

(51) International Patent Classification:
H04W 36/00 (2009.01)(21) International Application Number:
PCT/IB2013/000224(22) International Filing Date:
1 February 2013 (01.02.2013)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
201210024595.5 3 February 2012 (03.02.2012) CN(71) Applicant: **ALCATEL LUCENT** [FR/FR]; 3 avenue
Octave Gréard, F-75007 Paris (FR).(72) Inventors: **PAN, Yuwen**; Alcatel-Lucent Shanghai Bell,
388 Ningqiao Road, PuDong Jinqiao, Shanghai 201206
(CN). **LUO, Qinglin**; Alcatel-Lucent Shanghai Bell, 388
Ningqiao Road, PuDong Jinqiao, Shanghai 201206 (CN).
YANG, Tao; Alcatel-Lucent Shanghai Bell, 388 Ningqiao
Road, PuDong Jinqiao, Shanghai 201206 (CN).(74) Agent: **THERIAS, Philippe**; Alcatel-Lucent International,
32 avenue Kléber, F-92700 Colombes (FR).(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.(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, 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,
ML, MR, NE, SN, TD, TG).**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:
20 February 2014

(54) Title: METHOD AND APPARATUS FOR COOPERATIVE HANDOVER ACROSS MULTIPLE MOBILE RELAYS

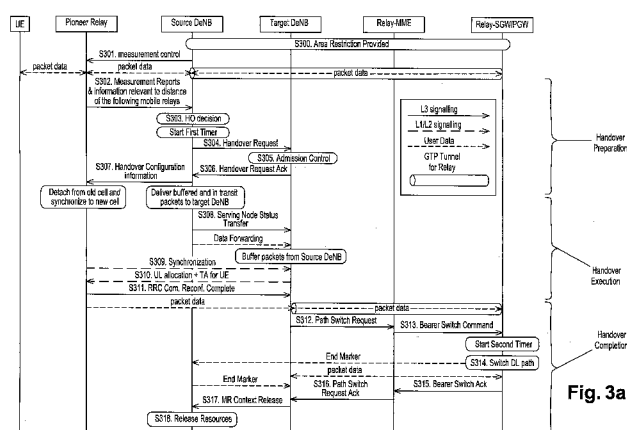


Fig. 3a

(57) **Abstract:** An objective of the present invention aims at providing a method and apparatus for cooperative handover across multiple mobile relays. Herein, when a source DeNB makes a handover decision for one of the multiple mobile relays, the source DeNB determines a handover triggering time of at least one of the mobile relays following the current handover mobile relay based on distance between the multiple mobile relays and information relevant to motion of the moving object, and initiates and executes a first timer corresponding to the following mobile relay according to the sequence of the following mobile relay; upon expiration of each first timer, the source DeNB obtains handover configuration information of a corresponding following mobile relay from a target DeNB corresponding to the current handover mobile relay, so as to be available for the corresponding following mobile relay to perform RRC reconfiguration and communicate with the target DeNB Through cooperative handover across multiple mobile relays, the amount of handover signaling and handover latency will be both reduced, thereby effectively avoiding handover failure and improving user experience.

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/000224

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04W36/00
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)
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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	VINH VAN PHAN ET AL: "Providing enhanced cellular coverage in public transportation with smart relay systems", VEHICULAR NETWORKING CONFERENCE (VNC), 2010 IEEE, IEEE, PISCATAWAY, NJ, USA, 13 December 2010 (2010-12-13), pages 301-308, XP031857802, ISBN: 978-1-4244-9526-9 abstract chapter III, chapter IV.B ----- -/-	1-12,14, 15



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

12 September 2013

Date of mailing of the international search report

09/12/2013

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

Patras, Paula Larisa

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2013/000224

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.:

1-12, 14, 15

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/IB2013/000224

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	RESEARCH IN MOTION UK LIMITED: "Joint PDCP protocols on Uu and Un interfaces to improve type-I relay handover", 3GPP DRAFT; R2-093735, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE, no. Los Angeles, USA; 20090622, 22 June 2009 (2009-06-22), XP050351968, figure 13 -----	1-12,14, 15

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-12, 14, 15

In a source DeNB, determining a handover triggering time of mobile relays following a current handover mobile relay.

2. claim: 13

In a mobile relay gateway, starting a timer for path switch triggering and executing the path switching upon expiration of the timer.
