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

[Continued on next page]

(54) Title: COMMUNICATING CHANNEL STATE INFORMATION (CSI) OF MULTIPLE TRANSMISSION POINTS

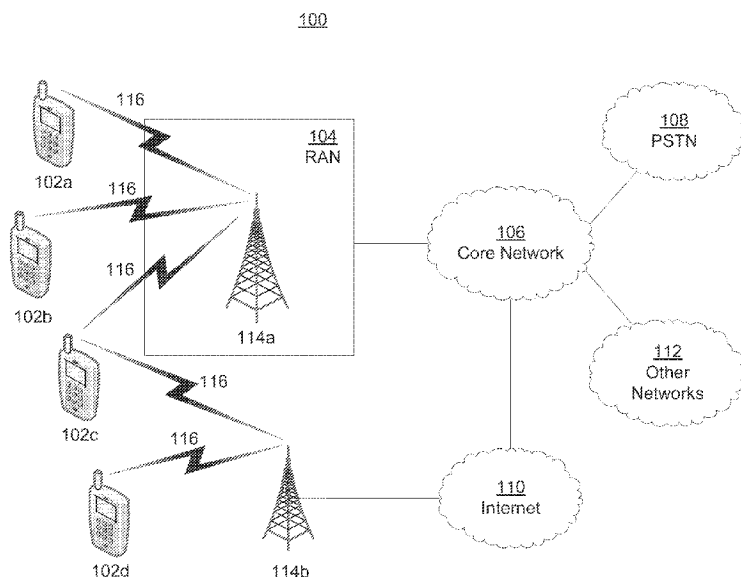


Figure 1A

(57) Abstract: Embodiments contemplate methods and systems for determining and communicating channel state information (CSI) for one or more transmission points (or CSI reference signal resources). Embodiments further contemplate determining transmission states may include applying at least one CSI process for channel state information (CSI) reporting. Embodiments also contemplate aperiodic and/or periodic reporting of one or more report types (e.g., rank indicator (RI)) of CSI, perhaps based on one or more reporting modes that may be configured for each of the one or more CSI process.



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13 March 2014

**INTERNATIONAL SEARCH REPORT**

International application No

PCT/US2013/043976

A. CLASSIFICATION OF SUBJECT MATTER  
 INV. H04B7/02 H04L1/00 H04L5/00  
 ADD. H04B7/06

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 H04B

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	HUAWEI ET AL: "CSI feedback modes for CoMP", 3GPP DRAFT; R1-121946, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, vol. RAN WG1, no. Prague, Czech Republic; 20120521 - 20120525, 12 May 2012 (2012-05-12), XP050600247, [retrieved on 2012-05-12]	1-14, 19-21,23
Y	the whole document ----- -/--	15-17,22

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 December 2013

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2013/043976

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>"3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures (Release 10)",                      3GPP STANDARD; 3GPP TS 36.213, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE,                      vol. RAN WG1, no. V10.5.0,                      7 March 2012 (2012-03-07), pages 1-125,                      XP050579996,                      [retrieved on 2012-03-07]                      Section 7.2</p>	<p>1-17,                      19-23</p>
E	<p>-----                      WO 2013/133653 A1 (LG ELECTRONICS INC [KR]) 12 September 2013 (2013-09-12) figures 20-24 abstract</p>	<p>7-14,20,                      21</p>
E	<p>-----                      WO 2013/112024 A1 (SAMSUNG ELECTRONICS CO LTD [KR]) 1 August 2013 (2013-08-01) the whole document</p>	<p>1-6,19,                      23</p>
X	<p>-----                      ERICSSON ET AL: "Control Signaling in Support of CoMP",                      3GPP DRAFT; R1-122843, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE,                      vol. RAN WG1, no. Prague, Czech Republic; 20120521 - 20120530,                      12 May 2012 (2012-05-12), XP050601017,                      [retrieved on 2012-05-12]                      Section 5</p>	<p>15,16,22</p>
Y A		<p>17                      1-14,                      19-21,23</p>
Y	<p>-----                      ERICSSON ET AL: "RI and PMI sharing between multiple CSI processes",                      3GPP DRAFT; R1-122836, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE,                      vol. RAN WG1, no. Prague, Czech Republic; 20120521 - 20120530,                      12 May 2012 (2012-05-12), XP050601012,                      [retrieved on 2012-05-12]</p>	<p>15-17,22</p>
A	<p>Title                      Section 2                      -----</p>	<p>1-14,                      19-21,23</p>

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2013/043976

## 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.:  
  
1-17, 19-23
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: 1-14, 19-21, 23

Communicating channel state information (CSI) of multiple transmission points, based one or more CSI processes, and handling collisions between two or more periodic reports.

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2. claims: 15-17, 22

Communicating channel state information (CSI) of multiple transmission points, based one or more CSI processes, with reduced overhead.

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3. claim: 18

Communicating channel state information (CSI) of multiple transmission points, based one or more CSI processes, with accurate CSI estimation.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/043976

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013133653 A1	12-09-2013	NONE	
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WO 2013112024 A1	01-08-2013	US 2013195045 A1	01-08-2013
		WO 2013112024 A1	01-08-2013
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