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Paper 15
Entered: January 24, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ERICSSON INC.,
Petitioner,

v.

KONINKLIJKE KPN N.V.,
Patent Owner.

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IPR2023-00582
Patent 8,660,560 B2

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Before NORMAN H. BEAMER, KARA L. SZPONDOWSKI, and SCOTT RAEVSKY, *Administrative Patent Judges*.

BEAMER, *Administrative Patent Judge*.

TERMINATION
Due to Settlement After Institution of Trial
*35 U.S.C. § 317; 37 C.F.R. § 42.74*

With the Board's authorization, Petitioner and Patent Owner filed a Joint Motion to Terminate Proceeding. Paper 13. The parties also filed their confidential Settlement And License Agreement (Ex. 1022) and a Joint Request To Treat As Confidential And Keep Separate Pursuant To 37 C.F.R § 42.74(c) (Paper 14).

The parties represent that they have settled their dispute in this proceeding and in the related district-court litigation and they filed true copies of their agreement in its entirety. Paper 13, 1. The parties also represent that there are no other agreements between them made in connection with or in contemplation of the termination of these proceedings. *Id.* According to the parties, the agreement that they filed contains confidential information under the Board's rules. Paper 14, 1–2 (citing 37 C.F.R. § 42.74).

The parties assert that this proceeding should be terminated because (1) the Board has not decided the merits, (2) the parties have settled their dispute, and (3) the parties jointly request termination. Paper 13, 1–2. We agree that termination is appropriate for all those reasons. *See* Consolidated Trial Practice Guide, 86 (Nov. 2019) ("The Board expects that a proceeding will terminate after the filing of a settlement agreement, unless the Board has already decided the merits of the proceeding.").[1]

We also agree that the agreement filed in this proceeding contains confidential information under the Board's rules. *See* Ex. 1022. Therefore, the agreement should be treated as business confidential information under 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c).

This Order does not constitute a final written decision under 35 U.S.C. § 318(a).

[1] *Available at* https://www.uspto.gov/TrialPracticeGuideConsolidated.

ORDER

It is

ORDERED that the parties' Joint Motion to Terminate the Proceedings (Paper 13) is *granted*;

FURTHER ORDERED that the parties' Joint Motion to File the Agreement as Business Confidential Information (Paper 14) is *granted* and the parties' confidential agreement (Ex. 1022) shall be treated as business confidential information and be kept separate from the files of the challenged patent, U.S. Patent No. 8,660,560 B2, and made available only under the provisions of 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c); and

FURTHER ORDERED that these proceedings are terminated.

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Paper 10
Entered: September 7, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ERICSSON INC.,
Petitioner,

v.

KONINKLIJKE KPN N.V.,
Patent Owner.

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IPR2023-00582
Patent 8,660,560 B2

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Before NORMAN H. BEAMER, KARA L. SZPONDOWSKI, and SCOTT RAEVSKY, *Administrative Patent Judges*.

BEAMER, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
*35 U.S.C. § 314*

# I. INTRODUCTION

On February 17, 2023, Ericsson, Inc. ("Petitioner") filed a Petition ("Pet.") pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claims 1 and 6–8 of U.S. Patent No. 8,660,560 B2 ("the '560 patent"). Paper 1 ("Pet"), 1. On June 20, 2023, Koninklijke KPN N.V. ("Patent Owner") filed a Preliminary Response ("Prelim. Resp."). Paper 6. Subsequently, with our authorization, the parties filed briefs on the issue of discretionary denial. Paper 7 ("Reply"); Paper 8 ("Sur-Reply").

The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted unless the information presented in the Petition and any preliminary response shows that "there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." *See* 37 C.F.R. § 42.108 (2022).

For the reasons explained below, we determine that Petitioner has established a reasonable likelihood that it would prevail with respect to at least one challenged claim. Accordingly, we institute an *inter partes* review as to the challenged claims and grounds raised in the Petition.

# II. BACKGROUND

## *A. The '560 Patent*

The '560 patent, titled "System For Updating A Neighbour Cell List (NCL) Of A Wireless Access Node Of A Telecommunications Architecture And Method Therefore," was filed on October 5, 2010 and issued on February 25, 2014. Ex. 1001, codes (54), (22), (45). The '560 patent is directed to updating neighbour cell lists of wireless access nodes. *Id.* at code (57). Figure 1 is reproduced below.

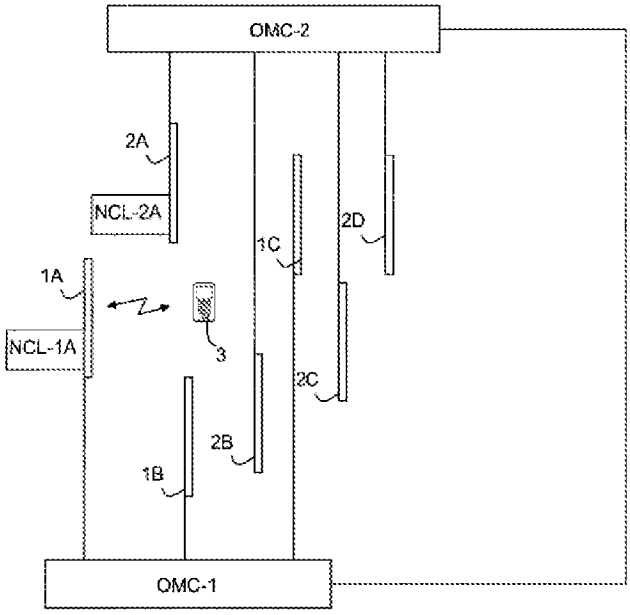


FIG. 1

Figure 1 is a schematic illustration of a telecommunications system with two different wireless access networks, each having wireless access nodes — nodes 1A–1C in the first network and nodes 2A–2D in the second network. Ex. 1001, 6:12–15, 6:32–35. A "wireless access node" is also referred to as a "cell," and each node/cell is associated with a "Base Station." *Id.* at 1:35, 2:65–66. The first network, for example, could be a Long Term Evolution (LTE) network, and the second a UMTS network. *Id.* at 6:36–38. Each network is controlled by an Operation and Maintenance Center (OMC-1 and OMC-2), and each node has at least one neighbour cell list (*e.g.*, NCL-1A and NCL-2A). *Id.* at 6:57–60. A mobile user terminal 3 receives and stores the NCL of the node that it currently is located in. *Id.* at 6:63–65. As explained in the '560 patent:

> When moving through the coverage area of a wireless access cellular network, mobile user terminals continuously scan the spectrum for pilot or reference signals (beacons) in order to determine which cell (base station) to camp on . . . . [T]his is referred to as handover. The cell-specific list of

> surrounding cells that are considered for cell . . . handover is called the neighbour cell list (NCL), which is stored in each base station and broadcast within the cell. The mobile user terminal receives and stores the NCL. The NCL contains the cells for which the mobile user terminal should send measurement reports (when certain criteria are met) to the base station currently serving the user terminal.

Ex. 1001, 1:32–45. The measurement reports from the mobile user terminal provide the signal strengths of the monitored cells, so that the network can make a decision whether or not the mobile user terminal should be handed over from the current serving cell to another cell. *Id.* at 6:65–7:3. A "transfer threshold determines at what level (typically involving pilot signal measurements) cell . . . handover would occur." *Id.* at 5:41–44.

The determination of the cells identified in the NCLs was traditionally done with the aid of off-line planning tools, using path loss predictions and (off-line) optimization algorithms. Ex. 1001, 1:49–51. The '560 patent discloses an automated configuration and optimization of NCLs, based on actual measurement feedback from mobile user terminals. *Id.* at 1:51–55. The measurement reports are used to update the identities of the neighboring cells included in the NCLs. *Id.* at 7:14–17. The cells are identified by, *inter alia*, their Global Cell Identifiers (GCID). *Id.* at 9:52–54.

Figure 2, reproduced below, depicts further details of a mobile user terminal and wireless access nodes (*i.e.*, cells). Ex. 1001, 6:16–18, 7:19–20.

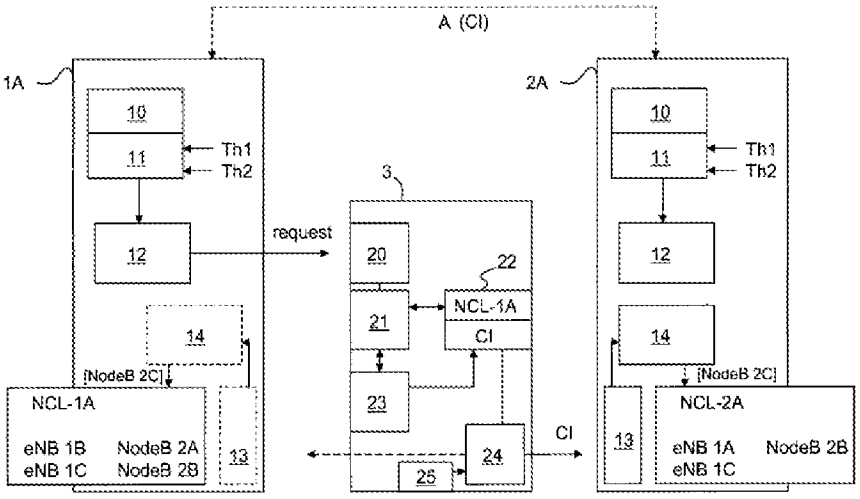


FIG. 2

Figure 2 depicts node 1A of a first network, node 2A of a second network, and mobile user terminal 3, the latter of which is "camped on" node 1A and monitoring neighboring cells, including node 2A. Ex. 1001, 7:25–28. As indicated, NCL-1A contains the identities (*e.g.*, the GCIDs) of nodes 1B, 1C, 2A, and 2B. *Id.* at 7:19–24. Assuming node 1A receives a measurement report from mobile user terminal 3 indicating handover to node 2A (for example), cell reselection/handover detector 10 recognizes that fact and triggers selection module 11, which determines whether mobile user terminal 3 should, in addition to being handed over, also participate in the process for updating of NCL-1A or NCL-2A. *Id.* at 7:31–44.

Selection module 11 filters an appropriate portion of the mobile user terminals for which cell reselection or handover is about to take place, in order to reduce unnecessary signalling over the first and/or second wireless access network. *Id.* at 7:45–48. Filtering criteria include providing the mobile user terminal with a "likelihood parameter" used to "flip a biased coin in determining whether it should send information at a specific handover or cell reselection instance." *Id.* at 5:13–17, 7:55–58. Other

filtering criteria include consideration of the geographic location of the mobile user terminal (obtained using GPS module 25), and use of the handover transfer threshold setting (for example, in situations where the handover thresholds are asymmetric *vis-à-vis* transfer from a first network to a second, *versus* from the second network to the first). *Id.* at 5:25–67, 7:65–8:5, 9:59–62. These criteria allow the amount of cell information measuring and reporting to be tuned, providing a trade-off between the measurement overhead (signalling load) and the potential for neighbour cell list optimization. *Id.* at 5:21–24.

If mobile user terminal 3 is selected by selection module 11, request generator 12 is activated in order to request user terminal 3 to report the cell information of a plurality of wireless access nodes. Ex. 1001, 8:28–31. Receiver 20 of mobile user terminal 3 receives the request, determination module 21 determines from which cells the cell information for the purpose of the NCL update should be gathered, scanning module 23 performs the measurements, and transmitter 24 transmits the measured cell information to the telecommunications system. *Id.* at 8:28–9:22. The transmitted information is received by receiver 13 of either or both of the nodes participating in the handover (*e.g.*, nodes 1A and/or 2A), and updater 14 updates the NCLs of the receiving node(s) based on the received signal strength measurements. *Id.* at 9:23–34, 9:46–48.

### *B. Illustrative Claim*

Independent claim 1 is reproduced below.

> 1. A system for updating a neighbour cell list in a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second

wireless access network having a second wireless access node for which at least one second neighbour cell list is defined, the system comprising:

a detector configured for detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;

a selector configured for selecting a part of the user terminals;

a request generator configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

a receiver configured for receiving the cell information from the one or more of the selected user terminals; and

updating means configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

Ex. 1001, 11:50–12:5.

*C. References*

Petitioner relies on the following references (Pet. 11):

- Amirijoo et al., U.S. Patent Publication No. 2009/0191862 ("Amirijoo"). Ex. 1005.
- 3GPP TR 32.816 v1.0.0 ("3GPP TR 32.816"). Ex. 1007.

In addition, Petitioner filed the Declaration of Dr. Mark P. Mahon in support of the Petition. Ex. 1002 ("Mahon Decl.").

### *D. Asserted Challenges to Patentability*

Petitioner challenges the patentability of claims 1 and 6–8 of the '560 patent on the following basis (Pet. 11):

| Claims Challenged | 35 U.S.C. §[1] | References |
|---|---|---|
| 1, 6–8 | 103 | Amirijoo, 3GPP TR 32.816 |

### *E. Real Parties in Interest*

Petitioner identifies Ericsson Inc. and Telefonaktiebolaget [Telephone Corporation] LM Ericsson as real parties in interest. Pet. 1. Patent Owner identifies itself as a real party in interest. Paper 4, 1.

### *F. Related Proceedings*

The parties identify *Koninklijke KPN N.V. v. Telefonaktiebolaget LM Ericsson et al.*, No. 2:22-cv-00282 (E.D. Tex.) (hereafter, "the Texas case"), as a related proceeding. Pet. 1; Paper 4, 1.

## III. ANALYSIS OF PETITIONER'S CHALLENGE

### *A. 35 U.S.C. § 314(a)*

Patent Owner argues that we should exercise our discretion under 35 U.S.C. § 314(a) to deny the Petition in light of the Texas Case. Prelim. Resp. 7–16; Sur-reply 1–5. Section 314(a) states that

> [t]he Director may not authorize an inter partes review to be instituted unless the Director determines that the information presented in the petition filed under section 311 and any

[1] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), included amendments to 35 U.S.C. §§ 102 and 103 that became effective after the filing of the application for the '560 patent. Therefore, we apply the pre-AIA versions of these sections.

> response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.

Under § 314(a), we have discretion to deny institution of an *inter partes* review. *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016). We consider several factors when determining whether to deny institution under § 314(a) based on a parallel district court proceeding, specifically

1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
3. investment in the parallel proceeding by the court and the parties;
4. overlap between issues raised in the petition and in the parallel proceeding;
5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
6. other circumstances that impact the Board's exercise of discretion, including the merits.

*Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) ("*Fintiv*"). We also consider "several clarifications" made by the Director of the United States Patent and Trademark Office ("USPTO"). *See* USPTO Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation, 2 (June 21, 2022), *available at* https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf ("Director's Memo").

*1. Factor 1 – Whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted*

Under the first *Fintiv* factor, we consider "whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted." *Fintiv*, Paper 11 at 6. Petitioner indicates that it intends to seek a stay upon institution, and does not dispute that this factor is neutral. Pet. 12; Reply 1. Patent Owner agrees that this factor is neutral. Prelim. Resp. 9; Sur-Reply 4.

Neither party identifies any statements by the District Court or other evidence that specifically address a stay of the District Court Litigation pending this proceeding. *See* Pet. 19; Prelim. Resp. 66–67; Reply 1; Sur-reply 4. We decline to speculate based on the record in this case whether the District Court would grant a stay of the District Court Litigation. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15 at 12 (PTAB May 13, 2020) (informative) ("*Fintiv II*"). As a result, we determine that the first *Fintiv* factor is neutral.

*2. Factor 2 – Proximity of the court's trial date to the Board's projected statutory deadline for a final written decision*

Under the second *Fintiv* factor, we consider the "proximity of the court's trial date to the Board's projected statutory deadline for a final written decision." *Fintiv*, Paper 11 at 6. Petitioner argues that "[i]t is reasonable to expect" that the District Court's trial date of April 1, 2024, "will be rescheduled" because "six other cases" also are scheduled for trial on the same day. Reply 1. Petitioner also argues that "there will almost certainly be additional post-trial motions addressing the invalidity issue" in the District Court Litigation "that go unaddressed by the final written decision deadline" in this case. *Id.* at 2. Petitioner concludes that the second

factor "favors institution." *Id.* Patent Owner argues that the second factor favors "denying institution" because the District Court's trial date of April 1, 2024, is "almost six months" before the expected date of the Board's final written decision. Prelim. Resp. 9–10; Sur-reply 1–2. According to Patent Owner, Petitioner's argument regarding possible trial delays is "speculative." Sur-reply 2.

The current trial date in the District Court Litigation is April 1, 2024. Ex. 2005, 1. The projected statutory deadline for a final written decision in this case is in September 2024. Thus, the current trial date in the District Court Litigation is almost six months before the projected statutory deadline for a final written decision in this case. As a result, we determine that the second *Fintiv* factor favors discretionary denial of institution.

*3. Factor 3 – Investment in the parallel proceeding by the court and the parties*

Under the third *Fintiv* factor, we consider the "investment in the parallel proceeding by the court and the parties." *Fintiv*, Paper 11 at 6. Petitioner argues that "[t]he district court claim construction hearing, the close of discovery, and rulings on dispositive motions, Daubert motions, and motions in limine are all scheduled after the September 16, 2023 [*sic* — September 20, 2023] institution deadline." Reply 3. Petitioner also argues that it "diligently filed its Petition less than six weeks after it received Patent Owner's infringement contentions . . . and well before serving initial invalidity contentions" in the District Court Litigation. *Id.* at 2–3 (emphasis omitted). Petitioner thus contends that the third factor weighs "strongly in favor of institution." *Id.* at 4. Patent Owner argues that the third factor "favors denying institution" because the parties 1) exchanged infringement

and invalidity contentions; 2) responded to discovery requests; 3) conducted a deposition; 4) produced and reviewed a large volume of documents and source code; and 5) started the claim construction process. Prelim. Resp. 11–12; Sur-reply 4.

The evidence of record indicates that the District Court and the parties have invested only minimal resources in the District Court Litigation as to issues of unpatentability involving the '560 patent. We recognize that Petitioner served invalidity contentions regarding the '560 patent. Ex. 2015. But the evidence of record indicates that the claim construction process and fact discovery are ongoing, expert discovery has not begun, and the deadline for dispositive motions is not until December 2023. Ex. 2010, 3–4. Further, Petitioner exercised reasonable diligence in filing the Petition about six weeks after receiving Patent Owner's disclosure of asserted claims and infringement contentions in the District Court Litigation. Reply 2–3; Ex. 1016, 5. Thus, we determine that the third *Fintiv* factor weighs against discretionary denial of institution.

*4. Factor 4 – Overlap between issues raised in the petition and in the parallel proceeding*

Under the fourth *Fintiv* factor, we consider the "overlap between issues raised in the petition and in the parallel proceeding." *Fintiv*, Paper 11 at 6. Petitioner states that "if the Patent Trial and Appeal Board institutes an IPR in this proceeding on the grounds presented in the Petition, Petitioner will not pursue an invalidity defense in the district court action (C.A. No. 2:22-cv-282-JRG) that the patent claims subject to the instituted IPR are invalid based on the same grounds as in the Petition or on the references that are the bases for those grounds (*e.g.*, *Angelot* and 3GPP TR 32.816)." Reply

4–5. Patent Owner argues that "Petitioner's stipulation 'falls far short of a *Sotera*-type stipulation,'" and thus factor four "weighs 'somewhat' against denial." Sur-reply 3.

The Petition challenges claims 1 and 6–8, and relies on Angelot and 3GPP TR 32.816. Pet. 11. Petitioner's invalidity contentions in the District Court Litigation also address claims 1 and 6–8, and rely on Angelot and 3GPP TR 32.816. Ex. 2015, 1, 11. Nonetheless, Petitioner's stipulation that it will not rely on the grounds or references asserted in the Petition in the District Court Litigation mitigates to at least some degree concerns of duplicative efforts and potentially conflicting decisions. Reply 4–5; *see Sand Revolution II, LLC v. Continental Intermodal Grp. – Trucking LLC*, IPR2019-01393, Paper 24 at 12 (PTAB June 16, 2020) (informative). Thus, we determine that the fourth *Fintiv* factor weighs at least slightly against discretionary denial of institution.

*5. Factor 5 – Whether the petitioner and the defendant in the parallel proceeding are the same party*

Under the fifth *Fintiv* factor, we consider "whether the petitioner and the defendant in the parallel proceeding are the same party." *Fintiv*, Paper 11 at 6. Here, Petitioner is the defendant in the District Court Litigation. Prelim. Resp. 14; Reply 5. Under these circumstances, we determine that the fifth *Fintiv* factor favors discretionary denial of institution.

*6. Factor 6 – Other circumstances that impact the Board's exercise of discretion, including the merits*

Under the sixth *Fintiv* factor, we consider "other circumstances that impact the Board's exercise of discretion, including the merits." *Fintiv*,

Paper 11 at 6. "[W]here the PTAB determines that the information presented at the institution stage presents a compelling unpatentability challenge, that determination alone demonstrates that the PTAB should not discretionarily deny institution under *Fintiv*." Director's Memo at 4–5. Petitioner argues that the Petition "presents a compelling unpatentability challenge of the '560 [p]atent, so the Board should not discretionarily deny institution." Reply 5. Patent Owner argues that the Petition "fails to present compelling evidence of unpatentability." Prelim. Resp. 15.

On balance, we determine that *Fintiv* factors 1–5 do not favor discretionary denial of institution. Specifically, we determine that Petitioner's stipulation and reasonable diligence in filing the Petition as well as the parties' minimal investment in the District Court Litigation outweigh the projected trial date. *See* Director's Memo at 8 ("[W]hen analyzing the proximity of the court's trial date under factor two of *Fintiv*, when other relevant factors weigh against exercising discretion to deny institution or are neutral, the proximity to trial should not alone outweigh all of those other factors."). As a result, we need not decide whether Petitioner presents a compelling unpatentability challenge. *See CommScope Techs. LLC v. Dali Wireless, Inc.*, IPR2022-01242, Paper 23 at 4–5 (PTAB Feb. 27, 2023) (decision on Director review) (precedential) ("[I]n circumstances where the Board determines that the other *Fintiv* factors 1–5 do not favor discretionary denial, the Board shall decline to discretionarily deny under *Fintiv* without reaching the compelling merits analysis.").

*7. Summary*

Based on our holistic view of the *Fintiv* factors, we decline to exercise our discretion under § 314(a) to deny the Petition.

*B. Legal Standards*

To prevail in its challenge, Petitioner must show a reasonable likelihood that at least one claim is unpatentable. 35 U.S.C. § 314(a). Under § 314, the Board is required to make a binary choice to institute review or not. *SAS Institute Inc. v. Iancu*, 138 S.Ct. 1348, 1355 (2018). "In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (2012) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden of persuasion never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective indicia of non-obviousness (also called secondary considerations), such as

commercial success, long-felt but unsolved needs, and failure of others.[2] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We analyze grounds based on obviousness in accordance with the above-stated principles.

### *C. Level of Skill in the Art*

In determining whether an invention would have been obvious at the time it was made, 35 U.S.C. § 103(a) requires us to resolve the level of ordinary skill in the pertinent art at the time of the invention. *Graham*, 383 U.S. at 17. The person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field. *Id.* In a given case, one or more factors may predominate. *Id.*

Petitioner asserts that a person of ordinary skill in the art at the time of the alleged invention of the '560 patent:

> would have had a B.S. in Electrical Engineering or a related field with at least three years of experience designing, developing, and/or testing telecommunication systems . . . . A POSITA would also have familiarity with the wireless standards and protocols related to data transmission and network management . . . . More education may supplement practical experience or vice versa.

Pet. 11 (citing Mahon Decl. ¶¶ 31–37). Patent Owner does not contest Petitioner's proposal at this stage of the proceeding. Prelim. Resp. 21–22.

[2] The record does not include evidence or argument regarding objective indicia of nonobviousness.

Petitioner's proposal is consistent with the level of ordinary skill in the art reflected by the asserted prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *GPAC*, 57 F.3d at 1579. On this record, the level of ordinary skill is neither in dispute nor dispositive of any challenge. For purposes of this Decision, we apply Petitioner's articulation.

### *D. Claim Construction*

The Petition was accorded a filing date of February 17, 2023. Paper 5. In an *inter partes* review for a petition filed on or after November 13, 2018, a claim "shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b)." 37 C.F.R. § 42.100(b). We apply the claim construction standard from *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (*en banc*).

Claim terms need only be construed to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

Petitioner submits that the "updating means" of claim 1 should be construed pursuant to pre-AIA 35 U.S.C. § 112, ¶ 6, and provides a proposed construction in accord with that provision, including identifying "updater 14" as the structure disclosed in the '560 patent that corresponds to the updating means. Pet. 8–9. For purposes of this Decision, it is not necessary to decide this construction issue.

Petitioner also proposes construction of the "location information" of claim 7 by relying on the fact that Patent Owner, in the Texas case, has served infringement contentions which compare the claim 7 requirement, "configured for receiving location information from one or more of the

detected user terminals," to "information regarding at least the cell in which the terminal is operating, such cell corresponding to a particular geographic coverage area." Pet. 10 (citing Ex. 1011, 7–8). Based on this, Petitioner proposes to construe the claimed "location information" as including "information regarding the cell in which a terminal is operating." *Id.*

Petitioner's construction is presented without any consideration of the intrinsic record and is based solely on extrinsic evidence (PO's infringement contentions). At this stage, this construction appears overly broad and we are not persuaded that it is correct. The "detected user terminals" of claim 7 are, according to claim 1, "user terminals to be transferred *from the first wireless access node* of the first wireless access network." Ex. 1001, 11:57–59 (emphasis added). Thus, the detector of claim 1 has already identified the user terminal as located *somewhere* within "the cell in which a terminal is operating." To construe claim 7 as merely again ascertaining that the user terminal is somewhere within its cell appears to be a redundancy that serves no purpose.

Considering the intrinsic evidence, the location information described in illustrative embodiments of the '560 patent is information generated by GPS module 25 or "by means of measurements using the first and/or the second wireless access network." Ex. 1001, 5:25–30, 9:59–62. As explained in the '560 patent:

> This location information can be useful e.g. in identifying where handover regions exist, and in solving location-specific outages or problems, e.g. dropped calls due to missing neighbour. It may also be useful when an operator changes configuration (optimisation of downlink power, antenna tilt, etc) and wants to measure the effect on the cells relevant for inter-RAT cell change or handover.

Ex. 1001, 5:30–42. Thus, the "location" of claim 7 is the actual location of the "detected user terminals" within the cell in which the terminals are operating.

In Patent Owner's arguments regarding Petitioner's challenge to claim 8, Patent Owner compares the claim 8 requirement, "thresholds . . . for transferring the user terminals between the first wireless access network and the second wireless access network," to the claim 1 requirement, "user terminals to be transferred from the first wireless access node . . . to the second wireless access node," and argues that the former refers to a "two-way transfer" and the latter to a "one-way transfer." Prelim. Resp. 44. As further discussed in Section III.E.4.c) below in our analysis of Petitioner's challenge to claim 8, the evidence at this stage does not support an interpretation requiring two-way transfers in claim 8.

An additional claim construction issue, not raised by the parties, is presented by the claim 1 requirement, "a selector configured for selecting a part of the user terminals." The "user terminals" referred to in this requirement are the user terminals that are detected in the claim 1 requirement, "a detector configured for detecting user terminals to be transferred . . . ." Ex. 1001, 11:57–58. Thus, the selected user terminals must be selected from the set of user terminals that have first been detected for transfer as claimed. On this record, merely selecting user terminals that happen to be in the wireless access network without regard to whether or not they have been detected is not encompassed by claim 1. This point is further discussed in our analysis of Petitioner's challenge to claim 1 in Section III.E.3.c) below.

### *E. Alleged Obviousness of Claims 1 and 6–8 Over Amirijoo and 3GPP TR 32.816*

Petitioner challenges claims 1 and 6–8 as obvious over the combination of Amirijoo and 3GPP TR 32.816. Pet. 22–49.

#### *1. Amirijoo*

Amirijoo, titled "Inter-RAT/Frequency Automatic Neighbor Relation List Management," was filed on December 10, 2008 and issued on July 30, 2009. Ex. 1005, codes (54), (22), (45). "RAT" is an acronym for "Radio Access Technology." *Id.* ¶ 15. Amirijoo is directed to automatically managing neighborhood relation lists (NRLs) by a serving radio base station nodes directing mobile stations to obtain information, such as Cell Global Identities (CGI), broadcasted by candidate radio base stations during a "reading gap," which is the time period in which a mobile station does not receive information from the serving radio base station. *Id.* at codes (54), (57), ¶¶ 6, 27–30. Each mobile station (MS) periodically monitors the signal quality of the serving base station (BS) as well as the signal quality of base stations in its surroundings and reports the measurements back to the serving radio base station. *Id.* ¶ 13. The radio network initiates handovers based on these measurements. *Id.* If the estimated signal quality of the serving base station falls below a certain threshold, and the estimated signal quality of the candidate base station is above a threshold, then the handover procedure may be initiated. *Id.* at Fig. 13, ¶¶ 17–20.

As stated in Amirijoo:

> Previously . . . NRL lists have been populated using planning tools by means of coverage predictions before the installation of a base station (BS). Prediction errors, due to inaccuracies in topography data and wave propagation models,

> have forced the operators to resort to drive/walk tests to completely exhaust the coverage region and identify all handover regions and as such the neighbors. Since a radio network gradually evolves over time with new cells and changing interference circumstances, traditional planning of NRL requires iterative repetitions of the planning procedure. This has proven to be costly and new methods for automatically deriving NRLs are required. Thus, it is essential to make use of automatic in-service approaches for generating and updating NRLs.

Ex. 1005 ¶ 24. Figure 3 of Amirijoo is reproduced below.

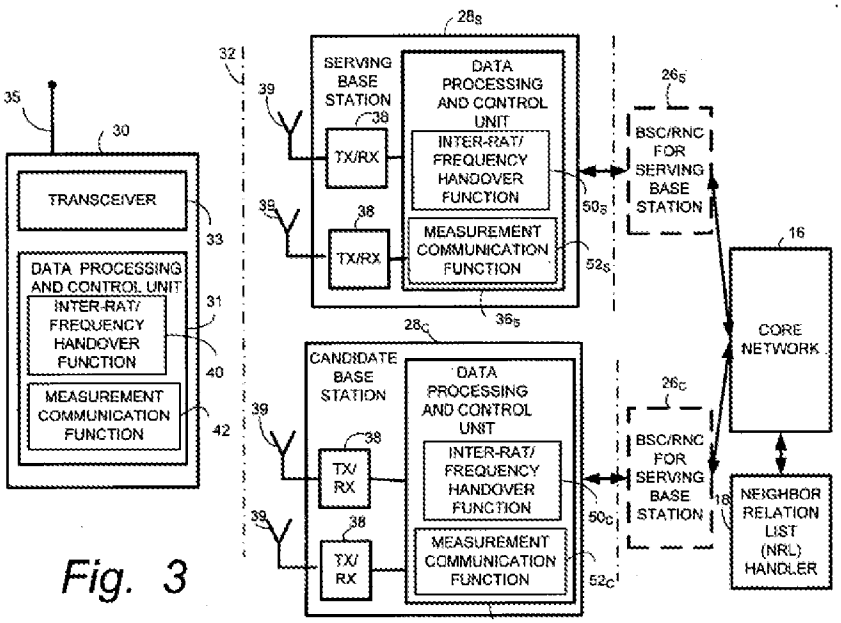


Fig. 3

Figure 3 is a block diagram showing mobile station 30, serving base station node $28_S$, and candidate base station node $28_C$. Ex. 1005 ¶¶ 50, 69, 74–75. For example, serving base station $28_S$ can be in a 2G (GERAN) network and candidate base station $28_C$ can be in a 3G (UTRAN) network. *Id.* at Fig. 1, ¶ 66. Each of those devices has a "data processing and control unit" which includes a "inter-RAT/frequency handover function" and a "measurement communication function." *Id.* ¶¶ 75–77. The measurement communication function modules control communications between the devices when

requesting or obtaining measurements or information (e.g., measurements or information for potential handover purposes). *Id.* ¶¶ 75, 77. The inter-RAT/frequency handover function is invoked when it is determined that a handover is to occur. *Id.*

In addition, triggering conditions are set to cause selected mobile stations to perform measurements via the measurement communication functions to detect new base station neighbors. Ex. 1005, Fig. 4, ¶ 79. Triggering conditions can include a mobile station having a low data rate, or a mobile station with an estimated signal quality of the serving base station below a given threshold. *Id.* ¶¶ 83–85. The threshold can be the same threshold as is used for handover measurements, or set higher than the handover threshold, and can "depend on the service, subscription type, UE type etc." *Id.* ¶¶ 87–89. The triggering conditions can be evaluated either at the base station, which would receive measurements from the mobile station and make the evaluation, or at the mobile station, in which the base station would inform the mobile station regarding the triggering conditions and the mobile station would evaluate the conditions. *Id.* ¶ 79. Once triggered, the mobile station measures the signal quality of surrounding base stations, which measurements are performed during the reading gaps. *Id.* at Fig. 4, ¶ 80. The measurements are reported to the serving base station, and based on the measurements, the neighborhood relation lists are updated. *Id.* at Fig. 4, ¶¶ 80, 82.

*2. 3GPP TR 32.816*

3GPP TR 32.816 is titled "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; Study on Management of LTE and SAE

(Release 8)." Ex. 1007. 3GPP TR 32.816 is cited in Amirijoo as a reference in support of a description of standardization work to "ensure that the new [E-UTRAN] network is simple to deploy and cost efficient to operate." Ex. 1005 ¶ 16. 3GPP TR 32.816 includes discussion of "Optimisation of the neighbourhood list" with input information including "[l]ocation of the neighbours (distance)," and a discussion of "Handover Optimisation" with input source described as including "[i]n ideal: all measurements can be linked with correct location information." Ex. 1007, 11, 13–14.

*3. Independent Claim 1*

*a) Petitioner's Challenge*

For the preamble of claim 1, Petitioner relies on the disclosures in Amirijoo of a system for managing neighbor relation lists involving nodes (*i.e.*, base stations) in different networks such as those conforming to different generations of standards such as 2G (GERAN) and 3G (UTRAN). Pet. 23–26 (citing Ex. 1005, Fig. 1, ¶¶ 13–15, 27, 48, 66–70, 79–82, 110–115; Mahon Decl. ¶¶ 63–65, 73–77).[3] Petitioner notes that Amirijoo refers to updating neighborhood relation lists (NRLs), rather than the neighbour cell lists (NCLs) of claim 1, but argues that it would have been obvious to modify Amirijoo's system to update neighbor cell lists, like those disclosed in 3GPP TR 32.816. Pet. 26–28 (citing Ex. 1005 ¶¶ 15–16, 27; Ex. 1007, 4, 11–12; Mahon Decl. ¶¶ 71–72, 78–82). We do not need to consider this argument at this time, because Patent Owner represents that, "[f]or purposes of this response only, the distinctions between these two lists (NCL and

[3] For this Decision, we make no determination whether or not the preamble of claim 1 is limiting.

NRL) is ignored as they are immaterial to the deficiencies in the asserted grounds explained herein." Prelim. Resp. 19 n. 3.

For the detector requirement of claim 1, Petitioner relies on the disclosure in Amirijoo of mobile stations (the claimed user terminals) and base stations (the wireless access nodes) involved in "inter-RAT/frequency turnover," in which the data processing and control unit (including the inter-RAT/frequency handover function and measurement communication function) of a serving base station makes a handoff decision based on measurements received from mobile stations. Pet. 28–30 (citing Ex. 1005, Figs. 3, 13, ¶¶ 18–20, 50, 74, 77; Mahon Decl. ¶¶ 83–85). Petitioner points out that the inter-RAT/frequency handover function of the serving base station "is invoked when it is determined that a handover is to occur." *Id.* at 30 (citing Ex. 1005 ¶ 77).

For the selector requirement of claim 1, Petitioner relies on the disclosure in Amirijoo that measurements are made "from certain mobile stations chosen using . . . triggering condition(s)" to detect new neighbors. Pet. 30–31 (citing Ex. 1005, Fig. 4, ¶¶ 51, 79; Mahon Decl. ¶¶ 86–93). As discussed in Section III.E.1 above, the triggering conditions include a mobile station having a low data rate, or a mobile station with an estimated signal quality of the serving base station below a given threshold. *Id.* at 32–33 (citing Ex. 1005 ¶¶ 83–89; Mahon Decl. ¶¶ 83–91). In one disclosed embodiment, the base station receives measurements from the mobile station and evaluates the triggering conditions. *Id.* at 31 (citing Ex. 1005, Fig. 4, ¶ 79).

For the request generator requirement of claim 1, Petitioner relies on the disclosure in Amirijoo that, in response to the serving base station

receiving measurements from the mobile stations and evaluating triggering conditions, the data processing and control unit of the serving base station communicates with a mobile station via a base station transceiver to request measurements and information. Pet. 34–35 (citing Ex. 1005, Fig. 3, ¶¶ 76–77; Mahon Decl. ¶¶ 94–98). Requested information from selected mobile stations includes the signal quality of surrounding base stations, and their local IDs and Cell Global Identities (CGIs). *Id.* at 35–37 (citing Ex. 1005, Fig. 4, ¶¶ 6, 80–81; Mahon Decl. ¶¶ 94–98).

For the receiver requirement of claim 1, Petitioner relies on the disclosure in Amirijoo of receivers (the "RX" component of the transceivers) of the serving base station, which receives the measurements and information from the mobile stations. Pet. 38–39 (citing Ex. 1005, Figs. 3, 4, ¶¶ 76. 81, 107–108; Mahon Decl. ¶ 99).

For the updating means requirement of claim 1, Petitioner relies on the disclosure in Amirijoo of updating the neighborhood relation lists (NRLs) in response to measurements received from the mobile stations. Pet. 39–41 (citing Ex. 1005, Fig. 4, ¶¶ 24–25, 28–30, 82, 115; Mahon Decl. ¶¶ 101–105).

*b) Patent Owner's Preliminary Response Regarding Independent Claim 1*

Patent Owner generally argues that Amirijoo "is directed to a different aspect of the relevant technology — ***when*** user terminals should perform measurements for updating the neighbor cell list — while the '560 Patent claims a novel approach to determining ***which*** user terminals should do so." Prelim. Resp. 6. Patent Owner argues that "Amirijoo does not disclose or

suggest a core feature of the solution of the '560 Patent — enabling the 'tuning' of cell list optimization traffic." *Id.* at 20.

Patent Owner specifically addresses Petitioner's analysis of two of the requirements of claim 1. First, Patent Owner argues that Amirijoo does not teach or suggest the detector requirement of claim 1. Prelim. Resp. 23–26. In particular, Patent Owner argues that "there is nothing in Amirijoo detailing that either the inter-RAT/frequency handover or the measurement communication functions identified by Petitioner actually detect user terminals to be transferred, as required by Claim 1." *Id.* at 25. Patent Owner argues that, in Amirijoo, the measurement communication function of the base station handles communications for requesting or obtaining measurements or information, but that there is no suggestion that it detects that a mobile station requires handover. *Id.* Likewise, argues Patent Owner, while the handover function of the base station performs handover, Amirijoo never states that it detects that a mobile station requires handover. *Id.* at 25–26.

The second claim 1 requirement addressed by Patent Owner is the request generator requirement. Prelim. Resp. 26–30. Patent Owner argues that Petitioner's reliance on the data processing and control unit and transceiver of the serving base station of Amirijoo is flawed because Amirijoo does not disclose that the information sent to the base station by the mobile station is in response to a request from the base station. *Id.* at 27–29. Rather, argues Patent Owner, the mobile station itself evaluates the triggering conditions for reporting information, and if they are met, undertakes the needed measurements without a request from the base station. *Id.* Patent Owner concedes that Amirijoo discloses that the base station

requests the mobile station to transmit Cell Global Identities (CGI) information to the base station, but Patent Owner argues that this request is limited to "only a single candidate base station," whereas claim 1 requires a request to report cell information of a ***plurality*** of wireless access nodes. *Id.* at 29–30.

*c) Analysis re Independent Claim 1*

Patent Owner's arguments that Amirijoo is directed to ***when*** user terminals should perform measurements rather than determining ***which*** user terminals should do so, and that Amirijoo fails to "enable the 'tuning' of cell list optimization traffic," are not commensurate with the scope of claim 1. Although Amirijoo does disclose ***when*** user terminals make measurements — *i.e.*, during "reading gaps" — it also limits ***which*** terminals perform measurements by imposing triggering conditions that limit the terminals to only those select mobile stations having a low data rate, or those with an estimated signal quality of the serving base station below a given threshold. Ex. 1005 ¶¶ 80, 83–85.

In regard to Patent Owner's argument that Amirijoo does not teach or suggest the detector requirement of claim 1, we determine that Amirijoo sufficiently teaches that limitation for purposes of institution. Amirijoo discloses that, for handovers, the serving base station triggers mobile stations to make measurements, and based on those measurements, makes a handoff decision. Ex. 1005 ¶ 17. If the signal quality of the serving base station measured by a mobile station falls below a set threshold, and the signal quality of a candidate base station measured by that mobile station is above a threshold, then handoff of the mobile station from the serving base station to the candidate base station occurs. *Id.* at Fig. 13, ¶¶ 18–20. The

handover process is performed by the data processing and control units of the base station and mobile station, including the measurement communication function of the serving base station requesting "measurements or information for potential handover purpose" from the mobile station, and the inter-RAT/frequency handover function of the serving base station that "is invoked when it is determined that a handover is to occur." *Id.* at Fig. 3, ¶¶ 75–77. We fail to see how this disclosure does not teach the claim 1 detector requirement of "detecting user terminals [*i.e.*, mobile stations] to be transferred from the first wireless access node of the first wireless access network [*i.e.*, the serving base station] to the second wireless access node of the second wireless access network [*i.e.*, the candidate base station]." Given that the data processing and control unit of the serving base station receives signal quality measurements from the mobile station, and initiates handover when the measurement meets the threshold criteria, it follows that the serving base station performs the required detection.

We also determine that Amirijoo sufficiently teaches the request generator requirement of claim 1 for purposes of institution. Patent Owner's argument that Amirijoo does not teach that the information sent to the serving base station by the mobile station is in response to a request from the base station is undermined at this stage by Amirijoo's disclosure that, as one alternative, the triggering conditions for causing a mobile station to make measurements may be evaluated at the base station. Ex. 1005 ¶ 79. Patent Owner focuses on the ***other*** alternative disclosed in Amirijoo, in which the mobile station evaluates the triggering conditions. Prelim. Resp. 28. But if the serving base station performs the evaluation, the occurrence of a

triggering event must be conveyed from the base station to the mobile station — *i.e.*, a request.

In addition, we are not persuaded by Patent Owner's argument that the admitted requests for Cell Global Identities (CGIs) from the serving base station to the mobile station fail to satisfy the requirement that the requests to report information for a ***plurality*** of nodes. Prelim. Resp. 29–30. Even if each such request is directed to a single node, Amirijoo discloses that mobile stations, once triggered, measure the signal quality of a plurality of nodes — namely, the "surrounding inter-RAT/frequency base stations." Ex. 1005 ¶ 80. If the serving base station has no prior knowledge of the CGI of a particular neighbor base station, a follow-up request for the CGI is made. *Id.* ¶ 81. We understand from this disclosure that a CGI request issues for each newly-discovered neighbor base station. Claim 1 only requires the request generator to issue multiple requests for information of multiple nodes — it does not require that a single request be directed to multiple nodes.

Other than its arguments regarding the detector requirement and the request generator requirement of independent claim 1, Patent Owner does not specifically respond to any other of Petitioner's arguments regarding the requirements of that claim. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. To that end, although not raised by the parties, we note that, as discussed above in Section III.D, the requirement in claim 1 of "selecting a part of the user terminals" requires that the selected user terminals must be selected from the set of user terminals that have first been detected as user terminals to be transferred. Amirijoo's selection process does not appear to necessarily

select terminals that have first been detected as user terminals to be transferred. During trial, the parties should address this aspect of claim 1 in more detail.

With that caveat, having reviewed Petitioner's arguments and supporting evidence in this present record, we determine the Petition demonstrates a reasonable likelihood that Petitioner will prevail in establishing that independent claim 1 is unpatentable under 35 U.S.C. § 103(a) over the combination of Amirijoo and 3GPP TR 32.816.

*4. Claims 6–8*

*a) Petitioner's Challenge*

Claim 6 depends from claim 1 and additionally requires:

> wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;
>
> wherein the receiver is configured for receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node,
>
> further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

Ex. 1005, 12:45–59. For claim 6, Petitioner relies on the disclosure in Amirijoo of performing a handoff operation where a user station is transferred from a node in one network to a node in a different network.

Pet. 43–46 (citing Ex. 1005, Fig. 3, ¶¶ 13–14, 50, 75, 77; Mahon Decl. ¶¶ 106–110).

Claim 7 depends from claim 1 and additionally requires, "wherein the telecommunications system is further configured for receiving location information from one or more of the detected user terminals and wherein the location information is used as a selection parameter for selecting the part of the detected user terminals." Ex. 1005, 12:60–65. For claim 7, Petitioner first relies on its proposed construction of "location information" as including "information regarding the cell in which a terminal is operating." Pet. 10, 47. Petitioner argues that the selection of the mobile devices to participate in the process of updating the neighbor relation list is based, in part, on information regarding the cells in which the mobile devices are currently operating. *Id.* at 47–48 (citing Ex. 1005 ¶¶ 6, 83–88; Mahon Decl. ¶ 113).

In the alternative, for claim 7, Petitioner relies on the disclosure in 3GPP TR 32.816 of an algorithm for updating neighbor cell lists using information regarding "location of the neighbors," and a statement that "all measurements can be linked with correct location information" when optimizing handover parameters. Pet. 48 (citing Ex. 1007, 11, 13–14; Mahon Decl. ¶ 114). Based on this, Petitioner argues that it would have been obvious to use location information as a selection parameter for selecting a part of the user terminals in the context of Amirijoo's system, given that Amirijoo teaches that the triggering criteria is intended, "to make sure that an inter-RAT/frequency neighbor is found before the mobile station (MS) falls out of coverage." *Id.* at 48–49 (citing Ex. 1005 ¶87; Mahon Decl. ¶ 115).

Claim 8 depends from claim 1 and additionally requires, "wherein one or more thresholds, possibly service-dependent, are defined in the telecommunications system for transferring the user terminals between the first wireless access network and the second wireless access network and wherein at least one of the thresholds is used as a selection parameter for selecting the part of the detected user terminals." Ex. 1005, 12:66–13:5. For claim 8, Petitioner relies on the disclosure in Amirijoo of a triggering condition for selecting mobile devices to perform measurements in which the measured signal quality of the serving base station falls below the same threshold as is used for handover measurements, and further that the threshold "can depend on the service, subscription type, UE type etc." Pet. 49–51 (citing Ex. 1005, Fig. 6, ¶¶ 79, 85, 87–89; Mahon Decl. ¶¶ 116–118).

*b) Patent Owner's Preliminary Response Regarding Claims 7 and 8*

For claim 7, Patent Owner argues that none of the triggering conditions (which are the conditions for selecting user terminals to perform measurements) disclosed in Amirijoo involve cell identity (which Petitioner asserts is the claimed location information). Prelim. Resp. 36–37. Patent Owner concedes that each cell has a geographic area and broadcasts its identity, but argues that "Amirijoo never references this information in explaining its triggering conditions." *Id.* at 36. Therefore, argues Patent Owner, Amirijoo does not teach or suggest the subject matter of claim 7, even if Petitioner's construction of "location information" as including cell identity is adopted. *Id.*

For Petitioner's alternative argument, that claim 7 would have been obvious over the combination of Amirijoo and 3GPP TR 32.816, Patent

Owner first argues that the claimed "location information" refers to the location of the user terminal itself. Prelim. Resp. 38. Given that, Patent Owner argues that the references to location in 3GPP TR 32.816 do not relate to using the location of user terminals to select them for measurements. *Id.* at 38–41. At most, argues Patent Owner, 3GPP TR 32.816 would suggest using location information to update the neighbour cell lists, but not using location to select terminals for reporting information. *Id.* at 41–42. Patent Owner challenges Petitioner's proposed motivation for combining Amirijoo and 3GPP TR 32.816, based on the need to prevent a mobile station falling out of coverage, because merely detecting that a mobile station is near a cell boundary does not differentiate whether the station is moving out of the cell, into the cell, or is stationary. *Id.* at 42–43.

For claim 8, Patent Owner argues that the claim 8 requirement of "thresholds . . . for transferring the user terminals between the first wireless access network and the second wireless access network," refers to thresholds for "two-way transfer," meaning that one threshold is defined for transferring the user terminal between the first wireless access network and a second wireless access network, and a different threshold is defined for transferring the user terminal in the opposite direction. *Id.* at 44. Patent Owner refers to the discussion in the '560 patent of asymmetric thresholds, where one threshold initiates transfer in one direction, and a different threshold initiates in the reverse direction. *Id.* at 45–46 (citing Ex. 1001, 5:38–67, 7:65–8:23). Based on this, Patent Owner argues that Amirijoo does not disclose a threshold that is both used for two-way handover and also used to select user terminals for measurements. *Id.* at 47–49. First,

Patent Owner argues that the threshold value that Petitioner relies on is only the threshold for signal quality of the serving base station, not the threshold for actually causing handover, which in Amirijoo is the threshold for signal quality of the candidate base station. *Id.* at 47–48. Second, Patent Owner argues that, even if the serving base station threshold were to be considered the claimed "thresholds . . . for transferring," it at most is a threshold for one-way transfer, not two-way transfer. *Id.* at 48–49.

*c) Analysis re Claims 6–8*

Patent Owner does not specifically respond to Petitioner's arguments regarding claim 6. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. Having reviewed Petitioner's arguments and supporting evidence in this present record, we determine the Petition demonstrates a reasonable likelihood that Petitioner will prevail in establishing that claim 6 is unpatentable under 35 U.S.C. § 103(a) over the combination of Amirijoo and 3GPP TR 32.816.

For claim 7, as discussed in Section III.D above, we do not agree with Petitioner's proposed construction of "location information" as including "information regarding the cell in which a terminal is operating." Moreover, we agree with Patent Owner that, even if the identity of the serving base station were considered to be location information, that information is not used in Amirijoo to select user terminals for measurement. We also agree with Patent Owner that the references to location in 3GPP TR 32.816 are not suggestive of using the location of a user terminal to select it for measurements. As Patent Owner points out, even if the references to location in that reference relate to the actual location of a user terminal,

Petitioner has not sufficiently shown that one of ordinary skill would have been motivated to use the location information to select user terminals for measurements per the requirements of claim 7. At this stage of the proceeding, we are not prepared to determine that Petition demonstrates a reasonable likelihood that Petitioner will prevail in establishing that claim 7 is unpatentable under 35 U.S.C. § 103(a) over the combination of Amirijoo and 3GPP TR 32.816.

For claim 8, we determine that Amirijoo sufficiently teaches the subject matter of that claim for purposes of institution, give that Amirijoo discloses the use of a triggering condition for selecting mobile devices to perform measurements in which the measured signal quality of the serving base station falls below the same threshold as is used for handover measurements. Ex. 1005, Fig. 6, ¶¶ 79, 85, 87–89. We do not agree with Patent Owner's argument that the claim requires thresholds for "two-way transfer." Although one example of the subject matter of claim 8 involves two-way transfer, the claim is not so limited. The claim requires "one or more thresholds," and "at least one of the thresholds is used as a selection parameter." In the case of a single threshold, one-way transfer is a covered example. In addition, we do not agree with Patent Owner's argument that the threshold relied on by Petitioner is only the threshold for signal quality of the serving base station, not the threshold for actually causing handover. The threshold at issue is the threshold causing the mobile terminal to make measurements of the signal quality or neighboring base stations for purpose of initiating handover. Ex. 1005, Fig. 13, ¶¶ 17–20. Claim 8 requires "thresholds . . . for transferring the user terminals between the first wireless access network and the second wireless access network." *Id.* at 12:67–13:3.

The threshold that Petitioner relies on is such a threshold. Accordingly. having reviewed the parties' arguments and evidence in this present record, we determine the Petition demonstrates a reasonable likelihood that Petitioner will prevail in establishing that claim 8 is unpatentable under 35 U.S.C. § 103(a) over the combination of Amirijoo and 3GPP TR 32.816.

## IV. CONCLUSION

After considering the evidence and arguments presented in the Petition and the Preliminary Response, Petitioner has established a reasonable likelihood of prevailing on its assertion that at least one claim of the '560 patent is unpatentable. Accordingly, we institute an *inter partes* review on all the challenged claims and all of the grounds presented in the Petition. At this stage of the proceeding, we have not made a final determination as to the patentability of these challenged claims.

## V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that pursuant to 35 U.S.C. § 314, *inter partes* review is instituted as to the challenged claims of the '560 patent with respect to all grounds of unpatentability presented in the Petition; and

FURTHER ORDERED that *inter partes* review is commenced on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial.

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AO 120 (Rev. 08/10)

| TO: | Mail Stop 8<br>Director of the U.S. Patent and Trademark Office<br>P.O. Box 1450<br>Alexandria, VA 22313-1450 | REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK |
|---|---|---|

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas on the following

☐ Trademarks or ☑ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

| DOCKET NO. | DATE FILED | U.S. DISTRICT COURT |
|---|---|---|
| 2:22-cv-282 | 7/25/2022 | Eastern District of Texas |

| PLAINTIFF | DEFENDANT |
|---|---|
| KONINKLIJKE KPN N.V. | TELEFONAKTIEBOLAGET LM ERICSSON and ERICSSON INC. |

| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
|---|---|---|---|
| 1 | 7,092,705 | 8/15/2006 | KONINKLIJKE KPN N.V. |
| 2 | 8,660,560 | 2/25/2014 | KONINKLIJKE KPN N.V. |
| 3 | 8,886,772 | 11/11/2014 | KONINKLIJKE KPN N.V. |
| 4 | | | |
| 5 | | | |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

| DATE INCLUDED | INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading | |
|---|---|---|
| PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

In the above—entitled case, the following decision has been rendered or judgement issued:

| DECISION/JUDGEMENT |
|---|
| |

| CLERK | (BY) DEPUTY CLERK | DATE |
|---|---|---|
| | | |

**Copy 1—Upon initiation of action, mail this copy to Director** **Copy 3—Upon termination of action, mail this copy to Director**
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| PATENT APPLICATION FEE DETERMINATION RECORD<br>Substitute for Form PTO-875 | Application or Docket Number<br>13/499,924 | Filing Date<br>04/03/2012 | ☐ To be Mailed |
|---|---|---|---|

**ENTITY:** ☒ LARGE ☐ SMALL ☐ MICRO

## APPLICATION AS FILED – PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | RATE ($) | FEE ($) |
|---|---|---|---|---|
| ☐ BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | |
| ☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | |
| ☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | |
| TOTAL CLAIMS (37 CFR 1.16(i)) | minus 20 = | * | X $ = | |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | minus 3 = | * | X $ = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | |

## APPLICATION AS AMENDED – PART II

AMENDMENT **05/13/2014**

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * 24 | Minus | ** 24 | = 0 | X $80 = | 0 |
| Independent (37 CFR 1.16(h)) | * 1 | Minus | ***3 | = 0 | X $420 = | 0 |
| ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | TOTAL ADD'L FEE | 0 |

AMENDMENT

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * | Minus | ** | = | X $ = | |
| Independent (37 CFR 1.16(h)) | * | Minus | *** | = | X $ = | |
| ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/DIANA BATES/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | ISSUE DATE | PATENT NO. | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/499,924 | 02/25/2014 | 8660560 | 4965.1003-000 | 7977 |

21005 7590 02/05/2014

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

# ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Job Cornelis Oostveen, Haren, NETHERLANDS;
Ljupco Jorguseski, Rijswijk, NETHERLANDS;
Remco Litjens, Voorschoten, NETHERLANDS;
Adrian Victor Pais, Rijswijk, NETHERLANDS;
Haibin Zhang, The Hague, NETHERLANDS;

## PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail** **Mail Stop ISSUE FEE**
**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, Virginia 22313-1450**
**or Fax** **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

21005 7590 10/11/2013
HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

| |
|---|
| (Depositor's name) |
| (Signature) |
| (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/499,924 | 04/03/2012 | Job Cornelis Oostveen | 4965.1003-000 | 7977 |

TITLE OF INVENTION: SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | ~~$1780~~ $960 | ~~$300~~ | $0 | ~~$2080~~ $960 | 01/13/2014 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| SIDDIQUI, KASHIF | 2646 | 455-437000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

| (A) NAME OF ASSIGNEE | (B) RESIDENCE: (CITY and STATE OR COUNTRY) |
|---|---|
| Koninklijke KPN N.V. and | The Hague, The Netherlands |
| Nederlandse Organisatie Voor Toegepast-Natuurwetenschappelijk Onderzoek TNO | Delft, The Netherlands |

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 08-0380 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

| | |
|---|---|
| ❑ Applicant certifying micro entity status. See 37 CFR 1.29 | NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. |
| ❑ Applicant asserting small entity status. See 37 CFR 1.27 | NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status. |
| ❑ Applicant changing to regular undiscounted fee status. | NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable. |

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Timothy J. Meagher, Reg. No.39302/ Date 1/10/2014

Typed or printed name Timothy J. Meagher Registration No. 39,302

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 13499924 |
| **Filing Date:** | 03-Apr-2012 |
| **Title of Invention:** | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE |
| **First Named Inventor/Applicant Name:** | Job Cornelis Oostveen |
| **Filer:** | Timothy J. Meagher/Julie Kertyzak |
| **Attorney Docket Number:** | 4965.1003-000 |

Filed as Large Entity

## U.S. National Stage under 35 USC 371 Filing Fees

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| Utility Appl Issue Fee | 1501 | 1 | 960 | 960 |
| **Extension-of-Time:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Miscellaneous:** | | | | |
| | | | **Total in USD ($)** | **960** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 17877464 |
| **Application Number:** | 13499924 |
| **International Application Number:** | |
| **Confirmation Number:** | 7977 |
| **Title of Invention:** | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE |
| **First Named Inventor/Applicant Name:** | Job Cornelis Oostveen |
| **Customer Number:** | 21005 |
| **Filer:** | Timothy J. Meagher/Julie Kertyzak |
| **Filer Authorized By:** | Timothy J. Meagher |
| **Attorney Docket Number:** | 4965.1003-000 |
| **Receipt Date:** | 10-JAN-2014 |
| **Filing Date:** | 03-APR-2012 |
| **Time Stamp:** | 15:06:35 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | Deposit Account |
| Payment was successfully received in RAM | $960 |
| RAM confirmation Number | 1659 |
| Deposit Account | 080380 |
| Authorized User | |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Issue Fee Payment (PTO-85B) | 49651003000IF.pdf | 85612<br>cdacc1bf0d41d2b990c2d922a721b7541d7dba61 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Fee Worksheet (SB06) | fee-info.pdf | 30983<br>f38c1805777cffa86f7f8c291addb319c397a480 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | **Total Files Size (in bytes):** | 116595 | | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**
**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**
**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**
**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

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www.uspto.gov

# NOTICE OF ALLOWANCE AND FEE(S) DUE

21005 7590 10/11/2013
HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

| EXAMINER |
|---|
| SIDDIQUI, KASHIF |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2646 | |

DATE MAILED: 10/11/2013

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/499,924 | 04/03/2012 | Job Cornelis Oostveen | 4965.1003-000 | 7977 |

TITLE OF INVENTION: SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $1780 | $300 | $0 | $2080 | 01/13/2014 |

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

## PART B - FEE(S) TRANSMITTAL

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**P.O. Box 1450**
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**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

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530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

| (Depositor's name) |
|---|
| (Signature) |
| (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/499,924 | 04/03/2012 | Job Cornelis Oostveen | 4965.1003-000 | 7977 |

TITLE OF INVENTION: SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $1780 | $300 | $0 | $2080 | 01/13/2014 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| SIDDIQUI, KASHIF | 2646 | 455-437000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
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- ❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

| | |
|---|---|
| ❑ Applicant certifying micro entity status. See 37 CFR 1.29 | NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. |
| ❑ Applicant asserting small entity status. See 37 CFR 1.27 | NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status. |
| ❑ Applicant changing to regular undiscounted fee status. | NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable. |

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/499,924 | 04/03/2012 | Job Cornelis Oostveen | 4965.1003-000 | 7977 |

21005 7590 10/11/2013

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530 VIRGINIA ROAD
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CONCORD, MA 01742-9133

| EXAMINER | |
|---|---|
| SIDDIQUI, KASHIF | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2646 | |

DATE MAILED: 10/11/2013

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Notices of Allowance and Fee(s) Due mailed between October 1, 2013 and December 31, 2013

(Addendum to PTOL-85)

If the "Notice of Allowance and Fee(s) Due" has a mailing date on or after October 1, 2013 and before January 1, 2014, the following information is applicable to this application.

If the issue fee is being timely paid on or after January 1, 2014, the amount due is the issue fee and publication fee in effect January 1, 2014. On January 1, 2014, the issue fees set forth in 37 CFR 1.18 decrease significantly and the publication fee set forth in 37 CFR 1.18(d)(1) decreases to $0.

If an issue fee or publication fee has been previously paid in this application, applicant is not entitled to a refund of the difference between the amount paid and the amount in effect on January 1, 2014.

| Notice of Allowability | Application No. 13/499,924 | Applicant(s) OOSTVEEN ET AL. | |
|---|---|---|---|
| | Examiner KASHIF SIDDIQUI | Art Unit 2646 | AIA (First Inventor to File) Status No |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--***

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *08/14/2013*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-13 and 15-18*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   **Certified copies:**

   a) ☒ All b) ☐ Some *c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE**.

5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/KASHIF SIDDIQUI/
Primary Examiner, Art Unit 2646

1. The present application is being examined under the pre-AIA first to invent provisions.

## DETAILED ACTION

### *Allowable Subject Matter*

2. In view of amended claims and further search, Claims 1-13, 15-18 are allowed.

3. The following is an examiner's statement of reasons for allowance:

The reasons for Allowance are the same as those presented by the Applicant in the Remarks submitted on 8/14/2013.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KASHIF SIDDIQUI whose telephone number is (571)270-3188. The examiner can normally be reached on Monday through Thursday 6:30-16:30 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamran Afshar can be reached on (571)272-7796. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KASHIF SIDDIQUI/
Primary Examiner, Art Unit 2646

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| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13499924 | OOSTVEEN ET AL. |
| | **Examiner** | **Art Unit** |
| | KASHIF SIDDIQUI | 2646 |

| CPC | | |
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| NONE | | Total Claims Allowed: | |
|---|---|---|---|
| (Assistant Examiner) | (Date) | 17 | |
| /KASHIF SIDDIQUI/<br>Primary Examiner.Art Unit 2646 | 10/02/2013 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 1 | 3A |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
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| | 13499924 | OOSTVEEN ET AL. |
| | **Examiner** | **Art Unit** |
| | KASHIF SIDDIQUI | 2646 |

| US ORIGINAL CLASSIFICATION | | INTERNATIONAL CLASSIFICATION | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASS | SUBCLASS | CLAIMED | | | | | NON-CLAIMED | | | | | |
| 455 | 437 | H | 0 | 4 | W | 36 / 08 (2009.01.01) | | | | | | |

| CROSS REFERENCE(S) | | | | | |
|---|---|---|---|---|---|
| CLASS | SUBCLASS (ONE SUBCLASS PER BLOCK) | | | | |
| 370 | 331 | | | | |

| NONE | | Total Claims Allowed: | |
|---|---|---|---|
| (Assistant Examiner) | (Date) | 17 | |
| /KASHIF SIDDIQUI/<br>Primary Examiner.Art Unit 2646 | 10/02/2013 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 1 | 3A |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13499924 | OOSTVEEN ET AL. |
| | **Examiner** | **Art Unit** |
| | KASHIF SIDDIQUI | 2646 |

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

| Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original |
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| NONE | | Total Claims Allowed: | |
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| (Assistant Examiner) | (Date) | 17 | |
| /KASHIF SIDDIQUI/<br>Primary Examiner.Art Unit 2646 | 10/02/2013 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 1 | 3A |

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13499924 | OOSTVEEN ET AL. |
| | Examiner | Art Unit |
| | KASHIF SIDDIQUI | 2646 |

| CPC- SEARCHED | | |
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| Symbol | Date | Examiner |
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| CPC COMBINATION SETS - SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US CLASSIFICATION SEARCHED | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 455 | 435.1-445,524-525 | 4/16/2013 | KS |
| 370 | 329-334,336,350 | 4/16/2013 | KS |
| All Above | Updated | 10/2/2013 | KS |

| SEARCH NOTES | | |
|---|---|---|
| Search Notes | Date | Examiner |
| Searched EAST | 4/16/2013 | KS |
| Searched Google Patents | 4/16/2013 | KS |
| Searched Inventor | 4/16/2013 | KS |
| Searched Assignee | 4/16/2013 | KS |
| Searched EPO/WIPO | 4/16/2013 | KS |
| Updated Search | 10/2/2013 | KS |

| INTERFERENCE SEARCH | | | |
|---|---|---|---|
| US Class/ CPC Symbol | US Subclass / CPC Group | Date | Examiner |
| 455 | 435.1-445,524-525 | 10/2/2013 | KS |
| 370 | 329-334,336,350 | 10/2/2013 | KS |
| | keyword search of the claims using claim terms and language | 10/2/2013 | KS |

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| | /KASHIF SIDDIQUI/<br>Primary Examiner.Art Unit 2646 |

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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|---|---|---|---|
| Inventor(s): | Job Cornelis Oostveen, Ljupco Jorguseski, Remco Litjens, Adrian Victor Pais and Haibin Zhang | | |
| Application No.: | 13/499,924 | Group: | 2646 |
| 371(c) File Date: | April 3, 2012 | Examiner: | Siddiqui, Kashif |
| Confirmation No: | 7977 | | |
| For: | System for Updating a Neighbour Cell List (NCL) of a Wireless Access Node of a Telecommunications Architecture and Method Therefore | | |

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or is being facsimile transmitted to the United States Patent and Trademark Office on:

_____ _____
Date Signature

_____
Typed or printed name of person signing certificate

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

This Amendment is being filed in response to the Office Action mailed from the U.S. Patent and Trademark Office on April 22, 2013 in the above-identified application. Reconsideration and further examination are requested.

An extension of time to respond to the Office Action is respectfully requested. A Petition for Extension of Time and the appropriate fee are being filed concurrently with this Amendment.

Please amend the application as follows:

**Amendments to the Claims**

Please cancel claim 14. Please amend claims 1, 9-13 and 16.

The Claim Listing below will replace all prior versions of the claims in the application:

**Claim Listing**

1. (Currently Amended) A system for updating a neighbour cell list in a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined, the system comprising:

[[-]] a detector configured for detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;

[[-]] a selector configured for selecting a part of the user terminals;

[[-]] a request generator configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

[[-]] a receiver configured for receiving the cell information from the one or more of the selected user terminals; and

[[-]] updating means configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

2. (Original) The system according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the first wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless nodes of the first wireless access network via the second wireless access node,

the system further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network prior to receiving

the cell information of the plurality of wireless access nodes of the first wireless access network via the second wireless access node.

3. (Original) The system according to claim 2, further comprising a data transfer system for transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node.

4. (Previously Presented) The system according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node,

the system further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node.

5. (Original) The system according to claim 4, further comprising a data transfer system for transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

6. (Previously Presented) The system according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node,

further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or

more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

7. (Previously Presented) The system according to claim 1, wherein the telecommunications system is further configured for receiving location information from one or more of the detected user terminals and wherein the location information is used as a selection parameter for selecting the part of the detected user terminals.

8. (Previously Presented) The system according to claim 1, wherein one or more thresholds, possibly service-dependent, are defined in the telecommunications system for transferring the user terminals between the first wireless access network and the second wireless access network and wherein at least one of the thresholds is used as a selection parameter for selecting the part of the detected user terminals.

9. (Currently Amended) In a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined, a method for updating at least one of the first and second neighbour cell lists comprising the steps of:

[[-]] detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;

[[-]] selecting a part of the user terminals; requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

[[-]] receiving the cell information from the one or more of the selected user terminals; and

[[-]] updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

10. (Currently Amended) The method according to claim 9, comprising the steps of:

[[-]] requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the first wireless access network;

[[-]] receiving the cell information of the wireless nodes of the first wireless access network via the second wireless access node, and

[[-]] transferring the selected user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the first wireless access network via the second wireless access node.

11. (Currently Amended) The method according to claim 9, comprising the steps of:

[[-]] requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

[[-]] receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node, and

[[-]] transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node.

12. (Currently Amended) The method according to claim 9, comprising the steps of:

[[-]] requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

[[-]] receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node; and

[[-]] transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

13. (Currently Amended) A non-transitory computer-readable storage medium containing a set of instructions that, when executed by a processor in a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined, performs a method for updating at least one of the first and second neighbour cell lists, including the steps of:

[[-]] detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;

[[-]] selecting a part of the user terminals;

[[-]] requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

[[-]] receiving the cell information from the one or more of the selected user terminals; and

[[-]] updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

14. (Cancelled)

15. (Previously Presented) The method according to claim 10, further comprising the step of transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node.

16. (Currently Amended) The method according to claim 10, comprising the steps of:

[[-]] requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

[[-]] receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node, and

[[-]] transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node.

17. (Previously Presented) The method according to claim 11, comprising the step of transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

18. (Previously Presented) The method according to claim 16, comprising the step of transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

## REMARKS

Claims 1-18 are pending in the application. With entry of the amendment, claim 14 is cancelled and claims 1, 9-13 and 16 are amended.

Claims 1, 9-13 and 16 are amended to remove extraneous punctuation.

Applicant acknowledges with appreciation the indication by the Office of allowable subject matter with respect to claims 2-6, 10-12 and 15-18. However, for the reasons indicated below, Applicant traverses the rejection of claims 1, 7-9 and 13.

Claims 1, 9 and 13 are rejected under 35 USC 102(b) as being anticipated by WO2009/119699 ("Serravalle"). The rejection is respectfully traversed.

Serravalle discloses a method of facilitating handover of a user device between a source base station component in a first communications network of a first network type and a target base station component in a second communications network of a second network type. The method includes determining an identifier of at least one target gateway component connected to the target base station component in the second communications network. A handover request message is then generated in the first communications network, the handover request message incorporating the identifier of the at least one target gateway component. The handover request message is then transmitted to the second communications network.

In order to facilitate such a handover between two different network types it is necessary that the first network obtains information about elements of the second network. The information relates to both identity information in order to address the elements of the other network, and also to, e.g., signal strength information. The identity information may relate to base stations, gateways and controllers.

As explained in the background section of the present application, a handover (or cell reselection) is performed using information from the neighbour cell list, which is stored in each base station and broadcast within the cell. Mobile terminals in the cell receive and store the NCL.

Serravalle discloses a method to update the NCL in the first network with information about elements in the second network, the Automatic Neighbour Relation (ANR) function.

The present application relates to an enhanced ANR function. Differences between claim 1 over the ANR disclosed in Serravalle are in the first place:

*- a detector configured for detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;*

*- a selector configured for selecting a part of the user terminals.*

Further, because the other features of the claim are performing their functionality on the previously detected and selected user terminals, Serravalle also not does disclose:

*- a request generator configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;*

*- a receiver configured for receiving the cell information from the one or more of the selected user terminals; and*

*- updating means configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.*

According to Serravalle at page 12, line 22-27, the Identifier Management Module is operable for requesting information relating to identifiers of target gateway and base station components and of storing processing and managing this information. It is not clear to the applicant how this module relates to the selector of the present application, which is configured to select a part of the user terminals from all the user terminals detected to be in a handover or cell reselect situation.

The Handover module of Serravalle is for generating and transmitting handover requests based on the identifier information (presumably in the Identifier Management Module), e.g., on page 12, line 4-5, where the source eNB can address the target SGSN and provides the identifier of the target RNC in the Handover request message. As such, the Handover module is clearly not operating the same as detecting user terminals to be handed over.

In Serravalle the ANR function is carried out as part of the actual handover, see page 9, line 13 to page 10, line 17.

In the present application the updating of the NCL is performed independently of actual handover procedures, although the updating of the NCL is done based on information received from selected terminals about to be in a handover or reselection situation (page 5, second paragraph). This leads to the situation of, e.g., claim 2 where the actual hand over or cell reselection is performed prior to receiving the cell information. In addition, this also allows for the possibility that a terminal that is about to be handed over is not requested to report cell information (page 7, last sentence).

Furthermore, in the present application a selection is made of all the terminals in a handover or reselection situation, e.g., based on location or on a service based threshold (page 7, last sentence – page 9 first paragraph and page 12 last paragraph- page 13 second paragraph).

In the ANR function of Serravalle the Report Neighbour Request message is sent to the user terminal to be handed over (page 8, line 10-11 and page 9, line 18).

In summary, Serravalle relates to a method of facilitating handovers based on the results of an ANR function based on information received from the terminal to be handed over, whereas the present application relates to updating (optimizing) an NCL based on information previously received from selected terminals in a handover situation.

The effect of selecting a part of the user terminals to report cell information is that the amount of cell information reporting can be tuned, which relates to a trade-off between the measurement overhead and the potential for neighbour cell list optimization (page 8, first paragraph). So the problem address by the present invention is how to tune the cell information reporting by user terminals. This is a problem which could occur in the system of the present application, where potentially all terminals in a handover or cell reselection situation could be requested to report cell information. The problem would not occur in the system of Serravalle, where a user terminal is requested to report cell information in a specific handover situation and which information is necessary to perform the handover. Therefore, one skilled in the art would not be motivated to consider Serravalle in addressing such a problem.

Since Serravalle does not teach each and every feature of claim 1, Serravalle does not anticipate claim 1. For the above reasons, claim 1 is patentable over Serravalle. Claims 9 and 13, which depend from claim 1, are patentable for at least the same reasons. Reconsideration and withdrawal of the rejection under 35 USC 102 are respectfully requested.

Claim 14 is rejected under 35 USC 103(a) as being unpatentable over Serravalle and further in view of US2009/0137265 ("Flore"). Claim 14 is now cancelled; therefore, the rejection is moot.

Claims 7 and 8 are rejected under 35 USC 103(a) as being unpatentable over Serravalle and further in view of US2006/0193295 ("White"). The rejection is respectfully traversed.

Claims 7 and 8 depend from base claim 1. White does not supply what is lacking in Serravalle with respect to claim 1. For reasons similar to those set forth above regarding claim 1, dependent claims 7 and 8 are patentable over Serravalle taken with White by being dependent upon a patentable base claim. Reconsideration and withdrawal of the rejection of claims 7 and 8 under 35 USC 103 are respectfully requested.

## CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By /Timothy J. Meagher, Reg. No. 39302/
Timothy J. Meagher
Registration No. 39,302
Telephone: (978) 341-0036
Facsimile: (978) 341-0136

Concord, MA 01742-9133
Date: August 14, 2013

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 13499924 |
| **Filing Date:** | 03-Apr-2012 |
| **Title of Invention:** | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE |
| **First Named Inventor/Applicant Name:** | Job Cornelis Oostveen |
| **Filer:** | Timothy J. Meagher/Julie Kertyzak |
| **Attorney Docket Number:** | 4965.1003-000 |

Filed as Large Entity

## U.S. National Stage under 35 USC 371 Filing Fees

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| **Extension-of-Time:** | | | | |
| Extension - 1 month with $0 paid | 1251 | 1 | 200 | 200 |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Miscellaneous:** | | | | |
| | | **Total in USD ($)** | | **200** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 16589391 |
| **Application Number:** | 13499924 |
| **International Application Number:** | |
| **Confirmation Number:** | 7977 |
| **Title of Invention:** | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE |
| **First Named Inventor/Applicant Name:** | Job Cornelis Oostveen |
| **Customer Number:** | 21005 |
| **Filer:** | Timothy J. Meagher/Julie Kertyzak |
| **Filer Authorized By:** | Timothy J. Meagher |
| **Attorney Docket Number:** | 4965.1003-000 |
| **Receipt Date:** | 14-AUG-2013 |
| **Filing Date:** | 03-APR-2012 |
| **Time Stamp:** | 16:15:08 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | Deposit Account |
| Payment was successfully received in RAM | $200 |
| RAM confirmation Number | 3314 |
| Deposit Account | 080380 |
| Authorized User | |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Transmittal Letter | 49651003000feetrans.pdf | 105451<br>f6b5c5ada089cf54d3915c4ff761ec59ef4e58bb | no | 3 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | | 49651003000Amend.pdf | 95613<br>592e70963286c6a11c9376530a87483ca486c78e | yes | 11 |

| Multipart Description/PDF files in .zip description | | |
|---|---|---|
| **Document Description** | **Start** | **End** |
| Amendment/Req. Reconsideration-After Non-Final Reject | 1 | 1 |
| Claims | 2 | 7 |
| Applicant Arguments/Remarks Made in an Amendment | 8 | 11 |

| | | | | | |
|---|---|---|---|---|---|
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 3 | Fee Worksheet (SB06) | fee-info.pdf | 31137<br>4309643462316c0e09003004f1f77b2bbac90d86 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | **Total Files Size (in bytes):** | 232201 | | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**
**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**
**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**
**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor(s): Job Cornelis Oostveen, Ljupco Jorguseski, Remco Litjens, Adrian Victor Pais and Haibin Zhang

Application No.: 13/499,924 Group: 2646

371(c) File Date: April 3, 2012 Examiner: Siddiqui, Kashif

Confirmation No.: 7977

For: System for Updating a Neighbour Cell List (NCL) of a Wireless Access Node of a Telecommunications Architecture and Method Therefore

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or is being facsimile transmitted to the United States Patent and Trademark Office on:

_____ _____

Date Signature

_____

Typed or printed name of person signing certificate

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Transmitted herewith is an Amendment for filing in the above-identified application.

☐ Small entity status of this application under 37 CFR 1.9 and 1.27 has been established by a Small Entity Statement previously submitted.

☐ A Small Entity Statement to establish small entity status under 37 CFR 1.9 and 1.27 is enclosed.

☐ The Assignee hereby asserts small entity status of the above-identified application under 37 CFR 1.27. This statement is being executed on behalf of the Assignee pursuant to 1.27(c)(2).
*(Use if large entity and changing to small entity.)*

☐ Applicant qualifies for and certifies micro entity status. A Certification of Micro Entity Status **[Option** (Gross Income Basis)(Institution of Higher Education Basis)**]** is enclosed.

**The claims fee has been calculated as shown below:**

| | CLAIMS REMAINING AFTER AMENDMENT | | HIGHEST NO. PREVIOUSLY PAID FOR | PRESENT EXTRA | LARGE ENTITY RATE | LARGE ENTITY ADDIT. FEE |
|---|---|---|---|---|---|---|
| TOTAL | 17 | MINUS | * 20 | 0 | X $80 | $ |
| INDEP | 3 | MINUS | ** 3 | 0 | X $420 | $ |
| ☐ FIRST PRESENTATION OF MULTIPLE DEP. CLAIM | | | | | + $780 | $ |

* not fewer than 20
** not fewer than 3

TOTAL OF ABOVE = $ 0

☐ Applicant asserts small entity status. Fees above are reduced by 50%. MINUS $ 0

☐ Applicant certifies micro entity status. Fees above are reduced by 75%. MINUS $ 0

**TOTAL CLAIMS FEE $ 0**

**The Application Size Fee has been calculated as shown below:**
***(Effective for cases filed on or after December 8, 2004)***

| Actual Sheets (Including current amendment) | Highest No. of Sheets Paid For (At least 100) | No. of Additional Units Required (Increments of 50 sheets) | LARGE ENTITY Rate | LARGE ENTITY Total Amount Owed | Payment Sufficient for up to |
|---|---|---|---|---|---|
| 29 | 100 | 0 | X $400 | $0 | 100 Sheets |

☐ Applicant asserts small entity status. Fees above are reduced by 50%. MINUS $ 0

☐ Applicant certifies micro entity status. Fees above are reduced by 75%. MINUS $ 0

**TOTAL APPLICATION SIZE FEE $ 0**

**Petition for Extension of Time**

☒ Applicant hereby petitions to extend the time to respond to the Office Action dated April 22, 2013 for 1 month(s) from July 22, 2013 to August 22, 2013. The appropriate fee is set forth below.

☐ *[For action-specific language in an extension of time, select the appropriate option from the Firm Templates]*

**Please charge Deposit Account No. 08-0380 for the following fees:**

| | | |
|---|---|---|
| ☒ | Petition for 1 month Extension of Time | $ 200 |
| ☐ | Claims Fee | $ |
| ☐ | Application Size Fee | $ |
| ☐ | Other Fees: | |
| | | $ |
| | | $ |
| | TOTAL: | $ 200 |

**A check is enclosed in payment of the following fees:**

| | | |
|---|---|---|
| ☐ | Petition for [ ] month Extension of Time | $ |
| ☐ | Claims Fee | $ |
| ☐ | Application Size Fee | $ |
| ☐ | Other Fees: | |
| | | $ |
| | | $ |
| | TOTAL: | $ |

☒ Please charge any deficiency or credit any overpayment in the fees that may be due in this matter to Deposit Account No. 08-0380.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By /Timothy J. Meagher, Reg. No. 39302/
Timothy J. Meagher
Registration No.: 39,302
Telephone (978) 341-0036
Facsimile (978) 341-0136

Concord, Massachusetts 01742-9133
Dated: August 14, 2013

–Rev/Fee Schedule March 19, 2013

1494746.1

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

| PATENT APPLICATION FEE DETERMINATION RECORD<br>Substitute for Form PTO-875 | Application or Docket Number<br>13/499,924 | Filing Date<br>04/03/2012 | ☐ To be Mailed |
|---|---|---|---|

**ENTITY**: ☒ LARGE ☐ SMALL ☐ MICRO

## APPLICATION AS FILED – PART I

| | (Column 1) | (Column 2) | | |
|---|---|---|---|---|
| FOR | NUMBER FILED | NUMBER EXTRA | RATE ($) | FEE ($) |
| ☐ BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | |
| ☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | |
| ☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | |
| TOTAL CLAIMS (37 CFR 1.16(i)) | minus 20 = | * | X $ = | |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | minus 3 = | * | X $ = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | |

## APPLICATION AS AMENDED – PART II

| | | (Column 1) | | (Column 2) | (Column 3) | | |
|---|---|---|---|---|---|---|---|
| | **08/14/2013** | CLAIMS REMAINING AFTER AMENDMENT | | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
| AMENDMENT | Total (37 CFR 1.16(i)) | * 17 | Minus | ** 20 | = 0 | X $80 = | 0 |
| | Independent (37 CFR 1.16(h)) | * 3 | Minus | ***3 | = 0 | X $420 = | 0 |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | | TOTAL ADD'L FEE | **0** |

| | | (Column 1) | | (Column 2) | (Column 3) | | |
|---|---|---|---|---|---|---|---|
| | | CLAIMS REMAINING AFTER AMENDMENT | | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
| AMENDMENT | Total (37 CFR 1.16(i)) | * | Minus | ** | = | X $ = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | X $ = | |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/DEBORAH POLLARD/

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
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| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/499,924 | 04/03/2012 | Job Cornelis Oostveen | US17827 |

**CONFIRMATION NO. 7977**

**POWER OF ATTORNEY NOTICE**

90057
De Vries & Metman
Overschiestraat 180
Amsterdam, 1062 XK
NETHERLANDS

*OC000000062139994*

Date Mailed: 06/24/2013

## NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/18/2013.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/gbien-aime/

---

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/499,924 | 04/03/2012 | Job Cornelis Oostveen | 4965.1003-000 |

**CONFIRMATION NO. 7977**

**POA ACCEPTANCE LETTER**

21005
HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

*OC000000062140065*

Date Mailed: 06/24/2013

## NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/18/2013.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/gbien-aime/

---

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

# REVOCATION OF POWER OF ATTORNEY WITH NEW POWER OF ATTORNEY and CHANGE OF CORRESPONDENCE ADDRESS

| | |
|---|---|
| *Application/Patent Number* | 13/499,924 |
| *371(c) Date* | April 3, 2012 |
| *First Named Inventor/Patentee* | Job Cornelis Oostveen |
| *Confirmation Number* | 7977 |
| *Group Art Unit* | 2646 |
| *Examiner Name* | Siddiqui, Kashif |
| *Attorney Docket Number* | 4965.1003-000 |

*Title*: System for Updating a Neighbour Cell List (NCL) of a Wireless Access Node of a Telecommunications Architecture and Method Therefore

**I hereby revoke all previous powers of attorney given in the above-identified application.**

☐ I hereby appoint the following practitioner(s): [Not to exceed 10]

**OR**

☒ I hereby appoint the practitioners associated with the Customer Number: **021005**

Please change the correspondence address for the above-identified application to:

☒ **Customer Number 021005**
Hamilton, Brook, Smith & Reynolds, P.C.
530 Virginia Road
P.O. Box 9133
Concord, Massachusetts 01742-9133

☐ Other

Please direct all telephone calls and facsimiles to:

Name: Timothy J. Meagher Tel. No. (978) 341-0036 Fax No. (978) 341-0136

I am the:

☐ Applicant/Inventor.

☒ Authorized representative of the Assignee, Koninklijke KPN N.V., of the entire interest. See 37 CFR § 3.71. A Statement under 37 CFR § 3.73(b) is enclosed.

☐ Authorized representative of the Assignee, [ FILL IN WITH NAME OF ASSIGNEE ], together with [ FILL IN WITH NAME OF ASSIGNEE ], of the entire interest. A Statement under 37 CFR § 3.73(b) is enclosed.

**A copy of this form, together with a Statement under 37 CFR § 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The Statement under 37 CFR § 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.**

SIGNATURE of Applicant or Assignee of Record

| | |
|---|---|
| Signature | |
| Name & Title | K.M. Wuyts Corporate Intellectual Property Officer |
| Date | |

1462000.1

Docket No. 4965.1003-000

# STATEMENT UNDER 37 CFR § 3.73(b)

Applicant/Patentee: Job Cornelis, Ljupco Jorguseski, Remco Litjens, Adrian Victor Pais and Haibin Zhang (Oosveen)

Application No./Patent No.: 13/499,924 371(c) Date: April 3, 2012

For: System for Updating a Neighbour Cell List (NCL) of a Wireless Access Node of a Telecommunications Architecture and Method Therefore

Koninklijke KPN N.V. (Name of Assignee), a Corporation (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is

A. ☒ the assignee of the entire right, title and interest in the patent application identified above; or

B. ☐ an assignee together with [ ] of the entire right, title and interest in the patent application identified above.

The right, title and interest of the above-named assignee in the patent application identified above is established by virtue of:

A. ☒ An assignment from the inventor(s) of the patent application identified above. The assignment was recorded in the Patent and Trademark Office at Reel 028153, Frames 0989-0993, or a copy thereof is attached.

OR

B. ☐ A chain of title from the inventor(s) of the patent application identified above, to the current assignee as shown below:

1. From: [ ] To: [ ]
The document was recorded in the United States Patent and Trademark Office at
Reel [ ], Frames [ ], or a copy thereof is attached.

2. From: [ ] To: [ ]
The document was recorded in the United States Patent and Trademark Office at
Reel [ ], Frames [ ], or a copy thereof is attached.

3. From: [ ] To: [ ]
The document was recorded in the United States Patent and Trademark Office at
Reel [ ], Frames [ ], or a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet.

As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Signature _____

Name: K.M. Wright

Title: Corporate Intellectual Property Officer

Date: 17 June 2013

1461994.1

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 16066474 |
| **Application Number:** | 13499924 |
| **International Application Number:** | |
| **Confirmation Number:** | 7977 |
| **Title of Invention:** | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE |
| **First Named Inventor/Applicant Name:** | Job Cornelis Oostveen |
| **Customer Number:** | 90057 |
| **Filer:** | Timothy J. Meagher/Amy McGrew |
| **Filer Authorized By:** | Timothy J. Meagher |
| **Attorney Docket Number:** | US17827 |
| **Receipt Date:** | 18-JUN-2013 |
| **Filing Date:** | 03-APR-2012 |
| **Time Stamp:** | 11:36:40 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | 49651003000Rev373.pdf | 199193<br>c272a36286d6518698301c3b3924fdb668545b8c | yes | 2 |

| | Multipart Description/PDF files in .zip description | | |
|---|---|---|---|
| | **Document Description** | **Start** | **End** |
| | Power of Attorney | 1 | 1 |
| | Assignee showing of ownership per 37 CFR 3.73. | 2 | 2 |
| **Warnings:** | | | |
| **Information:** | | | |
| | **Total Files Size (in bytes):** | 199193 | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**
**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**
**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**
**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

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Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/499,924 | 04/03/2012 | Job Cornelis Oostveen | US17827 | 7977 |

90057 7590 04/22/2013

De Vries & Metman
Overschiestraat 180
Amsterdam, 1062 XK
NETHERLANDS

| EXAMINER | |
|---|---|
| SIDDIQUI, KASHIF | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2646 | |

| NOTIFICATION DATE | DELIVERY MODE |
|---|---|
| 04/22/2013 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mail@dvme.nl
n.hartmann@dvme.nl
mk@dvme.nl

| Office Action Summary | Application No. 13/499,924 | Applicant(s) OOSTVEEN ET AL. | |
|---|---|---|---|
| | Examiner KASHIF SIDDIQUI | Art Unit 2646 | AIA (First Inventor to File) Status No |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *1 June 2012*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

5)☒ Claim(s) *1-18* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1,7-9,13 and 14* is/are rejected.

8)☒ Claim(s) *2-6,10-12 and 15-18* is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

**Application Papers**

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *03 April 2012* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a)☒ All b)☐ Some * c)☐ None of the:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Interim copies:**

a)☐ All b)☐ Some c)☐ None of the: Interim copies of the priority documents have been received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

## DETAILED ACTION

### *Allowable Subject Matter*

1. Claims 2-6, 10-12, and 15-18 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claim(s) 1, 9, 13 is/are rejected under 35 U.S.C. 102(b) as being anticipated by WO 2009119699 A2 to Serravalle, Francesca.**

**Re: Claim(s) 1, 9, 13**

**Serravalle** discloses a system (pg. 6 lines 3-4)

for updating a neighbour cell list in a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined (pg. 8 line 27- page 9 line 1 - the first BS updates its Inter-RAT neighbor relation list.

The Examiner points out that the neighbor relation list is a list of neighbors for both networks (e.g. RATs)),

the system comprising: a detector configured for detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network (Fig. 8 – element 35. Pg. 12 lines 20-27 – the BS utilizes an Identifier Management Module 33 and a Handover Module 35 to identify and store information relating to the target gateway and base station components which are used by the Handover Module to transmit handover requests. The Examiner points out that handover requests would be specific to the particular terminal for which the handover is requested; therefore detecting the terminals is necessary);

a selector configured for selecting a part of the user terminals (see last citation);

a request generator configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network (Fig. 3 – elements 316 and 318. pg. 8 lines 6-19 – the LTE network (i.e. first network) determines if other neighbor base stations are in the area that are part of other types of networks. The BS sends a Report Neighbour Request Message 316 to UE 314 which the UE in response transmits a Report Neighbour Response Message 318 which reports the presence of the second BS which is part of a different network type (e.g. a UTRAN network));

a receiver configured for receiving the cell information from the one or more of the selected user terminals (Fig. 8 – element 21);

and updating means configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information (pg. 8 line 27-pg. 9 line 1 - the first BS updates its Inter-RAT neighbor relation list).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claim(s) 14 is/are rejected under 35 U.S.C. 103(a) as being unpatentable over Serravalle as applied to claim 1 above, and further in view of US 20090137265 A1 Flore; Oronzo et al.**

**Re: Claim(s) 14**

**Serravalle** discloses a mobile user terminal configured for use in the method according to claim 9 (see the rejection of claim 1 above and Fig. 9),

the terminal comprising: a receiver for receiving the request for reporting cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network (Fig. 9 – element 71);

scanning means for detecting the cell information from the wireless access nodes, at least one of the wireless access nodes being absent in the neighbour cell list (Fig. 9 – element 89. pg. 13 lines 10-13. The Examiner points out that the purpose of the UE reporting the detected BSs is to inform the network about new BSs to update the neighbor list with; therefore the nodes being absent prior to the update is implicit),

a transmitter for transmitting the detected cell information (Fig. 9 – element 71).

**Serravalle** does/do not appear to explicitly disclose wherein the mobile terminal, in use, contain a neighbour cell list of the first wireless access node, and that wherein the mobile user terminal is arranged for temporarily storing the detected cell information and transmitting the detected cell information to the second wireless access node after being transferred from the first to the second wireless access network.

However, the Examiner points out that it is old and well known that a mobile terminal contains a neighbour cell list of the first wireless access node. For instance, as disclosed in 3GPP TS 36.300 v8.9.0, chapter 10.2.1 a UE performs cell reselection and handover functions per a neighbor list provided by the serving cell.

Further, attention is directed to **Flore** which discloses wherein the mobile user terminal is arranged for temporarily storing the detected cell information and transmitting the detected cell information to the second wireless access node after being transferred from the first to the second wireless access network (0054-0055 – after establishing a radio link with an intermediary of a different RAT, the UE 402 retains (i.e. stores) missing inter-RAT neighbor relationship between the first access node 406 and the

intermediary access node 416 for the duration of a timer. After expiration of the timer, the information is discarded (therefore temporary)).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the **Serravalle** invention by employing the teaching as taught by **Flore** to provide the ability to temporarily store the detected cell information after being transferred to the second network. The motivation for the combination is given by **Flore** (0003 – the invention relates to updating access node neighbor lists in a wireless communications network).

6. **Claim(s) 7, 8 is/are rejected under 35 U.S.C. 103(a) as being unpatentable over Serravalle as applied to claim 1 above, and further in view of US 20060193295 A1 to White; Patrick E. et al.**

**Re: Claim(s) 7**

**Serravalle** discloses those limitations as set forth in the rejection of claim(s) 1 above.

**Serravalle** does/do not appear to explicitly disclose wherein the telecommunications system is further configured for receiving location information from one or more of the detected user terminals and wherein the location information is used as a selection parameter for selecting the part of the detected user terminals.

However, attention is directed to **White** which discloses said limitation (0060 – Mobility management information includes triggers [for handover] which include known

metrics such as RSSI/SNR, CIR, BER, BLER measurements, cell ranking functions, various cost functions, distance, and location information).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the **Serravalle** invention by employing the teaching as taught by **White** to provide the ability to select terminals for transfer on the basis of location. The motivation for the combination is given by **White** (0007 - what would be desirable, but has not yet been provided, is a multi-access access terminal for communicating over multiple, heterogeneous (e.g., wired and wireless) communication channels, wherein a mobile client can simultaneously aggregate multiple connections to heterogeneous access points and/or ad-hoc network terminals to increase capacity and/or efficiency).

**Re: Claim(s) 8**

**Serravalle** discloses those limitations as set forth in the rejection of claim(s) 1 above.

**Serravalle** does/do not appear to explicitly disclose wherein one or more thresholds, possibly service-dependent, are defined in the telecommunications system for transferring the user terminals between the first wireless access network and the second wireless access network and wherein at least one of the thresholds is used as a selection parameter for selecting the part of the detected user terminals.

However, attention is directed to **White** which discloses said limitation (0054, 0060 - Mobility management information includes triggers [for handover] which include

known metrics such as RSSI/SNR, CIR, BER, BLER measurements, cell ranking functions, various cost functions, distance, and location information. The Examiner points out that if signal strength measurements are the basis for a trigger to be set, then it would be necessary for there to be a signal strength level above which the trigger could be enacted upon (i.e. a threshold). Further in 0054 - thresholds are disclosed to indicate that a communication loss is about to occur (i.e. a trigger to perform handover)) and in 0057 - The triggers include: changes in the underlying network (QoS characteristics, attributes, connectivity), changes in the availability of access networks, changes in the user or service context/preferences, internal decisions of the DE 124 (operation policy, timer-based policy updates, threshold-based policy updates) and the introduction of new application flows).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the **Serravalle** invention by employing the teaching as taught by **White** to provide the ability to utilize a threshold to be used in performing the selection of a UE for handover. The motivation for the combination is given by **White** (0007 - what would be desirable, but has not yet been provided, is a multi-access access terminal for communicating over multiple, heterogeneous (e.g., wired and wireless) communication channels, wherein a mobile client can simultaneously aggregate multiple connections to heterogeneous access points and/or ad-hoc network terminals to increase capacity and/or efficiency).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KASHIF SIDDIQUI whose telephone number is (571)270-3188. The examiner can normally be reached on Monday through Thursday 6:30-16:30 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamran Afshar can be reached on (571)272-7796. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KASHIF SIDDIQUI/
Examiner, Art Unit 2646

| Notice of References Cited | Application/Control No. 13/499,924 | Applicant(s)/Patent Under Reexamination OOSTVEEN ET AL. | |
|---|---|---|---|
| | Examiner KASHIF SIDDIQUI | Art Unit 2646 | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | Classification |
|---|---|---|---|---|---|
| * | A | US-2006/0193295 A1 | 08-2006 | White et al. | 370/336 |
| * | B | US-2009/0137265 A1 | 05-2009 | Flore et al. | 455/525 |
| * | C | US-7,539,175 B2 | 05-2009 | White et al. | 370/350 |
| * | D | US-2011/0013587 A1 | 01-2011 | Serravalle, Francesca | 370/331 |
| | E | US- | | | |
| | F | US- | | | |
| | G | US- | | | |
| | H | US- | | | |
| | I | US- | | | |
| | J | US- | | | |
| | K | US- | | | |
| | L | US- | | | |
| | M | US- | | | |

**FOREIGN PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Country | Name | Classification |
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| | N | | | | | |
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**NON-PATENT DOCUMENTS**

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
| | U | LTE; Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2 (3GPP TS 36.300 version 8.9.0 Release 8); 07-2009 |
| | V | |
| | W | |
| | X | |

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

| Index of Claims | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13499924 | OOSTVEEN ET AL. |
| | **Examiner** | **Art Unit** |
| | KASHIF SIDDIQUI | 2646 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ✓ | Rejected | - | Cancelled | N | Non-Elected | A | Appeal |
| = | Allowed | ÷ | Restricted | I | Interference | O | Objected |

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

| CLAIM | | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Final | Original | 04/16/2013 | | | | | | | | |
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| | 18 | O | | | | | | | | |

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


**INFORMATION DISCLOSURE STATEMENT BY APPLICANT**
**( Not for submission under 37 CFR 1.99)**

| | |
|---|---|
| Application Number | |
| Filing Date | |
| First Named Inventor | OOSTVEEN, Job Cornelis |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | US17827 |

**U.S.PATENTS**

| Examiner Initial* | Cite No | Patent Number | Kind Code[1] | Issue Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|---|
| | 1 | | | | | |

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**U.S.PATENT APPLICATION PUBLICATIONS**

| Examiner Initial* | Cite No | Publication Number | Kind Code[1] | Publication Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|---|
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| Examiner Initial* | Cite No | Foreign Document Number[3] | Country Code[2] i | Kind Code[4] | Publication Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear | T[5] |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2009119699 | WO | | 2009-10-01 | NEC CORP | page 7, line 28 - page 9, paragraph 15 page 12, paragraph 13 - page 13, paragraph 24; claims 1, 2-8, 9-14, 75, 76; figure | ☐ |
| | 2 | 2009064716 | WO | | 2009-05-22 | QUALCOMM INC | paragraph [0052] - paragraph [0056], paragraph [0062] - paragraph [0065], claims 2-8, 10-12, 14 | ☐ |
| | 3 | 2009019319 | WO | | 2009-02-12 | NOKIA SIEMENS NETWORKS OY | abstract, page7, line 15 - page 8, line 3, page 8, line 22 - page 9, line 20, claims 1-14 | ☐ |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.S./

| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | |
| | Filing Date | |
| | First Named Inventor | OOSTVEEN, Job Cornelis |
| | Art Unit | |
| | Examiner Name | |
| | Attorney Docket Number | US17827 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 4 | 2009045070 | WO | | 2009-04-09 | LG ELECTRONICS INC | the whole document, claims 1-14 | ☐ |

If you wish to add additional Foreign Patent Document citation information please click the Add button

**NON-PATENT LITERATURE DOCUMENTS**

| Examiner Initials* | Cite No | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published. | T[5] |
|---|---|---|---|
| | 1 | International Search Report, mailed January 24, 2011 in connection with International Patent Application No. PCT/EP2010/064823 | ☐ |

If you wish to add additional non-patent literature document citation information please click the Add button

**EXAMINER SIGNATURE**

| Examiner Signature | /Kashif Siddiqui/ | Date Considered | 04/16/2013 |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.S./

| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | |
| | Filing Date | |
| | First Named Inventor | OOSTVEEN, Job Cornelis |
| | Art Unit | |
| | Examiner Name | |
| | Attorney Docket Number | US17827 |

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| Signature | /Natalya Hartmann, Reg.No. 62,119/ | Date (YYYY-MM-DD) | 2012-04-03 |
|---|---|---|---|
| Name/Print | Natalya Hartmann | Registration Number | 62119 |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.S./

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.S./

**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L1 | 5 | "2009119699" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 10:04 |
| L2 | 6 | "2009064716" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 10:07 |
| L3 | 3 | "20090137265" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 10:08 |
| L4 | 2 | "20110013587" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 10:12 |
| L5 | 109 | (location same (RSSI or RSS)) and (trigger same (hand$over or hand$off)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 10:15 |
| L6 | 923 | vertical with (hand$off or hand$over) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 10:16 |
| L7 | 12 | L6 and 5 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 10:16 |
| L8 | 3 | "20060193295" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 10:18 |
| L9 | 2 | 5 and 8 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 10:18 |
| L11 | 61086 | (Oostveen-j$ or Jorguseski-l$ or Litjens-r$ or pais-a$ or zhang-h$).IN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 11:54 |
| L12 | 24298 | KONINKLIJKE .as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 11:54 |
| L13 | 1 | 11 and 5 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 11:55 |

| | | | | | | |
|---|---|---|---|---|---|---|
| L14 | 1 | 12 and 5 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 11:55 |
| L15 | 18967 | 455/435.1-445,524-525.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 11:58 |
| L16 | 26814 | 370/329-334,336,350.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 11:59 |
| L17 | 41735 | 15 or 16 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 11:59 |
| L18 | 53 | 5 and 17 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 11:59 |
| L19 | 12 | 6 and 18 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 11:59 |
| S1 | 1 | "13499924" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 07:31 |
| S2 | 5572 | (neighbor or neighbour) adj3 (list) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 07:31 |
| S3 | 923 | vertical with (hand$off or hand$over) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 07:31 |
| S4 | 2230 | MAHO | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 07:32 |
| S5 | 8 | S2 same S3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 07:32 |
| S6 | 0 | S4 and S5 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | ON | 2013/04/16 07:32 |

**EAST Search History (Interference)**

<This search history is empty>

**4/16/2013 11:59:57 AM**
**C:\Users\ksiddiqui\Documents\EAST\Workspaces\13499924.wsp**

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Alexandria, Virginia 22313-1450
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# BIB DATA SHEET

**CONFIRMATION NO. 7977**

| SERIAL NUMBER | FILING or 371(c) DATE | CLASS | GROUP ART UNIT | ATTORNEY DOCKET NO. |
|---|---|---|---|---|
| 13/499,924 | 04/03/2012<br>RULE | 455 | 2646 | US17827 |

**APPLICANTS**

Job Cornelis Oostveen, Haren, NETHERLANDS;
Ljupco Jorguseski, Rijswijk, NETHERLANDS;
Remco Litjens, Voorschoten, NETHERLANDS;
Adrian Victor Pais, Rijswijk, NETHERLANDS;
Haibin Zhang, The Hague, NETHERLANDS;

**** CONTINUING DATA ***************************

This application is a 371 of PCT/EP2010/064823 10/05/2010

**** FOREIGN APPLICATIONS ***************************

EUROPEAN PATENT OFFICE (EPO) 09172399.9 10/07/2009

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

05/16/2012

| Foreign Priority claimed ☑ Yes ☐ No<br>35 USC 119(a-d) conditions met ☑ Yes ☐ No<br>Verified and Acknowledged /KASHIF SIDDIQUI/ Examiner's Signature | ☐ Met after Allowance<br>Initials | STATE OR COUNTRY | SHEETS DRAWINGS | TOTAL CLAIMS | INDEPENDENT CLAIMS |
|---|---|---|---|---|---|
| | | NETHERLANDS | 4 | 18 | 3 |

**ADDRESS**

De Vries & Metman
Overschiestraat 180
Amsterdam, 1062 XK
NETHERLANDS

**TITLE**

SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

| FILING FEE RECEIVED | | |
|---|---|---|
| 1250 | FEES: Authority has been given in Paper<br>No._____ to charge/credit DEPOSIT ACCOUNT<br>No._____ for following: | ☐ All Fees<br>☐ 1.16 Fees (Filing)<br>☐ 1.17 Fees (Processing Ext. of time)<br>☐ 1.18 Fees (Issue)<br>☐ Other _____<br>☐ Credit |

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13499924 | OOSTVEEN ET AL. |
| | Examiner | Art Unit |
| | KASHIF SIDDIQUI | 2646 |

| CPC- SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| CPC COMBINATION SETS - SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US CLASSIFICATION SEARCHED | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 455 | 435.1-445,524-525 | 4/16/2013 | KS |
| 370 | 329-334,336,350 | 4/16/2013 | KS |

| SEARCH NOTES | | |
|---|---|---|
| Search Notes | Date | Examiner |
| Searched EAST | 4/16/2013 | KS |
| Searched Google Patents | 4/16/2013 | KS |
| Searched Inventor | 4/16/2013 | KS |
| Searched Assignee | 4/16/2013 | KS |
| Searched EPO/WIPO | 4/16/2013 | KS |

| INTERFERENCE SEARCH | | | |
|---|---|---|---|
| US Class/ CPC Symbol | US Subclass / CPC Group | Date | Examiner |
| | | | |

| /KASHIF SIDDIQUI/<br>Examiner.Art Unit 2646 | |
|---|---|

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| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/499,924 | 04/03/2012 | Job Cornelis Oostveen | US17827 |

**CONFIRMATION NO. 7977**

**PUBLICATION NOTICE**

90057
De Vries & Metman
Overschiestraat 180
Amsterdam, 1062 XK
NETHERLANDS

*OC00000056378010*

**Title:**SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

**Publication No.**US-2012-0225658-A1
**Publication Date:**09/06/2012

## NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

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Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

**S/N 13/499,924** **PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| Applicant(s): Job Cornelis Oostveen | Examiner: Unknown |
| Serial No.: 13/499,924 | Group Art Unit: Unknown |
| Filing Date: April 3, 2012 | Docket No.: US17827 |
| Customer No.: 90057 | Confirmation No.: 7977 |
| Title: SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE | |

MAIL STOP: MISSING PARTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

## DECLARATION AND REQUEST FOR FILING RECEIPT

Dear Sir:

As of today, June 1, 2012, we still have not received a Notification to File Missing Requirements. Nonetheless, we would like to provide you with the Declaration herewith.

The Commissioner is hereby authorized to charge Deposit account No. 50-5047 for the surcharge fee of $ 130.00 (large entity) associated with the late submission of the Declaration, and for any fees or deficiencies associated with this submission, or credit any overpayment to Deposit Account No. 50-5047, required to make this response timely and acceptable to the Office.

The office is hereby requested to provide a filing receipt upon the receipt of this letter.

Respectfully submitted,

/Natalya Hartmann, Reg No 62,119/

Natalya Hartmann
Registration No. 62,119

De Vries & Metman
Overschiestraat 180,
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Facsimile: **+31 20 5110931**
Agent for Applicants

Date of Deposit: June 1, 2012
This paper is being filed on the date indicated above using the USPTOs electronic filing system EFS-Web, and is addressed to The Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

DE VRIES & METMAN

# United States Patent Application

## COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor(s), I/we hereby declare that: each inventor's residence, mailing address and citizenship are as stated below next to his/her name; that

I/we believe I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE,**

the application and any applicable preliminary amendment of which is attached hereto.

I/we hereby authorize and request the attorneys or agents handling this application, at De Vries & Metman, located at Overschiestraat 180, 1062 XK Amsterdam, The Netherlands, to insert here in parentheses the serial number of said application (Ser. No.: 13/499,924), the filing date of said application (Application Filing Date: April 3, 2012), and filing date of any preliminary amendment (Preliminary Amendment Filing Date: April 3, 2012) when known.

I/we hereby state that I/we have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I/we acknowledge the duty to disclose information which is material to patentability of this application in accordance with 37 C.F.R. § 1.56 (attached hereto). I/We also acknowledge my/our duty to disclose all information known to be material to patentability which became available between a filing date of a prior application and the national or PCT international filing date in the event this is a Continuation-In-Part application in accordance with 37 C.F.R. § 1.63(e).

Each inventor initial here: RL LJ JO AVP HZ

*Authorization to Permit Access to Application by Participating Offices*

I/we hereby grant the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h).

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed; 2) any foreign application to which the above-identified patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

The undersigned believes no fee will be charged under 37 CFR 1.19(b)(1) for providing a participating intellectual property office with an electronic copy of the above-identified patent application.

Each inventor initial here: RC LJ JO AW, HZ

*Related Applications*

I/we hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or 365(b) of, and incorporate in the present patent application by reference, any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on the basis of which priority is claimed:

**Foreign Priority Information**

| Application no.: | Country: | Filed on: |
|---|---|---|
| 09172399.9 | EP | October 7, 2009 |

I/we hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below:

**No such claim for priority is being made at this time.**

I/we hereby claim the benefit under 35 U.S.C. § 120 or 365(c) of any United States and PCT international application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose material information as defined in 37 C.F.R. § 1.56(a) which became available between the filing date of the prior application and the national or PCT international filing date of this application:

**PCT Benefit Information**

| Application no.: | Filing Date: | Status: |
|---|---|---|
| PCT/EP2010/064823 | October 5, 2010 | Pending |

Each inventor initial here: RC LJ JO AVP HZ

*Power of Attorney and Correspondence Information*

I/we hereby appoint the attorneys and agents associated with the customer number listed below to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

**Customer Number: 90057**

I/we hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/agent/firm/organization/who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct De Vries & Metman to the contrary.

Please direct all correspondence in this case to **De Vries & Metman** at the address indicated below:

**Customer Number: 90057**

I/we hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Inventor Number 1: **OOSTVEEN, Job Cornelis**
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Signature: _____ Date: 3-4-2012
**OOSTVEEN, Job Cornelis**

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Citizenship: **NL** Residence: **Rijswijk, The Netherlands**
Mailing Address: **Jozef Israellaan 234, 2282 TR Rijswijk, The Netherlands**

Signature: _____ Date: 30-3-2012
**JORGUSESKI, Ljupco**

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Signature: _____ Date: 28-3-2012
**LITJENS, Remco**

Each inventor initial here: RC LJ JO NVP

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Citizenship: **NL** Residence: **Rijswijk, The Netherlands**
Mailing Address: **Caan van Necklaan 25, 2281 BA Rijswijk, The Netherlands**

Signature: _____ Date: 17/4/2012
**PAIS, Adrian Victor**

Full Name of Inventor Number 5: **ZHANG, Haibin**
Citizenship: **CN** Residence: **The Hague, The Netherlands**
Mailing Address: **Usselincxstraat 142, 2593 VP The Hague, The Netherlands**

Signature: _____ Date: 30/04/2012
**ZHANG, Haibin**

Each inventor initial here: _____

37 CFR § 1.56 Duty to disclose information material to patentability.

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

(1) prior art cited in search reports of a foreign patent office in a counterpart application, and

(2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

(1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or

(2) It refutes, or is inconsistent with, a position the applicant takes in:

(i) Opposing an argument of unpatentability relied on by the Office, or

(ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

(1) Each inventor named in the application:

(2) Each attorney or agent who prepares or prosecutes the application; and

(3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

Each inventor initial here: RC LJ JO AVP HZ

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 13499924 |
| **Filing Date:** | 03-Apr-2012 |
| **Title of Invention:** | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE |
| **First Named Inventor/Applicant Name:** | Job Cornelis Oostveen |
| **Filer:** | Natalya Hartmann/Tessa Koning |
| **Attorney Docket Number:** | US17827 |

Filed as Large Entity

## U.S. National Stage under 35 USC 371 Filing Fees

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| Oath/decl > 30 months from priority date | 1617 | 1 | 130 | 130 |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| **Extension-of-Time:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Miscellaneous:** | | | | |
| | | | **Total in USD ($)** | **130** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 12909518 |
| **Application Number:** | 13499924 |
| **International Application Number:** | |
| **Confirmation Number:** | 7977 |
| **Title of Invention:** | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE |
| **First Named Inventor/Applicant Name:** | Job Cornelis Oostveen |
| **Customer Number:** | 90057 |
| **Filer:** | Natalya Hartmann/Tessa Koning |
| **Filer Authorized By:** | Natalya Hartmann |
| **Attorney Docket Number:** | US17827 |
| **Receipt Date:** | 01-JUN-2012 |
| **Filing Date:** | 03-APR-2012 |
| **Time Stamp:** | 09:29:36 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | Deposit Account |
| Payment was successfully received in RAM | $130 |
| RAM confirmation Number | 8217 |
| Deposit Account | 505047 |
| Authorized User | |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees)

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Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Transmittal Letter | 17827_Transmittal_Letter.pdf | 15394<br>a2ef128787b559d87adc412e0daec3d354258795 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Oath or Declaration filed | 17827_Declaration.pdf | 278269<br>bcc5e37849489b58b9aad665931d7c1d2313d07d | no | 6 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 3 | Fee Worksheet (SB06) | fee-info.pdf | 30781<br>91902b48623aa7e644cf1e18975b84d644f821b1 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | **Total Files Size (in bytes):** | 324444 | | |

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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

## PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/499,924

### APPLICATION AS FILED - PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY FEE($) |
|---|---|---|---|---|---|---|---|
| BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | | | N/A | 380 |
| SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | | | N/A | 490 |
| EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | | | N/A | 250 |
| TOTAL CLAIMS (37 CFR 1.16(i)) | 18 minus 20 = | * | | | OR | x 60 = | 0.00 |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | 3 minus 3 = | * | | | | x 250 = | 0.00 |
| APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | | | | 0.00 |
| MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | | | | 0.00 |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | | | TOTAL | 1120 |

### APPLICATION AS AMENDED - PART II

| | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY ADDITIONAL FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|---|
| AMENDMENT A | Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| | Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

| | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY ADDITIONAL FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|---|
| AMENDMENT B | Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| | Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| U.S. APPLICATION NUMBER NO. | FIRST NAMED APPLICANT | ATTY. DOCKET NO. |
|---|---|---|
| 13/499,924 | Job Cornelis Oostveen | US17827 |

90057
De Vries & Metman
Overschiestraat 180
Amsterdam, 1062 XK
NETHERLANDS

| INTERNATIONAL APPLICATION NO. | |
|---|---|
| PCT/EP2010/064823 | |
| I.A. FILING DATE | PRIORITY DATE |
| 10/05/2010 | 10/07/2009 |

**CONFIRMATION NO. 7977**
**371 ACCEPTANCE LETTER**

*OC000000054323938*

Date Mailed: 05/29/2012

## NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

| 04/03/2012 | 04/07/2012 |
|---|---|
| DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS | DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS |

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Copy of the International Application filed on 04/03/2012
- Copy of the International Search Report filed on 04/03/2012
- Preliminary Amendments filed on 04/03/2012
- Information Disclosure Statements filed on 04/03/2012
- Oath or Declaration filed on 04/03/2012
- U.S. Basic National Fees filed on 04/03/2012
- Priority Documents filed on 04/03/2012

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

TAMALA D HOLLAND

Telephone: (571) 272-9120



FORM PCT/DO/EO/903 (371 Acceptance Notice)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING or 371(c) DATE | GRP ART UNIT | FIL FEE REC'D | ATTY.DOCKET.NO | TOT CLAIMS | IND CLAIMS |
|---|---|---|---|---|---|---|
| 13/499,924 | 04/03/2012 | | 1120 | US17827 | 18 | 3 |

**CONFIRMATION NO. 7977**

90057
De Vries & Metman
Overschiestraat 180
Amsterdam, 1062 XK
NETHERLANDS

**FILING RECEIPT**


Date Mailed: 05/29/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

**Applicant(s)**

Job Cornelis Oostveen, Haren, NETHERLANDS;
Ljupco Jorguseski, Rijswijk, NETHERLANDS;
Remco Litjens, Voorschoten, NETHERLANDS;
Adrian Victor Pais, Rijswijk, NETHERLANDS;
Haibin Zhang, The Hague, NETHERLANDS;

**Assignment For Published Patent Application**

KONINKLIJKE KPN N.V., The Hague, NETHERLANDS
NEDERLANDSE ORGANISATIE VOOR TOEGEPAST- NATUURWETENSCHAPPELIJK ONDERZOEK, Delft, NETHERLANDS

**Power of Attorney:** The patent practitioners associated with Customer Number 90057

**Domestic Priority data as claimed by applicant**

This application is a 371 of PCT/EP2010/064823 10/05/2010

**Foreign Applications** (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
EUROPEAN PATENT OFFICE (EPO) 09172399.9 10/07/2009

**If Required, Foreign Filing License Granted:** 05/16/2012
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/499,924**
**Projected Publication Date:** 09/06/2012
**Non-Publication Request:** No
**Early Publication Request:** No

**Title**

SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

**Preliminary Class**

## PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

## LICENSE FOR FOREIGN FILING UNDER

## Title 35, United States Code, Section 184

## Title 37, Code of Federal Regulations, 5.11 & 5.15

**GRANTED**

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set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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# MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

| Application Number | Filing Date |
|---|---|
| 13499924 | |

Applicant(s) Job Oostveen

* May be used for additional claims or amendments

| CLAIMS | AS FILED | | AFTER FIRST AMENDMENT | | AFTER SECOND AMENDMENT | |
|---|---|---|---|---|---|---|
| | Indep | Depend | Indep | Depend | Indep | Depend |
| 1 | 1 | | 1 | | | |
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| 6 | | 1 | | 1 | | |
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| Total Indep | 2 | | 3 | | 0 | |
| Total Depend | 13 | ↵ | 15 | ↵ | 0 | ↵ |
| Total Claims | 15 | | 18 | | 0 | |

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| U.S. APPLICATION NUMBER NO. | FIRST NAMED APPLICANT | ATTY. DOCKET NO. |
|---|---|---|
| 13/499,924 | Job Cornelis Oostveen | US17827 |

90057
De Vries & Metman
Overschiestraat 180
Amsterdam, 1062 XK
NETHERLANDS

| INTERNATIONAL APPLICATION NO. | |
|---|---|
| PCT/EP2010/064823 | |
| I.A. FILING DATE | PRIORITY DATE |
| 10/05/2010 | 10/07/2009 |

**CONFIRMATION NO. 7977**
**371 ACCEPTANCE LETTER**

*OC000000054323938*

Date Mailed: 05/21/2012

## NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

| 04/03/2012 | 04/07/2012 |
|---|---|
| DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS | DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS |

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Copy of the International Application filed on 04/03/2012
- Copy of the International Search Report filed on 04/03/2012
- Preliminary Amendments filed on 04/03/2012
- Information Disclosure Statements filed on 04/03/2012
- Oath or Declaration filed on 04/03/2012
- U.S. Basic National Fees filed on 04/03/2012
- Priority Documents filed on 04/03/2012

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

TAMALA D HOLLAND

Telephone: (571) 272-9120



FORM PCT/DO/EO/903 (371 Acceptance Notice)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING or 371(c) DATE | GRP ART UNIT | FIL FEE REC'D | ATTY.DOCKET.NO | TOT CLAIMS | IND CLAIMS |
|---|---|---|---|---|---|---|
| 13/499,924 | 04/03/2012 | | 1120 | US17827 | 18 | 3 |

**CONFIRMATION NO. 7977**

90057
De Vries & Metman
Overschiestraat 180
Amsterdam, 1062 XK
NETHERLANDS

**FILING RECEIPT**


Date Mailed: 05/21/2012

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**Applicant(s)**

Job Cornelis Oostveen, Haren, NETHERLANDS;
Ljupco Jorguseski, Rijswijk, NETHERLANDS;
Remco Litjens, Voorschoten, NETHERLANDS;
Adrian Victor Pais, Rijswijk, NETHERLANDS;
Haibin Zhang, The Hague, NETHERLANDS;

**Assignment For Published Patent Application**

KONINKLIJKE KPN N.V., The Hague, NETHERLANDS
NEDERLANDSE ORGANISATIE VOOR TOEGEPAST- NATUURWETENSCHAPPELIJK ONDERZOEK, Delft, NETHERLANDS

**Power of Attorney:** The patent practitioners associated with Customer Number 90057

**Domestic Priority data as claimed by applicant**

This application is a 371 of PCT/EP2010/064823 10/05/2010

**Foreign Applications** (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
EUROPEAN PATENT OFFICE (EPO) 09172399.9 10/07/2009

**If Required, Foreign Filing License Granted:** 05/16/2012
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/499,924**
**Projected Publication Date:** 371 Perfected
**Non-Publication Request:** No
**Early Publication Request:** No

**Title**

SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

**Preliminary Class**

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

## LICENSE FOR FOREIGN FILING UNDER

## Title 35, United States Code, Section 184

## Title 37, Code of Federal Regulations, 5.11 & 5.15

**GRANTED**

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set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

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## PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/499,924

### APPLICATION AS FILED - PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY FEE($) |
|---|---|---|---|---|---|---|---|
| BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | | | N/A | 380 |
| SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | | | N/A | 490 |
| EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | | | N/A | 250 |
| TOTAL CLAIMS (37 CFR 1.16(i)) | 18 minus 20 = | * | | | OR | x 60 = | 0.00 |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | 3 minus 3 = | * | | | | x 250 = | 0.00 |
| APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | | | | 0.00 |
| MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | | | | 0.00 |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | | | TOTAL | 1120 |

### APPLICATION AS AMENDED - PART II

| | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY ADDITIONAL FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|---|
| AMENDMENT A | Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| | Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

| | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY ADDITIONAL FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|---|
| AMENDMENT B | Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| | Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

# MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

| Application Number | Filing Date |
|---|---|
| 13499924 | |

Applicant(s) Job Oostveen

* May be used for additional claims or amendments

| CLAIMS | AS FILED | | AFTER FIRST AMENDMENT | | AFTER SECOND AMENDMENT | |
|---|---|---|---|---|---|---|
| | Indep | Depend | Indep | Depend | Indep | Depend |
| 1 | 1 | | 1 | | | |
| 2 | | 1 | | 1 | | |
| 3 | | 1 | | 1 | | |
| 4 | | ( 1 ) | | 1 | | |
| 5 | | ( 1 ) | | 1 | | |
| 6 | | 1 | | 1 | | |
| 7 | | ( 1 ) | | 1 | | |
| 8 | | ( 1 ) | | 1 | | |
| 9 | 1 | | 1 | | | |
| 10 | | 1 | | 1 | | |
| 11 | | 2 | | 1 | | |
| 12 | | 1 | | 1 | | |
| 13 | | ( 1 ) | 1 | | | |
| 14 | | ( 1 ) | | 1 | | |
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| 50 | | | | | | |
| Total Indep | 2 | | 3 | | 0 | |
| Total Depend | 13 | ↵ | 15 | ↵ | 0 | ↵ |
| Total Claims | 15 | | 18 | | 0 | |

| | * | | * | | * | |
|---|---|---|---|---|---|---|
| | Indep | Depend | Indep | Depend | Indep | Depend |
| 51 | | | | | | |
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| 100 | | | | | | |

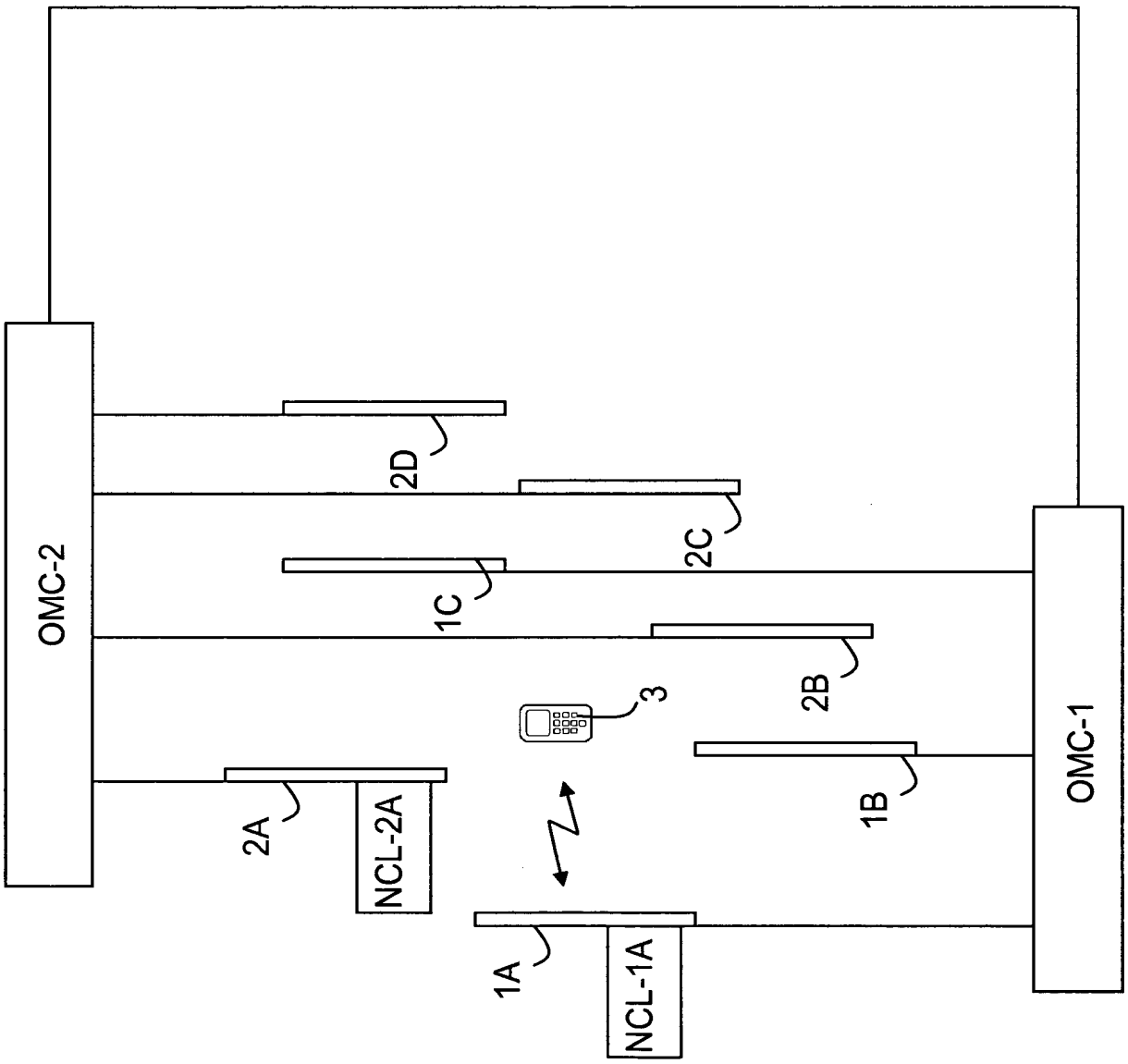


FIG. 1

2/4

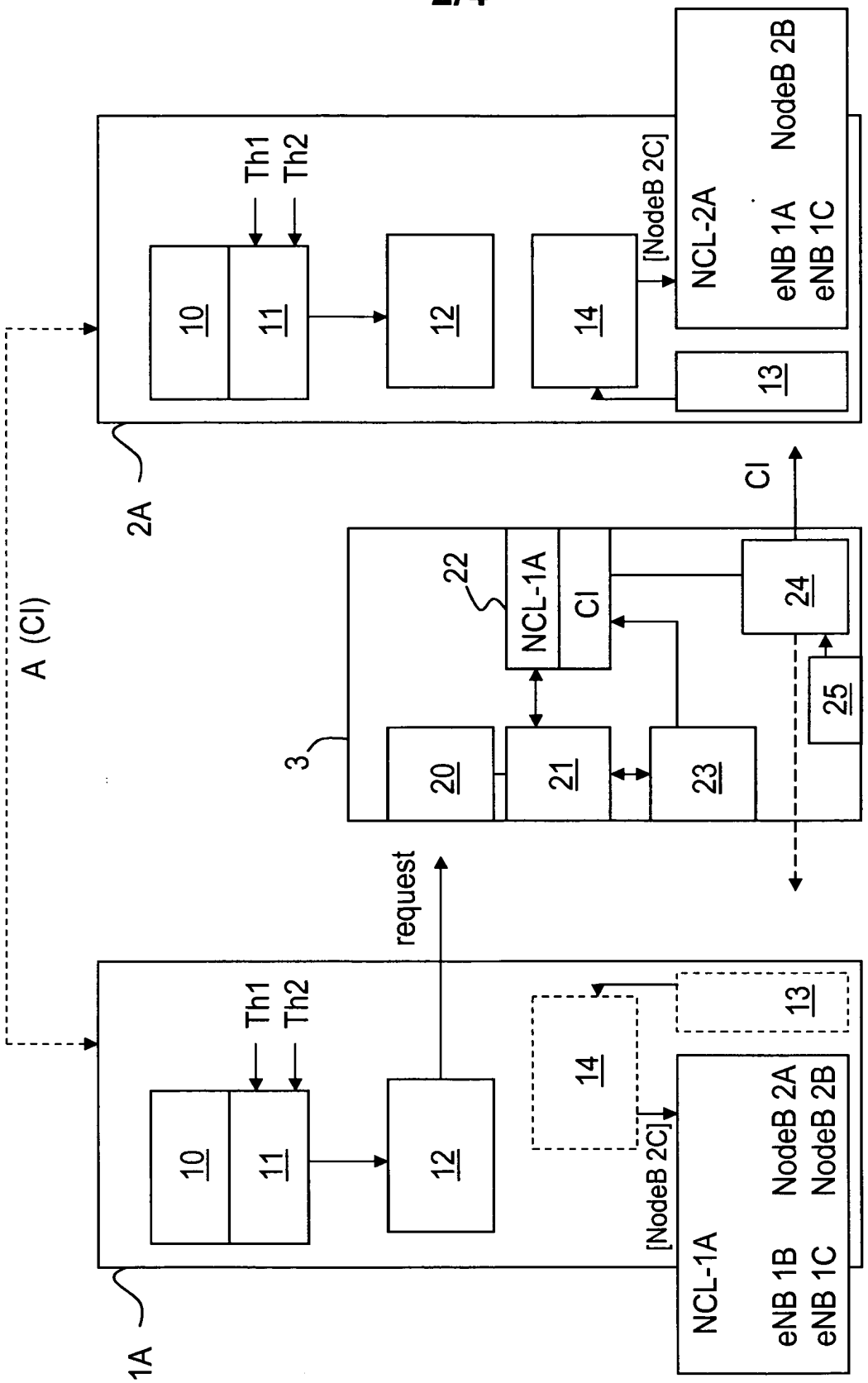
2A
NCL-2A
eNB 1A
eNB 1C
NodeB 2B
[NodeB 2C]
Th1
Th2
10
11
12
13
14
A (CI)
CI
3
NCL-1A
CI
22
20
21
23
24
25
request
1A
NCL-1A
eNB 1B
eNB 1C
NodeB 2A
NodeB 2B
[NodeB 2C]

FIG. 2

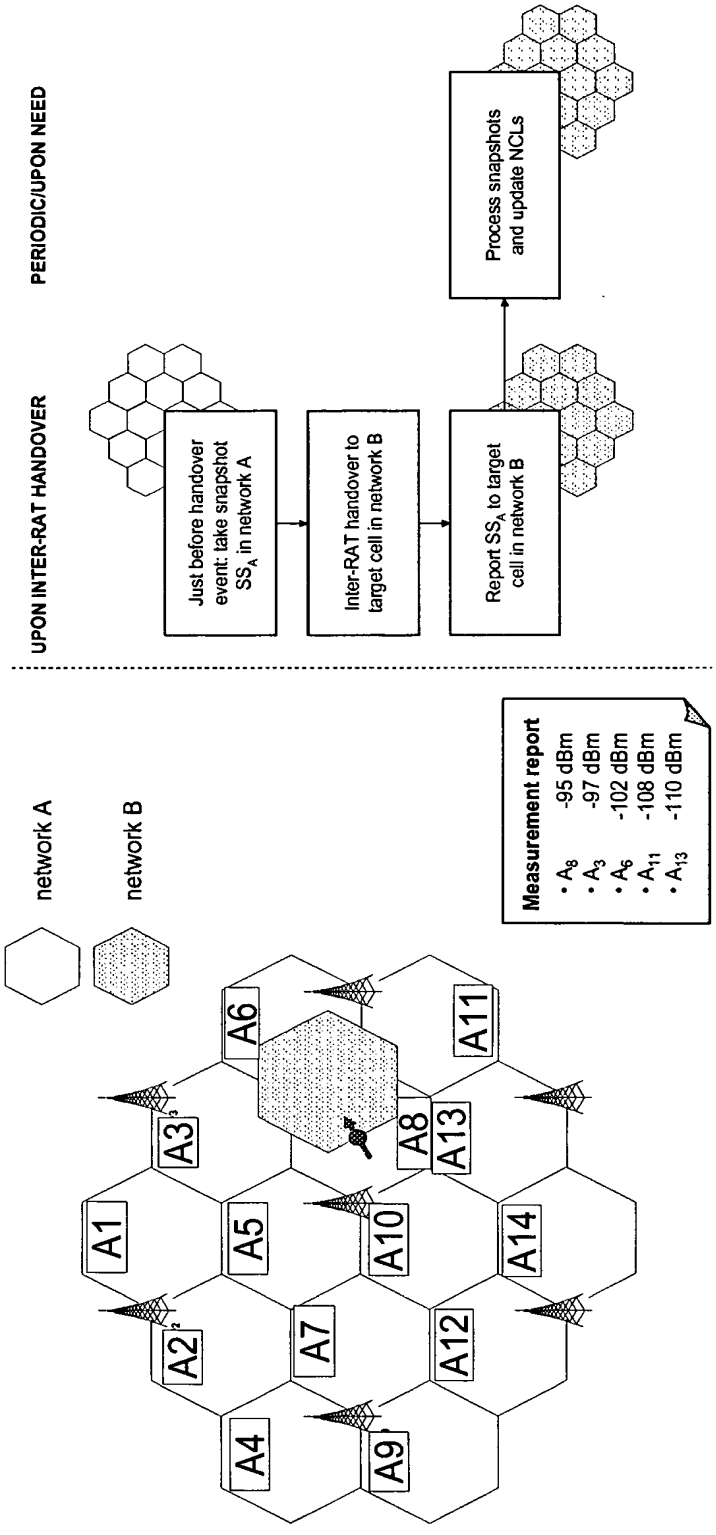
network A
network B
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
Measurement report
• $A_8$ -95 dBm
• $A_3$ -97 dBm
• $A_6$ -102 dBm
• $A_{11}$ -108 dBm
• $A_{13}$ -110 dBm
UPON INTER-RAT HANDOVER
Just before handover event: take snapshot $SS_A$ in network A
Inter-RAT handover to target cell in network B
Report $SS_A$ to target cell in network B
PERIODIC/UPON NEED
Process snapshots and update NCLs

FIG. 3A

FIG. 3B

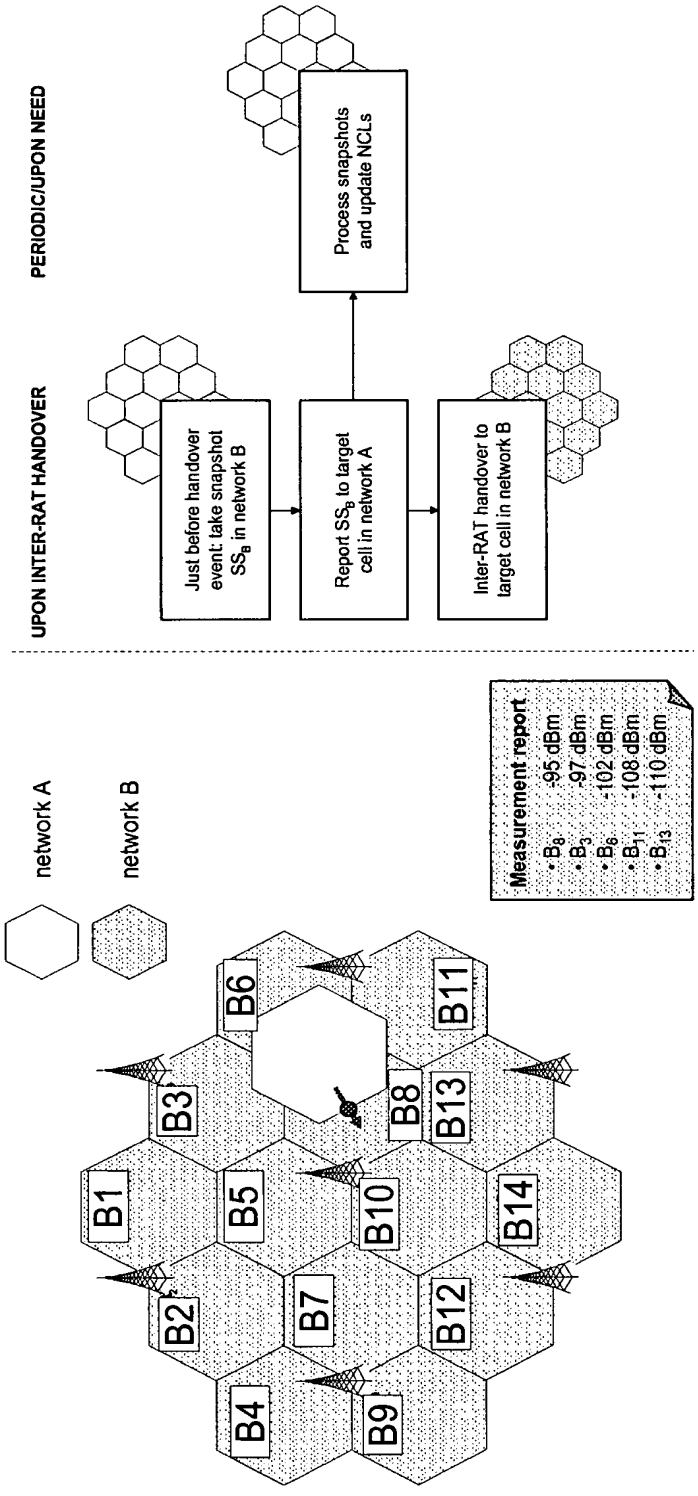
network A
network B
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
B13
B14
Measurement report
• $B_8$ -95 dBm
• $B_3$ -97 dBm
• $B_6$ -102 dBm
• $B_{11}$ -108 dBm
• $B_{13}$ -110 dBm
UPON INTER-RAT HANDOVER
Just before handover event: take snapshot $SS_B$ in network B
Report $SS_B$ to target cell in network A
Inter-RAT handover to target cell in network B
PERIODIC/UPON NEED
Process snapshots and update NCLs

FIG. 4A

FIG. 4B

## CLAIMS

1. A system for updating a neighbour cell list in a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined, the system comprising:

- a detector configured for detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;
- a selector configured for selecting a part of the user terminals;
- a request generator configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;
- a receiver configured for receiving the cell information from the one or more of the selected user terminals; and
- updating means configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

2. The system according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the first wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless nodes of the first wireless access network via the second wireless access node,

the system further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the first wireless access network via the second wireless access node.

3. The system according to claim 2, further comprising a data transfer system for transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node.

4. The system according to one or more of the preceding claims,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node,

the system further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node.

5. The system according to claim 4, further comprising a data transfer system for transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

6. The infrastructure according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node

further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

7. The system according to one or more of the preceding claims, wherein the telecommunications system is further configured for receiving location information from one or more of the detected user terminals and wherein the location information is used as a selection parameter for selecting the part of the detected user terminals.

8. The system according to one or more of the preceding claims , wherein one or more thresholds, possibly service-dependent, are defined in the telecommunications system for transferring the user terminals between the first wireless access network and the second wireless access network and wherein at least one of the thresholds is used as a selection parameter for selecting the part of the detected user terminals.

9. In a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is

defined, a method for updating at least one of the first and second neighbour cell lists comprising the steps of:

- detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;

- selecting a part of the user terminals;

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

- receiving the cell information from the one or more of the selected user terminals; and

- updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

10. The method according to claim 9, comprising the steps of:

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the first wireless access network;

- receiving the cell information of the wireless nodes of the first wireless access network via the second wireless access node,

- transferring the selected user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the first wireless access network via the second wireless access node, and

- optionally, transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node.

11. The method according to claim 9 or 10, comprising the steps of:

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

- receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node,

- transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node, and

- optionally, transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

12. The method according to claim 9, comprising the steps of;

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

- receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node

- transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

13. A computer program comprising software code portions configured for, when executed by at least one processor, performing the method of one or more of the claims 9-12.

14. A mobile user terminal configured for use in the method according to one or more of the claims 9-11, wherein the mobile terminal, in use, contain a neighbour cell list of the first wireless access node, the terminal comprising:

- a receiver for receiving the request for reporting cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

- scanning means for detecting the cell information from the wireless access nodes, at least one of the wireless access nodes being absent in the neighbour cell list,

- a transmitter for transmitting the detected cell information,

- wherein the mobile user terminal is arranged for temporarily storing the detected cell information and transmitting the detected cell information to the second wireless access node after being transferred from the first to the second wireless access network.

# SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

## FIELD OF THE INVENTION

The invention relates to the field of telecommunications systems and a method in telecommunications architecture. More specifically, the invention relates to a telecommunications architecture comprising at least a first and a second wireless access network between which user terminals can be transferred and a method in such a telecommunications system, wherein the neighbour cell lists (NCLs) of at least a wireless access node of the first and/or second wireless access network can be updated using a system.

## BACKGROUND OF THE INVENTION

When moving through the coverage area of a wireless access cellular network, mobile user terminals continuously scan the spectrum for pilot or reference signals (beacons) in order to determine which cell (base station) to camp on. In idle mode, this is referred to as cell reselection, while in active/dedicated mode, this is referred to as handover. The cell-specific list of surrounding cells that are considered for cell reselection or handover is called the neighbour cell list (NCL), which is stored in each base station and broadcast within the cell. The mobile user terminal receives and stores the NCL. The NCL contains the cells for which the mobile user terminal should send measurement reports (when certain criteria are met) to the base station currently serving the user terminal.

In case of multiple, cooperating wireless access cellular networks, each cell not only has an intra-network NCL, but also an inter-network NCL.

The optimisation of the NCLs is traditionally done with the aid of off-line planning tools, using path loss predictions and (off-line) optimisation algorithms. Currently, automated configuration and optimisation of intra-network NCLs and inter-network NCLs, based on e.g. actual measurement feedback from

user terminals, observed mobility patterns, base station scans and handover statistics, are being investigated.

3GPP TS 36.300, V8.9.0, discloses an automatic neighbour relation (ANR) function to relieve an operator from the burden of manually managing neighbour relations. Such an ANR function resides in the eNode-B (eNB) of an LTE network and manages a conceptual neighbour relation table (NRT). A neighbour detection function is used to find new neighbours and to add them to the NRT, whereas a neighbour removal function removes outdated neighbours from the NRT. The eNB instructs a user terminal from a serving cell to look for neighbour cells of other networks by scanning all cells. The user terminal first reports the physical cell identifier (PCI) of the detected cells in the other network. When the eNB receives the reports from the user terminals containing the PCI's of the cells, the eNB instructs the user terminal, using the newly discovered cell as a parameter, to read the Cell Global Identifier (CGI) and further cell information from the neighbouring cells. The user terminal also reports this information to the serving cell. The eNB may then update the NRT using the information reported from the user terminals.

## SUMMARY OF THE INVENTION

A system is disclosed for a telecommunications architecture that comprises a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined.

The system comprises a detector configured for detecting user terminals about to be transferred, i.e. for which cell reselection or handover will be performed, from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network.

The system also comprises a request generator configured for requesting from the first wireless access node one or

more of the detected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The telecommunications system, particularly at least one of the first and the second wireless access node, also comprises a receiver configured for receiving the cell information from one or more of the detected user terminals. Updating means are provided configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

A method in a telecommunications architecture is also disclosed. User terminals about to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network are detected. From the first wireless access node, one or more of the detected user terminals are requested to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The cell information is received from one or more of the detected user terminals and at least one of the first neighbour cell list and the second neighbour cell list is updated using the received cell information.

Furthermore, a mobile user terminal containing at least one neighbour cell list of the first wireless access node is disclosed. The terminal comprises a receiver for receiving the request for reporting cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The mobile terminal also contains scanning means configured for detecting the cell information from the wireless access nodes, at least one of the wireless access nodes being absent in the neighbour cell list, and a transmitter for transmitting the detected cell information. At present, standardization does not allow mobile terminals to measure cells not present in the NCL. However, there are no intrinsic obstacles for making performing such measurements. The mobile terminal is arranged for temporarily storing the detected cell information and transmitting the de-

tected cell information to the second wireless access node after being transferred from the first to the second wireless access network.

It is noted that in the present application the terms wireless access node and cell are used as similar terms. The skilled person will appreciate that a single wireless access node may provide multiple cells and that, typically, a neighbour cell list is defined for each of the cells of such a node.

The plurality of wireless access nodes of which cell information is requested may exclude the first wireless access node, or more particularly, the cell thereof currently serving the user terminal. On the other hand, the plurality of wireless access nodes would typically include cells that are absent in the neighbour cell list stored in the user terminal for regularly reporting measurement reports to the serving cell. Otherwise, since the neighbour cell list is obtained from the serving cell, the detection of the cell information by the user terminal would be restricted to this list and would therefore only be suitable for verifying the existing NCL and not for adding new neighbouring cells to the list. In an embodiment, the user terminal performs a complete scan for all cells in the first wireless access network (possibly excluding the currently serving cell) and/or all cells in the second wireless access network to allow the telecommunications system to obtain a complete picture of the available cells around the first wireless access node. This complete information containing the scan of all cells may then be used for updating the NCL(s). Alternatively, the user terminal may compare the received complete information with the NCL it has obtained from the first wireless access node and only report cell information of cells not present on the current NCL.

The first and second wireless access networks may differ in radio access technology (e.g. GSM and UMTS or UMTS and LTE), the deployed release of a given radio access technology, the used frequency spectrum (e.g. the 900 MHz and 1800 MHz frequency bands (the latter also being referred to as a DCS network) for GSM, different 5MHz carriers for UMTS) and/or wire-

less access networks of different mobile operators. The wireless access network may also differ in the type of cells provided, e.g. macro cells and pico cells.

The disclosed system and method are able to specifically direct the request for cell information for the first and/or second network to user terminals in the regions where cell reselection or handover from the first to the second wireless access network is about to occur. By collecting this information specifically at cell reselection or handover moments, the updating of the NCL is inherently based on the inter-network neighbours that a user terminal experiences in the cell reselection or handover region, where the reports of the user terminal measurements are most relevant for construing the NCL.

In some instances, user terminals may move rapidly through an area and cell reselection and handover to the second wireless access network should be performed quickly. In such cases, insufficient time may be available for performing the scan for obtaining the cell information for the first wireless access network and for reporting the cell information to the telecommunications system via the first wireless access network. The embodiments of the invention as defined in claims 2 and 10 provide additional time for completing the method by performing the cell reselection or handover as soon as the mobile user terminal has been instructed for performing the scan for cell information for the first and/or the second wireless access network. By temporarily storing the cell information resulting from the scan at the mobile user terminal, the user terminal may carry the cell information to the second network where it has sufficient time to report the cell information of the plurality of wireless access nodes of the first wireless access network via the second network.

The cell information of the wireless access nodes of the first wireless access network may be used for updating the neighbour cell list of the first wireless access node and/or for updating the neighbour cell list of the second wireless access node, or the cells thereof.

The updating of the neighbour cell list of the second wireless access node is relevant for user terminals reselecting cells or handed over from the second wireless access node to the first wireless access network, i.e. in the cell reselection or handover direction reverse to the direction travelled by the terminals reporting the cell information. Since other user terminals will be transferred from the second wireless access network to the first wireless access network, the neighbour cell list of the first wireless access node may also be updated in this way.

The cell information of the plurality of access nodes of the first wireless access network as received via the second wireless access node may also be transferred back to the first wireless access node, e.g. for updating the intra-network neighbour cell list, as defined in claim 3 and, optionally, in claim 10. In a particular example, this embodiment may be used to reduce the so-called 'missing neighbour' effect in a UMTS network, here being the first wireless access network. User terminals equipped to connect to UMTS networks are restricted to gathering cell information as defined in the neighbour cell list received from the base station currently serving the user terminal. An absent cell in the neighbour cell list of the base station will thus never be measured and reported by the user terminal as a result of this restriction of the user terminal. When the signal of a missing neighbour is too strong, call drops may occur. The present embodiments may reduce this problem by instructing the user terminals to also scan for cell information of wireless access nodes of the UMTS network being absent in the neighbour cell list (and thus possibly revealing the existence of cells not present in the neighbour cell list of the base station) and to report this via the second wireless access network back to the first wireless access node. The NCL of the first wireless access node may then be updated with the missing neighbour cell.

The user terminals may also be instructed to obtain the cell information of the plurality of wireless access nodes of the second wireless access network shortly before cell reselec-

tion or handover to the second wireless access node of this network and report the cell information to the telecommunications system via this second wireless access node, i.e. after cell reselection or handover. This embodiment is defined in claims 4 and 11.

Again, the cell information of the wireless access nodes of the second wireless access network may be used for updating the neighbour cell list of the first wireless access node and/or for updating the neighbour cell list of the second wireless access node. The cell information obtained for the access nodes of the second wireless access network may be relevant for the second wireless access network itself, e.g. for updating the intra-network NCL, in view of the 'missing neighbour' effect occurring in particular types of network such as UMTS, as discussed above for the first wireless access network.

The cell information of the plurality of access nodes of the second wireless access network as received via the second wireless access node may be transferred back to the first wireless access node as defined in claim 5 and, optionally, in claim 11. In doing so, the first wireless access node may update its neighbour cell list using the received cell information obtained shortly before cell reselection or handover, even when the user terminals have insufficient time for reporting the cell information for the plurality of wireless access nodes of the second wireless access network directly to the first wireless access node. The updated NCL is relevant for cell reselection or handover from the first wireless access node to the second wireless access network for other user terminals.

Of course, when sufficient time for reporting the cell information of the plurality of wireless access nodes of the second network is available, this cell information obtained shortly before cell reselection or handover to the second wireless access network can be reported directly to the first wireless access node, as defined in the embodiments of claims 6 and 12.

It is not required that all handover or cell reselection instances trigger a scan for cell information by the user

terminals. A wireless access node may for instance indicate on its broadcast channel not only whether handovers and/or cell re-selections should trigger such reporting, but also a likelihood parameter which the terminal can use to flip a (biased) coin in determining whether it should send cell information at a specific handover or cell reselection instance. Alternatively, the wireless access node may explicitly signal to the specific user terminal whether it should do the cell measurement and reporting. In this manner, the amount of cell information reporting can be tuned, which relates to a trade-off between the measurement overhead (signalling load) and the potential for neighbour cell list optimisation.

One embodiment of tuning the amount of cell list optimisation traffic is to use the location information from the user terminals as a selection criterion as defined in claim 7. The location information may e.g. be obtained from a GPS module in the user terminal or by means of measurements using the first and/or the second wireless access network. This location information can be useful e.g. in identifying where handover regions exist, and in solving location-specific outages or problems, e.g. dropped calls due to 'missing neighbour'. It may also be useful when an operator changes configuration (optimisation of downlink power, antenna tilt, etc) and wants to measure the effect on the cells relevant for inter-RAT cell change or handover.

Another advantageous selection criterion for determining which user terminals should report cell information is the transfer threshold that may have been set by the operator(s) of the telecommunication system, as defined in claim 8. The transfer threshold determines at what level (typically involving pilot signal measurements) cell reselection or handover would occur. The transfer threshold for cell reselection or handover from the first wireless access network to the second wireless access network may be asymmetric (i.e. a different transfer threshold Th2 applies for a transfer from the second to the first wireless access network) and may also be dependent on the service type of the service received by the user terminal when

connected to the first wireless access node. As an example, a user terminal provided with a voice service by a cell of an LTE network that is handed over to a GSM network might not be handed over back to the LTE network. This is because the operator chooses this mode of operation. In such a case, although this user terminal is a detected user terminal in the sense that it is about to be transferred to the second wireless access network (GSM), it is not selected for reporting requested to report cell information of the plurality of wireless access nodes of the first wireless access network (the LTE network), since the hand-over in the direction back to the first network (the LTE network) will generally not be made. On the other hand, for a user terminal using a data service that is temporarily handed over from an LTE network to a GSM network, a handover back to the LTE network is generally preferred and such user terminals can be selected to report cell information of the plurality of wireless access nodes of the second network. The embodiment of the telecommunications system of claim 8 may also be used for the method in the telecommunications system as defined in claims 10-13.

Hereinafter, embodiments of the invention will be described in further detail. It should be appreciated, however, that these embodiments may not be construed as limiting the scope of protection for the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 provides a schematic illustration of a telecommunication system comprising a first and a second wireless access network, each having a plurality of wireless access nodes, according to an embodiment of the invention;

FIG. 2 provides a schematic illustration of a mobile user terminal and wireless access nodes configured for performing a method according to an embodiment of the invention;

FIGS. 3A and 3B provide a schematic illustration of a telecommunications system and a flow chart for operating such a system, wherein cell information of wireless access nodes of the

first wireless access network is obtained and reported via the second wireless access network; and

FIGS. 4A and 4B provide a schematic illustration of a telecommunications system and a flow chart for operating such a system, wherein cell information of wireless access nodes of the second wireless access network is obtained and reported via the first wireless access network.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of first wireless access nodes 1A-1C of a first wireless access network and second wireless access nodes 2A-2D of a second wireless network. As an example, the first wireless access nodes 1A-1C are eNBs of an Long Term Evolution (LTE) network, whereas the second wireless access nodes 2A-2D are NodeBs of an UMTS network. Other examples includes wireless access networks differing in other radio access technologies (RATs), e.g. GSM and UMTS, differences in the deployed release of a given radio access technology, differences in the used frequency spectrum (e.g. the 900 MHz and 1800 MHz frequency bands (the latter also being referred to as a DCS network) for GSM, different 5MHz carriers for UMTS) and/or wireless access networks of different mobile operators. The wireless access network may also differ in the type of cells provided, e.g. macro cells and pico cells.

The wireless access nodes 1A-1C and 2A-2D can be controlled by control systems as schematically illustrated in FIG. 1. As an example, the control system may be Operation and Maintenance Centres (OMCs) as generally known in the art. The OMCs of the wireless access networks can be interconnected. Other connections between the wireless access networks can be used as well. If the wireless access nodes of the first and second wireless access networks originate from the same vendor, a single OMC can be used.

Each of the wireless access nodes 1A-1C and 2A-2D may contain at least one neighbour cell list (NCL). In FIG. 1, NCL-1A and NCL-2A are indicated as NCL of the corresponding wireless

access nodes. When a wireless access node provides multiple cells, typically each cell has a corresponding NCL.

A wireless access node broadcasts the NCL and mobile user terminals 3 camping on such a cell receive and store the NCL. The NCL is typically used to instruct the mobile terminal 3 which cells to monitor and to report every now and then the received signal strengths of each of the monitored cells, such that the network can make a decision whether or not the mobile terminal 3 should select or should be handed over to another cell.

As an example, the mobile terminal 3 receives the NCL-1A from wireless access node 1A to which it is currently connected. NCL-1A contains the cell(s) of neighbouring access nodes 1B and 1C and mobile terminal 3 monitors the signal strengths of these cells and reports these to the wireless access node 1A. Such an NCL-1A is referred to as an intra-network NCL. NCL-1A may also list neighbouring access nodes 2A and 2B of the second wireless access network, in which case NCL-1A would be referred to as an inter-network NCL. NCL-1A may also be a combined NCL, i.e. a combination of an intra-network and an inter-network NCL. Currently, automated configuration and optimisation of intra-network NCLs and inter-network NCLs is based on e.g. actual measurement feedback from user terminals 3 as disclosed in 3GPP TS 36.300, V8.9.0.

Referring also to FIG. 2, an embodiment will now be described in further detail, wherein intra-network NCL-1A contains the cells of eNBs 1B and 1C and inter-network NCL-1A contains the cells of NodeBs 2A and 2B. Note that inter-network NCL-1A does not yet contain NodeBs 2C and 2D.

Mobile user terminal 3 is assumed to camp on a cell of eNB 1A and is monitoring the cells of eNB's 1B, 1C and NodeBs 2A and 2B as indicated in the intra-network and inter-network NCLs transmitted in the cell under consideration. The mobile user terminal 3 regularly sends measurement reports to the eNB 1A as generally known in the art.

As illustrated schematically in FIG. 2, eNB 1A contains a cell reselection/handover detector 10 that recognizes that mo-

bile terminal 3 requires a cell reselection or handover to NodeB 2A of the second wireless access network. The cell reselection or handover indication triggers the following sequence of events in eNB 1A.

First, it may be determined whether or not the mobile terminal 3 for which a cell reselection or handover indication is received should participate, i.e. should be selected, in the process for updating (which includes the verification of the correctness) of an NCL, such as NCL-1A or NCL-2A. To that end, the eNB 1A contains a selection module 11 for selecting a part of the user terminals 3 for which a cell reselection or handover indication is detected. In this manner, it is possible to filter an appropriate portion the user terminals for which cell reselection or handover is about in order to reduce unnecessary signalling over the first and/or second wireless access network. The decision whether or not to participate in the updating process, i.e. whether or not to provide information to the telecommunication system allowing the updating of the NCL's, may either be taken at the mobile terminal or at the telecommunications system, particularly eNB 1A.

As an example, eNB 1A may indicate on its broadcast channel not only whether handovers and/or cell reselections should trigger such reporting, but also a likelihood parameter which the terminal 3 can use to flip a biased coin in determining whether it should send information at a specific handover or cell reselection instance. Alternatively, eNB 1A may explicitly signal to the specific user terminal 3 whether it should do the cell measurement and reporting. In this manner, the amount of cell information reporting can be tuned, which relates to a trade-off between the measurement overhead (signalling load) and the potential for neighbour cell list optimisation.

An advantageous selection criterion at the side of the eNB 1A for determining which user terminals 3 should report cell information is the transfer threshold that may have been set by the operator(s) of the telecommunications system between the first and the second wireless access networks. The transfer threshold determines at what level (typically involving pilot

signal measurements) cell reselection or handover would occur. The transfer threshold Th1 for cell reselection or handover from the first wireless access network to the second wireless access network may be asymmetric (i.e. a different transfer threshold Th2 applies for a transfer from the second to the first wireless access network) and may also be dependent on the service type of the service enjoyed by the user terminal when connected to the first wireless access node.

In FIG. 1, the user terminal 3 camping on a cell of eNB 1A of an LTE network using a data service that is about to be handed over to NodeB 2A of an UMTS network will generally be handed over back to the LTE network, if possible, because the operator applies a low threshold for handing over the user terminal 3 from the UMTS network to the LTE network for data services but a much higher threshold for handing over the user terminal to the UMTS network. In such a case, since a transfer between the networks is more likely in one direction than in the other, the terminal 3 may or may not be selected for providing information useful for the NCL updating process as will now be described in further detail.

The selection stage of user terminals 3 may be omitted completely or may be selectively applied, e.g. during particular hours of the day or at particular stages of the configuration and optimisation of the network.

Once user terminal 3 has been selected, request generator 12 in FIG. 2 is activated in order to request the user terminal 3 to report cell information of a plurality of wireless access nodes.

The plurality of wireless access nodes of which cell information is requested may exclude the cell of eNB 1A currently serving the user terminal 3. On the other hand, the plurality of wireless access nodes would typically include cells that are absent in the neighbour cell list NCL-1A stored in the user terminal 3 for regularly reporting measurement reports to the serving cell. In the example of FIG. 1, the cell information requested would typically include cell information of at least one of the cells NodeB 2C or NodeB 2D. In other words, the user

terminal 3 should at least monitor other cells than included in the neighbour cell list NCL-1A.

The user terminal 3, to that end, contains a receiver 20 (see FIG. 2) for receiving the request for reporting cell information of a plurality of wireless access nodes. The actual determination for which cells the cell information should be obtained and/or should be reported may be performed in the eNB 1A (and than being signalled to the user terminal 3) and/or internally in the user terminal 3.

When the updating of e.g. NCL-1A would only involve the determination whether additional cells should be included in the list, cell information may only be obtained for the cells of NodeB 2C and NodeB 2D. NCL-1A may be used to determine which cell(s) should be excluded for the gathering of cell information for the purpose of updating the NCL in such a case. However, when NCL-2A should be updated, the cells listed in NCL-1A should not necessarily be excluded.

On the other hand, if the NCL updating is also used to verify the existing NCL, cell information for one or more cells of the existing NCL should be gathered as well. In a particular embodiment, user terminal 3 comprises a determination module 21 for determining for which cells the cell information for the purpose of the NCL update should be gathered. As mentioned, the determination by the determination module 21 may be fully based on instructions received from the wireless access node eNB 1A or may be (partly) based on an internal comparison algorithm of the user terminal 3, using the copy of NCL-1A stored in a section of storage 22. The stored NCL may also be applied (illustrated by the arrow between scanning module 23 and determination module 21) after detecting (a part of) the cell information of all the available cells, as will be explained in further detail below.

The gathering of cell information for the purpose of updating an NCL may also be performed independently of the NCL stored in the user terminal 3. In such a case, the user terminal 3 preferably gathers cell information of all measurable cells.

The measurement is performed by a scanning module 23. The scanning module 23 detects the cell information of one or

more cells of wireless access nodes of the first and/or the second wireless access network.

The user terminal 3 is configured for storing the obtained cell information CI, or a derivative thereof, in a section of the storage means 22. While NCL-1A is normally erased from the storage means 22 after cell reselection or handover (in order to store the NCL of the new cell), the cell information remains stored for at least a particular period after the cell reselection or handover in order to transmit the cell information CI to the telecommunications system via the new cell using transmitter 24.

After cell reselection or handover to a cell of NodeB 2A, the transmitter 24 transmits the cell information CI, obtained while camping on the cell of eNB 1A, to a receiver 13 of NodeB 2A. Receiver 13 forwards the cell information to an updater 14 configured for updating (including verification) of the NCL-2A using the cell information CI.

When sufficient time is available, the mobile user terminal 3 may also transmit the cell information CI to the first wireless access network, particularly eNB 1A, in order to e.g. update NCL-1A, prior to cell reselection or handover to NodeB 2A. This transmission is shown by the dashed arrow from transmitter 23 towards eNB 1A.

In a particular example, a request is sent from request generator 12 to user terminal 3 to obtain cell information of the second wireless access network when user terminal is about to be handed over to this network. First, user terminal 3, using scanning means 23 detects as many PCI's (physical cell identifiers) as possible. As an example, the PCI's of the cells of nodes 2A-2D are detected. The PCI's are generally transmitted on a specialized channel (a pilot channel for UMTS). Using NCL-1A stored in storage 22 and determination module 21, the PCI's of NodeB 2A and NodeB 2B are omitted from the further processing, since these are already present in NCL-1A. The scanning means then detects the signal strengths of the pilot channel of the remaining cells identified by the PCI's of NodeB 2C and NodeB 2D. It may turn out that the signal strength for the cell of

NodeB 2D is too low and, therefore, determination module 21 also omits further processing for cell NodeB 2D.

Subsequently, the scanning means tunes to the broadcast channel BCH of the cell of NodeB 2C and detects the GCID (global cell identifier) of this cell. If sufficient time is available before handover to the NodeB 2A occurs, the GCID and (possibly) other information is transmitted as cell information, using transmitter 24, to eNB 1A where it is received by receiver 13. Updater 14 may be used to update NCL-1A by adding wireless access node NodeB 2C, as illustrated. The other information may e.g. comprise location information of the mobile terminal 3, obtained using GPS module 25, when the scanning for available cells was performed.

However, time may be insufficient to complete the cell information gathering process and transmission of the cell information via the currently serving cell prior to handover. The GCID of NodeB 2C may then be stored as cell information CI in storage 22. User terminal 3 may then be handed over to NodeB 2A and transmission of the cell information CI may be performed using transmitter 24 to transmit the cell information CI to receiver 13 of NodeB 2A.

The cell information CI revealing the existence of NodeB 2C, i.e. the cell thereof, as an appropriate neighbour cell may be used for updating NCL-2A (for which the cell of NodeB 2C can be called a 'missing neighbour', since it was not present in NCL-2A) and for updating NCL-1A via a connection between the first wireless access network and the second wireless access network transporting cell information CI or a derivative thereof. This connection is indicated by the dashed arrow A in FIG. 2 and may e.g. be implemented using the OMC-2 and OMC-1 presented in FIG. 1.

Instead of or in addition to obtaining and reporting cell information of the second wireless access network, the mobile user terminal 3 may obtain cell information related to the first wireless access terminal. Reference is made to FIGS. 3A and 3B for an example of this.

In order to aid the automated optimisation of inter-network NCL, in one embodiment of the presented invention as illustrated in FIGS. 3A and 3B, an active terminal 3, just before making a handover from network A to network B, takes a snapshot of the pilot channel strengths it sees in network A, indicated by the measurement report. The terminal 3 performs a global scan and does not limit itself to considering only cells on the current NCL in order to identify potential cell candidates for adoption in the existing NCLs. Once the handover to network B is completed, user terminal 3 reports this snapshot to the new serving cell in network B. The new serving cell in network B can combine this report with other equivalent reports obtained from other handed-over terminals, in order to periodically optimise its inter-network NCL. The intra-network NCL of the originally serving cell may be updated as well by making the obtained cell information available to this cell using a connection between the wireless access networks.

FIGS. 4A and 4B provide another representation of an embodiment already discussed with reference to FIG. 2. The active terminal, just before making a handover from network A to network B, takes a snapshot of the pilot channel strengths it sees in network B, reports this to its source cell in network A (if sufficient time is available) and then undergoes the handover to the target cell in network B. Equivalently to the above description, now the source cell in network A can use these reports to self-optimise its inter-network NCL. The advantage of the second embodiment is that the cell in which the NCL is updated is in accordance with the direction of mobility. In other words, user motion from a source cell in network A to a target cell in network B makes use of the NCL in the source cell and hence the snapshot information generated at its handover can be used to update the NCL in the source cell. This advantage is primarily relevant in regions where inter-cell mobility is asymmetric. This is relevant when the operator favours one network over another for providing one or more particular services. This is also relevant in the case where mobility predominantly occurs in one direction (e.g. a one-way street).

Again, the cell information may also be stored using storage 22 and be transmitted to wireless access network A via wireless access network B. Also, the cell information of network B may be relevant for updating the intra-network NCL of the cell of this network.

The cell information CI (e.g. measurement reports) are periodically, or upon observed need, processed in each cell (access node) in order to re-optimise the inter-network NCL. This can be done by ranking all reported global cell IDs based on some weighted combination of the relative frequency at which they are reported and the associated pilot power strengths. This ranked list can then be combined with the actual handover statistics, as this indicates to what extent existing inter-network neighbour relations are actually used.

In an embodiment, a significant part of the processed reports of the mobile user terminals 3 (e.g. say more than 30% of the reported measurements) indicates a Cell ID with sufficient pilot (beacon) quality which is not included in the current inter-network NCL. Then this Cell ID should be added in the NCL.

Another example includes the case where an insignificant part of the processed UE reports (e.g. less than 1%) indicates a Cell ID with sufficient pilot (beacon) quality which is already included in the NCL. Then, this Cell ID should be removed from the NCL. Additionally, a listed neighbour to which hardly ever inter-network handover takes place, may be a candidate for removal from the NCL.

Additions or removals of cells in Network A and Network B may automatically be reflected in the ranking of the Cell IDs with sufficient pilot (beacon) strengths that are reported by the UEs. Consequently, these cells are then automatically added or removed from the NCL and no manual configuration is necessary.

As an alternative to optimising NCLs for each network separately, in an embodiment a single integrated NCL in each cell, containing cells both in the same network and in other (cooperative) networks, and both on the same carrier and differ-

ent carriers is automatically optimised. It is noted that optimisation of such an integrated list may then also implicitly involve a ranking of networks and carriers for potential adoption in the NCL (and possibly even for potential handovers).

One embodiment of the invention may be implemented as a program product for use with a computer system. The program(s) of the program product define functions of the embodiments (including the methods described herein) and can be contained on a variety of computer-readable storage media. Illustrative computer-readable storage media include, but are not limited to: (i) non-writable storage media (e.g., read-only memory devices within a computer such as CD-ROM disks readable by a CD-ROM drive, flash memory, ROM chips or any type of solid-state non-volatile semiconductor memory) on which information is permanently stored; and (ii) writable storage media (e.g., floppy disks within a diskette drive or hard-disk drive or any type of solid-state random-access semiconductor memory) on which alterable information is stored.

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*[Continued on next page]*

(54) Title: SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

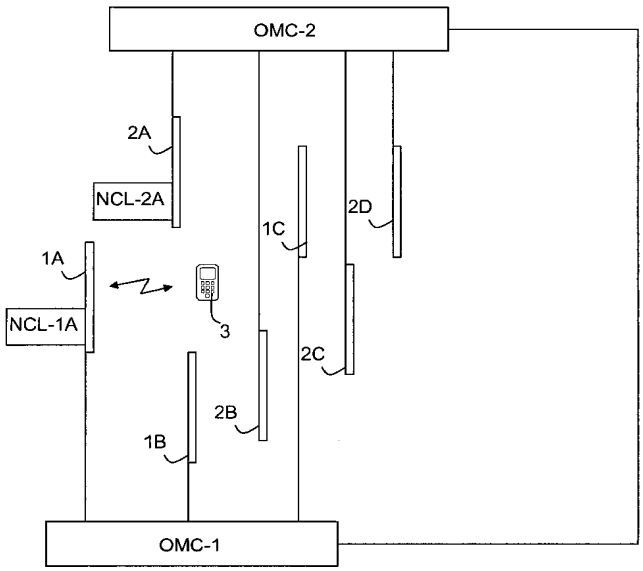


FIG. 1

(57) Abstract: The invention relates to a system and method for updating a neighbour cell list of a wireless access node. User terminals to be to be transferred from a first wireless access node of a first wireless access network to a second wireless access node of a second wireless access network are detected. From the first wireless access node, one or more of the detected user terminals are requested to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The cell information is received from the one or more of the detected user terminals and at least one of the first neighbour cell list and the second neighbour cell list is updated using the received cell information.

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We are submitting herewith the following attached items and information:

- Transmittal Letter (Form PTO-1390) to the DO/EO/US concerning a PCT-U.S. National Stage filing under 35 U.S.C. 371 (4 pages)
- Authorization to charge Deposit Account 50-5047 in the amount of $ 1120.00 to pay the filing fee for large entity
- Incorporation by Reference herein in its entirety: *The entire disclosure of the prior application, PCT/EP2010/064823, filed October 5, 2010, and published April 14, 2011 as WO 2011/042433 A1 is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein in its entirety*
- Copy of International Application No. PCT/EP2010/064823 as published (Int'l Publ. No. WO 2011/042433A1), including specification (25 pages and a cover page (2 pages) including abstract, 14 claims), 4 sheets of drawings, and International Search Report (3 pages)
- Information Disclosure Statement (2 pages), Form PTO/SB/08a, and copies of cited references (4)
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# TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

| ATTORNEY'S DOCKET NUMBER | |
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| U.S. APPLICATION NO. (If known, see 37 CFR 1.5) | |

| INTERNATIONAL APPLICATION NO. | INTERNATIONAL FILING DATE | PRIORITY DATE CLAIMED |
|---|---|---|
| PCT/EP2010/064823 | October 5, 2010 | October 7, 2009 |

TITLE OF INVENTION
SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ...

APPLICANT(S) FOR DO/EO/US
OOSTVEEN, Job Cornelis

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☑ This is a **FIRST** submission of items concerning a submission under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a submission under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☑ The US has been elected (Article 31).
5. ☑ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☑ is attached hereto (required only if not communicated by the International Bureau).
   b. ☐ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☐ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

**Items 11 to 20 below concern document(s) or information included:**

11. ☑ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☑ A preliminary amendment.
14. ☑ An Application Data Sheet under 37 CFR 1.76.
15. ☐ A substitute specification.
16. ☐ A power of attorney and/or change of address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.3 and 37 CFR 1.821- 1.825.
18. ☐ A second copy of the published International Application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).

| U.S. APPLICATION NO. (if known, see 37 CFR 1.5) | INTERNATIONAL APPLICATION NO. | ATTORNEY'S DOCKET NUMBER |
|---|---|---|
| | PCT/EP2010/064823 | US17827 |

20. Other items or information:

| The following fees have been submitted | CALCULATIONS | PTO USE ONLY |
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| 21. ☑ Basic national fee (37 CFR 1.492(a))..... **$380** | $ 380 | |
| 22. ☑ Examination fee (37 CFR 1.492(c))<br>If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4)..... **$0**<br>All other situations..... **$250** | $ 250 | |
| 23. ☑ Search fee (37 CFR 1.492(b))<br>If the written opinion of the ISA/US or the International preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4)..... **$0**<br>Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority..... **$120**<br>International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB..... **$490**<br>All other situations..... **$620** | $ 490 | |
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| CLAIMS | NUMBER FILED | NUMBER EXTRA | RATE | | |
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| Total claims | - 20 = | | x $ **60** | $ | |
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| MULTIPLE DEPENDENT CLAIM(S) (if applicable) | | | + **$450** | $ | |
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| Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property + | | | | $ | |
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62,119
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**Declarations under Rule 4.17**:

*[Continued on next page]*

(54) Title: SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

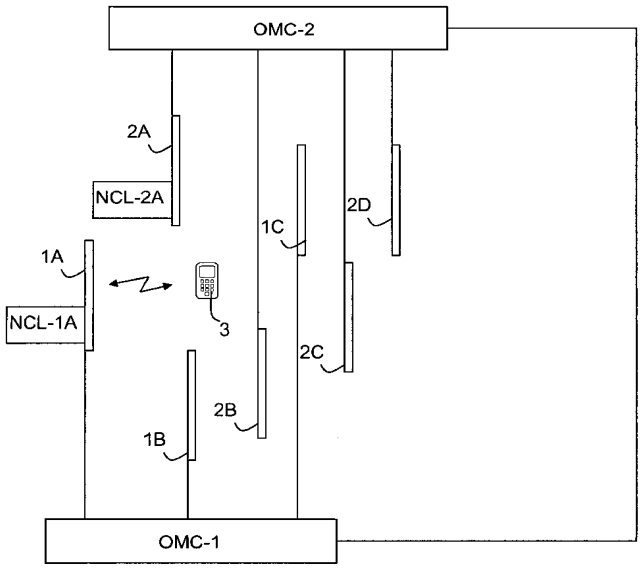


FIG. 1

(57) Abstract: The invention relates to a system and method for updating a neighbour cell list of a wireless access node. User terminals to be to be transferred from a first wireless access node of a first wireless access network to a second wireless access node of a second wireless access network are detected. From the first wireless access node, one or more of the detected user terminals are requested to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The cell information is received from the one or more of the detected user terminals and at least one of the first neighbour cell list and the second neighbour cell list is updated using the received cell information.

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**Published**:

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# SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

## FIELD OF THE INVENTION

The invention relates to the field of telecommunications systems and a method in telecommunications architecture. More specifically, the invention relates to a telecommunications architecture comprising at least a first and a second wireless access network between which user terminals can be transferred and a method in such a telecommunications system, wherein the neighbour cell lists (NCLs) of at least a wireless access node of the first and/or second wireless access network can be updated using a system.

## BACKGROUND OF THE INVENTION

When moving through the coverage area of a wireless access cellular network, mobile user terminals continuously scan the spectrum for pilot or reference signals (beacons) in order to determine which cell (base station) to camp on. In idle mode, this is referred to as cell reselection, while in active/dedicated mode, this is referred to as handover. The cell-specific list of surrounding cells that are considered for cell reselection or handover is called the neighbour cell list (NCL), which is stored in each base station and broadcast within the cell. The mobile user terminal receives and stores the NCL. The NCL contains the cells for which the mobile user terminal should send measurement reports (when certain criteria are met) to the base station currently serving the user terminal.

In case of multiple, cooperating wireless access cellular networks, each cell not only has an intra-network NCL, but also an inter-network NCL.

The optimisation of the NCLs is traditionally done with the aid of off-line planning tools, using path loss predictions and (off-line) optimisation algorithms. Currently, automated configuration and optimisation of intra-network NCLs and inter-network NCLs, based on e.g. actual measurement feedback from

user terminals, observed mobility patterns, base station scans and handover statistics, are being investigated.

3GPP TS 36.300, V8.9.0, discloses an automatic neighbour relation (ANR) function to relieve an operator from the burden of manually managing neighbour relations. Such an ANR function resides in the eNode-B (eNB) of an LTE network and manages a conceptual neighbour relation table (NRT). A neighbour detection function is used to find new neighbours and to add them to the NRT, whereas a neighbour removal function removes outdated neighbours from the NRT. The eNB instructs a user terminal from a serving cell to look for neighbour cells of other networks by scanning all cells. The user terminal first reports the physical cell identifier (PCI) of the detected cells in the other network. When the eNB receives the reports from the user terminals containing the PCI's of the cells, the eNB instructs the user terminal, using the newly discovered cell as a parameter, to read the Cell Global Identifier (CGI) and further cell information from the neighbouring cells. The user terminal also reports this information to the serving cell. The eNB may then update the NRT using the information reported from the user terminals.

SUMMARY OF THE INVENTION

A system is disclosed for a telecommunications architecture that comprises a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined.

The system comprises a detector configured for detecting user terminals about to be transferred, i.e. for which cell reselection or handover will be performed, from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network.

The system also comprises a request generator configured for requesting from the first wireless access node one or

more of the detected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The telecommunications system, particularly at least one of the first and the second wireless access node, also comprises a receiver configured for receiving the cell information from one or more of the detected user terminals. Updating means are provided configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

A method in a telecommunications architecture is also disclosed. User terminals about to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network are detected. From the first wireless access node, one or more of the detected user terminals are requested to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The cell information is received from one or more of the detected user terminals and at least one of the first neighbour cell list and the second neighbour cell list is updated using the received cell information.

Furthermore, a mobile user terminal containing at least one neighbour cell list of the first wireless access node is disclosed. The terminal comprises a receiver for receiving the request for reporting cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The mobile terminal also contains scanning means configured for detecting the cell information from the wireless access nodes, at least one of the wireless access nodes being absent in the neighbour cell list, and a transmitter for transmitting the detected cell information. At present, standardization does not allow mobile terminals to measure cells not present in the NCL. However, there are no intrinsic obstacles for making performing such measurements. The mobile terminal is arranged for temporarily storing the detected cell information and transmitting the de-

tected cell information to the second wireless access node after being transferred from the first to the second wireless access network.

It is noted that in the present application the terms wireless access node and cell are used as similar terms. The skilled person will appreciate that a single wireless access node may provide multiple cells and that, typically, a neighbour cell list is defined for each of the cells of such a node.

The plurality of wireless access nodes of which cell information is requested may exclude the first wireless access node, or more particularly, the cell thereof currently serving the user terminal. On the other hand, the plurality of wireless access nodes would typically include cells that are absent in the neighbour cell list stored in the user terminal for regularly reporting measurement reports to the serving cell. Otherwise, since the neighbour cell list is obtained from the serving cell, the detection of the cell information by the user terminal would be restricted to this list and would therefore only be suitable for verifying the existing NCL and not for adding new neighbouring cells to the list. In an embodiment, the user terminal performs a complete scan for all cells in the first wireless access network (possibly excluding the currently serving cell) and/or all cells in the second wireless access network to allow the telecommunications system to obtain a complete picture of the available cells around the first wireless access node. This complete information containing the scan of all cells may then be used for updating the NCL(s). Alternatively, the user terminal may compare the received complete information with the NCL it has obtained from the first wireless access node and only report cell information of cells not present on the current NCL.

The first and second wireless access networks may differ in radio access technology (e.g. GSM and UMTS or UMTS and LTE), the deployed release of a given radio access technology, the used frequency spectrum (e.g. the 900 MHz and 1800 MHz frequency bands (the latter also being referred to as a DCS network) for GSM, different 5MHz carriers for UMTS) and/or wire-

less access networks of different mobile operators. The wireless access network may also differ in the type of cells provided, e.g. macro cells and pico cells.

The disclosed system and method are able to specifically direct the request for cell information for the first and/or second network to user terminals in the regions where cell reselection or handover from the first to the second wireless access network is about to occur. By collecting this information specifically at cell reselection or handover moments, the updating of the NCL is inherently based on the inter-network neighbours that a user terminal experiences in the cell reselection or handover region, where the reports of the user terminal measurements are most relevant for construing the NCL.

In some instances, user terminals may move rapidly through an area and cell reselection and handover to the second wireless access network should be performed quickly. In such cases, insufficient time may be available for performing the scan for obtaining the cell information for the first wireless access network and for reporting the cell information to the telecommunications system via the first wireless access network. The embodiments of the invention as defined in claims 2 and 10 provide additional time for completing the method by performing the cell reselection or handover as soon as the mobile user terminal has been instructed for performing the scan for cell information for the first and/or the second wireless access network. By temporarily storing the cell information resulting from the scan at the mobile user terminal, the user terminal may carry the cell information to the second network where it has sufficient time to report the cell information of the plurality of wireless access nodes of the first wireless access network via the second network.

The cell information of the wireless access nodes of the first wireless access network may be used for updating the neighbour cell list of the first wireless access node and/or for updating the neighbour cell list of the second wireless access node, or the cells thereof.

The updating of the neighbour cell list of the second wireless access node is relevant for user terminals reselecting cells or handed over from the second wireless access node to the first wireless access network, i.e. in the cell reselection or handover direction reverse to the direction travelled by the terminals reporting the cell information. Since other user terminals will be transferred from the second wireless access network to the first wireless access network, the neighbour cell list of the first wireless access node may also be updated in this way.

The cell information of the plurality of access nodes of the first wireless access network as received via the second wireless access node may also be transferred back to the first wireless access node, e.g. for updating the intra-network neighbour cell list, as defined in claim 3 and, optionally, in claim 10. In a particular example, this embodiment may be used to reduce the so-called 'missing neighbour' effect in a UMTS network, here being the first wireless access network. User terminals equipped to connect to UMTS networks are restricted to gathering cell information as defined in the neighbour cell list received from the base station currently serving the user terminal. An absent cell in the neighbour cell list of the base station will thus never be measured and reported by the user terminal as a result of this restriction of the user terminal. When the signal of a missing neighbour is too strong, call drops may occur. The present embodiments may reduce this problem by instructing the user terminals to also scan for cell information of wireless access nodes of the UMTS network being absent in the neighbour cell list (and thus possibly revealing the existence of cells not present in the neighbour cell list of the base station) and to report this via the second wireless access network back to the first wireless access node. The NCL of the first wireless access node may then be updated with the missing neighbour cell.

The user terminals may also be instructed to obtain the cell information of the plurality of wireless access nodes of the second wireless access network shortly before cell reselec-

tion or handover to the second wireless access node of this network and report the cell information to the telecommunications system via this second wireless access node, i.e. after cell reselection or handover. This embodiment is defined in claims 4 and 11.

Again, the cell information of the wireless access nodes of the second wireless access network may be used for updating the neighbour cell list of the first wireless access node and/or for updating the neighbour cell list of the second wireless access node. The cell information obtained for the access nodes of the second wireless access network may be relevant for the second wireless access network itself, e.g. for updating the intra-network NCL, in view of the 'missing neighbour' effect occurring in particular types of network such as UMTS, as discussed above for the first wireless access network.

The cell information of the plurality of access nodes of the second wireless access network as received via the second wireless access node may be transferred back to the first wireless access node as defined in claim 5 and, optionally, in claim 11. In doing so, the first wireless access node may update its neighbour cell list using the received cell information obtained shortly before cell reselection or handover, even when the user terminals have insufficient time for reporting the cell information for the plurality of wireless access nodes of the second wireless access network directly to the first wireless access node. The updated NCL is relevant for cell reselection or handover from the first wireless access node to the second wireless access network for other user terminals.

Of course, when sufficient time for reporting the cell information of the plurality of wireless access nodes of the second network is available, this cell information obtained shortly before cell reselection or handover to the second wireless access network can be reported directly to the first wireless access node, as defined in the embodiments of claims 6 and 12.

It is not required that all handover or cell reselection instances trigger a scan for cell information by the user

terminals. A wireless access node may for instance indicate on its broadcast channel not only whether handovers and/or cell re-selections should trigger such reporting, but also a likelihood parameter which the terminal can use to flip a (biased) coin in determining whether it should send cell information at a specific handover or cell reselection instance. Alternatively, the wireless access node may explicitly signal to the specific user terminal whether it should do the cell measurement and reporting. In this manner, the amount of cell information reporting can be tuned, which relates to a trade-off between the measurement overhead (signalling load) and the potential for neighbour cell list optimisation.

One embodiment of tuning the amount of cell list optimisation traffic is to use the location information from the user terminals as a selection criterion as defined in claim 7. The location information may e.g. be obtained from a GPS module in the user terminal or by means of measurements using the first and/or the second wireless access network. This location information can be useful e.g. in identifying where handover regions exist, and in solving location-specific outages or problems, e.g. dropped calls due to 'missing neighbour'. It may also be useful when an operator changes configuration (optimisation of downlink power, antenna tilt, etc) and wants to measure the effect on the cells relevant for inter-RAT cell change or handover.

Another advantageous selection criterion for determining which user terminals should report cell information is the transfer threshold that may have been set by the operator(s) of the telecommunication system, as defined in claim 8. The transfer threshold determines at what level (typically involving pilot signal measurements) cell reselection or handover would occur. The transfer threshold for cell reselection or handover from the first wireless access network to the second wireless access network may be asymmetric (i.e. a different transfer threshold Th2 applies for a transfer from the second to the first wireless access network) and may also be dependent on the service type of the service received by the user terminal when

connected to the first wireless access node. As an example, a user terminal provided with a voice service by a cell of an LTE network that is handed over to a GSM network might not be handed over back to the LTE network. This is because the operator chooses this mode of operation. In such a case, although this user terminal is a detected user terminal in the sense that it is about to be transferred to the second wireless access network (GSM), it is not selected for reporting requested to report cell information of the plurality of wireless access nodes of the first wireless access network (the LTE network), since the hand-over in the direction back to the first network (the LTE network) will generally not be made. On the other hand, for a user terminal using a data service that is temporarily handed over from an LTE network to a GSM network, a handover back to the LTE network is generally preferred and such user terminals can be selected to report cell information of the plurality of wireless access nodes of the second network. The embodiment of the telecommunications system of claim 8 may also be used for the method in the telecommunications system as defined in claims 10-13.

Hereinafter, embodiments of the invention will be described in further detail. It should be appreciated, however, that these embodiments may not be construed as limiting the scope of protection for the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 provides a schematic illustration of a telecommunication system comprising a first and a second wireless access network, each having a plurality of wireless access nodes, according to an embodiment of the invention;

FIG. 2 provides a schematic illustration of a mobile user terminal and wireless access nodes configured for performing a method according to an embodiment of the invention;

FIGS. 3A and 3B provide a schematic illustration of a telecommunications system and a flow chart for operating such a system, wherein cell information of wireless access nodes of the

first wireless access network is obtained and reported via the second wireless access network; and

FIGS. 4A and 4B provide a schematic illustration of a telecommunications system and a flow chart for operating such a system, wherein cell information of wireless access nodes of the second wireless access network is obtained and reported via the first wireless access network.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of first wireless access nodes 1A-1C of a first wireless access network and second wireless access nodes 2A-2D of a second wireless network. As an example, the first wireless access nodes 1A-1C are eNBs of an Long Term Evolution (LTE) network, whereas the second wireless access nodes 2A-2D are NodeBs of an UMTS network. Other examples includes wireless access networks differing in other radio access technologies (RATs), e.g. GSM and UMTS, differences in the deployed release of a given radio access technology, differences in the used frequency spectrum (e.g. the 900 MHz and 1800 MHz frequency bands (the latter also being referred to as a DCS network) for GSM, different 5MHz carriers for UMTS) and/or wireless access networks of different mobile operators. The wireless access network may also differ in the type of cells provided, e.g. macro cells and pico cells.

The wireless access nodes 1A-1C and 2A-2D can be controlled by control systems as schematically illustrated in FIG. 1. As an example, the control system may be Operation and Maintenance Centres (OMCs) as generally known in the art. The OMCs of the wireless access networks can be interconnected. Other connections between the wireless access networks can be used as well. If the wireless access nodes of the first and second wireless access networks originate from the same vendor, a single OMC can be used.

Each of the wireless access nodes 1A-1C and 2A-2D may contain at least one neighbour cell list (NCL). In FIG. 1, NCL-1A and NCL-2A are indicated as NCL of the corresponding wireless

access nodes. When a wireless access node provides multiple cells, typically each cell has a corresponding NCL.

A wireless access node broadcasts the NCL and mobile user terminals 3 camping on such a cell receive and store the NCL. The NCL is typically used to instruct the mobile terminal 3 which cells to monitor and to report every now and then the received signal strengths of each of the monitored cells, such that the network can make a decision whether or not the mobile terminal 3 should select or should be handed over to another cell.

As an example, the mobile terminal 3 receives the NCL-1A from wireless access node 1A to which it is currently connected. NCL-1A contains the cell(s) of neighbouring access nodes 1B and 1C and mobile terminal 3 monitors the signal strengths of these cells and reports these to the wireless access node 1A. Such an NCL-1A is referred to as an intra-network NCL. NCL-1A may also list neighbouring access nodes 2A and 2B of the second wireless access network, in which case NCL-1A would be referred to as an inter-network NCL. NCL-1A may also be a combined NCL, i.e. a combination of an intra-network and an inter-network NCL. Currently, automated configuration and optimisation of intra-network NCLs and inter-network NCLs is based on e.g. actual measurement feedback from user terminals 3 as disclosed in 3GPP TS 36.300, V8.9.0.

Referring also to FIG. 2, an embodiment will now be described in further detail, wherein intra-network NCL-1A contains the cells of eNBs 1B and 1C and inter-network NCL-1A contains the cells of NodeBs 2A and 2B. Note that inter-network NCL-1A does not yet contain NodeBs 2C and 2D.

Mobile user terminal 3 is assumed to camp on a cell of eNB 1A and is monitoring the cells of eNB's 1B, 1C and NodeBs 2A and 2B as indicated in the intra-network and inter-network NCLs transmitted in the cell under consideration. The mobile user terminal 3 regularly sends measurement reports to the eNB 1A as generally known in the art.

As illustrated schematically in FIG. 2, eNB 1A contains a cell reselection/handover detector 10 that recognizes that mo-

bile terminal 3 requires a cell reselection or handover to NodeB 2A of the second wireless access network. The cell reselection or handover indication triggers the following sequence of events in eNB 1A.

First, it may be determined whether or not the mobile terminal 3 for which a cell reselection or handover indication is received should participate, i.e. should be selected, in the process for updating (which includes the verification of the correctness) of an NCL, such as NCL-1A or NCL-2A. To that end, the eNB 1A contains a selection module 11 for selecting a part of the user terminals 3 for which a cell reselection or handover indication is detected. In this manner, it is possible to filter an appropriate portion the user terminals for which cell reselection or handover is about in order to reduce unnecessary signalling over the first and/or second wireless access network. The decision whether or not to participate in the updating process, i.e. whether or not to provide information to the telecommunication system allowing the updating of the NCL's, may either be taken at the mobile terminal or at the telecommunications system, particularly eNB 1A.

As an example, eNB 1A may indicate on its broadcast channel not only whether handovers and/or cell reselections should trigger such reporting, but also a likelihood parameter which the terminal 3 can use to flip a biased coin in determining whether it should send information at a specific handover or cell reselection instance. Alternatively, eNB 1A may explicitly signal to the specific user terminal 3 whether it should do the cell measurement and reporting. In this manner, the amount of cell information reporting can be tuned, which relates to a trade-off between the measurement overhead (signalling load) and the potential for neighbour cell list optimisation.

An advantageous selection criterion at the side of the eNB 1A for determining which user terminals 3 should report cell information is the transfer threshold that may have been set by the operator(s) of the telecommunications system between the first and the second wireless access networks. The transfer threshold determines at what level (typically involving pilot

signal measurements) cell reselection or handover would occur. The transfer threshold Th1 for cell reselection or handover from the first wireless access network to the second wireless access network may be asymmetric (i.e. a different transfer threshold Th2 applies for a transfer from the second to the first wireless access network) and may also be dependent on the service type of the service enjoyed by the user terminal when connected to the first wireless access node.

In FIG. 1, the user terminal 3 camping on a cell of eNB 1A of an LTE network using a data service that is about to be handed over to NodeB 2A of an UMTS network will generally be handed over back to the LTE network, if possible, because the operator applies a low threshold for handing over the user terminal 3 from the UMTS network to the LTE network for data services but a much higher threshold for handing over the user terminal to the UMTS network. In such a case, since a transfer between the networks is more likely in one direction than in the other, the terminal 3 may or may not be selected for providing information useful for the NCL updating process as will now be described in further detail.

The selection stage of user terminals 3 may be omitted completely or may be selectively applied, e.g. during particular hours of the day or at particular stages of the configuration and optimisation of the network.

Once user terminal 3 has been selected, request generator 12 in FIG. 2 is activated in order to request the user terminal 3 to report cell information of a plurality of wireless access nodes.

The plurality of wireless access nodes of which cell information is requested may exclude the cell of eNB 1A currently serving the user terminal 3. On the other hand, the plurality of wireless access nodes would typically include cells that are absent in the neighbour cell list NCL-1A stored in the user terminal 3 for regularly reporting measurement reports to the serving cell. In the example of FIG. 1, the cell information requested would typically include cell information of at least one of the cells NodeB 2C or NodeB 2D. In other words, the user

terminal 3 should at least monitor other cells than included in the neighbour cell list NCL-1A.

The user terminal 3, to that end, contains a receiver 20 (see FIG. 2) for receiving the request for reporting cell information of a plurality of wireless access nodes. The actual determination for which cells the cell information should be obtained and/or should be reported may be performed in the eNB 1A (and than being signalled to the user terminal 3) and/or internally in the user terminal 3.

When the updating of e.g. NCL-1A would only involve the determination whether additional cells should be included in the list, cell information may only be obtained for the cells of NodeB 2C and NodeB 2D. NCL-1A may be used to determine which cell(s) should be excluded for the gathering of cell information for the purpose of updating the NCL in such a case. However, when NCL-2A should be updated, the cells listed in NCL-1A should not necessarily be excluded.

On the other hand, if the NCL updating is also used to verify the existing NCL, cell information for one or more cells of the existing NCL should be gathered as well. In a particular embodiment, user terminal 3 comprises a determination module 21 for determining for which cells the cell information for the purpose of the NCL update should be gathered. As mentioned, the determination by the determination module 21 may be fully based on instructions received from the wireless access node eNB 1A or may be (partly) based on an internal comparison algorithm of the user terminal 3, using the copy of NCL-1A stored in a section of storage 22. The stored NCL may also be applied (illustrated by the arrow between scanning module 23 and determination module 21) after detecting (a part of) the cell information of all the available cells, as will be explained in further detail below.

The gathering of cell information for the purpose of updating an NCL may also be performed independently of the NCL stored in the user terminal 3. In such a case, the user terminal 3 preferably gathers cell information of all measurable cells.

The measurement is performed by a scanning module 23. The scanning module 23 detects the cell information of one or

more cells of wireless access nodes of the first and/or the second wireless access network.

The user terminal 3 is configured for storing the obtained cell information CI, or a derivative thereof, in a section of the storage means 22. While NCL-1A is normally erased from the storage means 22 after cell reselection or handover (in order to store the NCL of the new cell), the cell information remains stored for at least a particular period after the cell reselection or handover in order to transmit the cell information CI to the telecommunications system via the new cell using transmitter 24.

After cell reselection or handover to a cell of NodeB 2A, the transmitter 24 transmits the cell information CI, obtained while camping on the cell of eNB 1A, to a receiver 13 of NodeB 2A. Receiver 13 forwards the cell information to an updater 14 configured for updating (including verification) of the NCL-2A using the cell information CI.

When sufficient time is available, the mobile user terminal 3 may also transmit the cell information CI to the first wireless access network, particularly eNB 1A, in order to e.g. update NCL-1A, prior to cell reselection or handover to NodeB 2A. This transmission is shown by the dashed arrow from transmitter 23 towards eNB 1A.

In a particular example, a request is sent from request generator 12 to user terminal 3 to obtain cell information of the second wireless access network when user terminal is about to be handed over to this network. First, user terminal 3, using scanning means 23 detects as many PCI's (physical cell identifiers) as possible. As an example, the PCI's of the cells of nodes 2A-2D are detected. The PCI's are generally transmitted on a specialized channel (a pilot channel for UMTS). Using NCL-1A stored in storage 22 and determination module 21, the PCI's of NodeB 2A and NodeB 2B are omitted from the further processing, since these are already present in NCL-1A. The scanning means then detects the signal strengths of the pilot channel of the remaining cells identified by the PCI's of NodeB 2C and NodeB 2D. It may turn out that the signal strength for the cell of

NodeB 2D is too low and, therefore, determination module 21 also omits further processing for cell NodeB 2D.

Subsequently, the scanning means tunes to the broadcast channel BCH of the cell of NodeB 2C and detects the GCID (global cell identifier) of this cell. If sufficient time is available before handover to the NodeB 2A occurs, the GCID and (possibly) other information is transmitted as cell information, using transmitter 24, to eNB 1A where it is received by receiver 13. Updater 14 may be used to update NCL-1A by adding wireless access node NodeB 2C, as illustrated. The other information may e.g. comprise location information of the mobile terminal 3, obtained using GPS module 25, when the scanning for available cells was performed.

However, time may be insufficient to complete the cell information gathering process and transmission of the cell information via the currently serving cell prior to handover. The GCID of NodeB 2C may then be stored as cell information CI in storage 22. User terminal 3 may then be handed over to NodeB 2A and transmission of the cell information CI may be performed using transmitter 24 to transmit the cell information CI to receiver 13 of NodeB 2A.

The cell information CI revealing the existence of NodeB 2C, i.e. the cell thereof, as an appropriate neighbour cell may be used for updating NCL-2A (for which the cell of NodeB 2C can be called a 'missing neighbour', since it was not present in NCL-2A) and for updating NCL-1A via a connection between the first wireless access network and the second wireless access network transporting cell information CI or a derivative thereof. This connection is indicated by the dashed arrow A in FIG. 2 and may e.g. be implemented using the OMC-2 and OMC-1 presented in FIG. 1.

Instead of or in addition to obtaining and reporting cell information of the second wireless access network, the mobile user terminal 3 may obtain cell information related to the first wireless access terminal. Reference is made to FIGS. 3A and 3B for an example of this.

In order to aid the automated optimisation of inter-network NCL, in one embodiment of the presented invention as illustrated in FIGS. 3A and 3B, an active terminal 3, just before making a handover from network A to network B, takes a snapshot of the pilot channel strengths it sees in network A, indicated by the measurement report. The terminal 3 performs a global scan and does not limit itself to considering only cells on the current NCL in order to identify potential cell candidates for adoption in the existing NCLs. Once the handover to network B is completed, user terminal 3 reports this snapshot to the new serving cell in network B. The new serving cell in network B can combine this report with other equivalent reports obtained from other handed-over terminals, in order to periodically optimise its inter-network NCL. The intra-network NCL of the originally serving cell may be updated as well by making the obtained cell information available to this cell using a connection between the wireless access networks.

FIGS. 4A and 4B provide another representation of an embodiment already discussed with reference to FIG. 2. The active terminal, just before making a handover from network A to network B, takes a snapshot of the pilot channel strengths it sees in network B, reports this to its source cell in network A (if sufficient time is available) and then undergoes the handover to the target cell in network B. Equivalently to the above description, now the source cell in network A can use these reports to self-optimise its inter-network NCL. The advantage of the second embodiment is that the cell in which the NCL is updated is in accordance with the direction of mobility. In other words, user motion from a source cell in network A to a target cell in network B makes use of the NCL in the source cell and hence the snapshot information generated at its handover can be used to update the NCL in the source cell. This advantage is primarily relevant in regions where inter-cell mobility is asymmetric. This is relevant when the operator favours one network over another for providing one or more particular services. This is also relevant in the case where mobility predominantly occurs in one direction (e.g. a one-way street).

Again, the cell information may also be stored using storage 22 and be transmitted to wireless access network A via wireless access network B. Also, the cell information of network B may be relevant for updating the intra-network NCL of the cell of this network.

The cell information CI (e.g. measurement reports) are periodically, or upon observed need, processed in each cell (access node) in order to re-optimise the inter-network NCL. This can be done by ranking all reported global cell IDs based on some weighted combination of the relative frequency at which they are reported and the associated pilot power strengths. This ranked list can then be combined with the actual handover statistics, as this indicates to what extent existing inter-network neighbour relations are actually used.

In an embodiment, a significant part of the processed reports of the mobile user terminals 3 (e.g. say more than 30% of the reported measurements) indicates a Cell ID with sufficient pilot (beacon) quality which is not included in the current inter-network NCL. Then this Cell ID should be added in the NCL.

Another example includes the case where an insignificant part of the processed UE reports (e.g. less than 1%) indicates a Cell ID with sufficient pilot (beacon) quality which is already included in the NCL. Then, this Cell ID should be removed from the NCL. Additionally, a listed neighbour to which hardly ever inter-network handover takes place, may be a candidate for removal from the NCL.

Additions or removals of cells in Network A and Network B may automatically be reflected in the ranking of the Cell IDs with sufficient pilot (beacon) strengths that are reported by the UEs. Consequently, these cells are then automatically added or removed from the NCL and no manual configuration is necessary.

As an alternative to optimising NCLs for each network separately, in an embodiment a single integrated NCL in each cell, containing cells both in the same network and in other (cooperative) networks, and both on the same carrier and differ-

ent carriers is automatically optimised. It is noted that optimisation of such an integrated list may then also implicitly involve a ranking of networks and carriers for potential adoption in the NCL (and possibly even for potential handovers).

One embodiment of the invention may be implemented as a program product for use with a computer system. The program(s) of the program product define functions of the embodiments (including the methods described herein) and can be contained on a variety of computer-readable storage media. Illustrative computer-readable storage media include, but are not limited to: (i) non-writable storage media (e.g., read-only memory devices within a computer such as CD-ROM disks readable by a CD-ROM drive, flash memory, ROM chips or any type of solid-state non-volatile semiconductor memory) on which information is permanently stored; and (ii) writable storage media (e.g., floppy disks within a diskette drive or hard-disk drive or any type of solid-state random-access semiconductor memory) on which alterable information is stored.

## CLAIMS

1. A system for updating a neighbour cell list in a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined, the system comprising:

- a detector configured for detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;

- a selector configured for selecting a part of the user terminals;

- a request generator configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

- a receiver configured for receiving the cell information from the one or more of the selected user terminals; and

- updating means configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

2. The system according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the first wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless nodes of the first wireless access network via the second wireless access node,

the system further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the first wireless access network via the second wireless access node.

3. The system according to claim 2, further comprising a data transfer system for transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node.

4. The system according to one or more of the preceding claims,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node,

the system further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node.

5. The system according to claim 4, further comprising a data transfer system for transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

6. The infrastructure according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node

further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

7. The system according to one or more of the preceding claims, wherein the telecommunications system is further configured for receiving location information from one or more of the detected user terminals and wherein the location information is used as a selection parameter for selecting the part of the detected user terminals.

8. The system according to one or more of the preceding claims , wherein one or more thresholds, possibly service-dependent, are defined in the telecommunications system for transferring the user terminals between the first wireless access network and the second wireless access network and wherein at least one of the thresholds is used as a selection parameter for selecting the part of the detected user terminals.

9. In a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is

defined, a method for updating at least one of the first and second neighbour cell lists comprising the steps of:

- detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;

- selecting a part of the user terminals;

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

- receiving the cell information from the one or more of the selected user terminals; and

- updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

10. The method according to claim 9, comprising the steps of:

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the first wireless access network;

- receiving the cell information of the wireless nodes of the first wireless access network via the second wireless access node,

- transferring the selected user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the first wireless access network via the second wireless access node, and

- optionally, transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node.

11. The method according to claim 9 or 10, comprising the steps of:

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

- receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node,

- transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node, and

- optionally, transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

12. The method according to claim 9, comprising the steps of;

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

- receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node

- transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

13. A computer program comprising software code portions configured for, when executed by at least one processor, performing the method of one or more of the claims 9-12.

14. A mobile user terminal configured for use in the method according to one or more of the claims 9-11, wherein the mobile terminal, in use, contain a neighbour cell list of the first wireless access node, the terminal comprising:

- a receiver for receiving the request for reporting cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;
- scanning means for detecting the cell information from the wireless access nodes, at least one of the wireless access nodes being absent in the neighbour cell list,
- a transmitter for transmitting the detected cell information,
- wherein the mobile user terminal is arranged for temporarily storing the detected cell information and transmitting the detected cell information to the second wireless access node after being transferred from the first to the second wireless access network.

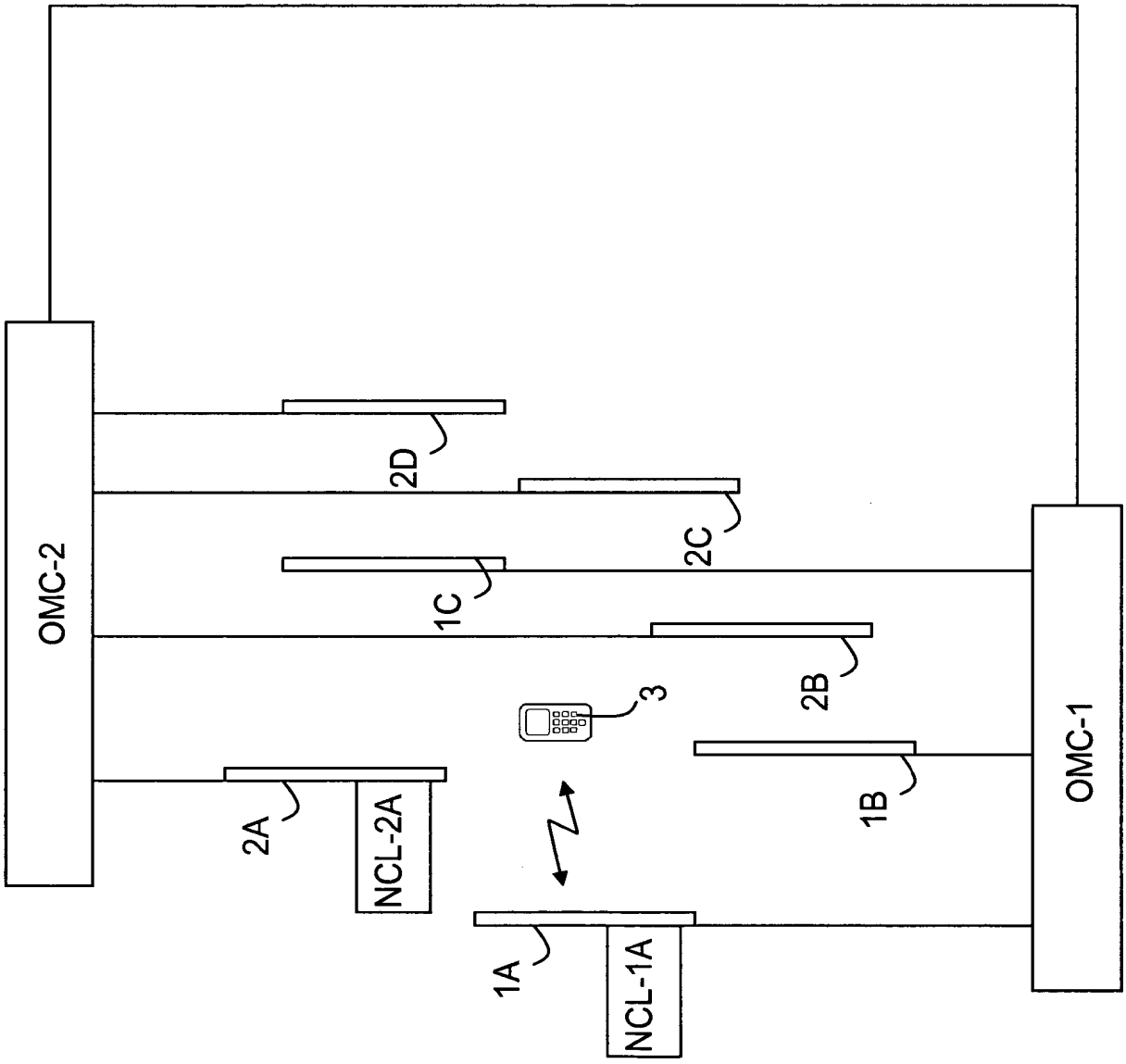


FIG. 1

2/4

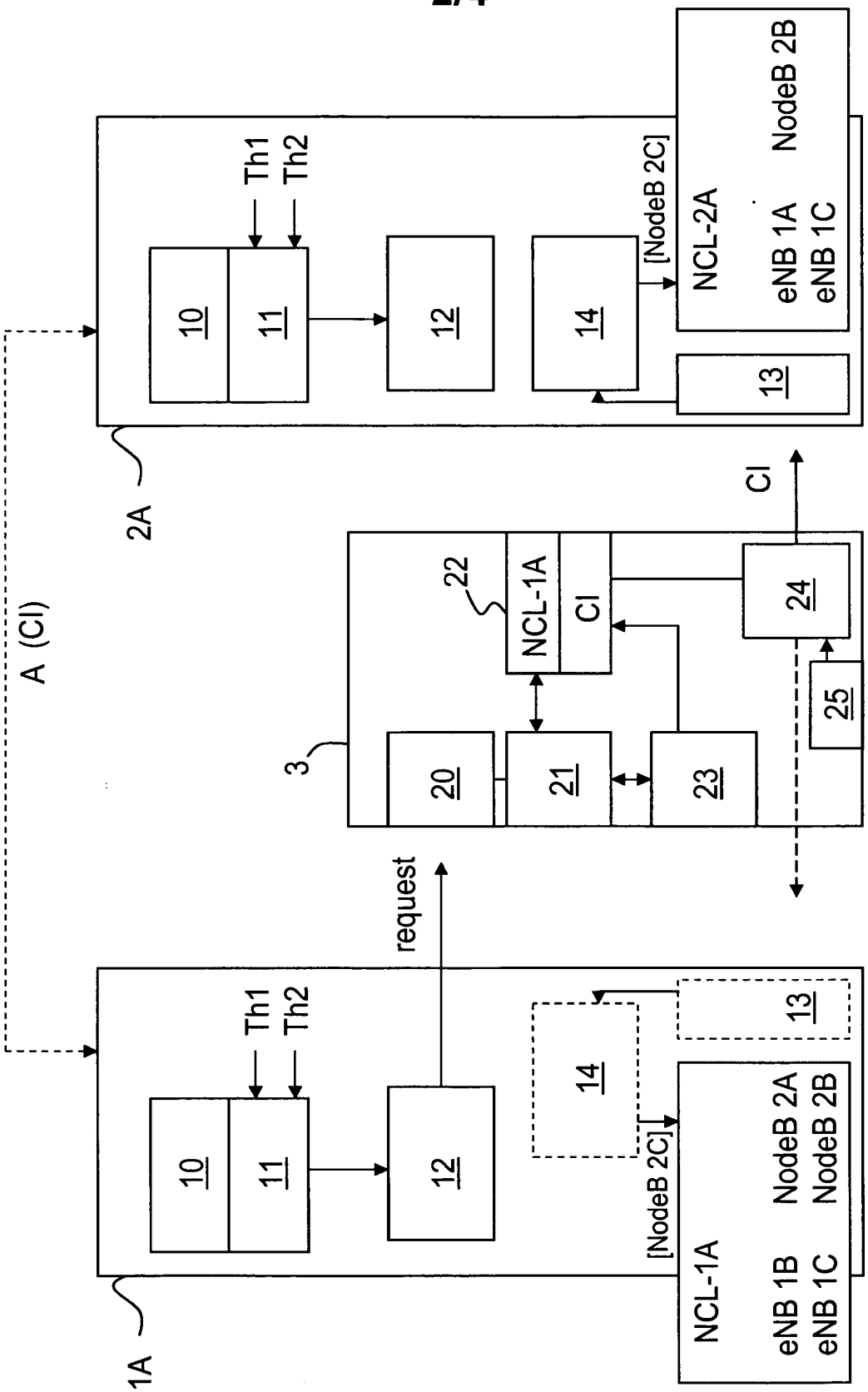
2A
NCL-2A
eNB 1A
eNB 1C
NodeB 2B
[NodeB 2C]
Th1
Th2
10
11
12
13
14
A (CI)
CI
3
22
NCL-1A
CI
20
21
23
24
25
request
1A
NCL-1A
eNB 1B
eNB 1C
NodeB 2A
NodeB 2B
[NodeB 2C]

FIG. 2

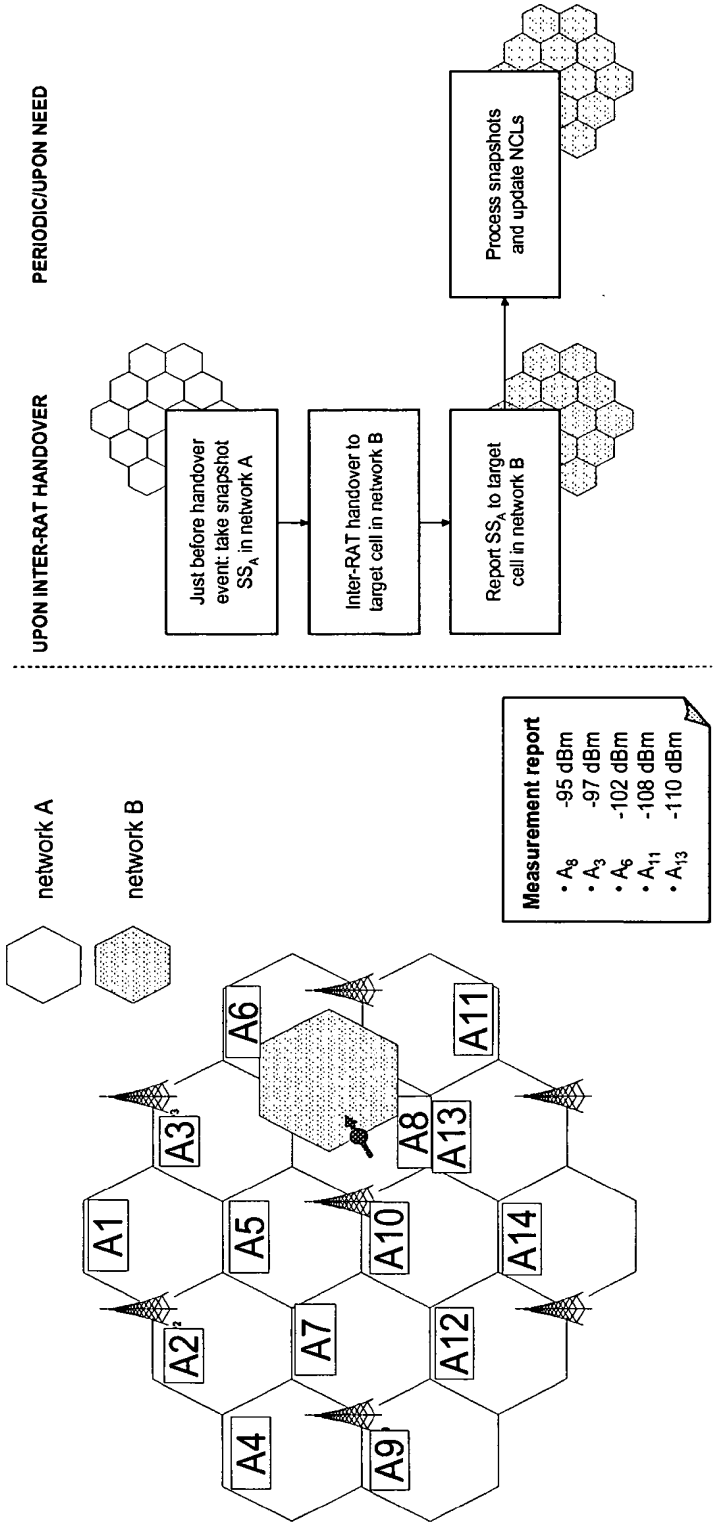
network A
network B
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
Measurement report
• $A_8$ -95 dBm
• $A_3$ -97 dBm
• $A_6$ -102 dBm
• $A_{11}$ -108 dBm
• $A_{13}$ -110 dBm
UPON INTER-RAT HANDOVER
Just before handover event: take snapshot $SS_A$ in network A
Inter-RAT handover to target cell in network B
Report $SS_A$ to target cell in network B
PERIODIC/UPON NEED
Process snapshots and update NCLs

FIG. 3A

FIG. 3B

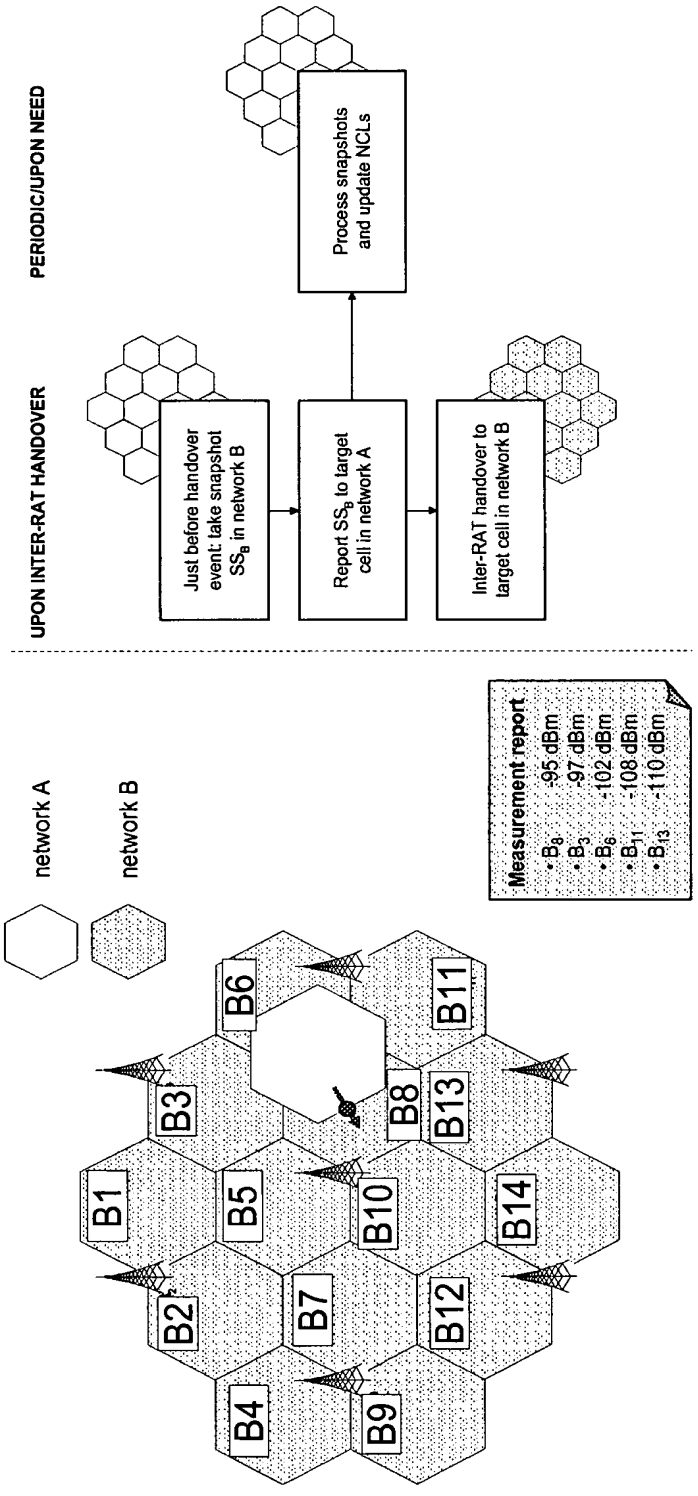
network A
network B
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
B13
B14
Measurement report
• $B_8$ -95 dBm
• $B_3$ -97 dBm
• $B_6$ -102 dBm
• $B_{11}$ -108 dBm
• $B_{13}$ -110 dBm
UPON INTER-RAT HANDOVER
PERIODIC/UPON NEED
Just before handover event: take snapshot $SS_B$ in network B
Report $SS_B$ to target cell in network A
Inter-RAT handover to target cell in network B
Process snapshots and update NCLs

FIG. 4A

FIG. 4B

# INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/064823

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04W36/02 H04W24/10
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 practical, search terms used)
EPO-Internal

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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| Y | page 7, line 28 - page 9, paragraph 15<br>page 12, paragraph 13 - page 13, paragraph 24<br>claims 1,75,76<br>figures 3,5,8,9,10 | 2-8, 10-12,14 |
| Y | WO 2009/064716 A1 (QUALCOMM INC [US]; FLORE ORONZO [US]; GRILLI FRANCESCO [US]; CHAPONNIE) 22 May 2009 (2009-05-22)<br>paragraph [0052] - paragraph [0056]<br>paragraph [0062] - paragraph [0065] | 2-8, 10-12,14 |

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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| Name and mailing address of the ISA/ | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016 | Patras, Paula Larisa |

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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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| A | WO 2009/019319 A2 (NOKIA SIEMENS NETWORKS OY [FI]; CENTONZA ANGELO [GB]) 12 February 2009 (2009-02-12) * abstract page 7, line 15 - page 8, line 3 page 8, line 22 - page 9, line 20 | 1-14 |
| A | WO 2009/045070 A2 (LG ELECTRONICS INC [KR]; PARK GI WON [KR]; KIM YONG HO [KR]; LEE JIN [) 9 April 2009 (2009-04-09) the whole document | 1-14 |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2010/064823

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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**S/N Unknown** **PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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| Serial No.: Unknown | Group Art Unit: Unknown |
| Filed: Concurrently herewith | Docket No.: US17827 |
| Customer No.: 90057 | Confirmation No.: Unknown |
| Title: SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE | |

MAIL STOP: AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**INFORMATION DISCLOSURE STATEMENT**

Dear Sir:

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-captioned patent application. Applicants respectfully request that this Information Disclosure Statement be entered and the documents listed on the attached PTO SB/08a Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicants request that a copy of the PTO SB/08a Form, initialed as being considered by the Examiner, be returned to the Applicants with the next official communication.

Although Applicants believe that no additional fees are due in connection with this submission, the Commissioner is hereby authorized to charge any fees or deficiencies associated with this submission, or credit any overpayment to Deposit Account No. 50-5047.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicants acknowledge the requirement to submit copies of foreign patent documents and non-

patent literature in accordance with 37 C.F.R § 1.98(a)(2). Copies of foreign patent documents are enclosed. If any of the references were uncovered by an international or foreign search part of a counterpart application filed by the Applicants, then a copy of the search report is also enclosed.

The Examiner is invited to contact the Applicants' Representative at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

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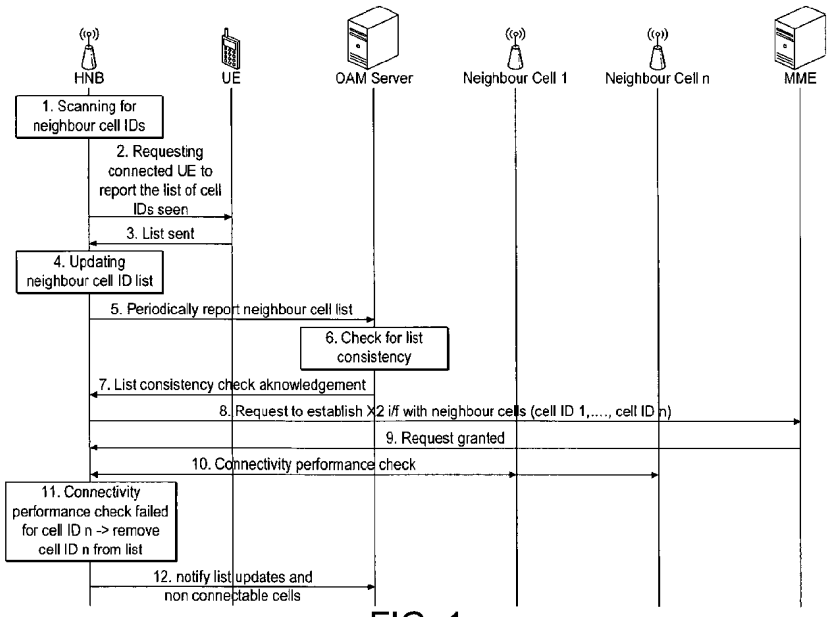


FIG. 1

(57) Abstract: Apparatus, comprising means for providing connectivity information for at least one neighbour cell in a neighbour cell list, said information being dependent on the result of a connectivity check carried out to measure the performance of a route between the apparatus and a respective base station associated with the at least one neighbour cell.

WO 2009/019319 A2

# NEIGHBOUR CELL LISTS

The present invention relates to a neighbour cell list. In particular, the present invention relates to providing connectivity information for at least one neighbour cell in a neighbour cell list.

In the third generation partnership project (3GPP) long term evolution (LTE) standardisation work there is ongoing study of the use in LTE networks of so called Home Node Bs (HNBs). A HNB is meant to provide indoor coverage to e.g. a household via LTE radio technology and network architecture support. The user is the owner of the home base station and the connection between the HNB and the operator's network is intended to be achieved via internet connections commonly available to private users, e.g. x digital subscriber line (xDSL).

One of the main issues when deploying HNBs is how to guarantee service continuity and efficient handover to neighbour cells, or to overlapping macro cells. A "neighbour cell" is a cell which is adjacent or proximate to the cell with which the home base station is associated. A "macro cell" comprises a large cell that is optimized to provide coverage rather than capacity, the coverage of which overlaps small cells, such as micro cells, pico cells and femto cells. A solution for such a problem implies the availability of a neighbour cell list as well as appropriate interfaces between the HNB and the neighbour base stations (such interface being called X2) that will allow performance of e.g. handover procedures, data forwarding, measurements exchange etc.

Use of a neighbour cell list at the HNB is intended to facilitate hand over procedures from HNB to macro cell and between HNBs, i.e. in the corporate scenario.

In 3GPP it is desirable to support seamless mobility between HNBs and overlapping macro or between neighbour HNBs.

If a cell is listed in the neighbour cell list it means that handover is possible from the cell owning the list to the cell listed. However, handover procedures strongly benefit from the presence of an X2 interface between the serving and target cell, such interface mainly being used for data forwarding during handovers.

Cells with poor connectivity are automatically included in the neighbour cell list of the HNB and X2 interfaces with such cells will eventually be established. However, due to the poor performance of the end to end connection between the X2 interface end-points, data forwarding, seamless handovers or fast measurements exchanges are not possible (i.e. will not be timely or reliably performed), nullifying the advantages of establishing the X2 interface or keeping the cell in the neighbour cell list. Eventually the UE will be guided to hand over to target cells with poor connectivity with the HNB serving cell, resulting in service interruption due to consequent break before make handovers.

Due to the way HNBs are going to be connected to the operator's network, i.e. via relatively cheap and low performance backhaul, establishment of X2 interfaces will not always be subject to the QoS an X2 would need. One example of degraded QoS is that where the end to end connectivity between the serving and target base stations allows for delays in excess of the maximum limit allowed for data forwarding. The latter nullifies the benefits of establishing an X2 interface and it prompts deletion of the respective cell from the neighbour cell list.

This invention is aimed at providing a method according to which such process of neighbour cell list creation/maintenance is defined, and it aims to reduce or eliminate one or more of the above problems.

A particular problem addressed by this invention is that of allowing neighbour cell list creation and maintenance depending on whether X2 interfaces can be enabled between the node owning the list and the nodes on the list.

At its most general, the present invention provides connectivity information for an entity on a list in dependence on a measurement of the characteristics of a route between the entity on the list and another entity.

According to a first aspect, the present invention may provide an apparatus, comprising means for providing connectivity information for at least one neighbour cell in a neighbour cell list, said information being dependent on the result of a connectivity check carried out to measure the performance of a route between the apparatus and a respective base station associated with the at least one neighbour cell.

The connectivity check may comprise a check to determine whether an interface is capable of establishment over the route. The interface may be for the performance of at least one of a handover procedure, data forwarding, and measurements exchange between the apparatus and the base station. The neighbour cell list may be at the apparatus.

The means for providing connectivity information may comprise means for creating the neighbour cell list. The means for providing connectivity information may comprise means for updating the neighbour cell list. The apparatus may further comprise means for receiving a list of one or more neighbour cell identities. The apparatus may comprise means for requesting the list of one or more neighbour cell identities. The means for providing connectivity information may be arranged to provide the connectivity information in dependence on the list of one or more neighbour cell identities received.

The apparatus may comprise means for reporting the neighbour cell list to a server, such as an operation and maintenance (OAM) server. The server could then perform a coherence check with other neighbour cell lists received from neighbour nodes and prompt for a rescan if it detects an inconsistency between the lists. The apparatus may further comprise means, such as a receiver or transceiver, for receiving from a server a prompt to rescan for one or more neighbour cell identities.

The apparatus may include means for requesting permission from an entity, such as a mobility management entity (MME), for the apparatus to establish the interface with the respective base station in the at least one neighbour cell. The permission request may be for permission to establish an interface with a base station of one cell, or with a base station of each of a plurality or all of the cells on the list. The connectivity check may be carried out once the entity grants permission for the apparatus to establish the interface or interfaces.

The apparatus preferably includes means for performing the connectivity check. The connectivity check may include calculating at least one of round trip delay, packet loss, and sustainable throughput on the route between the apparatus and the respective base station.

The apparatus may include means for removing a neighbour cell from the neighbour cell list in dependence on results of the connectivity check. The apparatus may comprise

means for notifying a server, such as an OAM server, that a neighbour cell, or plural neighbour cells, has been removed from the neighbour cell list.

The apparatus may include means for establishing an interface with the respective base station in the at least one neighbour cell included in the list. Such establishment may be carried out in dependence on the result of the connectivity check.

The apparatus may comprise a base station, such as a home base station. The apparatus may comprise a component part of a base station, and may comprise an electronic chip e.g. within a base station. The apparatus may include means for broadcasting the neighbour cell list within a cell associated with the apparatus/base station.

The at least one neighbour cell may include at least one of a neighbour cell (such as a HNB or an eHNB) and an overlapping macro cell.

According to a second aspect, the present invention may provide a method, comprising providing connectivity information for at least one neighbour cell in a neighbour cell list, said information being dependent on the result of a connectivity check carried out to measure the performance of a route between the apparatus and a respective base station associated with the at least one neighbour cell.

According to a third aspect, the present invention may provide a computer program embodied on a computer readable medium, said computer program configured to control a processor to perform providing connectivity information for at least one neighbour cell in a neighbour cell list, said information being dependent on the result of a connectivity check carried out to measure the performance of a route between the apparatus and a respective base station associated with the at least one neighbour cell.

According to a fourth aspect, the present invention may provide an apparatus, comprising circuitry arranged to provide connectivity information for at least one neighbour cell in a neighbour cell list, said information being dependent on the result of a connectivity check carried out to measure the performance of a route between the apparatus and a respective base station associated with the at least one neighbour cell.

According to a fifth aspect, the present invention may provide an apparatus,

comprising means for receiving a first neighbour cell list including at least one neighbour cell from a home base station; and means for detecting an inconsistency between the neighbour cell list received from the home base station and at least one neighbour cell list received from at least one respective base station, which respective base station neighbours the home base station.

The apparatus of the fifth aspect of the present invention may include means for prompting the home base station to rescan for an element (or elements) of the first neighbour cell list which generates the inconsistency or plural inconsistencies. Moreover, the apparatus of the fifth aspect may further comprise means for receiving a notification from the home base station that a neighbour cell (or plural cells) has been removed from the first neighbour cell list.

The apparatus of the fifth aspect of the present invention may comprise a server, such as an OAM server, or part of a server. For example, the apparatus of the fifth aspect may comprise an electronic chip e.g. within a server.

According to a sixth aspect, the present invention may provide a method, comprising receiving a first neighbour cell list including at least one neighbour cell from a home base station; and detecting an inconsistency between the neighbour cell list received from the home base station and at least one neighbour cell list received from at least one respective base station, which respective base station neighbours the home base station.

According to a seventh aspect, the present invention may provide a computer program embodied on a computer readable medium, said computer program configured to control a processor to perform receiving a first neighbour cell list including at least one neighbour cell from a home base station; and detecting an inconsistency between the neighbour cell list received from the home base station and at least one neighbour cell list received from at least one respective base station, which respective base station neighbours the home base station.

According to an eighth aspect, the present invention may provide an apparatus, comprising a receiver arranged to receive a first neighbour cell list including at least one neighbour cell from a home base station; and a detector arranged to detect an inconsistency between the neighbour cell list received from the home base station and at least one

neighbour cell list received from at least one respective base station, which respective base station neighbours the home base station.

The present invention is not applicable only to whether X2 interfaces are capable of establishment, but is applicable to other interfaces, such as other interfaces between base stations, which preferably allow the performance of e.g. handover procedures, data forwarding, and measurements exchange.

Embodiments of this invention relate to a method to create and maintain neighbour cell lists at the HNB and also relate to a way of checking whether X2 interfaces with neighbour base stations can be established or not.

Embodiments of the invention are not concerned with defining how to create a neighbour cell list from the information received from neighbour or overlapping cells via broadcast radio channels, such as primary broadcast channel (P-BCH).

As the scenario of HNB deployment is relatively new, the problem of neighbour cell list creation/maintenance has always undergone procedures taking into account network, planning and fairly static deployment scenarios. Some solutions have been proposed for the HNB scenario, where the HNB can detect (by acting as a receiver) the P-BCH channel of neighbour cells and derive their cell ID information. However, this way of creating/maintaining the cell ID list does not take into account the backhaul connectivity factors between the HNB and the operator's network or between the HNB and its neighbour base stations.

Ideally it is desirable to ensure that the eNode Bs (eNBs), or HNBs reported in the neighbour cell list of a HNB are also connected to the HNB via a X2 interface. This improves handover to the cells listed in the neighbour cell list. However, due to the backhaul connectivity of HNBs and to the performance it may be subject to, it is foreseen that establishing X2 interfaces with all possible neighbour cells may not be feasible.

Embodiments of the present invention provide criteria as to how X2 interfaces can be setup depending on the entries in the neighbour cell list and/or how the neighbour cell list is maintained depending on X2 interface establishment.

An example of the present invention will now be described with reference to the accompanying drawing, in which:

Figure 1 shows a graphical representation (message sequence chart) of the procedures for neighbour cell list creation and maintenance according to one embodiment of the present invention; and

Figure 2 shows a representation of an apparatus according to one embodiment of the present invention.

It is to be noted that the order of the steps illustrated in the example embodiment of Fig. 1 is not intended to limit the scope of the invention to a series of steps carried out in that particular order. In some embodiments some of the illustrated steps may be carried out in a different order, combined, or even omitted, and yet the other embodiments will be examples of the invention.

At cell setup, home base station (in this embodiment a home node B, or HNB), or rather a scanner of the home base station, scans for received Cell IDs and forms a first list of neighbour cells. The list may include one or more neighbour cells, or rather the list may include information identifying one or more neighbouring cells. The HNB periodically requests that user equipments (UEs) connected to the HNB provide a list of received cell IDs in order to update its neighbour cell list. Such updating may be carried out by circuitry in the home base station. In other embodiments, the request for cell identities may be sent to an entity other than a UE, and an entity other than a UE may provide the list of IDs to the HNB. In this embodiment, the HNB periodically reports the neighbour cell list formed to an operation and maintenance (OAM) server. Having received the list, the OAM server then performs a coherence check with other neighbour cell list received from neighbour nodes. If an inconsistency between the neighbour cell lists submitted to the OAM server by neighbour eNBs/HNBs is detected, the OAM server prompts a rescan for the elements of the neighbour cell lists generating the inconsistency.

Once a stable neighbour cell list has been achieved, as shown in Fig. 1 the HNB requests that the network, i.e. a mobility management entity (MME) grants permission for the HNB to establish an X2 interface with the eNBs/HNBs populating the neighbour cell list. Once permission to establish an X2 interface with such nodes is granted the HNB performs a connectivity check with each of the nodes with which an X2 needs to be established. Such a test may consist of calculating e.g. the round trip delay, packet loss,

sustainable throughput on the end to end route between the HNB and the node with which an X2 needs to be established.

As one of the main purposes of the X2 is to allow data forwarding in handover procedures, an excessive end to end delay along the X2 would impair any type of data forwarding and may neutralise the benefits of such interface. If such a situation is registered the HNB does not attempt to establish an X2 interface with such a node and it eliminates the respective cell ID from its neighbour cell list. Such an event is notified to the OAM server with the appropriate event description, so that the OAM can efficiently detect true anomalies in an HNB's neighbour.

HNBs deployed without undergoing any network planning procedures will not have a preconfigured neighbour cell list. Further, HNBs need to re-create a neighbour cell list in case they are moved from their usual location. If mobility between HNBs and overlapping macro or home neighbour cells has to be provided it is essential in one embodiment of the invention that the HNB broadcasts a neighbour cell list within its cell. If seamless mobility needs to be guaranteed (this being the working assumption at least for the HNB <-> overlapping macro cell scenario) the base stations associated with the cells in the HNB neighbour cell list also preferably need to establish a X2 interface with the HNB owning the list.

Figure 2 shows an embodiment of the apparatus of the present invention. Figure 2 shows a home base station (100) comprising circuitry (102), memory (104), a transmitter (106), a receiver (108) and further circuitry (110) for establishing an X2 interface with another base station. In other embodiments, the further circuitry (110) may be incorporated into the circuitry (102). In other embodiments the transmitter (106) and receiver (108) may be combined as a transceiver, rather than being separate. Indeed, in other embodiments of the invention any of the individual blocks shown in Figure 2 may be combined with others of the individual blocks.

The circuitry (102) carries out the above-mentioned scanning for cell IDs which have been received via the receiver (108) from user equipment. The circuitry (102) forms a neighbour cell list and holds it in the memory (104). In other embodiments, the neighbour cell list (114) is provided to the home base station (100). In any event the circuitry (102) provides connectivity information for at least one neighbour cell on the neighbour cell list

(114).

Connectivity checking circuitry (112) in the circuitry (102) carries out the above-mentioned connectivity check. In other embodiments, the connectivity checking circuitry (112) is an element in the base station (100) separate from the circuitry (102). In further embodiments still, the home base station (100) receives the result of a connectivity check carried out at entity separate from the home base station (100) via the receiver (108).

The transmitter (106) is used for sending requests for the list of cell identities, reporting the neighbour cell list to the OAM server, requesting permission from the MME for permission to establish the X2 interface with the base stations in the neighbouring cells listed in the neighbour cell list, for notifying the OAM when a neighbour cell is removed from the neighbour cell list, and for broadcasting the neighbour cell list. In other embodiments, some or all of these processes are carried out by different elements of the home base station (100), rather than all being carried out by the transmitter (106).

The receiver (108) is used for receiving the list of neighbour cell identities from user equipment and for receiving the prompt from the OAM. In other embodiments these processes are carried out by separate or different elements of the home base station (100).

An advantage of the present invention is that X2 interfaces are established by taking into account the performance of the connectivity route between the two end nodes of the X2 interface. Such performance is not guaranteed in the HNB scenario because the HNB is connected to the IP world by means of cheap and highly available broadband connections such as xDSL. Efficient neighbour cell list creation and maintenance for HNBs is thus preferred for supporting effective mobility.

The disadvantages of not using the present invention include the fact that cells with poor connectivity are automatically included in the neighbour cell list of the HNB and X2 interfaces with such cells will eventually be established. However, due to the poor performance of the end to end connection between the X2 interface end-points, data forwarding, seamless handovers or fast measurements exchanges are not possible (i.e. will not be timely or reliably performed), nullifying the advantages of establishing the X2 interface or keeping the cell in the neighbour cell list. Eventually the UE will be guided to hand over to target cells with poor connectivity with the HNB serving cell, resulting in

service interruption due to consequent break before make handovers.

This invention may also be used in other technologies such as GPRS GUN or more generally in cases where a home base station is deployed with no particular network planning or connectivity performance checks and where interfaces need to be established between such base station and other elements in the network.

In general, the various embodiments of the invention may be implemented in hardware or special purpose circuits, software, logic or any combination thereof. For example, some aspects may be implemented in hardware, while other aspects may be implemented in firmware or software which may be executed by a controller, microprocessor or other computing device, although the invention is not limited thereto.

While various aspects of the invention may be illustrated and described as block diagrams, flow charts, or using some other pictorial representation, it is well understood that these blocks, apparatus, systems, techniques or methods described herein may be implemented in, as non-limiting examples, hardware, software, firmware, special purpose circuits or logic, general purpose hardware or controller or other computing devices, or some combination thereof.

The embodiments of this invention may be implemented by computer software executable by a data processor of the mobile device, such as in the processor entity, or by hardware, or by a combination of software and hardware. Further in this regard it should be noted that any blocks of the logic flow as in the Figures may represent program steps, or interconnected logic circuits, blocks and functions, or a combination of program steps and logic circuits, blocks and functions.

The memory may be of any type suitable to the local technical environment and may be implemented using any suitable data storage technology, such as semiconductor-based memory devices, magnetic memory devices and systems, optical memory devices and systems, fixed memory and removable memory. The data processors may be of any type suitable to the local technical environment, and may include one or more of general purpose computers, special purpose computers, microprocessors, digital signal processors (DSPs) and processors based on multi-core processor architecture, as non-limiting examples.

Embodiments of the inventions may be practiced in various components such as integrated circuit modules. The design of integrated circuits is by and large a highly automated process. Complex and powerful software tools are available for converting a logic level design into a semiconductor circuit design ready to be etched and formed on a semiconductor substrate.

The foregoing description has provided by way of exemplary and non-limiting examples a full and informative description of the exemplary embodiment of this invention. However, various modifications and adaptations may become apparent to those skilled in the relevant arts in view of the foregoing description, when read in conjunction with the accompanying drawings and the appended claims.

Claims:

1. Apparatus, comprising:

means for providing connectivity information for at least one neighbour cell in a neighbour cell list,

said information being dependent on the result of a connectivity check carried out to measure the performance of a route between the apparatus and a respective base station associated with the at least one neighbour cell.

2. Apparatus as claimed in claim 1, wherein the connectivity check comprises a check to determine whether an interface is capable of establishment over the route.

3. Apparatus as claimed in claim 2, wherein the interface is for the performance of at least one of a handover procedure, data forwarding, and measurements exchange between the apparatus and the base station.

4. Apparatus as claimed in any one of claims1 to 3, wherein the neighbour cell list is at the apparatus.

5. Apparatus as claimed in any one of claims 1 to 4, wherein the means for providing connectivity information comprises means for creating the neighbour cell list.

6. Apparatus as claimed in any one of claims 1 to 5, wherein the means for providing connectivity information comprises means for updating the neighbour cell list.

7. Apparatus as claimed in any one of claims 1 to 6, further comprising means for receiving a list of one or more neighbour cell identities.

8. Apparatus as claimed in claim 7, further comprising means for requesting the list of one or more neighbour cell identities.

9. Apparatus as claimed in claim 7 or claim 8, wherein the means for providing connectivity information is arranged to provide the connectivity information in dependence on the list of one or more neighbour cell identities received.

10. Apparatus as claimed in any one of claims 1 to 9, further comprising means for reporting the neighbour cell list to a server.

11. Apparatus as claimed in claim 10, further comprising means for receiving from the server a prompt to rescan for one or more neighbour cell identities.

12. Apparatus as claimed in any one of claims 1 to 11, further comprising means for requesting from an entity permission for the apparatus to establish the interface with the respective base station in the at least one neighbour cell.

13. Apparatus as claimed in any one of claims 1 to 12, further comprising means for performing the connectivity check.

14. Apparatus as claimed in any one of claims 1 to 13, wherein the connectivity check includes calculating at least one of round trip delay, packet loss, and sustainable throughput on the route between the apparatus and the respective base station.

15. Apparatus as claimed in any one of claims 1 to 14, wherein the means for providing connectivity information comprises means for removing a neighbour cell from the neighbour cell list in dependence on results of the connectivity check.

16. Apparatus as claimed in any one of claims 1 to 15, further comprising means for notifying a server that a neighbour cell has been removed from the neighbour cell list.

17. Apparatus as claimed in any one of claims 2 to 16, further comprising means for establishing the interface with the respective base station in the at least one neighbour cell included in the list.

18. Apparatus as claimed in any one of claims 1 to 17, wherein the at least one neighbour cell includes at least one of a neighbour cell and an overlapping macro cell.

19. Method, comprising:

providing connectivity information for at least one neighbour cell in a neighbour cell list,

said information being dependent on the result of a connectivity check carried out to

measure the performance of a route between the apparatus and a respective base station associated with the at least one neighbour cell.

20. Method as claimed in claim 19, wherein the connectivity check comprises a check to determine whether an interface is capable of establishment over the route.

21. Method as claimed in claim 20, wherein the interface is for the performance of at least one of a handover procedure, data forwarding, and measurements exchange between the apparatus and the base station.

22. Method as claimed in any one of claims 19 to 21, wherein the neighbour cell list is at the apparatus.

23. Method as claimed in any one of claims 19 to 22, wherein the providing connectivity information comprises creating the neighbour cell list.

24. Method as claimed in any one of claims 19 to 23, wherein the providing connectivity information comprises updating the neighbour cell list.

25. Method as claimed in any one of claims 19 to 24, further comprising performing the connectivity check.

26. Method as claimed in any one of claims 19 to 25, wherein the connectivity check includes calculating at least one of round trip delay, packet loss, and sustainable throughput on the route between the apparatus and the respective base station.

27. Method as claimed in any one of claims 19 to 26, wherein the providing connectivity information comprises removing a neighbour cell from the neighbour cell list in dependence on results of the connectivity check.

28. Method as claimed in any one of claims 20 to 27, further comprising establishing the interface with the respective base station in the at least one neighbour cell included in the list.

29. Method as claimed in any one of claims 19 to 28, wherein the at least one neighbour

cell includes at least one of a neighbour cell and an overlapping macro cell.

30. A computer program embodied on a computer readable medium, said computer program configured to control a processor to perform:

providing connectivity information for at least one neighbour cell in a neighbour cell list,

said information being dependent on the result of a connectivity check carried out to measure the performance of a route between the apparatus and a respective base station associated with the at least one neighbour cell.

31. Apparatus, comprising:

circuitry arranged to provide connectivity information for at least one neighbour cell in a neighbour cell list,

said information being dependent on the result of a connectivity check carried out to measure the performance of a route between the apparatus and a respective base station associated with the at least one neighbour cell.

32. Apparatus, comprising:

means for receiving a first neighbour cell list including at least one neighbour cell from a home base station; and

means for detecting an inconsistency between the neighbour cell list received from the home base station and at least one neighbour cell list received from at least one respective base station, which respective base station neighbours the home base station.

33. Apparatus as claimed in claim 32, further comprising means for prompting the home base station to rescan for the an element of the first neighbour cell list which generates the inconsistency.

34. Apparatus as claimed in claim 32 or claim 33, further comprising means for receiving a notification from the home base station that a neighbour cell has been removed from the first neighbour cell list.

35. Apparatus as claimed in any one of claims 32 to 34, wherein the apparatus comprises a server.

36. Apparatus as claimed in claim 35, wherein the apparatus comprises an operation and maintenance server.

37. Method, comprising:

receiving a first neighbour cell list including at least one neighbour cell from a home base station; and

detecting an inconsistency between the neighbour cell list received from the home base station and at least one neighbour cell list received from at least one respective base station, which respective base station neighbours the home base station.

38. Method as claimed in claim 37, further comprising prompting the home base station to rescan for the an element of the first neighbour cell list which generates the inconsistency.

39. Method as claimed in claim 37 or claim 38, further comprising receiving a notification from the home base station that a neighbour cell has been removed from the first neighbour cell list.

40. A computer program embodied on a computer readable medium, said computer program configured to control a processor to perform:

receiving a first neighbour cell list including at least one neighbour cell from a home base station; and

detecting an inconsistency between the neighbour cell list received from the home base station and at least one neighbour cell list received from at least one respective base station, which respective base station neighbours the home base station.

41. Apparatus, comprising:

a receiver arranged to receive a first neighbour cell list including at least one neighbour cell from a home base station; and

a detector arranged to detect an inconsistency between the neighbour cell list received from the home base station and at least one neighbour cell list received from at least one respective base station, which respective base station neighbours the home base station.

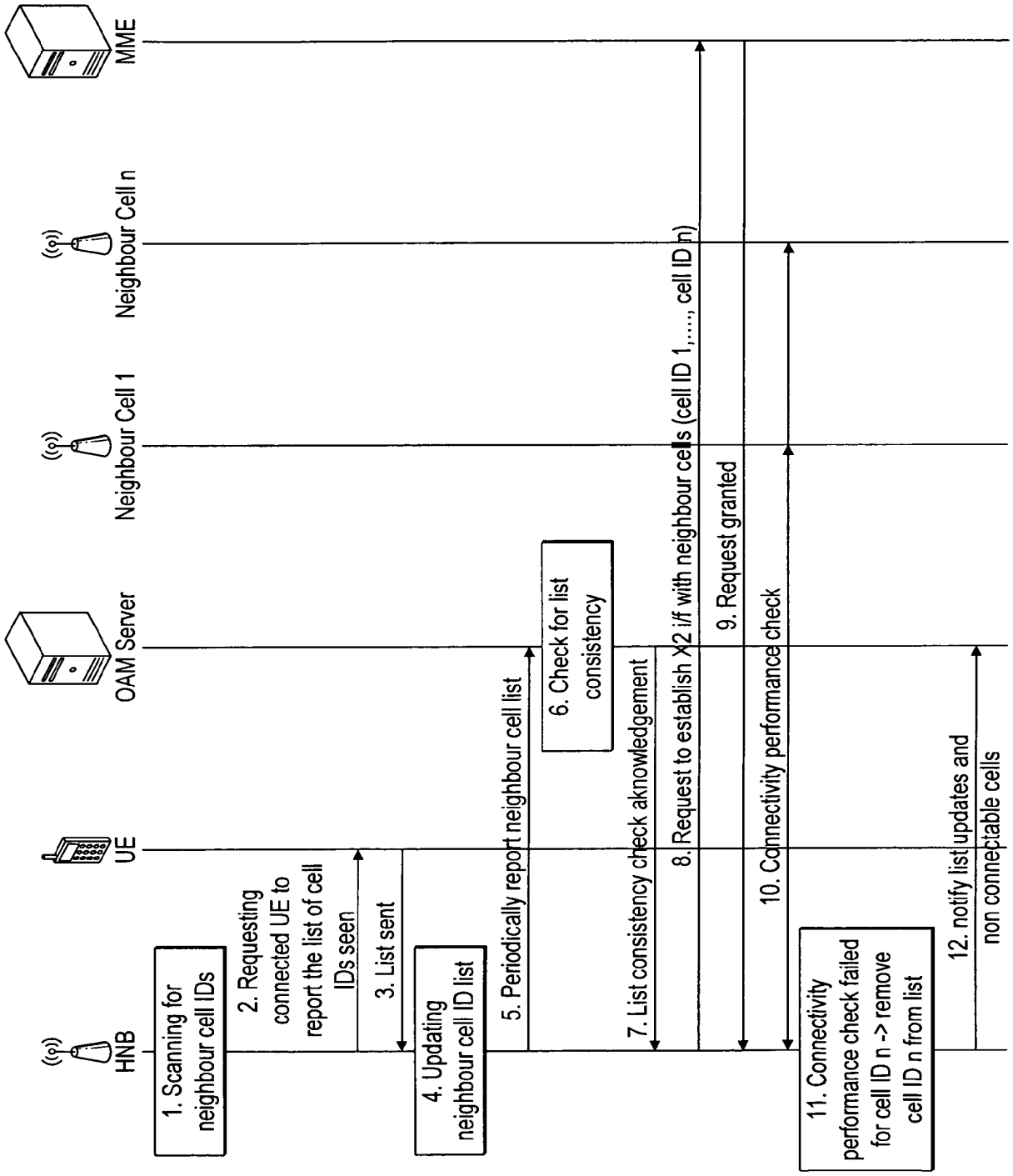
HNB
UE
OAM Server
Neighbour Cell 1
Neighbour Cell n
MME
1. Scanning for neighbour cell IDs
2. Requesting connected UE to report the list of cell IDs seen
3. List sent
4. Updating neighbour cell ID list
5. Periodically report neighbour cell list
6. Check for list consistency
7. List consistency check aknowledgement
8. Request to establish X2 i/f with neighbour cells (cell ID 1,...., cell ID n)
9. Request granted
10. Connectivity performance check
11. Connectivity performance check failed for cell ID n -> remove cell ID n from list
12. notify list updates and non connectable cells

FIG. 1

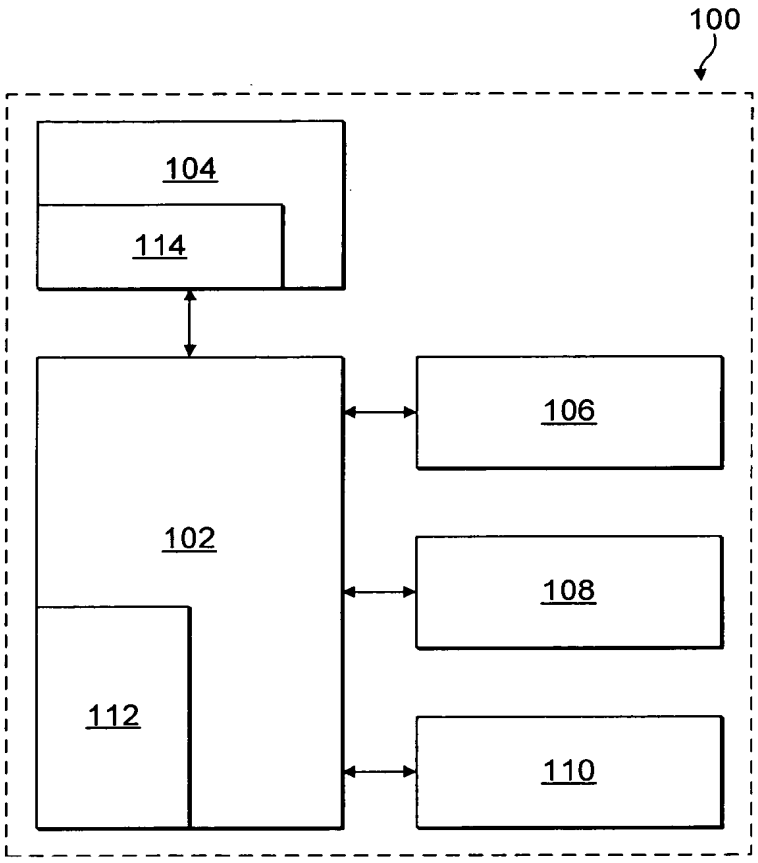


FIG. 2

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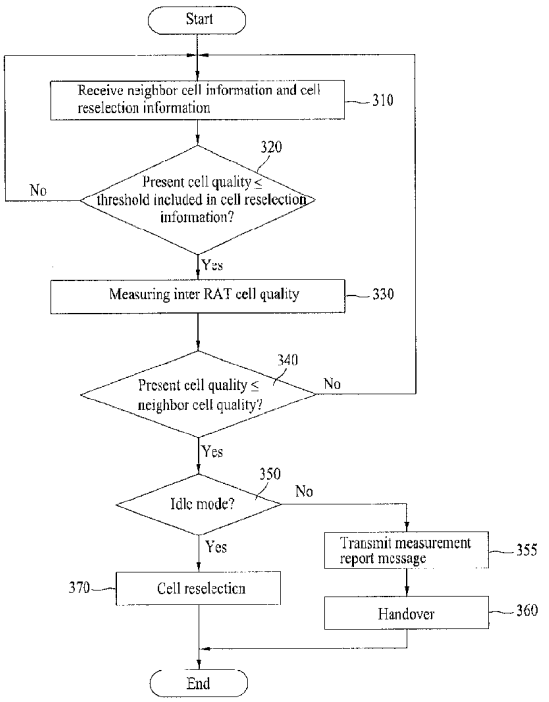
*[Continued on next page]*

(54) Title: METHOD FOR SUPPORTING MOBILITY OF MOBILE TERMINAL, AND MOBILE TERMINAL THEREOF

FIG. 3




(57) Abstract: A method for supporting mobility of a mobile station and the mobile station which supports the mobility are disclosed. The method of supporting the mobility of the mobile station includes receiving cell reselection information and neighbor cell information from a base station (BS) of a present cell, wherein the cell reselection information includes thresholds for determining whether the quality of the other RAT cell shall be measured or not, wherein the neighbor cell information includes a frame duration code and a frame number of a downlink frame in the other RAT cell, wherein the frame duration code indicates the start preamble of the downlink frame; determining whether a mobile station (MS) shall measure the quality of the other RAT cell or not using the thresholds; and measuring the quality of the other RAT cell and reselecting a cell or transmitting the measured result to the BS through a measurement report message according to the measured result, if it is determined that the MS would measure the quality of the other RAT cell. Accordingly, since the mobility of the mobile station between the E- UTRAN network and the other RAT cell is supported, the mobile station can continuously receive a service while maintaining current service quality although a user moves to the other RAT cell.

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【DESCRIPTION】

【Invention Title】

METHOD FOR SUPPORTING MOBILITY OF MOBILE TERMINAL, AND MOBILE TERMINAL THEREOF

【Technical Field】

The present invention relates to a inter radio access technology (RAT), and more particularly, to a method for supporting mobility of a mobile station between an evolved UMTS terrestrial radio access (E-UTRAN) network which is provided in the 3rd Generation Partnership Project (3GPP) and the other RAT cell.

【Background Art】

The inter RAT indicates a technology of allowing a mobile station to continuously receive a service, which is currently being used, even when a mobile station is moved from a network, in which the mobile station is registered, to the other RAT cell so as to improve the convenience of a user.

In the 3GPP network, as shown in FIGs. 1A and 1B, system information is transmitted. The system information may be transmitted using a system information block as

shown in FIG. 1A or may be transmitted using a measurement control message as shown in FIG. 1B. A base station periodically transmits the system information block to a mobile station such that the mobile station knows information about a cell in which the mobile station is registered and a neighbor cell, for example, radio bearer information, physical channel information, and an attribute such as cell quality, and provides useful information such that the mobile station continuously receives a service from a present cell or the mobile station is moved to a cell having high quality.

In the technology of the 3GPP network, 15, 16 or 18 pieces of system information are respectively defined and used in a Global System for Mobile communication (GSM), a General Packet Radio Service (GPRS) and a Universal Mobile Telecommunication System (UMTS). Table 1 shows system information block types 4 using cell selection and reselection in a system information block used in the UMTS network. As shown in Table 1, the system information includes information elements including an individual parameter and various parameters, for example, cell selection and reselection information.

Table 1

| Information Element/Group name | Need | Type and reference |
|---|---|---|
| UTRAN mobility information elements | | |
| Cell identity | Mandatory | Cell identity |
| Cell selection and re-selection info | Mandatory | Cell selection and re-selection info for SIB3/4 |
| Cell Access Restriction | Mandatory | Cell Access Restriction |

In the 3GPP network, cell measurement is performed as follows. The mobile station periodically measures the quality of a present cell or a neighbor cell, for example, an intra neighbor cell or an inter RAT neighbor cell, includes a measurement value in a measurement report message, and transmits the measurement report message to the base station. The base station which receives the measurement report message from the mobile station checks the value included in the message, compares the quality of the cell managed by the base station with the quality of the neighbor cell, and determines whether the mobile station shall stay in the present cell or shall be moved to the neighbor cell having the quality higher than that of the present cell. The measurement report message transmitted from the mobile station to the base station may be transmitted to the base station by a periodic method or an event-trigger method.

Currently, in the 3GPP inter-RAT, a technology of supporting mobility between other RAT cells in the same standard, for example, a technology of supporting mobility from a UMTS network defined in the 3GPP to a GSM network

was developed.

However, a technology of supporting mobility between other RAT cells in different standards, for example, a technology of supporting mobility between an E-UTRAN network which is provided in the 3GPP and a World Interoperability for Microwave Access (WiMAX) network which is provided in the IEEE has not been developed.

【Disclosure】

【Technical Problem】

An object of the present invention devised to solve the problem lies on a method for supporting mobility of a mobile station between an E-UTRAN network and the other RAT cell.

Another object of the present invention devised to solve the problem lies on a mobile station to which a method of supporting mobility of the mobile station is applied.

【Technical Solution】

The object of the present invention can be achieved by providing a method of supporting mobility between E-UTRAN network and the other RAT cell includes receiving

cell reselection information and neighbor cell information from a base station (BS) of a present cell, wherein the cell reselection information includes thresholds, wherein the neighbor cell information includes downlink frame information of the other RAT cell; determining whether a mobile station (MS) shall measure the quality of the other RAT cell or not using the thresholds; and measuring the quality of the other RAT cell and reselecting a cell or transmitting the measured result to the BS through a measurement report message according to the measured result, if it is determined that the MS would measure the quality of the other RAT cell.

Preferably, the frame information included in the neighbor cell information may include a frame duration code indicating a downlink frame start preamble of the other RAT cell and a frame number of a downlink frame of the other RAT cell.

Preferably, the determining may include determining that the MS would measure the quality of the other RAT cell if the signal quality of a present cell is equal to or lower than a signal quality threshold or the Rx power strength of the present cell is equal to or lower than an Rx power strength threshold.

Preferably, the transmitting through the measurement

report message may include adjusting, by the MS, the transmission frequency of the measurement report message using at least one of a hysteresis parameter or time-to-trigger parameter.

Preferably, the neighbor cell information may be used when any one of cell reselection or handover is performed with respect to the mobile station.

In another aspect of the present invention, provided herein is a method of supporting mobility between E-UTRAN network and the other RAT cell, the method including transmitting cell reselection information and neighbor cell information from a base station (BS) to a mobile station (MS) periodically, wherein the cell reselection information includes thresholds for determining whether the quality of the other RAT cell shall be measured or not, wherein the neighbor cell information includes a frame duration code and a frame number of a downlink frame in the other RAT cell, wherein the frame duration code indicates the start preamble of the downlink frame; at the MS, receiving a measurement report message which includes the result of measuring the quality of the other RAT cell according to the thresholds; and transmitting a command which indicates a handover of the MS according to the measured result.

Preferably, the neighbor cell information and the

cell reselection information may be transmitted in a way that information elements are added to a system information block transmitted from the BS to the MS periodically.

Preferably, the cell reselection information and the neighbor cell information may be transmitted in a way that system information is added to a measurement control message transmitted from the BS to the MS periodically, and the system information includes the cell reselection information and the neighbor cell information.

Preferably, the neighbor cell information may further include at least one of bandwidth information and a preamble index. The bandwidth information indicates cell bandwidth size of the other RAT cell and the preamble index indicates a specific preamble of a physical layer in the other RAT cell.

In a further aspect of the present invention, provided herein is a mobile station supporting mobility between E-UTRAN network and other RAT, the mobile station including: system information receiving portion to receive cell reselection information and neighbor cell information from a base station (BS) of a present cell periodically, wherein the cell reselection information includes thresholds for determining whether the quality of the other RAT cell shall be measured or not, wherein the neighbor

cell information includes a frame duration code and a frame number of a downlink frame in the other RAT cell, wherein the frame duration code indicates the start preamble of the downlink frame; quality measurement portion to measure the quality of other RAT cell if it is determined that the quality of the other RAT cell would be measured according to the thresholds; and measurement report portion to transmit a result of measuring the quality of the other RAT cell to the BS through a measurement report message.

Preferably, the quality measurement portion may measure the quality of the other RAT cell according to duration scheduled in a measurement gap registered in the MS and the BS if the mobile station is in an active mode.

Preferably, the mobile station may be a dual receiver which is able to receive signals of the E-UTRAN and the other RAT cell simultaneously.

【Advantageous Effects】

According to an embodiment of the present invention, since the mobility of the mobile station between the E-UTRAN network and the other RAT cell is supported, the mobile station can continuously receive a service while maintaining current service quality although a user moves to the other RAT cell.

【Description of Drawings】

The accompanying drawings, which are included to provide a further understanding of the invention, illustrate embodiments of the invention and together with the description serve to explain the principle of the invention.

In the drawings:

FIGs. 1A and 1B are views showing a conventional scheme of transmitting system information from a base station to a mobile station.

FIG. 2 is a view showing a base station and a mobile station in an E-UTRAN network according to an embodiment of the present invention.

FIG. 3 is a flowchart illustrating a method for supporting mobility of a mobile station according to an embodiment of the present invention.

FIG. 4A is a view showing an example in which a mobile station receives a system information block and triggers a measurement report message, according to an embodiment of the present invention.

FIG. 4B is a view showing an example in which a mobile station receives a measurement control message and triggers the measurement control message, according to an

embodiment of the present invention.

FIG. 5A is a view showing a method for checking a code "series to modulate" according to preamble indexes.

FIG. 5B is a view showing a method for reading a preamble corresponding to a preamble index.

FIG. 5C is a view showing an example of the structure of a WiMAX frame associated with FIG. 5B.

FIG. 6 is a view showing an example of the structure of a system information block according to the present invention.

FIG. 7 is a graph showing a method for adjusting the amount of measurement report message in consideration of a hysteresis margin according to an embodiment of the present invention.

FIG. 8 is a graph showing a method for adjusting the amount of measurement report message in consideration of a time-to-trigger parameter according to an embodiment of the present invention.

【Mode for Invention】

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. The detailed description set forth below in connection with the appended

drawings is intended as a description of exemplary embodiments and is not intended to represent the only embodiments in which the concepts explained in these embodiments can be practiced.

FIG. 2 is a view showing a base station 220 and a mobile station 210 in an E-UTRAN network according to an embodiment of the present invention.

The mobile station 210 of FIG. 2 includes a system information receiving portion 211, a quality measurement portion 212, a measurement report portion 213 and a cell reselection unit 214.

The system information receiving portion 211 receives neighbor cell information and cell reselection information from the base station 220 of a present cell. The neighbor cell information includes downlink frame information of the other RAT cell and the cell reselection information includes thresholds for determining whether or not the quality of the other RAT cell shall be measured. The neighbor cell information transmitted from the base station 220 to the mobile station may include bandwidth information indicating a cell bandwidth size of the other RAT cell and a preamble index indicating a specific preamble of a physical layer in the other RAT cell.

The quality measurement portion 212 measures the

quality of the other RAT cell while the signal of the other RAT cell is received, if it is determined that the quality of the other RAT cell is measured according to the thresholds. At this time, if the mobile station 210 is a single receiver, the quality measurement portion 212 may be configured to measure the quality of the other RAT cell according to a measurement gap. In contrast, if the mobile station 210 is a dual receiver, the quality measurement portion 212 may be configured to measure the quality of the other RAT cell if the quality of the present cell measured by the mobile station 210 is equal to or lower than the threshold of the cell selection information.

The measurement report portion 213 transmits the result measured by the quality measurement portion 212 to the base station through a measurement report message periodically or an event-trigger method, if the mobile station 210 is in an active mode.

The cell reselection unit 214 performs a cell reselection procedure of the mobile station 210 according to the measured result or performs handover according to a command received from a measurement report checking unit 222, that is, a handover command message. In more detail, the cell reselection unit 214 performs the cell reselection procedure if the mobile station 210 is in an idle mode and

performs the handover procedure if the mobile station 210 is in the active mode.

The base station 220 includes a system information transmission unit 221 and the measurement report checking unit 222.

The system information transmission unit 221 periodically transmits neighbor cell information and cell reselection information to the mobile station 210. The system information including the neighbor cell information and the cell reselection information is transmitted to the mobile station through the system information block or the measurement control message.

The measurement report checking unit 222 receives the measurement report message including the result of measuring the quality of the other RAT cell from the mobile station 210. The measurement report checking unit 222 transmits the command indicating that the mobile station 210 should perform the handover, that is, the handover command message, to the mobile station 210, if the handover of the mobile station 210 is necessary according to the measured result included in the measurement report message.

FIG. 3 is a flowchart illustrating a method for supporting mobility of a mobile station according to an embodiment of the present invention.

The mobile station receives neighbor cell information and cell reselection information from a base station of a present cell (step 310). The neighbor cell information includes downlink frame information of the other RAT cell and the cell reselection information includes thresholds for determining whether or not the quality of the other RAT cell shall be measured.

Next, it is determined whether or not the mobile station shall measure the quality of the other RAT cell using the thresholds of the cell reselection information (step 320). That is, if the quality of the present cell checked by the mobile station is equal to or lower than the threshold of the cell selection information, it is determined that the quality of the other RAT cell would be measured and, if the quality of the present cell measured by the mobile station exceeds the threshold of the cell selection information, the step (step 310) of, at the mobile station, receiving the neighbor cell information and the cell reselection information from the base station of the present cell is repeated.

If it is determined that the mobile station would measure the quality of the other RAT cell, the mobile station measures the quality of the other RAT cell while the signal of the other RAT cell is received (step 330).

Next, it is determined whether cell reselection or a quality measurement report shall be performed according to the quality information of the neighbor cell measured by the mobile station (step 335). That is, if the quality of the present cell checked by the mobile station exceeds the quality of the neighbor cell measured by the mobile station, the step (step 310) of, at the mobile station, receiving the neighbor cell information and the cell reselection information from the base station of the present cell is repeated. In contrast, if the quality of the present cell checked by the mobile station is equal to or lower than the quality of the neighbor cell measured by the mobile station, the method progresses to a next step (step 350) of reporting the cell reselection or the quality measurement.

Next, it is checked whether the mobile station is in an idle mode (step 350). If the mobile station is in an active mode, the result measured by the mobile station is included in a measurement report message and the measurement report message is transmitted to the base station (step 355). The base station receives the measurement report message from the mobile station and determines whether the handover shall be performed with respect to the mobile station according to the measured result included in the measurement report message. If the

base station transmits the command indicating that the handover should be performed, that is, the handover command message, to the mobile station, the mobile station performs handover into the neighbor cell (step 360). In this step (step 360), the mobile station may use the neighbor cell information which is previously received from the base station.

In contrast, if the mobile station is in the idle mode, the cell reselection using the neighbor cell information is performed (step 370). Even in this step (step 370), the mobile station may use the neighbor cell information which is previously received from the base station.

Hereinafter, a WiMAX network will be, for example, described as the other RAT cell.

The neighbor cell information and the cell reselection information are transmitted in a state of being included in the system information block or the measurement control message transmitted in the E-UTRAN network as information elements.

FIG. 4A is a view showing an example in which a mobile station receives a system information block transmitted by the E-UTRAN base station and triggers a measurement report message.

The E-UTRAN base station 220 transmits the system information block including the present cell information and the neighbor cell information to the mobile station 210 (405).

In the E-UTRAN, the base station may provide WiMAX system information to the mobile station. In order to allow the mobile station to be moved from the E-UTRAN network to the WiMAX network, necessary information of the WiMAX cell should be previously received through the system information in the E-UTRAN network. The necessary information may be received through two types of system information as follows.

The system information block (SIB) is a message which is periodically transmitted from the E-UTRAN base station to the mobile station and includes the WiMAX neighbor cell necessary for allowing the mobile station to be moved from the cell managed by the E-UTRAN base station to the cell managed by the WiMAX base station. The system information as the neighbor cell information may include the base station identifier (BS ID) or information necessary for synchronization, which is performed in order to receive downlink information of the WiMAX neighbor cell, as shown in Table 2. The contents included in the system information block are shown in Table 2.

Table 2

| Name | Description |
|---|---|
| WiMAX RAT Identifier | This field contains the identifier of WiMAX RAT among the RAT IDs (e.g. GSM, CDMA 20001X, etc). |
| NAP ID | NAP (Network Access Provider) is a business entity that provides WiMAX radio access infrastructure to one or more WiMAX Network Service Providers (NSPs). |
| NSP ID | NSP (Network Service Provider) is a business entity that provides IP connectivity and WiMAX services to WIMAX subscribers compliant with the Service Level agreement it establishes with WiMAX subscribers. |
| BS ID | BS (Base Station) ID is a global unique identifier for a WiMAX base station. |
| MAC Version | MAC Version specifies the version of IEEE 802.16 to which BS or MS. |
| System Version | This indicates the Mobile WiMAX release as specified by the WiMAX Forum Mobile Air Interface System Profile. |
| QoS Levels Supported | QoS level which is supported in WiMAX cell (e.g. Real time service or Non-Real time service etc). |
| DL center carrier frequency of WiMAX neighbouring cells | Identifies the DL center carrier frequency of WiMAX neighboring cells.<br>DL center carrier frequency shall be a multiple of 250 kHz. |
| Bandwidth | Identifies the size of cell bandwidth (the difference between the highest and lowest frequencies available for network signals. It is also used to describe the amount of data that can be transmitted in a fixed amount of time). |
| FFT size | Indicates the FFT sizes supported by the MS. |
| Preamble index | Identifies the PHY-specific Preamble for the WiMAX neighboring BS. |
| Frame Duration Code | This field indicates the periodicity of the DL frame start preamble. |
| Frame Number | Indicates the current DL Frame Number and incremented by 1 MOD $2^{24}$ each frame. |
| Other parameter | In addition, other parameter similar to those used in intra-3GPP inter-RAT idle mode mobility can also be sent on the E-UTRAN broadcast channel. |

The system information block (SIB) may include information necessary for determining whether or not the mobile station which is in the idle mode (LTE_IDLE) needs to be moved from the cell managed by the E-UTRAN base

station to the cell managed by the WiMAX base station. Such information is a message which is periodically transmitted from the E-UTRAN base station to the mobile station. The contents included in the system information block are shown in Table 3.

Table 3

| Name | Description |
|---|---|
| WiMAX RAT Identifier | This field contains the identifier of WiMAX RAT among the RAT IDs (e.g. GSM, CDMA 20001X, etc). |
| WiMAX Start Measuring E-UTRAN Signal Quality Threshold | This field contains the threshold of the signal quality of the current cell to trigger WiMAX measurements |
| WiMAX Start Measuring E-UTRAN Rx Power Strength Threshold | This field contains the threshold of the Rx Power Strength of the current cell to trigger WiMAX measurements |

The mobile station 210 which receives the system information block from the base station 220 checks whether the quality of the present cell in the contents of the system information block satisfies the following condition (420).

The thresholds for determining whether or not the condition is satisfied include a WiMAX start measuring E-UTRAN signal quality threshold (hereinafter, referred to as a first threshold) and a WiMAX start measuring E-UTRAN receiver (Rx) power strength threshold (hereinafter, referred to as a second threshold).

That is, if the measured signal quality of the present cell (serving cell) is equal to or lower than the first threshold or if the measured Rx power strength of the

serving cell is equal to or lower than the second threshold, the measurement of the WiMAX cell is started.

The mobile station 210 collects the WiMAX neighbor cell information, includes the WiMAX neighbor cell information in the measurement report message, and transmits the measurement report message to the base station 220 (430).

The WiMAX neighbor cell information may be added to the measurement control message transmitted from the E-UTRAN base station to the mobile station such that the mobile station performs the measurement by another method for transmitting the system information including the WiMAX neighbor cell information.

FIG. 4B is a view showing an example in which a mobile station receives a measurement control message transmitted by the E-UTRAN base station and triggers the measurement control message.

The E-UTRAN base station 220 includes information, which is desired to be reported by the mobile station 210, in the measurement control message and transmits the measurement control message to the mobile station (410).

The mobile station 210 checks the measurement control message received from the base station 220 and determines whether or not the attribute of the WiMAX neighbor cell

shall be measured (420). Similarly, the determination whether or not the attribute of the WiMAX neighbor cell shall be measured uses the first threshold and the second threshold as described above.

The mobile station measures the signal quality and the Rx power strength from the signal transmitted by the E-UTRAN base station managed by the cell in which the mobile station is registered. The mobile station compares the measured value and the thresholds in the system information block received from the E-UTRAN base station, that is, the first threshold and the second threshold, and determines whether the information (e.g., the signal quality and the Rx power strength) of the WiMAX neighbor cell shall be measured or only the present cell information shall be continuously measured.

The mobile station 210 measures the attribute of the WiMAX neighbor cell according to the contents of the measurement control message, includes the attribute in the measurement report message, and transmits the measurement report message to the E-UTRAN base station (430).

If the quality (e.g., the signal quality and the Rx power strength) of the present E-UTRAN cell is equal to or lower than the threshold included in the system information block, the mobile station measures the WiMAX neighbor cell

information and reports the WiMAX neighbor cell information to the base station. The base station checks the measured result reported from the mobile station and performs handover of the mobile station into the WiMAX neighbor cell if the quality of the WiMAX neighbor cell is higher than that of the base station of the present cell.

In particular, in the embodiment of the present invention, the base station provides parameters such as a bandwidth, a preamble index, a frame duration code, a frame number and an FFT size to the mobile station.

The mobile station may acquire information used for a process of reading a preamble of a WiMAX frame through preamble index information. The mobile terminal may acquire a receive signal strength indicator (RSSI) and a carrier-to-interference-and-noise ratio (CINR) of the WiMAX cell after decoding the preamble, and read DL-MAP information of FIG. 5C necessary for DL synchronization. For example, if the mobile station acquires the preamble index, the mobile station can know a code "series to modulate" of FIG. 5A. The mobile station analyzes the code so as to recognize a cell ID and a segment, that is, a sector. In FIG. 5B, if the preamble index is 0, the mobile station reads only the preamble corresponding to a segment 1 of a cell 1. FIG. 5C is a view showing an example of the

structure of a WiMAX frame including the preamble and the DL-MAP which is the information for downlink synchronization. The mobile station may readily perform synchronization for receiving the downlink information of the WiMAX network through the DL-MAP information after decoding the preamble.

The mobile station can recognize DL carrier allocation information. The DL carrier allocation information facilitates the reception of the DL information. The mobile station can know the following DL carrier allocation through the FFT size. That is, the mobile station can know the number of DC subcarriers, the number of guard subcarriers, the number of all subcarriers within a symbol, pilots, the number of data subcarriers, the number of data subcarriers per subchannel, the number of subchannels through the FFT size.

FIG. 6 is a view showing an example of the structure of a system information block (SIB) in the case where the neighbor cell information and the cell reselection information are added to the system information block (SIB).

The transmission of the system information for the cell selection and cell reselection from the E-UTARN network to the WiMAX network uses a method for adding information elements to the system information block (SIB)

used in the E-UTRAN, and the system information may be transmitted to the mobile station through an SIB3 message. The transmission of the system information including the WiMAX neighbor cell uses a method for adding the information elements to the system information used in the E-UTRAN, and the system information may be transmitted to the mobile station through a SIB5 message.

Meanwhile, if the neighbor cell information and the cell reselection information are included in the measurement control message, the procedure of collecting the parameters of the measurement control message by the mobile station is changed. The meanings of the parameters of the measurement control message are shown in Table 4.

Table 4

| Name | Description |
|---|---|
| Measurement Identity | Identifier to discriminate the measurement report message. |
| Measurement Command | Indicates the purpose of measurement report message (e.g. Setup, Modify, Delete) |
| Measurement Type | Indicates the measurement type. (e.g. Intra frequency measurement, Inter frequency measurement, Inter RAT Measurement) |
| Report Criteria | Indicates the Event (e.g. Event3a, Event3b, Event3c, Event3d). |
| Other Information | Cell list, Physical channel information elements, etc. |

Hereinafter, a process of measuring the quality of the neighbor RAT cell and reporting the measured result will be described in detail.

In order to allow the mobile station to be moved from the E-UTRAN network to the WiMAX network, the mobile

station should measure the attribute (e.g., the signal quality and the Rx power strength) of the WiMAX cell. This measurement can be performed in the idle (LTE_IDLE) mode and the active (LTE_ACTIVE) mode. The idle (LTE_IDLE) mode and the active (LTE_ACTIVE) mode described herein are as follows.

The idle (LTE_IDLE) mode indicates the mode in which the mobile station has only minimum information in order to perform the communication between the mobile station and the E-UTRAN base station. In order to transmit a message of an upper layer between the mobile station and the base station, the mode should transition to the active (LTE_ACTIVE) mode. The supporting of the mobility in the idle (LTE_IDLE) mode is performed by the cell reselection.

The active (LTE_ACTIVE) mode indicates the mode in which the mobile station has all information necessary for performing the communication between the mobile station and the E-UTRAN base station, that is, the mode in which the message of the upper layer can be transmitted between the mobile station and the base station. The supporting of the mobility in the active (LTE_ACTIVE) mode is performed by handover.

The mobile station which is in the idle (LTE_IDLE) mode in the E-UTRAN network may measure a specific

attribute of the E-UTRAN cell and the WiMAX cell in order to perform the cell reselection, and schedule a DRX duration such that a receiver is turned off (DRX off duration) in a predetermined period so as to reduce power consumption. It is determined whether or not the mobile station shall measure the attribute of the WiMAX neighbor cell, by at least one of the first threshold or the second threshold.

An example of the rule of measuring and stopping the attribute of the WiMAX neighbor cell by the mobile station is as follows.

First, if the measured signal quality of the serving cell is equal to or lower than the first threshold or if the measured Rx power strength of the serving cell is equal to or lower than the second threshold, the measurement of the WiMAX cell is started.

During the measurement of the WiMAX cell, if the measured signal quality of the serving cell is higher than the first threshold or if the measured Rx power strength of the serving cell is higher than the second threshold, the measurement of the WiMAX cell is stopped.

Even in the mobile station which is registered in the E-UTRAN network is currently in the active (LTE_ACTIVE) mode, the same rule is applied similar to the mobile

station which is in the idle (LTE_idle) mode, and the necessary information of the WiMAX cell is measured.

When the mobile station which is in the active (LTE_ACTIVE) mode measures the WiMAX cell information, a measurement gap is required. The measurement gap indicates information for scheduling duration which can measure the information about the serving base station or another network for a predetermined period of time while the mobile station communicates with the serving base station. The mobile station which is registered in the E-UTRAN network can measure the WiMAX cell information according to the duration scheduled in the measurement gap. The measuring method of the mobile station in the active (LTE_ACTIV) mode may be changed according to the capability (UE capability) of the mobile station. For example, if the mobile station is a single receiver, that is, if the mobile station cannot simultaneously receive signals of two networks, the measurement gap is required. If the mobile station is a dual receiver, that is, if the mobile station can simultaneously receive the signals of the two networks, the signal of the other RAT cell except the network in which the mobile station is currently registered can be received or measured without the measurement gap.

The mobile station which is in the active

(LTE_ACTIVE) mode measures the RSSI and the CINR of the WiMAX neighbor cell. The mobile station may classify the WiMAX neighbor cell using a WiMAX neighbor cell list included in the measurement control message and the system information received from the base station. The mobile station may transmit the measured RSSI or CINR to the WiMAX neighbor cell through the measurement report message, and may transmit the measurement report only when the measured RSSI or CINR exceeds a specific threshold. In addition, the transmission of the measurement report message may use both a method for periodically transmitting the message from the mobile station to the base station and a method for reporting the message when a specific event is generated. The event which can trigger the inter RAT measurement report will now be described.

That is, the event includes a case where the estimated quality of the serving system is equal to or lower than a specific threshold and the estimated quality of the target system is higher than the specific threshold (event 3a), a case where the estimated quality of the target system is equal to or lower than the specific threshold (event 3b), a case where the estimated quality of the target system is higher than the specific threshold (event 3c), and a case where a best cell is changed in the

target system (event 3d).

The mobile station may control the transmission amount of the measurement report message using a hysteresis parameter and a time-to-trigger parameter.

As shown in FIG. 7, only when the signal strength of the neighbor cell 1 is higher than a hysteresis margin although higher than the threshold, the event 3a is triggered and the measurement report message is transmitted, thereby adjusting the amount of message.

FIG. 8 is a graph showing a method for adjusting the transmission of measurement report message in consideration of a time-to-trigger parameter according to an embodiment of the present invention. As shown in FIG. 8, when the signal strength of the neighbor cell 1 is higher than the threshold for a period of time corresponding to the time-to-trigger parameter although being higher than the threshold, the event 3a is triggered and the measurement report message is transmitted, thereby adjusting the amount of message.

As described above, the mobile station receives the neighbor cell information and the cell reselection information from the base station before being moved to the WiMAX cell and previously acquires the WiMAX neighbor cell such that the mobile station is readily moved from the E-

UTRAN network to the WiMAX network and a time consumed for the movement of the mobile station is reduced.

It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

【Industrial Applicability】

The present invention is applicable to an inter radio access technology (RAT), and more particularly, to an access algorithm of an E-UTRAN network which is provided in the 3GPP and apparatuses associated therewith, such as a mobile station and a base station.

【CLAIMS】

【Claim 1】 A method of supporting mobility between E-UTRAN network and the other RAT cell, the method comprising:

receiving cell reselection information and neighbor cell information from a base station (BS) of a present cell, wherein the cell reselection information includes thresholds for determining whether the quality of the other RAT cell shall be measured or not, wherein the neighbor cell information includes a frame duration code and a frame number of a downlink frame in the other RAT cell, wherein the frame duration code indicates the start preamble of the downlink frame;

determining whether a mobile station (MS) shall measure the quality of the other RAT cell or not using the thresholds; and

measuring the quality of the other RAT cell and reselecting a cell or transmitting the measured result to the BS through a measurement report message according to the measured result, if it is determined that the MS would measure the quality of the other RAT cell.

【Claim 2】 The method of claim 1, wherein the neighbor cell information includes at least one of bandwidth

information, a preamble index or FFT size, wherein the bandwidth information indicates a cell bandwidth size of the other RAT cell, wherein the preamble index indicates a specific preamble of a physical layer in the other RAT cell.

【Claim 3】 The method of claim 1, wherein the determining comprises determining that the MS would measure the quality of the other RAT cell if the signal quality of the present cell is equal to or lower than a signal quality threshold or the Rx power strength of the present cell is equal to or lower than an Rx power strength threshold.

【Claim 4】 The method of claim 1, wherein the transmitting through the measurement report message comprises adjusting, by the MS, the transmission frequency of the measurement report message using at least one of a hysteresis parameter or time-to-trigger parameter.

【Claim 5】 The method of claim 1, further comprising receiving a handover command message from the BS and performing handover into the other RAT cell.

【Claim 6】 The method of claim 1, wherein the other RAT

cell is a WiMAX cell.

【Claim 7】 A method of supporting mobility between E-UTRAN network and the other RAT cell, the method comprising:

transmitting cell reselection information and neighbor cell information from a base station (BS) to a mobile station (MS) periodically, wherein the cell reselection information includes thresholds for determining whether the quality of the other RAT cell shall be measured or not, wherein the neighbor cell information includes a frame duration code and a frame number of a downlink frame in the other RAT cell, wherein the frame duration code indicates the start preamble of the downlink frame;

at the MS, receiving a measurement report message which includes the result of measuring the quality of the other RAT cell according to the thresholds; and

transmitting a command which indicates a handover of the MS according to the measured result.

【Claim 8】 The method of claim 7, wherein the neighbor cell information and the cell reselection information are transmitted in a way that information elements are added to a system information block transmitted from the BS to the MS periodically.

【Claim 9】 The method of claim 7, wherein the cell reselection information and the neighbor cell information are transmitted in a way that system information is added to a measurement control message transmitted from the BS to the MS periodically, and the system information includes the cell reselection information and the neighbor cell information.

【Claim 10】 The method of claim 7, wherein the neighbor cell information includes at least one of bandwidth information, a preamble index or FFT size, wherein the bandwidth information indicates cell bandwidth size of the other RAT cell, wherein the preamble index indicates a specific preamble of a physical layer in the other RAT cell.

【Claim 11】 The method of claim 7, wherein the other RAT cell is a WiMAX cell.

【Claim 12】 A mobile station supporting mobility between E-UTRAN network and other RAT, the mobile station comprising:

system information receiving portion to receive cell reselection information and neighbor cell information from a base station (BS) of a present cell periodically, wherein the cell reselection information includes thresholds for determining whether the quality of the other RAT cell shall be measured or not, wherein the neighbor cell information includes a frame duration code and a frame number of a downlink frame in the other RAT cell, wherein the frame duration code indicates the start preamble of the downlink frame;

quality measurement portion to measure the quality of other RAT cell if it is determined that the quality of the other RAT cell would be measured according to the thresholds; and

measurement report portion to transmit a result of measuring the quality of the other RAT cell to the BS through a measurement report message.

【Claim 13】 The mobile station of claim 12, wherein the quality measurement portion measures the quality of the other RAT cell according to duration scheduled in a measurement gap registered in the mobile station and the BS if the mobile station is in an active mode.

【Claim 14】 The mobile station of claim 12, wherein the mobile station is a dual receiver which is able to receive signals of the E-UTRAN and the other RAT cell simultaneously.

FIG. 1A

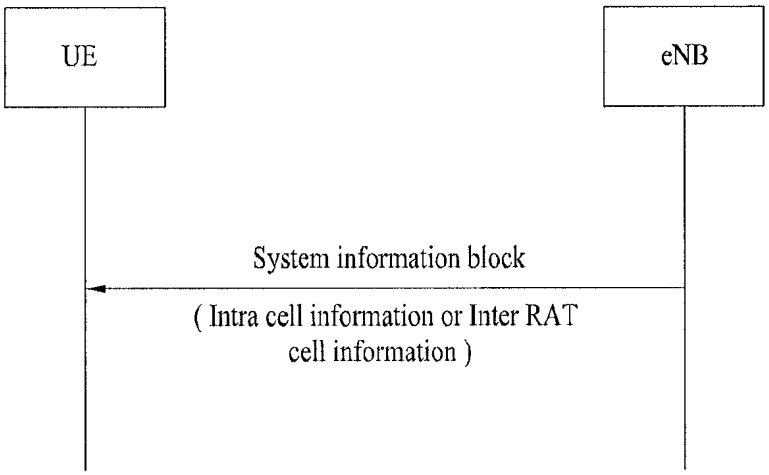

UE
eNB
System information block
( Intra cell information or Inter RAT cell information )

FIG. 1B

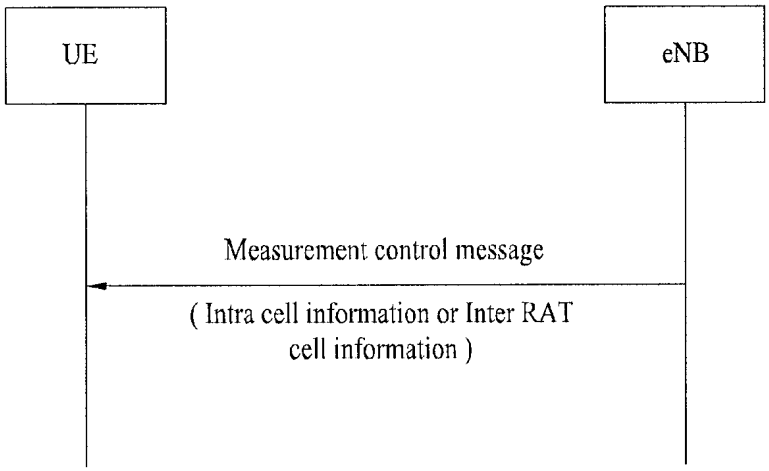

UE
eNB
Measurement control message
( Intra cell information or Inter RAT cell information )

FIG. 2

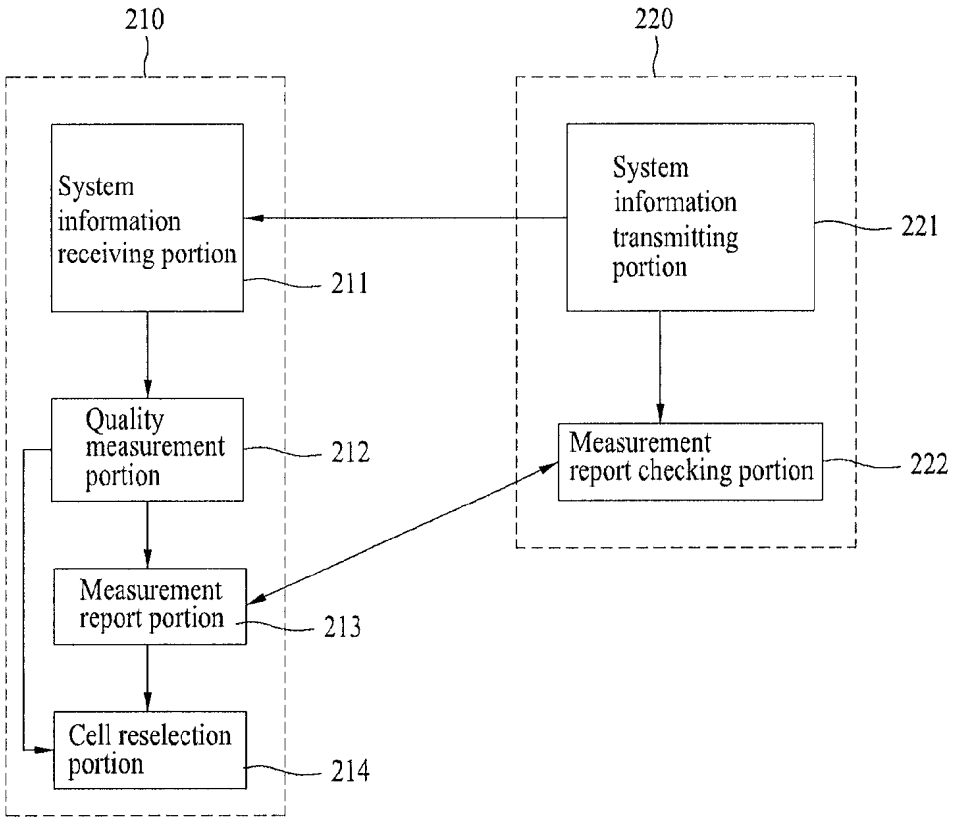

210
220
System information receiving portion
211
System information transmitting portion
221
Quality measurement portion
212
Measurement report checking portion
222
Measurement report portion
213
Cell reselection portion
214

FIG. 3

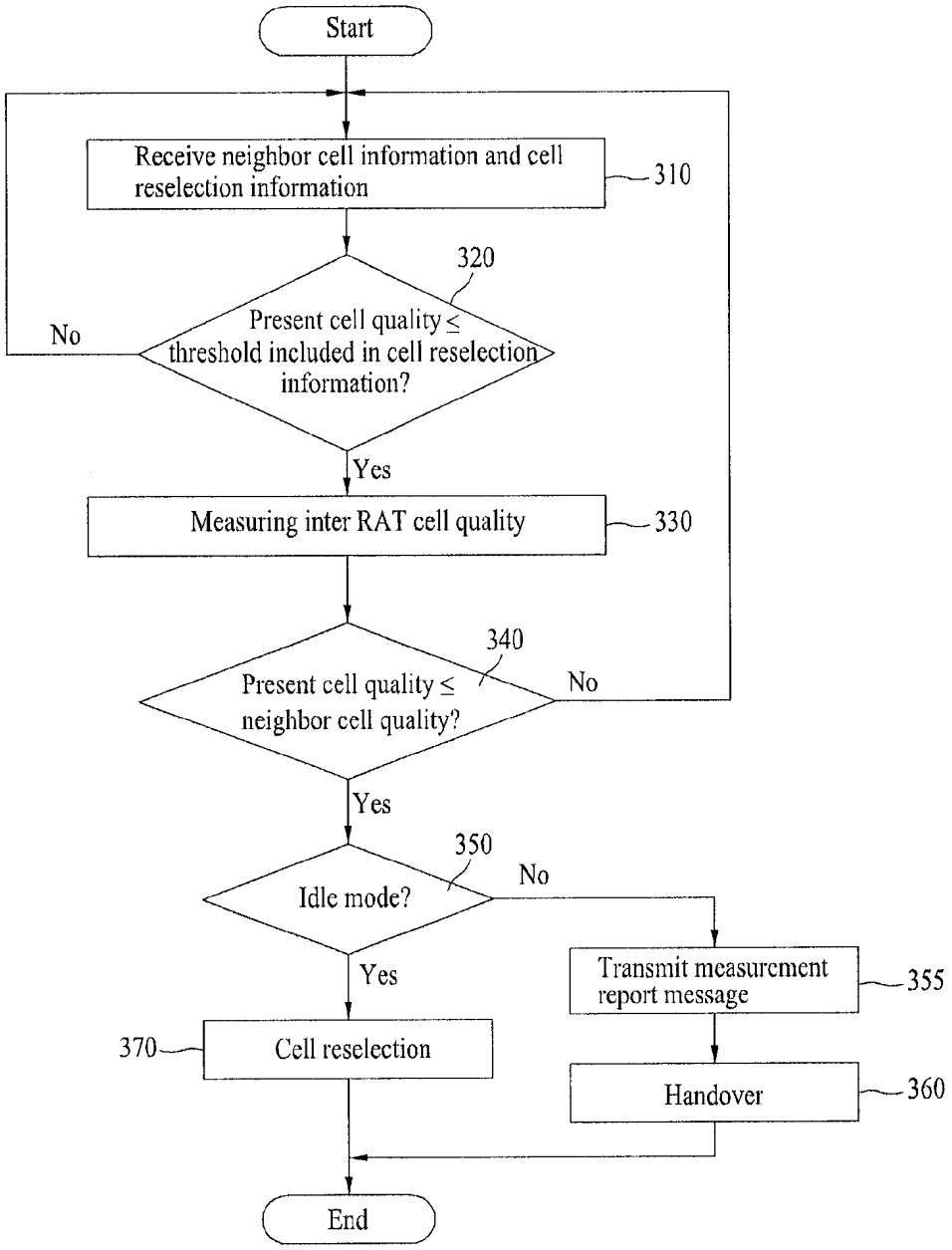

Start
Receive neighbor cell information and cell reselection information
310
320
Present cell quality ≤ threshold included in cell reselection information?
No
Yes
Measuring inter RAT cell quality
330
340
Present cell quality ≤ neighbor cell quality?
No
Yes
350
Idle mode?
No
Yes
Transmit measurement report message
355
370
Cell reselection
Handover
360
End

FIG. 4A

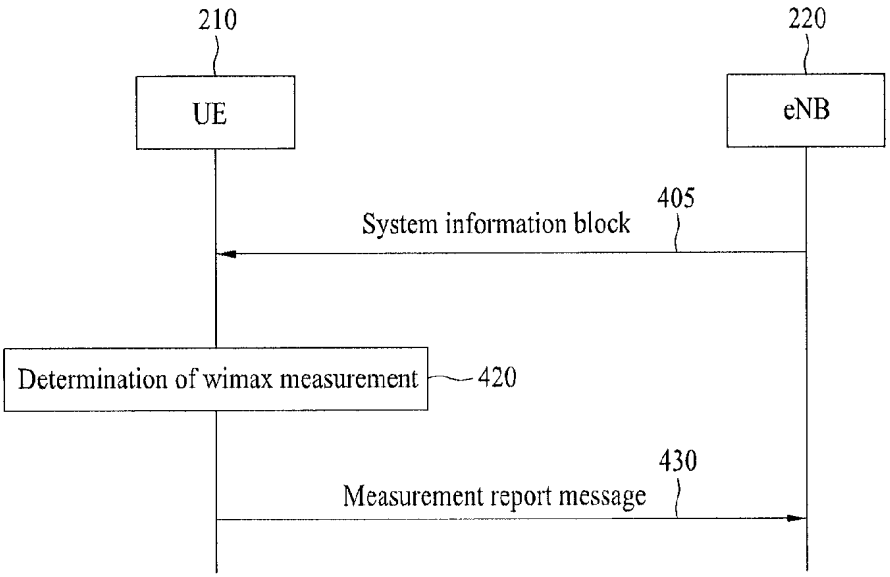

210
220
UE
eNB
405
System information block
Determination of wimax measurement
420
430
Measurement report message

FIG. 4B

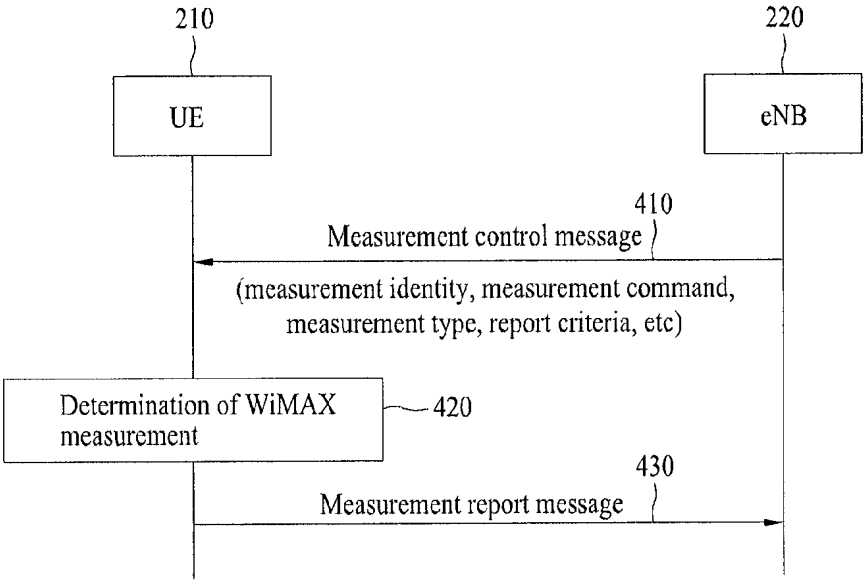

210
220
UE
eNB
410
Measurement control message
(measurement identity, measurement command, measurement type, report criteria, etc)
Determination of WiMAX measurement
420
430
Measurement report message

FIG. 5A

| Preamble Index | Cell ID | segment | Series to modulate |
|---|---|---|---|
| 0 | 1 | 1 | 0xA6F294537B285E1844677D1 33E4D53CCB1F182DE00489E5 3E6B6E |

FIG. 5B

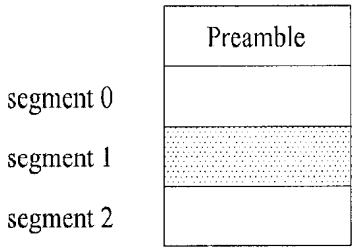



FIG. 5C

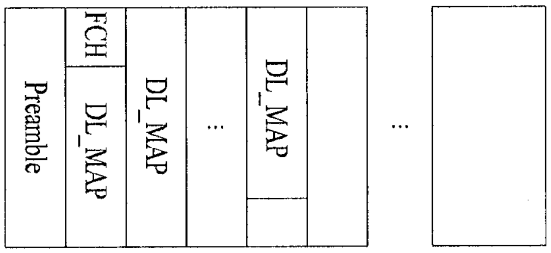


FIG. 6

| System Information Block 3 | System Information Block 5 |
|---|---|
| Information Elements<br>{<br>Cell reselection information<br>} | Information Elements<br>{<br>Neighbor cell information<br>} |
| | |
| Other information | Other information |

FIG. 7

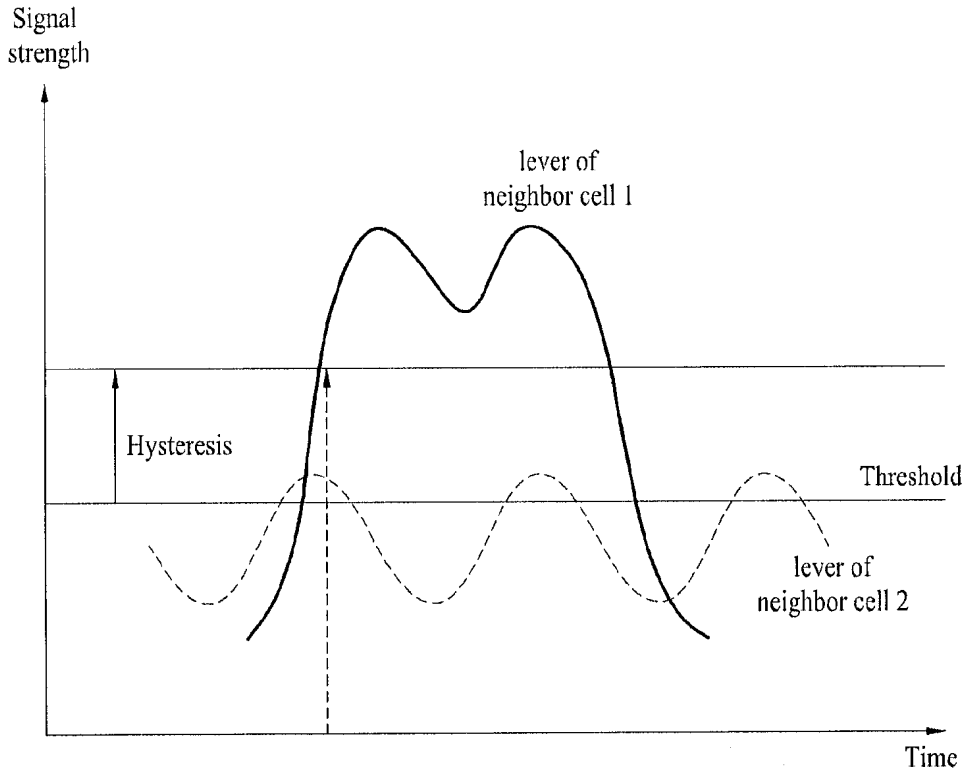
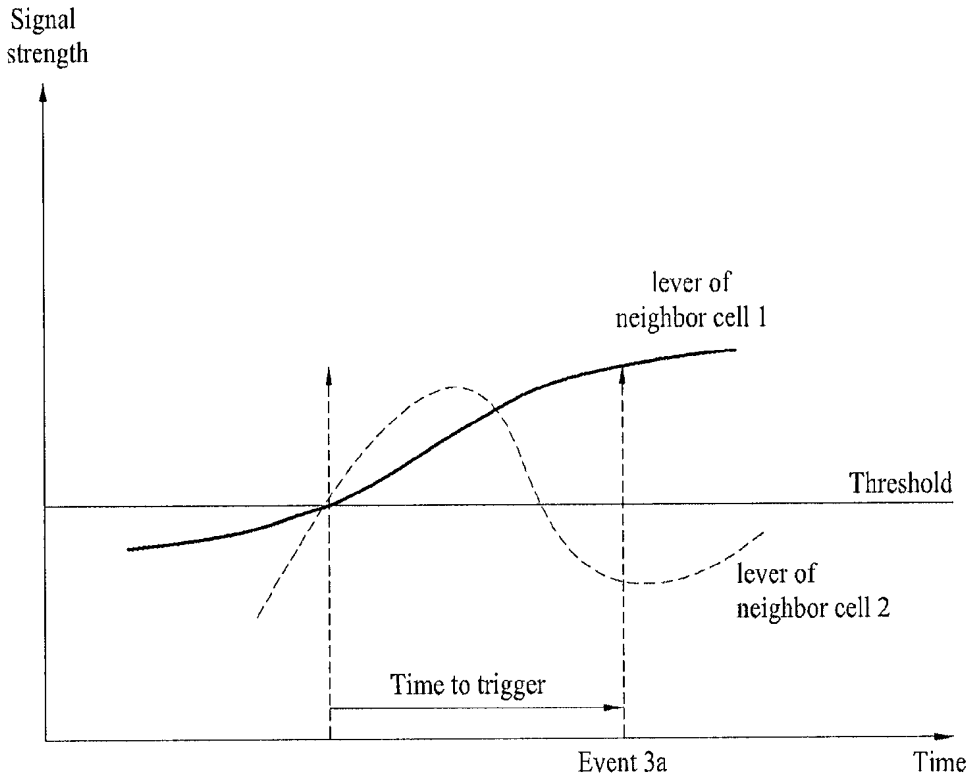

Signal strength
lever of neighbor cell 1
Hysteresis
Threshold
lever of neighbor cell 2
Time

FIG. 8


Signal strength
lever of neighbor cell 1
Threshold
lever of neighbor cell 2
Time to trigger
Event 3a
Time

Optimisation of neighbourcells

# PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
Wuyts, Koenraad Maria
Royal KPN N.V.
P.O. Box 95321
2509 CH The Hague
PAYS-BAS

# PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

| | |
|---|---|
| Applicant's or agent's file reference<br>403446WO | Date of mailing<br>*(day/month/year)*<br>24 January 2011 (24-01-2011)<br>**FOR FURTHER ACTION** See paragraphs 1 and 4 below |
| International application No.<br>PCT/EP2010/064823 | International filing date<br>*(day/month/year)*<br>5 October 2010 (05-10-2010) |
| Applicant<br>KONINKLIJKE KPN N.V. | |

1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   **Filing of amendments and statement under Article 19:**
   The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

   **When?** The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

   **Where?** Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 338.82.70

   **For more detailed instructions, see** *PCT Applicant's Guide*, International Phase, paragraphs 9.004 - 9.011.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

| Name and mailing address of the International Searching Authority | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL-2280 HV Rijswijk<br>Tel. (+31-70) 340-2040<br>Fax: (+31-70) 340-3016 | REICHERT, Jacques<br>Tel: +49 (0)89 2399-5951 |

Form PCT/ISA/220 (July 2010)

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| Applicant's or agent's file reference | **FOR FURTHER ACTION** | see Form PCT/ISA/220 as well as, where applicable, item 5 below. |
|---|---|---|
| 403446WO | | |
| International application No. | International filing date *(day/month/year)* | (Earliest) Priority Date *(day/month/year)* |
| PCT/EP2010/064823 | 05/10/2010 | 07/10/2009 |
| Applicant | | |
| KONINKLIJKE KPN N.V. | | |

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

[X] the international application in the language in which it was filed

[ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title**,

[ ] the text is approved as submitted by the applicant

[X] the text has been established by this Authority to read as follows:

SYSTEM FOR UPDATING A NEIGHBOR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

5. With regard to the **abstract**,

[X] the text is approved as submitted by the applicant

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 1

[ ] as suggested by the applicant

[ ] as selected by this Authority, because the applicant failed to suggest a figure

[X] as selected by this Authority, because this figure better characterizes the invention

b. [ ] none of the figures is to be published with the abstract

# INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/064823

**A. CLASSIFICATION OF SUBJECT MATTER**
INV. H04W36/02 H04W24/10
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 practical, search terms used)
EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X<br><br>Y | WO 2009/119699 A2 (NEC CORP [JP]; SERRAVALLE FRANCESCA [GB]) 1 October 2009 (2009-10-01)<br>page 7, line 28 - page 9, paragraph 15<br>page 12, paragraph 13 - page 13, paragraph 24<br>claims 1,75,76<br>figures 3,5,8,9,10 | 1,9,13<br><br>2-8, 10-12,14 |
| Y | WO 2009/064716 A1 (QUALCOMM INC [US]; FLORE ORONZO [US]; GRILLI FRANCESCO [US]; CHAPONNIE) 22 May 2009 (2009-05-22)<br>paragraph [0052] - paragraph [0056]<br>paragraph [0062] - paragraph [0065] | 2-8, 10-12,14 |

-/--

[X] Further documents are listed in the continuation of Box C. [X] 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 document 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 | Date of mailing of the international search report |
|---|---|
| 17 January 2011 | 24/01/2011 |

| Name and mailing address of the ISA/ | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016 | Patras, Paula Larisa |

3

Form PCT/ISA/210 (second sheet) (April 2005)

# INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/064823

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | WO 2009/019319 A2 (NOKIA SIEMENS NETWORKS OY [FI]; CENTONZA ANGELO [GB]) 12 February 2009 (2009-02-12) * abstract page 7, line 15 - page 8, line 3 page 8, line 22 - page 9, line 20 | 1-14 |
| A | WO 2009/045070 A2 (LG ELECTRONICS INC [KR]; PARK GI WON [KR]; KIM YONG HO [KR]; LEE JIN [) 9 April 2009 (2009-04-09) the whole document | 1-14 |

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2010/064823

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| WO 2009119699 A2 | 01-10-2009 | EP 2255573 A2 | 01-12-2010 |
| | | GB 2458886 A | 07-10-2009 |
| WO 2009064716 A1 | 22-05-2009 | CA 2703812 A1 | 22-05-2009 |
| | | CN 101855927 A | 06-10-2010 |
| | | EP 2220894 A1 | 25-08-2010 |
| | | KR 20100093087 A | 24-08-2010 |
| | | US 2009137265 A1 | 28-05-2009 |
| WO 2009019319 A2 | 12-02-2009 | CN 101822077 A | 01-09-2010 |
| | | EP 2179597 A2 | 28-04-2010 |
| | | US 2010208693 A1 | 19-08-2010 |
| WO 2009045070 A2 | 09-04-2009 | KR 20090034261 A | 07-04-2009 |
| | | US 2010216474 A1 | 26-08-2010 |

# PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

# PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Date of mailing
*(day/month/year)* see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

**FOR FURTHER ACTION**
See paragraph 2 below

| International application No. | International filing date *(day/month/year)* | Priority date *(day/month/year)* |
|---|---|---|
| PCT/EP2010/064823 | 05.10.2010 | 07.10.2009 |

International Patent Classification (IPC) or both national classification and IPC
INV. H04W36/02 H04W24/10

Applicant
KONINKLIJKE KPN N.V.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0
Fax: +49 89 2399 - 4465

Date of completion of this opinion
see form PCT/ISA/210

Authorized Officer
Patras, Paula Larisa
Telephone No. +49 89 2399-4081

**Box No. I Basis of the opinion**

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

**Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Yes: | Claims | 2-8, 10-12, 14 |
| | No: | Claims | 1, 9, 13 |
| Inventive step (IS) | Yes: | Claims | |
| | No: | Claims | 1-14 |
| Industrial applicability (IA) | Yes: | Claims | 1-14 |
| | No: | Claims | |

2. Citations and explanations

**see separate sheet**

**Box No. VII Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

**Box No. VIII Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

Reference is made to the following documents; the numbering will be adhered to in the rest of the procedure:

D1 WO 2009/119699 A2 (NEC CORP [JP]; SERRAVALLE FRANCESCA [GB]) 1 October 2009 (2009-10-01)

D2 WO 2009/064716 A1 (QUALCOMM INC [US]; FLORE ORONZO [US]; GRILLI FRANCESCO [US]; CHAPONNIE) 22 May 2009 (2009-05-22)

**Concerning Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability**

1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claim 1** is not new in the sense of Article 33(2) PCT.

Document **D1** discloses, according to the features of **claim 1** (the text in brackets refers to **D1**), **a system** (page 6, lines 3 and 4:"mobile(cellular) telecommunication system"; claim 1) **for updating a neighbour cell list in a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined** (page 8 line 27 to page 9 line 1:"The first base station 310 then updates its Inter-Radio Access Technology (Inter-RAT) neighbour relation list"), **the system comprising:**

**- a detector configured for detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network** (figure 8:"35"; page 12, lines 26-27:"handover module 35 for generating and transmitting handover requests");

**- a selector configured for selecting a part of the user terminals** (figure 8: "33"- Identifier management module");

**- a request generator configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes** (figure 8:"33"; page 12, lines 22 to 24:"the identifier management module 33 is operable for requesting information relating to identifiers of target gateway and basestation components") **of at least one of the first wireless access network and the second wireless access network** (figure 3; page 8, lines 6 to 13:"a first base station 310 in an LTE network may use the process to determine whether there are other neighbouring base stations in the area, for example base stations that are part of other types of networks. The base station 310 sends a Report Neighbour Request message 316 to a user device (UE) 314 that is connected to the base station 310, requesting that the UE 314 reports the presence of any neighbouring base stations to the first base station 310);

**- a receiver configured for receiving the cell information from the one or more of the selected user terminals** (figure 8:"21"; page 12, lines15 to 17:"transceiver circuit 21 which is operable to transmit signals to and to receive signals from the mobile telephones"); **and**

**- updating means configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information** (page 8 line 27 to page 9 line 1:"first base station 310 then updates its Inter-Radio Access Technology (Inter-RAT) neighbour relation list").

As a consequence **claim 1** is not new (see Article 33(2) PCT).

2 The same considerations as made in paragraph 1 of this section regarding **claim 1** are also valid for independent **claims 9 and 13**, said **claim 9** comprising the same feature combination of **claim 1** in terms of a method claim, and **claim 13** being the implementation of the method in **claim 9** in a computer program.

Therefore independent **claims 9 and 13** are not new (see Article 33(2) PCT).

3 The subject-matter of **claim 14** does not involve an inventive step within the meaning of Article 33(1) and (3) PCT.

Document **D1** discloses, according to the features of **claim 14** (the text in brackets refers to **D1**), **a mobile user terminal** (figure 9), **the terminal comprising:**

**- a receiver for receiving the request for reporting cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network** (figure 9:"71");

**- scanning means for detecting the cell information from the wireless access nodes** (figure 9:"89"; page 13, line 10:"identifier request module"), **at least one of the wireless access nodes scanned by the terminal being absent in the neighbour cell list ,**

**- a transmitter for transmitting the detected cell information** (figure 9:"71"; page 13, line 2:"transceiver circuit"),

The difference between the mobile user terminal of **claim 14** and the one disclosed in document **D1** consists of the following features:

**[1]** the terminal contains a neighbour cell list of the first wireless access node;

**[2]** at least one of the wireless access nodes scanned by the terminal being absent in the neighbour cell list;

**[3]** the mobile user terminal is arranged for temporarily storing the detected cell information and transmitting the detected cell information to the second wireless access node after being transferred from the first to the second wireless access network.

Feature **[1]** is not implicitly disclosed in document **D1**. Nevertheless, it is noted that storing a neighbor cell list provided by a serving cell in a mobile terminal is a well known capability of user terminals performing cell reselection and handover (see for example 3GPP TS 36.300 v8.9.0, chapter 10.2.1).

Regarding feature **[2]**, it is obvious that a mobile terminal having a stored neighbor cell list will, when moving through the network, scan cells absent from the stored cell list.

The technical problem solved by feature **[3]** is "how to adapt a mobile terminal to efficiently update a neighbor cell list of a network node after being handed over to that node". Document **D2** discloses, in the context of neighbor list up-

dating techniques in a communication system, the fact that a mobile terminal can be adapted for notifying a newly selected cell about a missing neighbor list information (see D2: paragraphs [0052] and [0053]).

The skilled person would, without use of inventive skill, apply the teaching of document **D2** in order to solve the above formulated technical problem.

As a consequence, the subject-matter of **claim 14** is not inventive (see Article 33(3) PCT).

4 Furthermore, dependent **claims 2 to 8** along with dependent **claims 10 to 12** do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to novelty or inventive step (Articles 33(1) PCT), for the reason that the subject-matter of said claims is either directly derivable from the disclosure of documents **D1** and **D2** (**D2** paragraphs [0052]-[0058] for claims 2, 3, 4, 5, 6, 10, 11 and 12), or represents simple details which are generally known to the person skilled in the field of neighbor cell list updating techniques (claims 7, 8).

Therefore said claims are also considered not inventive (Article 33(3) PCT).

## Concerning Item VIII

## Certain observations on the international application

1 In addition, the applicant's attention is drawn to the following clarity objections (Article 6 PCT):

1.1 **Claim 1**, despite being directed to an apparatus (i.e. a system in a telecommunication architecture) defines part of the system components in terms of the operations they carry out. This latter manner of claiming is proper to a claim setting out a method or a procedure whereas a claim to an apparatus should be phrased in terms of the structural features which allow said operations to be actually performed. Since the claim contains a mixture of method and apparatus features, its category is not clear, which, in turn, results in the scope of protection conferred by the claim being also unclear (Article 6 PCT).

Similar objections equally apply to **claims 2-9**.

1.2 **Claim 15** refers to a "mobile user terminal configured for use in the method according to one or more of the claims 10-12". The usage of the mobile in the specified method is not limiting the scope of the said claim (see Guidelines III-12.4.16), for the reason that any standard mobile would respond to a neighbor cell information report request.

## Concerning Item VII

## Certain defects in the international application

1 Furthermore, the applicant's attention is drawn to the following formal comments and/or objections:

1.1 Independent claims are not in the two-part form in accordance with Rule 6.3 (b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document **D1**) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

1.2 All features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

1.3 According to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the prior art documents cited above is not mentioned in the description, nor are these documents identified therein.

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

| | |
|---|---|
| General information | For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities. |
| Amending claims under Art. 19 PCT | Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220. |
| Filing a demand for international preliminary examination | In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT).<br><br>If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT). |
| Filing informal comments | After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box. |
| End of the international phase | At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report). |
| Relevant PCT Rules and more information | Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003 |

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| Applicants: OOSTVEEN, Job Cornelis et al. | Examiner: Unknown |
| Serial No.: Unknown | Group Art Unit: Unknown |
| Filed: Concurrently herewith | Docket No.: US17827 |
| Customer No.: 90057 | Confirmation No.: Unknown |
| Title: SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE | |

MAIL STOP: PCT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**PRELIMINARY AMENDMENT**

Dear Sir:

Prior to taking up this application for examination, please enter the following amendments:

**Amendments to the Specification** begin on page 2;

**Amendments to the Claims** begin on page 3;

**Remarks** begin on page 9.

## IN THE SPECIFICATION

**Please amend the Specification as follows:**

Please insert the following paragraph on page 1, line 2, as follows:

PRIORITY CLAIM TO RELATED APPLICATIONS

This application is a national stage application under 35 U.S.C. § 371 of PCT/EP2010/064823, filed October 5, 2010, published as WO 2011/042433 A1 on April 14, 2011, and claiming priority to European Application No. 09172399.9, filed October 7, 2009, which application and publication is incorporated herein by reference and made a part hereof in its entirety, and the benefit of priority of which is claimed herein.

## IN THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application:

1.(Original): A system for updating a neighbour cell list in a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined, the system comprising:

- a detector configured for detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;
- a selector configured for selecting a part of the user terminals;
- a request generator configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;
- a receiver configured for receiving the cell information from the one or more of the selected user terminals; and
- updating means configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

2.(Original): The system according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the first wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless nodes of the first wireless access network via the second wireless access node,

the system further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the first wireless access network via the second wireless access node.

3.(Original): The system according to claim 2, further comprising a data transfer system for transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node.

4.(Currently Amended): The system according to claim 1 ~~one or more of the preceding claims~~,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node,

the system further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node.

5.(Original): The system according to claim 4, further comprising a data transfer system for transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

6.(Currently Amended): The system ~~infrastructure~~ according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node,

further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

7.(Currently Amended): The system according to claim 1 ~~one or more of the preceding claims~~, wherein the telecommunications system is further configured for receiving location information from one or more of the detected user terminals and wherein the location information is used as a selection parameter for selecting the part of the detected user terminals.

8.(Currently Amended): The system according to claim 1 ~~one or more of the preceding claims~~ , wherein one or more thresholds, possibly service-dependent, are defined in the telecommunications system for transferring the user terminals between the first wireless access network and the second wireless access network and wherein at least one of the thresholds is used as a selection parameter for selecting the part of the detected user terminals.

9.(Original): In a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined, a method for updating at least one of the first and second neighbour cell lists comprising the steps of:

- detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;
- selecting a part of the user terminals;
- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;
- receiving the cell information from the one or more of the selected user terminals; and
- updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

10.(Currently Amended): The method according to claim 9, comprising the steps of:

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the first wireless access network;
- receiving the cell information of the wireless nodes of the first wireless access network via the second wireless access node, and

- transferring the selected user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the first wireless access network via the second wireless access node~~, and~~

~~optionally, transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node~~.

11.(Currently Amended): The method according to claim 9 ~~or 10~~, comprising the steps of:

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

- receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node, and

- transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node~~, and~~

~~optionally, transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node~~.

12.(Currently Amended): The method according to claim 9, comprising the steps of:

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

- receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node; and

transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

13.(Currently Amended): ~~A computer program comprising software code portions configured for, when executed by at least one processor, performing the method of one or more of the claims 9-12~~ A non-transitory computer-readable storage medium containing a set of instructions that, when executed by a processor in a telecommunications architecture comprising a first wireless

access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined, performs a method for updating at least one of the first and second neighbour cell lists, including the steps of:

- detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;
- selecting a part of the user terminals;
- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;
- receiving the cell information from the one or more of the selected user terminals; and
- updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

14.(Currently Amended): A mobile user terminal configured for use in the method according to claim 9~~one or more of the claims 9-11~~, wherein the mobile terminal, in use, contain a neighbour cell list of the first wireless access node, the terminal comprising:

- a receiver for receiving the request for reporting cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;
- scanning means for detecting the cell information from the wireless access nodes, at least one of the wireless access nodes being absent in the neighbour cell list,
- a transmitter for transmitting the detected cell information,
- wherein the mobile user terminal is arranged for temporarily storing the detected cell information and transmitting the detected cell information to the second wireless access node after being transferred from the first to the second wireless access network.

15.(New): The method according to claim 10, further comprising the step of transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node.

16.(New): The method according to claim 10, comprising the steps of:

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

- receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node, and

- transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node.

17.(New): The method according to claim 11, comprising the step of transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

18.(New): The method according to claim 16, comprising the step of transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

## REMARKS AND CONCLUSION

The specification has been amended to update the claim of priority. No new matter has been added.

Claims 4, 6-8, and 10-14 have been amended, no claims are cancelled, and claims 15-18 have been added. As a result, claims 1-18 are pending in this patent application. No new matter has been added by the amendments to the claims.

Applicants respectfully submit that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's representative at the phone number provided below to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 50-5047.

Respectfully submitted,

/Natalya Hartmann, Reg No 62119/

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Agent for Applicants

Date of Deposit: April 3d, 2012
This paper is being filed on the date indicated above using the USPTOs electronic filing system EFS-Web, and is addressed to The Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

# PATENT COOPERATION TREATY

From the RECEIVING OFFICE

To:

Wuyts, Koenraad Maria
Royal KPN N.V.
P.O. Box 95321
2509 CH The Hague
PAYS-BAS

# PCT

NOTIFICATION OF THE INTERNATIONAL APPLICATION NUMBER AND OF THE INTERNATIONAL FILING DATE

(PCT Rule 20.2(c))

| | |
|---|---|
| Date of mailing *(day/month/year)* | 04-11-2010 |
| Applicant's or agent's file reference 403446WO | IMPORTANT NOTIFICATION |

| International application No. | International filing date *(day/month/year)* | Priority date *(day/month/year)* |
|---|---|---|
| PCT/EP2010/064823 | 5 October 2010 (05-10-2010) | 7 October 2009 (07-10-2009) |

Applicant
KONINKLIJKE KPN N.V.

Title of the invention

1. The applicant is hereby notified that the international application has been accorded the international application number and the international filing date indicated above.

2. The applicant is further notified that the record copy of the international application:

[X] was transmitted to the International Bureau on **see above date of mailing**

[ ] has not yet been transmitted to the International Bureau for the reason indicated below and a copy of this notification has been sent to the International Bureau*:

[ ] because the necessary national security clearance has not yet been obtained

[ ] because *(reason to be specified)*

* The International Bureau monitors the transmittal of the record copy by the receiving Office and will notify the applicant (with Form PCT/IB/301) of its receipt. Should the record copy not have been received by the expiration of 14 months from the priority date, the International Bureau will notify the applicant (Rule 22.1(c)).

| Name and mailing address of the Receiving Office | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL-2280 HV Rijswijk<br>Tel. (+31-70) 340-2040<br>Fax: (+31-70) 340-3016 | Kuiper-Cristina, Nathalie |

Form PCT/RO/105 (April 2007)

**PCT REQUEST**

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| | | |
|---|---|---|
| **0** | **For receiving Office use only** | |
| **0-1** | International Application No. | **PCT/EP2010/064823** |
| **0-2** | International Filing Date | **05 OCT 2010 (05.10.2010)** |
| **0-3** | Name of receiving Office and "PCT International Application" | **RO/EP** |

| | | |
|---|---|---|
| **0-4** | **Form PCT/RO/101 PCT Request** | |
| 0-4-1 | Prepared Using | PCT Online Filing Version 3.5.000.221 MT/FOP 20020701/0.20.5.9 |
| **0-5** | **Petition** The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty | |
| **0-6** | **Receiving Office (specified by the applicant)** | European Patent Office (EPO) (RO/EP) |
| **0-7** | **Applicant's or agent's file reference** | 403446WO |
| **I** | **Title of Invention** | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE COMPRISING CO-OPERATING WIRELESS ACCESS NETWORKS AND METHOD THEREFORE |
| **II** | **Applicant** | |
| II-1 | This person is | Applicant only |
| II-2 | Applicant for | All designated States except US |
| II-4 | Name | KONINKLIJKE KPN N.V. |
| II-5 | Address | Maanplein 55<br>2516 CK The Hague<br>Netherlands |
| II-6 | State of nationality | NL |
| II-7 | State of residence | NL |
| II-8 | Telephone No. | +31 70 343 39 55 |
| II-9 | Facsimile No. | +31 70 385 54 37 |
| II-10 | e-mail | dieneke.vandertoorn-dejager@kpn.com |
| II-10(a) | E-mail authorization The receiving Office, the International Searching Authority, the International Bureau and the International Preliminary Examining Authority are authorized to use this e-mail address, if the Office or Authority so wishes, to send notifications issued in respect of this international application: | exclusively in electronic form (no paper notifications will be sent) |

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| | | |
|---|---|---|
| **III-1** | **Applicant and/or inventor** | |
| III-1-1 | This person is | Applicant only |
| III-1-2 | Applicant for | All designated States except US |
| III-1-4 | Name | NEDERLANDSE ORGANISATIE VOOR TOEGEPAST-NATUURWETENSCHAPPELIJK ONDERZOEK TNO |
| III-1-5 | Address | Schoemakerstraat 97<br>2628 VK Delft<br>Netherlands |
| III-1-6 | State of nationality | NL |
| III-1-7 | State of residence | NL |
| **III-2** | **Applicant and/or inventor** | |
| III-2-1 | This person is | Applicant and inventor |
| III-2-2 | Applicant for | US only |
| III-2-4 | Name (LAST, First) | OOSTVEEN, Job Cornelis |
| III-2-5 | Address | Bilderdijklaan 2<br>9752 EN Haren<br>Netherlands |
| III-2-6 | State of nationality | NL |
| III-2-7 | State of residence | NL |
| **III-3** | **Applicant and/or inventor** | |
| III-3-1 | This person is | Applicant and inventor |
| III-3-2 | Applicant for | US only |
| III-3-4 | Name (LAST, First) | JORGUSESKI, Ljupco |
| III-3-5 | Address | Jozef Israellaan 234<br>2282 TR Rijswijk<br>Netherlands |
| III-3-6 | State of nationality | NL |
| III-3-7 | State of residence | NL |
| **III-4** | **Applicant and/or inventor** | |
| III-4-1 | This person is | Applicant and inventor |
| III-4-2 | Applicant for | US only |
| III-4-4 | Name (LAST, First) | LITJENS, Remco |
| III-4-5 | Address | Van Kempenstraat 22<br>2352 VH Voorschoten<br>Netherlands |
| III-4-6 | State of nationality | NL |
| III-4-7 | State of residence | NL |

**PCT REQUEST**

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| | | |
|---|---|---|
| **III-5** | **Applicant and/or inventor** | |
| III-5-1 | This person is | Applicant and inventor |
| III-5-2 | Applicant for | US only |
| III-5-4 | Name (LAST, First) | PAIS, Adrian Victor |
| III-5-5 | Address | Caan van Necklaan 25<br>2281 BA Rijswijk<br>Netherlands |
| III-5-6 | State of nationality | NL |
| III-5-7 | State of residence | NL |
| **III-6** | **Applicant and/or inventor** | |
| III-6-1 | This person is | Applicant and inventor |
| III-6-2 | Applicant for | US only |
| III-6-4 | Name (LAST, First) | ZHANG, Haibin |
| III-6-5 | Address | Usselincxstraat 142<br>2593 VP The Hague<br>Netherlands |
| III-6-6 | State of nationality | CN |
| III-6-7 | State of residence | NL |
| **IV-1** | **Agent or common representative; or address for correspondence**<br>The person identified below is hereby/ has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: | Agent |
| IV-1-1 | Name (LAST, First) | WUYTS, Koenraad |
| IV-1-2 | Address | P.O. Box 95321<br>2509 CH The Hague<br>Netherlands |
| IV-1-3 | Telephone No. | +31 70 343 39 55 |
| IV-1-4 | Facsimile No. | +31 70 385 54 37 |
| IV-1-5 | e-mail | dieneke.vandertoorn-dejager@kpn.com |
| IV-1-5(a) | E-mail authorization<br>The receiving Office, the International Searching Authority, the International Bureau and the International Preliminary Examining Authority are authorized to use this e-mail address, if the Office or Authority so wishes, to send notifications issued in respect of this international application: | exclusively in electronic form (no paper notifications will be sent) |
| IV-1-6 | Agent's registration No. | 100754124 |
| **V** | **DESIGNATIONS** | |
| **V-1** | **The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.** | |

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| | | |
|---|---|---|
| **VI-1** | **Priority claim of earlier regional application** | |
| VI-1-1 | Filing date | 07 October 2009 (07.10.2009) |
| VI-1-2 | Number | 09172399.9 |
| VI-1-3 | Regional Office | EP |
| **VI-2** | **Priority document request**<br>The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s): | VI-1 |
| **VI-3** | **Incorporation by reference :**<br>where an element of the international application referred to in Article 11(1)(iii)(d) or (e) or a part of the description, claims or drawings referred to in Rule 20.5(a) is not otherwise contained in this international application but is completely contained in an earlier application whose priority is claimed on the date on which one or more elements referred to in Article 11(1)(iii) were first received by the receiving Office, that element or part is, subject to confirmation under Rule 20.6, incorporated by reference in this international application for the purposes of Rule 20.6. | |
| **VII-1** | **International Searching Authority Chosen** | European Patent Office (EPO) (ISA/EP) |
| **VII-2** | **Request to use results of earlier search; reference to that search** | |
| **VII-2-1** | Filing date | 07 October 2009 (07.10.2009) |
| VII-2-2 | Application Number | 09172399.9 |
| VII-2-3 | Country (or regional Office) | EP |
| VII-2-5 | Documents are available to the ISA in a form and manner acceptable to it and therefore do not need to be submitted by the applicant to the ISA (Rule 12bis.1(f)): | A copy of the results of the earlier search<br>A copy of the earlier application<br>A copy of any document cited in the results of the earlier search |

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| VIII | Declarations | Number of declarations | |
|---|---|---|---|
| VIII-1 | Declaration as to the identity of the inventor | – | |
| VIII-2 | Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent | – | |
| VIII-3 | Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application | – | |
| VIII-4 | Declaration of inventorship (only for the purposes of the designation of the United States of America) | 1 | |
| VIII-5 | Declaration as to non-prejudicial disclosures or exceptions to lack of novelty | – | |

| | | |
|---|---|---|
| VIII-4-1 | **Declaration: Inventorship (only for the purposes of the designation of the United States of America)** Declaration of Inventorship (Rules 4.17(iv) and 51bis.1(a)(iv)) for the purposes of the designation of the United States of America: | I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.<br><br>This declaration is directed to the international application of which it forms a part (if filing declaration with application).<br><br>This declaration is directed to international application No. PCT/ . . . . . (if furnishing declaration pursuant to Rule 26ter).<br><br>I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.<br>I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications", by application number, country or Member of the World Trade Organization, day, month, and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed. |
| VIII-4-1-1 | Prior applications: | |

| | | |
|---|---|---|
| | | I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.<br>I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon. |
| VIII-4-1-1-1 | Name (LAST, First) | OOSTVEEN, Job Cornelis |
| VIII-4-1-1-2 | Residence: (city and either US State, if applicable, or country) | Haren, Netherlands |
| VIII-4-1-1-3 | Mailing address: | Bilderdijklaan 2 9752 EN Haren Netherlands |
| VIII-4-1-1-4 | Citizenship: | NL |
| VIII-4-1-1-5 | Inventor's Signature: (The signature must be that of the inventor, not that of the agent) | /Job Cornelis Oostveen/ |
| VIII-4-1-1-6 | Date: | 04 October 2010 (04.10.2010) |

| | | |
|---|---|---|
| VIII-4-1-2-1 | Name (LAST, First) | JORGUSESKI, Ljupco |
| VIII-4-1-2-2 | Residence: (city and either US State, if applicable, or country) | Rijswijk, Netherlands |
| VIII-4-1-2-3 | Mailing address: | Jozef Israellaan 234 2282 TR Rijswijk Netherlands |
| VIII-4-1-2-4 | Citizenship: | NL |
| VIII-4-1-2-5 | Inventor's Signature: (The signature must be that of the inventor, not that of the agent) | /Ljupco Jorguseski/ |
| VIII-4-1-2-6 | Date | 04 October 2010 (04.10.2010) |
| VIII-4-1-3-1 | Name (LAST, First) | LITJENS, Remco |
| VIII-4-1-3-2 | Residence: (city and either US State, if applicable, or country) | Voorschoten, Netherlands |
| VIII-4-1-3-3 | Mailing address: | Van Kempenstraat 22 2352 VH Voorschoten Netherlands |
| VIII-4-1-3-4 | Citizenship: | NL |
| VIII-4-1-3-5 | Inventor's Signature: (The signature must be that of the inventor, not that of the agent) | /Remco Litjens/ |
| VIII-4-1-3-6 | Date | 04 October 2010 (04.10.2010) |
| VIII-4-1-4-1 | Name (LAST, First) | PAIS, Adrian Victor |
| VIII-4-1-4-2 | Residence: (city and either US State, if applicable, or country) | Rijswijk, Netherlands |
| VIII-4-1-4-3 | Mailing address: | Caan van Necklaan 25 2281 BA Rijswijk Netherlands |
| VIII-4-1-4-4 | Citizenship: | NL |
| VIII-4-1-4-5 | Inventor's Signature: (The signature must be that of the inventor, not that of the agent) | /Adrian Victor Pais/ |
| VIII-4-1-4-6 | Date | 04 October 2010 (04.10.2010) |
| VIII-4-1-5-1 | Name (LAST, First) | ZHANG, Haibin |
| VIII-4-1-5-2 | Residence: (city and either US State, if applicable, or country) | The Hague, Netherlands |
| VIII-4-1-5-3 | Mailing address: | Usselincxstraat 142 2593 VP The Hague Netherlands |
| VIII-4-1-5-4 | Citizenship: | CN |
| VIII-4-1-5-5 | Inventor's Signature: (The signature must be that of the inventor, not that of the agent) | /Haibin Zhang/ |
| VIII-4-1-5-6 | Date | 04 October 2010 (04.10.2010) |

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| IX | Check list | Number of sheets | Electronic file(s) attached |
|---|---|---|---|
| IX-1 | Request (including declaration sheets) | 9 | ✓ |
| IX-2 | Description | 19 | ✓ |
| IX-3 | Claims | 6 | ✓ |
| IX-4 | Abstract | 1 | ✓ |
| IX-5 | Drawings | 4 | ✓ |
| IX-7 | TOTAL | 39 | |
| | **Accompanying Items** | Paper document(s) attached | Electronic file(s) attached |
| IX-8 | Fee calculation sheet | – | ✓ |
| IX-18 | PCT-SAFE physical media | – | – |
| **IX-20** | **Figure of the drawings which should accompany the abstract** | 2 | |
| **IX-21** | **Language of filing of the international application** | English | |
| **X-1** | **Signature of applicant, agent or common representative** | (PKCS7 Digital Signature) | |
| **X-1-1** | Name (LAST, First) | WUYTS, Koenraad | |
| **X-1-2** | Name of signatory | NL, Koninklijke KPN N.V., K. Wuyts 16870 | |
| **X-1-3** | Capacity | (Representative) | |

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| | | |
|---|---|---|
| **10-1** | **Date of actual receipt of the purported international application** | **05 OCT 2010 (05.10.2010)** |
| **10-2** | **Drawings:** | |
| 10-2-1 | Received | X |
| 10-2-2 | Not received | |
| **10-3** | **Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application** | |
| **10-4** | **Date of timely receipt of the required corrections under PCT Article 11(2)** | |
| **10-5** | **International Searching Authority** | ISA/EP |
| **10-6** | **Transmittal of search copy delayed until search fee is paid** | |

## FOR INTERNATIONAL BUREAU USE ONLY

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| **11-1** | **Date of receipt of the record copy by the International Bureau** | |

PTO/SB/14 (11-08)
Approved for use through 09/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | US17827 |
|---|---|---|
| | Application Number | |
| Title of Invention | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE | |

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

## Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

## Applicant Information:

**Applicant 1**

**Applicant Authority** ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

| Prefix | Given Name | Middle Name | Family Name | Suffix |
|---|---|---|---|---|
| | Job | Cornelis | Oostveen | |

**Residence Information (Select One)** ○ US Residency ◉ Non US Residency ○ Active US Military Service

| City | Haren | Country Of Residence[i] | NL |
|---|---|---|---|

**Citizenship under 37 CFR 1.41(b)** [i] NL

**Mailing Address of Applicant:**

| Address 1 | Bilderdijklaan 2 | | |
|---|---|---|---|
| Address 2 | | | |
| City | Haren | State/Province | |
| Postal Code | 9752 EN | Country[i] | NL |

**Applicant 2**

**Applicant Authority** ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

| Prefix | Given Name | Middle Name | Family Name | Suffix |
|---|---|---|---|---|
| | Ljupco | | Jorguseski | |

**Residence Information (Select One)** ○ US Residency ◉ Non US Residency ○ Active US Military Service

| City | Rijswijk | Country Of Residence[i] | NL |
|---|---|---|---|

**Citizenship under 37 CFR 1.41(b)** [i] NL

**Mailing Address of Applicant:**

| Address 1 | Jozef Israellaan 234 | | |
|---|---|---|---|
| Address 2 | | | |
| City | Rijswijk | State/Province | |
| Postal Code | 2282 TR | Country[i] | NL |

**Applicant 3**

**Applicant Authority** ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

| Prefix | Given Name | Middle Name | Family Name | Suffix |
|---|---|---|---|---|
| | Remco | | Litjens | |

**Residence Information (Select One)** ○ US Residency ◉ Non US Residency ○ Active US Military Service

| City | Voorschoten | Country Of Residence[i] | NL |
|---|---|---|---|

PTO/SB/14 (11-08)
Approved for use through 09/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | US17827 |
|---|---|---|
| | Application Number | |
| Title of Invention | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE | |

| | | | |
|---|---|---|---|
| **Citizenship under 37 CFR 1.41(b)** i | NL | | |
| **Mailing Address of Applicant:** | | | |
| **Address 1** | Van Kempenstraat 22 | | |
| **Address 2** | | | |
| **City** | Voorschoten | **State/Province** | |
| **Postal Code** | 2352 VH | **Country**i | NL |

**Applicant 4**

| | | | |
|---|---|---|---|
| **Applicant Authority** ◉ Inventor | ○ Legal Representative under 35 U.S.C. 117 | ○ Party of Interest under 35 U.S.C. 118 | |
| **Prefix** | **Given Name** | **Middle Name** | **Family Name** / **Suffix** |
| | Adrian | Victor | Pais |

**Residence Information (Select One)** ○ US Residency ◉ Non US Residency ○ Active US Military Service

| | | | |
|---|---|---|---|
| **City** | Rijswijk | **Country Of Residence**i | NL |
| **Citizenship under 37 CFR 1.41(b)** i | NL | | |
| **Mailing Address of Applicant:** | | | |
| **Address 1** | Caan van Necklaan 25 | | |
| **Address 2** | | | |
| **City** | Rijswijk | **State/Province** | |
| **Postal Code** | 2281 BA | **Country**i | NL |

**Applicant 5**

| | | | |
|---|---|---|---|
| **Applicant Authority** ◉ Inventor | ○ Legal Representative under 35 U.S.C. 117 | ○ Party of Interest under 35 U.S.C. 118 | |
| **Prefix** | **Given Name** | **Middle Name** | **Family Name** / **Suffix** |
| | Haibin | | Zhang |

**Residence Information (Select One)** ○ US Residency ◉ Non US Residency ○ Active US Military Service

| | | | |
|---|---|---|---|
| **City** | The Hague | **Country Of Residence**i | NL |
| **Citizenship under 37 CFR 1.41(b)** i | CN | | |
| **Mailing Address of Applicant:** | | | |
| **Address 1** | Usselincxstraat 142 | | |
| **Address 2** | | | |
| **City** | The Hague | **State/Province** | |
| **Postal Code** | 2593 VP | **Country**i | NL |

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

## Correspondence Information:

**Enter either Customer Number or complete the Correspondence Information section below.**
**For further information see 37 CFR 1.33(a).**

☐ **An Address is being provided for the correspondence Information of this application.**

| | |
|---|---|
| **Customer Number** | 90057 |

EFS Web 2.2.2

PTO/SB/14 (11-08)
Approved for use through 09/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | US17827 |
|---|---|---|
| | Application Number | |
| Title of Invention | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE | |

| Email Address | mail@dvme.nl | Add Email | Remove Email |
|---|---|---|---|

## Application Information:

| Title of the Invention | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE | | |
|---|---|---|---|
| Attorney Docket Number | US17827 | Small Entity Status Claimed | ☐ |
| Application Type | Nonprovisional | | |
| Subject Matter | Utility | | |
| Suggested Class (if any) | | Sub Class (if any) | |
| Suggested Technology Center (if any) | | | |
| Total Number of Drawing Sheets (if any) | 4 | Suggested Figure for Publication (if any) | 1 |

## Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S. C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

## Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.

| Please Select One: | ◉ Customer Number | ○ US Patent Practitioner | ○ Limited Recognition (37 CFR 11.9) |
|---|---|---|---|
| Customer Number | 90057 | | |

## Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

| Prior Application Status | | | Remove |
|---|---|---|---|
| Application Number | Continuity Type | Prior Application Number | Filing Date (YYYY-MM-DD) |
| PCT/EP2010/064823 | a 371 of international | PCT/EP2010/064823 | 2010-10-05 |

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

## Foreign Priority Information:

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| **Application Data Sheet 37 CFR 1.76** | Attorney Docket Number | US17827 |
|---|---|---|
| | Application Number | |
| Title of Invention | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE | |

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Remove

| Application Number | Country [i] | Parent Filing Date (YYYY-MM-DD) | Priority Claimed |
|---|---|---|---|
| 09172399.9 | EP | 2009-10-07 | (•) Yes ( ) No |

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

## Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

**Assignee 1**

If the Assignee is an Organization check here. [X]

| | | | |
|---|---|---|---|
| Organization Name | KONINKLIJKE KPN N.V. | | |
| **Mailing Address Information:** | | | |
| **Address 1** | Maanplein 55 | | |
| Address 2 | | | |
| **City** | The Hague | **State/Province** | |
| **Country** [i] | NL | Postal Code | 2516 CK |
| Phone Number | | Fax Number | |
| Email Address | | | |

**Assignee 2**

If the Assignee is an Organization check here. [X]

| | | | |
|---|---|---|---|
| Organization Name | NEDERLANDSE ORGANISATIE VOOR TOEGEPAST-NATUURWETENSCHAPPELIJK ONDERZOEK T | | |
| **Mailing Address Information:** | | | |
| **Address 1** | Schoemakerstraat 97 | | |
| Address 2 | | | |
| **City** | Delft | **State/Province** | |
| **Country** [i] | NL | Postal Code | 2628 VK |
| Phone Number | | Fax Number | |
| Email Address | | | |

Additional Assignee Data may be generated within this form by selecting the **Add** button.

## Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

| **Signature** | /Natalya Hartmann,Reg.No.62,119/ | Date (YYYY-MM-DD) | 2012-04-03 |
|---|---|---|---|

PTO/SB/14 (11-08)
Approved for use through 09/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


| **Application Data Sheet 37 CFR 1.76** | Attorney Docket Number | US17827 |
|---|---|---|
| | Application Number | |
| Title of Invention | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE | |

| First Name | Natalya | Last Name | Hartmann | Registration Number | 62119 |
|---|---|---|---|---|---|

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


| **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** ( **Not for submission under 37 CFR 1.99**) | | |
|---|---|---|
| | Application Number | |
| | Filing Date | |
| | First Named Inventor | OOSTVEEN, Job Cornelis |
| | Art Unit | |
| | Examiner Name | |
| | Attorney Docket Number | US17827 |

**U.S.PATENTS**

| Examiner Initial* | Cite No | Patent Number | Kind Code[1] | Issue Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear |
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**U.S.PATENT APPLICATION PUBLICATIONS**

| Examiner Initial* | Cite No | Publication Number | Kind Code[1] | Publication Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear |
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| Examiner Initial* | Cite No | Foreign Document Number[3] | Country Code[2] i | Kind Code[4] | Publication Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear | T[5] |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2009119699 | WO | | 2009-10-01 | NEC CORP | page 7, line 28 - page 9, paragraph 15 page 12, paragraph 13 - page 13, paragraph 24; claims 1, 2-8, 9-14, 75, 76; figure | ☐ |
| | 2 | 2009064716 | WO | | 2009-05-22 | QUALCOMM INC | paragraph [0052] - paragraph [0056], paragraph [0062] - paragraph [0065], claims 2-8, 10-12, 14 | ☐ |
| | 3 | 2009019319 | WO | | 2009-02-12 | NOKIA SIEMENS NETWORKS OY | abstract, page7, line 15 - page 8, line 3, page 8, line 22 - page 9, line 20, claims 1-14 | ☐ |

| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | |
| | Filing Date | |
| | First Named Inventor | OOSTVEEN, Job Cornelis |
| | Art Unit | |
| | Examiner Name | |
| | Attorney Docket Number | US17827 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 4 | 2009045070 | WO | | 2009-04-09 | LG ELECTRONICS INC | the whole document, claims 1-14 | ☐ |

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**NON-PATENT LITERATURE DOCUMENTS**

| Examiner Initials* | Cite No | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published. | T[5] |
|---|---|---|---|
| | 1 | International Search Report, mailed January 24, 2011 in connection with International Patent Application No. PCT/EP2010/064823 | ☐ |

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**EXAMINER SIGNATURE**

| Examiner Signature | | Date Considered | |
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | |
| | Filing Date | |
| | First Named Inventor | OOSTVEEN, Job Cornelis |
| | Art Unit | |
| | Examiner Name | |
| | Attorney Docket Number | US17827 |

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| Signature | /Natalya Hartmann, Reg.No. 62,119/ | Date (YYYY-MM-DD) | 2012-04-03 |
|---|---|---|---|
| Name/Print | Natalya Hartmann | Registration Number | 62119 |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | |
| **Filing Date:** | |
| **Title of Invention:** | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE |
| **First Named Inventor/Applicant Name:** | Job Cornelis Oostveen |
| **Filer:** | Natalya Hartmann/Tessa Koning |
| **Attorney Docket Number:** | US17827 |

Filed as Large Entity

## U.S. National Stage under 35 USC 371 Filing Fees

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| National Stage Fee | 1631 | 1 | 380 | 380 |
| Natl Stage Search Fee - Report provided | 1642 | 1 | 490 | 490 |
| National Stage Exam - all other cases | 1633 | 1 | 250 | 250 |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| Post-Allowance-and-Post-Issuance: | | | | |
| Extension-of-Time: | | | | |
| Miscellaneous: | | | | |
| | | | Total in USD ($) | 1120 |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 12453641 |
| **Application Number:** | 13499924 |
| **International Application Number:** | PCT/EP10/64823 |
| **Confirmation Number:** | 7977 |
| **Title of Invention:** | SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE |
| **First Named Inventor/Applicant Name:** | Job Cornelis Oostveen |
| **Customer Number:** | 90057 |
| **Filer:** | Natalya Hartmann/Tessa Koning |
| **Filer Authorized By:** | Natalya Hartmann |
| **Attorney Docket Number:** | US17827 |
| **Receipt Date:** | 03-APR-2012 |
| **Filing Date:** | |
| **Time Stamp:** | 10:51:23 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

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|---|---|
| Submitted with Payment | yes |
| Payment Type | Deposit Account |
| Payment was successfully received in RAM | $1120 |
| RAM confirmation Number | 8290 |
| Deposit Account | 505047 |
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## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Transmittal of New Application | 17827_DVME_TransmitalLetter.pdf | 23079<br>bafa4706d72044086defff991e505625a15c776f | no | 1 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Transmittal Letter | 17827_TransmittalLetter_NationalStage_pto-1390.pdf | 386556<br>d653597174b8934d1c8a1d84dec72d089f41a24f | no | 4 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 3 | | 17827_WO2011042433.pdf | 1396018<br>d7b8e6501a93ab5ea5a10e9d0f9201781ab25c36 | yes | 34 |

**Multipart Description/PDF files in .zip description**

| Document Description | Start | End |
|---|---|---|
| Abstract | 1 | 2 |
| Specification | 3 | 21 |
| Claims | 22 | 27 |
| Drawings-only black and white line drawings | 28 | 31 |
| Documents submitted with 371 Applications | 32 | 34 |

| | | | | | |
|---|---|---|---|---|---|
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 4 | Transmittal Letter | 17827_IDSletter.pdf | 18683<br>f1186d0b95bab48a1557018c93959dd6bf6c3886 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 5 | Foreign Reference | IDS_WO2009119699A2.pdf | 1455879<br>73c8b23694297c230aa5f23bb94dd45a702ad676 | no | 47 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 6 | Foreign Reference | IDS_WO2009064716A1.pdf | 2094880<br>d5307ab5d6a3cfc4c69b39af4d1f6001f22576d0 | no | 51 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 7 | Foreign Reference | IDS_WO2009019319A2.pdf | 763547<br>ca5e12eb19a4fba1f143075ab782ba4da7b229a9 | no | 19 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 8 | Foreign Reference | IDS_WO2009045070A2.pdf | 1424986<br>585d6cc9377be2e2863a61d94896fd9c6cf4f0ab | no | 46 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 9 | Non Patent Literature | 17827_SearchReport.pdf | 695134<br>fd0e36f95f7a5beee6f1e641ca213859145e7718 | no | 14 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 10 | Preliminary Amendment | 17827_PreliminaryAmendment_NationalStage.pdf | 44258<br>84d77a213edea10caa35bb09370a369a6b7f3ad1 | no | 9 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 11 | Documents submitted with 371 Applications | 17827_NotificationIntAppNo.pdf | 372621<br>d1fb04480bfae76d85b5cd593570bdc95c143467 | no | 10 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 12 | Application Data Sheet | 17827_ADS.pdf | 324325<br>854fee67be0fab5fa39d768b7815fe088f1f7455 | no | 6 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| This is not an USPTO supplied ADS fillable form | | | | | |
| 13 | Information Disclosure Statement (IDS) Form (SB08) | 17827_IDSPTOSB008.pdf | 215802<br>f02dedd135dc9384b1f7bbec17a5b3dee9aff3f7 | no | 4 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
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| 14 | Fee Worksheet (SB06) | fee-info.pdf | 33649<br>bedd408dad58544b79f5b587d00ee66ed6e37481 | no | 2 |

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| **Warnings:** | |
| **Information:** | |
| **Total Files Size (in bytes):** | 9249417 |

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**New Applications Under 35 U.S.C. 111**

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**National Stage of an International Application under 35 U.S.C. 371**

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**New International Application Filed with the USPTO as a Receiving Office**

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
14 April 2011 (14.04.2011)

PCT

(10) International Publication Number
WO 2011/042433 A1

(51) International Patent Classification:
*H04W 36/02* (2009.01) *H04W 24/10* (2009.01)

(21) International Application Number:
PCT/EP2010/064823

(22) International Filing Date:
5 October 2010 (05.10.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09172399.9 7 October 2009 (07.10.2009) EP

(71) Applicants *(for all designated States except US)*: **KONINKLIJKE KPN N.V.** [NL/NL]; Maanplein 55, NL-2516 CK The Hague (NL). **NEDERLANDSE ORGANISATIE VOOR TOEGEPAST-NATUURWETENSCHAPPELIJK ONDERZOEK TNO** [NL/NL]; Schoemakerstraat 97, NL-2628 VK Delft (NL).

(72) Inventors; and

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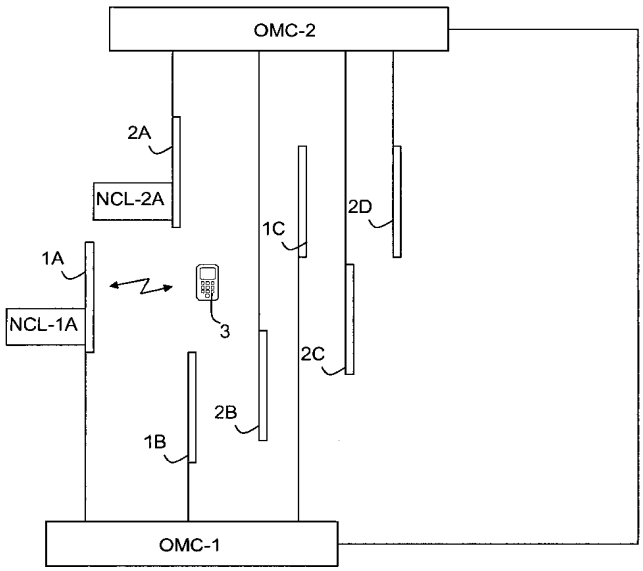


FIG. 1

(57) Abstract: The invention relates to a system and method for updating a neighbour cell list of a wireless access node. User terminals to be to be transferred from a first wireless access node of a first wireless access network to a second wireless access node of a second wireless access network are detected. From the first wireless access node, one or more of the detected user terminals are requested to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The cell information is received from the one or more of the detected user terminals and at least one of the first neighbour cell list and the second neighbour cell list is updated using the received cell information.

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# SYSTEM FOR UPDATING A NEIGHBOUR CELL LIST (NCL) OF A WIRELESS ACCESS NODE OF A TELECOMMUNICATIONS ARCHITECTURE AND METHOD THEREFORE

## FIELD OF THE INVENTION

The invention relates to the field of telecommunications systems and a method in telecommunications architecture. More specifically, the invention relates to a telecommunications architecture comprising at least a first and a second wireless access network between which user terminals can be transferred and a method in such a telecommunications system, wherein the neighbour cell lists (NCLs) of at least a wireless access node of the first and/or second wireless access network can be updated using a system.

## BACKGROUND OF THE INVENTION

When moving through the coverage area of a wireless access cellular network, mobile user terminals continuously scan the spectrum for pilot or reference signals (beacons) in order to determine which cell (base station) to camp on. In idle mode, this is referred to as cell reselection, while in active/dedicated mode, this is referred to as handover. The cell-specific list of surrounding cells that are considered for cell reselection or handover is called the neighbour cell list (NCL), which is stored in each base station and broadcast within the cell. The mobile user terminal receives and stores the NCL. The NCL contains the cells for which the mobile user terminal should send measurement reports (when certain criteria are met) to the base station currently serving the user terminal.

In case of multiple, cooperating wireless access cellular networks, each cell not only has an intra-network NCL, but also an inter-network NCL.

The optimisation of the NCLs is traditionally done with the aid of off-line planning tools, using path loss predictions and (off-line) optimisation algorithms. Currently, automated configuration and optimisation of intra-network NCLs and inter-network NCLs, based on e.g. actual measurement feedback from

user terminals, observed mobility patterns, base station scans and handover statistics, are being investigated.

3GPP TS 36.300, V8.9.0, discloses an automatic neighbour relation (ANR) function to relieve an operator from the burden of manually managing neighbour relations. Such an ANR function resides in the eNode-B (eNB) of an LTE network and manages a conceptual neighbour relation table (NRT). A neighbour detection function is used to find new neighbours and to add them to the NRT, whereas a neighbour removal function removes outdated neighbours from the NRT. The eNB instructs a user terminal from a serving cell to look for neighbour cells of other networks by scanning all cells. The user terminal first reports the physical cell identifier (PCI) of the detected cells in the other network. When the eNB receives the reports from the user terminals containing the PCI's of the cells, the eNB instructs the user terminal, using the newly discovered cell as a parameter, to read the Cell Global Identifier (CGI) and further cell information from the neighbouring cells. The user terminal also reports this information to the serving cell. The eNB may then update the NRT using the information reported from the user terminals.

SUMMARY OF THE INVENTION

A system is disclosed for a telecommunications architecture that comprises a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined.

The system comprises a detector configured for detecting user terminals about to be transferred, i.e. for which cell reselection or handover will be performed, from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network.

The system also comprises a request generator configured for requesting from the first wireless access node one or

more of the detected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The telecommunications system, particularly at least one of the first and the second wireless access node, also comprises a receiver configured for receiving the cell information from one or more of the detected user terminals. Updating means are provided configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

A method in a telecommunications architecture is also disclosed. User terminals about to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network are detected. From the first wireless access node, one or more of the detected user terminals are requested to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The cell information is received from one or more of the detected user terminals and at least one of the first neighbour cell list and the second neighbour cell list is updated using the received cell information.

Furthermore, a mobile user terminal containing at least one neighbour cell list of the first wireless access node is disclosed. The terminal comprises a receiver for receiving the request for reporting cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The mobile terminal also contains scanning means configured for detecting the cell information from the wireless access nodes, at least one of the wireless access nodes being absent in the neighbour cell list, and a transmitter for transmitting the detected cell information. At present, standardization does not allow mobile terminals to measure cells not present in the NCL. However, there are no intrinsic obstacles for making performing such measurements. The mobile terminal is arranged for temporarily storing the detected cell information and transmitting the de-

tected cell information to the second wireless access node after being transferred from the first to the second wireless access network.

It is noted that in the present application the terms wireless access node and cell are used as similar terms. The skilled person will appreciate that a single wireless access node may provide multiple cells and that, typically, a neighbour cell list is defined for each of the cells of such a node.

The plurality of wireless access nodes of which cell information is requested may exclude the first wireless access node, or more particularly, the cell thereof currently serving the user terminal. On the other hand, the plurality of wireless access nodes would typically include cells that are absent in the neighbour cell list stored in the user terminal for regularly reporting measurement reports to the serving cell. Otherwise, since the neighbour cell list is obtained from the serving cell, the detection of the cell information by the user terminal would be restricted to this list and would therefore only be suitable for verifying the existing NCL and not for adding new neighbouring cells to the list. In an embodiment, the user terminal performs a complete scan for all cells in the first wireless access network (possibly excluding the currently serving cell) and/or all cells in the second wireless access network to allow the telecommunications system to obtain a complete picture of the available cells around the first wireless access node. This complete information containing the scan of all cells may then be used for updating the NCL(s). Alternatively, the user terminal may compare the received complete information with the NCL it has obtained from the first wireless access node and only report cell information of cells not present on the current NCL.

The first and second wireless access networks may differ in radio access technology (e.g. GSM and UMTS or UMTS and LTE), the deployed release of a given radio access technology, the used frequency spectrum (e.g. the 900 MHz and 1800 MHz frequency bands (the latter also being referred to as a DCS network) for GSM, different 5MHz carriers for UMTS) and/or wire-

less access networks of different mobile operators. The wireless access network may also differ in the type of cells provided, e.g. macro cells and pico cells.

The disclosed system and method are able to specifically direct the request for cell information for the first and/or second network to user terminals in the regions where cell reselection or handover from the first to the second wireless access network is about to occur. By collecting this information specifically at cell reselection or handover moments, the updating of the NCL is inherently based on the inter-network neighbours that a user terminal experiences in the cell reselection or handover region, where the reports of the user terminal measurements are most relevant for construing the NCL.

In some instances, user terminals may move rapidly through an area and cell reselection and handover to the second wireless access network should be performed quickly. In such cases, insufficient time may be available for performing the scan for obtaining the cell information for the first wireless access network and for reporting the cell information to the telecommunications system via the first wireless access network. The embodiments of the invention as defined in claims 2 and 10 provide additional time for completing the method by performing the cell reselection or handover as soon as the mobile user terminal has been instructed for performing the scan for cell information for the first and/or the second wireless access network. By temporarily storing the cell information resulting from the scan at the mobile user terminal, the user terminal may carry the cell information to the second network where it has sufficient time to report the cell information of the plurality of wireless access nodes of the first wireless access network via the second network.

The cell information of the wireless access nodes of the first wireless access network may be used for updating the neighbour cell list of the first wireless access node and/or for updating the neighbour cell list of the second wireless access node, or the cells thereof.

The updating of the neighbour cell list of the second wireless access node is relevant for user terminals reselecting cells or handed over from the second wireless access node to the first wireless access network, i.e. in the cell reselection or handover direction reverse to the direction travelled by the terminals reporting the cell information. Since other user terminals will be transferred from the second wireless access network to the first wireless access network, the neighbour cell list of the first wireless access node may also be updated in this way.

The cell information of the plurality of access nodes of the first wireless access network as received via the second wireless access node may also be transferred back to the first wireless access node, e.g. for updating the intra-network neighbour cell list, as defined in claim 3 and, optionally, in claim 10. In a particular example, this embodiment may be used to reduce the so-called 'missing neighbour' effect in a UMTS network, here being the first wireless access network. User terminals equipped to connect to UMTS networks are restricted to gathering cell information as defined in the neighbour cell list received from the base station currently serving the user terminal. An absent cell in the neighbour cell list of the base station will thus never be measured and reported by the user terminal as a result of this restriction of the user terminal. When the signal of a missing neighbour is too strong, call drops may occur. The present embodiments may reduce this problem by instructing the user terminals to also scan for cell information of wireless access nodes of the UMTS network being absent in the neighbour cell list (and thus possibly revealing the existence of cells not present in the neighbour cell list of the base station) and to report this via the second wireless access network back to the first wireless access node. The NCL of the first wireless access node may then be updated with the missing neighbour cell.

The user terminals may also be instructed to obtain the cell information of the plurality of wireless access nodes of the second wireless access network shortly before cell reselec-

tion or handover to the second wireless access node of this network and report the cell information to the telecommunications system via this second wireless access node, i.e. after cell reselection or handover. This embodiment is defined in claims 4 and 11.

Again, the cell information of the wireless access nodes of the second wireless access network may be used for updating the neighbour cell list of the first wireless access node and/or for updating the neighbour cell list of the second wireless access node. The cell information obtained for the access nodes of the second wireless access network may be relevant for the second wireless access network itself, e.g. for updating the intra-network NCL, in view of the 'missing neighbour' effect occurring in particular types of network such as UMTS, as discussed above for the first wireless access network.

The cell information of the plurality of access nodes of the second wireless access network as received via the second wireless access node may be transferred back to the first wireless access node as defined in claim 5 and, optionally, in claim 11. In doing so, the first wireless access node may update its neighbour cell list using the received cell information obtained shortly before cell reselection or handover, even when the user terminals have insufficient time for reporting the cell information for the plurality of wireless access nodes of the second wireless access network directly to the first wireless access node. The updated NCL is relevant for cell reselection or handover from the first wireless access node to the second wireless access network for other user terminals.

Of course, when sufficient time for reporting the cell information of the plurality of wireless access nodes of the second network is available, this cell information obtained shortly before cell reselection or handover to the second wireless access network can be reported directly to the first wireless access node, as defined in the embodiments of claims 6 and 12.

It is not required that all handover or cell reselection instances trigger a scan for cell information by the user

terminals. A wireless access node may for instance indicate on its broadcast channel not only whether handovers and/or cell re-selections should trigger such reporting, but also a likelihood parameter which the terminal can use to flip a (biased) coin in determining whether it should send cell information at a specific handover or cell reselection instance. Alternatively, the wireless access node may explicitly signal to the specific user terminal whether it should do the cell measurement and reporting. In this manner, the amount of cell information reporting can be tuned, which relates to a trade-off between the measurement overhead (signalling load) and the potential for neighbour cell list optimisation.

One embodiment of tuning the amount of cell list optimisation traffic is to use the location information from the user terminals as a selection criterion as defined in claim 7. The location information may e.g. be obtained from a GPS module in the user terminal or by means of measurements using the first and/or the second wireless access network. This location information can be useful e.g. in identifying where handover regions exist, and in solving location-specific outages or problems, e.g. dropped calls due to 'missing neighbour'. It may also be useful when an operator changes configuration (optimisation of downlink power, antenna tilt, etc) and wants to measure the effect on the cells relevant for inter-RAT cell change or handover.

Another advantageous selection criterion for determining which user terminals should report cell information is the transfer threshold that may have been set by the operator(s) of the telecommunication system, as defined in claim 8. The transfer threshold determines at what level (typically involving pilot signal measurements) cell reselection or handover would occur. The transfer threshold for cell reselection or handover from the first wireless access network to the second wireless access network may be asymmetric (i.e. a different transfer threshold Th2 applies for a transfer from the second to the first wireless access network) and may also be dependent on the service type of the service received by the user terminal when

connected to the first wireless access node. As an example, a user terminal provided with a voice service by a cell of an LTE network that is handed over to a GSM network might not be handed over back to the LTE network. This is because the operator chooses this mode of operation. In such a case, although this user terminal is a detected user terminal in the sense that it is about to be transferred to the second wireless access network (GSM), it is not selected for reporting requested to report cell information of the plurality of wireless access nodes of the first wireless access network (the LTE network), since the hand-over in the direction back to the first network (the LTE network) will generally not be made. On the other hand, for a user terminal using a data service that is temporarily handed over from an LTE network to a GSM network, a handover back to the LTE network is generally preferred and such user terminals can be selected to report cell information of the plurality of wireless access nodes of the second network. The embodiment of the telecommunications system of claim 8 may also be used for the method in the telecommunications system as defined in claims 10-13.

Hereinafter, embodiments of the invention will be described in further detail. It should be appreciated, however, that these embodiments may not be construed as limiting the scope of protection for the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 provides a schematic illustration of a telecommunication system comprising a first and a second wireless access network, each having a plurality of wireless access nodes, according to an embodiment of the invention;

FIG. 2 provides a schematic illustration of a mobile user terminal and wireless access nodes configured for performing a method according to an embodiment of the invention;

FIGS. 3A and 3B provide a schematic illustration of a telecommunications system and a flow chart for operating such a system, wherein cell information of wireless access nodes of the

first wireless access network is obtained and reported via the second wireless access network; and

FIGS. 4A and 4B provide a schematic illustration of a telecommunications system and a flow chart for operating such a system, wherein cell information of wireless access nodes of the second wireless access network is obtained and reported via the first wireless access network.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of first wireless access nodes 1A-1C of a first wireless access network and second wireless access nodes 2A-2D of a second wireless network. As an example, the first wireless access nodes 1A-1C are eNBs of an Long Term Evolution (LTE) network, whereas the second wireless access nodes 2A-2D are NodeBs of an UMTS network. Other examples includes wireless access networks differing in other radio access technologies (RATs), e.g. GSM and UMTS, differences in the deployed release of a given radio access technology, differences in the used frequency spectrum (e.g. the 900 MHz and 1800 MHz frequency bands (the latter also being referred to as a DCS network) for GSM, different 5MHz carriers for UMTS) and/or wireless access networks of different mobile operators. The wireless access network may also differ in the type of cells provided, e.g. macro cells and pico cells.

The wireless access nodes 1A-1C and 2A-2D can be controlled by control systems as schematically illustrated in FIG. 1. As an example, the control system may be Operation and Maintenance Centres (OMCs) as generally known in the art. The OMCs of the wireless access networks can be interconnected. Other connections between the wireless access networks can be used as well. If the wireless access nodes of the first and second wireless access networks originate from the same vendor, a single OMC can be used.

Each of the wireless access nodes 1A-1C and 2A-2D may contain at least one neighbour cell list (NCL). In FIG. 1, NCL-1A and NCL-2A are indicated as NCL of the corresponding wireless

access nodes. When a wireless access node provides multiple cells, typically each cell has a corresponding NCL.

A wireless access node broadcasts the NCL and mobile user terminals 3 camping on such a cell receive and store the NCL. The NCL is typically used to instruct the mobile terminal 3 which cells to monitor and to report every now and then the received signal strengths of each of the monitored cells, such that the network can make a decision whether or not the mobile terminal 3 should select or should be handed over to another cell.

As an example, the mobile terminal 3 receives the NCL-1A from wireless access node 1A to which it is currently connected. NCL-1A contains the cell(s) of neighbouring access nodes 1B and 1C and mobile terminal 3 monitors the signal strengths of these cells and reports these to the wireless access node 1A. Such an NCL-1A is referred to as an intra-network NCL. NCL-1A may also list neighbouring access nodes 2A and 2B of the second wireless access network, in which case NCL-1A would be referred to as an inter-network NCL. NCL-1A may also be a combined NCL, i.e. a combination of an intra-network and an inter-network NCL. Currently, automated configuration and optimisation of intra-network NCLs and inter-network NCLs is based on e.g. actual measurement feedback from user terminals 3 as disclosed in 3GPP TS 36.300, V8.9.0.

Referring also to FIG. 2, an embodiment will now be described in further detail, wherein intra-network NCL-1A contains the cells of eNBs 1B and 1C and inter-network NCL-1A contains the cells of NodeBs 2A and 2B. Note that inter-network NCL-1A does not yet contain NodeBs 2C and 2D.

Mobile user terminal 3 is assumed to camp on a cell of eNB 1A and is monitoring the cells of eNB's 1B, 1C and NodeBs 2A and 2B as indicated in the intra-network and inter-network NCLs transmitted in the cell under consideration. The mobile user terminal 3 regularly sends measurement reports to the eNB 1A as generally known in the art.

As illustrated schematically in FIG. 2, eNB 1A contains a cell reselection/handover detector 10 that recognizes that mo-

bile terminal 3 requires a cell reselection or handover to NodeB 2A of the second wireless access network. The cell reselection or handover indication triggers the following sequence of events in eNB 1A.

First, it may be determined whether or not the mobile terminal 3 for which a cell reselection or handover indication is received should participate, i.e. should be selected, in the process for updating (which includes the verification of the correctness) of an NCL, such as NCL-1A or NCL-2A. To that end, the eNB 1A contains a selection module 11 for selecting a part of the user terminals 3 for which a cell reselection or handover indication is detected. In this manner, it is possible to filter an appropriate portion the user terminals for which cell reselection or handover is about in order to reduce unnecessary signalling over the first and/or second wireless access network. The decision whether or not to participate in the updating process, i.e. whether or not to provide information to the telecommunication system allowing the updating of the NCL's, may either be taken at the mobile terminal or at the telecommunications system, particularly eNB 1A.

As an example, eNB 1A may indicate on its broadcast channel not only whether handovers and/or cell reselections should trigger such reporting, but also a likelihood parameter which the terminal 3 can use to flip a biased coin in determining whether it should send information at a specific handover or cell reselection instance. Alternatively, eNB 1A may explicitly signal to the specific user terminal 3 whether it should do the cell measurement and reporting. In this manner, the amount of cell information reporting can be tuned, which relates to a trade-off between the measurement overhead (signalling load) and the potential for neighbour cell list optimisation.

An advantageous selection criterion at the side of the eNB 1A for determining which user terminals 3 should report cell information is the transfer threshold that may have been set by the operator(s) of the telecommunications system between the first and the second wireless access networks. The transfer threshold determines at what level (typically involving pilot

signal measurements) cell reselection or handover would occur. The transfer threshold Th1 for cell reselection or handover from the first wireless access network to the second wireless access network may be asymmetric (i.e. a different transfer threshold Th2 applies for a transfer from the second to the first wireless access network) and may also be dependent on the service type of the service enjoyed by the user terminal when connected to the first wireless access node.

In FIG. 1, the user terminal 3 camping on a cell of eNB 1A of an LTE network using a data service that is about to be handed over to NodeB 2A of an UMTS network will generally be handed over back to the LTE network, if possible, because the operator applies a low threshold for handing over the user terminal 3 from the UMTS network to the LTE network for data services but a much higher threshold for handing over the user terminal to the UMTS network. In such a case, since a transfer between the networks is more likely in one direction than in the other, the terminal 3 may or may not be selected for providing information useful for the NCL updating process as will now be described in further detail.

The selection stage of user terminals 3 may be omitted completely or may be selectively applied, e.g. during particular hours of the day or at particular stages of the configuration and optimisation of the network.

Once user terminal 3 has been selected, request generator 12 in FIG. 2 is activated in order to request the user terminal 3 to report cell information of a plurality of wireless access nodes.

The plurality of wireless access nodes of which cell information is requested may exclude the cell of eNB 1A currently serving the user terminal 3. On the other hand, the plurality of wireless access nodes would typically include cells that are absent in the neighbour cell list NCL-1A stored in the user terminal 3 for regularly reporting measurement reports to the serving cell. In the example of FIG. 1, the cell information requested would typically include cell information of at least one of the cells NodeB 2C or NodeB 2D. In other words, the user

terminal 3 should at least monitor other cells than included in the neighbour cell list NCL-1A.

The user terminal 3, to that end, contains a receiver 20 (see FIG. 2) for receiving the request for reporting cell information of a plurality of wireless access nodes. The actual determination for which cells the cell information should be obtained and/or should be reported may be performed in the eNB 1A (and than being signalled to the user terminal 3) and/or internally in the user terminal 3.

When the updating of e.g. NCL-1A would only involve the determination whether additional cells should be included in the list, cell information may only be obtained for the cells of NodeB 2C and NodeB 2D. NCL-1A may be used to determine which cell(s) should be excluded for the gathering of cell information for the purpose of updating the NCL in such a case. However, when NCL-2A should be updated, the cells listed in NCL-1A should not necessarily be excluded.

On the other hand, if the NCL updating is also used to verify the existing NCL, cell information for one or more cells of the existing NCL should be gathered as well. In a particular embodiment, user terminal 3 comprises a determination module 21 for determining for which cells the cell information for the purpose of the NCL update should be gathered. As mentioned, the determination by the determination module 21 may be fully based on instructions received from the wireless access node eNB 1A or may be (partly) based on an internal comparison algorithm of the user terminal 3, using the copy of NCL-1A stored in a section of storage 22. The stored NCL may also be applied (illustrated by the arrow between scanning module 23 and determination module 21) after detecting (a part of) the cell information of all the available cells, as will be explained in further detail below.

The gathering of cell information for the purpose of updating an NCL may also be performed independently of the NCL stored in the user terminal 3. In such a case, the user terminal 3 preferably gathers cell information of all measurable cells.

The measurement is performed by a scanning module 23. The scanning module 23 detects the cell information of one or

more cells of wireless access nodes of the first and/or the second wireless access network.

The user terminal 3 is configured for storing the obtained cell information CI, or a derivative thereof, in a section of the storage means 22. While NCL-1A is normally erased from the storage means 22 after cell reselection or handover (in order to store the NCL of the new cell), the cell information remains stored for at least a particular period after the cell reselection or handover in order to transmit the cell information CI to the telecommunications system via the new cell using transmitter 24.

After cell reselection or handover to a cell of NodeB 2A, the transmitter 24 transmits the cell information CI, obtained while camping on the cell of eNB 1A, to a receiver 13 of NodeB 2A. Receiver 13 forwards the cell information to an updater 14 configured for updating (including verification) of the NCL-2A using the cell information CI.

When sufficient time is available, the mobile user terminal 3 may also transmit the cell information CI to the first wireless access network, particularly eNB 1A, in order to e.g. update NCL-1A, prior to cell reselection or handover to NodeB 2A. This transmission is shown by the dashed arrow from transmitter 23 towards eNB 1A.

In a particular example, a request is sent from request generator 12 to user terminal 3 to obtain cell information of the second wireless access network when user terminal is about to be handed over to this network. First, user terminal 3, using scanning means 23 detects as many PCI's (physical cell identifiers) as possible. As an example, the PCI's of the cells of nodes 2A-2D are detected. The PCI's are generally transmitted on a specialized channel (a pilot channel for UMTS). Using NCL-1A stored in storage 22 and determination module 21, the PCI's of NodeB 2A and NodeB 2B are omitted from the further processing, since these are already present in NCL-1A. The scanning means then detects the signal strengths of the pilot channel of the remaining cells identified by the PCI's of NodeB 2C and NodeB 2D. It may turn out that the signal strength for the cell of

NodeB 2D is too low and, therefore, determination module 21 also omits further processing for cell NodeB 2D.

Subsequently, the scanning means tunes to the broadcast channel BCH of the cell of NodeB 2C and detects the GCID (global cell identifier) of this cell. If sufficient time is available before handover to the NodeB 2A occurs, the GCID and (possibly) other information is transmitted as cell information, using transmitter 24, to eNB 1A where it is received by receiver 13. Updater 14 may be used to update NCL-1A by adding wireless access node NodeB 2C, as illustrated. The other information may e.g. comprise location information of the mobile terminal 3, obtained using GPS module 25, when the scanning for available cells was performed.

However, time may be insufficient to complete the cell information gathering process and transmission of the cell information via the currently serving cell prior to handover. The GCID of NodeB 2C may then be stored as cell information CI in storage 22. User terminal 3 may then be handed over to NodeB 2A and transmission of the cell information CI may be performed using transmitter 24 to transmit the cell information CI to receiver 13 of NodeB 2A.

The cell information CI revealing the existence of NodeB 2C, i.e. the cell thereof, as an appropriate neighbour cell may be used for updating NCL-2A (for which the cell of NodeB 2C can be called a 'missing neighbour', since it was not present in NCL-2A) and for updating NCL-1A via a connection between the first wireless access network and the second wireless access network transporting cell information CI or a derivative thereof. This connection is indicated by the dashed arrow A in FIG. 2 and may e.g. be implemented using the OMC-2 and OMC-1 presented in FIG. 1.

Instead of or in addition to obtaining and reporting cell information of the second wireless access network, the mobile user terminal 3 may obtain cell information related to the first wireless access terminal. Reference is made to FIGS. 3A and 3B for an example of this.

In order to aid the automated optimisation of inter-network NCL, in one embodiment of the presented invention as illustrated in FIGS. 3A and 3B, an active terminal 3, just before making a handover from network A to network B, takes a snapshot of the pilot channel strengths it sees in network A, indicated by the measurement report. The terminal 3 performs a global scan and does not limit itself to considering only cells on the current NCL in order to identify potential cell candidates for adoption in the existing NCLs. Once the handover to network B is completed, user terminal 3 reports this snapshot to the new serving cell in network B. The new serving cell in network B can combine this report with other equivalent reports obtained from other handed-over terminals, in order to periodically optimise its inter-network NCL. The intra-network NCL of the originally serving cell may be updated as well by making the obtained cell information available to this cell using a connection between the wireless access networks.

FIGS. 4A and 4B provide another representation of an embodiment already discussed with reference to FIG. 2. The active terminal, just before making a handover from network A to network B, takes a snapshot of the pilot channel strengths it sees in network B, reports this to its source cell in network A (if sufficient time is available) and then undergoes the handover to the target cell in network B. Equivalently to the above description, now the source cell in network A can use these reports to self-optimise its inter-network NCL. The advantage of the second embodiment is that the cell in which the NCL is updated is in accordance with the direction of mobility. In other words, user motion from a source cell in network A to a target cell in network B makes use of the NCL in the source cell and hence the snapshot information generated at its handover can be used to update the NCL in the source cell. This advantage is primarily relevant in regions where inter-cell mobility is asymmetric. This is relevant when the operator favours one network over another for providing one or more particular services. This is also relevant in the case where mobility predominantly occurs in one direction (e.g. a one-way street).

Again, the cell information may also be stored using storage 22 and be transmitted to wireless access network A via wireless access network B. Also, the cell information of network B may be relevant for updating the intra-network NCL of the cell of this network.

The cell information CI (e.g. measurement reports) are periodically, or upon observed need, processed in each cell (access node) in order to re-optimise the inter-network NCL. This can be done by ranking all reported global cell IDs based on some weighted combination of the relative frequency at which they are reported and the associated pilot power strengths. This ranked list can then be combined with the actual handover statistics, as this indicates to what extent existing inter-network neighbour relations are actually used.

In an embodiment, a significant part of the processed reports of the mobile user terminals 3 (e.g. say more than 30% of the reported measurements) indicates a Cell ID with sufficient pilot (beacon) quality which is not included in the current inter-network NCL. Then this Cell ID should be added in the NCL.

Another example includes the case where an insignificant part of the processed UE reports (e.g. less than 1%) indicates a Cell ID with sufficient pilot (beacon) quality which is already included in the NCL. Then, this Cell ID should be removed from the NCL. Additionally, a listed neighbour to which hardly ever inter-network handover takes place, may be a candidate for removal from the NCL.

Additions or removals of cells in Network A and Network B may automatically be reflected in the ranking of the Cell IDs with sufficient pilot (beacon) strengths that are reported by the UEs. Consequently, these cells are then automatically added or removed from the NCL and no manual configuration is necessary.

As an alternative to optimising NCLs for each network separately, in an embodiment a single integrated NCL in each cell, containing cells both in the same network and in other (cooperative) networks, and both on the same carrier and differ-

ent carriers is automatically optimised. It is noted that optimisation of such an integrated list may then also implicitly involve a ranking of networks and carriers for potential adoption in the NCL (and possibly even for potential handovers).

One embodiment of the invention may be implemented as a program product for use with a computer system. The program(s) of the program product define functions of the embodiments (including the methods described herein) and can be contained on a variety of computer-readable storage media. Illustrative computer-readable storage media include, but are not limited to: (i) non-writable storage media (e.g., read-only memory devices within a computer such as CD-ROM disks readable by a CD-ROM drive, flash memory, ROM chips or any type of solid-state non-volatile semiconductor memory) on which information is permanently stored; and (ii) writable storage media (e.g., floppy disks within a diskette drive or hard-disk drive or any type of solid-state random-access semiconductor memory) on which alterable information is stored.

## CLAIMS

1. A system for updating a neighbour cell list in a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined, the system comprising:

- a detector configured for detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;
- a selector configured for selecting a part of the user terminals;
- a request generator configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;
- a receiver configured for receiving the cell information from the one or more of the selected user terminals; and
- updating means configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

2. The system according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the first wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless nodes of the first wireless access network via the second wireless access node,

the system further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the first wireless access network via the second wireless access node.

3. The system according to claim 2, further comprising a data transfer system for transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node.

4. The system according to one or more of the preceding claims,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node,

the system further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node.

5. The system according to claim 4, further comprising a data transfer system for transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

6. The infrastructure according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node

further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

7. The system according to one or more of the preceding claims, wherein the telecommunications system is further configured for receiving location information from one or more of the detected user terminals and wherein the location information is used as a selection parameter for selecting the part of the detected user terminals.

8. The system according to one or more of the preceding claims , wherein one or more thresholds, possibly service-dependent, are defined in the telecommunications system for transferring the user terminals between the first wireless access network and the second wireless access network and wherein at least one of the thresholds is used as a selection parameter for selecting the part of the detected user terminals.

9. In a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is

defined, a method for updating at least one of the first and second neighbour cell lists comprising the steps of:

- detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;

- selecting a part of the user terminals;

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

- receiving the cell information from the one or more of the selected user terminals; and

- updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

10. The method according to claim 9, comprising the steps of:

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the first wireless access network;

- receiving the cell information of the wireless nodes of the first wireless access network via the second wireless access node,

- transferring the selected user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the first wireless access network via the second wireless access node, and

- optionally, transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node.

11. The method according to claim 9 or 10, comprising the steps of:

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

- receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node,

- transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node, and

- optionally, transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

12. The method according to claim 9, comprising the steps of;

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

- receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node

- transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

13. A computer program comprising software code portions configured for, when executed by at least one processor, performing the method of one or more of the claims 9-12.

14. A mobile user terminal configured for use in the method according to one or more of the claims 9-11, wherein the mobile terminal, in use, contain a neighbour cell list of the first wireless access node, the terminal comprising:

- a receiver for receiving the request for reporting cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

- scanning means for detecting the cell information from the wireless access nodes, at least one of the wireless access nodes being absent in the neighbour cell list,

- a transmitter for transmitting the detected cell information,

- wherein the mobile user terminal is arranged for temporarily storing the detected cell information and transmitting the detected cell information to the second wireless access node after being transferred from the first to the second wireless access network.

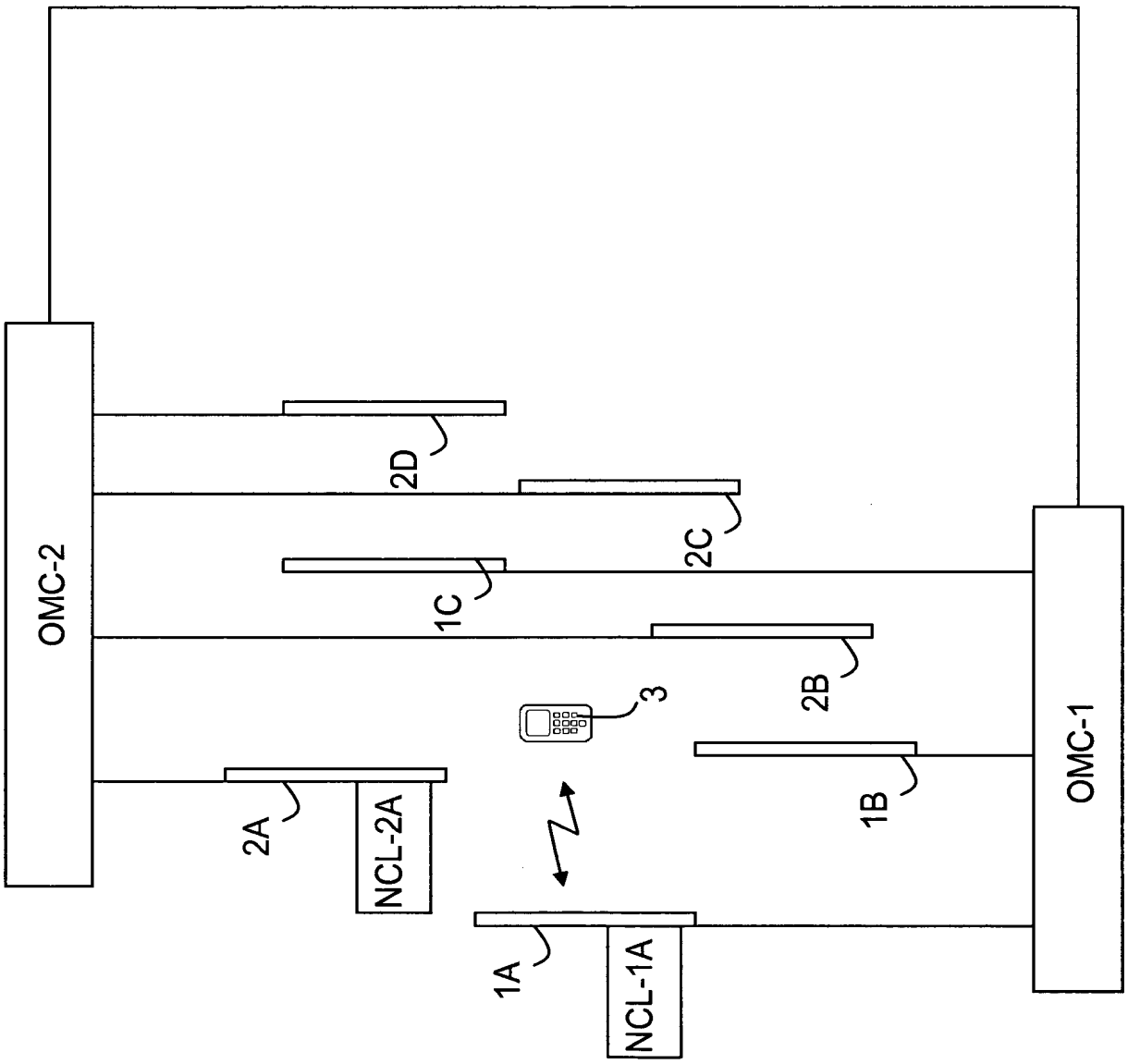


FIG. 1

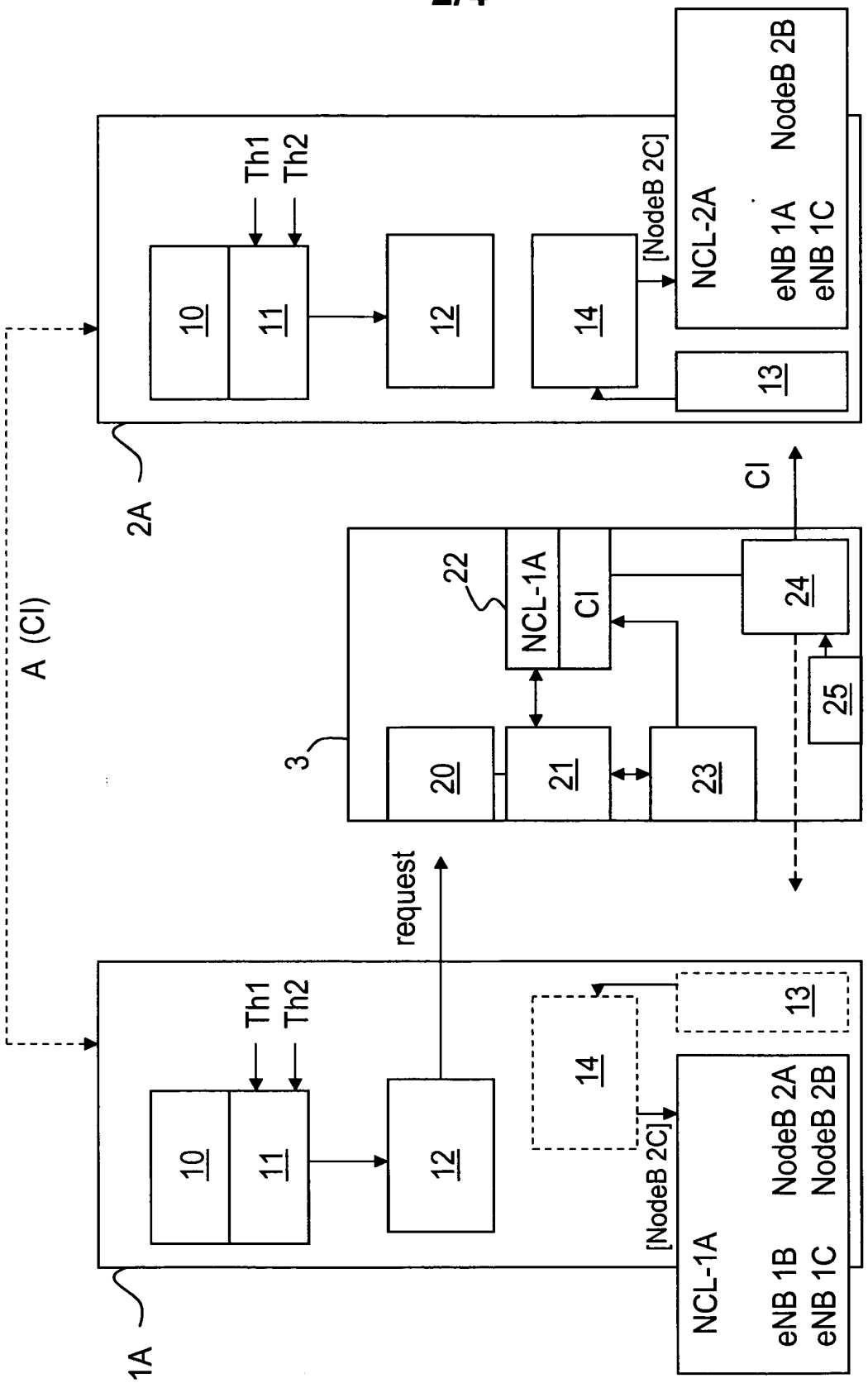
2A
NCL-2A
eNB 1A
eNB 1C
NodeB 2B
[NodeB 2C]
Th1
Th2
10
11
12
13
14
A (CI)
CI
22
NCL-1A
CI
24
25
3
20
21
23
request
1A
NCL-1A
eNB 1B
eNB 1C
NodeB 2A
NodeB 2B
[NodeB 2C]

FIG. 2

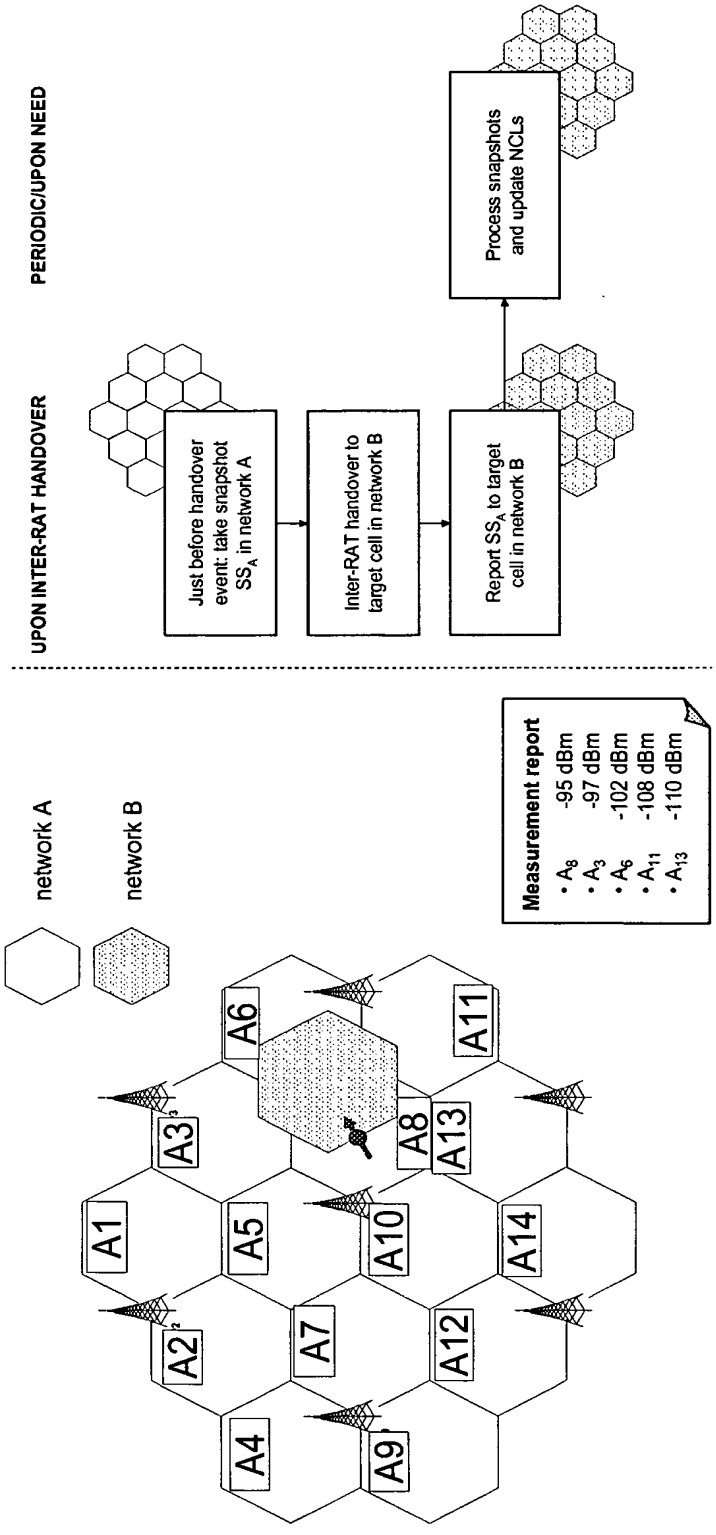
network A
network B
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
Measurement report
• $A_8$ -95 dBm
• $A_3$ -97 dBm
• $A_6$ -102 dBm
• $A_{11}$ -108 dBm
• $A_{13}$ -110 dBm
UPON INTER-RAT HANDOVER
Just before handover event: take snapshot $SS_A$ in network A
Inter-RAT handover to target cell in network B
Report $SS_A$ to target cell in network B
PERIODIC/UPON NEED
Process snapshots and update NCLs

FIG. 3A

FIG. 3B

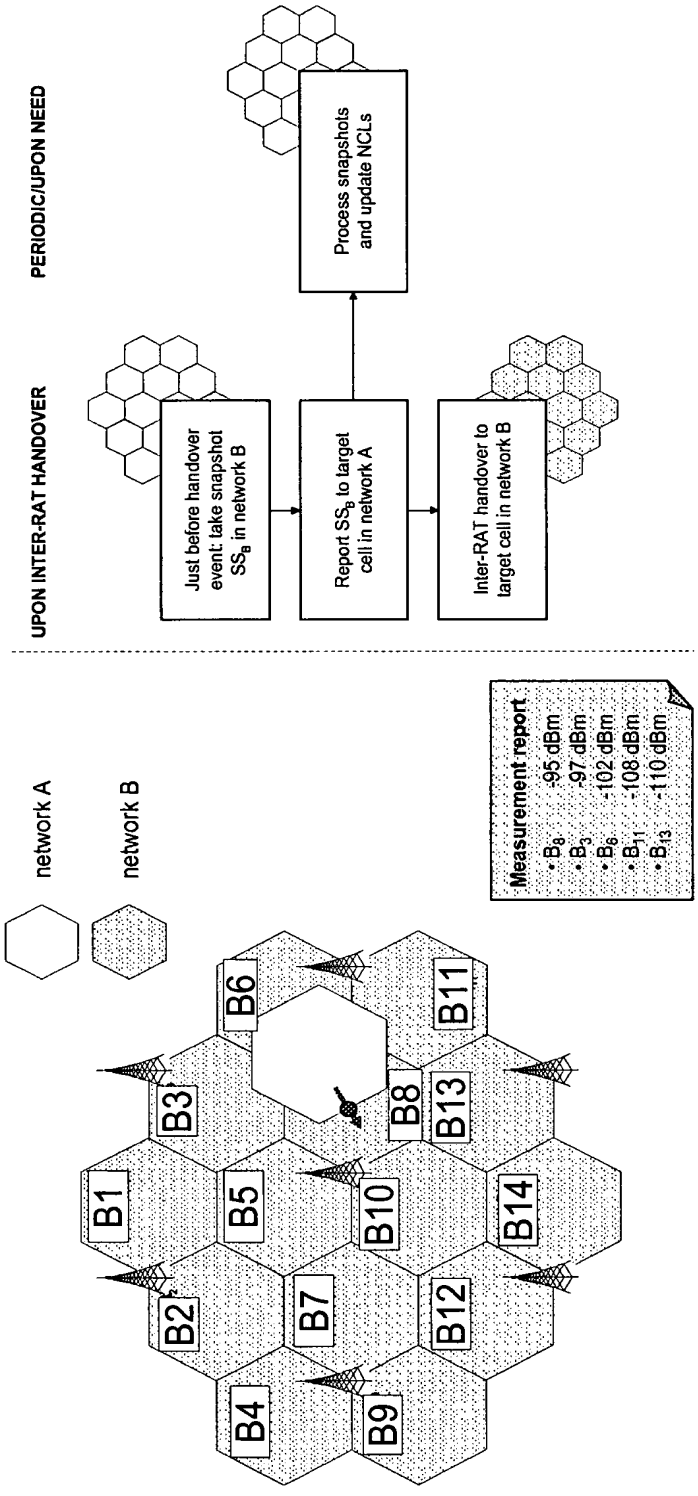
network A
network B
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
B13
B14
Measurement report
• $B_8$ -95 dBm
• $B_3$ -97 dBm
• $B_6$ -102 dBm
• $B_{11}$ -108 dBm
• $B_{13}$ -110 dBm
UPON INTER-RAT HANDOVER
Just before handover event: take snapshot $SS_B$ in network B
Report $SS_B$ to target cell in network A
Inter-RAT handover to target cell in network B
PERIODIC/UPON NEED
Process snapshots and update NCLs

FIG. 4A

FIG. 4B

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|---|---|---|
| | 09172399.9 / EP09172399 | |

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Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le President de l'Office européen des brevets
p.o.

R.C. van Dijk

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(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
If no title is shown please refer to the description.
Si aucun titre n'est indiqué se référer à la description.)

System for updating a neighbour cell list (NCL) of a wireless access node of a telecommunications architecture comprising co-operating wireless access networks and method therefore

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# System for updating a neighbour cell list (NCL) of a wireless access node of a telecommunications architecture comprising co-operating wireless access networks and method therefore

## FIELD OF THE INVENTION

The invention relates to the field of telecommunications systems and a method in telecommunications architecture. More specifically, the invention relates to a telecommunications architecture comprising at least a first and a second wireless access network between which user terminals can be transferred and a method in such a telecommunications system, wherein the neighbour cell lists (NCLs) of at least a wireless access node of the first and/or second wireless access network can be updated using a system.

## BACKGROUND OF THE INVENTION

When moving through the coverage area of a wireless access cellular network, mobile user terminals continuously scan the spectrum for pilot or reference signals (beacons) in order to determine which cell (base station) to camp on. In idle mode, this is referred to as cell reselection, while in active/dedicated mode, this is referred to as handover. The cell-specific list of surrounding cells that are considered for cell reselection or handover is called the neighbour cell list (NCL), which is stored in each base station and broadcast within the cell. The mobile user terminal receives and stores the NCL. The NCL contains the cells for which the mobile user terminal should send measurement reports (when certain criteria are met) to the base station currently serving the user terminal.

In case of multiple, cooperating wireless access cellular networks, each cell not only has an intra-network NCL, but also an inter-network NCL.

The optimisation of the NCLs is traditionally done with the aid of off-line planning tools, using path loss predictions and (off-line) optimisation algorithms. Currently, automated configuration and optimisation of intra-network NCLs and inter-network NCLs, based on e.g. actual measurement feedback from

user terminals, observed mobility patterns, base station scans and handover statistics, are being investigated.

3GPP TS 36.300, V8.9.0, discloses an automatic neighbour relation (ANR) function to relieve an operator from the burden of manually managing neighbour relations. Such an ANR function resides in the eNode-B (eNB) of an LTE network and manages a conceptual neighbour relation table (NRT). A neighbour detection function is used to find new neighbours and to add them to the NRT, whereas a neighbour removal function removes outdated neighbours from the NRT. The eNB instructs a user terminal from a serving cell to look for neighbour cells of other networks by scanning all cells. The user terminal first reports the physical cell identifier (PCI) of the detected cells in the other network. When the eNB receives the reports from the user terminals containing the PCI's of the cells, the eNB instructs the user terminal, using the newly discovered cell as a parameter, to read the Cell Global Identifier (CGI) and further cell information from the neighbouring cells. The user terminal also reports this information to the serving cell. The eNB may then update the NRT using the information reported from the user terminals.

## SUMMARY OF THE INVENTION

A system is disclosed for a telecommunications architecture that comprises a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined.

The system comprises a detector configured for detecting user terminals about to be transferred, i.e. for which cell reselection or handover will be performed, from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network.

The system also comprises a request generator configured for requesting from the first wireless access node one or

more of the detected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The telecommunications system, particularly at least one of the first and the second wireless access node, also comprises a receiver configured for receiving the cell information from one or more of the detected user terminals. Updating means are provided configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

A method in a telecommunications architecture is also disclosed. User terminals about to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network are detected. From the first wireless access node, one or more of the detected user terminals are requested to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The cell information is received from one or more of the detected user terminals and at least one of the first neighbour cell list and the second neighbour cell list is updated using the received cell information.

Furthermore, a mobile user terminal containing at least one neighbour cell list of the first wireless access node is disclosed. The terminal comprises a receiver for receiving the request for reporting cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The mobile terminal also contains scanning means configured for detecting the cell information from the wireless access nodes, at least one of the wireless access nodes being absent in the neighbour cell list, and a transmitter for transmitting the detected cell information. At present, standardization does not allow mobile terminals to measure cells not present in the NCL. However, there are no intrinsic obstacles for making performing such measurements. The mobile terminal is arranged for temporarily storing the detected cell information and transmitting the de-

tected cell information to the second wireless access node after being transferred from the first to the second wireless access network.

It is noted that in the present application the terms wireless access node and cell are used as similar terms. The skilled person will appreciate that a single wireless access node may provide multiple cells and that, typically, a neighbour cell list is defined for each of the cells of such a node.

The plurality of wireless access nodes of which cell information is requested may exclude the first wireless access node, or more particularly, the cell thereof currently serving the user terminal. On the other hand, the plurality of wireless access nodes would typically include cells that are absent in the neighbour cell list stored in the user terminal for regularly reporting measurement reports to the serving cell. Otherwise, since the neighbour cell list is obtained from the serving cell, the detection of the cell information by the user terminal would be restricted to this list and would therefore only be suitable for verifying the existing NCL and not for adding new neighbouring cells to the list. In an embodiment, the user terminal performs a complete scan for all cells in the first wireless access network (possibly excluding the currently serving cell) and/or all cells in the second wireless access network to allow the telecommunications system to obtain a complete picture of the available cells around the first wireless access node. This complete information containing the scan of all cells may then be used for updating the NCL(s). Alternatively, the user terminal may compare the received complete information with the NCL it has obtained from the first wireless access node and only report cell information of cells not present on the current NCL.

The first and second wireless access networks may differ in radio access technology (e.g. GSM and UMTS or UMTS and LTE), the deployed release of a given radio access technology, the used frequency spectrum (e.g. the 900 MHz and 1800 MHz frequency bands (the latter also being referred to as a DCS network) for GSM, different 5MHz carriers for UMTS) and/or wire-

less access networks of different mobile operators. The wireless access network may also differ in the type of cells provided, e.g. macro cells and pico cells.

The disclosed system and method are able to specifically direct the request for cell information for the first and/or second network to user terminals in the regions where cell reselection or handover from the first to the second wireless access network is about to occur. By collecting this information specifically at cell reselection or handover moments, the updating of the NCL is inherently based on the inter-network neighbours that a user terminal experiences in the cell reselection or handover region, where the reports of the user terminal measurements are most relevant for construing the NCL.

In some instances, user terminals may move rapidly through an area and cell reselection and handover to the second wireless access network should be performed quickly. In such cases, insufficient time may be available for performing the scan for obtaining the cell information for the first wireless access network and for reporting the cell information to the telecommunications system via the first wireless access network. The embodiments of the invention as defined in claims 2 and 11 provide additional time for completing the method by performing the cell reselection or handover as soon as the mobile user terminal has been instructed for performing the scan for cell information for the first and/or the second wireless access network. By temporarily storing the cell information resulting from the scan at the mobile user terminal, the user terminal may carry the cell information to the second network where it has sufficient time to report the cell information of the plurality of wireless access nodes of the first wireless access network via the second network.

The cell information of the wireless access nodes of the first wireless access network may be used for updating the neighbour cell list of the first wireless access node and/or for updating the neighbour cell list of the second wireless access node, or the cells thereof.

The updating of the neighbour cell list of the second wireless access node is relevant for user terminals reselecting cells or handed over from the second wireless access node to the first wireless access network, i.e. in the cell reselection or handover direction reverse to the direction travelled by the terminals reporting the cell information. Since other user terminals will be transferred from the second wireless access network to the first wireless access network, the neighbour cell list of the first wireless access node may also be updated in this way.

The cell information of the plurality of access nodes of the first wireless access network as received via the second wireless access node may also be transferred back to the first wireless access node, e.g. for updating the intra-network neighbour cell list, as defined in claim 3 and, optionally, in claim 11. In a particular example, this embodiment may be used to reduce the so-called 'missing neighbour' effect in a UMTS network, here being the first wireless access network. User terminals equipped to connect to UMTS networks are restricted to gathering cell information as defined in the neighbour cell list received from the base station currently serving the user terminal. An absent cell in the neighbour cell list of the base station will thus never be measured and reported by the user terminal as a result of this restriction of the user terminal. When the signal of a missing neighbour is too strong, call drops may occur. The present embodiments may reduce this problem by instructing the user terminals to also scan for cell information of wireless access nodes of the UMTS network being absent in the neighbour cell list (and thus possibly revealing the existence of cells not present in the neighbour cell list of the base station) and to report this via the second wireless access network back to the first wireless access node. The NCL of the first wireless access node may then be updated with the missing neighbour cell.

The user terminals may also be instructed to obtain the cell information of the plurality of wireless access nodes of the second wireless access network shortly before cell reselec-

tion or handover to the second wireless access node of this network and report the cell information to the telecommunications system via this second wireless access node, i.e. after cell reselection or handover. This embodiment is defined in claims 4 and 12.

Again, the cell information of the wireless access nodes of the second wireless access network may be used for updating the neighbour cell list of the first wireless access node and/or for updating the neighbour cell list of the second wireless access node. The cell information obtained for the access nodes of the second wireless access network may be relevant for the second wireless access network itself, e.g. for updating the intra-network NCL, in view of the 'missing neighbour' effect occurring in particular types of network such as UMTS, as discussed above for the first wireless access network.

The cell information of the plurality of access nodes of the second wireless access network as received via the second wireless access node may be transferred back to the first wireless access node as defined in claim 5 and, optionally, in claim 12. In doing so, the first wireless access node may update its neighbour cell list using the received cell information obtained shortly before cell reselection or handover, even when the user terminals have insufficient time for reporting the cell information for the plurality of wireless access nodes of the second wireless access network directly to the first wireless access node. The updated NCL is relevant for cell reselection or handover from the first wireless access node to the second wireless access network for other user terminals.

Of course, when sufficient time for reporting the cell information of the plurality of wireless access nodes of the second network is available, this cell information obtained shortly before cell reselection or handover to the second wireless access network can be reported directly to the first wireless access node, as defined in the embodiments of claims 6 and 13.

It is not required that all handover or cell reselection instances trigger a scan for cell information by the user

terminals. A wireless access node may for instance indicate on its broadcast channel not only whether handovers and/or cell re-selections should trigger such reporting, but also a likelihood parameter which the terminal can use to flip a (biased) coin in determining whether it should send cell information at a specific handover or cell reselection instance. Alternatively, the wireless access node may explicitly signal to the specific user terminal whether it should do the cell measurement and reporting. In this manner, the amount of cell information reporting can be tuned, which relates to a trade-off between the measurement overhead (signalling load) and the potential for neighbour cell list optimisation. The embodiment of the invention as defined in claim 7 provides the possibility of achieving such an appropriate trade-off. The embodiment of the telecommunications system of claim 7 may also be used for the method in the telecommunications system as defined in claims 10-13.

One embodiment of tuning the amount of cell list optimisation traffic is to use the location information from the user terminals as a selection criterion as defined in claim 8. The location information may e.g. be obtained from a GPS module in the user terminal or by means of measurements using the first and/or the second wireless access network. This location information can be useful e.g. in identifying where handover regions exist, and in solving location-specific outages or problems, e.g. dropped calls due to 'missing neighbour'. It may also be useful when an operator changes configuration (optimisation of downlink power, antenna tilt, etc) and wants to measure the effect on the cells relevant for inter-RAT cell change or handover.

Another advantageous selection criterion for determining which user terminals should report cell information is the transfer threshold that may have been set by the operator(s) of the telecommunication system, as defined in claim 9. The transfer threshold determines at what level (typically involving pilot signal measurements) cell reselection or handover would occur. The transfer threshold for cell reselection or handover from the first wireless access network to the second wireless

access network may be asymmetric (i.e. a different transfer threshold Th2 applies for a transfer from the second to the first wireless access network) and may also be dependent on the service type of the service received by the user terminal when connected to the first wireless access node. As an example, a user terminal provided with a voice service by a cell of an LTE network that is handed over to a GSM network might not be handed over back to the LTE network. This is because the operator chooses this mode of operation. In such a case, although this user terminal is a detected user terminal in the sense that it is about to be transferred to the second wireless access network (GSM), it is not selected for reporting requested to report cell information of the plurality of wireless access nodes of the first wireless access network (the LTE network), since the handover in the direction back to the first network (the LTE network) will generally not be made. On the other hand, for a user terminal using a data service that is temporarily handed over from an LTE network to a GSM network, a handover back to the LTE network is generally preferred and such user terminals can be selected to report cell information of the plurality of wireless access nodes of the second network. The embodiment of the telecommunications system of claim 9 may also be used for the method in the telecommunications system as defined in claims 10-13.

Hereinafter, embodiments of the invention will be described in further detail. It should be appreciated, however, that these embodiments may not be construed as limiting the scope of protection for the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 provides a schematic illustration of a telecommunication system comprising a first and a second wireless access network, each having a plurality of wireless access nodes, according to an embodiment of the invention;

FIG. 2 provides a schematic illustration of a mobile user terminal and wireless access nodes configured for performing a method according to an embodiment of the invention;

FIGS. 3A and 3B provide a schematic illustration of a telecommunications system and a flow chart for operating such a system, wherein cell information of wireless access nodes of the first wireless access network is obtained and reported via the second wireless access network; and

FIGS. 4A and 4B provide a schematic illustration of a telecommunications system and a flow chart for operating such a system, wherein cell information of wireless access nodes of the second wireless access network is obtained and reported via the first wireless access network.

## DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of first wireless access nodes 1A-1C of a first wireless access network and second wireless access nodes 2A-2D of a second wireless network. As an example, the first wireless access nodes 1A-1C are eNBs of an Long Term Evolution (LTE) network, whereas the second wireless access nodes 2A-2D are NodeBs of an UMTS network. Other examples includes wireless access networks differing in other radio access technologies (RATs), e.g. GSM and UMTS, differences in the deployed release of a given radio access technology, differences in the used frequency spectrum (e.g. the 900 MHz and 1800 MHz frequency bands (the latter also being referred to as a DCS network) for GSM, different 5MHz carriers for UMTS) and/or wireless access networks of different mobile operators. The wireless access network may also differ in the type of cells provided, e.g. macro cells and pico cells.

The wireless access nodes 1A-1C and 2A-2D can be controlled by control systems as schematically illustrated in FIG. 1. As an example, the control system may be Operation and Maintenance Centres (OMCs) as generally known in the art. The OMCs of the wireless access networks can be interconnected. Other connections between the wireless access networks can be used as well. If the wireless access nodes of the first and second wire-

less access networks originate from the same vendor, a single OMC can be used.

Each of the wireless access nodes 1A-1C and 2A-2D may contain at least one neighbour cell list (NCL). In FIG. 1, NCL-1A and NCL-2A are indicated as NCL of the corresponding wireless access nodes. When a wireless access node provides multiple cells, typically each cell has a corresponding NCL.

A wireless access node broadcasts the NCL and mobile user terminals 3 camping on such a cell receive and store the NCL. The NCL is typically used to instruct the mobile terminal 3 which cells to monitor and to report every now and then the received signal strengths of each of the monitored cells, such that the network can make a decision whether or not the mobile terminal 3 should select or should be handed over to another cell.

As an example, the mobile terminal 3 receives the NCL-1A from wireless access node 1A to which it is currently connected. NCL-1A contains the cell(s) of neighbouring access nodes 1B and 1C and mobile terminal 3 monitors the signal strengths of these cells and reports these to the wireless access node 1A. Such an NCL-1A is referred to as an intra-network NCL. NCL-1A may also list neighbouring access nodes 2A and 2B of the second wireless access network, in which case NCL-1A would be referred to as an inter-network NCL. NCL-1A may also be a combined NCL, i.e. a combination of an intra-network and an inter-network NCL. Currently, automated configuration and optimisation of intra-network NCLs and inter-network NCLs is based on e.g. actual measurement feedback from user terminals 3 as disclosed in 3GPP TS 36.300, V8.9.0.

Referring also to FIGS. 2A and 2B, an embodiment will now be described in further detail, wherein intra-network NCL-1A contains the cells of eNBs 1B and 1C and inter-network NCL-1A contains the cells of NodeBs 2A and 2B. Note that inter-network NCL-1A does not yet contain NodeBs 2C and 2D.

Mobile user terminal 3 is assumed to camp on a cell of eNB 1A and is monitoring the cells of eNB's 1B, 1C and NodeBs 2A and 2B as indicated in the intra-network and inter-network NCLs

transmitted in the cell under consideration. The mobile user terminal 3 regularly sends measurement reports to the eNB 1A as generally known in the art.

As illustrated schematically in FIG. 2A, eNB 1A contains a cell reselection/handover detector 10 that recognizes that mobile terminal 3 requires a cell reselection or handover to NodeB 2A of the second wireless access network. The cell reselection or handover indication triggers the following sequence of events in eNB 1A.

First, it may be determined whether or not the mobile terminal 3 for which a cell reselection or handover indication is received should participate, i.e. should be selected, in the process for updating (which includes the verification of the correctness) of an NCL, such as NCL-1A or NCL-2A. To that end, the eNB 1A contains a selection module 11 for selecting a part of the user terminals 3 for which a cell reselection or handover indication is detected. In this manner, it is possible to filter an appropriate portion the user terminals for which cell reselection or handover is about in order to reduce unnecessary signalling over the first and/or second wireless access network. The decision whether or not to participate in the updating process, i.e. whether or not to provide information to the telecommunication system allowing the updating of the NCL's, may either be taken at the mobile terminal or at the telecommunications system, particularly eNB 1A.

As an example, eNB 1A may indicate on its broadcast channel not only whether handovers and/or cell reselections should trigger such reporting, but also a likelihood parameter which the terminal 3 can use to flip a biased coin in determining whether it should send information at a specific handover or cell reselection instance. Alternatively, eNB 1A may explicitly signal to the specific user terminal 3 whether it should do the cell measurement and reporting. In this manner, the amount of cell information reporting can be tuned, which relates to a trade-off between the measurement overhead (signalling load) and the potential for neighbour cell list optimisation.

An advantageous selection criterion at the side of the eNB 1A for determining which user terminals 3 should report cell information is the transfer threshold that may have been set by the operator(s) of the telecommunications system between the first and the second wireless access networks. The transfer threshold determines at what level (typically involving pilot signal measurements) cell reselection or handover would occur. The transfer threshold Th1 for cell reselection or handover from the first wireless access network to the second wireless access network may be asymmetric (i.e. a different transfer threshold Th2 applies for a transfer from the second to the first wireless access network) and may also be dependent on the service type of the service enjoyed by the user terminal when connected to the first wireless access node.

In FIG. 1, the user terminal 3 camping on a cell of eNB 1A of an LTE network using a data service that is about to be handed over to NodeB 2A of an UMTS network will generally be handed over back to the LTE network, if possible, because the operator applies a low threshold for handing over the user terminal 3 from the UMTS network to the LTE network for data services but a much higher threshold for handing over the user terminal to the UMTS network. In such a case, since a transfer between the networks is more likely in one direction than in the other, the terminal 3 may or may not be selected for providing information useful for the NCL updating process as will now be described in further detail.

The selection stage of user terminals 3 may be omitted completely or may be selectively applied, e.g. during particular hours of the day or at particular stages of the configuration and optimisation of the network.

Once user terminal 3 has been selected, request generator 12 in FIG. 2 is activated in order to request the user terminal 3 to report cell information of a plurality of wireless access nodes.

The plurality of wireless access nodes of which cell information is requested may exclude the cell of eNB 1A currently serving the user terminal 3. On the other hand, the

plurality of wireless access nodes would typically include cells that are absent in the neighbour cell list NCL-1A stored in the user terminal 3 for regularly reporting measurement reports to the serving cell. In the example of FIG. 1, the cell information requested would typically include cell information of at least one of the cells NodeB 2C or NodeB 2D. In other words, the user terminal 3 should at least monitor other cells than included in the neighbour cell list NCL-1A.

The user terminal 3, to that end, contains a receiver 20 (see FIG. 2) for receiving the request for reporting cell information of a plurality of wireless access nodes. The actual determination for which cells the cell information should be obtained and/or should be reported may be performed in the eNB 1A (and than being signalled to the user terminal 3) and/or internally in the user terminal 3.

When the updating of e.g. NCL-1A would only involve the determination whether additional cells should be included in the list, cell information may only be obtained for the cells of NodeB 2C and NodeB 2D. NCL-1A may be used to determine which cell(s) should be excluded for the gathering of cell information for the purpose of updating the NCL in such a case. However, when NCL-2A should be updated, the cells listed in NCL-1A should not necessarily be excluded.

On the other hand, if the NCL updating is also used to verify the existing NCL, cell information for one or more cells of the existing NCL should be gathered as well. In a particular embodiment, user terminal 3 comprises a determination module 21 for determining for which cells the cell information for the purpose of the NCL update should be gathered. As mentioned, the determination by the determination module 21 may be fully based on instructions received from the wireless access node eNB 1A or may be (partly) based on an internal comparison algorithm of the user terminal 3, using the copy of NCL-1A stored in a section of storage 22. The stored NCL may also be applied (illustrated by the arrow between scanning module 23 and determination module 21) after detecting (a part of) the cell information of all the available cells, as will be explained in further detail below.

The gathering of cell information for the purpose of updating an NCL may also be performed independently of the NCL stored in the user terminal 3. In such a case, the user terminal 3 preferably gathers cell information of all measurable cells.

The measurement is performed by a scanning module 23. The scanning module 23 detects the cell information of one or more cells of wireless access nodes of the first and/or the second wireless access network.

The user terminal 3 is configured for storing the obtained cell information CI, or a derivative thereof, in a section of the storage means 22. While NCL-1A is normally erased from the storage means 22 after cell reselection or handover (in order to store the NCL of the new cell), the cell information remains stored for at least a particular period after the cell reselection or handover in order to transmit the cell information CI to the telecommunications system via the new cell using transmitter 24.

After cell reselection or handover to a cell of NodeB 2A, the transmitter 24 transmits the cell information CI, obtained while camping on the cell of eNB 1A, to a receiver 13 of NodeB 2A. Receiver 13 forwards the cell information to an updater 14 configured for updating (including verification) of the NCL-2A using the cell information CI.

When sufficient time is available, the mobile user terminal 3 may also transmit the cell information CI to the first wireless access network, particularly eNB 1A, in order to e.g. update NCL-1A, prior to cell reselection or handover to NodeB 2A. This transmission is shown by the dashed arrow from transmitter 23 towards eNB 1A.

In a particular example, a request is sent from request generator 12 to user terminal 3 to obtain cell information of the second wireless access network when user terminal is about to be handed over to this network. First, user terminal 3, using scanning means 23 detects as many PCI's (physical cell identifiers) as possible. As an example, the PCI's of the cells of nodes 2A-2D are detected. The PCI's are generally transmitted on a specialized channel (a pilot channel for UMTS). Using NCL-1A

stored in storage 22 and determination module 21, the PCI's of NodeB 2A and NodeB 2B are omitted from the further processing, since these are already present in NCL-1A. The scanning means then detects the signal strengths of the pilot channel of the remaining cells identified by the PCI's of NodeB 2C and NodeB 2D. It may turn out that the signal strength for the cell of NodeB 2D is too low and, therefore, determination module 21 also omits further processing for cell NodeB 2D.

Subsequently, the scanning means tunes to the broadcast channel BCH of the cell of NodeB 2C and detects the GCID (global cell identifier) of this cell. If sufficient time is available before handover to the NodeB 2A occurs, the GCID and (possibly) other information is transmitted as cell information, using transmitter 24, to eNB 1A where it is received by receiver 13. Updater 14 may be used to update NCL-1A by adding wireless access node NodeB 2C, as illustrated. The other information may e.g. comprise location information of the mobile terminal 3, obtained using GPS module 25, when the scanning for available cells was performed.

However, time may be insufficient to complete the cell information gathering process and transmission of the cell information via the currently serving cell prior to handover. The GCID of NodeB 2C may then be stored as cell information CI in storage 22. User terminal 3 may then be handed over to NodeB 2A and transmission of the cell information CI may be performed using transmitter 24 to transmit the cell information CI to receiver 13 of NodeB 2A.

The cell information CI revealing the existence of NodeB 2C, i.e. the cell thereof, as an appropriate neighbour cell may be used for updating NCL-2A (for which the cell of NodeB 2C can be called a 'missing neighbour', since it was not present in NCL-2A) and for updating NCL-1A via a connection between the first wireless access network and the second wireless access network transporting cell information CI or a derivative thereof. This connection is indicated by the dashed arrow A in FIG. 2 and may e.g. be implemented using the OMC-2 and OMC-1 presented in FIG. 1.

Instead of or in addition to obtaining and reporting cell information of the second wireless access network, the mobile user terminal 3 may obtain cell information related to the first wireless access terminal. Reference is made to FIGS. 3A and 3B for an example of this.

In order to aid the automated optimisation of inter-network NCL, in one embodiment of the presented invention as illustrated in FIGS. 3A and 3B, an active terminal 3, just before making a handover from network A to network B, takes a snapshot of the pilot channel strengths it sees in network A, indicated by the measurement report. The terminal 3 performs a global scan and does not limit itself to considering only cells on the current NCL in order to identify potential cell candidates for adoption in the existing NCLs. Once the handover to network B is completed, user terminal 3 reports this snapshot to the new serving cell in network B. The new serving cell in network B can combine this report with other equivalent reports obtained from other handed-over terminals, in order to periodically optimise its inter-network NCL. The intra-network NCL of the originally serving cell may be updated as well by making the obtained cell information available to this cell using a connection between the wireless access networks.

FIGS. 4A and 4B provide another representation of an embodiment already discussed with reference to FIG. 2. The active terminal, just before making a handover from network A to network B, takes a snapshot of the pilot channel strengths it sees in network B, reports this to its source cell in network A (if sufficient time is available) and then undergoes the handover to the target cell in network B. Equivalently to the above description, now the source cell in network A can use these reports to self-optimise its inter-network NCL. The advantage of the second embodiment is that the cell in which the NCL is updated is in accordance with the direction of mobility. In other words, user motion from a source cell in network A to a target cell in network B makes use of the NCL in the source cell and hence the snapshot information generated at its handover can be used to update the NCL in the source cell. This advantage is

primarily relevant in regions where inter-cell mobility is asymmetric. This is relevant when the operator favours one network over another for providing one or more particular services. This is also relevant in the case where mobility predominantly occurs in one direction (e.g. a one-way street).

Again, the cell information may also be stored using storage 22 and be transmitted to wireless access network A via wireless access network B. Also, the cell information of network B may be relevant for updating the intra-network NCL of the cell of this network.

The cell information CI (e.g. measurement reports) are periodically, or upon observed need, processed in each cell (access node) in order to re-optimise the inter-network NCL. This can be done by ranking all reported global cell IDs based on some weighted combination of the relative frequency at which they are reported and the associated pilot power strengths. This ranked list can then be combined with the actual handover statistics, as this indicates to what extent existing inter-network neighbour relations are actually used.

In an embodiment, a significant part of the processed reports of the mobile user terminals 3 (e.g. say more than 30% of the reported measurements) indicates a Cell ID with sufficient pilot (beacon) quality which is not included in the current inter-network NCL. Then this Cell ID should be added in the NCL.

Another example includes the case where an insignificant part of the processed UE reports (e.g. less than 1%) indicates a Cell ID with sufficient pilot (beacon) quality which is already included in the NCL. Then, this Cell ID should be removed from the NCL. Additionally, a listed neighbour to which hardly ever inter-network handover takes place, may be a candidate for removal from the NCL.

Additions or removals of cells in Network A and Network B may automatically be reflected in the ranking of the Cell IDs with sufficient pilot (beacon) strengths that are reported by the UEs. Consequently, these cells are then automatically added

or removed from the NCL and no manual configuration is necessary.

As an alternative to optimising NCLs for each network separately, in an embodiment a single integrated NCL in each cell, containing cells both in the same network and in other (cooperative) networks, and both on the same carrier and different carriers is automatically optimised. It is noted that optimisation of such an integrated list may then also implicitly involve a ranking of networks and carriers for potential adoption in the NCL (and possibly even for potential handovers).

One embodiment of the invention may be implemented as a program product for use with a computer system. The program(s) of the program product define functions of the embodiments (including the methods described herein) and can be contained on a variety of computer-readable storage media. Illustrative computer-readable storage media include, but are not limited to: (i) non-writable storage media (e.g., read-only memory devices within a computer such as CD-ROM disks readable by a CD-ROM drive, flash memory, ROM chips or any type of solid-state non-volatile semiconductor memory) on which information is permanently stored; and (ii) writable storage media (e.g., floppy disks within a diskette drive or hard-disk drive or any type of solid-state random-access semiconductor memory) on which alterable information is stored.

**CLAIMS**

1. A system for updating a neighbour cell list in a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is defined, the system comprising:

- a detector configured for detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;

- a request generator configured for requesting from the first wireless access node one or more of the detected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

- a receiver configured for receiving the cell information from the one or more of the detected user terminals; and

- updating means configured for updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

2. The system according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the detected user terminals to report cell information of a plurality of wireless access nodes of the first wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless nodes of the first wireless access network via the second wireless access node,

the system further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the first wireless access network via the second wireless access node.

3. The system according to claim 2, further comprising a data transfer system for transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node.

4. The system according to one or more of the preceding claims,

wherein the request generator is configured for requesting from the first wireless access node one or more of the detected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node,

the system further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node.

5. The system according to claim 4, further comprising a data transfer system for transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

6. The infrastructure according to claim 1,

wherein the request generator is configured for requesting from the first wireless access node one or more of the

selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

wherein the receiver is configured for receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node

further comprising a transfer system configured for transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

7. The system according to one or more of the preceding claims, wherein the telecommunications system is further configured for selecting a part of the detected user terminals for transmitting the cell information to the receiver.

8. The system according to claim 7 one or more of the preceding claims, wherein the telecommunications system is further configured for receiving location information from one or more of the detected user terminals and wherein the location information is used as a selection parameter for selecting the part of the detected user terminals.

9. The system according to claim 7, wherein one or more thresholds, possibly service-dependent, are defined in the telecommunications system for transferring the user terminals between the first wireless access network and the second wireless access network and wherein at least one of the thresholds is used as a selection parameter for selecting the part of the detected user terminals.

10. In a telecommunications architecture comprising a first wireless access network having a first wireless access node for which at least one first neighbour cell list is defined and a second wireless access network having a second wireless access node for which at least one second neighbour cell list is

defined, a method for updating at least one of the first and second neighbour cell lists comprising the steps of:

- detecting user terminals to be transferred from the first wireless access node of the first wireless access network to the second wireless access node of the second wireless access network;

- requesting from the first wireless access node one or more of the detected user terminals to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

- receiving the cell information from the one or more of the detected user terminals; and

- updating at least one of the first neighbour cell list and the second neighbour cell list using the received cell information.

11. The method according to claim 10, comprising the steps of:

- requesting from the first wireless access node one or more of the detected user terminals to report cell information of a plurality of wireless access nodes of the first wireless access network;

- receiving the cell information of the wireless nodes of the first wireless access network via the second wireless access node,

- transferring the detected user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the first wireless access network via the second wireless access node, and

- optionally, transferring the cell information, or a derivative thereof, of the wireless access nodes of the first wireless access network to the first wireless access node.

12. The method according to claim 10 or 11, comprising the steps of:

- requesting from the first wireless access node one or more of the detected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

- receiving the cell information of the wireless nodes of the second wireless access network via the second wireless access node,

- transferring user terminals from the first wireless access network to the second wireless access network prior to receiving the cell information of the plurality of wireless access nodes of the second wireless access network via the second wireless access node, and

- optionally, transferring the cell information, or a derivative thereof, of the wireless access nodes of the second wireless access network to the first wireless access node.

13. The method according to claim 10, comprising the steps of;

- requesting from the first wireless access node one or more of the selected user terminals to report cell information of a plurality of wireless access nodes of the second wireless access network;

- receiving the cell information of the wireless access nodes of the second wireless access network via the first wireless access node

- transferring user terminals from the first wireless access network to the second wireless access network after receiving the one or more cell parameters of wireless access nodes of the second wireless access network via the first wireless access node.

14. A computer program comprising software code portions configured for, when executed by at least one processor, performing the method of one or more of the claims 10-13.

15. A mobile user terminal configured for use in the method according to one or more of the claims 10-12, wherein the

mobile terminal, in use, contain a neighbour cell list of the first wireless access node, the terminal comprising:

- a receiver for receiving the request for reporting cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network;

- scanning means for detecting the cell information from the wireless access nodes, at least one of the wireless access nodes being absent in the neighbour cell list,

- a transmitter for transmitting the detected cell information,

- wherein the mobile user terminal is arranged for temporarily storing the detected cell information and transmitting the detected cell information to the second wireless access node after being transferred from the first to the second wireless access network.

**ABSTRACT**

The invention relates to a system and method for updating a neighbour cell list of a wireless access node. User terminals to be to be transferred from a first wireless access node of a first wireless access network to a second wireless access node of a second wireless access network are detected. From the first wireless access node, one or more of the detected user terminals are requested to report cell information of a plurality of wireless access nodes of at least one of the first wireless access network and the second wireless access network. The cell information is received from the one or more of the detected user terminals and at least one of the first neighbour cell list and the second neighbour cell list is updated using the received cell information.

+ FIG. 2

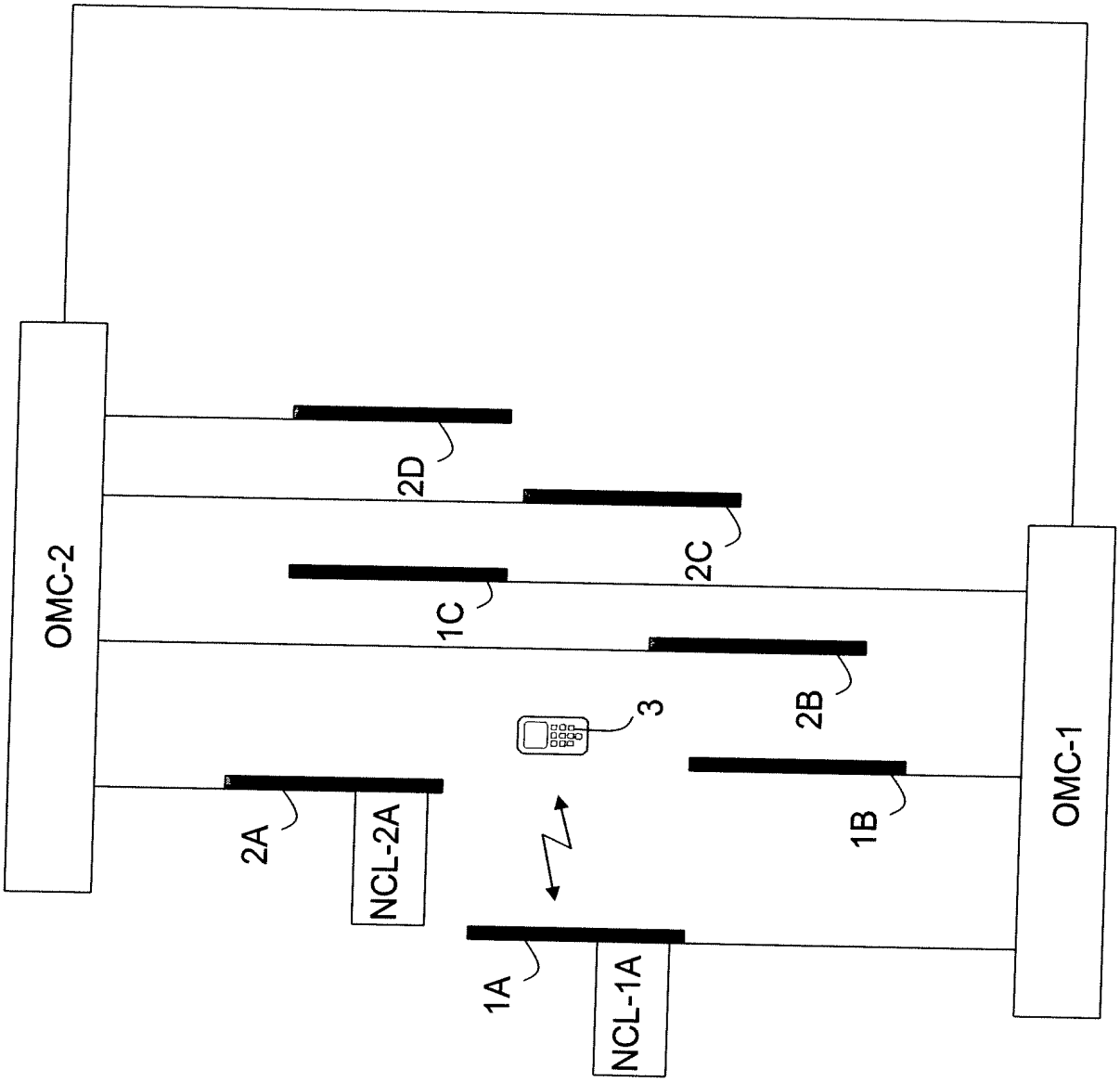


FIG. 1

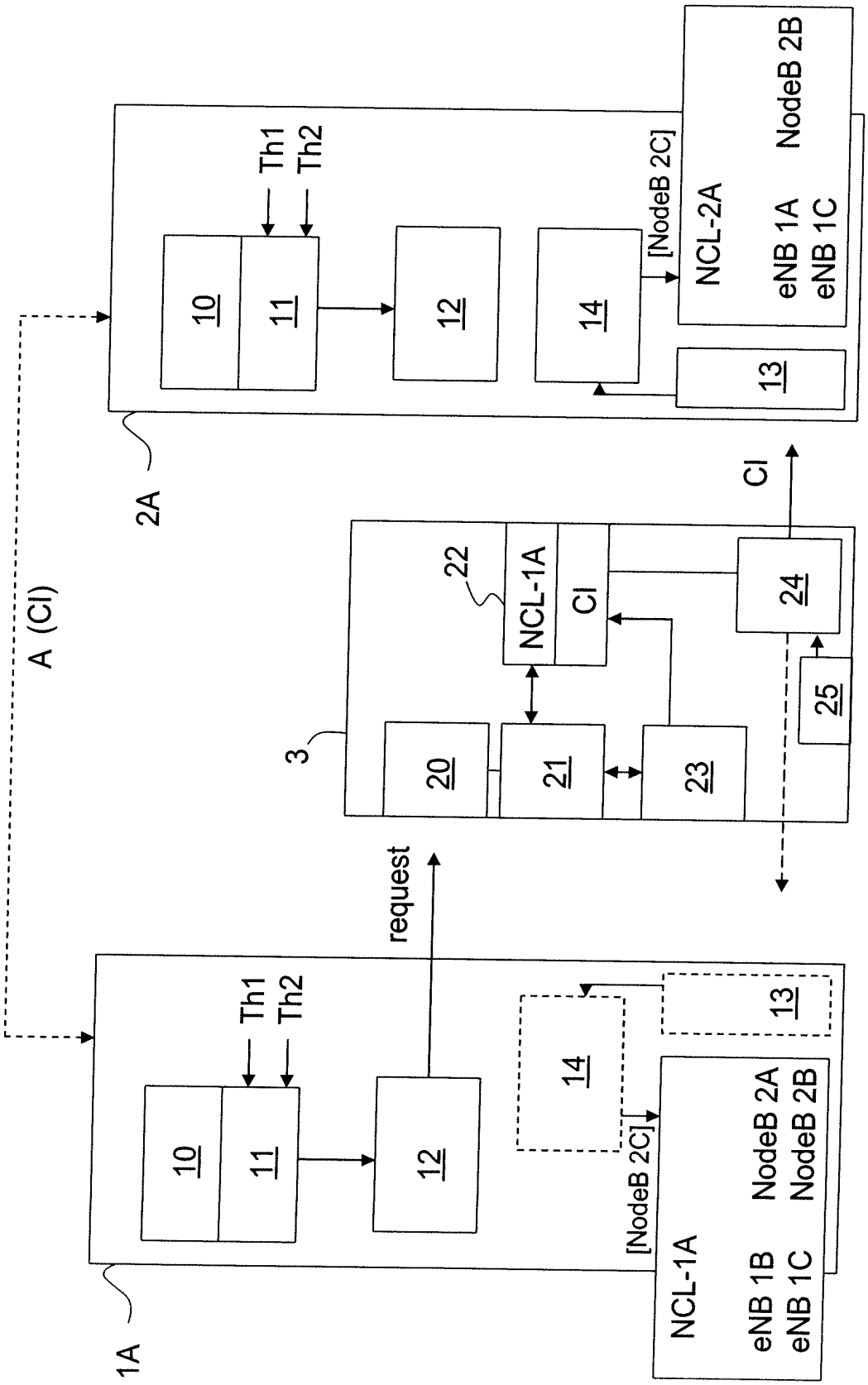
1A
2A
3
A (CI)
Th1
Th2
10
11
12
13
14
request
CI
20
21
22
23
24
25
NCL-1A
[NodeB 2C]
eNB 1B
eNB 1C
NodeB 2A
NodeB 2B
eNB 1A
eNB 1C

FIG. 2

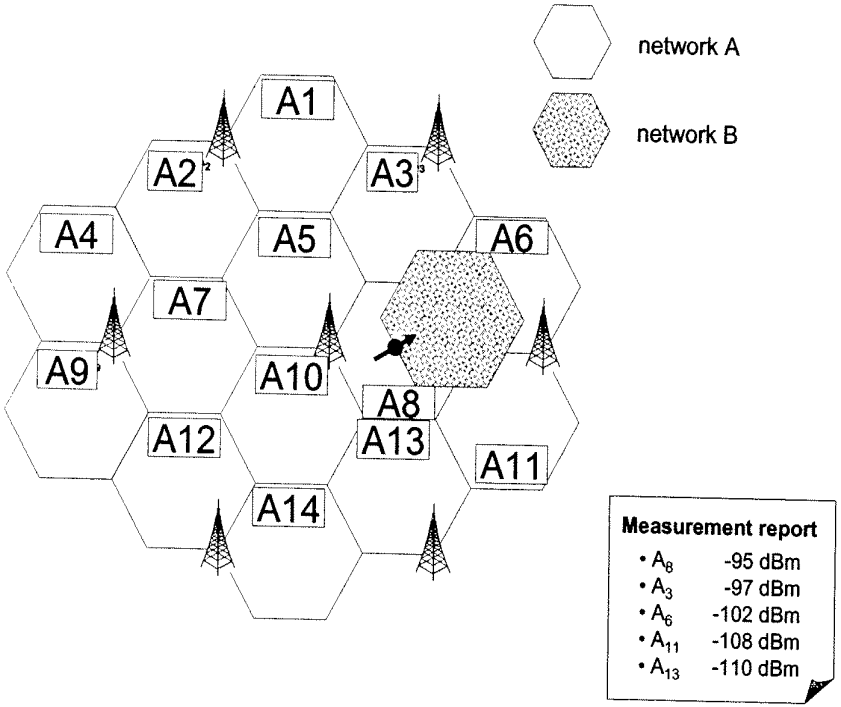
network A
network B
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
Measurement report
• $A_8$ -95 dBm
• $A_3$ -97 dBm
• $A_6$ -102 dBm
• $A_{11}$ -108 dBm
• $A_{13}$ -110 dBm

FIG. 3A

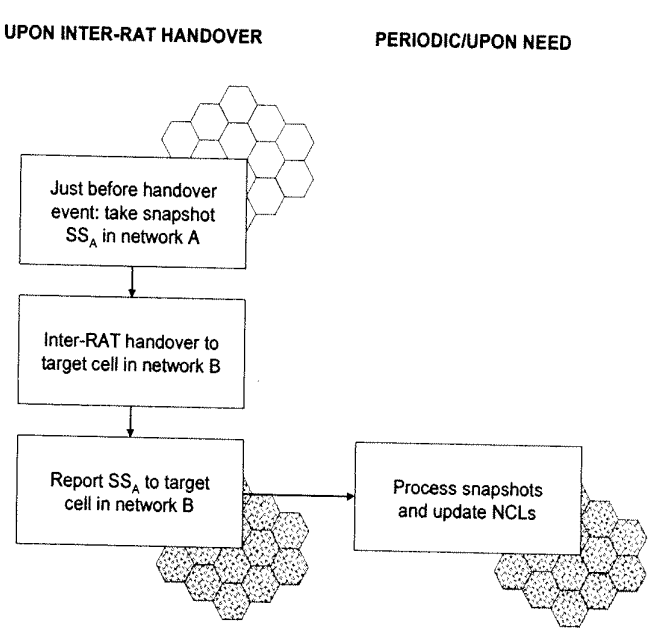
UPON INTER-RAT HANDOVER
PERIODIC/UPON NEED
Just before handover event: take snapshot $SS_A$ in network A
Inter-RAT handover to target cell in network B
Report $SS_A$ to target cell in network B
Process snapshots and update NCLs

FIG. 3B

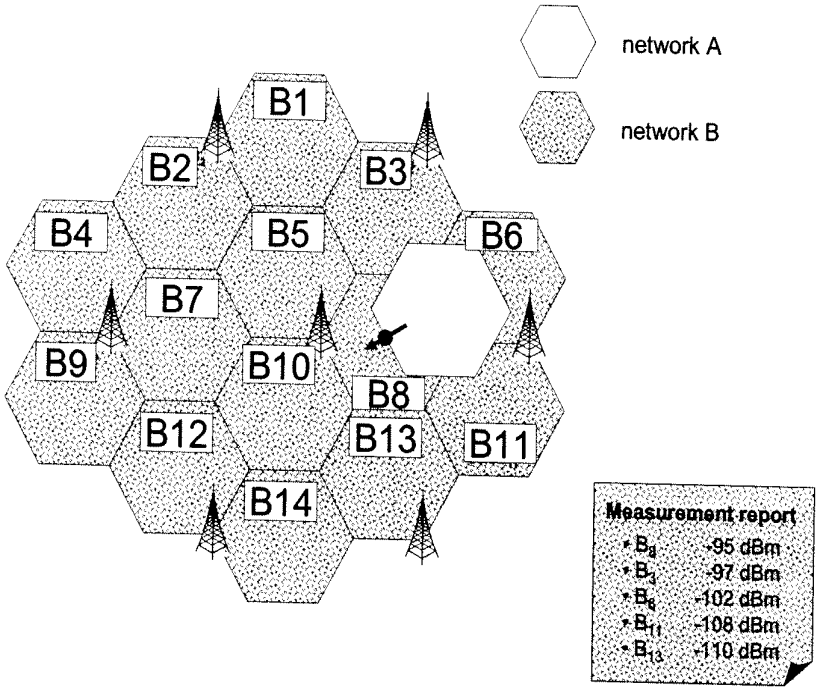
network A
network B
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
B13
B14
Measurement report
• $B_8$ -95 dBm
• $B_3$ -97 dBm
• $B_6$ -102 dBm
• $B_{11}$ -108 dBm
• $B_{13}$ -110 dBm

FIG. 4A

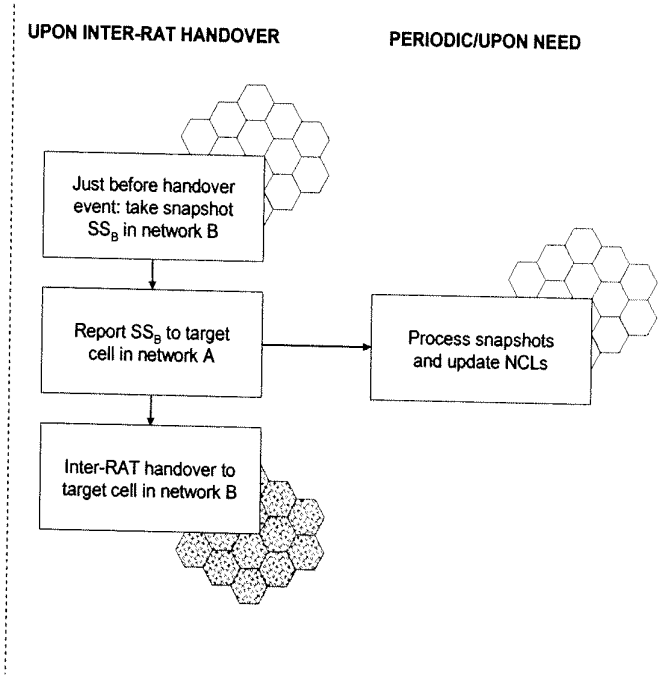
UPON INTER-RAT HANDOVER
PERIODIC/UPON NEED
Just before handover event: take snapshot $SS_B$ in network B
Report $SS_B$ to target cell in network A
Inter-RAT handover to target cell in network B
Process snapshots and update NCLs

FIG. 4B

| | | |
|---|---|---|
| VIII-4-1 | **Declaration: Inventorship (only for the purposes of the designation of the United States of America)**<br>Declaration of Inventorship (Rules 4.17(iv) and 51bis.1(a)(iv)) for the purposes of the designation of the United States of America: | I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.<br><br>This declaration is directed to the international application of which it forms a part (if filing declaration with application).<br><br>This declaration is directed to international application No. PCT/ . . . . . (if furnishing declaration pursuant to Rule 26ter).<br><br>I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.<br>I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications", by application number, country or Member of the World Trade Organization, day, month, and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed. |
| VIII-4-1-1 | Prior applications: | |

| | | |
|---|---|---|
| | | I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.<br>I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon. |
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| VIII-4-1-1-5 | Inventor's Signature:<br>(The signature must be that of the inventor, not that of the agent) | /Job Cornelis Oostveen/ |
| VIII-4-1-1-6 | Date: | 04 October 2010 (04.10.2010) |

| | | |
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| VIII-4-1-3-6 | Date | 04 October 2010 (04.10.2010) |
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| VIII-4-1-4-4 | Citizenship: | NL |
| VIII-4-1-4-5 | Inventor's Signature: (The signature must be that of the inventor, not that of the agent) | /Adrian Victor Pais/ |
| VIII-4-1-4-6 | Date | 04 October 2010 (04.10.2010) |
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| VIII-4-1-5-2 | Residence: (city and either US State, if applicable, or country) | The Hague, Netherlands |
| VIII-4-1-5-3 | Mailing address: | Usselincxstraat 142 2593 VP The Hague Netherlands |
| VIII-4-1-5-4 | Citizenship: | CN |
| VIII-4-1-5-5 | Inventor's Signature: (The signature must be that of the inventor, not that of the agent) | /Haibin Zhang/ |
| VIII-4-1-5-6 | Date | 04 October 2010 (04.10.2010) |

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


# PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

| Application or Docket Number | Filing Date | ☐ To be Mailed |
|---|---|---|
| 13/499,924 | 04/03/2012 | |

## APPLICATION AS FILED – PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | SMALL ENTITY ☐ RATE ($) | SMALL ENTITY ☐ FEE ($) | OR | OTHER THAN SMALL ENTITY RATE ($) | OTHER THAN SMALL ENTITY FEE ($) |
|---|---|---|---|---|---|---|---|
| ☐ BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | | | N/A | |
| ☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | | | N/A | |
| ☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | | | N/A | |
| TOTAL CLAIMS (37 CFR 1.16(i)) | minus 20 = | * | X $ = | | OR | X $ = | |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | minus 3 = | * | X $ = | | | X $ = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | | | TOTAL | |

## APPLICATION AS AMENDED – PART II

| AMENDMENT | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE ($) | SMALL ENTITY ADDITIONAL FEE ($) | OR | OTHER THAN SMALL ENTITY RATE ($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 04/03/2012 | | | | | | | | | |
| | Total (37 CFR 1.16(i)) | * 18 | Minus | ** 20 | = 0 | X $ = | | OR | X $60= | 0 |
| | Independent (37 CFR 1.16(h)) | * 3 | Minus | ***3 | = 0 | X $ = | | OR | X $250= | 0 |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | 0 |

| AMENDMENT | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) | | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total (37 CFR 1.16(i)) | * | Minus | ** | = | X $ = | | OR | X $ = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | X $ = | | OR | X $ = | |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/STELLA LITTLE/