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(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, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, 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.

(54) Title: RESOURCE ALLOCATION FOR NARROWBAND COMMUNICATIONS USING AN EXPANDED BANDWIDTH

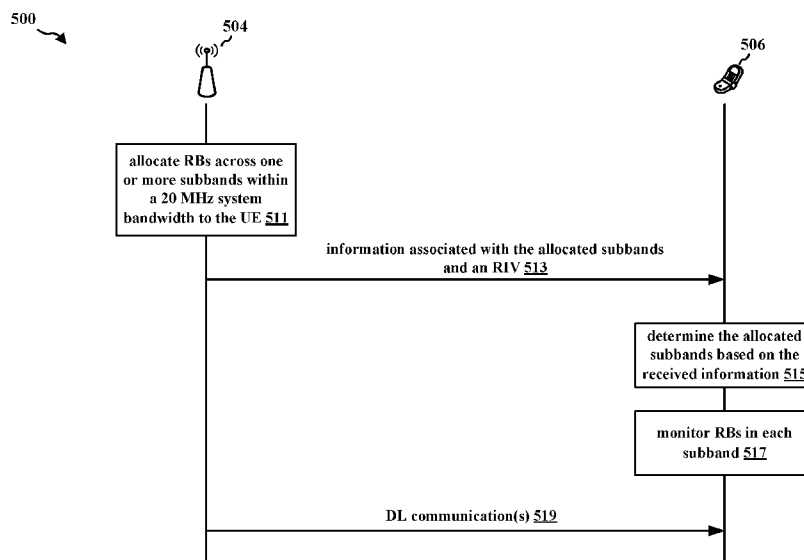


FIG. 5

(57) Abstract: A method, a computer-readable medium, and an apparatus are provided. The apparatus may allocate one or more narrowbands for at least one downlink transmission to a UE. The apparatus may transmit information associated with the one or more narrowbands and a RIV to the UE. In one aspect, the RIV may indicate a common starting RB and a common set of RBs allocated for the at least one downlink transmission in each of the one or more narrowbands.



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

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

- *with international search report (Art. 21(3))*
- *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))*

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

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2018/013597

A. CLASSIFICATION OF SUBJECT MATTER
 INV. H04L5/00
 ADD. H04L1/00

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)
 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 practicable, search terms used)
 EPO-Internal, COMPENDEX, INSPEC, 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	LG ELECTRONICS: "Larger channel bandwidth for FeMTC", 3GPP DRAFT; R1-1609205 LARGER CHANNEL BANDWIDTH FOR FEMTC, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE , vol. RAN WG1, no. Lisbon, Portugal; 20161010 - 20161014 9 October 2016 (2016-10-09), XP051149251, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/Meetings_3GPP_SYNC/RAN1/Docs/ [retrieved on 2016-10-09] sections 1, 2.1, 3 ----- -/--	1,12,23, 34,45, 56,67,78

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"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</p> <p>"&" document member of the same patent family</p>
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Date of the actual completion of the international search 18 May 2018	Date of mailing of the international search report 06/08/2018
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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 Faber, Thomas
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2018/013597

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.:

1-4, 12-15, 23-26, 34-37, 45-48, 56-59, 67-70, 78-81

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

International application No
PCT/US2018/013597

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 2015/009939 A1 (ZHANG WEN [CN] ET AL) 8 January 2015 (2015-01-08)</p> <p>abstract paragraph [0003] - paragraph [0009] paragraph [0072] - paragraph [0077] paragraph [0124] - paragraph [0125]</p> <p>-----</p>	<p>1,12,23, 34,45, 56,67,78</p>
X	<p>HUAWEI ET AL: "On initialization of physical downlink control channel for MTC", 3GPP DRAFT; R1-155125, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE</p> <p>, vol. RAN WG1, no. Malmo, Sweden; 20151005 - 20151009 4 October 2015 (2015-10-04), XP051002109, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/Meetings_3GPP_ SYNC/RAN1/Docs/ [retrieved on 2015-10-04] sections 2.1, 2.2.2</p> <p>-----</p>	<p>1-4, 12-15, 23-26, 34-37, 45-48, 56-59, 67-70, 78-81</p>
X	<p>US 2012/087331 A1 (SEO DONG YOUN [KR] ET AL) 12 April 2012 (2012-04-12)</p> <p>figure 8 paragraph [0011] - paragraph [0017] paragraph [0021] paragraph [0095] - paragraph [0097] paragraph [0120] paragraph [0129] paragraph [0139]</p> <p>-----</p>	<p>1-4, 12-15, 23-26, 34-37, 45-48, 56-59, 67-70, 78-81</p>

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2018/013597

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
US 2015009939	A1	08-01-2015	CN 103327615 A	25-09-2013
			EP 2830378 A1	28-01-2015
			US 2015009939 A1	08-01-2015
			WO 2013139278 A1	26-09-2013

US 2012087331	A1	12-04-2012	EP 2439995 A2	11-04-2012
			KR 20100130154 A	10-12-2010
			US 2012087331 A1	12-04-2012
			WO 2010140828 A2	09-12-2010

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-4, 12-15, 23-26, 34-37, 45-48, 56-59, 67-70, 78-81

Using a same RIV including possible valid combinations of starting RBs and number of RBs.

2. claims: 1, 5, 6, 12, 16, 17, 23, 27, 28, 34, 38, 39, 45, 49, 50, 56, 60, 61, 67, 71, 72, 78, 82, 83

Using a group of four contiguous narrowbands.

3. claims: 1, 7, 8, 12, 18, 19, 23, 29, 30, 34, 40, 41, 45, 51, 52, 56, 62, 63, 67, 73, 74, 78, 84, 85

Jointly coding information associated with one or more narrowbands.

4. claims: 1, 9-12, 20-23, 31-34, 42-45, 53-56, 64-67, 75-78, 86-88

Determining non-overlapping 5 MHz subbands within a 20 MHz bandwidth.
