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61/653,643 31 May 2012 (31.05.2012) US  
61/818,182 1 May 2013 (01.05.2013) US(71) Applicant: **INTERDIGITAL PATENT HOLDINGS, INC.** [US/US]; 200 Bellevue Parkway, Suite 300, Wilmington, Delaware 19809 (US).(72) Inventors: **RAGHOTHAMAN, Balaji**; 3933 Powell Road, Chester Springs, Pennsylvania 19425 (US). **PRAGADA, Ravikumar V.**; 309 Johnson Road, Collegeville, Pennsylvania 19426 (US). **DENG, Zhuorong**; 1864 West 12th Street, Brooklyn, New York 11223 (US). **PANI, Diana**; 730 Lusignan, Apartment 4, Montreal, Québec H3C 1Y9 (CA). **PELLETIER, Ghyslain**; 2055 rue De Valmont, Chomedey, Laval, Québec H7M 3J3 (CA). **POITAU, Gwenaël**; 7630 Rue Casgrain, Montreal, Québec H2R 1Y8 (CA). **VANGANURU, Kiran K.**; 3000 Valley Forge Circle, Apartment #1150, King of Prussia,Pennsylvania 19406 (US). **STERNBERG, Gregory S.**; 7 Brookwood Road, Mt. Laurel, New Jersey 08054 (US).(74) Agent: **HALT, JR., Gerald B.**; Volpe and Koenig, P.C., United Plaza, Suite 1600, 30 S. 17th Street, Philadelphia, Pennsylvania 19103 (US).

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Published:

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

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR DEVICE-TO-DEVICE (D2D) MOBILITY IN WIRELESS SYSTEMS

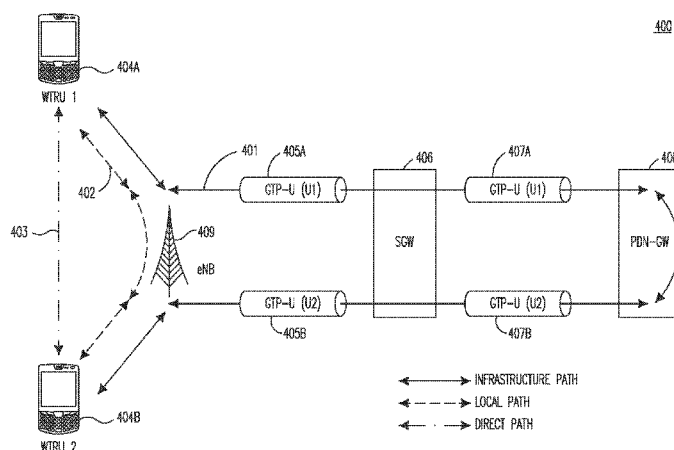


FIG. 4

(57) Abstract: A method and apparatus for mobility for device-to-device, D2D, communications is disclosed. A WTRU may store a proximity detection configuration that includes a measurement object corresponding to at least one discovery signal property, perform a proximity detection measurement to detect a discovery signal property, and then establish D2D communication. A radio resource control, RRC, Measurement Report may be received from a WTRU. Methods for D2D mobility procedures are also disclosed including mobility to or from a direct path, to or from a local path, to or from an infrastructure path, changing serving cell, and cell reselection. Other embodiments include: behavior upon mobility failure, radio link failure, and direct link failure. Security configuration and activation methods and apparatuses are also disclosed. Network methods for inter-eNB management are also disclosed. Finally, direct path proximity detection measurements and methods and apparatuses for triggering and establishing D2D sessions are disclosed.



— *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:**  
24 April 2014

# INTERNATIONAL SEARCH REPORT

International application No

PCT/US2013/043408

## A. CLASSIFICATION OF SUBJECT MATTER

INV. H04W76/02

ADD. H04W88/04

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)

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)

EP0-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. |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
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|           | -----<br>-/-                                                                                                                                                                   |                       |



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

28 November 2013

Date of mailing of the international search report

28/02/2014

Name and mailing address of the ISA/

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# INTERNATIONAL SEARCH REPORT

International application No

PCT/US2013/043408

| C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                       |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Category*                                            | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                                                                                                                                                                                                                                            | Relevant to claim No. |
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| X                                                    | WO 2012/015698 A1 (QUALCOMM INC [US];<br>GEIRHOFER STEFAN [US]; BHUSHAN NAGA [US];<br>PALANKI R) 2 February 2012 (2012-02-02)<br>paragraphs [0023] - [0024], [0090] -<br>[0096]<br>-----                                                                                                                                                                                                                                                                                                                      | 1,9                   |
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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2013/043408

### 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.:

1-16

#### 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: 1-16

Method and wireless transmit/receive unit configured for establishing a device-to-device, D2D, communication.

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2. claims: 17-20

Method for link failure handling in a device-to-device, D2D, communication.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/043408

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s)                                                                                                                    | Publication<br>date                                                                                          |
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