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H04W 16/14 (2009.01)

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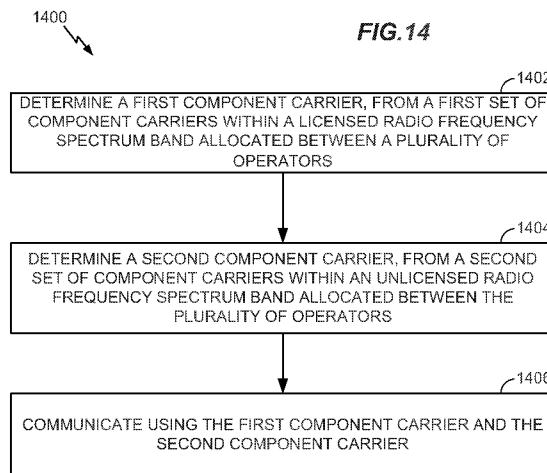
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(54) Title: TECHNIQUES FOR ENABLING ASYNCHRONOUS COMMUNICATIONS USING UNLICENSED RADIO FREQUENCY SPECTRUM



(57) Abstract: Certain aspects of the present disclosure relate to techniques that may help address issues in wireless communications systems that utilize unlicensed radio frequency spectrum bands. For example, the techniques presented herein may be used in systems where frames transmitted in licensed and/or un-licensed component carriers are not synchronous.



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/060410

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L5/00 H04W16/14 H04W74/08
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)
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	LINDA DOYLE ET AL: "Regulating for carrier aggregation & getting spectrum management right for the longer term", DYNAMIC SPECTRUM ACCESS NETWORKS (DYSPAN), 2012 IEEE INTERNATIONAL SYMPOSIUM ON, IEEE, 16 October 2012 (2012-10-16), pages 10-20, XP032342313, DOI: 10.1109/DYSPAN.2012.6478111 ISBN: 978-1-4673-4447-0 page 12, right-hand column - page 13, left-hand column page 16 figure 3 ----- -/--	1-17, 22-27

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 13 May 2015	Date of mailing of the international search report 26/05/2015
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 Orozco Roura, Carles

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2014/060410

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	"Reconfigurable Radio Systems (RRS); Use Cases for Operation in White Space Frequency Bands", TECHNICAL REPORT, EUROPEAN TELECOMMUNICATIONS STANDARDS INSTITUTE (ETSI), 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS ; FRANCE, vol. RRS 1, no. V1.2.1, 1 November 2012 (2012-11-01), XP014092602, page 41	1-17, 22-27
X	----- WO 2012/114150 A1 (RESEARCH IN MOTION LTD [CA]; VRZIC SOPHIE [CA]; YU DONGSHENG [CA]; STE) 30 August 2012 (2012-08-30) paragraphs [0046], [0097], [0099]; figure 5	1-17, 22-27
A	----- WO 2012/040520 A1 (INTERDIGITAL PATENT HOLDINGS [US]; BALA ERDEM [US]; KAUR SAMIAN J [US]) 29 March 2012 (2012-03-29) paragraphs [0002], [0006] - [0014], [0095], [0098], [0101] paragraphs [0107] - [0109], [0133]; figure 7	1-17, 22-27
A	----- WO 2012/141462 A2 (LG ELECTRONICS INC [KR]; KIM HAKSEONG [KR]; SEO HANBYUL [KR]) 18 October 2012 (2012-10-18) figure 21	1-17, 22-27
A,P	-& US 2014/036889 A1 (KIM HAKSEONG [KR] ET AL) 6 February 2014 (2014-02-06) paragraphs [0003], [0005], [0013], [0016], [0162] paragraphs [0193] - [0211], [0220] - [0230] figure 21	1-17, 22-27
X	----- WO 2012/101481 A1 (NOKIA CORP [FI]; DOPPLER KLAUS [FI]; KNECKT JARKKO [FI]) 2 August 2012 (2012-08-02) page 6 page 8, line 1 - page 11, line 7 page 13, line 27 - page 14, line 11	18-21, 28-30
X	----- US 2013/203458 A1 (CHARBIT GILLES [GB] ET AL) 8 August 2013 (2013-08-08) paragraphs [0003] - [0005], [0030] - [0039], [0053] - [0069]	18-21, 28-30

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/060410

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: 1-17, 22-27

Carrier aggregation using licensed and unlicensed radio frequency spectrum bands.

2. claims: 18-21, 28-30

Clear channel assessment for transmission on component carrier.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2014/060410

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2012114150 A1	30-08-2012	CA 2828070 A1 CN 103503534 A EP 2679069 A1 US 2013329692 A1 WO 2012114150 A1	30-08-2012 08-01-2014 01-01-2014 12-12-2013 30-08-2012
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