-6890 [retrieved on 2013-10-02] page 1 - page 3 section I - section III; figure 1 -----	1-93

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2018/043197

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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2015288427 A1	08-10-2015	CN 104904292 A	09-09-2015
		EP 2918123 A1	16-09-2015
		JP 6371296 B2	08-08-2018
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		US 2017026853 A1	26-01-2017
		WO 2016011917 A1	28-01-2016

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-7, 13-26, 30-36, 42-55, 59-65, 71-84, 88-93

The apparatus of D1, wherein the processing system is configured to generate at least one second frame comprising an indication of the at least one of the one or more second wireless nodes and an indication of an order in which the one or more first wireless nodes are to perform sounding operations;

2. claims: 8-12, 27-29, 37-41, 56-58, 66-70, 85-87

The apparatus of D1, wherein the processing system is further configured to determine to share the resources with the one or more first wireless nodes, and generate a first message comprising an indication that a length of the distributed transmission opportunity has been extended based on the determination; the generation of the at least one first frame including the invitation to share resources is based on the determination to share the resources;
