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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, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP,

KR, KZ, LA, LC, LK, LR, LS, LT, 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, 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.

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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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(54) Title: ADAPTIVE CONTROL CHANNEL DESIGN FOR BALANCING DATA PAYLOAD SIZE AND DECODING TIME

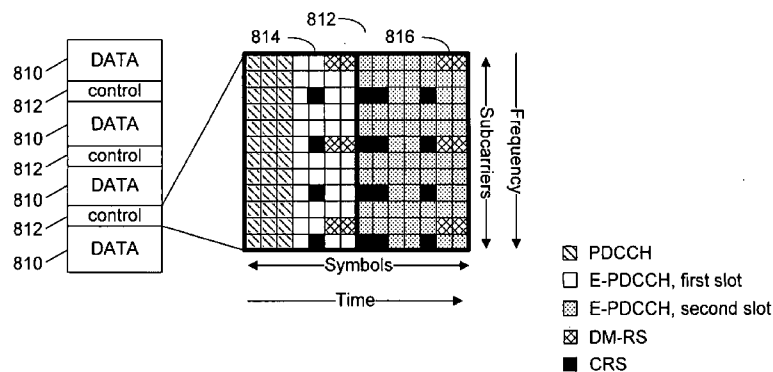


FIG. 8

(57) Abstract: A method of wireless communication includes allocating transport blocks to a control channel region as a function of the size of the transport block. The user equipment (UE) monitors at least two different control regions in a subframe for control information. The monitored control regions do not overlap in time. The UE receives a subframe including control information in at least one of the two different control regions.

WO 2013/052103 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/000450

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L5/00
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

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	SAMSUNG: "Discussion on ePDCCH Design Issues", 3GPP DRAFT; R1-112517 EPDCCH, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG1, no. Athens, Greece; 20110822, 16 August 2011 (2011-08-16), XP050537597, [retrieved on 2011-08-16]	1-3,5, 17-19, 21,33,35
Y	the whole document	4,6-8, 20,22-24
A		9-16, 25-32, 34,36
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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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Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/000450

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ETRI: "Discussions on enhanced PDCCH structure", 3GPP DRAFT; R1-112211 EPDCCH, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG1, no. Athens, Greece; 20110822, 16 August 2011 (2011-08-16), XP050537374, [retrieved on 2011-08-16] the whole document	1,17
X,P	----- QUALCOMM INCORPORATED: "E-PDCCH Requirements", 3GPP DRAFT; R1-113396 E-PDCCH, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG1, no. Zhuhai; 20111010, 4 October 2011 (2011-10-04), XP050538452, [retrieved on 2011-10-04] the whole document	1-3,5, 9-19,21, 25-36
Y	----- SAMSUNG: "Configuration of PDCCH candidate sets for the control of blind decoding attempts", 3GPP DRAFT; R1-080675 PDCCH CANDIDATE SET, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG1, no. Sorrento, Italy; 20080211 - 20080215, 5 February 2008 (2008-02-05), XP050596641, [retrieved on 2008-02-05] the whole document	4,6,7, 20,22,23
A	----- US 2009/088148 A1 (CHUNG JAE HOON [KR] ET AL) 2 April 2009 (2009-04-02) paragraph [0082] paragraph [0089] - paragraph [0093]	4,6,20, 22
A	----- US 2010/246721 A1 (CHEN WANSHI [US] ET AL) 30 September 2010 (2010-09-30) paragraphs [0050], [0054] paragraph [0057] - paragraph [0058]	4,6,20, 22
Y	----- KR 2011 0066108 A (LG ELECTRONICS INC [KR]) 16 June 2011 (2011-06-16) the whole document	8,24
Y,P	----- -& US 2012/236783 A1 (PARK KYU JIN [KR] ET AL) 20 September 2012 (2012-09-20) paragraph [0079]	8,24

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/000450

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 PCT/US2012/000450

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009088148 A1	02-04-2009	US 2009088148 A1 WO 2009041779 A1	02-04-2009 02-04-2009

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US 2012236783 A1	20-09-2012	KR 20110066108 A US 2012236783 A1	16-06-2011 20-09-2012

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-3, 5, 9-19, 21, 25-36

Determining a control region to use for transmitting control information to a receiver based on a transport block size; and transmitting control information in the determined control region (as defined in claim 9)

2. claims: 4, 6, 20, 22

Restricting monitoring control information with at least one aggregation level to one of the control regions (as defined in claim 4) or the plurality of decoding hypotheses in one of the control regions comprises a number of decoding hypotheses that depends on an aggregation level (as defined in claim 6).

3. claims: 7, 23

The plurality of decoding hypotheses in one of the control regions comprises a number of decoding hypotheses that is semi- statically configured (as defined in claim 7).

4. claims: 8, 24

A receiver restricts monitoring control information with cyclic redundancy check (CRC) scrambled with at least one radio network temporary identifier (RNTI) value to one of the control regions (as defined in claim 8).
