

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	HW707010
Client Reference No.	0811316US
First Inventor	Michael ROBERTS
Title	METHOD, TERMINAL AND SYSTEM FOR CELL RESELECTION

ADDRESS Commissioner for Patents
P.O. Box 1450
TO: Alexandria, VA 22313-1450

APPLICATION ELEMENTS

ACCOMPANYING APPLICATION PARTS

1. Utility Patent Application Transmittal Form
2. Applicant claims small entity status. See 37 CFR 1.27.
3. Specification (including claims and abstract) [Total Pages 21]
4. Drawings [Total Sheets 3]
5. Combined Declaration and Power of Attorney [Total Pages]
 - a. Newly executed
 - b. Copy from prior application [Note Box 6 below]
 - i. Deletion of Inventor(s) Signed statement attached deleting inventor(s) named in the prior application
6. Incorporation by Reference: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b is considered as part of the disclosure of the accompanying application and is hereby incorporated by reference.
7. Application Data Sheet. See 37 CFR 1.76
8. Large Table or Computer Program (Appendix) in Computer Readable Form (CRF), or on CD-ROM or CD-R in duplicate.
9. Nucleotide and/or Amino Acid Sequence Submission
 - a. Computer Readable Form (CRF)
 - b. Specification Sequence Listing on:
 - i. CD-ROM or CD-R (2 copies); or
 - ii. Paper Copy
 - c. Statement verifying identity of above copies

10. Applicant requests early publication. (include publication fee under 37 CFR 1.18(d))
11. Assignment Papers (cover sheet and document(s))
12. 37 CFR 3.73(b) Statement (when there is an Assignee)
13. Power of Attorney
14. English Translation Document (if applicable)
15. Information Disclosure Statement (IDS)
 - Form PTO-1449
 - Copies of References (except for U.S. patents and applications)
16. Preliminary Amendment
17. Return Receipt Postcard (Should be specifically itemized)
18. Claim of Priority & Certified Copy of Priority Document(s)
19. Request & Certification Under 35 USC 122(b)(2)(B)(i) (Form PTO/SB/35 or its equivalent must be submitted with this application to prevent publication at 18 months)
20.

21. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information below:
 Continuation Divisional Continuation-in-part of prior application no. PCT/CN2009/071194.
 Prior application information: Examiner N/A; Group Art Unit: N/A

APPLICATION FEES

			SMALL ENTITY		OTHER THAN A SMALL ENTITY	
FILING FEE			\$82 (EFS)		\$330	
SEARCH FEE			\$270		\$540	
EXAM FEE			\$110		\$220	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	ADD'L CLAIM FEE	RATE	ADD'L CLAIM FEE
Total Claims	20 - 20 =	0	x 26 =		x 52 =	
Independent Claims	2 - 3 =	0	x 110 =		x 220 =	
<input type="checkbox"/> First Presentation of Multiple Dependent Claim			+ 195 =		+ 390 =	
<input type="checkbox"/> Application Size Fee – If the application transmittals, data sheet, specification, claims, abstract, drawings, and preliminary amendment exceed 100 sheets of paper, enter number of sheets here: - If application is filed in paper form, enter this number in Total Sheets, below. - If application is filed via EFS-Web, multiply this number by 0.75 and enter result in Total Sheets, below.						
Total Sheets =	- 100 =	÷ 50 =	(round up to a whole number)		x 135 =	x 270 =
<input type="checkbox"/> Assignment Fee			+ 40 =		+ 40 =	
<input type="checkbox"/> Early Publication Fee			+ 300 =		+ 300 =	
TOTAL AMOUNT TO BE CHARGED			TOTAL		TOTAL \$1090	

UTILITY PATENT APPLICATION TRANSMITTAL
 Attorney Docket No. HW707010
 Client Reference No. 0811316US

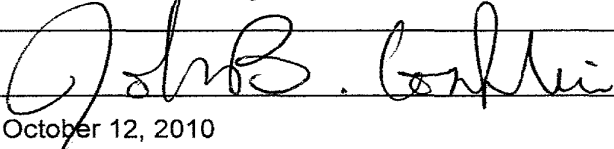
22. Please charge my Deposit Account No. 12-1216 in the amount of \$1090.
23. A check in the amount of \$ _____ is enclosed.
24. The Commissioner is hereby authorized to credit overpayments or charge any additional fees of the following types to Deposit Account No. 12-1216:
- a. Fees required under 37 CFR 1.16.
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25. The Commissioner is hereby generally authorized under 37 CFR 1.136(a)(3) to treat any future reply in this or any related application filed pursuant to 37 CFR 1.53 requiring an extension of time as incorporating a request therefor, and the Commissioner is hereby specifically authorized to charge Deposit Account No. 12-1216 for any fee that may be due in connection with such a request for an extension of time.

26. CORRESPONDENCE ADDRESS

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| <input checked="" type="checkbox"/> Customer No.:

<div style="text-align: center; font-size: 1.2em;">77399</div> | <input type="checkbox"/> , R eg. No.
Leydig, Voit & Mayer, Ltd.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6731
(312) 616-5600 (telephone)
(312) 616-5700 (facsimile) |
|---|--|

Name	John B. Conklin, Reg. No. 30,369
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Signature	
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Date	October 12, 2010
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Utility Transmittal (Revised 10/1/2008)

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

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<input type="checkbox"/> First Presentation of Multiple Dependent Claim			+ 195 =		+ 390 =	
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Total Sheets =	- 100 =	÷ 50 =	(round up to a whole number)		x 135 =	x 270 =
<input type="checkbox"/> Assignment Fee			+ 40 =		+ 40 =	
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TOTAL AMOUNT TO BE CHARGED			TOTAL		TOTAL \$1090	

UTILITY PATENT APPLICATION TRANSMITTAL
 Attorney Docket No. HW707010
 Client Reference No. 0811316US

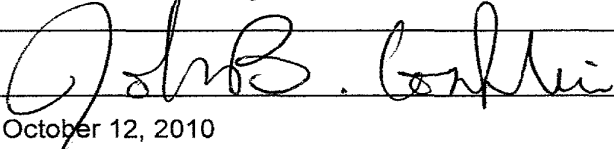
22. Please charge my Deposit Account No. 12-1216 in the amount of \$1090.
23. A check in the amount of \$ _____ is enclosed.
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| <input checked="" type="checkbox"/> Customer No.:

<div style="text-align: center; font-size: 1.2em;">77399</div> | <input type="checkbox"/> , R eg. No.
Leydig, Voit & Mayer, Ltd.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6731
(312) 616-5600 (telephone)
(312) 616-5700 (facsimile) |
|---|--|

Name	John B. Conklin, Reg. No. 30,369
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Signature	
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Date	October 12, 2010
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Utility Transmittal (Revised 10/1/2008)

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	HW707010
	Application Number	
Title of Invention	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION	
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

<input type="checkbox"/>	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.)
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Applicant Information:

Applicant 1				
Applicant Authority <input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117		<input type="radio"/> Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix
	Michael		ROBERTS	
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Kista	Country Of Residence ⁱ	SE	
Citizenship under 37 CFR 1.41(b)		FR		
Mailing Address of Applicant:				
Address 1		Haukadalsgatan		
Address 2		P.O. Box 54		
City	Kista	State/Province		
Postal Code	16494	Country	SE	
Applicant 2				
Applicant Authority <input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117		<input type="radio"/> Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix
	Johan		JOHANSSON	
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Kungsangen	Country Of Residence ⁱ	SE	
Citizenship under 37 CFR 1.41(b)		SE		
Mailing Address of Applicant:				
Address 1		Lillsjbacken 4		
Address 2				
City	Kungsangen	State/Province		
Postal Code	19634	Country	SE	
Applicant 3				
Applicant Authority <input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117		<input type="radio"/> Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix
	Boyun		XIE	
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Shenzhen	Country Of Residence ⁱ	CN	

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	HW707010
		Application Number	
Title of Invention	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION		

Citizenship under 37 CFR 1.41(b)	CN		
Mailing Address of Applicant:			
Address 1	Huawei Administration Building		
Address 2	Bantian, Longgang District		
City	Shenzhen, Guangdong	State/Province	
Postal Code	518129	Country	CN

Applicant 4			
Applicant Authority	<input checked="" type="radio"/> Inventor	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name
	Min		HUANG
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service			
City	Shenzhen	Country Of Residence	CN
Citizenship under 37 CFR 1.41(b)	CN		
Mailing Address of Applicant:			
Address 1	Huawei Administration Building		
Address 2	Bantian, Longgang District		
City	Shenzhen, Guangdong	State/Province	
Postal Code	518129	Country	CN
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. <input type="button" value="Add"/>			

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.			
Customer Number	77399		
Email Address	chgpatent@leydig.com	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

Application Information:

Title of the Invention	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION		
Attorney Docket Number	HW707010	Small Entity Status Claimed	<input type="checkbox"/>
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)	3	Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	HW707010
	Application Number	
Title of Invention	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION	

Publication Information:

<input type="checkbox"/>	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
<input type="checkbox"/>	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:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	77399		

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	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	PCT/CN2009/071194	2009-04-08
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			

Foreign Priority Information:

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
200810091957.6	CN	2008-04-09	<input checked="" type="radio"/> Yes <input type="radio"/> 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

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	HW707010
	Application Number	
Title of Invention	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION	

If the Assignee is an Organization check here. <input checked="" type="checkbox"/>			
Organization Name	Huawei Technologies Co., Ltd.		
Mailing Address Information:			
Address 1	Huawei Administration Building		
Address 2	Bantian, Longgang District		
City	Shenzhen, Guangdong	State/Province	
Country	CN	Postal Code	518129
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	/John B. Conklin/			Date (YYYY-MM-DD)	2010-10-12
First Name	John	Last Name	Conklin	Registration Number	30369

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.**

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 records.
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.
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METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of International Application No. PCT/CN2009/071194, filed on April 8, 2009, which claims priority to Chinese Patent Application No. 200810091957.6, filed on April 9, 2008, both of which are hereby incorporated by reference in their entireties.

FIELD OF THE INVENTION

[0002] The present invention relates to a field of mobile communications, and more particularly, to a method, terminal, and system for cell reselection.

BACKGROUND

[0003] With developments in the mobile communication field, various mobile communication systems have emerged, for example, a Global System for Mobile Communication (GSM), an Enhanced Data for GSM Evolution (EDGE) system, a GSM/EDGE Radio Access Network (GERAN) system, a Wideband Code Division Multiple Access (WCDMA) system, a Code Division Multiple Access (CDMA) system, a Code Division Multiple Access 2000 (CDMA2000) system, a Time Division-Synchronous CDMA (TD-SCDMA) system, a Long Term Evolution (LTE) system under development and establishment, a World Interoperability for Microwave Access (WIMAX) system, etc. The WCDMA system may also be referred to as Universal Mobile Telecommunications System (UMTS). Due to the emergence of the various systems, when a terminal performs cell reselection during movement, there may be several frequencies available for selection in the system, and there may be many cells of several systems available for selection. Therefore, it becomes an important issue as to how the terminal reselects a suitable cell and how to reduce measurements to save power energy.

[0004] In the current LTE system, considering that the terminal should reduce measurement overhead to save power energy, when performing cell reselection, the terminal will decide a cell on which the terminal is to camp according to the priority. Specifically, the terminal will first measure a frequency or system having a higher priority. If a cell of the frequency or system having a higher priority meets the cell reselection criterion, the cell will

be reselected; otherwise, a cell having a lower priority will be measured. If a terminal camps on a cell having a lower priority, a cell having a higher priority might be measured periodically. The priority-based cell reselection method may reduce the measurements by the terminal and save power energy. Meanwhile, a good priority setting may lead to load balance.

[0005] In the existing technical solutions, the terminal performs cell reselection by using a dedicated priority list established by the non-LTE mobile communication system. The Access Network (AN) node or the Core Network (CN) node has to add more signaling for establishment of the dedicated priorities, which leads to higher costs for network upgrade.

SUMMARY

[0006] To solve the problems in the conventional arts that the establishment of the dedicated priority list by the non-LTE system causes too much increased signaling and too high costs for network upgrade, an embodiment of the invention provides a method, terminal, and system for cell reselection.

[0007] An embodiment of the invention provides a method for cell reselection, including: a terminal obtains a dedicated priority list and a valid time of the dedicated priority list from a first system, and the terminal performs a cell reselection according to the dedicated priority list and the valid time of the dedicated priority list, when the terminal camps on a cell of a second system.

[0008] An embodiment of the invention provides a terminal, including: a first obtaining unit configured to obtain a dedicated priority list and a valid time of the dedicated priority list from a first system; a first storage configured to store the dedicated priority list; and a first processing unit configured to perform a cell reselection according to the dedicated priority list and the valid time of the dedicated priority list stored in the first storage when the terminal camps on a second system.

[0009] An embodiment of the invention provides a system, including a network-side device and a terminal as provided in any embodiment of the invention, where the network-side device is configured to send the dedicated priority list.

[0010] In an example where the first system is an LTE system and the second system is a non-LTE system, the terminal according to the embodiments of the invention may perform cell reselection by using the dedicated priority list obtained from the LTE system, so as to free the non-LTE system from establishing the dedicated priority list. Problems in the

conventional arts that the establishment of the dedicated priority list by the non-LTE system causes too much increased signaling and too high costs for network upgrade, are solved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a flow chart of a method provided in an embodiment of the present invention;

[0012] FIG. 2 is a flow chart of a method provided in embodiment 1 of the present invention; and

[0013] FIG. 3 is a schematic diagram of a terminal provided in embodiment 6 of the present invention.

DETAILED DESCRIPTION

[0014] To further clarify the objects, the technical solutions, and the advantages of the present invention, detailed descriptions are given below to the implementation of the present invention with reference to the accompanying drawings.

[0015] Referring to FIG. 1, a cell reselection method provided in an embodiment of the present invention includes the following steps.

[0016] In step 001, a terminal obtains a dedicated priority list from a first system.

[0017] In step 002, the terminal performs a cell reselection according to the dedicated priority list when the terminal camps on a cell of a second system.

[0018] In the above embodiment of the invention, the terminal performs the cell reselection by using the dedicated priority list obtained from the first system. In this way, there is no need for the second system to establish the dedicated priority list.

[0019] Further, the first system may be an LTE system and the second system may be a non-LTE system in an embodiment of the invention. Accordingly, problems in the conventional arts that establishment of the dedicated priority list by the non-LTE system causes too much increased signaling and too high costs for network upgrade, are solved.

[0020] Further, the terminal in this embodiment may also obtain the valid time of the dedicated priority list from the LTE system. Before the valid time expires, the terminal camping on a cell of the non-LTE system may perform cell reselection according to the dedicated priority list. After the valid time expires, the dedicated priority list is invalid. Then, the terminal may perform cell reselection according to a public priority list, or perform cell

reselection according to a result measured in accordance with a cell signal quality criterion, or search for a cell of the LTE system.

[0021] Further, the above public priority list may be one obtained by the terminal from the LTE system or the non-LTE system. Optionally, the terminal may process the public priority list according to an indication which is used to notify the terminal that the non-LTE system will not deliver the public priority list and/or notify the terminal to store the public priority list obtained from the LTE system.

[0022] Further, the terminal may also perform other processes related to cell reselection according to an indication from the non-LTE system. The indication may notify the terminal of any one of (or the combination of) the following: (1) searching for a cell of the LTE system when the dedicated priority list is invalid; (2) searching for a cell of the LTE system when the terminal does not store the dedicated priority list and the public priority list; and (3) performing cell reselection according to a result measured in accordance with a cell signal quality criterion when the terminal does not store the dedicated priority list and the public priority list.

[0023] In an embodiment of the invention, if no dedicated priority list is delivered to the terminal from a UMTS or GERAN system, the terminal may use the dedicated priority list obtained from the LTE system and the time length of the valid time of the dedicated priority list. The terminal may use a public priority list delivered from the UMTS or GERAN system. Alternatively, if no public priority list is delivered from the UMTS or GERAN system, or a public priority list delivered from the UMTS or GERAN system is not received, a public priority list obtained from the LTE system may be used. When the terminal stores both the dedicated priority list and the public priority list, the dedicated priority list may be used for cell reselection. When the terminal has no dedicated priority list, the public priority list may be used for cell reselection.

[0024] It should be noted that, UMTS and GERAN systems are taken as examples to describe the embodiments of the invention for ease of illustration. The embodiments of the invention are equally applicable to other non-LTE systems, for example, the GSM system, the WCDMA system, the CDMA system, the TD-SCDMA system, or the WIMAX system. Additionally, signal quality of cell reselection, which is one of the performance measurements related to the cell reselection procedure, is taken as an example for illustration in an embodiment of the invention.

[0025] A priority in the priority list may refer to the priority level of a frequency or a Radio Access Technology (RAT). It may also refer to the priority level of a Frequency Band in GERAN. The priority list may include the priority levels of the frequency of the serving cell, its adjacent frequencies, and the neighboring systems, as well as the priority level assigned for each frequency or Frequency Band of a neighboring system.

[0026] In the following embodiments 1-4, the cell reselection procedure is described in a case where the terminal is idle, that is, the terminal is power-on but not activated.

Embodiment 1

[0027] In this embodiment, the terminal camps on a cell of an LTE system. The LTE system may deliver a dedicated priority list via a dedicated signaling and deliver a public priority list in system broadcast information. A UMTS or GERAN system may deliver a public priority list. The public priority list delivered in broadcast information of the UMTS or GERAN system may indicate a priority as LTE>UMTS>GERAN. A public priority list may be delivered in broadcast information of the LTE system. Alternatively, the public priority list may be delivered via a dedicated signaling (for example, a Radio Resource Control (RRC) dedicated signaling) or a Non-Access Stratum (NAS) message when a dedicated RRC connection is established. The delivered public priority list may indicate that LTE>UMTS>GERAN. It can be understood that the above priority lists may indicate the same or different priorities. The dedicated priority list delivered in dedicated signaling of the LTE system may indicate that GERAN >UMTS>LTE.

[0028] Referring to FIG. 2, a method for cell reselection according to embodiment 1 of the invention may include the following steps.

[0029] In step 101, when a terminal camps on a cell of an LTE system, the terminal obtains a dedicated priority list and a public priority list from the LTE network side, and stores the two priority lists.

[0030] In step 102, the terminal performs cell reselection according to the obtained dedicated priority list. Since the dedicated priority list indicates a priority as GERAN >UMTS>LTE, the terminal in the cell of the LTE system reselects and enters into a cell of a GERAN system.

[0031] Those skilled in the art will appreciate that the terminal in the cell of the LTE system will reselects and camps on the cell of the GERAN system according to the dedicated priority list. If signal quality of the cell of the GERAN system does not meet the signal

quality criterion, the terminal in the cell of the GERAN system performs a cell reselection again according to the dedicated priority list so as to reselect and enter into a cell of an UMTS system.

[0032] In step 103, the terminal obtains a public priority list from the UMTS or GERAN network side and stores the public priority list.

[0033] In step 104, the terminal in the cell of the UMTS or GERAN system obtains an indication from the UMTS or GERAN system broadcast information.

[0034] The indication is delivered periodically in the system broadcast information from the UMTS or GERAN network side. The indication indicates whether the public priority list delivered from the UMTS or GERAN system is usable or not. In this embodiment, for example, the indication shows that the public priority list delivered from the UMTS or GERAN system is usable.

[0035] It can be understood that the delivery of the indication in the system broadcast information from the UMTS or GERAN network side is not limited by whether the terminal is in the cell of the UMTS or GERAN system.

[0036] In step 105, the above indication notifies the terminal that the public priority list delivered from the UMTS or GERAN network side is usable. Then, the terminal deletes the public priority list obtained from the LTE system.

[0037] The above deletion of the public priority list obtained from the LTE system by the terminal is optional. Alternatively, the terminal may label the public priority list obtained from the LTE system as “unusable”, rather than deleting the list.

[0038] In step 106, before the signal quality of the current cell decreases to a certain level, the terminal in the cell of the UMTS or GERAN system may perform cell reselection according to the dedicated priority list obtained from the LTE system until the dedicated priority list is invalid.

[0039] The invalidation of the dedicated priority list may be implemented by setting a timer. In other words, a valid time of the dedicated priority list is set by a timer and the timer starts when the terminal obtains the dedicated priority list. Before the timer expires, the dedicated priority list is GERAN>UMTS>LTE. Thus, the terminal will attempt to reselect a cell of the LTE system only when the signal quality of the current cell decreases to a certain level (for example, when it is lower than a preset threshold value). The valid time of the dedicated priority list may be delivered to the terminal by an evolved base station (eNodeB) via a RRC dedicated signaling, for example, an RRC Connection Release message, or may be

delivered in a Non-Access Stratum (NAS) message to the terminal by a CN node. Before the timer expires, the terminal camps on a cell which has the highest priority shown in the dedicated priority list. At this time, the terminal decides whether to perform cell reselection according to signal quality of the cell. When the signal quality of the cell decreases to a preset threshold, the terminal may perform cell reselection.

[0040] In step 107, when the dedicated priority list is invalid, the terminal stops using the dedicated priority list and deletes the dedicated priority list. The terminal uses the public priority list for cell reselection. Since the priority shown in the public priority list is LTE>UMTS>GERAN, the terminal reselects a cell of the LTE system.

[0041] In step 108 (not shown in FIG. 2), when the terminal camps on a cell of the LTE system, the terminal obtains a new dedicated priority list and a valid time of the new dedicated priority list from the network side via a Tracing area (TA) update or a periodical TA update procedure.

[0042] In this embodiment, step 103 is optional. In other words, the UMTS or GERAN network side may deliver no public priority list, and the terminal uses the public priority list obtained from the LTE system.

[0043] In this embodiment, step 104 is optional. If no indication is delivered in the UMTS or GERAN system broadcast information, the terminal and the network side defaults that the UMTS or GERAN delivers the public priority list in the system broadcast information and the public priority list is usable.

[0044] In this embodiment, the terminal performs cell reselection by using the dedicated priority list obtained from the LTE system and the valid time of the dedicated priority list. This is applicable to the case in which the UMTS or GERAN system delivers no dedicated priority list to the terminal. When there is no dedicated priority list, the terminal performs cell reselection by using the public priority list obtained from the LTE system or delivered from the UMTS or GERAN system. In this embodiment, the terminal uses the dedicated priority list obtained from the LTE system for cell reselection so that the non-LTE system may be freed from the establishment of the dedicated priority list. Problems in the conventional arts that the establishment of the dedicated priority list by the non-LTE system causes too much increased signaling and too high costs for network upgrade, are solved.

Embodiment 2

[0045] In this embodiment, a terminal camps on a cell of an UMTS or GERAN system, and the UMTS or GERAN system delivers a public priority list. Accordingly, the terminal can only obtain the public priority list from the UMTS or GERAN system broadcast information and store the public priority list. The terminal cannot obtain a dedicated priority list and a public priority list delivered from the LTE system. The public priority list delivered from the UMTS or GERAN system broadcast information indicates that the priority is LTE>UMTS>GERAN. When the terminal enters into a cell of the LTE system, the LTE system delivers a public priority list in the system broadcast information. The public priority list delivered in the LTE system broadcast information indicates that the priority is LTE>UMTS>GERAN. The dedicated priority list delivered in the LTE system is via a dedicated signaling, the dedicated priority list indicates that the priority is GERAN >UMTS>LTE.

[0046] When the terminal camps on a cell of the UMTS or GERAN system, the terminal performs cell selection after power-on or move back from a non-coverage area to a coverage area. For example, the terminal camps on a cell of the UMTS or GERAN system before power-off. When the terminal is power-off, information about the cell of the UMTS or GERAN system is stored. When the terminal is power-on, the terminal searches for a cell of the UMTS or GERAN system. When there is a suitable cell in the UMTS or GERAN system, the terminal camps on the suitable cell. Alternatively, when the terminal stores no information about the cell of the UMTS or GERAN system, or when the terminal moves back from a non-coverage area to a coverage area, the terminal selects and camps on a cell of the UMTS or GERAN system after power-on.

[0047] A method for cell reselection in embodiment 2 of the invention may include the following steps.

[0048] In step 201, a terminal obtains a public priority list from an UMTS or GERAN system broadcast information and stores the priority list.

[0049] In step 202, the terminal performs cell reselection according to the above public priority list. Since the priority of the public priority list is LTE>UMTS>GERAN, the terminal reselects a cell of an LTE system.

[0050] In step 203, when the terminal enters into a cell of the LTE system, the terminal obtains a dedicated priority list from the network side of the LTE system via a TA update

procedure or a periodical TA update procedure or a traffic setup and release procedure. After obtaining the dedicated priority list, the terminal reselects a cell of the GERAN system according to the dedicated priority list.

[0051] Those skilled in the art can understand that the subsequent steps 204-208 of this embodiment are similar to steps 104-108 of embodiment 1 after the terminal enters into the cell of the GERAN system. Thus, no repeated description is made here. It is optional whether the UMTS or GERAN delivers an indication in the system broadcast information.

[0052] This embodiment differs from the previous embodiment in that: when the terminal camps on the cell of the UMTS or GERAN system; the UMTS or GERAN system delivers no dedicated priority list to the terminal, but may deliver a public priority list to the terminal; the terminal may use the public priority list to reselect a cell of the LTE system; the dedicated priority list delivered from the LTE system may be obtained, and cell reselection may be performed once more.

[0053] In this embodiment, the terminal performs cell reselection by using the dedicated priority list obtained from the LTE system and the valid time of the dedicated priority list. This is applicable to the case in which the UMTS or GERAN system delivers no dedicated priority list to the terminal. When there is no dedicated priority list, the terminal performs cell reselection by using the public priority list obtained from the LTE system or delivered from the UMTS or GERAN system. Due to the fact that the terminal performs cell reselection by using the dedicated priority list obtained from the LTE, the non-LTE system may be freed from establishment of the dedicated priority list. Problems in the conventional arts that the establishment of the dedicated priority list by the non-LTE system causes too much increased signaling and too high costs for network upgrade, are solved.

Embodiment 3

[0054] In this embodiment, a terminal camps on a cell of an LTE system. The LTE system may deliver a dedicated priority list via a dedicated signaling and deliver a public priority list in system broadcast information. An UMTS or GERAN system delivers no public priority list. The public priority list delivered in the LTE system broadcast information may indicate a priority as LTE>UMTS>GERAN, and the dedicated priority list deliver via the LTE dedicated signaling may indicate a priority as GERAN >UMTS>LTE.

[0055] A method for cell reselection in this embodiment may include the following steps.

[0056] In step 301, a terminal camps on a cell of the LTE system. The terminal has obtained a dedicated priority list and a public priority list from the LTE network side, and has stored the two priority lists.

[0057] In step 302, after obtaining the priority lists, the terminal performs cell reselection according to the dedicated priority list. Since the dedicated priority list indicates a priority as GERAN>UMTS>LTE, the terminal in the cell of the LTE system reselect and enters into a cell of a GERAN system.

[0058] In step 303, the terminal obtains an indication from the UMTS or GERAN system broadcast information.

[0059] The above indication is delivered from the UMTS or GERAN network side to the terminal in the system broadcast information, used to indicate that the UMTS or GERAN system delivers no public priority list. Then, the terminal retains the public priority list obtained from the LTE.

[0060] In step 304, the above indication notifies the terminal that the UMTS or GERAN will not deliver any usable public priority list, and the terminal retains the public priority list obtained from the LTE.

[0061] The indication is not limited to the above contents, and may include some extended contents as follows.

[0062] (1) The terminal is notified to perform a periodical search for a cell of the LTE system when the dedicated priority list obtained from the LTE system is invalid and is deleted.

[0063] (2) The terminal is notified to perform a cell reselection procedure by using an existing cell reselection criterion when no priority information is stored. In other words, the terminal uses the existing cell reselection criterion which makes measurement and comparison according to a signal quality criterion.

[0064] During implementation, a bit included in the indication may be used to determine one of the three contents included in the above indication. Alternatively, three choices may be provided at the same time via two bits included in the indication.

[0065] In the above solution, step 303 is a mandatory step. When the terminal learns from the indication that the UMTS or GERAN system will not deliver any available public priority list and the terminal has not stored any public priority list, the terminal may perform subsequent operations according to the extended contents of the above indication.

[0066] Steps 305-307 of this embodiment are similar to steps 106-108 of embodiment 1, and thus no repeated description is made here.

[0067] In this embodiment, after the terminal enters into a cell of the UMTS or GERAN system, the UMTS or GERAN system will not deliver a public priority list. The terminal performs subsequent actions according to the indication delivered from the UMTS or GERAN system or the public priority list obtained from LTE system and stored at the terminal.

[0068] In this embodiment, the terminal performs cell reselection by using the dedicated priority list obtained from the LTE system. Thus, the non-LTE system may be freed from establishment of the dedicated priority list. Problems in the prior arts that establishment of the dedicated priority list by the non-LTE system causes too much increased signaling and too high costs for network upgrade, are solved. Meanwhile, in the case that the terminal receives no public priority list delivered from the non-LTE system, subsequent actions may be performed by using the dedicated priority list obtained from the LTE system or according to the received indication, which improves the flexibility for cell reselection.

Embodiment 4

[0069] In this embodiment, a terminal camps on a cell of an UMTS or GERAN system. The UMTS or GERAN system will not deliver a public priority list. An LTE system may deliver a dedicated priority list via a dedicated signaling, and deliver a public priority list in system broadcast information. The public priority list delivered from the LTE system broadcast information indicates a priority as LTE>UMTS>GERAN. The dedicated priority list delivered via the LTE dedicated signaling indicates a priority as GERAN >UMTS>LTE.

[0070] A method for cell reselection in this embodiment may include the following steps.

[0071] In step 401, a terminal camps on a cell of an UMTS or GERAN system, but the terminal has not obtained a dedicated priority list and a public priority list.

[0072] In step 402, the network side of the UMTS or GERAN system delivers an indication to the terminal in system broadcast information.

[0073] In step 403, the terminal in the cell of the UMTS or GERAN system obtains the indication from the system broadcast information.

[0074] In step 404, the above indication notifies the terminal that the cell of the UMTS or GERAN system has not delivered a public priority list.

[0075] Or, the indication notifies the terminal to perform a periodical search for a cell of an LTE system when the dedicated priority list is invalid.

[0076] Or, the indication notifies the terminal to perform a cell reselection procedure by using an existing cell reselection criterion when no priority information is stored.

[0077] In step 405, the terminal reselects and enters to a cell of an LTE system.

[0078] The terminal may reselect a cell of the LTE system by performing a periodical search for the cell of the LTE system. Alternatively, the terminal may reselect the cell of the LTE system by performing a cell reselection procedure using the existing cell reselection criterion.

[0079] In step 406, when the terminal camps on a cell of the LTE system, the terminal obtains a dedicated priority list from the network side via a TA update procedure or a periodical TA update procedure or a traffic setup and release procedure, and obtains a public priority list from the network side via system broadcast information. After obtaining the priority list, the terminal performs cell reselection according to the dedicated priority list. Since the dedicated priority list is GERAN>UMTS>LTE, the terminal in the cell of the LTE system reselects and enters into a cell of the UMTS or GERAN system.

[0080] The steps subsequent to step 406 are similar to those steps in embodiment 3 performed after the terminal in the cell of the LTE system reselects and enters into a cell of the UMTS or GERAN system. Thus, no repeated description is made here.

[0081] This embodiment differs from embodiment 3 in that the terminal camps on a cell of the UMTS or GERAN system, the UMTS or GERAN system will not deliver a public priority list, and the terminal performs subsequent actions according to the indication delivered from the UMTS or GERAN system.

[0082] In this embodiment, the terminal performs cell reselection by using the dedicated priority list obtained from the LTE system. Thus, the non-LTE system may be freed from establishment of the dedicated priority list. Problems in the prior arts that establishment of the dedicated priority list by the non-LTE system causes too much increased signaling and too high costs for network upgrade, are solved. Meanwhile, in the case that the terminal receives no public priority list delivered from the non-LTE system, subsequent actions may be performed by using the dedicated priority list obtained from the LTE system or according to the received indication, which improves the flexibility for cell reselection.

[0083] In the following embodiments of the cell reselection procedure, for example, the terminal is activated, that is, the terminal is in the connected state. The activated terminal switches to a new cell via the cell reselection procedure.

Embodiment 5

[0084] In this embodiment, a terminal camps on a cell of an LTE system and the terminal is activated. The activated terminal switches from the cell of the LTE system to a cell of an UMTS or GERAN system. The LTE system delivers a dedicated priority list via a dedicated signaling, and delivers a public priority list in system broadcast information. The UMTS or GERAN system delivers a public priority list. The public priority list delivered in the UMTS or GERAN system broadcast information indicates a priority as LTE>UMTS>GERAN. The public priority list delivered in the LTE system broadcast information indicates a priority as LTE>UMTS>GERAN. The dedicated priority list delivered in the LTE dedicated signaling indicates a priority as GERAN >UMTS>LTE.

[0085] A method for cell reselection according to this embodiment includes the following steps.

[0086] In step 501, a terminal activated in a cell of an LTE system obtains a dedicated priority list and a public priority list from the LTE network side, and stores the two priority lists.

[0087] During an RRC connection setup procedure, the terminal obtains the dedicated priority list in the following steps. When the terminal performs the RRC connection setup procedure with an eNodeB, upon entry into the RRC connection state, the terminal obtains a new dedicated priority list and releases the old dedicated priority list at the same time.

[0088] Alternatively, the terminal may not release the current dedicated priority list after the RRC connection established. Instead, the current dedicated priority list is overlaid with a new dedicated priority list in an RRC connection release message.

[0089] In step 502, the terminal switches from the cell of the LTE system to a cell of the UMTS or GERAN system, and releases the RRC connection in the cell of the UMTS or GERAN system.

[0090] After the terminal enters into the cell of the UMTS or GERAN system, steps 503-508 to be performed are similar to steps 103-108 of embodiment 1, and thus no repeated description is made here.

[0091] In the technical solution according to this embodiment, an activated terminal performs a cell reselection/switch from a cell of the LTE system to a cell of the UMTS or GERAN system. The terminal obtains a dedicated priority list during the RRC connection setup procedure. Or, during the RRC connection setup procedure, the current dedicated priority list is not released, and the current dedicated priority list is overlaid with a new dedicated priority list in the RRC connection release message. The problem in the prior art that the old dedicated priority list is deleted before the terminal obtains a new dedicated priority list, is solved. Meanwhile, in this embodiment, the terminal performs cell reselection by using the dedicated priority list obtained from the LTE system, which may free the non-LTE system from establishment of the dedicated priority list. Problems in the conventional arts that the establishment of the dedicated priority list by the non-LTE system causes too much increased signaling and too high costs for network upgrade, are solved.

Embodiment 6

[0092] Referring to FIG. 3, this embodiment provides a terminal capable of performing the methods provided in the embodiments of the invention. The terminal includes:

- a first obtaining unit 61 configured to obtain a dedicated priority list from a first system;

- a first storage 62 configured to store the dedicated priority list obtained by the first obtaining unit 61; and

- a first processing unit 63 configured to perform cell reselection according to the dedicated priority list stored in the first storage 62 when the terminal camps on a second system.

[0093] Furthermore, the terminal may also includes:

- a second obtaining unit configured to obtain a public priority list from the first system and/or the second system; a second storage configured to store the public priority list obtained by the second obtaining unit; and a second processing unit configured to perform cell reselection according to the public priority list stored in the second storage when the terminal camps on the second system and the first storage 62 does not store a valid dedicated priority list.

[0094] Furthermore, the terminal may also includes:

- a third obtaining unit configured to obtain an indication from the second system;
- a third storage configured to store the indication; and

a third processing unit configured to operate according to the indication stored in the third storage.

[0095] Further, the first system may be an LTE system and the second system may be a non-LTE system in this embodiment.

[0096] Furthermore, an embodiment of the invention provides a system, including a network-side device and a terminal as provided in the above embodiment 6, the network-side device is configured to send the dedicated priority list.

Embodiment 7

[0097] This embodiment provides a system, including a network-side device and a terminal.

[0098] The network-side device is configured to deliver an indication to the terminal, where the indication is used to notify the terminal that the non-LTE system on which the terminal camps will not deliver the public priority list, or notify the terminal to store the public priority list obtained from the LTE system, or notify the terminal to search for a cell of the LTE system when the dedicated priority list stored in the terminal is invalid or search for a cell of the LTE system or perform cell reselection according to a result measured in accordance with a cell signal quality criterion when the terminal does not store the dedicated priority list and the public priority list.

[0099] The terminal is configured to receive an indication from the network-side device and perform cell reselection according to the indication.

Embodiment 8

[0100] This embodiment provides a system, including a network-side device and a terminal.

[0101] The network-side device is within an LTE system, including a first transmission unit configured to transmit a dedicated priority list.

[0102] The terminal includes a first storage configured to receive and store the dedicated priority list, and a first processing unit configured to perform cell reselection according to the dedicated priority list when the terminal camps on a cell of a non-LTE system.

[0103] In the above embodiments 6-8, the non-LTE system may be a GSM system, an EDGE system, a WCDMA system, a CDMA system, a TD-SCDMA system, or a WIMAX system.

[0104] In the above embodiments 6-8, the terminal performs cell reselection by using a dedicated priority list obtained from the first system (for example, an LTE system). Thus, the second system (for example, a non-LTE system) may be freed from establishing the dedicated priority list. Problems in the prior arts that establishment of the dedicated priority list by the various systems causes too much increased signaling and too high costs for network upgrade, are solved.

[0105] From the above description to the various embodiments, those skilled in the art may clearly appreciate that the present invention may be implemented by means of software and a necessary general-purpose hardware platform. Alternatively, the present invention may be implemented in hardware. The former case, however, is a more preferred implementation in many cases. Based on this understanding, the technical solution of the present invention in its essence or the features which make a contribution to the prior arts may be embodied in a software product. The computer software product may be stored in a storage media, such as ROM/RAM, magnetic disk, optic disc, etc., including several instructions which cause a computer device (a PC, a server, a network device, or the like) to perform the methods according to the various embodiments of the present invention.

[0106] Detailed descriptions have been made above to the invention with reference to some exemplary embodiments, which are not used to limit the present invention. Various changes, equivalent substitutions, and improvements within the principle of the invention are intended to fall within the scope of the invention.

CLAIMS

What is claimed is:

1. A method for cell reselection, comprising:
obtaining, by a terminal, a dedicated priority list and a valid time of the dedicated priority list from a first system; and
performing, by the terminal, cell reselection according to the dedicated priority list and the valid time of the dedicated priority list, when the terminal camps on a cell of a second system.
2. The method according to claim 1, wherein the first system is a Long Term Evolution (LTE) system and the second system is a non-LTE system.
3. The method according to claim 2, wherein the method further comprises:
when the terminal camps on a cell of the non-LTE system, the performing cell reselection according to the dedicated priority list and the valid time comprises: performing, by the terminal camping on the cell of the non-LTE system, cell reselection according to the dedicated priority list before the valid time expires.
4. The method according to claim 2, wherein when the terminal camps on the cell of the non-LTE system, the dedicated priority list is invalid after the valid time expires, the method further comprises:
performing cell reselection according to a public priority list, or
performing cell reselection according to a result measured in accordance with a cell signal quality criterion, or
searching for a cell of the LTE system.
5. The method according to claim 4, wherein when the public priority list is obtained by the terminal from the LTE system, the method further comprises:
obtaining, by the terminal, an indication from the non-LTE system when the terminal camps on the cell of the non-LTE system, wherein the indication is used to

notify the terminal that the non-LTE system will not deliver the public priority list, and/or notify the terminal to store the public priority list obtained from the LTE system.

6. The method according to claim 2, further comprising: obtaining, by the terminal, an indication from the non-LTE system, wherein the indication is used to notify the terminal at least one of the following:

- searching for a cell of the LTE system when the dedicated priority list is invalid;
- searching for a cell of the LTE system when the terminal does not store the dedicated priority list and the public priority list; and
- performing cell reselection according to a result measured in accordance with a cell signal quality criterion when the terminal does not store the dedicated priority list and the public priority list.

7. The method according to claim 2, wherein the dedicated priority list and the valid time of the dedicated priority list are carried in a dedicated signaling.

8. The method according to claim 2, wherein the dedicated priority list comprises priority level information of different Radio Access Technologies (RATs).

9. A terminal, comprising:

- a first obtaining unit, configured to obtain a dedicated priority list and a valid time of the dedicated priority list from a first system;
- a first storage, configured to store the dedicated priority list and the valid time of the dedicated priority list; and
- a first processing unit, configured to perform cell reselection according to the dedicated priority list and the valid time of the dedicated priority list stored in the first storage when the terminal camps on a second system.

10. The terminal according to claim 9, further comprising:

- a second obtaining unit, configured to obtain a public priority list from the first system;
- a second storage, configured to store the public priority list; and

a second processing unit, configured to perform cell reselection according to the public priority list stored in the second storage when the terminal camps on the second system and the first storage does not store a valid dedicated priority list.

11. The terminal according to claim 9, wherein the first processing unit is further configured to perform the cell reselection according to the dedicated priority list before the valid time expires, when the terminal camps on a cell of the non-LTE system.

12. The terminal according to claim 9, wherein the first system is a Long Term Evolution (LTE) system and the second system is a non-LTE system.

13. The terminal according to claim 10, wherein the dedicated priority list and the valid time of the dedicated priority list are carried in a dedicated signaling.

14. The terminal according to claim 10, wherein the dedicated priority list comprises priority level information of different Radio Access Technologies (RATs).

15. A system, comprising a network-side device and a terminal according to claim 9, wherein the network-side device is configured to send the dedicated priority list.

16. The system according to claim 15, wherein the first system is a Long Term Evolution (LTE) system and the second system is a non-LTE system.

17. The system according to claim 15, wherein the dedicated priority list and the valid time of the dedicated priority list are carried in a dedicated signaling.

18. The system according to claim 15, wherein the dedicated priority list comprises priority level information of different Radio Access Technologies (RATs).

19. The system according to claim 15, wherein the terminal further comprises:
a second obtaining unit, configured to obtain a public priority list from the first system;
a second storage, configured to store the public priority list; and
a second processing unit, configured to perform cell reselection according to the public priority list stored in the second storage when the terminal camps on the second system and the first storage does not store a valid dedicated priority list.

20. The system according to claim 15, wherein the first processing unit is further configured to perform the cell reselection according to the dedicated priority list before the valid time expires, when the terminal camps on a cell of the non-LTE system.

ABSTRACT

A method, terminal, and system for cell reselection are disclosed. The method includes: a terminal obtains a dedicated priority list from a first system; and performs cell reselection according to the dedicated priority list when the terminal camps on a cell of a second system. The corresponding terminal and system are also provided in other embodiments of the invention. According to an embodiment of the invention, the terminal performs cell reselection by using the dedicated priority list obtained from the first system so as to free the second system from establishing the dedicated priority list. Problems in the prior arts that establishment of the dedicated priority list causes too much increased signaling and too high costs for network upgrade are solved.

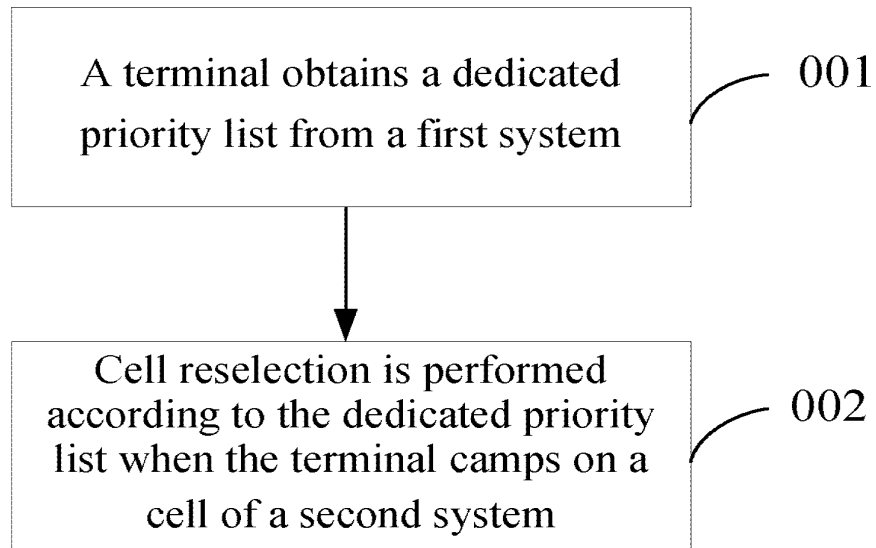


FIG.1

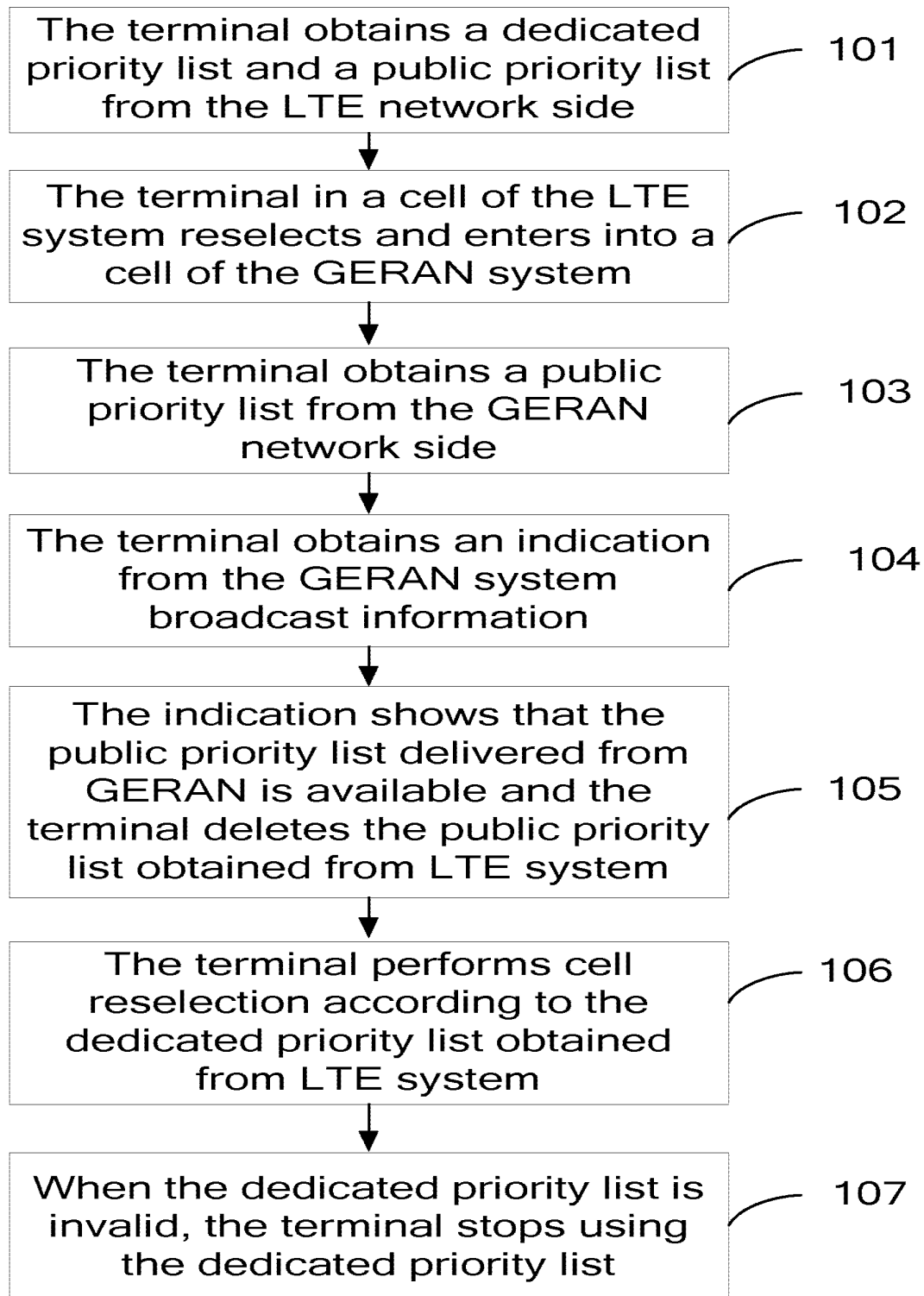


FIG.2

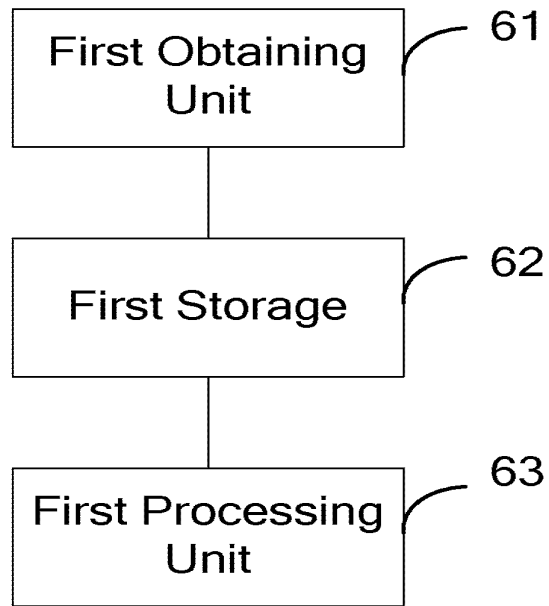


FIG.3

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application No. TBD

Confirmation No. TBD

Applicant: ROBERTS et al.

Filed: October 12, 2010

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Docket No.: HW707010 (Client Reference No. 0811316US)

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

INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 CFR 1.97 and 1.98, the references listed on the enclosed Form PTO-1449 and/or Substitute Form PTO-1449 ("Form 1449") are submitted for consideration by the Examiner in the examination of the above-identified patent application.

The full consideration of the references in their entirety by the Examiner is respectfully requested and encouraged. Also, it is respectfully requested that the references be entered into the record of the present application and that the Examiner initial the appropriate area on the enclosed Form 1449, thereby indicating the Examiner's consideration of each of the references.

The submission of the references listed on the Form 1449 is for the purpose of providing a complete record and is not a concession that the references listed thereon are prior art to the invention claimed in the patent application. The right is expressly reserved to establish an invention date earlier than the above-identified filing date in order to remove any reference submitted herewith as prior art should it be deemed appropriate to do so.

Further, the submission of the references is not to be taken as a concession that any reference represents art that is relevant or analogous to the claimed invention. Accordingly, the right to argue that any reference is not properly within the scope of prior art relevant to an examination of the claims in the above-identified application is also expressly reserved.

The Information Disclosure Statement is being filed:

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- the Statement under 37 CFR 1.97(e) (see “Statement under 37 CFR 1.97(e)” below).
- Note: This submission includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.
- or –
- the fee of \$180 set forth in 37 CFR 1.17(p) (see “Fees” below).
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Citation to Other Patent Applications

- The following U.S. patent applications are hereby brought to the attention of the Examiner. The U.S. patent applications claim subject matter that may be considered by the Examiner to be similar to the subject matter claimed in the above-identified patent application. Accordingly, these U.S. patent applications and/or the prosecution pertaining thereto may include information considered to be material to the prosecution of the above-identified patent application. Since the Examiner has electronic access to the prosecution histories of these U.S. patent applications, copies of prosecution materials therefrom are not provided herewith, but will be promptly provided if the Examiner so desires and requests same.

U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Never Issued: Abandoned/Expired
1.				
2.				
3.				

Copies of the References

- Copies of any U.S. patents and published patent applications that are listed on the accompanying Form 1449 are not enclosed herewith. Copies of any other references identified on the accompanying Form 1449 are enclosed herewith.
- For each reference not in the English language, attached is at least one of the following: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.
- Copies of foreign search reports or foreign examination reports are enclosed as follows.

SEARCHING OR EXAMINING OFFICE	APPLICATION COUNTRY	APPLICATION NO.	DATE OF MAILING OF SEARCH REPORT OR EXAMINATION REPORT
SIPO-China	WO	2009/045078	April 9, 2009

- The references listed on the enclosed Form 1449 were previously identified in the parent application(s) of the present application, and copies of the references were furnished at that time. Accordingly, additional copies of the references are not submitted herewith, so as not to burden the file with duplicate copies of references. The Examiner is respectfully requested to carefully review the references in accordance with the requirements set out in the Manual of Patent Examining Procedure. In accordance with 37 CFR 1.98(d), the details of the parent application(s) relied upon for an earlier filing date under 35 USC 120 in which copies of the references were previously furnished are set out below:

U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Abandoned
1.				
2.				
3.				

Statement under 37 CFR 1.97(e)

- The **undersigned** hereby states 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 patent application not more than three months prior to the filing of the Information Disclosure Statement.
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Fees

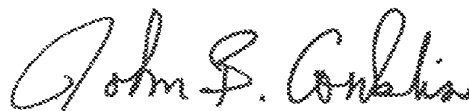
- No fee** is owed by the applicant(s).
- Charge Deposit Account No. 12-1216 in the amount of **\$180.00** (37 CFR 1.17(p)).

Authorization to Charge Additional Fees

- If any additional fees are owed in connection with this communication, please charge Deposit Account No. 12-1216.

Instructions as to Overpayment

- Credit Account No. 12-1216.
- Refund



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Date: October 12, 2010

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Substitute for form 1449A/B/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	TBD
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				First Named Inventor	Michael ROBERTS
				Group Art Unit	TBD
				Examiner Name	TBD
Sheet	1	of	1	Attorney Docket Number	HW707010

U.S. PATENT DOCUMENTS						
Examiner Initials	Doc. No.	U.S. Patent Document		Name of Patentee or Applicant	Date of Publication	Filing Date If Appropriate
		Application or Patent Number	Kind Code			
	A A	20080268843	A1	Nokia Corp.	10/30/2008	

FOREIGN PATENT DOCUMENTS							
Examiner Initials	Doc. No.	Foreign Patent Document			Name of Patentee or Applicant	Date of Publication	Translation *
		Office	Application or Patent Number	Kind Code			
	A B	WO	2009045078	A2	LG Electronics Inc.	04/09/2009	
	A C	CN	1832601	A	LG Electronics China Co. Ltd.	09/13/2006	
	A D	CN	1675957	A	Motorola Inc.	09/28/2005	x
	A E	CN	1965605	A	Nokia Corp.	05/16/2007	x
	A F	CN	10113614	A	Huawei Technologies Co., Ltd.	02/27/2008	x

OTHER - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Doc. 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, page(s), volume-issue number (s), publisher, city and/or country where published.	Translation *
	A G	"3GPP TS 36.304-Evolved Universal Terrestrial Radio Access (E-UTRA)," March 2008, V8.1.0, 3 rd Generation Partnership Project, Valbonne, France.	
	A H	Written Opinion from the International Searching Authority in corresponding PCT Application No. PCT/CN2009/071194 (April 8, 2009).	

Examiner Signature	Date Considered
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* If the reference is not in English, then at least one of the following is provided: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.

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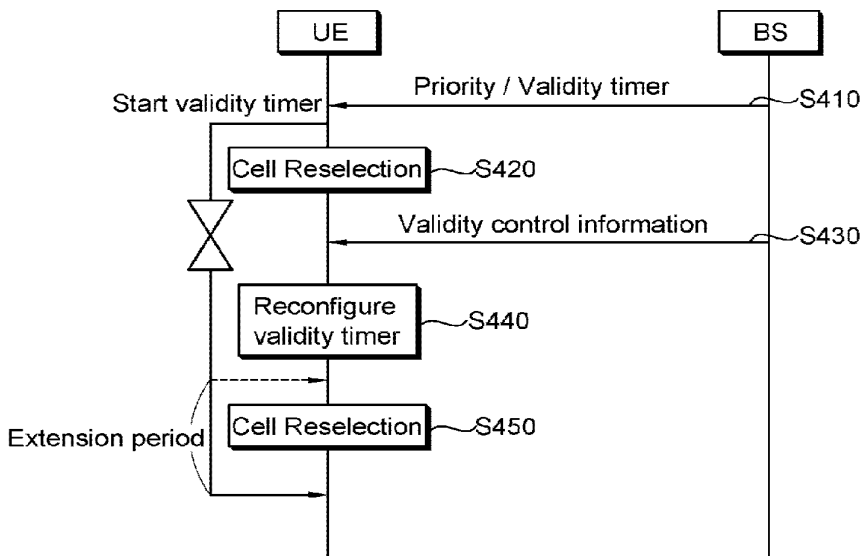
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[Continued on next page]

(54) Title: METHOD OF PERFORMING CELL RESELECTION IN WIRELESS COMMUNICATION SYSTEM

[Fig. 9]



(57) Abstract: A method of performing cell reselection includes receiving priority for a different frequency or RAT (Radio Access Technology) and information on a validity timer for the priority, starting the validity timer, performing cell reselection based on the priority while the validity timer is running, receiving reconfiguration information of the validity timer, and reconfiguring the validity timer based on the reconfiguration information.

WO 2009/045078 A2



GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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Description

METHOD OF PERFORMING CELL RESELECTION IN WIRELESS COMMUNICATION SYSTEM

Technical Field

- [1] The present invention relates to wireless communications and, more particularly, to a method for performing cell reselection in a wireless communication system.

Background Art

- [2] A 3rd Generation Partnership Project (3GPP) based on a Wideband Code Division Multiple Access (WCDMA) radio access technique is being extensively deployed all over the world. A High Speed Downlink Packet Access (HSDPA), which may be defined as a first evolution of the WCDMA, provides a radio access technique with a competitive edge in the mid-term future to the 3GPP. However, as requirements and expectations of users and service providers are continuously increasing and development of competitive wireless access techniques is proceeding, a new technical evolution in the 3GPP is requested to ensure competitiveness in the future. The requirements include a reduction in costs per bit, an increase in service availability, the flexible use of frequency bands, a simple structure and an open interface, proper power consumption of user equipments, or the like.
- [3] In general, cell selection may be classified into an initial cell selection performed at an initial stage after power of a user equipment is turned on and a cell reselection performed for a handover or a neighbor cell measurement.
- [4] The reason for the user equipment to perform a cell reselection is to register itself to a network to receive a service from a base station. If the strength or quality of signals between the user equipment and a serving cell is degraded due to the movement of the user equipment, the user equipment reselects a different cell to keep its transmission quality.
- [5] There may be various types of criterion to perform cell selection, and cell selection may be performed according to priority for inter-frequency or inter-RAT (Radio Access Technology). The priority may be temporarily changed due to mobility of the user equipment and various other factors. Thus, it is required to reconfigure priority over time, rather than maintaining the same priority for the same frequency or the RAT.
- [6] Besides the priority for cell selection, there may be various validity factors that may temporarily change the validity according to factors such as an environment in the wireless communication system. There is a need for a method to control effectively operations of the validity factors such as extension or release of validity.

Disclosure of Invention

Technical Problem

[7] The present invention provides a method for performing cell reselection in consideration of priority of a different frequency/RAT.

[8] The present invention also provides a method for balancing loads between cells.

Technical Solution

[9] In an aspect, a method of performing cell reselection in a wireless communication system includes receiving priority for a different frequency or RAT (Radio Access Technology) and information on a validity timer for the priority, starting the validity timer, performing cell reselection based on the priority while the validity timer is running, receiving reconfiguration information of the validity timer, and reconfiguring the validity timer based on the reconfiguration information.

[10] In another aspect, a user equipment includes a Radio Frequency (RF) unit for receiving a radio signal, and a processor coupled with the RF unit, configured to perform cell reselection according to priority for a different frequency or RAT based on results measured from the radio signal, and configured to start a validity timer for the priority, wherein the priority is invalidated when the validity timer expires, and reconfigure the validity timer according to validity control information.

[11] In still another aspect, a method of configuring cell reselection in a wireless communication system includes transmitting priority for a different frequency and RAT and information on a validity timer for the priority to a user equipment so that the user equipment performs cell reselection based on the priority while the validity timer is running, and transmitting reconfiguration information of the validity timer to the user equipment.

Advantageous Effects

[12] Load balance between cells, efficient use of radio resources and high quality services can be achieved.

Brief Description of the Drawings

[13] FIG. 1 is a schematic block diagram showing a wireless communication system.

[14] FIG. 2 is a schematic block diagram showing a functional split between a E-UTRAN and an EPC.

[15] FIG. 3 is a schematic block diagram showing elements of a user equipment.

[16] FIG. 4 is a schematic block diagram showing a user plane of a radio interface protocol.

[17] FIG. 5 is a schematic block diagram showing a control plane of the radio interface protocol.

[18] FIG. 6 shows a subframe structure.

- [19] FIG. 7 is a flow chart illustrating the process of an operation of performing cell selection by a user equipment in an idle mode.
- [20] FIG. 8 is a flow chart of controlling validity of inter-frequency/inter-RAT priority information.
- [21] FIG. 9 is a flow chart of a cell reselection method according to an embodiment of the present invention.
- [22] FIG. 10 is a flow chart illustrating the process of measurement using set priority.
- [23] FIG. 11 is an exemplary view showing a method of controlling a validity timer of priority according to an embodiment of the present invention.

Mode for the Invention

- [24] FIG. 1 is a schematic block diagram showing a wireless communication system. This may be a network structure of an Evolved-Universal Mobile Telecommunications System (E-UMTS). The E-UMTS system may be called as a Long Term Evolution (LTE) system. The wireless communication system can be widely deployed to provide a variety of communication services, such as voices, packet data, etc.
- [25] Referring to FIG. 1, an Evolved-UMTS Terrestrial Radio Access Network (E-UTRAN) includes a base station (BS) 20 that provides a control plane and a user plane. A user equipment 10 may be fixed or mobile, and may be referred to as another terminology, such as a mobile station (MS), a user terminal (UT), a subscriber station (SS), a wireless device, etc. The BS 20 generally refers to a fixed station that communicates with the UE 10 and may be called another terminology, such as an eNB(evolved-Node B), a BTS (Base Transceiver System), an access point, etc. There are one or more cells within the coverage of the BS 20. An interface may be used to transmit user traffic or control traffic between BSs 20. Hereinbelow, downlink refers to communication from the BS 20 to the UE 10, and uplink refers to communication from the UE 10 to the BS 20.
- [26] The BSs 20 may be connected with each other via an X2 interface. The BS 20 is connected with an EPC (Evolved Packet Core), specifically, to an MME (Mobility Management Entity)/S-GW (Serving Gateway) 30, via an S1 interface. The S1 interface supports many-to-many relation between the BS 20 and the MME/S-GW 30.
- [27] FIG. 2 is a schematic block diagram showing a functional split between a E-UTRAN and an EPC.
- [28] With reference to FIG. 2, shaded blocks (with oblique lines) represent radio protocol layers, and empty blocks represent functional entities of the control plane.
- [29] The BS performs the following functions: (1) radio resource management (RRM) function such as radio bearer (RB) control, radio admission control, connection mobility control, dynamic resource allocation to the UE; (2) IP (Internet Protocol)

header compression and decryption of user data stream; (3) routing of user plane data to a serving gateway (S-GW); (4) scheduling and transmission of a paging message; (5) scheduling and transmission of broadcast information; and (6) measurement for mobility and scheduling and setting a measurement report.

[30] An MME performs the following functions: (1) distribution of paging messages to BSs; (2) security control; (3) idle state mobility control; (4) SAE bearer control; (5) ciphering and integrity protection of NAS (Non-Access Stratum) signaling.

[31] The S-GW performs the following functions: (1) termination of a user plane packet with respect to paging; and (2) user plane switching to support UE mobility.

[32] FIG. 3 is a schematic block diagram showing elements of a UE. A UE 50 includes a processor 51, a memory 52, an RF unit 53, a display unit 54, and a user interface unit 55. The processor 51 configures to functions the layers of the radio interface protocol and provides the control plane and the user plane. Functions of the layers may be implemented via the processor 51. The memory 52 is coupled with the processor 51 and stores a driving system, an application and a general file. The display unit 54 displays various information of the UE and may be formed by using the well known elements such as an LCD (Liquid Crystal Display), an OLED (Organic Light Emitting Diode), or the like. The user interface unit 55 may be configured by combining well known user interfaces such as a keypad, a touch screen, or the like. The RF unit 53 is coupled with the processor and transmits and/or receives a radio signal.

[33] The layers of the radio interface protocol between the UE and a network may be divided into a first layer L1, a second layer L2, and a third layer L3 based on the three lower layers of an open system interconnection (OSI) standard model widely known in communication systems. The physical layer belonging to the first layer (L1) provides an information transfer service using a physical channel, and an Radio Resource Control (RRC) layer positioned at the third layer serves to control radio resources between the UE and the network. To this end, the RRC layer exchanges an RRC message between the UE and the network.

[34] FIG. 4 is a schematic block diagram showing the user plane of the radio interface protocol. FIG. 5 is a schematic block diagram showing the control plane of the radio interface protocol. It shows the structure of the radio interface protocol between the UE and the E-UTRAN. The user plane is a protocol stack for transmitting user data, and the control plane is a protocol stack for transmitting a control signal.

[35] Referring to FIGs. 4 and 5, the physical layer, namely, the first layer, provides an information transfer service to an upper layer by using a physical channel. The physical layer is coupled with an upper layer called a medium access control (MAC) layer via a transport channel, and data is transferred between the MAC layer and the physical layer via the transport channel. Meanwhile, between different physical layers, namely,

between a physical layer of a transmitting side and that of a receiving side, data is transferred via the physical channel. The physical channel may be modulated according to an Orthogonal Frequency Division Multiplexing (OFDM) scheme, and time and frequency may be utilized as radio resources.

[36] The MAC layer of the second layer provides a service to an Radio Link Control (RLC) layer, an upper layer, via a local channel. The RLC layer of the second supports reliable data transmission. The RLC layer includes three types of operation modes: a transparent mode (TM), an unacknowledged mode (UM), and an acknowledged mode (AM) according to a data transmission method. An AM RLC provides bi-directional data transmission service, and supports re-transmission when transmission of an RLC PDU (Protocol Data Unit) fails.

[37] In order to effectively transmit an Internet Protocol (IP) packet such as an IPv4 or an IPv6 in a radio interface with a relatively small bandwidth, a Packet Data Convergence Protocol (PDCP) layer of the second layer performs a header compression function to reduce the header size of the IP packet that includes relatively large and unnecessary control information.

[38] The RRC layer of the third layer is defined only at the control plane. The RRC layer serves to control a logical channel, a transport channel and a physical channel in relation to configuration, re-configuration, and releasing of radio bearers (RBs). RB refers to a service provided by the second layer for data transmission between the UE and the E-UTRAN. When there is an RRC connection between the RRC of the UE and that of the network, the UE is in an RRC-connected mode, or otherwise, the UE is in an RRC idle mode.

[39] A Non-Access Stratum (NAS) layer positioned at an upper portion of the RRC layer performs a function such as session management, mobility management, or the like.

[40] Downlink transport channels for transmitting data from the network to the UE includes a BCH (Broadcast Channel) for transmitting system information, a PCH (Paging Channel) for transmitting a call message, a DL-SCH (Downlink-Shared Channel) for transmitting user traffic or a control message, or the like. Traffic or a control message of a downlink multicast or broadcast service may be transmitted via the DL-SCH or via a downlink MCH (Multicast Channel). Uplink transport channels for transmitting data from the UE to the network includes an RACH (Random Access Channel) for transmitting an initial control message and a UL-SCH (Uplink-Shared Channel) for transmitting user traffic or a control message.

[41] The BS manages radio resources of one or more cells. A single cell is set with one of 1.25, 2.5, 5, 10, 20 Mhz, etc., to provide a downlink or uplink transmission service to several UEs. In this case, different cells may be set to provide different bandwidth. Cells may be configured to overlap geographically by using several frequencies. The

BS provides basic information for a network connection to the UE by using system information. The system information includes essential information for the UE to know in order to be connected to the network. Thus, the UE should receive all the system information before being connected to the BS, and constantly updates the latest system information. The system information is information all the UEs within a single cell should retain, so the BS periodically transmits the system information.

[42] Logical channels mapped to a transport channel includes a BCCH (Broadcast Channel), a PCCH (Paging Control Channel), a CCCH (Common Control Channel), an MCCH (Multicast Control Channel), an MTCH (Multicast Traffic Channel), a DCCH (Dedicated Control Channel), or the like.

[43] FIG. 6 shows a subframe structure.

[44] Referring to FIG. 6, a subframe includes a plurality of OFDM symbols and a plurality of subcarriers. The subframe is a unit for allocating radio resources. The subframe includes a plurality of resource blocks, and a resource block includes a plurality of subcarriers (e.g., twelve subcarriers). The subframe may be divided into a region to which a PDCCH (Physical Downlink Control Channel, which is also called an L1/L2 control channel) is allocated, and a region to which a PDSCH (Physical Downlink Shared Channel) is allocated. For example, three preceding OFDM symbols of the subframe may be allocated to the PDCCH. Time during which a single subframe is transmitted is called a TTI (Transmission Time Interval), and 1 TTI may be, for example, 1ms. The subframe may be divided into two slots in time domain, so when 1 TTI is 1ms, one slot has an interval of 0.5ms.

[45] A method for transmitting and receiving a paging message will now be described.

[46] When a paging message including a paging record with a paging cause, a UE identity, or the like, is received, the UE performs a discontinuous reception (DRX) for the purpose of reducing power consumption. Namely, the network configures several paging occasions at every period called a paging cycle, and the UE acquires a paging message only at the paging occasion. The UE may not receive such a paging message at other time than the paging occasion, and may be in a sleep state in order to reduce power consumption. An interval of a single paging occasion may correspond to one TTI. The network may indicate whether or not the paging message appears by using a paging indicator as a particular value informing a transmission of the paging message. An identifier such as a P-RNTI (Paging-Radio Network Temporary Identity) or the like may be defined as the paging indicator.

[47] The UE wakes up at every DRX period to monitor the PDCCH in a subframe to know whether or not the paging message has been transmitted. When the UE detects the PDCCH addressed by the P-RNTI, it receives the paging message on a PDSCH indicated by the PDCCH. When the paging message includes a UE identifier (e.g., an

IMSI (International Mobile Subscriber Identity)) of the UE, the UE can receive a service in response to the BS.

[48] FIG. 7 is a flow chart illustrating the process of an operation for performing cell selection by a UE in an idle mode. The purpose of performing cell selection by the UE is to register to the network to receive a service from the BS. When the strength or quality of a signal between the UE and a serving cell is degraded due to the movement of the UE, the UE reselects a different cell to maintain transmission quality of data. Hereinafter, a characteristic value of a physical signal related to the strength of a signal or an SINR (Signal-To-Interference plus Noise Ratio) or the like may be simply called a signal characteristic value. There may be a selection or reselection of a cell based on the signal characteristic value which depends on a radio environment. In performing the cell selection, the following methods may be performed according to a Radio Access Technology (RAT) of a cell and frequency characteristics.

[49] (1) Intra-frequency cell reselection: reselection of a cell having the same RAT and the same center frequency as those of the cell in use by the UE

[50] (2) Inter-frequency cell reselection: reselection of a cell having the same RAT as that of the cell in use by the UE and a different center frequency from that of the cell in use by the UE

[51] (3) Inter-RAT cell reselection: reselection of a cell using a different RAT from that of the cell in use by the UE.

[52] With reference to FIG. 7, in step S210, the UE selects a RAT to communicate with a PLMN (Public Land Mobile Network) from which the UE wants to receive a service. The PLMN and the RAT information may be selected by the user of the UE, or information stored in a USIM (Universal Subscriber Identity Module) may be used.

[53] In step S220, the UE selects a cell having the best signal characteristic value as an initial cell according to a measured signal characteristic value, and then receives system information the selected cell periodically transmits.

[54] In step S230, the UE determines whether or not registration has been made by comparing network information (e.g., a TAI (Tracking Area Identity)) received from the system information and network information that the UE has. If the network information received from the system information and the network information of its own are different, the UE performs a registration procedure to the network.

[55] In step S240, the UE registers its information (e.g., IMSI) to receive a service from the network.

[56] In step S250, if the signal characteristic value measured from a neighbor cell is better than that measured from the serving cell from which the UE receives a service, the UE performs cell reselection. In this case, if priority of the inter-frequency or the inter-RAT has been defined, a cell may be selected in consideration of the priority. This is

called a cell reselection, discriminated from an initial cell selection.

- [57] In step S260, when a new cell is selected, the UE determines again, starting from whether or not registration has been performed.
- [58] In step S290, the UE periodically or non-periodically performs measurement for the initial cell selection or cell reselection. An RSRP (Reference Symbol Received Power), an RSRQ (Reference Symbol Received Quality), an RSSI (Received Signal Strength Indicator), or the like, may be used as the measurement result value.
- [59] In order for the UE to perform cell reselection according to the measurement result, cell reselection criterion such as a UE capability (UE capability), subscriber information, cell load balancing, traffic load balancing or the like are required.
- [60] The cell reselection according to the UE capability refers to performing cell reselection according to a selectable frequency band because an available frequency band that can be used by the UE itself may be limited. The cell reselection according to the subscriber information refers to the fact that the UE may be set to be able to select or unable to select a cell according to subscriber information or an operator policy. The cell reselection according to the cell load balancing refers to allow a smaller number of UEs to select a cell in use in order to reduce a load by data generated when the UEs in an idle mode are activated in a single cell. The cell reselection according to the traffic load balancing refers to changing a cell in terms of reducing a load according to data generated from the activated UE.
- [61] The E-UTRAN system has a high possibility of extending and operating a frequency band in an existing UTRAN for the purpose of installation/maintenance/repairing. Thus, in order to effectively use radio resources and balance an inter-cell load, it is much necessary to consider cell load balancing or traffic load balancing in a cell reselection.
- [62] In order to effectively perform a cell selection process, the UE may define priority for each frequency or each RAT to be considered in cell selection or cell reselection. This is called an inter-frequency or inter-RAT priority. In addition, if there are a plurality of frequencies/RATs, each of them may have a different priority level or the same priority level.
- [63] The criterion for determining the inter-frequency/inter-RAT priority are based on various purposes as described below, and the below purposes require a process for selecting a cell by the UE.
- [64] (1) QoS (Quality of Service) to be provided for the UE: This refers to setting priority according to QoS or types of services to be provided to the UE. For example, for a UE using only a VoIP (Voice over IP), a higher priority may be set for a particular frequency or RAT suitable for the VoIP. For another example, for a UE using a service requiring a high data rate, a higher priority may be set for the RAT (e.g., E-UTRAN)

providing a high data rate. In addition, for a UE using an MBMS (Multimedia Broadcast Multicast Service), a higher priority may be set for a RAT or a frequency providing the MBMS.

- [65] (2) Network sharing: This refers to providing a service to a UE by sharing different PLMNs. In order to the UE to select a cell providing an available PLMN, a priority level for a frequency or a RAT may be determined.
- [66] (3) Subscriber type: This refers to determining a priority level according to subscriber information. For example, for a user who has subscribed to only a voice communication service requiring a low speed, a higher priority level may be set for a RAT (e.g., UTRAN) with a low speed, and a lower priority level may be set for a RAT (e.g., E-UTRAN) with a high speed. For another example, for a user who has subscribed to a multimedia service requiring a high data rate, a higher priority level may be set for the RAT (e.g., E-UTRAN) with a relatively high speed, and a lower priority level may be set for the RAT (e.g., UTRAN) with a relatively low speed.
- [67] (4) CSG (Closed Subscriber Group) cell or home BS: A CSG cell refers to a cell that can be used by one or more particular users or UEs, and a high priority level may be set for a frequency or a RAT to a particular UE that can access the CSG cell. A home BS installed in a place such as a home and used by the user may be one example of the CSG.
- [68] (5) Load balancing: Cell load balancing and traffic load balancing are included in load balancing. For example, a frequency or a RAT of a cell with a smaller load is set with a high priority level to allow the UE to preferentially select the cell with the smaller load, thereby balancing inter-cell load. In addition, load balancing can be made by cell, TA (Tracking Area), RA (Registration Area, a set of a plurality of TAs), and PLMN according to a range of a region to which priority between frequencies and RATs is applied.
- [69] (6) Operator policy: A particular frequency or RAT may have a high priority level according to a policy of an operator operating a network.
- [70] The validity and application range (scope) of the inter-frequency/inter-RAT priority information allocated to a UE may be as follows.
- [71] - Validity of priority is determined by TA and the inter-frequency/inter-RAT priority is not changed before a TAU (Tracking Area Update) process. The TAU process refers to a process of registering identifier information such as an IMSI of the UE by the UE. When priority information is received from the network during or after the TAU process, the inter-frequency/inter-RAT priority are valid until the next TAU process.
- [72] - Validity is determined in units of cells, and the inter-frequency/inter-RAT priority is not changed until before reselection of a different cell. For example, when priority information is received from the network during or after the cell reselection process,

the inter-frequency/inter-RAT priority is valid until a next cell is reselected or until new priority information is received after a cell reselection.

- [73] - Besides the TA unit or cell unit, validity or an application range such as a PLMN unit may be provided.
- [74] - Validity or an application range such as an RPLMN (Registered PLMN) registered by the UE may be provided.
- [75] Priority may be invalidated due to a change in the state of the UE from an RRC idle mode to an RRC-connected mode. Priority may be invalidated according to a particular RRC message that the UE changes from the RRC idle mode to the RRC-connected mode. For example, when the UE transmits an RRC connection request message, priority may be invalidated when an RRC connection setup message is received from the BS or when an RRC connection complete message is transmitted to the BS. Conversely, priority information may be invalidated due to a change in the state of the UE from the RRC-connected mode to the RRC idle mode. For example, priority may be invalidated according to reception of an RRC connection release message.
- [76] The frequency and/or RAT information and the inter-frequency/inter-RAT priority information may be received from the BS as follows.
- [77] (1) The UE receives selectable frequency and/or RAT information from the BS in the process of TAU. The UE receives inter-frequency/inter-RAT priority information as a portion of system information.
- [78] (2) The UE receives inter-frequency/inter-RAT priority information as a part of system information.
- [79] (3) The UE receives selectable frequency and/or RAT information from the BS in the process of TAU. And the UE receives inter-frequency/inter-RAT priority information corresponding to each frequency and RAT.
- [80] (4) The inter-frequency/inter-RAT priority information may be received together with information about a frequency and/or a RAT through an RRC message. The RRC message may be at least one of an RRC connection release/connection request/connection setup message, a radio bearer setup message, a radio bearer reconfiguration message, an RRC connection reconfiguration message, and an RRC connection re-establishment message.
- [81] (5) Frequency and/or RAT information are received via L1/L2 control signaling, and PDCP/RLC/MAC PDU. And inter-frequency/inter-RAT priority information of each frequency/RAT may be received.
- [82] Besides the method of receiving the frequency and/or RAT information from the BS and the method of receiving priority, frequency and or RAT information stored in an SIM/USIM card may be fetched, or priority information corresponding to each frequency and each RAT may be fetched.

- [83] The method for acquiring frequency and/or RAT information by the UE and the priority information acquiring method are not limited to one method but can be combined to be applied.
- [84] The UE may receive the inter-frequency/inter-RAT priority from the network according to at least one of the methods as mentioned above, and inter-frequency/inter-RAT priorities received according to different methods may be the same or different. If the UE repeatedly receives priority information according to different methods, the UE may preferentially apply a second priority level rather than a first priority level arbitrarily or according to a designated method. For example, when the UE receives the first priority information through system information and then receives the second priority information through the RRC connection release message, the UE may perform measurement and cell reselection according to the second priority information, disregarding the first priority information. Thereafter, the UE may be establish an RRC connection with the BS in order to be changed from an RRC idle mode to an RRC-connected mode to receive a service from the BS, and in this process, the UE may invalidate the second priority information that has been previously received from the RRC connection release message. If the UE fails to receive priority information from the network in RRC connection release, it may return to the RRC idle mode and perform cell reselection based on previous priority information or priority information received as a part of the system information.
- [85] The UE may know the presence of each frequency or RAT from an NCL (Neighbor Cell List) received through the system information, and applies allocated priority with respect to the present frequency or RAT in cell reselection. Without the NCL, the UE may detect whether or not frequency or RAT exists through a process of searching a different frequency or RAT by the UE itself.
- [86] In addition, in order to determine validity of priority transferred to the UE, the network may have a validity timer which defines the validity of the priority. The network may transfer information about the validity timer to the UE according to one or more of the priority transferring methods. The priority transferred by the network to the UE may be valid only while the validity UE is running, and the UE performs an operation according to priority (e.g., measurement, cell reselection according to priority, etc.). When the validity timer expires, the UE may read priority information provided from the system information. For example, when the UE receives priority information and a validity timer value (e.g., 100 seconds) through the RRC connection release message, the UE initiates the validity timer at a particular time point and performs cell reselection according to the priority received from the system information. A point of time at which the validity timer is initiated may be a value implicitly determined between the UE and the BS, or may be explicitly determined by

one of the BS and the UE and informed to the other.

[87] The purpose of configuring the validity timer for the inter-frequency/inter-RAT priority obtained through the NAS message (e.g., TAU (Tracking Area Update) message) or the RRC message is allowing the UE to select a cell of a particular frequency or RAT and receive a service while the validity timer is running. For example, the network sets a frequency or RAT with a small load with high priority and transfers the validity timer value to allow the UE to receive a service at the frequency or RAT with the small load for the reason of temporarily load balancing.

[88] FIG. 8 is a flow chart of controlling validity of inter-frequency/inter-RAT priority information.

[89] With reference to FIG. 8, in step S310, when the UE receives an RRC connection release message from the BS, it enters the RRC idle mode. The RRC connection release message instructs release of an RRC connection and includes inter-frequency/inter-RAT priority information and a validity timer value.

[90] In step S320, the UE initiates the validity timer and performs cell reselection based on the inter-frequency/inter-RAT priority.

[91] In step S330, the UE transmits an RRC connection request message to the BS to request an RRC connection. In step S340, the BS transmits an RRC connection setup message to the UE in response to the RRC connection request. Upon receiving the RRC connection setup message, the UE discards the inter-frequency/inter-RAT priority information, and if the validity timer is running, the UE stops the validity timer. In step S350, when the UE transmits an RRC connection setup complete message to the BS, the RRC connection is completed.

[92] While the validity timer is running, the UE may perform cell reselection for a frequency or RAT with higher priority among priorities associated with the validity timer. When the validity timer expires, the UE may perform cell reselection based on new priority information or a previous priority level, or may perform cell reselection regardless of priority. The purpose of using the validity timer is for load balancing. However, when the timer expires, it is difficult to consider the load of a current cell according to the operation of the UE. For example, a serving cell may determine the value of the validity timer in consideration of a traffic state. However, the serving cell cannot adjust the value of the validity timer by any other method than the RRC connection release message. Priority information transferred as a portion of the system information is applied to every UE within a cell, so it is difficult to differently apply the priority of a frequency or RAT in units of particular UEs. Thus, when the validity timer expires, it is difficult to induce a particular UE to reselect a cell of a frequency or RAT with a particular priority level.

[93] If the load of a particular frequency or RAT is high even when the validity timer

expires, it would be better for the UE to select a cell with a smaller load than a cell with a larger load. However, when the validity timer expires, the priority information used in conjunction with the validity timer is invalidated, so the UE has no choice but to perform cell reselection based on priority provided from the system information or a previous priority level (e.g., the priority level allocated in the TAU process or the priority level stored in the USIM card, etc.). Thus, the UE may rather select a cell with a larger load even after the validity timer expires. When the UE requests an RRC connection to a cell with a larger load, the BS connects the user request to a different cell with a smaller load, generating RRC connection redirection that makes the UE receive a service in the cell with a smaller load, resultantly causing a service delay. In addition, although the BS provides a service from a cell with a larger load without re-directing the RRC connection, the bandwidth provided to the UE is inevitably limited. Thus, it is difficult to effectively use radio resources, and QoS may be degraded.

[94] FIG. 9 is a flow chart of a cell reselection method according to an embodiment of the present invention.

[95] With reference to FIG. 9, in step S410, the BS transmits inter-frequency/inter-RAT priority and information on configuration of the validity timer to the UE.

[96] In step S420, the UE starts the validity timer and performs cell reselection process through the inter-frequency/inter-RAT priority.

[97] In step S430, the BS transmits validity control information to the UE. The validity control information is information for controlling validity of priority which includes information on extension of the validity timer.

[98] In step S440, the UE reconfigures the validity timer according to the validity control information. Thus, the validity timer continuously extends although an existing valid time lapses.

[99] In step S450, the UE performs cell reselection based on the inter-frequency/inter-RAT priority.

[100] FIG. 10 shows a flow chart illustrating the process of measurement using set priority.

[101] With reference to FIG. 10, in step S510, the UE measures a signal of the serving cell.

[102] In step S520, the UE performs measurement on different frequency/RAT with a priority higher than that of the serving cell.

[103] In step S530, the UE compares the measurement result ($S_{\text{servicing_cell}}$) of the serving cell with a threshold value. If the measurement result of the serving cell is lower than the threshold value, the UE does not perform measurement on different frequency/RAT with a lower priority.

[104] In step S540, if the measurement result of the serving cell is lower than the threshold value, the UE performs measurement on different frequency/RAT with a lower priority.

- [105] In step S550, the UE performs cell reselection based on the measurement result and the priority.
- [106] If priority is defined between different frequencies or different RATs, the UE performs measurement on a cell corresponding to the frequency or RAT with high priority within a range satisfying a signal characteristic value defined in the system. Exceptionally, the UE may select a cell with the highest signal characteristic value without consideration of the priority defined in the frequency or RAT in an initial cell selection.
- [107] If the measurement result of the serving cell is higher than the threshold value, the UE does not perform measurement on other frequency/RAT with lower priority, so power consumption that may be otherwise caused by measurement can be reduced.
- [108] If several cells satisfy the signal characteristic value as a target for a cell reselection, the UE may select a cell by using one or more signal characteristic value, priority, and the like, such as a cell with the highest priority level, a cell with the best signal characteristics, a cell with more than a particular signal characteristic value and with the highest priority level, a cell with a priority level higher than a particular value and with the highest signal characteristic value, or the like.
- [109] If the UE cannot receive a service from a cell of a frequency or RAT with the highest priority level, namely, when the UE selects a cell of a frequency or RAT with a low priority level, the UE periodically searches the cell of the frequency or the RAT with high priority level. Here, the period at which other cell is searched may be a value previously determined between the BS and the UE, or may be explicitly determined by one of the BS and the UE and informed to the other.
- [110] If a signal characteristic value of a cell as a target for cell reselection satisfies certain conditions for a certain time period, cell reselection is performed. In addition, if a signal characteristic value of the serving cell does not satisfy the certain conditions but a signal characteristic value of a cell as a target for cell reselection satisfies certain conditions for a certain time period, cell reselection is performed.
- [111] The validity control information will now be described.
- [112] The validity control information is used to define validity for a validity target (e.g., priority) defined between the BS and the UE in a control target (e.g., a timer or a counter, etc), and control the validity. In specifying the validity between the BS and the UE, the validity may be implicitly defined between the BS and the UE, or explicitly informed to one of the BS and the UE by the other.
- [113] In order to control validity periodically or non-periodically, the BS may transmit a control target (e.g., timer), a controlling operation (e.g., extending) of the control target, and a factor value required for the controlling operation to the UE. The factor value required for the controlling operation is called a control value. The UE performs

controlling operation with the control value with respect to the control target.

- [114] In order to control the validity of a validity target of the UE periodically or non-periodically, the BS may transmit a validity target (e.g., priority) along with a control target (e.g., timer), a controlling operation (e.g., extending) of the control target, and the control value.
- [115] Even if the BS does not specify a control target, the UE can discriminate the control target by using the controlling operation and/or the control value. Even if the BS informs the UE about only one of the control target, the controlling operation, and the control value, the UE can implicitly know the other remaining values.
- [116] Even if the BS informs the UE about only one of the control target, the controlling operation, and the control value, the UE can discriminate a validity target to which the control information is applied. The UE may discriminate the validity target to which the control information is applied by a method according to which the BS transfers the control information to the UE.
- [117] The UE may know the validity target, the control target, the controlling operation, the control value, or the like, according to system definition by a particular event. The types of events may be a time point at which the signal characteristic value of the serving cell becomes higher or lower than a particular threshold value, a time point at which a cell reselection is performed according to priority or the signal characteristic value, a time point at which a particular RRC message (e.g., RRC connection reconfiguration failure message) is transmitted or received, or the like. For example, the UE may reselect other cell having the same priority level as that of the serving cell and perform an operation of controlling validity of the priority.
- [118] Hereinafter, the above-mentioned control target, the controlling operation, and the control value will be collectively called validity control information.
- [119] The control target of the validity control information includes a timer and a counter. The timer may be used as a method indicating a validity term of the validity target. While the timer is running, a validity target associated with the timer is determined to be valid, and when the timer expires, the validity target is determined not to be valid. A default expiry time of the timer may be a value implicitly defined between the UE and the BS, or may be a value determined by one of the UE and the BS and informed to the other. As the control value for the timer, (1) a value indicating an expiry term of the timer and/or (2) the number of times of operating the timer may be used.
- [120] The counter may be used as a method for indicating a valid degree of the validity target. If the counter value is larger than a particular value (e.g., 0), it is determined that a validity target associated with the counter is valid, and if the counter value is not larger than the particular value (e.g., 0), it is determined that the validity target is not valid. Alternatively, if the counter value is not larger than a particular value (e.g., 10),

it is determined that the validity target is valid, and if the counter value is larger than 10, it is determined that the validity target is not valid. An initial value of the counter and the particular value may be a value implicitly determined between the UE and the BS, or may be a value determined by one of the UE and the BS and explicitly informed to the other. As a control value for the counter, (1) the initial value of the counter, (2) a value indicating the size of the counter to be increased and decreased, (3) a value indicating an increase/decrease unit of the counter, and (4) a value indicating the expiry number of times of a particular timer when the UE is used together with the timer, may be used.

- [121] In order to transfer the validity control information, the following methods may be used.
- [122] (1) System information: Validity control information is transmitted as a part of system information.
- [123] (2) Paging: Validity control information may be transmitted to the UE through a paging message. Namely, like the paging record including a paging reason and a UE identifier, validity control information is included in the paging message and transmitted to the UE. When the paging record is included in the paging message, the UE performs a general paging procedure according to the paging record information, and if there exists validity control information, the UE performs a corresponding operation. If the paging message includes both the paging record and the validity control information, whether to perform both operations or whether to perform only one of them according to each information may be defined by the system. The paging record may include the validity control information. If both the paging record and the validity control information exist, only a particular UE may perform an operation according to the validity control information according to a UE identifier included in the paging record.
- [124] (3) L1/L2 control channel: The validity control information may be transmitted via a channel that transfers control information such as a PDCCH. One example of a particular value indicating the validity control information may be an identity value according to whether or not a change is instructed and a change rule. As the identity value, an RNTI indicating a controlling operation and a control value of a control target such as a PI-RNTI indicating the presence of a paging message may be defined to be used. Accordingly, a plurality of RNTIs may be defined according to the validity control information.
- [125] (4) RRC signaling: The validity control information may be transmitted through RRC signals such as a radio bearer setup-associated message, a radio bearer reconfiguration-associated message, an RRC connection request/connection setup/connection release-associated message, an RRC connection reconfiguration-associated

message, an RRC connection re-establishment-associated message, and the like.

[126] (5) NAS signaling: The validity control information may be transmitted via the NAS signal such as the message in the TAU process.

[127] (6) The validity control information may be transmitted through PDUs such as the RLC, the MAC, the PDCP, or the like, and it can be transferred according to every signaling procedures of the BS and the UE.

[128] Controlling operations of the validity control information may include the followings:

[129] (1) Extension: It refers to extending an expiry term of the validity of a control target. When the BS transfers a control value indicating extension of a valid time of a particular value to the UE, the UE applies the control value to a valid value of a control target. Because the extending operation may be used to indicate sustaining of the validity, it may be also called a sustaining operation. For example, if there are priority information of a frequency or RAT and a validity timer and if the BS transmits a control value instructing that the validity timer should be operated one more time together with a controlling operation of extending the validity timer, the UE runs the validity timer again when the validity timer expires.

[130] (2) Pause: It refers to pausing the operation of a control target. For example, if there are priority information of a frequency/RAT and the validity timer and if an expiry term of the timer is 100 seconds and validity control information regarding a pausing operation is received 40 seconds after the timer is driven, the UE pauses the timer. Accordingly, 60 seconds remain till the expiry time of the timer, and in this state, if validity control information regarding resuming is received later, the UE runs the timer for 60 seconds, the remaining expiry time period. After the UE stops the timer, whether the priority information is valid or not until the timer is resumed may follow a reference determined implicitly or explicitly between the BS and the UE.

[131] (3) Resume: It refers to resume a control target whose operation has been paused.

[132] (4) Release: It refers to releasing the operation of the control target. Thus, the validity of a validity target associated with the control target disappears.

[133] (5) Modify: While the extension extends the validity without changing an attribute of the control target, a modifying operation changes the attribute of the control target. For example, if the control target is a timer, a running expiry time may be changed (e.g., if 60 seconds of expiry time remains for a 100-second timer, the remaining expiry time is changed to 100 seconds), or a default expiry term of the timer may be changed (e.g., a timer with the term of 100 seconds is changed to a timer with the term of 200 seconds). In case of a counter, a running counter value may be changed (e.g., if the counter value is reduced from 10 to 6, the counter value is changed to 15), or an initial counter value may be changed (e.g., an initial value 10 is changed to 20).

- [134] (6) Re-start: A current operation of a control target is released, and the control target starts operating again from the beginning.
- [135] A particular time point at which the UE receives the validity control information and applies an operation according to the validity control information varies according to a method of transferring the validity control information, a validity target associated with the validity control information, or content of the validity control information, namely, a control target, a controlling operation, and a control value.
- [136] For example, a time point at which the UE receives the validity control information may be a time point at which the validity control information is applied. Alternatively, if the timer is a control target, a time point at which the timer expires may be a time point at which the validity control information is applied. If the counter is a control target, a time point at which the counter reaches a particular value (e.g., 0) may be a particular time point at which the validity control information is applied. The validity control information may be applied according to a particular event occurring incidentally due to an increase/decrease of a signal characteristic value of a serving cell to be larger or smaller than a particular threshold value, cell reselection according to priority or a signal characteristic value, driving and expiry of a particular timer used by the UE, and transmission/reception of a particular RRC signal (e.g., RRC connection reconfiguration failure), or the like.
- [137] The UE may receive a plurality of validity control information. For example, if a time point at which the timer expires corresponds to a time point at which the validity control information is applied, the UE may receive a plurality of validity control information through a plurality of paging messages while the timer is running and until before it expires. The plurality of validity control information may be applied according to the following method.
- [138] In one embodiment, only validity control information immediately after the timer runs or immediately before the timer expires is applied.
- [139] In another embodiment, among all the validity control information received until the timer expires after it is started, if the types of validity targets related to a control target are the same and the same controlling operation is performed on the same control target, the control values are all added and applied when the timer expires. For example, if the UE receives paging messages indicating extension while the timer with respect to priority is running, five times, the UE operates the timer five more times when the timer expires.
- [140] In still another embodiment, among all the validity control information received until the timer expires after it is started, if the types of validity targets related to a control target are the same and the same controlling operation is performed on the same control target, a value satisfying particular conditions among control values is applied

when the timer expires. For example, in case of conditions of a largest value, if the UE receives paging messages indicating extension while the timer with respect to priority is running, three times, and if control values indicate four times of extension of the timer, two times of extension of the timer, and one time of extension of the timer, respectively, the UE operates the timer four more times when the timer expires.

- [141] In still another embodiment, different weight values are applied to each of a control target, a control operation, and a control value among the validity control information received until the timer expires after being driven. For example, if a weight value of a controlling operation of release is higher than that of extension, the validity control information related to the controlling operation of release is applied.
- [142] In still another embodiment, among the validity control information received until the timer expires after being driven, if the types of validity targets related to a control target are different or only some of them are the same, validity control information is separately applied according to the respective validity targets.
- [143] The time point at which the UE applies the validity control information and the method for applying a plurality of validity control information may be determined implicitly between the BS and the UE or may be determined explicitly by one of the BS and the UE and informed to the other.
- [144] The UE performs an operation of extending/ stopping/resuming/releasing/modifying/re-starting according to the validity control information, namely, on the control target according to a control value. While control operation information for extending a validity time with respect to the validity timer is received while the validity timer is being driven, the UE may operate the timer again at the time point when the controlling operation information is received, or may drive the timer again when the timer expires. In addition, if a value clarifying the extension term or the extension number of the validity timer is defined as a control value, the term of the timer may be set as long as the term of extension, according to which the time may be driven. If the number of times is clarified, the number of times of driving the timer may be increased to extend the validity.
- [145] When the BS sets priority for frequencies or RATs through an RRC signal or a NAS signal and transfers the validity timer to one or a plurality of UEs for a particular purpose (e.g., load balancing between cells of different frequencies or RATs), the BS may transfer validity control information to extend a validity time.
- [146] For example, the validity control information may be transferred through system information as follows. It is assumed that the BS transfers a value informing an extension of a validity time of priority to the UE through system information. Validity control information indicating an extension of a timer may be clarified by using one or a plurality of bits. It is assumed that, if the validity control information value is 1, it

means to extend validity time of priority by operating the timer indicating the validity time of the priority one or more after the timer expires. The validity control information value 1 transmitted as system information is used as a control value indicating the control target as the timer, the controlling operation as extension, and one time of extension of the timer. Because the system information includes information indicating a continuous operation, the timer is continuously operated. Conversely, it is assumed that, if a particular value indicating control information is 0, it means that there is no need to extend the validity time of priority. When the validity time of priority expires, the UE determines that priority information provided through the RRC signal or the NAS signal is not valid.

- [147] For example, transferring of the validity control information through a paging message is as follows. It is assumed that the BS transfers a value indicating sustaining or extending a validity time of a priority value to the UE through a paging process. 'Priority=1' may be clarified in the paging message, apart from paging record information, in order to indicate extending a validity time of a validity target to which the validity control information is applied. In this case, '1' may be used as a control value indicating a control target as a timer, a controlling operation as extension, and one time of extension of the timer. In detail, there are two fields including one or more bits used as validity control information, separately from the paging record, in the paging message. One of the fields indicates a type of the validity target of the UE to which the validity control information is applied, and the other indicates the validity control information. In a different method, the validity control information indicating extending of the timer may be clarified by using one or a plurality of bits in the paging message.
- [148] Besides the method of transferring the validity control information using the system information or the paging message, the validity control information may be transferred in various manners, and the present invention is not limited. A plurality of transferring methods may be combined to be used.
- [149] FIG. 11 is an exemplary view showing a method of controlling the validity timer of priority according to an embodiment of the present invention.
- [150] With reference to FIG. 11, the UE is allocated priority information of a frequency or a RAT and a validity timer indicating a validity term of the priority information through an RRC message (e.g., an RRC connection release message) during a time (T). If there are two frequencies, it is assumed that the first frequency has a large load and the second frequency has a small load during the time (T). Accordingly, the BS configures the first frequency with a lower priority level because the first frequency has the large load, and configures the second frequency with a higher priority level. The UE is allocated information regarding the priority of the first frequency, the

priority level of the second frequency, and the validity timer with a particular value (e.g., 100 seconds) from the BS.

- [151] While the validity timer is running, the UE preferentially may select a cell corresponding to the second frequency according to the priority levels of the frequencies allocated by the BS, for load balancing between cells.
- [152] However, after a time point (i.e., 2T) at which the validity timer expires, the UE may determine that the priority levels allocated from the existing RRC signal are not valid, and select a cell according to a priority level received from system information or select a cell without priority. In this case, the UE may still select the cell of the first frequency with the large load. After selecting the cell of the first frequency with the large load, the UE transmits an RRC connection request to the BS after the time 2T. If the BS redirects the RRC connection request to make the UE receive a service in a cell with a small load, delay with respect to the RRC connection request would occur, causing a service delay. Or, even if the BS provides the service in the cell with a large load without redirecting the RRC connection request of the UE, efficiency of radio resources would deteriorate because load balancing is not effectively made between cells.
- [153] The use of the validity control information can prevent such a problem. The BS may determine that the load of the first frequency would be still high even after the particular time point (e.g., 2T) and extend the validity of priority until the load of the first frequency is reduced.
- [154] When the control value indicating the extension is 1 bit, if the control value is '1' (indicated as E(1) in FIG. 11), it means extension. If the control value is '0' (indicated as E(0) in FIG. 11) or if the BS does not transfer the validity control information, the UE determines that the priority information received through the RRC signal is not valid when the validity timer expires at a particular time (e.g., 4T). Accordingly, the BS can extend the validity of the priority information set for a particular UE or a plurality of UEs until the time point at which the load of the first frequency is reduced, so the load balancing can be made between cells.
- [155] The validity target to which the validity control information is applied may be various types of parameters used between the UE and the BS as well as the priority levels of cells.
- [156] For example, in order to avoid a collision that may be possibly generated during an initial random access process for the UE to request resources from the BS, the UE may be allocated a dedicated random access preamble from the BS. The UE, which attempts the random access by using the dedicated random access preamble, can request resources from the BS without contention with other UEs, so delay of resource allocation caused by a delay in a random access can be prevented. In order to allow the

UE to perform a non-contention-based random access process, the BS allocates the dedicated random access preamble to the UE. In addition, the BS may set an end time indicating expiry of the validity of the dedicated random access preamble. The end time may become a validity target.

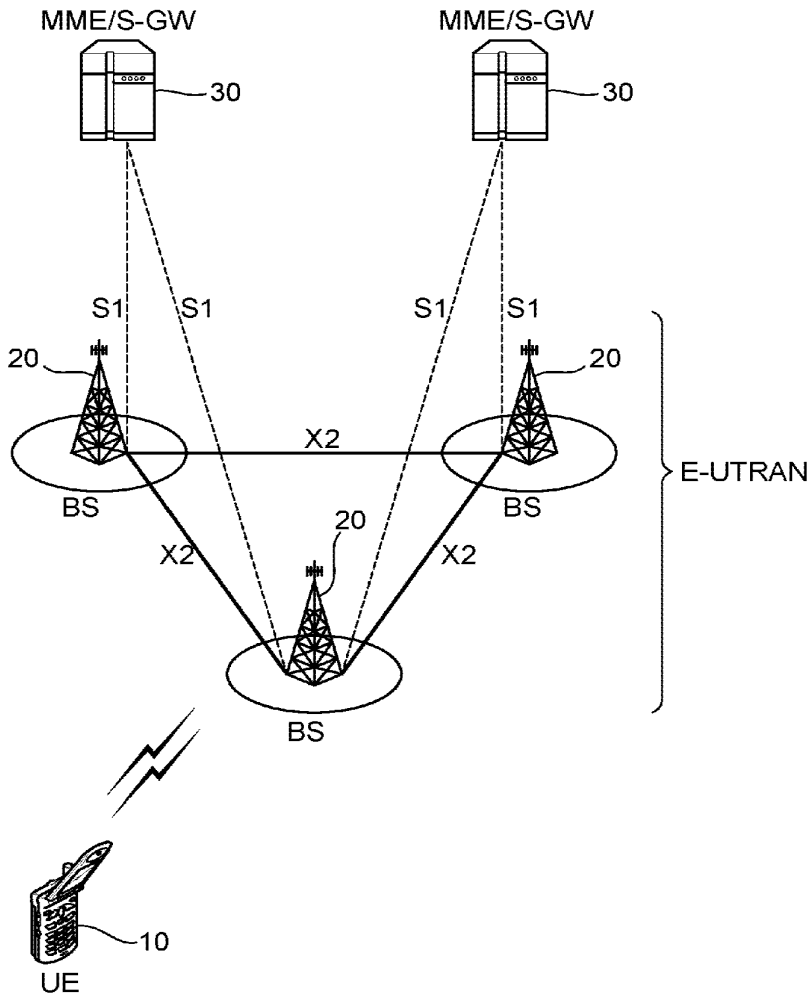
- [157] During a handover process, the UE is allocated the dedicated random access preamble and a validity end time of the dedicated random access preamble through a handover command message from a source BS. The validity end time of the dedicated random access preamble is set to be as long as estimated until the UE completes its connection to a target BS after the handover command.
- [158] Upon receiving the handover command, the UE performs a synchronization process with the target BS, requests resource allocation by using the dedicated random access preamble, and transmits a handover confirm message with resource which has been allocated from the target BS, to the BS, thus complete the handover procedure. If handover delay (or failure) occurs, for example, if the UE is not properly synchronized with the target BS, the validity of the dedicated random access preamble may expire so the dedicated random access preamble may not be used any longer. In this case, a contention-based random access process may be performed.
- [159] Thus, when the handover delay or failure occurs, the validity of the dedicated random access preamble may be extended through validity control information, whereby the non-contention-based random access process can be continuously performed.
- [160] The present invention may be implemented by hardware, software, or their combinations. In implementing hardware, the hardware may be implemented by an ASIC (Application Specific Integrated Circuit), a DSP (Digital Signal Processor), a PLD (Programmable Logic Device), an FPGA (Field Programmable Gate Array), a processor, a controller, a microprocessor, an electronic unit designed to perform the above-described functions, or their combinations. In implementing software, the software may be implemented by modules that perform the above-described functions. The software may be stored in a memory unit and executed by a processor. As the memory unit and the processor, various units well known to the person in the art may be employed.
- [161] The foregoing description of the preferred embodiments of the present invention has been presented for the purpose of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed, and modifications and variations are possible in light of the above teachings or may be acquired from practice of the invention. It is intended that the scope of the invention be defined by the claims appended hereto and their equivalents.

Claims

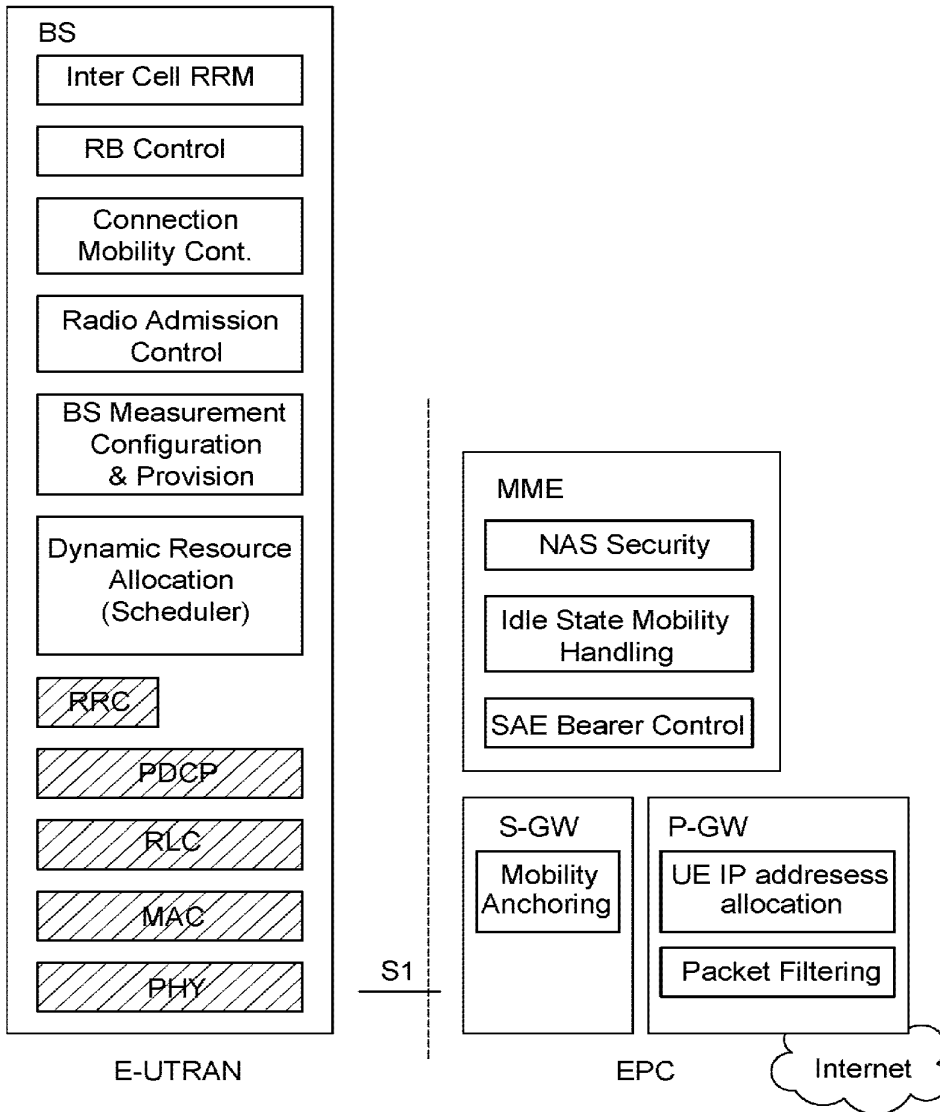
- [1] A method of performing cell reselection in a wireless communication system, the method comprising:
receiving priority for a different frequency or RAT (Radio Access Technology) and information on a validity timer for the priority;
starting the validity timer;
performing cell reselection based on the priority while the validity timer is running;
receiving reconfiguration information of the validity timer; and
reconfiguring the validity timer based on the reconfiguration information.
- [2] The method of claim 1, wherein the priority for the different frequency or RAT and the information on the validity timer for the priority are received through a Radio Resource Control (RRC) connection release message.
- [3] The method of claim 1, wherein the reconfiguration information is received through a paging message.
- [4] The method of claim 3, wherein the reconfiguration information indicates an extension of the validity timer.
- [5] The method of claim 1, wherein the validity timer expires when an RRC connection setup message is received.
- [6] The method of claim 1, wherein when the validity timer expires, the priority is invalidated.
- [7] The method of claim 6, wherein when the validity timer expires, cell reselection is performed based on priority obtained as a part of system information.
- [8] The method of claim 6, wherein when the validity timer expires, cell reselection is performed based on previous priority.
- [9] A user equipment comprising:
a Radio Frequency (RF) unit for receiving a radio signal; and
a processor coupled with the RF unit, configured to perform cell reselection according to priority for a different frequency or RAT based on results measured from the radio signal, and configured to:
start a validity timer for the priority, wherein the priority is invalidated when the validity timer expires, and
reconfigure the validity timer according to validity control information.
- [10] The user equipment of claim 9, wherein the validity control information is received through a paging message.
- [11] The user equipment of claim 10, wherein the validity control information indicates at least one of extending, releasing and stopping of the validity timer.

- [12] A method of configuring cell reselection in a wireless communication system, the method comprising:
- transmitting priority for a different frequency and RAT and information on a validity timer for the priority to a user equipment so that the user equipment performs cell reselection based on the priority while the validity timer is running;
 - and
 - transmitting reconfiguration information of the validity timer to the user equipment.

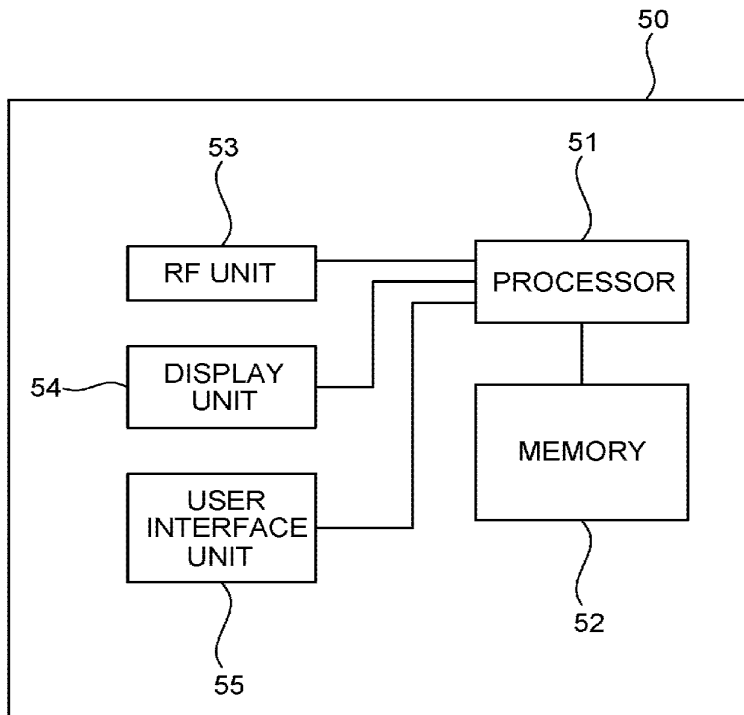
[Fig. 1]



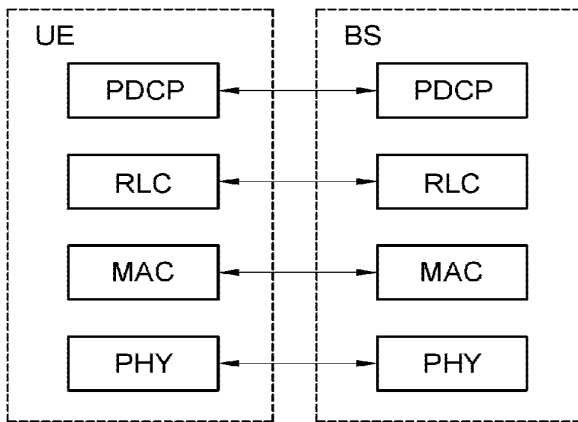
[Fig. 2]



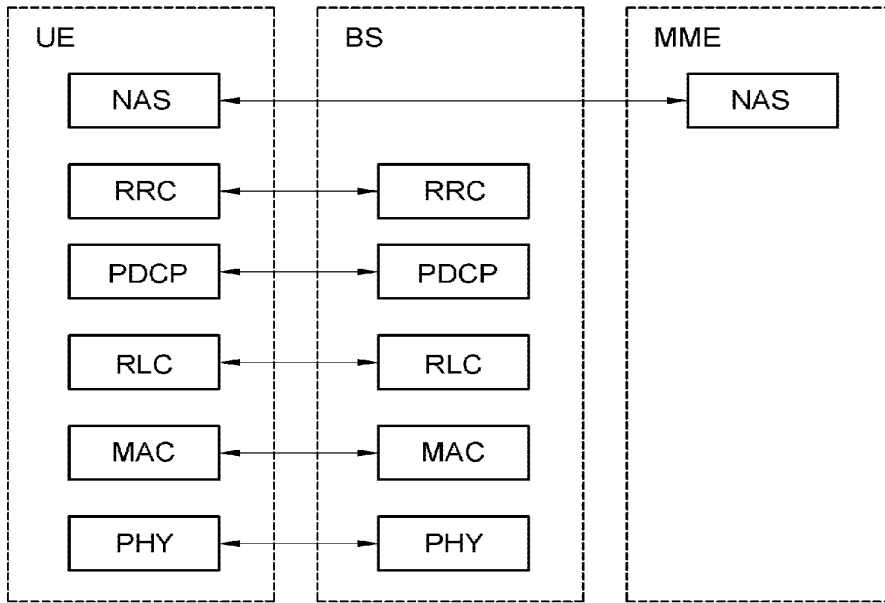
[Fig. 3]



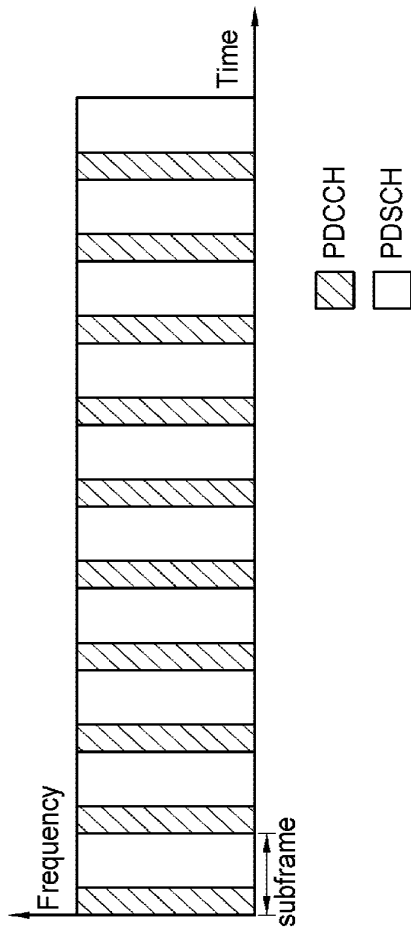
[Fig. 4]



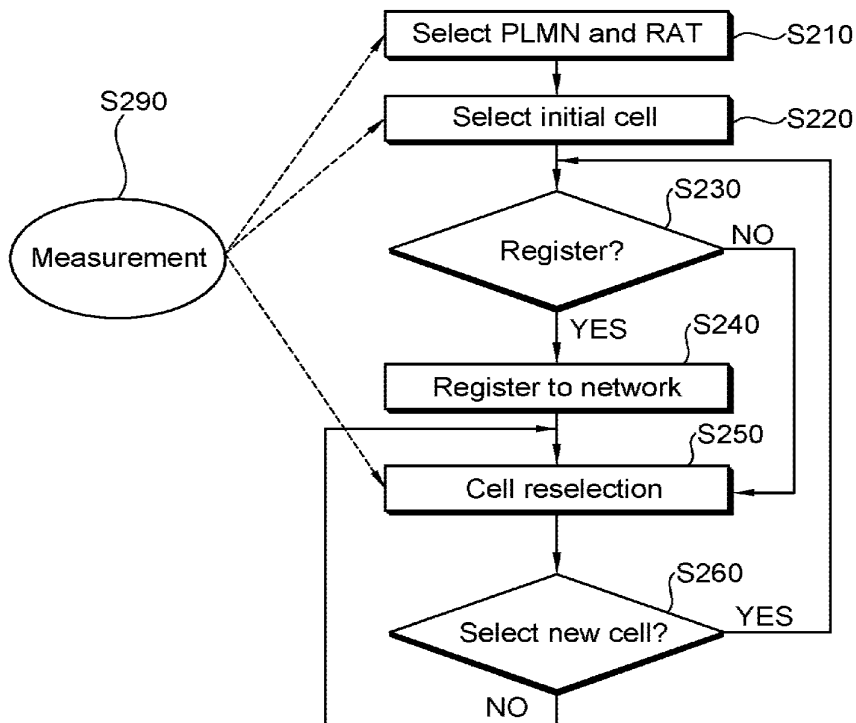
[Fig. 5]



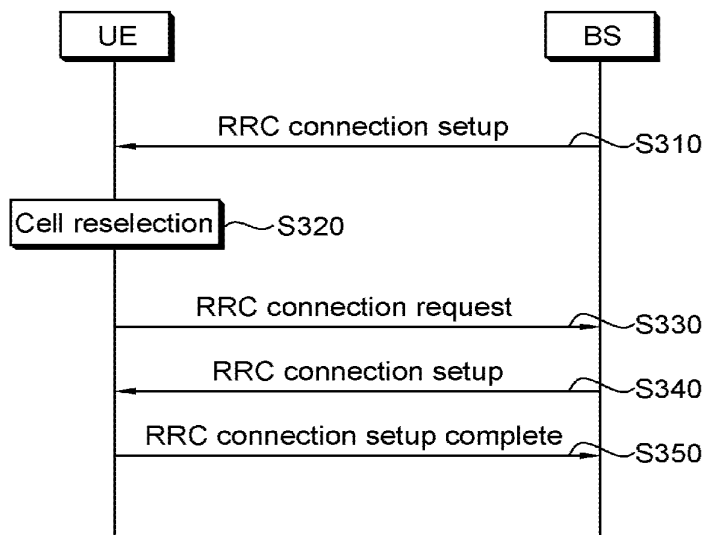
[Fig. 6]



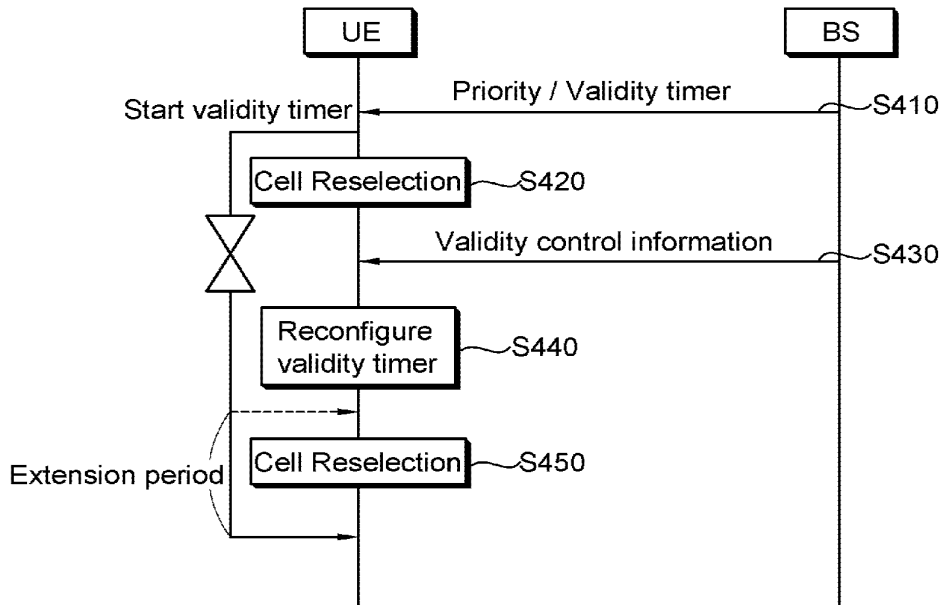
[Fig. 7]



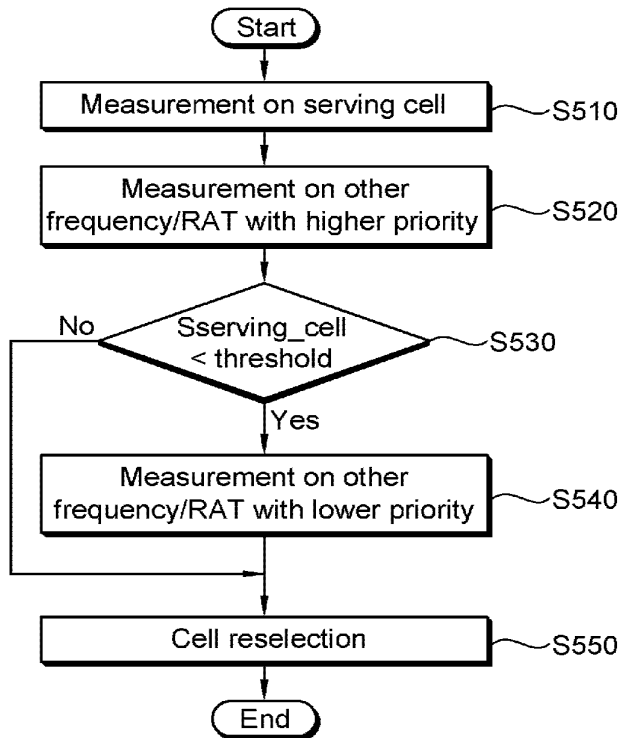
[Fig. 8]



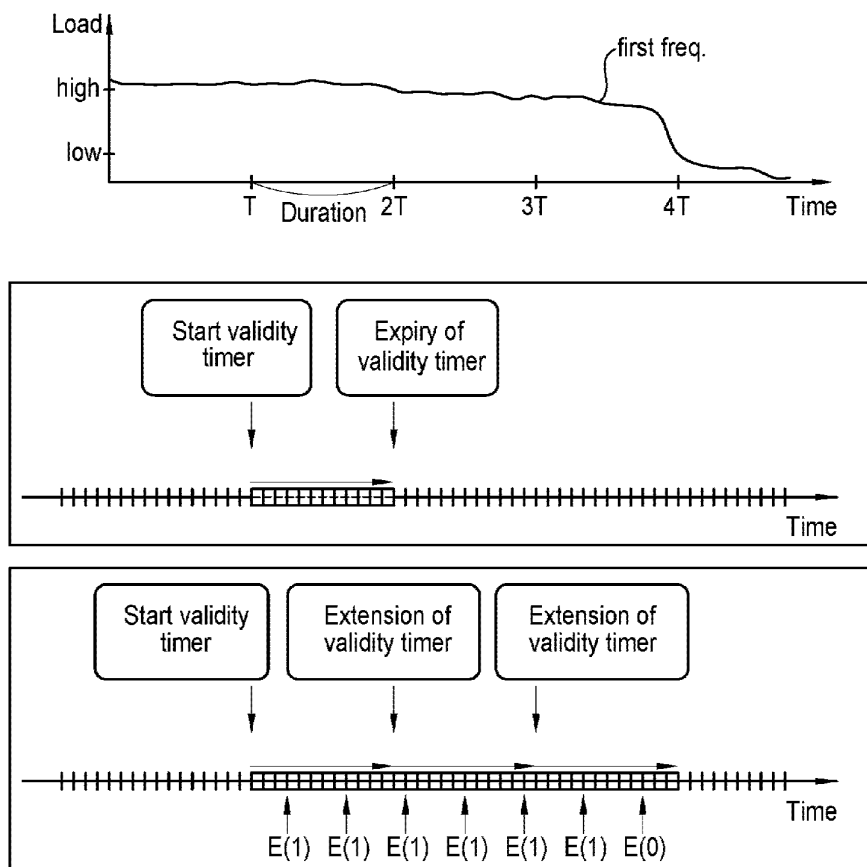
[Fig. 9]



[Fig. 10]



[Fig. 11]



[19] 中华人民共和国国家知识产权局

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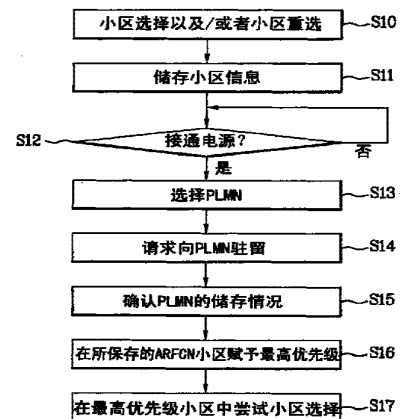
权利要求书1页 说明书6页 附图2页

[54] 发明名称

一种在通信系统中选择小区的方法

[57] 摘要

本发明涉及一种在通信系统中选择小区的方法，更具体地，涉及一种可在全球移动通信系统(GSM: Global System for Mobile communications)终端机中选择所定小区的方法。在本发明中，终端机将基于小区信息指定优先级，为寻找适当小区(suitable cell)提供更大的方便，进而使终端机利用原来在实施小区选择以及/或者小区重选过程中所获得的小区信息决定优先级之后，再实施小区的选择。



- 1、一种在通信系统中选择小区的方法，其特征在于，包括如下步骤：
对移动通信终端机选择小区的过程中所获得的小区信息进行保存；
在接通上述移动通信终端机电源之后，由上述移动通信终端机选择指定公共陆地移动通信网；
确认是否保存着有关所述所选公共陆地移动通信网的小区信息；
当储存有所述所选公共陆地移动通信网小区信息时，为所述公共陆地移动通信网的各小区赋予更高一级的优先级；
根据所述赋予的优先级顺序，尝试小区选择。
- 2、根据权利要求1中所述的一种在通信系统中选择小区的方法，其特征在于，
所述小区信息包括：所述所选公共陆地移动通信网服务小区的绝对射频信道号；所述公共陆地移动通信网的移动国家码以及移动网络代码；上述服务小区的各相临小区的绝对射频信道号。
- 3、根据权利要求2中所述的一种在通信系统中选择小区的方法，其特征在于，
所述小区信息还包括系统信息播放控制信道分配列表。
- 4、根据权利要求2中所述的一种在通信系统中选择小区的方法，其特征在于，
为所述服务小区赋予最高优先级，而为所述相临小区赋予次优先级。
- 5、根据权利要求1中所述的一种在通信系统中选择小区的方法，其特征在于，
所述优先级将用于在尝试所述小区选择时所实施的电测量中。
- 6、根据权利要求1中所述的一种在通信系统中选择小区的方法，其特征在于，
所述移动通信终端机将根据所述赋予的优先级，执行小区选择所需基站识别代码解码和系统信息的获得操作。

一种在通信系统中选择小区的方法

技术领域

本发明涉及通信系统技术，更具体地，涉及一种移动通信终端机选择所定小区的方法。

背景技术

在通信系统中小区 (Cell) 是可以对移动通信终端机 (=用户终端, User Equipment : UE) 进行特有划分的通信服务区。

移动通信终端机接通电源 (Power on) 之后, 由该移动通信终端机执行选择所定小区的过程。将该过程称为小区选择过程 (cell selection procedure)。

以上小区选择过程是一种每当选择新的公共陆地移动通信网 (Public Land Mobile Network ; 下面简称为 PLMN) 时, 查找移动通信终端机准备驻留 (camp on) 的相应 PLMN 的适当小区的过程。

如果找到了适当的小区, 找到该适当小区的地点的 PLMN 即为有用的 PLMN (Available PLMN)。

一方面, 根据情况, 如果无线路径出现故障, 或者增加通信量负荷 (traffic load), 或者网络方有请求或者用户方有请求时, 有必要重新选择小区。该过程称为小区重选过程 (cell reselection procedure)。

但是, 在以往 GSM 系统中, 选择特定小区时还存在着试图选择不必要小区的情况, 从而发生驻留 (Camp on) 到不希望 PLMN 的小区的情况。

发明内容

本发明的目的在于, 提供一种在通信系统中选择小区的方法, 即, 通过该方法, 在全球移动通信系统 (GSM) 终端机中指定基于小区信息的优先等级, 为查找适当小区 (suitable cell) 提供方便。

本发明的另一个目的在于, 利用终端机原先实施的小区选择及/或者小区重选过程中所获得的小区信息, 指定优先等级之后, 再实施小区选择过程。

为了实现如上所述的目的, 本发明的特征在于, 包括如下步骤: 对移动通

信终端机选择小区的过程中所获得的小区信息进行保存；在接通所述移动通信终端机电源之后，由所述移动通信终端机选择指定公共陆地移动通信网（PLMN）；确认是否保存着有关所述所选公共陆地移动通信网的小区信息；当储存有所述所选公共陆地移动通信网小区信息时，为所述公共陆地移动通信网的各小区赋予更高一级的优先级；根据以上赋予的优先级顺序，尝试小区选择。

而且，所述小区信息包括：所述所选公共陆地移动通信网服务小区（Serving cell）的绝对射频信道号（ARFCN）；所述公共陆地移动通信网的移动国家码（MCC）以及移动网络代码（MNC）；所述服务小区的各相临小区（Neighbour cell）的绝对射频信道号。而且，所述小区信息还包括系统信息播放控制信道分配列表。

特别是，为所述服务小区赋予最优先等级，再为所述各相临小区服务赋予次优先级。

而且，所述优先级将用于在尝试所述小区选择时所实施的电测量（Power management）中。

本发明的功效在于，本发明在进行当前小区选择之前，首先将由该移动终端机执行过的小区选择（Cell selection）以及/或者小区重选（Cell reselection）过程中所获得的小区信息进行保存，基于所保存的小区信息决定优先级并选择小区，由此，可以防止向特定小区进行不必要的选择尝试，而直接驻留（Camping on）在所需要的 PLMN 小区。因此，不仅可以提高移动终端机的工作效率，而且可以在更短的时间之内为用户提供通信服务。

下面结合附图，对本发明实施例的构成和相应的作用进行说明，在此，将利用一个以上的实施例对图中显示部分以及基于这些部分所说明的本发明的构成及作用进行说明，而本发明技术思想、其核心构成及作用并不受到上述实施例的限制。

附图说明

图 1a 是本发明实施例中用于小区选择的小区信息列表显示图；

图 1b 是本发明中小区信息列表举例图；

图 2 是本发明通信系统中小区选择步骤显示图。

具体实施方式

本发明移动通信终端机较佳机种为全球移动通信系统（GSM）终端机，该移动通信终端机将利用原先小区选择（Cell selection）及/或者小区重选（Cell reselection）过程中所获得的小区信息构成小区信息列表。而且，移动通信终端机最好要具备保存以上构成的小区信息列表所需缓冲存储器（buffer）以及/或者内部存储器。

图 1a 是本发明实施例中用于小区选择的小区信息列表显示图。

参见图 1a，基于本发明的小区信息列表将为各 PLMN（公共陆地移动通信网）赋予多个绝对射频信道号（Absolute Radio Frequency Channel Numbers；以下简称 ARFCN）之后构成。

其中，ARFCN 是所定 PLMN 为了识别指定的各无线信道（radio frequency channel）而提供信道编号，是所定 PLMN 用于区别小区所用到的识别符。

例如，如图 1 中所示，保存在本发明小区信息列表中的小区信息是被划分为 m 个 PLMN，为各 PLMN 各赋予 n 个 ARFCN。

上述小区信息列表将根据移动通信终端机的缓冲存储器（Buffer）以及/或者存储器的可用情况，决定其大小。在图 1 中显示了每个 PLMN 保存 n 个 ARFCN，并保存到第 m 个 PLMN 的例子。

另外，在本发明中，将移动通信终端机在进行小区选择或者小区重选过程中所得到的小区信息保存到具有临时储存功能的缓冲存储器中。此后，当关掉该移动通信终端机电源时，将原来保存在上述缓冲存储器中的基于小区信息获得的小区信息列表保存在存储器中。在此，存储器应该采用非易失性存储器。

此后，再次接通移动通信终端机电源，并选择新的 PLMN 时，移动通信终端机要确认所选择的 PLMN 的所定小区是否存在于已保存在存储器中的列表之内。即，确认原来作为所选 PLMN 的服务小区的相应小区的 ARFCN 是否保存在存储器中。

当所选择的 PLMN 的相应 ARFCN 被保存在存储器中时，在移动通信终端机中，为在选择小区的过程中所执行的电测量中已确认的上述 ARFCN 的小区赋予最高优先级（Highest priority）。作为另外增加的例子，为以上确认的 ARFCN 各相临小区赋予次优先级。由此，在试图选择小区时，优先选择该最

高优先级小区。

另外，在本发明中构成上述小区信息列表的各小区信息，包括服务小区（Serving cell）的 ARFCN、为区别 PLMN 所需移动国家码（Mobile Country Code：以下简称为 MCC）以及移动网络代码（Mobile Network Code：以下简称为 MNC）、以及系统信息的播放控制信道分配（BA：BCCH Allocation）列表等。在上述内容中，播放控制信道分配（BA）列表是除了服务小区 ARFCN 之外被基站分配（Base station allocation）中所参照的各 ARFCN 列表。

结合附图 1b，对有关本发明中小区信息列表构成例加以说明。

在图 1b 中，“310-380”与“310-410”是被区别为 MCC 和 MNC 的各 PLMN 的识别符（identifier）。即，第一 PLMN 的 MCC 为 310，而它的 MNC 为 380。而且，第二 PLMN 的 MCC 为 310，它的 MNC 为 410。

而且，相应于第一 PLMN “310-380” 服务小区的 ARFCN 是 “512”，而相应于第二 PLMN “310-410” 服务小区的 ARFCN 是 “522”。

上述各 PLMN 信息将在小区选择或者小区重选过程中通过系统信息（system information）获得，还通过该系统信息，获得有关各相临小区（neighbour-cell）的信息。即，参见图 1b，移动通信终端机进行小区选择或者小区重选时，通过 ARFCN 为 “512” 的服务小区的系统信息，可以知道相应小区是 MCC 为 310、而 MNC 为 380 的 PLMN 小区，而当前相临小区各 ARFCN 为 “513, 514, 515, ..., 520”。不仅如此，而且，移动通信终端机在进行小区选择或者小区重选时，将通过系统信息中 ARFCN 为 “522” 的服务小区系统信息，可以知道相应小区是 MCC 为 310、而 MNC 为 410 的 PLMN 小区，而当前相临小区各 ARFCN 为 “522, 523, 524, ..., 530”。

由此，移动通信终端机将上述图 1b 中所显示的小区信息列表临时保存在缓冲存储器中，当关闭移动通信终端机电源时，将临时储存在缓冲存储器中的小区信息列表保存到存储器中。

图 2 是有关本发明通信系统中小区选择步骤显示图。

参见图 2，显示了本发明移动通信终端机执行小区选择的步骤。特别是，在本发明中，当移动通信终端机选择小区时，对准备尝试小区选择的各小区事先指定其优先级。

在进行当前小区选择之前，首先基于该移动通信终端机原来在执行小区选

择 (Cell selection) 以及/或者小区重选 (Cell reselection) 过程中所获得的小区信息, 决定其优先级。

以下对基于本发明的小区选择步骤加以说明。

移动通信终端机执行小区选择或者小区重选 (步骤 S10)。

根据上述内容, 移动通信终端机把在上述小区选择或者小区重选实施过程中所获得的各小区信息保存到指定缓冲存储器 (或者存储器) 中 (步骤 S11)。更具体地, 移动通信终端机在进行小区选择或者小区重选时, 从系统信息中获得服务小区 (Serving cell) ARFCN、MCC 以及 MNC、系统信息的播放控制信道分配 (BA : BCCH Allocation) 列表等各小区信息。特别是, 在关闭移动通信终端机电源 (Power off) 时, 将保存在缓冲存储器中的上述小区信息保存在非易失性存储器中。

更理想的情况是, 在本发明中当移动通信终端机处于电源打开状态时, 将在小区选择及/或者小区重选中所获得的各小区信息临时保存到缓冲存储器中。如果移动通信终端机处于电源关闭, 或者不能支持服务的无服务 (no service) 状态时, 将该临时保存的小区信息保存在非易失性存储器中。这就是在移动通信终端机中登录当前服务小区信息的过程。

在本发明中, 在以后实施的小区选择过程中对当前登录的服务小区信息进行参考。即, 移动通信终端机因为某种原因 (移动通信终端机接通电源) 而需要执行小区选择过程时, 移动通信终端机则从存储器读取在以前小区选择或者小区重选过程中所获得的各小区信息加以利用。

更具体地, 当接通移动通信终端机时, 由移动通信终端机所具备的移动通信管理 (Mobility management : 以下称为 MM) 模块选择一个 PLMN (步骤 S12, 步骤 S13)。

此时, MM 模块则利用所选择的 PLMN, 向无线资源 (Radio resources : 以下称为 RR) 模块请求驻留 (Camp on) (步骤 S14)。

这时, 由 RR 模块确认该所选 PLMN 各小区信息是否已被保存在存储器中 (步骤 S15)。更具体地, 由 RR 模块确认在存储器中已保存的列表中是否存在相应于上述所选 PLMN 的所定小区的 ARFCN。

当所选 PLMN 的相应 ARFCN 已保存在存储器中时, RR 模块即将服务在小区选择过程中电力测量 (Power management) 所需优先级, 为以上确认的

ARFCN 小区服务最高优先级 (Highest priority) (步骤 S16)。然后, 再按顺序为被选择的 PLMN 的相邻小区各 ARFCN 赋予次优先级。

此后, 移动通信终端机首先对被赋予最高优先级的小区尝试小区选择 (步骤 S17)。即, 移动通信终端机向最高优先级小区执行基站识别代码 BSIC (Base station identity code) 解码 (decoding) 以及系统信息的获得过程。

参见图 1b 说明一个实施例, 当移动通信终端机对相邻小区实施电力测量时, 即将确认这些相邻小区的存在。例如, 假设对所测量的电力具有一定电平以上 (dBm) 的各小区的 ARFCN 按其大小向下排列时, 得到了如下排序 “580, 590, 600, 610, 512, 515, 522, 525”。一方面, 假设 MM 模块选择了第二 PLMN [310-410]。

如果不参考本发明的小区信息列表时, 将所测量的电平最佳的小区被选为候补小区 (candidate cell), 利用该候补小区优先尝试小区选择。但是, 如本发明的情况, 当参考小区信息列表时, 为第一 PLMN [310-410] 的 ARFCN 为 “522” 的小区赋予最高优先级, 为 “522” 小区的相邻小区 “525” 赋予次优先级。

由此, 试图进行小区选择的顺序为 “522, 525, 580, 590, 600, 610, 512, 515”。

对于以上说明的内容, 在不超出本发明技术核心范围的情况下, 本行业相关技术人员可以对其进行各种变更和修改。因此, 本发明的技术范围只取决于发明权利要求范围, 而不局限于本发明说明书中详细内容。

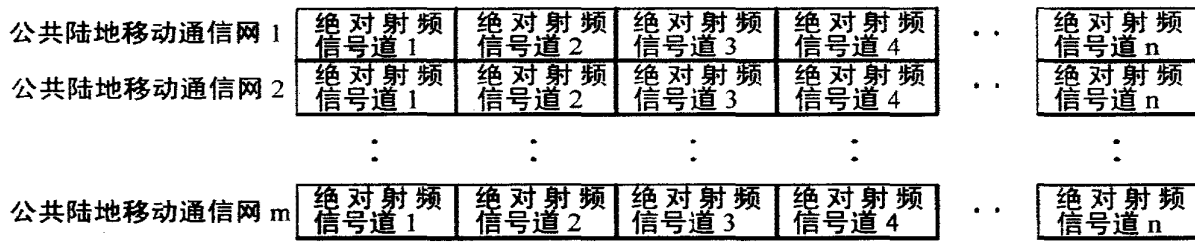


图 1a

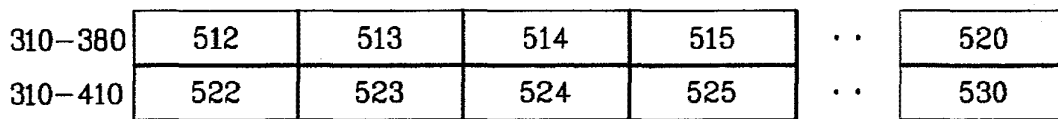


图 1b

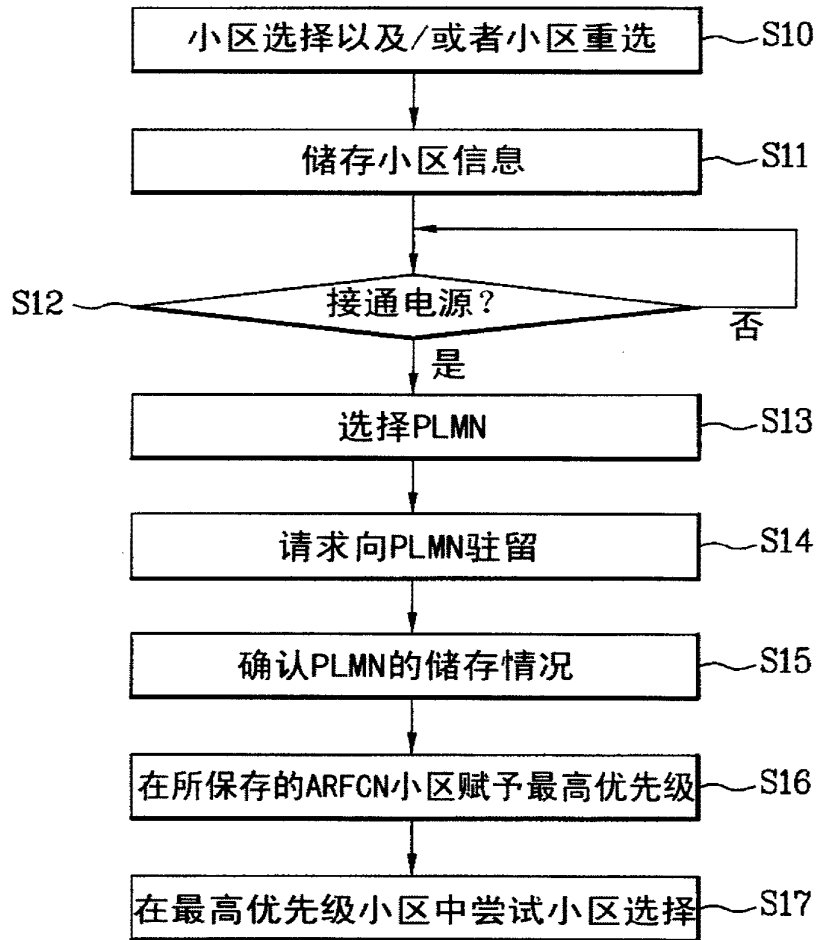


图 2

Resource utilisation between different frequency bands by compensating handover parameter values with a frequency band preference parameter

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Applicant(s): MOTOROLA INC [US] +

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Abstract not available for CN 1675957 (A)

Abstract of corresponding document: **GB 2392346 (A)**

The invention relates to a cellular communication system comprising a plurality of frequency bands. A central frequency band processor (317) located at a Base Station Controller (BSC) (303) determines a preferred frequency and sets a frequency band preference parameter accordingly. The frequency band preference parameter is communicated to a plurality of base stations (305, 307, 309). Each base station has a handover controller (311) which determines handover parameters for a plurality of candidate cells for a handover of a subscriber unit. The handover parameter values associated with the first frequency are compensated by the frequency band preference parameter, and the handover controller (311) reorders the candidates accordingly. A target handover candidate is then determined from the reordered list. The invention is particularly applicable to a GSM cellular communication system.

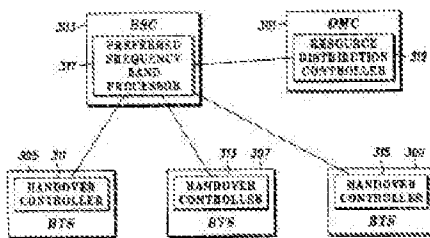


FIG. 3

.....
Data supplied from the **espacenet** database — Worldwide



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公司

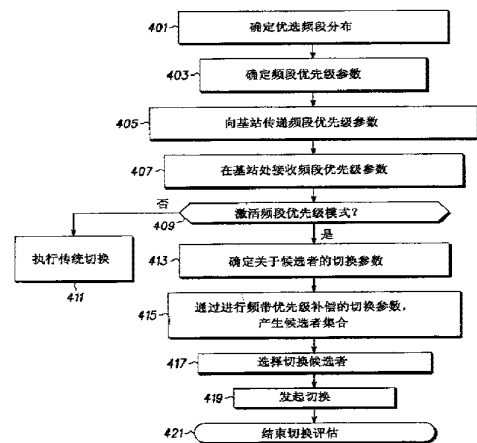
代理人 樊卫民 钟 强

权利要求书 3 页 说明书 22 页 附图 4 页

[54] 发明名称 通过以频段优选参数补偿切换参数
值在不同频段间进行资源利用

[57] 摘要

本发明涉及包括多个频段的蜂窝通信系统。位于基站控制器 (BSC) (303) 处的中央频段处理器 (317) 确定优选频率, 并且据此设置频段优先级参数。该频段优先级参数传递到多个基站 (305、307、309)。每个基站具有切换控制器 (311), 其确定关于用户单元的切换的多个候选小区的切换参数。与第一频率相关的切换参数值由频段优先级参数进行补偿, 而切换控制器 (311) 据此重新排列候选者。然后从该重新排序的列表中确定目标切换候选者。特别地, 本发明可应用于 GSM 蜂窝通信系统。



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1. 一种在蜂窝通信系统中的不同的频段之间进行资源利用的方法，该方法包括步骤：

- 5 确定关于至少第一频段的频段优先级参数；
 将该频段优先级参数分送给多个基站；
 在多个基站中的每一个中：
 确定多个关于用户单元的多个候选小区的切换参数值；
 产生包括多个切换参数值的切换参数值的集合，并且其中由频段
10 优先级参数补偿与第一频率相关的切换参数值；和
 响应集合中的切换参数值确定切换候选小区。

2. 前面任何权利要求的方法，其中与第一频率相关的切换参数值的补偿包括，使与第一频率相关的切换参数值偏移频段优先级参数。
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3. 前面任何权利要求的方法，进一步包括步骤：在多个基站的每一个中，产生响应集合中的切换参数值而排序的候选基站的有序列表。
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4. 前面任何权利要求的方法，其中切换参数值包括信号电平。

5. 前面任何权利要求的方法，其中信号电平是关于用户单元的服务小区和每个候选小区之间的相对信号电平。
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6. 前面任何权利要求的方法，其中切换参数值包括信号干扰比电平。

7. 前面任何权利要求的方法，其中响应关于用户单元组的用户单元能力的分布，确定频段优先级参数。
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8. 前面任何权利要求的方法，其中响应关于基站组的小区负荷的分布，确定频段优先级参数。
- 5 9. 前面任何权利要求的方法，其中响应频段的可利用性，确定频段优先级参数。
10. 前面任何权利要求的方法，其中响应频段负荷，确定频段优先级参数。
- 10 11. 前面任何权利要求的方法，进一步包括使集合中的至少一个切换参数值偏移分层小区优先级值的步骤。
12. 前面任何权利要求的方法，其中具有低于规定质量级别的切换参数值的候选小区不包括在集合中。
- 15 13. 前面任何权利要求的方法，进一步包括响应集合中的切换参数值发起切换的步骤。
14. 一种用于包括多个频段的蜂窝通信系统的基站，该基站包括：
接收机，用于接收关于多个频段的至少第一频段的频段优先级参数；和
切换处理器，可操作用于
25 确定多个关于用户单元的多个候选小区的切换参数值；
产生包括多个切换参数值的切换参数值的集合，其中由频段优先级参数补偿与第一频率相关的切换参数值；和
响应集合中的切换参数值确定切换候选小区。
- 30 15. 一种包括多个频段的蜂窝通信系统，该蜂窝通信系统包括：

- 频段处理器，用于确定关于至少第一频段的频段优先级参数；
用于将该频段优先级参数分送给多个基站的装置；
多个基站，该多个基站中的每一个包括：
用于确定多个关于用户单元的多个候选小区的切换参数值的装
5 置；
用于产生包括多个切换参数值的切换参数值的集合的装置，其中
由频段优先级参数补偿与第一频率相关的切换参数值；和
用于响应集合中的切换参数值确定切换候选小区的装置。

通过以频段优选参数补偿切换参数值
在不同频段间进行资源利用

5

技术领域

本发明涉及蜂窝通信系统和基站以及其资源利用的方法，特别地，涉及全球移动通信系统（GSM）的蜂窝通信系统。

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背景技术

图 1 说明了根据现有技术的传统的蜂窝通信系统 100 的原理。地理区域被分为多个小区 101、103、105、107，每个小区由基站 109、111、113、115 提供服务。基站通过固定网络相互连接，其可在基站 101、103、105、107 之间传递数据。由移动站所处的小区的基站通过无线通信链路为该移动站提供服务。在图 1 的示例中，移动站 117 由基站 109 在无线链路 119 上提供服务，移动站 121 由基站 111 在无线链路 123 上提供服务，等等。

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当移动站移动时，其可以由一个基站的覆盖区域移动至另一基站的覆盖区域，即从一个小区移动至另一小区。例如，移动站 125 初始由基站 113 在无线链路 127 上提供服务。当其向基站 115 移动时，其进入两个基站 111 和 113 的重叠覆盖区域，并且在重叠区域中，其改变为由基站 115 在无线链路 129 上支持。当移动站 125 进一步移动进入小区 107 时，其继续由基站 115 支持。这被称为移动站在小区之间的移交（handover）或者切换（handoff）。

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典型的蜂窝通信系统典型地将覆盖区域延伸至整个国家，并且包括数百或者甚至数千个小区，其支持数千或者甚至数百万个移动站。从移动站到基站的通信被称为上行链路，而从基站到移动站的通信被称为下行链路。

互连基站的固定网络可操作用于在任意两个基站之间路由数据，由此使小区中的移动站能够与任何其他小区中的移动站通信。此外，固定网络包括用于互连到外部网络（诸如公共交换电话网络（PSTN））的网关功能，由此允许移动站与陆线电话以及由陆线连接的其他通信终端进行通信。而且，固定网络包括用于管理传统的蜂窝通信网络所需的许多功能，包括用于路由数据、准入控制、资源分配、用户计费、移动站鉴权等的功能。基站自身可被认为是固定网络的一部分。

分配给蜂窝通信系统的频段典型地受到严格的限制，并且因此必须在移动站之间有效地划分资源。蜂窝通信系统的基本属性是，通过分为不同的小区，在地理上对资源进行划分。这样，可以在规定的时刻将一定量的资源分配给规定的小区，由此减少了对邻小区的资源分配。为了使蜂窝通信系统的容量最优化，重要地是使由其他移动站引起的干扰或者对其他的移动站的干扰的影响最小。蜂窝通信系统的重要的优点在于，由于无线信号随距离衰减，因此由邻小区中的通信引起的干扰在距离足够远的小区中是可忽略的，并且因此资源在该小区中可重新使用。此外，典型地通过在时域、频域和/或码域划分资源，在一个小区中或者在小区之间对资源进行划分。不同的通信系统使用不同的用于此划分的原理。依赖于通信系统当前的负荷，资源分配可以是静态的或者是动态的，并且典型地使用静态资源分配和动态资源分配的组合。

第一代模拟通信系统使用频分多址（FDMA）系统，其中频域被用于小区之间的资源划分。在这些系统中，频段被分为典型地具有 25kHz 带宽的窄带信道。将一定数目的该信道分配给每个基站，并且在通话建立时，将向每个移动站分配具体的用于上行链路通信的窄带信道和用于下行链路通信的窄带信道。

当前，最普遍的蜂窝通信系统是被称为全球移动通信系统（GSM）的第二代系统。类似于模拟系统，频段被分为相对窄的 200kHz 的信

道，并且向每个基站分配一个或者多个该频率信道。然而，相比于模拟系统，每个频率信道被分为 8 个独立的时隙，其允许多达 8 个移动站使用每个频率信道。此共享可利用的资源的方法被称为时分多址（TDMA）。在 Michel Mouly 和 Marie Bernadette Pautet 的“*The GSM System for Mobile Communications*”，Bay Foreign Books, 1992, ISBN 2950719007 中可以找到 GSM TDMA 通信系统的进一步的描述。

在被称为 IS95 的第二代通信系统中，以及在诸如通用移动通信系统（UMTS）的第三代通信系统中，使用了资源分布的另一原理。这些系统将频段分为一个或者几个宽带信道，对于 UMTS，其具有 5MHz 的带宽。典型地，在全部小区中使用一个宽带频率信道用于上行链路，并且使用不同的宽带频率信道用于下行链路。在该情况中，小区之间的分隔是通过使用扩频技术实现的，其中为每个小区分配了小区特有的长用户扩频码。

在这些系统中，待传送的信号与扩频码进行倍增，其具有典型地比信号的数据率大很多的码片速率。因此，窄带信号被扩展至宽带频率信道上。在接收机中，接收信号通过相同的扩频码进行倍增，由此导致重新产生原始的窄带信号。然而，来自其他的具有不同的扩频码的小区中的信号不能通过接收机中的倍增进行解扩频，并且保持为宽带信号。因此，通过对解扩频窄带信号的滤波，可以移除来自这些信号的大部分干扰，随即可接收该解扩频窄带信号。

使用扩频技术所带来的后果在于，通过滤波可移除处于窄带信号的带宽内的干扰信号量，并且因此将减小接收信号的信号干扰比。因此，其所具有的最深远的重要性在于，使基站之间的干扰最优化，以便于使系统的容量最大。在 Harri Holma（编者）、Antti Toskala（编者）的“*WCDMA for UMTS*”，Wiley & Sons, 2001, ISBN 0471486876 中可以找到 CDMA 的进一步的描述，特别是 UMTS 的宽带 CDMA（WCDMA）模式的描述。

随着近年来移动通信系统，特别是蜂窝通信系统的使用的急剧增加，对资源的需求显著增加。因此，附加频段已被分配用于蜂窝通信，使得目前有多个频段典型地可用于移动站。例如，目前许多 GSM 运营
5 运营商具有覆盖数个频段的许可，这些频段包括：

PGSM：最初的（主要的）用于 GSM 的频段，其覆盖用于上行链路的 890~915MHz 和用于下行链路的 935~960MHz。

GSM 1800：也被称为 DCS 或者 DCS 1800。该频段覆盖用于上行链路的 1710~1785MHz 和用于下行链路的 1805~1880MHz。许多
10 运营商具有 GSM 900 或者 GSM 1800 频段的许可，而某些运营商具有覆盖全部两个频段的许可，或者同其他运营商达成共同的协议，允许独立的网络使用全部两个频段。

EGSM：这是被称为扩展 GSM 的附加频段。该频段为 PGSM 频段添加了用于上行链路的 880~890 的频段和用于下行链路的 925~935
15 频段。

在最初的 GSM 规范中，仅指定了 GSM 900 频段，并且因此早期的 GSM 移动站仅具有使用该频段的单一的能力。而且，尽管具有使用全部或者大部分频段的能力的移动站变得日益普遍，但是出于成本
20 原因，许多移动站被制造为仅具有使用理论上可利用的频段的子集的能力。因此对于典型的蜂窝通信系统，移动站的群体覆盖了广的能力范围，并且对于资源管理而言，重要的是针对给定的移动站的能力分布，对资源分配进行优化。

用于增加蜂窝通信系统容量的另一方法是使用分层小区。这样，被称为微小区或者微微小区的较小的小区位于被称为宏小区的较大的小区中。微小区和微微小区具有非常小的覆盖区域，由此允许非常接近的
25 频率的重新使用。宏小区常常用于在密集分布的区域中和热点区域中提供附加的容量。然而，为了使通信系统的容量最优化，重要的是，对不同小区之间的资源分配进行优化。因此，资源分配变成非常
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关键和复杂的过程，特别是对于具有多个频段，而其中全部或者某些频段具有分层小区的系统。

而且，许多运营商已拥有第三代蜂窝通信系统的许可，诸如
5 UMTS。典型地将这些系统配置为覆盖区域岛（island of coverage），
其中覆盖区域限于典型地较小的分立区域。这些区域之中和区域之间的
服务将由第二代系统提供，诸如 UMTS，并且因此可以预期，大部
分第三代移动站将是双模式移动站，其可在第二代和第三代通信系统
中工作。因此在这些系统中，在不同通信系统的频段之间，必须对资源
10 分配进行进一步的仔细的管理。

清楚的是，资源管理变得日益关键和复杂，并且对于资源分配而
言重要的是进行尽可能最优化的管理，以便于使通信系统的容量最大，
并且提供对用户的最优服务。因此，已发展了大量的资源分配算法，
15 特别是切换算法。然而，这些算法倾向于不考虑不同频段或者系
统中间的资源分配或者切换，或者倾向于使用非常简单的判定标准。
具体地，当全部的 GSM 移动站倾向于具有 PGSM 能力，而仅有子集
在历史上具有使用其他频段的能力时，使用简单的标准，其中所有的
具有多频段能力的移动站切换至新的频段。例如，在组合的 PGSM 和
20 GSM 1800 系统中，当 GSM 1800 基站可用于移动站时，所有的双频
段移动站切换至 GSM 1800。

然而，此非常简单的方法是非常缺乏灵活性的，并且在许多情况
中，不能导致最优化的资源利用。例如，在 GSM 1900 上的用于双频
25 段移动站所需的发射功率明显高于在 PGSM 上的发射功率，由此导致
了显著增加的干扰。

而且，不同的频段和资源的可利用性的显著增长导致了对管理网
络中的整体资源分布的需要的增加。典型地，通过设置关于独立小区的
30 切换参数，已经实现了通过移动性管理进行的资源管理（诸如切换

控制)。例如，规定小区的切换可以朝向相邻的微小区偏移，优先于宏小区。然而，尽管这可以在每个独立小区中实现可接受的切换性能，但是其是非常复杂的方法，并且仅优化了局部的资源分布。

5 因此，目前的方法导致了通信系统的减小的容量以及针对用户的劣化的服务。因此，用于资源分配的改进的系统是有利的。

发明内容

10 因此，本发明试图提供改进的资源分配的系统。优选地，本发明试图减轻或者缓和一个或者多个上文提及的缺陷，并且特别地，试图提供更加灵活的和/或有效的用于资源分配的系统，其允许在整个频段上控制资源分布的简单且有效的方法。

15 因此，提供了在蜂窝通信系统中的不同的频段之间利用资源的方法，该方法包括步骤：确定关于至少第一频段的频段优先级参数；将该频段优先级参数分送给多个基站；在多个基站中的每一个中：确定多个关于用户单元的多个候选小区的切换参数值；产生包括多个切换参数值的切换参数值的集合，并且其中由频段优先级参数补偿与第一频率相关的切换参数值；和响应集合中的切换参数值确定切换候选小区。

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25 因此，本发明提供了影响关于多个基站的多个频段之间的资源分布的简单的方法。可以优化局部切换参数对切换决定的影响和非局部切换参数对切换决定的影响之间的平衡，由此确保了，可以满足非局部设置的目标，同时维持了高的局部性能。具体地，可以满足非局部的资源分布的目标，同时确保用户单元接收具有高质量和低掉话概率的高的服务质量。频段优先级参数可以动态地更新。因此可以针对当前的设置和运行特性优化性能。由于仅有的非局部效果是对切换参数值的补偿，因此该方法易于实现。

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根据本发明的特征，与第一频率相关的切换参数值的补偿包括，使与第一频率相关的切换参数值偏移频段优先级参数。因此提供了使切换朝向所需的频段偏移的简单且有效的方法。

5 根据本发明的不同的特征，该方法进一步包括步骤：在多个基站的每一个中，产生响应集合中的切换参数值而排序的候选基站的有序列表。这提供了切换候选者的适当的排列，允许由频段优先级参数进行容易地补偿。

10 根据本发明的另一特征，切换参数值包括信号电平，并且该信号电平优选地是关于用户单元的服务小区和每个候选小区之间的相对信号电平。这提供了适于由频段优先级参数进行补偿的切换参数，并且实现了适当的切换候选者的选择。而且，其与许多现有的蜂窝通信系统相兼容。

15 根据本发明的不同的特征，切换参数值包括信号干扰比电平。这提供了适于由频段优先级参数进行补偿的切换参数，并且适合于选择适当的切换候选者。而且，其与许多现有的蜂窝通信系统相兼容。

20 根据本发明的另一特征，响应关于用户单元组的用户单元能力的分布，确定频段优先级参数。这允许在蜂窝通信系统中通过简单的方法实现所需的资源分布，在该蜂窝通信系统中用户单元的能力有变化。而且，其提供了这样的系统，其中资源管理可以连续地与用户单元能力分布中的变化相适应。

25 根据本发明的一个特征，响应关于基站组的小区负荷的分布，确定频段优先级参数。因此，该频段优先级参数可被优化用于将当前资源分布修改为所需的资源分布。

30 根据本发明的不同的特征，响应频段的可利用性，确定频段优先

级参数。这样，资源分布可以针对可利用的频段进行优化。

5 根据本发明的另一特征，响应频段负荷，确定频段优先级参数。因此，该频段优先级参数可被优化用于将当前资源分布修改为所需的资源分布。

10 根据本发明的一个特征，该方法进一步包括使集合中的至少一个切换参数值偏移分层小区优先级值的步骤。这提供了，多个频段上的资源分布的优化可以与分层蜂窝通信系统的不同小区层之间的资源分布的优化一起进行。

15 根据本发明的不同的特征，具有低于规定质量级别的切换参数值的候选小区不包括在集合中。这确保了，仅有可以提供足够的服务质量的候选小区将纳入切换的确定。

20 根据本发明的另一特征，该方法进一步包括响应集合的切换参数值发起切换的步骤。因此，该方法通过发起切换可以进一步用于积极地改变资源分布。

25 根据本发明的第二方面，提供了用于包括多个频段的蜂窝通信系统的基站，该基站包括：接收机，用于接收关于多个频段的至少第一频段的频段优先级参数；和切换处理器，可操作用于确定多个关于用户单元的多个候选小区的切换参数值；产生包括多个切换参数值的切换参数值的集合，其中由频段优先级参数补偿与第一频率相关的切换参数值；和响应集合中的切换参数值确定切换候选小区。

30 根据本发明的第三方面，提供了包括多个频段的蜂窝通信系统，该蜂窝通信系统包括：频段处理器，用于确定关于至少第一频段的频段优先级参数；用于将该频段优先级参数分送给多个基站的装置；多个基站，该多个基站中的每一个包括：用于确定多个关于用户单元的

多个候选小区的切换参数值的装置；用于产生包括多个切换参数值的切换参数值的集合的装置，其中由频段优先级参数补偿与第一频率相关的切换参数值；和用于响应集合中的切换参数值确定切换候选小区的装置。

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附图说明

通过参考附图，将仅借助于示例来描述本发明的实施例，在附图中：

图 1 是根据现有技术的蜂窝通信系统的图示；

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图 2 是 GSM 通信系统结构的简化的图示；

图 3 是根据本发明的实施例的 GSM 通信系统的切换控制子系统的图示；

图 4 是根据本发明的实施例的切换评估的方法的流程图的图示；

且

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图 5 是根据本发明的实施例，排列切换候选者的示例的图示。

具体实施方式

在下文中，主要通过参考 GSM 蜂窝通信系统来描述本发明的优选实施例。然而，将显而易见的是，本发明可应用于许多其他的通信系统，包括，例如，第三代蜂窝通信系统。

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在蜂窝通信系统中，固定的基础设施典型地包括用于管理资源分配的复杂的功能，特别是用于管理用户单元切换的功能。用户单元典型地可以是无线用户设备、移动站、通信终端、个人数字助理、膝上型电脑、嵌入式通信处理器或者任何通过空中接口进行通信的通信元素。

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图 2 是 GSM 通信系统结构的简化的图示。在典型的 GSM 蜂窝通信系统中，大量的基站控制器（BSC）201（未示出）连接到移动服务交换中心（MSC）203。MSC 是中央交换中心，并且交换不同 BSC

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之间的通信，由此连接到一个 BSC 的用户单元可以同与其他 BSC 相关的用户单元通信。此外，MSC 负责连接到其他网络，执行鉴权、某个移动性管理等。MSC 203，以及典型地 BSC 201，连接到操作和维护中心（OMC）205，其是网络运营商监控网络的运行和性能的地点。

5 典型地，可以在 OMC 处设置多种运行参数，并且可以将其传递给其他的网络元素，诸如 BSC。这样，网络的运行可通过 OMC 205 进行管理。BSC 连接到多个基站收发信机（BTS）207，其负责通过空中接口与相关小区中的用户单元通信。

10 典型地，切换控制功能分布在 BSC 和相关的 BTS 的功能之间。这样，在优选实施例中，蜂窝通信系统包括在 BSC 和 BTS 之间分布的切换控制子系统。此外，该通信系统包括用于建立关于具体的逻辑信道的物理信道的子系统，处理初始的系统设置和可更新的设置变化等。

15 例如，该切换控制子系统识别何时出现需要切换的无线条件，处理测量报告信息和收集/提供信道干扰电平测量值。来自这些测量的数据存储存储在数据库中，其还存储控制测量值平均处理的定时的参数。这些数据用于执行所需的测量值平均处理。切换控制处理还使得涉及接收自用户单元的相邻频率的测量值映射到邻小区的频率。当邻小区信息和网络出现变化时，对有关数据库进行适当的修改。切换控制子系统可以确定，除了基于用户单元测量以外，出于其他原因而需要切换。这些原因可以包括，不同小区的负荷，时间前置量等。

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25 该切换控制子系统进一步包括切换评估子系统，其响应需要切换的确定，评估切换候选者。需要切换的确定包括确定候选小区的列表。该切换评估子系统负责重新排列切换候选者列表，以便于选择最佳的候选切换小区。如果切换是内部的（即，切换到这样的 BTS，其与当前服务 BTS 相同，处于同一 BSC 控制下），则该切换控制子系统自身处理切换。否则，如果切换是外部的，则该切换评估子系统向固定

30

网络发送切换请求消息。该消息包括有关所选候选小区的信息，并且传递到目标 BTS。

5 该切换控制子系统还包括通话资源管理器，其负责基于小区负荷和信道干扰电平选择无线资源。其还排列对无线资源的请求，选择连接数目，动态地改变业务信道设置，跟踪空闲信道干扰电平上的数据，以及报告资源指示级别。此外，该切换控制子系统依赖于 MSC 优先级、运营商优先级和可获得的资源，选择信道语音速率和语音版本。

10 如前文所提及的，该切换控制子系统负责在通话过程中监视来自用户单元的测量报告。具体地，GSM 用户单元能够监视多达 64 个邻居。该用户单元向切换控制子系统发送信息，其有关这样的信号电平，即在该信号电平处该用户单元接收邻居的接收电平的导频信号。此外，其还发送这样信息，其有关邻居的基站识别码的解码、服务小区的接收电平、接收质量、时间前置量、功率电平、是否激活了不连续的传输、以及哪个用户列表用于该测量。

15

在切换控制子系统处，对测量值求平均，并且在该平均处理中使用指明测量值数目的数据库参数。然后切换控制子系统使用用户单元测量的参数，对切换做出决定，改变功率电平并改变时间前置量。切换触发器典型地基于下列标准（按照优先级顺序）：

20

接收质量（上行链路）

接收质量（下行链路）

干扰电平（上行链路和下行链路）

25 接收信号强度（上行链路）

接收信号强度（下行链路）

距离（时间前置量）

功率预算（PBGT）

30 在通话过程中，出于任何上文列出的原因，切换变得是必要的。

在优选实施例中，通信系统利用多个频段，并且在切换控制子系统的数据库中设置用户单元所允许切换到的频段。切换到哪个小区的确定通常基于功率预算算法。一个功率预算的算法的示例是：

$$PBGT_{(n)} = \text{邻小区接收信号功率} - \text{服务小区接收信号功率} \\ = \text{neighbour_rxlev_dl}_{(n)} - [\text{server_rxlev_dl} + \text{PWR_C_D}]$$

其中：

- server_rxlev_dl 和 neighbour_rxlev_dl_(n) 是分别服务小区的业务信号的信号电平和由用户单元测量的当前邻小区的导频信号的信号电平。
- PWR_C_D 是关于服务小区的修正系数，其对应于测量业务信号和全功率导频信号之间的功率电平差。

通常，切换到具有最高功率预算的邻小区。

目前，当前全球的 GSM 用户的 80~90% 属于缓慢移动和稳定的范畴。部署分层的或者分级的网络意味着，可以提供较大的频谱效率、覆盖范围和容量。然而，引入分层结构需要仔细的资源管理，并且因此现有的切换算法通过定制功率预算的计算而进行了修改。在分层系统中典型地同时使用了多种不同的功率预算算法。一个传统的切换算法的具体示例是这样的切换算法，其中仅在必要时才允许微小区切换到宏小区。因此，针对相邻的微小区执行常规的功率预算算法，并且用户单元切换到具有最佳功率预算的微小区。仅在不存在提供可接受的质量的微小区时，才考虑宏小区。如果未确定可接受的微小区，则针对相邻的宏小区执行功率预算算法，并且用户单元切换到由此确认的目标小区。

因此，为了优化蜂窝通信系统的性能和服务，重要的是，具有有效地管理所有可利用的资源目录的资源分布的切换控制子系统。切换算法在资源管理方面的效能依赖于运营商网络中频率中的业务分布以及该网络中的用户单元的具体能力。例如，在双频段（例如，

PGSM/GSM1800) 网络中, 仅有用户单元的小的子集在历史上具有使用 GSM 1800 频段的能力, 因此, 如果可行, 则切换算法使所有具有 GSM 1800 能力的用户单元切换到这些频段。然而, 目前大部分用户站能够工作于两个频段, 由于将大部分用户单元切换到 GSM 1800, 因此该算法导致了不均匀的资源负荷。这导致了干扰的增加并且因此减小了服务质量和通信系统的容量。例如, 在 PGSM/EGSM/DCS1800 网络中, 情况变得更加复杂, 并且清楚的是, 需要更加精细的算法。

最近使用的切换算法倾向设计为具有不超过两个频段, 并且在设计该算法时, 大部分用户单元主要仅能够工作于一个频段 (即, PGSM)。然而在此期间, 用户单元的能力得到极大的提高, 并且目前在现今的网络中存在各种各样的用户单元的分布。根据优选实施例, 提供了一种用于切换的更加灵活的系统, 其导致了增加的容量和改善的服务质量, 同时具有较少的掉话。

而且, 最常见的切换控制子系统基于局部设置和条件, 并且因此提供了局部最优化。然而, 优选实施例提供了多个基站上的资源分布的最优化。具体地, 在优选实施例中, 针对多个基站确定关于至少第一频段的频段优先级参数, 并且因此传递给该多个基站。该多个基站在确定优选切换候选者中使用该频段优先级参数, 因此优选地提供了朝向或者背离给定的频段的相同的偏移。因此, 可以在中心控制和管理多个频段上的资源分布。

图 3 是根据本发明的实施例的 GSM 通信系统的切换控制子系统的图示。图 3 中说明的 GSM 通信系统的子集包括连接到 BSC 303 的 OMC 301, 该 BSC 303 又连接到三个 BTS 305、307、309。在该示例中, 切换控制子系统分布在 BSC 303 和 BSC 305、307、309 之间。因此 BSC 303 包括设置可应用于全部 BTP 305、307、309 的切换参数的功能。每个 BTP 305、307、309 进一步包括特定的功能, 用于 BTP 305、307、309 所服务的特定小区中的切换的确定。因此, 每个 BTP 305、

307、309 包括切换控制器 311、313、315，其处理来自用户单元的测量结果，计算功率预算并执行其他用于确定关于 BTP 305、307、309 所服务的用户单元所需的适当的切换候选者的功能。BCS 303 具体地包括确定优选频段的优选频段处理器 317。将优选频段参数传递给 BTP

5 305、307、309，并且全部 BTP 305、307、309 将此频段视为优选频段。每个 BTP 305、307、309 的切换控制器 311、313、315 执行切换评估，并且考虑由 BSC 303 的优选频段处理器 317 确定的频段优先级参数，确定优选切换候选者。

10 这样，在所示的示例中，切换控制子系统包括 BSC 的优选频段处理器 317 和 BTS 的切换控制器。

在图 3 的示例中，OMC 301 包括资源分布控制器 319。该资源分布控制器 319 确定通信系统的频段上的优选资源分布。例如，其可以

15 确定，应找到均匀的资源分布。在最简单的实施例中，优选资源分布简单地作为用户输入由运营商输入，但是在较先进的实施例中，资源分布可以考虑通信系统的多种运行和设置参数。具体地，资源分布可以考虑部署条件以及（因而涉及的）例如，覆盖范围和不同频段的可利用容量。

20

图 4 是根据本发明的实施例的切换评估的方法的流程图的图示。该方法可应用于图 3 的 GSM 通信系统，并且将通过参考该 GSM 通信系统进行描述。

25 在步骤 401 中，OMC 301 中的资源分布控制器 319 确定总体上关于通信系统的优选频段分布。在优选实施例中，每个频段的资源容量基本上相同，并且均匀地设置频段分布，即，试图在不同的频段上均匀地分配资源消耗。

30 在其他的实施例中，可以设置资源的优选频段分布，以考虑在每

个频段上可利用的容量。例如，一个频段（例如 PGSM）由于其是更加全面地部署的，因此可以具有两倍于第二频段（例如 GSM 1800）的容量。在该情况中，优选的是，使资源分布反映出容量的差异，并且具体地，可以设置优选频段分布，用以向第一频段分配两倍于第二频段的用户单元。在某些实施例中，与使用一个频段相关的成本函数可能高于关于使用另一频率的成本函数，并且可以设置优选频段分布以反映这一点。例如，如果一个频段处于比另一频段高很多的频率上，则由于传播条件要求较高的发射功率，因此将导致额外的功耗。因此，对于该频段，在电池寿命方面相关的成本增加，并且优选频段分布将因此针对其他的频段使用更大的权重。

在步骤 403 中，BSC 303 的优选频段处理器 317 确定关于至少第一频段的频段优先级参数。该频段优先级参数是与第一频段的优先程度相关的参数。优选地，该频段优先级参数可以用于使资源朝向或者背离第一频段偏移。在本发明的考虑范围内的是，频段优先级参数可以是任何适当的参数，而在优选实施例中，其是功率预算偏移量，其可用于修改基站中的计算功率预算。

频段优先级参数对于多个基站而言是公用的，并且用于控制资源分布，具体地，用于控制切换行为，使得可以实现不同频段上的优选资源分布。因此，使用该参数以管理小区组的行为，由此，优选地针对基站组的小区所形成的区域，控制频段之间的资源分布。

在步骤 405 中，将频段优先级参数分送多个基站，并且特别地，其自优选频段处理器 317 传递到每个 BTS 305、307、309 的切换控制器 311、313、315。该分送可以通过任何适当的方法执行，而在优选实施例中，其是通过存在于 BSC 303 和 BTS 305、307、309 之间的固定连接执行的。该频段优先级参数可以以任何适当的形式进行传递。在优选实施例中，传递实际的频段优先级参数，而在其他实施例中，传递频段优先级参数的表述，或者发送允许基站确定该频段优先级参

数的信息。因此，在一个实施例中，基站可以包括预先定义的频段优先级参数的列表，通过传递可用于适当的查找表的关于频段优先级参数的识别信息，简单地实现了频段优先级参数的传递。

5 在步骤 407 中，每个切换控制器 311、313、315 以任何适当的形式接收频段优先级参数。针对由该 BTS 的服务的用户单元，由每个切换控制器 311、313、315 独立地执行后面的步骤。然而，在该过程中，全部的切换控制器 311、313、315 使用相同的频段优先级参数。下面的描述集中于切换控制器 311 的操作。

10

开始，在步骤 409 中，切换控制器 311 确定是否激活了频段优先级模式，即 BTS 是否应通过考虑优选频段之间的资源分布而进行操作。如果否，则该过程前进至步骤 411，执行传统的切换而不考虑频段优先级参数。否则，该方法继续到步骤 413。

15

在步骤 413 中，切换控制器 311 确定多个关于用户单元的多个候选小区的切换参数值。具体地，切换控制器 311 确定关于试图切换到另一小区的用户单元的多个邻小区的功率预算。因此，针对每个切换用户单元，产生切换候选者列表，该切换候选者列表包括可能的切换候选者，其根据它们的功率预算进行排列。

20

在优选实施例中，切换控制器 311 基于用户单元的测量结果，确定适当的切换候选者。然而，为了使邻小区被认为是有效的切换目标，必须满足这样的标准，即其指出可以获得关于该邻小区的可接受的性能。因此，该标准确保了，在足够使该小区的 BTS 支持良好的通话的功率电平处，用户单元接收潜在的切换目标。如果用户单元处关于邻小区的接收电平高于阈值 $RXLEV_MIN_{(n)}$ ，则该邻小区被认为是有效的，输入到潜在候选者的列表上，其中可在切换控制数据库中设置阈值 $RXLEV_MIN_{(n)}$ 。

25
30

标准 1: $rxlev_ncell_{(n)} > rxlev_min_{(n)}$

其中:

$rxlev_ncell$ 是关于该邻居的所处理的最近的平均接收信号强度, 而 $rxlev_min_{(n)}$ 是数据库定义的阈值。

5

因此, 步骤 413 中确定的切换参数值限于功率预算满足标准 1 的小区。

10 在步骤 415 中, 产生切换参数值的集合, 该集合包括切换候选者列表的多个切换参数值, 该切换候选者列表不包括任何不满足标准 1 的候选者。在该集合中, 与第一频率相关的切换参数值进行补偿, 并且优选地偏移了频段优先级参数。因此, 产生了切换参数值的集合, 其包括由频段优先级参数的补偿引起的偏置。在优选实施例中, 频段优先级参数是功率预算偏移参数, 并且针对第一频率的候选者, 对候选者切换列表的功率预算值进行补偿。例如, 优选频段的所有候选者的功率预算按照 6dB 的因子提高。在修改功率预算值之后, 考虑经补偿的功率预算值, 重新排列切换候选者列表。

15

20 在步骤 415 之后, 该方法继续到步骤 417, 响应集合中的切换参数值, 确定切换候选小区。因此, 在优选实施例中, 从重新排序的切换候选者列表中选择目标切换候选者。在选择目标切换候选者之后, 在步骤 419 中使用与传统切换相同的切换过程发起切换。如果不能切换到优选候选者, 例如, 如果目标基站拒绝切换请求, 则选择重新排序列表中的下一切换候选者。

25

在图 5 中说明了方法, 该图是根据本发明的实施例, 排列切换候选者的示例的图示。

30 图 5 示出了第一列表 501, 其对应于由切换控制器 311 根据功率预算排列 (如步骤 413 中的操作) 的切换候选者 505~521 的队列。

如可以看到的，候选者 3 505 具有最佳的功率预算，其后面是候选者 6 507 和候选者 4 509。因此，通常发起针对切换候选者 3 505 的切换。然而，根据优选实施例，通过考虑至少一个频段的频段优先级参数，重新排列切换候选者列表。在所示例中，由优选频段处理器 317 将
5 一个频段确定为优选频段。例如，其可以优选用于使尽可能多的用户单元切换到 GSM 1800，以便于增加该频段的目前的资源利用。

因此，在优选频段处理器 317 中产生了频段优先级参数，其存在于关于 GSM 1800 频段的功率预算偏移中，并且将该频段优先级参数
10 传递到切换控制器 311。作为 GSM 1800 候选者的候选者 4、7 和 2 增加了频段优先级参数值。然后，响应偏移的功率预算值（即，由频段优先级参数进行了补偿），重新排列候选者切换列表，用以提供经补偿的功率预算切换候选者列表 503。如图 6 中所说明的，候选者 4 的
15 补偿使得关于该候选者的功率预算高于候选者 3 和 6 的功率预算，因此候选者 4 是优选切换候选者。然而，候选者 7 的补偿仅导致该候选者具有优于候选者 6 的功率预算，而其仍然劣于候选者 3。因此，候选者 3 是第二高的切换候选者，其后面是候选者 7 和 6。在重新排序之后，经补偿的功率预算切换候选者列表 503 用于确定切换候选者，
20 将排在最高处的候选者选为切换目标。

如图 5 指出的，当优选频段的候选者的功率预算值相对于其他的
候选者而言是适度的时候，优选频段候选者将倾向于向列表顶部偏
移。然而，如果优选频段的候选者的功率预算值是不能令人满意的，
则另一候选者是关于切换目标的第一选择。显然，偏置的水平依赖于
25 频段优先级参数的实际值。因此，可以实现非常精细的偏移，其可以修改不同频段上的资源分布，同时仍确保仅选择适当的切换候选者。
因此，在确保关于独立的用户单元的高的服务质量的同时，获得了改善的分布。

30 而且，可以在中心控制偏移和（因此而导致的）资源分布，并且

导致了关于多个小区的整体的资源分布，同时将独立的和局部的影响维持在最小，导致了每个独立的基站中的切换过程的高的性能。而且，用于实现全局资源分布所需的局部修改仅是单一的切换参数的修改。因此，该方法非常易于实现。

5

将显而易见的是，该实施例倾向于单独地或者组合地提供一个或者多个下列优点：

- 提供了简单的方法，用以管理、控制和/或修改几个频段上的资源分布。

10

- 简单的中心控制提供了局部的偏移，其具有有限的局部的服务质量影响，同时仍导致了全局的修改。

- 对独立的用户单元提供了高的服务质量，同时提供了所需资源分布。

15

- 提供了一种方法，其允许动态地与目前的运行条件相适应。

- 提供了一种方法，其中准确的资源分布是可能的，同时低的偏移量也是可能的。

- 该方法可以易于通过许多不同的切换算法实现。

20

- 提供了对全局资源分布的控制，同时保持了高的局部性能。

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在本发明的考虑范围内的是，切换决定可以考虑多种参数，而不是仅考虑功率预算。而且，基于除了频段上的资源分布以外的考虑，可以对切换参数进行补偿、修改或偏移。因此，在优选实施例中，该方法进一步包括使集合中的至少一个切换参数值偏移分层小区优先级值的步骤。因此，不仅引入了朝向优选频段的偏移，还引入了朝向网络层的偏移，即典型地，朝向微小区或者微微小区的层的偏移。在优选实施例中，使用与频段优先级参数的偏移相似的方式引入偏置，即，使功率预算偏移量添加到作为微小区或者微微小区的切换候选者。

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优选地局部执行层偏移量的确定和控制，这是因为其依赖于每个小区的拓扑和地理条件，具体地，依赖于作为邻居的微小区和微微小区的可利用性。因此，优选的频段偏移量和层偏移量易于结合，而不考虑一个是中心方法而另一个是局部方法。其充分地允许运营商根据局部的和全局的需要和要求，设置和优化他们的网络。因此，其使得运营商能够通过设置适当的补偿参数值，根据偏好，根据优选频段和微小区的性能容易地设置与之相关的他们的网络的行为。

在本发明的考虑范围内的是，在切换选择过程中可以使用其他的切换参数，并且其中一个可以由频段优先级参数进行补偿，而不是由功率预算进行补偿。而且，在选择过程中可以使用多个参数，通过频段优先级参数进行偏移的偏移量可以具有这些切换参数中的一个或者多个。因此，频段优先级参数可以是包括数个子参数的复合参数，每个子参数对应于关于不同参数的补偿。

在一个实施例中，切换参数值包括信号电平，并且切换和频段优先级参数偏移主要基于该信号电平。因此，切换可以简单地基于测得的相邻基站的导频信号的信号电平。然而，在优选实施例中，该信号电平是关于用户单元的服务小区和每个候选小区之间的相对信号电平。因此，如前文所述，在优选实施例中，切换的确定和频段优先级参数的补偿优选地基于功率预算。可替换地，或者此外，切换参数值可以包括信号干扰比电平（signal to interference levels）。

在本发明的考虑范围内的是，可以以任何适当的方式并且响应任何适当的参数，确定频段优先级参数。因此，在非常简单的实施例中，由网络运营商直接提供频段优先级参数，并且因此简单地响应用户输入确定频段优先级参数。然而，在优选实施例中，响应频段的可利用性，确定频段优先级参数。因此，优选地根据哪个频段对于用户单元而言是可利用的，设置频段优先级参数。具体地，频段的可利用性可以在整个通信系统中变化，并且因此由该通信系统覆盖的区域可以分

为多个具有不同的频段可利用性的不同的区域。在该情况中，每个区域可以针对该区域中所包括的基站，相异地设置频段优先级参数。这样，可以容易地使资源分布同整个通信系统中的变化的条件相适应。

5 在一个实施例中，响应关于用户单元组的用户单元的能力的分布，确定频段优先级参数。例如，在包括第一和第二频段的通信系统中，全部的用户单元能够在第一频段上通信，而仅有部分用户单元能够在第二频率上通信。如果该比例非常小，则将强偏移引入到频段优先级参数，用以确保，如果可能，所有的用户单元切换到第二频率。
10 然而，如果该比例非常高，则仅需要小的偏移，以实现两个频段上的均匀的资源分布。在典型的通信系统中，用户单元的能力常常发生显著的变化，并且随着用户单元变得越来越先进而改变。因此，该实施例提供了，随着系统中用户单元的能力分布的变化，动态地控制整个频段上的资源分布的方法。

15 此外，或者可替换地，可以响应关于基站组的小区负荷的分布，确定频段优先级参数。因此，在一个实施例中，优选频段处理器持续地监视关于该 BSC 的基站的使用。针对多个频段独立地监视资源消耗，如果确定分布优选地发生改变，则修改频段优先级参数，用以使
20 切换朝向所需的频段偏移。因此，在具有两个频段的特定的示例中，如果确定，一个频段相比于另一个具有明显更多的负荷，则针对第二个频段设置频段优先级参数，将增加关于该小区的切换候选者的功率预算值。因此，通过简单的机制实现了资源分布的动态管理。通信系统中的当前条件（特别是负荷）的监视可以基于小区和/或频段的负荷。

25 根据本发明的一个实施例，该方法包括响应集合中的切换参数值发起切换的步骤。例如，切换控制器可以针对一个或者多个用户单元连续地执行所述的切换评估程序，而不论是否请求了切换。如果该切换评估导致切换候选者满足特定的条件，则可以发起切换。这些条件
30 可以包括，例如，关于邻小区的功率预算（如由频段优先级参数进行

补偿的) 超出规定的阈值。因此, 根据所述实施例的方法自身可以触发切换。

5 在一个实施例中, 与第一频率相关的切换参数值的补偿不是直接修改切换参数值本身。而是由频段优先级参数定义优选频段的切换参数值和最强未补偿切换参数值之间的最大偏移量。因此, 在该实施例中, 该偏移量限定了具有最佳功率预算的小区 and 具有最佳功率预算的优选频段的小区之间的功率预算值之中的最大差值。在该实施例中, 超出该限制的小区被排除在该集合外, 并且将目标切换候选者选为保留在10 该集合中的最佳的优选频段的小区, 如果没有优选频段的小区被当作最佳小区的话。如果添加到频段优先级参数的优选频段的小区的功率预算值小于“最佳”小区的功率预算值, 则该优选频段的小区将从切换候选者列表中移除, 由此消除了差的功率预算的切换候选者, 在这一点上, 该实施例等效于前文所述的偏移方法。

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本发明可以以任何适当的方式实现, 包括硬件、软件、固件或者它们的任何组合。然而, 本发明优选地实现为在一个或者多个数据处理器上运行的计算机软件。本发明的实施例的元件和部件可以位于核心网络、无线接入网络、用户单元或者任何适当的物理或者功能性位置。事实上, 可以在单一的单元中、在多个单元中或者作为其他的功能单元的一部分, 实现该功能。因此, 本发明可以在单一的单元中实现, 20 或者可以物理地或者功能性地分布在通信系统中。

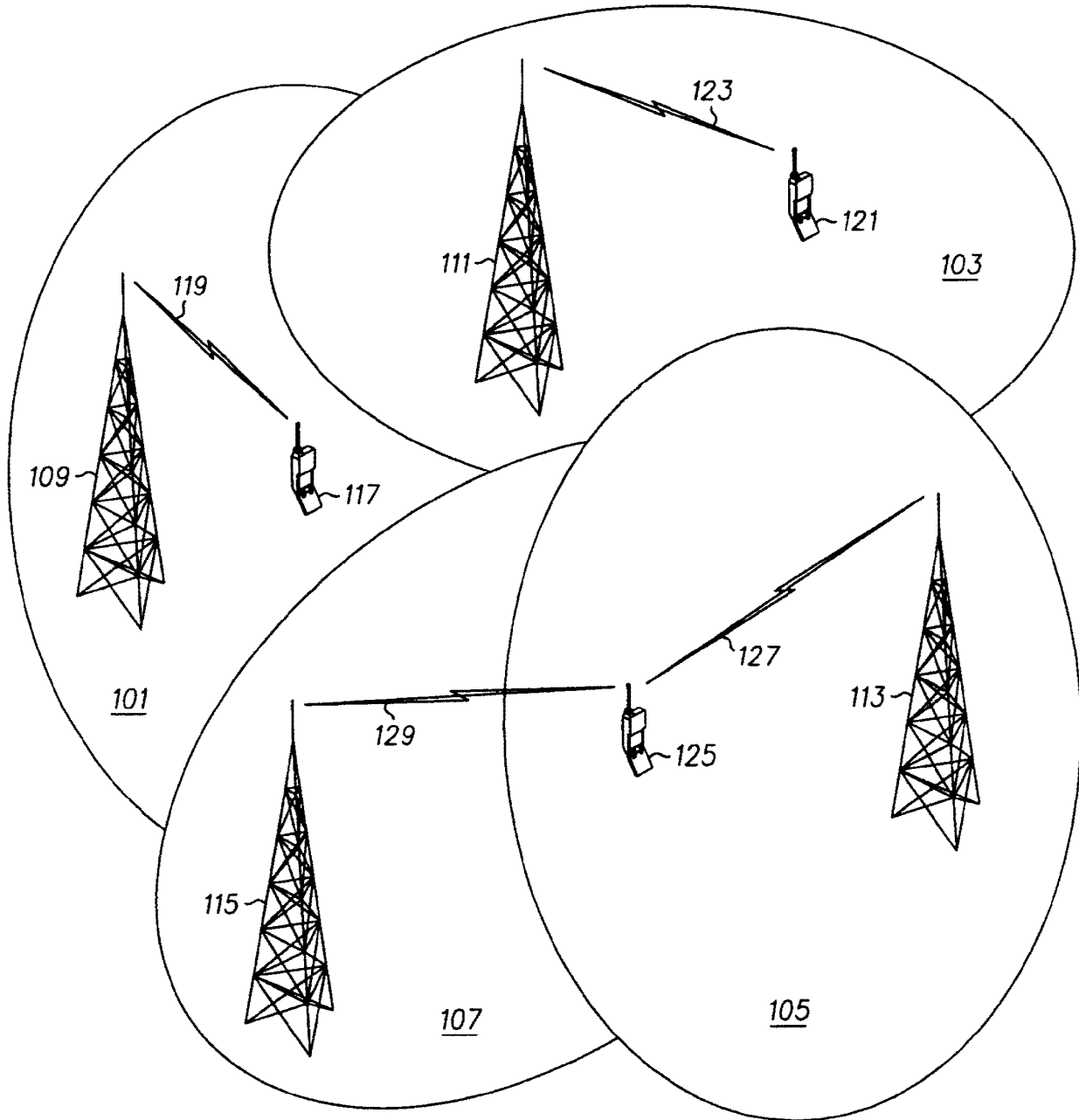


图1
现有技术

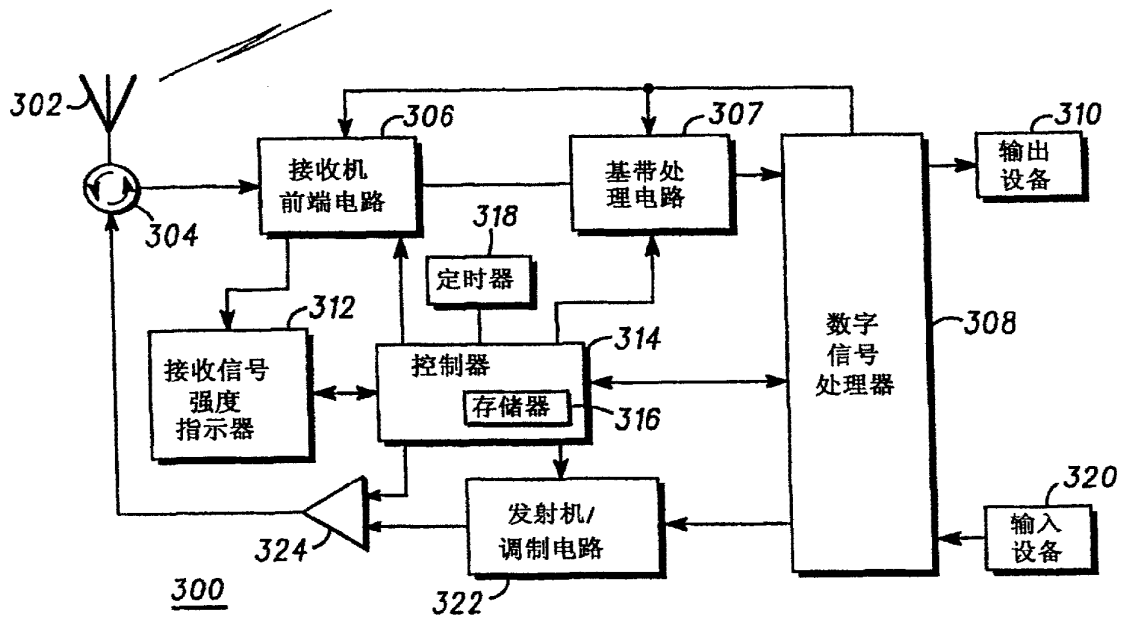


图3

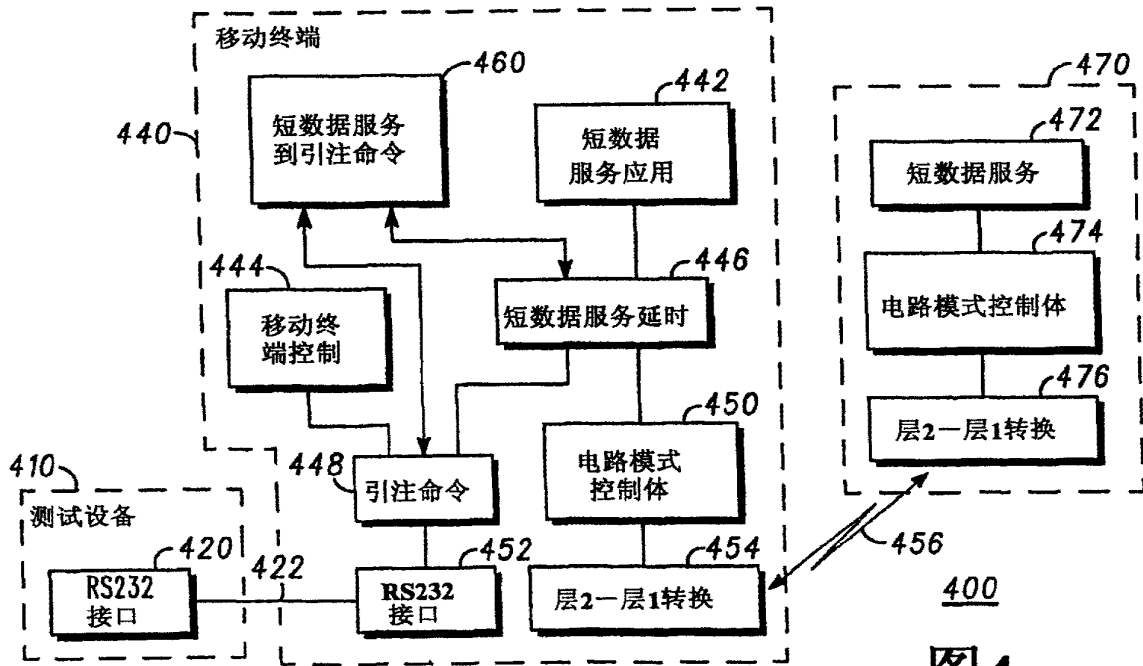


图4

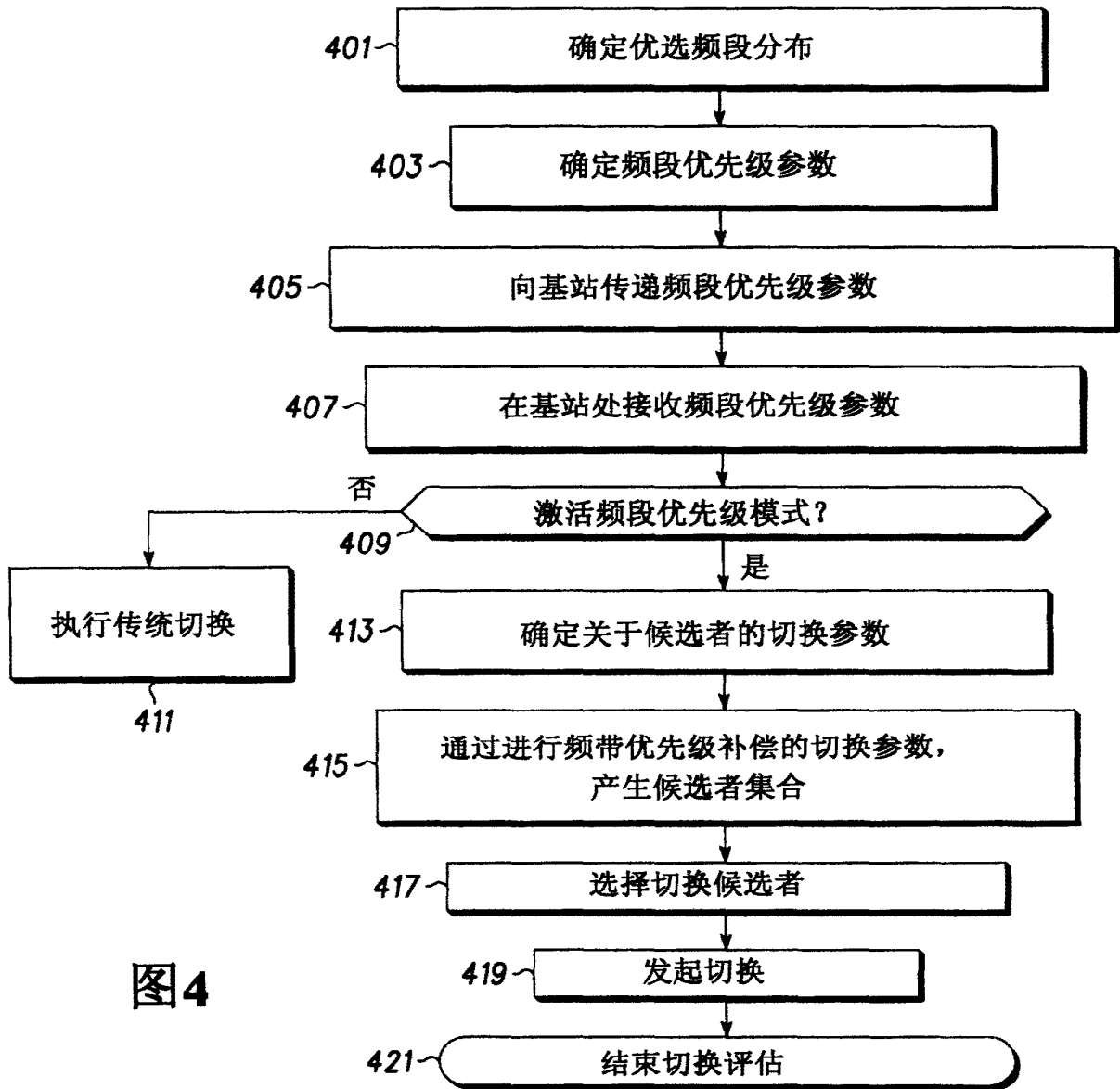


图4

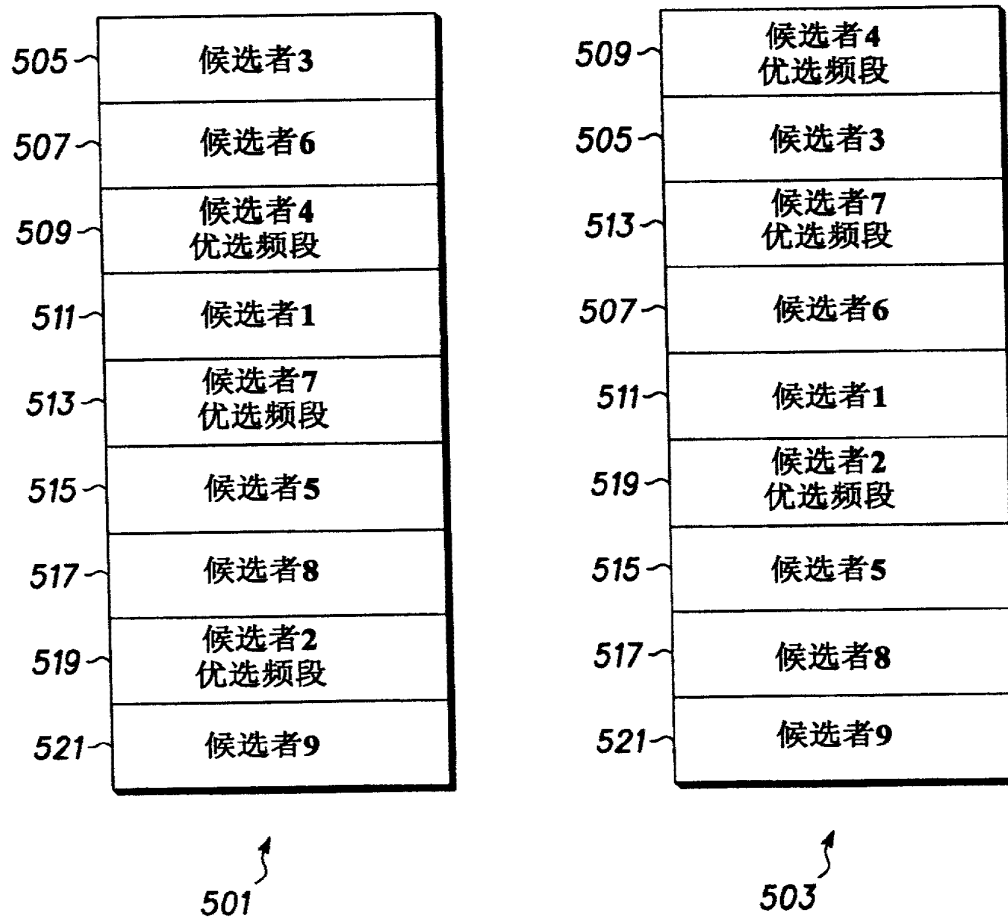


图5

Improving intersystem cell reselection from GERAN to UTRAN

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Inventor(s): HARRI NIELSEN SARI JOKINEN [FI] +	
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Classification:	
- international: H04Q7/38; H04Q7/38	
- European:	
Application number: CN20058018919 20050602	
Priority number(s): US20040578639P 20040610	

Abstract of **CN 1965605 (A)**

This invention describes a method for a cell reselection by a mobile station from a serving GERAN cell supported by a GSM/EDGE (global system for mobile communications/enhanced data rates for GSM evolution) radio access network (GERAN) to a UTRAN cell supported by a universal terrestrial radio access network (UTRAN). According to a first embodiment of the invention, the intended intersystem reselection behavior is reached without signaling changes. This can be a preferred mode for early implementations because signaling changes always take a longer time to reach the products on the field (both mobile and network updates are normally required). According to a second embodiment of the invention, the flexibility of signaling changes is used for an advantage.

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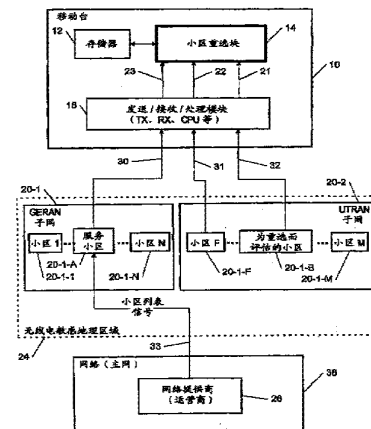
权利要求书 6 页 说明书 13 页 附图 3 页

[54] 发明名称

改进从 GERAN 到 UTRAN 的系统间小区重选

[57] 摘要

本发明描述了一种由移动台从由 GSM/EDGE (全球移动通信系统/GSM 演进增强数据速率) 无线接入网 (GERAN) 所支持的服务 GERAN 小区到由通用地面无线接入网 (UTRAN) 所支持的 UTRAN 小区进行小区重选的方法。根据本发明的第一种实施方式, 所涉及的系统间重选行为无需信令改变而实现。这可作为早期实现的优选模式, 因为信令改变经常花费更长时间来实现本领域内的产品 (通常, 移动设备和网络更新二者都有所需要)。根据本发明的第二种实施方式, 信令改变的灵活性作为一种优点加以使用。



1. 一种方法，用于由移动台（10）从由第一无线接入技术所支持的服务小区（20-1-A）到由第二无线接入技术所支持的小区（20-1-B）的小区重选，所述方法包括步骤：

选择由所述第二无线接入技术所支持的以前的小区（20-1-F）以及读取并存储来自所述以前的小区的 RSCP 适用阈值；

由所述移动台选择所述服务小区（20-1-A）；以及

由所述移动台建立（50）重选标准，用于从所述服务小区重选所述小区（20-1-B），其中所述重选标准包括至少一个阈值，所述阈值包括所述 RSCP 适用阈值加上由所述移动台使用预确定标准所定义的偏移。

2. 根据权利要求 1 所述的方法，其中所述服务小区是服务 GERAN 小区，所述小区是 UTRAN 小区，所述以前的小区是前一 UTRAN 小区，所述第一无线接入技术是 GSM/EDGE 无线接入网（GERAN），所述第二无线接入技术是通用地面无线接入网（UTRAN）以及所述 RSCP 适用阈值是 UTRAN RSCP 适用阈值。

3. 根据权利要求 2 所述的方法，进一步包括步骤：

确定（54）所述重选标准对于所述 UTRAN 小区是否合适，并且，如果合适，由所述移动台重选所述 UTRAN 小区。

4. 根据权利要求 2 所述的方法，其中在选择所述服务 GERAN 小区的步骤之前，所述方法包括步骤：

选择前一 UTRAN 小区以及从所述前一 UTRAN 小区读取并存储所述 UTRAN RSCP 适用阈值。

5. 根据权利要求 2 所述的方法，其中所述偏移包括滞后值或使用所述移动台的功率能力加以定义。

6. 一种计算机程序产品，包括：计算机可读存储结构，在其上具体实现用于由计算机处理器执行的计算机程序代码，所述计算机程序代码的特征在于，其包括用于执行权利要求 2 所述的方法的步骤的指令，所述指令指示为由所述移动台、所述 GSM/EDGE 无线接入网（GERAN）

或所述通用地面无线接入网 (UTRAN) 的任何部件所执行。

7. 一种方法, 用于由移动台 (10) 从由第一无线接入技术所支持的服务小区 (20-1-A) 到由第二无线接入技术所支持的小区 (20-1-B) 的小区重选, 所述方法包括步骤:

由所述移动台选择所述服务小区 (20-1-A); 以及

由所述移动台建立 (60) 第一和第二重选标准, 用于从所述服务小区重选所述小区 (20-1-B), 其中所述第一重选标准包括阈值, 所述阈值包括每 PN 码片从公共导频信道 (CPICH) 接收的能量与在所述移动台天线连接器处接收的全部功率频谱密度的比率 (E_c/N_0) 加上由所述移动台附加到所述比率的偏移, 以及所述第二重选标准包括 RSCP 阈值, 由所述服务小区向所述移动台提供对所述比率的所述偏移和所述 RSCP 阈值。

8. 根据权利要求 7 所述的方法, 其中所述服务小区是服务 GERAN 小区, 所述小区是 UTRAN 小区, 所述第一无线接入技术是 GSM/EDGE 无线接入网 (GERAN), 所述第二无线接入技术是通用地面无线接入网 (UTRAN) 以及所述 RSCP 阈值是 UTRAN RSCP 阈值。

9. 根据权利要求 8 所述的方法, 进一步包括步骤:

确定 (54) 所述第一和所述第二重选标准对于所述 UTRAN 小区是否合适, 以及, 如果合适, 由所述移动台重选所述 UTRAN 小区。

10. 根据权利要求 8 所述的方法, 其中所述 UTRAN RSCP 阈值包括滞后值或使用该移动台的功率能力加以定义。

11. 一种计算机程序产品, 包括: 计算机可读存储结构, 在其上具体实现用于由计算机处理器执行的计算机程序代码, 所述计算机程序代码的特征在于, 其包括用于执行权利要求 8 所述的方法的步骤的指令, 所述指令指示为由所述移动台、所述 GSM/EDGE 无线接入网 (GERAN) 或所述通用地面无线接入网 (UTRAN) 的任何部件所执行。

12. 一种移动台, 能够从由第一无线接入技术所支持的服务小区 (20-1-A) 到由第二无线接入技术所支持的小区 (20-1-B) 进行小区重选, 包括:

接收/发送/处理模块，响应于指示了来自所述第二无线接入技术所支持的以前的小区（20-1-F）的 RSCP 适用阈值的阈值信号（31），用于提供指示了所述 RSCP 适用阈值的所接收的阈值信号（22）；以及

小区重选块（14），响应于所述指示了所述 RSCP 适用阈值的所述所接收的阈值信号（22），用于建立用于从所述服务小区（20-1-B）重选小区的重选标准，其中所述重选标准包括至少一个阈值，所述阈值包括所述 RSCP 适用阈值加上由所述小区重选块使用预确定标准所定义的偏移。

13. 根据权利要求 12 所述的移动台，其中所述服务小区是服务 GERAN 小区，所述小区是 UTRAN 小区，所述以前的小区是前一 UTRAN 小区，所述第一无线接入技术是 GSM/EDGE 无线接入网（GERAN），所述第二无线接入技术是通用地面无线接入网（UTRAN）以及所述 RSCP 适用阈值是 UTRAN RSCP 适用阈值。

14. 根据权利要求 13 所述的方法，其中由所述小区重选块（14）确定所述重选标准对于所述 UTRAN 小区是否合适，以及，如果合适，由所述移动台重选所述 UTRAN 小区。

15. 根据权利要求 13 所述的方法，其中所述偏移包括滞后值或使用所述移动台的功率能力加以定义。

16. 根据权利要求 13 所述的方法，其中所述移动台包括：
存储器，用于存储所述 UTRAN RSCP 适用阈值。

17. 一种移动台，能够从由第一无线接入技术所支持的服务小区（20-1-A）到由第二无线接入技术所支持的小区（20-1-B）进行小区重选，包括：

接收/发送/处理模块，响应于来自所述服务小区的信号（30），所述信号指示了 RSCP 阈值和每 PN 码片从公共导频信道（CPICH）接收的能量与在所述移动台天线连接器处接收的全部功率频谱密度的比率（ E_c/N_0 ）的偏移，用于提供指示了所述 RSCP 阈值和所述比率的所述偏移的所接收的信号（23）；以及

小区重选块（14），响应于指示了所述 UTRAN RSCP 阈值和所述比

率的所述偏移的所述所接收的信号 (23), 用于建立用于从所述服务小区重选所述小区 (20-1-B) 的第一和第二重选标准, 其中所述第一重选标准包括阈值, 所述阈值包括所述比率 (E_c/N_0) 加上附加到所述比率的偏移, 以及所述第二重选标准包括所述 RSCP 阈值。

18. 根据权利要求 17 所述的移动台, 其中所述服务小区是服务 GERAN 小区, 所述小区是 UTRAN 小区, 所述第一无线接入技术是 GSM/EDGE 无线接入网 (GERAN), 所述第二无线接入技术是通用地面无线接入网 (UTRAN), 所述 RSCP 阈值是 UTRAN RSCP 阈值, 所述信号是 GERAN 信号以及所述所接收信号是 GERAN 所接收的信号。

19. 根据权利要求 18 所述的移动台, 其中由所述小区重选块 (14) 确定所述第一和第二重选标准对于所述 UTRAN 小区是否合适, 以及, 如果它们合适, 由所述移动台重选所述 UTRAN 小区。

20. 根据权利要求 18 所述的移动台, 其中所述 UTRAN RSCP 阈值包括滞后值或使用所述移动台的功率能力加以定义。

21. 根据权利要求 18 所述的移动台, 其中所述移动台包括:
存储器, 用于存储所述 UTRAN RSCP 阈值、所述比率以及所述偏移。

22. 一种系统, 使用从 GSM/EDGE 无线接入网 (GERAN) 到通用地面无线接入网 (UTRAN) 的小区重选, 包括:

前一 UTRAN 小区 (20-1-F), 由通用地面无线接入网所支持, 用于提供指示了 UTRAN RSCP 适用阈值的阈值信号 (31);

服务 GERAN 小区 (20-1-A), 由 GSM/EDGE 无线接入网所支持;

UTRAN 小区 (20-1-B), 由通用地面无线接入网所支持; 以及

移动台, 响应于指示了 UTRAN RSCP 适用阈值的阈值信号 (31), 用于建立用以从所述服务 GERAN 小区重选所述 UTRAN 小区 (20-1-B) 的重选标准, 其中所述重选标准包括至少一个阈值, 所述阈值包括了所述 UTRAN RSCP 适用阈值加上由所述移动台使用预确定标准所定义的偏移。

23. 根据权利要求 22 所述的系统, 其中由所述移动台确定所述重

选标准对于所述 UTRAN 小区合适, 以及, 如果它们合适, 由所述移动台重选所述 UTRAN 小区。

24. 一种系统, 使用从 GSM/EDGE 无线接入网 (GERAN) 到通用地面无线接入网 (UTRAN) 的小区重选的, 包括:

UTRAN 小区 (20-1-B), 由通用地面无线接入网所支持;

移动台, 响应于 GERAN 信号 (30), 所述信号指示了 UTRAN RSCP 阈值和每 PN 码片从公共导频信道 (CPICH) 接收的能量与在所述移动台天线连接器处接收的全部功率频谱密度的比率 (E_c/N_0) 的偏移, 用于建立用以重选所述 UTRAN 小区 (20-1-B) 的第一和第二重选标准, 其中所述第一重选标准包括阈值, 所述阈值包括所述比率 (E_c/N_0) 加上由所述移动台附加到所述比率的偏移, 以及所述第二重选标准包括 UTRAN RSCP 阈值; 以及

服务 GERAN 小区 (20-1-A), 由 GSM/EDGE 无线接入网所支持, 用于提供所述 GERAN 信号 (30);

其中如果由所述移动台确定所述第一和第二重选标准对于所述 UTRAN 小区合适, 则由所述移动台从所述服务 GERAN 小区重选所述 UTRAN 小区。

25. 一种集成电路, 能够执行从由 GSM/EDGE 无线接入网 (GERAN) 所支持的服务 GERAN 小区 (20-1-A) 到由通用地面无线接入网 (UTRAN) 所支持的 UTRAN 小区 (20-1-B) 的小区重选, 包括:

接收/发送/处理模块, 响应于阈值信号 (31), 所述阈值信号指示了来自所述由通用地面无线接入网所支持的 UTRAN 小区 (20-1-F) 的 UTRAN RSCP 适用阈值, 用于提供指示了所述 UTRAN RSCP 适用阈值的所接收的阈值信号 (22); 以及

小区重选块 (14), 响应于指示了所述 UTRAN RSCP 适用阈值的所接收的阈值信号 (22), 用于建立用于从所述服务 GERAN 小区重选所述 UTRAN 小区 (20-1-B) 的重选标准, 其中所述重选标准包括至少一个阈值, 所述阈值包括所述 UTRAN RSCP 适用阈值加上由所述小区重选块使用预确定标准所定义的偏移。

26. 一种集成电路移动台，能够从由 GSM/EDGE 无线接入网 (GERAN) 所支持的服务 GERAN 小区 (20-1-A) 到由通用地面无线接入网 (UTRAN) 所支持的 UTRAN 小区 (20-1-B) 进行小区重选，包括：

接收/发送/处理模块，响应于来自服务 GERAN 小区的 GERAN 信号 (30)，所述信号指示了 UTRAN RSCP 适用阈值和每 PN 码片从公共导频信道 (CPICH) 接收的能量与在移动台天线连接器处接收的全部功率频谱密度的比率 (E_c/N_0) 的偏移，用于提供指示了所述 UTRAN RSCP 阈值的所接收的 GERAN 信号 (23) 和所述比率的偏移；以及

小区重选块 (14)，响应于指示了所述 UTRAN RSCP 阈值和所述比率的偏移的所接收的 GERAN 信号 (23)，用于建立用于从所述服务 GERAN 小区重选 UTRAN 小区 (20-1-B) 的第一和第二重选标准，其中第一重选标准包括一个阈值，该阈值包括该比率 (E_c/N_0) 加上附加在所述比率上的偏移，并且所述第二重选标准包括所述 UTRAN RSCP 阈值。

改进从 GERAN 到 UTRAN 的系统间小区重选

相关申请的交叉引用

本申请要求提交日期为 2004 年 6 月 10 日的美国临时专利申请，序列号 60/578, 639 以及提交日期为 2005 年 5 月 13 日的美国申请，序列号 11/129, 673 的优先权。

技术领域

本发明涉及移动通信系统中的系统间重选优化，并更具体地涉及从 GERAN 到 UTRAN 的小区重选。

背景技术

现有的 2G 到 3G 的小区重选是基于通用地面无线接入网 (UTRAN) 公共导频信道 (CPICH) E_c/N_o (每 PN 码片从 CPICH 接收的能量与在移动台的天线连接器处接收的全部功率频谱密度之比) 的阈值以及基于相对于 GSM/EDGE 无线接入网 (GERAN) 服务小区接收的信号电平 (RXLEV) 的 UTRAN CPICH 的接收的信号代码功率 (RSCP) 电平。另外，如果不满足 UTRAN 目标小区的适用标准 S ($S_{rxlev} > 0$ 并且 $S_{qual} > 0$)，则对于 UTRAN 的小区重选可能被禁止 (重选仍可以被触发)。

TeliaSonera 公司提出了一种对于该 UTRAN CPICH RSCP 的新的阈值基于信令改变的改进以便控制除了现有参数之外的从 GERAN 到 UTRAN 的小区重选。(现有参数见 (1) 2004 年 4 月 19-23 日在墨西哥康坎市召开的第 19 次 GPP TSG-GERAN 会议的更改请求 45.008 CR 205, Tdoc GP-040586, (2) Tdoc GP-040585, “Background for WCDMA uplink best characterized by CPICH RSCP and downlink by CPICH E_c/N_o ”, 以及 (3) 2004 年 10 月 6 日由 Ari-Pekka Salovaara 提出的建议书 “Need to study for Cell Re-selection specification changes”, 10,06,04)。

当从 GERAN 对 UTRAN 小区进行重选时，目前不存在于全球移动通信系统 (GSM) 中所发信号的最小可接收 UTRAN CPICH RSCP 阈值。结果就是在移动台将重选可用的 UTRAN 小区时，无论 UTRAN 小区是否适合（加入实用滞后以避免乒乓效应），都不可能应用主动的重选行为。

更为特别地，如果该重选仅以现有 E_c/N_0 阈值控制（通过设置 RSCP 比 RXLEV 偏移标准为“负无穷”，即，允许重选而不考虑服务小区的接收信号强度指示 (RSSI) 比目标小区 RSCP），移动设备可以从上行链路失败的相距甚远的地方重选未加载的 UTRAN 小区（尤其是如果该 UTRAN 小区处于 UTRAN 覆盖范围的边缘）。另一方面，当将该 E_c/N_0 阈值设置为足够高时（以保证上行链路的接入），移动台可能完全无法接入加载的 UTRAN 小区或至少该移动台需要远比网络规划所预定的要更加靠近目标 UTRAN 站点。

该问题的由来，正如在上文涉及的 TeliaSonera 文档中解释的，是由于取决于 UTRAN 小区的加载，UTRAN CPICH E_c/N_0 变化很大并且尤其是对于处于 UTRAN 覆盖范围边缘的小区。这使得不可能设置在其中上行链路被保证可操作的点处发生的重选，而与此同时使得该移动台重选 UTRAN 小区，只要上行链路和下行链路两者都可操作（基本上当 UTRAN CPICH RSCP 和 E_c/N_0 两者均具有足够的电平）。在 UTRAN 的适用标准中包括基于 CPICH RSCP 的最小阈值。

发明内容

本发明的目的是提供一种由移动台从由全球移动通信系统/GSM 演进增强数据速率 (GSM/EDGE) 无线接入网 (GERAN) 所支持的服务 GERAN 小区到由通用地面无线接入网 (UTRAN) 所支持的 UTRAN 小区的小区重选的方法。

根据本发明的第一种实施方式，所涉及的系统间重选行为无需信令改变而得以实现。这对于早期实现可以是优选的模式因为信令改变经常花费更长时间来实现于本领域内的产品（通常移动设备和网络更新二者

都有所需要)。根据本发明的第二种实施方式, 信令改变的灵活性被用作是一种优点, 因此这种改变旨在无需由移动和网络设备强求地支持。

根据本发明的第一方面, 一种由移动台从由第一无线接入技术所支持的服务小区到由第二无线接入技术所支持的小区的小区重选的方法, 包括如下步骤: 选择由第二无线接入技术所支持的以前的小区并读取并存储来自该以前的小区的 RSCP 适用阈值; 由该移动台选择服务小区; 以及由该移动台建立用于从该服务小区重选小区的重选标准, 其中重选标准包括至少一个阈值, 该阈值包括该 RSCP 适用阈值加上由该移动台使用预确定标准所定义的偏移。

进一步根据本发明的第一方面, 该服务小区可以是服务 GERAN 小区, 该小区可以是 UTRAN 小区, 以前的小区可以是前一 UTRAN 小区, 第一无线接入技术可以是 GSM/EDGE 无线接入网 (GERAN), 第二无线接入技术可以是通用地面无线接入网 (UTRAN) 并且该 RSCP 适用阈值可以是 UTRAN RSCP 适用阈值。另外, 本方法可以包括如下步骤: 确定重选标准对于 UTRAN 小区是否合适以及, 如果合适, 由该移动台重选该 UTRAN 小区。更进一步, 在选择服务 GERAN 小区的步骤之前, 本方法仍可包括如下步骤: 选择前一 UTRAN 小区并从该前一 UTRAN 小区读取并存储 UTRAN RSCP 适用阈值。仍可更进一步, 该偏移可以包括滞后值或可以使用该移动台的功率能力定义。

根据本发明的第二方面, 一种计算机程序产品包括: 计算机可读存储结构, 其实现为在其上的计算机程序代码用于由具有计算机程序代码的计算机处理器执行, 特征在于其包括用于运行本发明第一方面的步骤的指令, 该指令被指示为由该移动台、GSM/EDGE 无线接入网 (GERAN) 或通用地面无线接入网 (UTRAN) 的任何部件所运行。

根据本发明的第三方面, 一种由移动台从由第一无线接入技术所支持的服务小区到由第二无线接入技术所支持的小区的小区重选的方法, 包括如下步骤: 由该移动台选择服务小区; 以及由该移动台建立用于从该服务小区重选小区的第一和第二重选标准, 其中该第一重选标准包括阈值, 该阈值包括每 PN 码片从公共导频信道 (CPICH) 接收的能量与

在移动台天线连接器处接收的全部功率频谱密度的比率 (E_c/N_0) 加上由该移动台附加到该比率的偏移, 以及该第二重选标准包括 RSCP 阈值, 该服务小区向该移动台提供对所述比率的偏移和该 RSCP 阈值。

进一步根据本发明的第三方面, 该服务小区可以是服务 GERAN 小区, 该小区可以是 UTRAN 小区, 第一无线接入技术可以是 GSM/EDGE 无线接入网 (GERAN), 第二无线接入技术可以是通用地面无线接入网 (UTRAN) 以及该 RSCP 阈值可以是 UTRAN RSCP 阈值。另外, 本方法还可以包括如下步骤: 确定第一和第二重选标准对于 UTRAN 小区是否合适以及, 如果合适, 由该移动台重选该 UTRAN 小区。仍可更进一步, 该 UTRAN RSCP 阈值可以包括滞后值或可以使用该移动台的功率能力定义。

根据本发明的第四方面, 一种计算机程序产品包括: 计算机可读存储结构, 其实现为在其上的计算机程序代码用于由具有计算机程序代码的计算机处理器执行, 特征在于其包括用于运行本发明第三方面的步骤的指令, 该指令被指示为由该移动台、GSM/EDGE 无线接入网 (GERAN) 或通用地面无线接入网 (UTRAN) 的任何部件所运行。

根据本发明的第五方面, 一种能够从由第一无线接入技术所支持的服务小区到由第二无线接入技术所支持的小区进行小区重选的移动台, 包括: 接收/发送/处理模块, 响应于指示了来自该由第二无线接入技术所支持的以前的小区的 RSCP 适用阈值的阈值信号, 用于提供指示了该 RSCP 适用阈值的所接收的阈值信号; 以及小区重选块, 响应于指示了该 RSCP 适用阈值的所接收的阈值信号, 用于建立用于从该服务小区重选小区的重选标准, 其中重选标准包括至少一个阈值, 该阈值包括该 RSCP 适用阈值加上由该小区重选块使用预确定标准所定义的偏移。

进一步根据本发明的第五方面, 该服务小区可以是服务 GERAN 小区, 该小区可以是 UTRAN 小区, 以前的小区可以是前一 UTRAN 小区, 第一无线接入技术可以是 GSM/EDGE 无线接入网 (GERAN), 第二无线接入技术可以是通用地面无线接入网 (UTRAN) 以及该 RSCP 适用阈值可以是 UTRAN RSCP 适用阈值。另外, 小区重选块可以确定重选

标准对于 UTRAN 小区是否合适以及, 如果合适, 由该移动台重选该 UTRAN 小区。更进一步, 该偏移可以包括滞后值或可以使用该移动台的功率能力定义。仍可更进一步, 移动台可以包括: 存储器, 用于存储该 UTRAN RSCP 适用阈值。

根据本发明的第六方面, 一种能够从由第一无线接入技术所支持的服务小区到由第二无线接入技术所支持的小区进行小区重选的移动台, 包括: 接收/发送/处理模块, 响应于来自该服务小区的信号, 该信号指示了该 RSCP 适用阈值和每 PN 码片从公共导频信道 (CPICH) 接收的能量与在移动台天线连接器处接收的全部功率频谱密度的比率 (E_c/N_0) 的偏移, 用于提供所接收的指示了该 RSCP 阈值和该比率的偏移的信号; 以及小区重选块, 响应于指示了该 UTRAN RSCP 适用阈值和该比率的偏移的所接收的信号, 用于建立用以从该服务小区重选小区的第一和第二重选标准, 其中, 该第一重选标准包括一个阈值, 该阈值包括了该比率 (E_c/N_0) 加上附加于该比率的偏移, 并且该第二重选标准包括 RSCP 阈值。

进一步根据本发明的第六方面, 该服务小区可以是服务 GERAN 小区, 该小区可以是 UTRAN 小区, 第一无线接入技术可以是 GSM/EDGE 无线接入网 (GERAN), 第二无线接入技术可以是通用地面无线接入网 (UTRAN) 并且该 RSCP 阈值可以是 UTRAN RSCP 阈值, 信号可以是 GERAN 信号以及所接收的信号可以是 GERAN 所接收的信号。另外, 小区重选块可以确定第一和第二重选标准对于 UTRAN 小区是否合适以及, 如果合适, 由该移动台重选该 UTRAN 小区。更进一步, 该 UTRAN RSCP 阈值包括滞后值或可以使用移动台的功率能力加以定义。仍可更进一步, 该移动台包括: 存储器, 用于存储该 UTRAN RSCP 阈值、比率和偏移。

根据本发明的第七方面, 一种使用从 GSM/EDGE 无线接入网 (GERAN) 到通用地面无线接入网 (UTRAN) 的小区重选的系统, 包括: 前一 UTRAN 小区, 由通用地面无线接入网所支持, 用于提供指示了 UTRAN RSCP 适用阈值的阈值信号; 服务 GERAN 小区, 由

GSM/EDGE 无线接入网所支持; UTRAN 小区, 由通用地面无线接入网所支持; 以及移动台, 响应于指示了 UTRAN RSCP 适用阈值的阈值信号, 用于建立用以从该服务 GERAN 小区重选 UTRAN 小区的重选标准, 其中该重选标准包括至少一个阈值, 该阈值包括了 UTRAN RSCP 适用阈值加上由该移动台使用预确定标准所定义的偏移。

进一步根据本发明的第七方面, 该移动台可以确定重选标准对于 UTRAN 小区是否合适以及, 如果合适, 由该移动台重选该 UTRAN 小区。

根据本发明的第八方面, 一种使用从 GSM/EDGE 无线接入网 (GERAN) 到通用地面无线接入网 (UTRAN) 的小区重选的系统, 包括: UTRAN 小区, 由通用地面无线接入网所支持; 移动台, 响应于 GERAN 信号, 其指示了 UTRAN RSCP 阈值和每 PN 码片从公共导频信道 (CPICH) 接收的能量与在移动台天线连接器处接收的全部功率频谱密度的比率 (E_c/N_0) 的偏移, 用于建立用以重选该 UTRAN 小区的第一和第二重选标准, 其中该第一重选标准包括了一个阈值, 该阈值包括该比率 (E_c/N_0) 加上由该移动台附加在该比率上的偏移, 并且第二重选标准包括 UTRAN RSCP 阈值; 以及服务 GERAN 小区 (20-1-A), 由 GSM/EDGE 无线接入网所支持, 用于提供该 GERAN 信号, 其中如果该移动台确定该第一和第二重选标准对于该 UTRAN 小区合适, 则该移动台从该服务 GERAN 小区重选为该 UTRAN 小区。

根据本发明的第九方面, 一种能够执行从由 GSM/EDGE 无线接入网 (GERAN) 所支持的服务 GERAN 小区到由通用地面无线接入网 (UTRAN) 所支持的 UTRAN 小区的小区重选的集成电路, 包括: 接收/发送/处理模块, 响应于指示了来自该由通用地面无线接入网所支持的 UTRAN 小区的 UTRAN RSCP 适用阈值的阈值信号, 用于提供指示了该 UTRAN RSCP 适用阈值的所接收的阈值信号; 以及小区重选块, 响应于指示了该 UTRAN RSCP 适用阈值的所接收的阈值信号, 用于建立用以从该服务 GERAN 小区重选 UTRAN 小区的重选标准, 其中重选

标准包括至少一个阈值，该阈值包括该 UTRAN RSCP 适用阈值加上由该小区重选块使用预确定标准所定义的偏移。

根据本发明的第十方面，一种能够从由 GSM/EDGE 无线接入网 (GERAN) 所支持的服务 GERAN 小区到由通用地面无线接入网 (UTRAN) 所支持的 UTRAN 小区进行小区重选的集成电路移动台，包括：接收/发送/处理模块，响应于来自服务 GERAN 小区的 GERAN 信号，该信号指示了 UTRAN RSCP 阈值和每 PN 码片从公共导频信道 (CPICH) 接收的能量与在移动台天线连接器处接收的全部功率频谱密度的比率 (E_c/N_0) 的偏移，用于提供指示了该 UTRAN RSCP 阈值的所接收的 GERAN 信号和该比率的偏移；以及小区重选块，响应于指示了该 UTRAN RSCP 阈值和该比率的偏移的所接收的 GERAN 信号，用于建立用于从该服务 GERAN 小区重选 UTRAN 小区的第一和第二重选标准，其中第一重选标准包括一个阈值，该阈值包括该比率 (E_c/N_0) 加上附加在该比率上的偏移，并且第二重选标准包括该 UTRAN RSCP 阈值。

本发明第一模式的优点在于实际上与现有技术所提出的相同的行为可以不经信令改变而完成。还有一个优点就是在某种意义上由 GERAN 广播系统信息的能力早已成熟并且另外的新参数 (例如系统间重选参数) 可能要么不可能，要么就是如果仍加入这些参数则使一些更为重要的扩展在未来无法实现。

第二模式的优点在于，在对现有技术提出改进的情况下可以完成完全相同的移动行为，不过另外，网络能够适当地控制旧有终端 (那些仅符合现有重选规则的终端) 以及新终端。通常该 CPICH E_c/N_0 阈值对于旧有终端应被设置得相当高以避免移动台被周期地重选未加载的 UTRAN 小区，而新的移动设备可以使用更主动的 E_c/N_0 阈值 (由于其由该新的 RSCP 阈值所控制而无上行链路故障的风险)。

另外，由于上行链路故障将取决于移动台的输出功率能力，本发明的方法也更加精确。在移动台具有更高的输出功率能力的优选情况下，将接受更低的 RSCP 阈值。

附图说明

为了更好地理解本发明的本质和目的，结合附图对下文详细描述加以参考，其中：

图 1 是示出了根据本发明的由移动台从 GERAN 小区到 UTRAN 小区的小区重选的一种实施方式的系统方框图；

图 2 是示出了根据本发明的由移动台从 GERAN 小区到 UTRAN 小区的小区重选的一种实施方式的流程图；以及

图 3 是示出了根据本发明的由移动台从 GERAN 小区到 UTRAN 小区的小区重选的另一实施方式的流程图。

具体实施方式

本发明提供了一种由移动台从由 GSM/EDGE 无线接入网 (GERAN) 所支持的服务 GERAN 小区到由通用地面无线接入网 (UTRAN) 所支持的 UTRAN 小区的小区重选的新方法。

根据本发明的第一种实施方式，所涉及的系统间重选行为无需信令改变而实现。在本发明的第一种实施方式中，优点在于，通过使用目标 UTRAN 小区适用标准实现用于系统间重选的阈值。无论何时重选由现有重选参数所触发，移动台都需要读取该目标小区系统信息，这首先是为了评估该小区上的适用标准。根据本发明，对于任何在该重选首先被触发但该目标小区适用标准失败之处的重选尝试，该移动台将为该特定小区存储 RSCP 适用标准 (或 UTRAN RSCP 适用标准)。这个值 (即，该 RSCP 适用阈值)，可选地以偏移加以修改 (例如，使用滞后值或考虑到移动台的功率能力)，该值可以随即被用作对于此特定 UTRAN 小区以及为了重选将要被评估的其他 UTRAN 小区的附加重选标准。该偏移 (例如，该滞后值) 可以由一种标准所固定以便避免信令改变，或者可选地，新参数可能被添加或其他可行的滞后参数也可以用于此目的。

通常，重选标准周期性地被更新以便如果该网络开始广播经修改的值使得该移动台知晓新的值。对所存储的 UTRAN 值的适用性可能限于

相同的时间段但优选的有效性可以是取决时间的。改变的似然性是小的并且如果在广播的值改变后（对于限定时间段这种现象在今天已经发生）该移动台持续使用（一旦读取）UTRAN 参数值则性能的降低将达到限度。相对长的有效时间段通常将允许该移动台避免重复地从该相同的备选小区读取参数因为该移动台可能将移动到其他小区的某一区域。优选的有效性触发仍将是基于事件为原因，正如重选或位置区域改变。根据本发明的第二种实施方式，信令改变的灵活性被用作一种优点。在本发明的第二种实施方式中，不仅相比于 UTRAN CPICH RSCP 的阈值被加入该重选标准，而且另外，对于 UTRAN CPICH Ec/No 的偏移也被加入由那些支持新 UTRAN RSCP 阈值的移动台用于重选评估。另外，不同于现有技术，本发明提出将该滞后和/或移动台输出功率能力作为该 RSCP 接受标准考虑以便恰当地处理具有不同输出功率能力的移动台。

因此，在第一种实施方式中，需要实现在该移动台中用于对特定数量（至少一个）的 UTRAN 小区的该 UTRAN RSCP 适用阈值的附加存储器。在第二种实施方式中，该移动台需要被升级以支持新的重选参数。

图 1 是示出了根据本发明的一种由移动台 10 从 GERAN 小区到 UTRAN 小区进行小区重选的实施方式的系统框图的一个其他示例中的一个。

在图 1 的示例中，该移动台 10 包括小区重选块 14、存储器 12 以及发送/接收/处理模块 16。该小区重选块 14 是用于实现本发明的关键块并且所有由该移动台 10 所执行的、涉及该小区重选的步骤都能够由该小区重选块 14 协调和发起。

根据本发明，该块 14 可以作为软件或硬件块或它们的组合加以实现。另外，该块 14 可以作为分离的块加以实现或者可以与该移动台 10 的任何其他标准块组合。该小区重选块 14 可以使用该存储器 12 存储并取回本发明所描述的相应小区信息。此外，该存储器 12 可以通过各种不同方式实现。其可以是该移动台 10 的通用存储器的一部分或者其可以是分离的专用区域（例如，用户识别模块（SIM）等）。最后，该移动台 10 包括可以由多种方式实现的发送/接收/处理模块 16，这是现有技

术公知的。通常，模块 16 可以包括发射器、接收器、CPU 和 I/O 块等等。基本上，该模块 16 用于提供该小区重选块 14 同网络的有效通信，下文将详细描述。

图 1 示出了至少两个在用于该移动设备 10 的无线电敏感地理区域 24 中的子网 20-1 (GERAN 类型) 和 20-2 (UTRAN 类型)。这两个子网 20-1 和 20-2 中的每个子网包括一定数量的小区，例如，子网 20-1 包括 N 个小区 20-1-1、...20-1-A、...20-1-N 以及子网 20-2 包括 N 个小区 20-2-F、...20-2-A、...20-2-N。根据涉及图 2 和 3 做出的详细描述，该移动台 10 可以例如驻留 (camp on) 在子网 20-1 的服务 GERAN 小区 (例如小区 20-1-A) 上，驻留子网 20-2 的为重选而评估的 UTRAN 小区 (例如小区 20-1-B) 上，或驻留在先前选择的 (在选择该服务小区 20-1-A 之前) UTRAN 小区 20-1-F 上。

网络 38 通常包括网络提供商 (或网络运营商) 26，其向例如该服务 GERAN 小区 20-1-A 提供小区列表信号 33 (在本发明的上下文中)，该小区列表信号包括为从该服务 GERAN 小区 20-1-A 中重选而评估的小区的列表 (GERAN 小区和 UTRAN 小区二者)。

图 2 是示出了根据本发明的第一种由该移动台 10 从 GERAN 小区 (例如服务小区 20-1-A) 到 UTRAN 小区 (例如 UTRAN 小区 20-1-B) 进行小区重选的实施方式的流程图。

图 2 的流程图仅描绘了多种其他可能中的一种可能的情况。在根据本发明第一种实施方式的方法中，在第一步骤 40 中，该移动台 (MS) 10 驻留或“访问”该 UTRAN 小区 (或前一 UTRAN 小区) 20-1-F 并检测 (读取) 适用标准。特别地，该接收/发送/处理模块 16，响应于指示了来自该 UTRAN 小区 20-1-F 的 UTRAN RSCP 适用阈值的阈值信号 31 (见图 1)，向该小区重选块 14 提供了指示了所述 UTRAN RSCP 适用阈值的所接收的阈值信号 22 (见图 1)。

在下一步骤 42 中，该 MS 10 存储 RSCP 适用参数 (即，作为 UTRAN RSCP 适用阈值) 用于后续使用 (例如，将 UTRAN RSCP 适用阈值存储于该存储器 12)。如果该 UTRAN 适用标准不合适该 UTRAN 小区

20-1-F, 则在下一步骤 46 中, 该 MS 选择 GERAN 小区 20-1-A。在下一步骤 48 中, 该 MS 10 (即, 该小区重选块 14) 读取 (见图 1 中的对应信号 30 和 23) 系统信息 (例如, 指向本地可用相邻小区, GERAN 小区和 UTRAN 小区二者, 的指针以及还例如有关重选参数)。

在下一步骤 50 中, 该 MS 10 (即, 该小区重选块 14) 从该先前所存储的 UTRAN 适用参数产生由偏移修改的 RSCP 阈值 (或“阈值”); 所述阈值被用于从 GERAN 小区到 UTRAN 小区的重选标准。该偏移可以包括滞后值或可以使用该 MS 10 的功率能力加以定义 (如上文所指出的)。在下一步骤 52 中, 该 MS 10 (即, 该小区重选块 14) 监视 (见图 1 中的对应信号 32 和 21) UTRAN 相邻小区的 UTRAN CPICH RSCP 电平 (使用步骤 50 中所建立的标准) 和 CPICH E_c/N_0 (此标准经现有技术所定义) 以及 GERAN 相邻小区的 RXLEV (其被选择以为重选而评估)。

在步骤 54 中, 在重选评估后确定是否该重选标准对于 UTRAN 或 GERAN 小区是合适的。如果该重选标准 (经现有技术) 对于该 GERAN 小区合适, 处理转到步骤 46 并且重选新的 GERAN 小区。不过, 如果该重选标准 (在步骤 50 中所建立的) 对于该 UTRAN 小区 (例如小区 20-1-B) 合适, 则该处理转到步骤 40 并且可能重选新的 UTRAN 小区 (见上述步骤 40)。

图 3 是示出了根据本发明的由 MS 10 从 GERAN 小区 (例如, 服务小区 20-1-A) 到 UTRAN 小区 (例如, UTRAN 小区 20-1-B) 的小区重选的第二种实施方式的流程图。

图 3 的流程图仅描绘了多种其他可能性中一种可能的情况。在根据本发明的第一种实施方式的方法中, 在第一步骤 56 中, 该 MS 10 选择该 GERAN 小区 20-1-A 并读取 (见图 1 中的对应信号 30 和 23) 系统信息 (例如, 指向本地可用相邻小区, GERAN 小区和 UTRAN 小区二者, 的指针以及另外有关重选参数)。特别地, 该接收/发送/处理模块 16 响应于 GERAN 信号 30 (见图 1), 该信号指示了 UTRAN RSCP 阈值以及每 PN 码片从公共导频信道 (CPICH) 接收的能量与在移动台天线连接

器处接收的全部功率频谱密度的比率 (E_c/N_0) 的偏移, 向该小区重选块 14 提供所接收的指示了所述 UTRAN RSCP 阈值和所述比率 E_c/N_0 的所述偏移的 GERAN 信号 23。

在下一步骤 60 中, 该 MS 10 (即, 该小区重选块 14) 评估并产生基于该 UTRAN RSCP 阈值并基于以该 E_c/N_0 偏移修改的该 E_c/N_0 阈值的评估标准 (因此保留了为上文所述的新的和旧有设备分别控制该 E_c/N_0 阈值的灵活性)。该 UTRAN RSCP 阈值可以包括滞后值或可以使用该 MS 10 的功率能力加以定义 (正如上文所指出的)。

在下一步骤 62 中 (类似于步骤 52), 该 MS 10 (即, 该小区重选块 14) 监视 (见图 1 中的对应信号 32 和 21) UTRAN 相邻小区的 UTRAN CPICH RSCP 电平 (使用步骤 60 中所建立的标准) 和 CPICH E_c/N_0 (使用步骤 60 中所建立的标准) 以及 GERAN 相邻小区的 RXLEV (其被选择以为重选而评估)。

在步骤 64 中, 在重选评估后确定是否该重选标准对于 UTRAN 或 GERAN 小区是合适的。如果该重选标准 (经现有技术) 对于该 GERAN 小区合适, 处理转到步骤 56 并且重选新的 GERAN 小区。不过, 如果该重选标准 (在步骤 60 中所建立的) 对于该 UTRAN 小区 (例如小区 20-1-B) 合适, 则该处理转到步骤 66 并且可能重选新的 UTRAN 小区。

应该注意到根据本发明的实施方式, 本发明中所描述的系统间小区重选可以被应用于各种新兴的无线接入技术并且不专用于涉及基于 GERAN 和/或 UTRAN 的系统的现有的实现。

正如上文所述, 本发明提供了方法和包括各种提供了执行本方法步骤的功能的模块的相应设备二者。该模块可以实现为硬件, 或可以作为用于由计算机处理器加以执行的软件或固件而实现。特别地, 在固件或软件的情况下, 可以提供本发明作为包括了计算机可读存储结构的计算机程序产品, 在该计算机可读存储结构上实现了用于由计算机处理器执行的计算机程序代码 (即, 该软件或固件)。

应该理解上文所述的布置仅作为对本发明原理的应用加以示出。本领域技术人员在不脱离本发明范围的前提下可以作出许多修改和替代

的布置，并且随附的权利要求书旨在覆盖这些修改和布置。

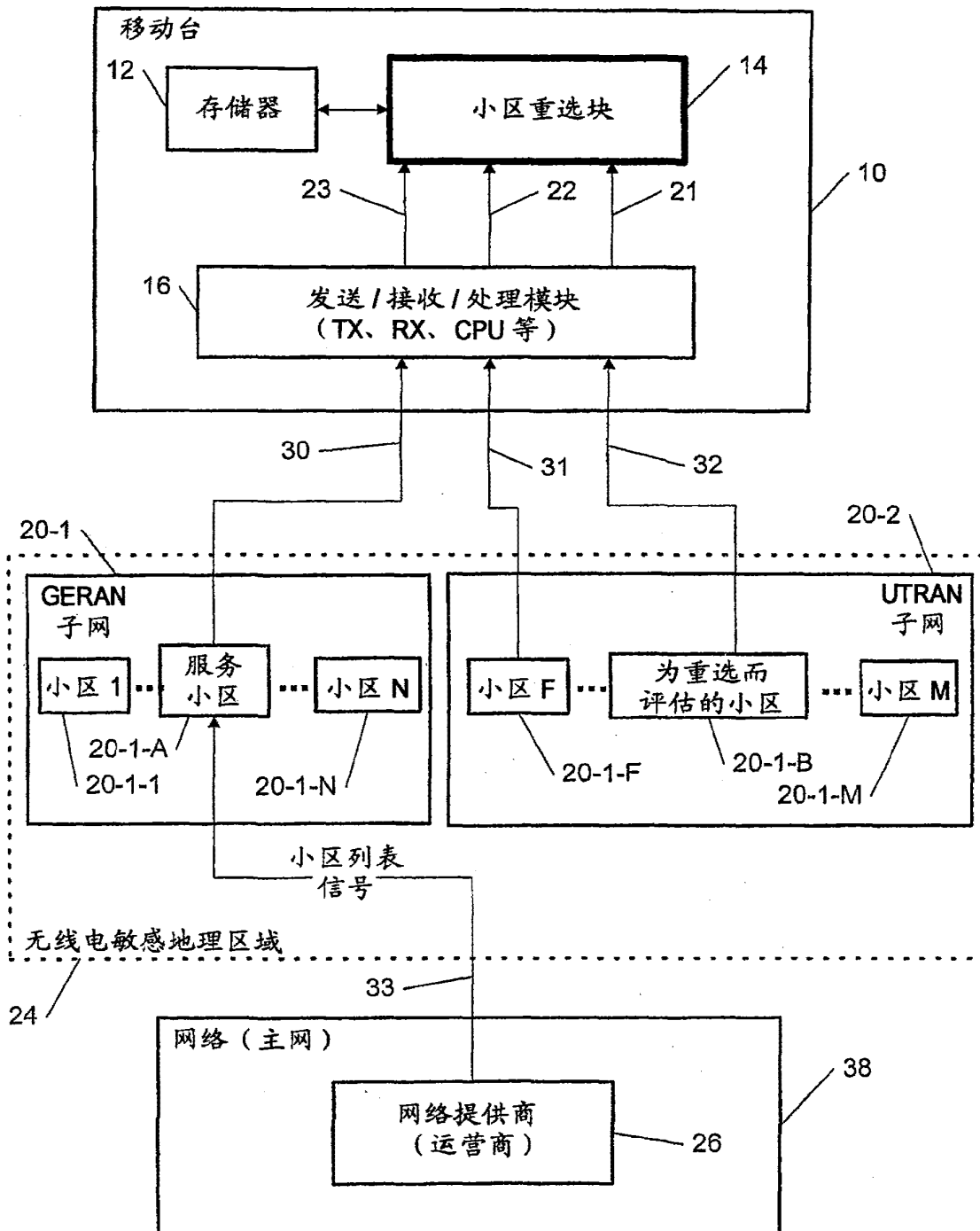


图 1

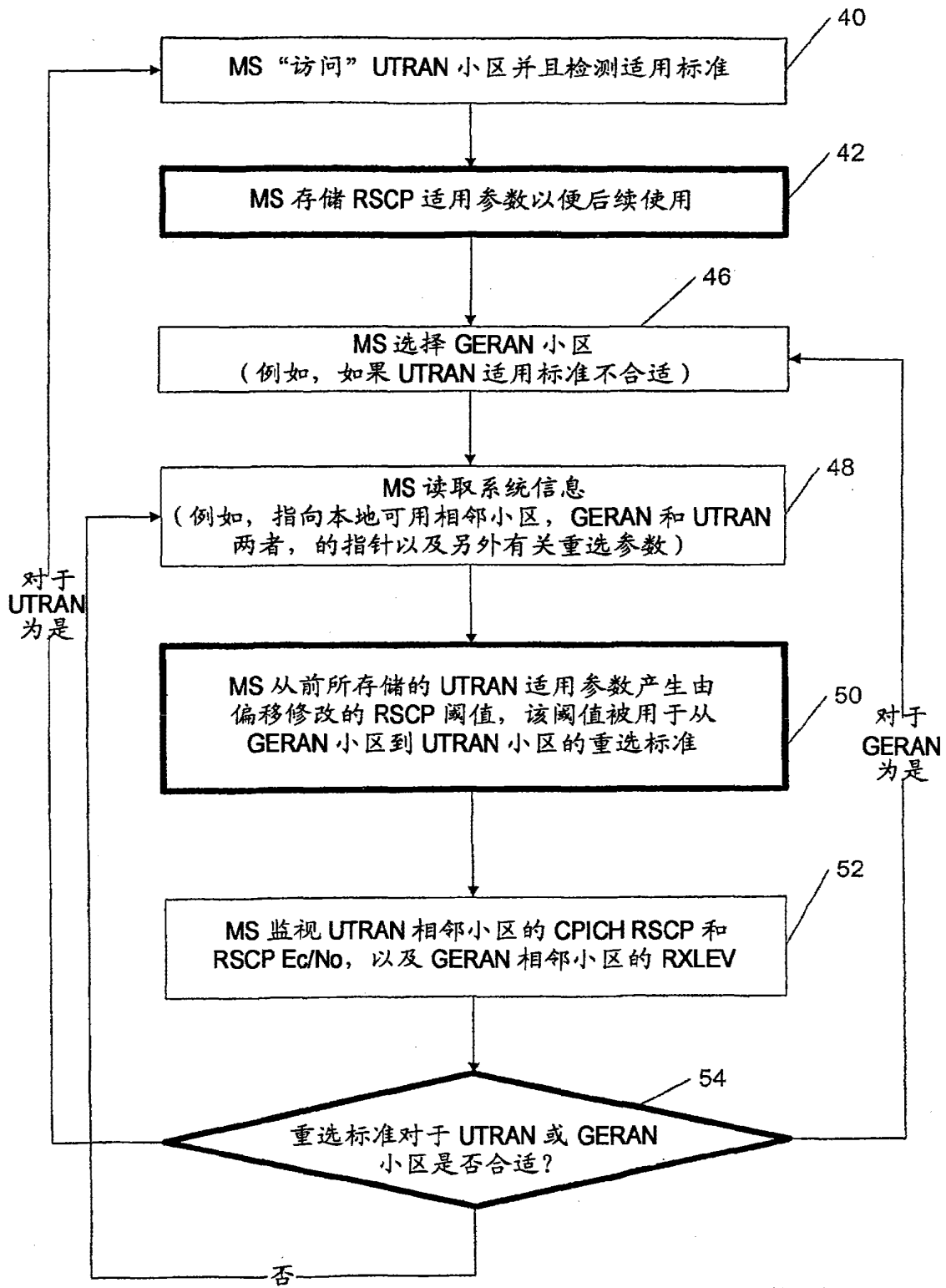


图 2

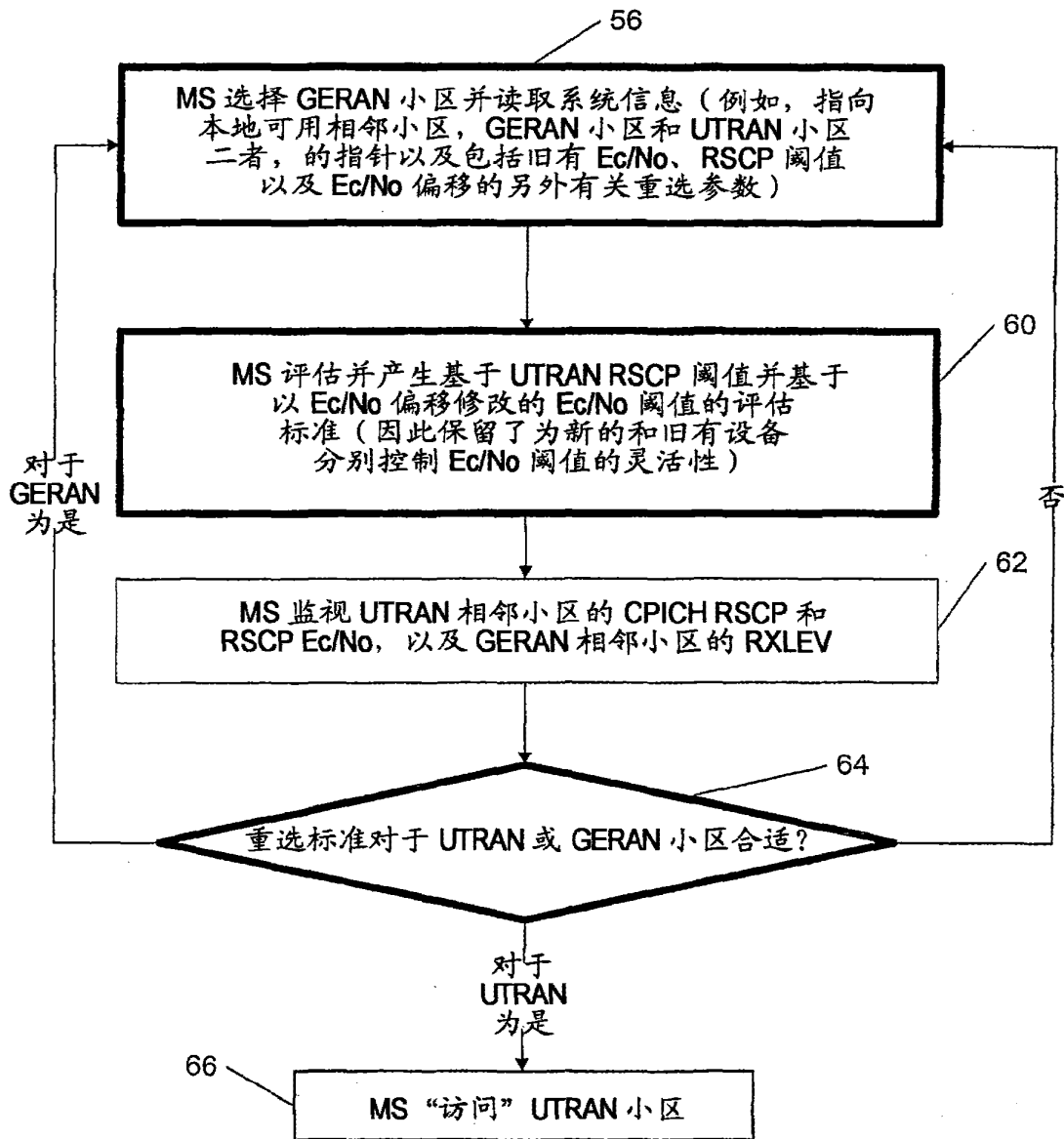


图 3

Subdistrict re-selection method, device and system**Publication number:** CN101132614 (A)**Publication date:** 2008-02-27**Inventor(s):** YANYAN CHEN [CN] +**Applicant(s):** HUAWEI TECH CO LTD [CN] +**Classification:**- **international:** *H04Q7/32; H04Q7/34; H04Q7/38; H04Q7/32; H04Q7/34; H04Q7/38*- **European:****Application number:** CN20061111530 20060821**Priority number(s):** CN20061111530 20060821Abstract of **CN 101132614 (A)**

This invention relates to a re-selection method for local areas, a device and a system for reducing call loss of user devices at connection state including: a UE gets the identity information of a base station where an adjacent area locates and selects a local area in the same identity information with the base station where the current local area of the UE locates in priority based on the identity information of the base station, therefore, UE can influence sequence of current and adjacent local areas based on the identity information of the base station and retarding parameter of call loss and UE can try its best to select an area belonging to a same base station to respond paging of network as much as possible.

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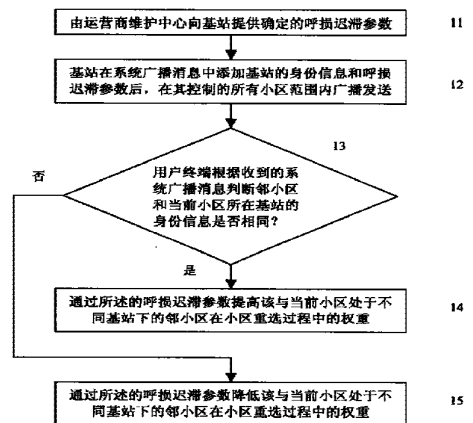
权利要求书 4 页 说明书 17 页 附图 2 页

[54] 发明名称

一种小区重选方法及装置及系统

[57] 摘要

本发明涉及一种减少连接状态用户设备呼损的小区重选方法及装置及系统。本发明主要包括：用户终端获取邻小区所在基站的身份信息，并根据所述基站的身份信息优先选择与用户终端当前小区所在基站的身份信息相同的小区。因此，本发明的实现可以使得在 LTE 系统中，用户终端能够根据基站的身份信息和呼损迟滞参数来影响用户终端当前小区和邻小区的排序，使得用户终端所执行的小区重选能够尽可能的重选到属于同一个基站下的小区，从而使用户终端能够尽量响应网络的寻呼，增加用户终端的业务接通率，减小了用户终端连接状态的呼损率。



1、一种小区重选的实现方法，其特征在于，包括：

用户终端获取邻小区所在基站的身份信息，并根据所述基站的身份信息优先选择与用户终端当前小区所在基站的身份信息相同的小区。

2、如权利要求1所述的方法，其特征在于，所述的身份信息包括：

当前小区的基站标识；或者，

标识所述邻小区与当前小区属于相同或者不同基站的标识。

3、如权利要求1所述的方法，其特征在于，所述的优先选择包括：

若存在与当前小区处于同一基站下的邻小区，则直接在与当前小区处于同一基站下的邻小区中进行小区重选操作；

或者，

对与当前小区处于同一基站下的邻小区和/或处于不同基站下的邻小区的权重进行调整后，在调整权重后的邻小区中进行小区重选操作。

4、如权利要求3所述的方法，其特征在于，所述的对邻小区的权重进行调整的操作包括：

增加与当前小区处于同一基站下的邻小区在小区重选过程中的权重；

和/或，

减少与当前小区处于不同基站下的邻小区在小区重选过程中的权重。

5、如权利要求1至4任一项所述的方法，其特征在于，所述的方法还包括：

将由运营商维护中心根据所需的呼损状况确定基站的各小区的呼损迟滞参数提供给各基站，并由各基站增加相应的基站的身份信息后，通过系统广播消息广播给用户终端。

6、如权利要求5所述的方法，其特征在于，所述的呼损迟滞参数包括：

同基站呼损迟滞参数和/或不同基站呼损迟滞参数。

7、如权利要求6所述的方法，其特征在于，所述的对邻小区的权重进行调整的操作具体包括：

所述的终端收到所述的广播消息后，根据其中的基站的身份信息判断邻小区是否与当前小区属于同一基站；

根据判断结果将与当前小区处于同一基站下的邻小区的小区重选参数进行根据该小区的呼损迟滞参数的增加处理；和/或，将与当前小区处于不同基站下的邻小区的小区重选参数进行根据对应的该小区呼损迟滞参数的减少处理。

8、如权利要求7所述的方法，其特征在于，所述的增加处理，和/或，所述的减少处理具体包括：

根据判断结果将与当前小区处于同一基站下的邻小区的小区重选参数增加网络侧下发的同基站呼损迟滞参数；和/或，将与当前小区处于不同基站下的邻小区的小区重选参数减去网络侧下发的不同基站呼损迟滞参数；

或者，

根据判断结果将与当前小区处于同一基站下的邻小区对应的小区重选参数乘以网络侧下发的同基站呼损迟滞参数；和/或，将与当前小区处于不同基站下的邻小区对应的小区重选参数乘以网络侧下发的不同基站呼损迟滞参数。

9、一种小区重选的实现装置，其特征在于，该装置设置于用户终端中，且所述的装置包括：

基站身份信息确定单元，用于确定邻小区所在基站的身份信息，并提供给小区重选处理单元；

小区重选处理单元，用于根据所述基站的身份信息优先选择与用户终端当前小区所在基站的身份信息相同的小区。

10、如权利要求9所述的装置，其特征在于，所述的基站身份信息确定单元包括：

广播消息接收单元，用于接收基站发来的包含有基站身份信息的广播消息，并提供给基站身份识别单元；

基站身份识别单元，用于根据所述的广播消息接收单元提供的信息确定邻小区所在基站的身份信息，并提供给小区重选处理单元。

11、如权利要求10所述的装置，其特征在于，所述的装置还包括：

呼损迟滞参数接收单元，用于通过广播消息接收单元接收获取广播消息中承载的基站发送的呼损迟滞参数信息，并提供给小区重选处理单元；

且所述的小区重选处理单元包括：

判断处理单元，用于判断确定邻小区是否与用户终端当前所在小区处于同一基站下，并将判断结果提供给小区重选操作单元；

小区重选操作单元，用于根据判断处理单元的判断结果，利用所述的呼损迟滞参数调整优选与用户终端当前所在小区处于同一基站下的邻小区。

12、如权利要求11所述的装置，其特征在于，所述的小区重选操作单元具体包括：

小区重选参数调整单元，用于将用户终端当前所在小区处于同一基站下的小区对应的小区重选参数进行针对该小区的呼损迟滞参数的增加处理，和/或，将用户终端当前所在小区处于不同基站下的小区对应的小区重选参数进行针对该小区的呼损迟滞参数的减少处理；

小区排序处理单元，用于根据调整后的各小区对应的小区重选参数进行排序处理；

小区选择单元，用于根据小区排序处理单元的排序结果进行小区重选。

13、一种用于实现小区重选的系统，其特征在于，包括设置于用户终端中的小区重选的实现装置，以及设置于基站中的标识处理单元和广播消息发

送单元，其中，

标识处理单元，用于在系统广播消息中增加基站的身份信息；

广播消息发送单元，用于在基站控制的所有小区范围内广播所述的系统广播消息。

14、如权利要求13所述的系统，其特征在于，所述的系统还包括：

呼损迟滞参数下发处理单元，用于确定运营商维护中心提供的各小区的呼损迟滞参数，并将所述的呼损迟滞参数添加到所述的系统广播消息中，之后，通过基站中的广播消息发送单元在基站控制的所有小区范围内广播发送该系统广播消息。

15、如权利要求14所述的系统，其特征在于，所述的呼损迟滞参数包括：同基站呼损迟滞参数和/或不同基站呼损迟滞参数。

一种小区重选方法及装置及系统

技术领域

本发明涉及小区重选方法及系统，尤其涉及一种减少连接状态用户设备呼损的小区重选方法及系统。

背景技术

在WCDMA（宽带码分多址）现有技术的小区重选过程中，用户终端在对邻小区和当前小区的信号质量完成测量，并采用R准则进行排序：

用户终端在按照某种特定的准则（如UMTS（通用移动通信系统）的R准则）进行比较后，邻小区的信号好于用户终端当前服务的小区；当邻小区的信号好于用户终端当前服务小区信号，且持续时间达到或高于T_{reselction}（小区重选定时器时长）时，则将重新选择该邻小区作为服务小区。

在现有技术中，若考虑HCS（分层网络）的情况，对测量小区进行的排序的R准则可以表示为：

$$R_s = Q_{\text{meas},s} + Q_{\text{hyst}_s} + Q_{\text{offmbms}}; \quad (1)$$

$$R_n = Q_{\text{meas},n} - Q_{\text{offset}_{s,n}} + Q_{\text{offmbms}} - TO_n * (1 - L_n); \quad (2)$$

其中，

在式（1）中， R_s 为当前小区（即服务小区）的排序值， $Q_{\text{meas},s}$ 是当前小区的测量质量值， Q_{hyst_s} 是处于连接状态的用户终端处于CELL_PCH，CELL_FACH状态时引起的小区重选的滞后值，该值通过系统广播消息下发。

在式（2）中， R_n 是邻小区的排序值，而 $Q_{\text{meas},n}$ 是邻小区的测量值，

$Q_{\text{offset}_{s,n}}$ 是当前小区和邻小区之间进行小区重选的偏置值，该值可以进行自行设置并在系统广播消息中下发。

在式（2）中，分量 TO_n 可以表示为：

$$TO_n = \text{TEMP_OFFSET}_n * W(\text{PENALTY_TIME}_n - T_n)$$

$$L_n = 0 \quad \text{if } \text{HCS_PRIO}_n = \text{HCS_PRIO}_s$$

$$L_n = 1 \quad \text{if } \text{HCS_PRIO}_n \neq \text{HCS_PRIO}_s$$

$$W(x) = 0 \quad \text{for } x < 0$$

$$W(x) = 1 \quad \text{for } x \geq 0$$

其中， TEMP_OFFSET_n 和 PENALTY_TIME_n 仅应用于在系统消息中指示使用HCS的情况。

在式（1）和（2）中， Q_{offmbms} 为应用于MBMS PL（多播广播业务优选频率层）的小区时的偏置因素，即当不考虑MBMS（多播广播业务）的情况时，该偏置 Q_{offmbms} 可以不用考虑。

在上述R准则的描述式中，当不使用HCS情况下时，相应的R准则描述式就可以简化为：

$$R_s = Q_{\text{meas},s} + Q_{\text{hyst}_s}; \quad (3)$$

$$R_n = Q_{\text{meas},n} - Q_{\text{offset}_{s,n}}; \quad (4)$$

从上述式（1）至式（4）描述的公式中可以看出，对于当前小区，在R准则中，其排序值 R_s 是它的测量值 $Q_{\text{meas},s}$ 和一个滞后值 Q_{hyst_s} 之和。而对于邻小区，其排序值 R_n 是它的测量值 $Q_{\text{meas},n}$ 和一个偏置值 $Q_{\text{offset}_{s,n}}$ 之差。也就是说在R准则中，对于当前小区有加值，对于邻小区有减值的处理，以体现优选当前小区的思想。

而且，在WCDMA技术中，由于采用了宏分集技术，使得用户终端服务RNC（Serving RNC，即保存有用户终端RRC上下文的无线网络控制器，是用户终端与核心网的接口）和控制RNC（Controlling RNC，即用户终端使用了控制RNC下的小区资源）可以是不一致的。即，当用户终端进行小区重选

时，如果通过小区重选规则得到的目标小区和当前小区属于不同的RNC时，用户终端也不必要执行SRNS relocation（服务无线网络子系统的重定位）过程来进行用户终端的RRC上下文的搬移过程。

在LTE系统中，由于取消了宏分集技术，使得用户终端的服务基站和控制基站始终是相同的。即，只要用户终端所在小区的服务基站发生了变化，在用户终端的旧服务基站与新的服务基站之间，一定会发生用户终端的RRC上下文搬移的过程。而在上下文搬移的过程中，由于涉及到多条空口信令，在这些信令的交互过程中，会导致用户终端无法响应网络对它的寻呼，因而使业务接通率降低，增大了用户终端连接状态的设备呼损率。

针对上述在LTE系统中，用户终端在不同基站间进行上下文搬移的过程中用户终端的业务接通率降低的缺陷，目前没有相关的技术方案能够解决。

发明内容

本发明的目的是提供一种小区重选的实现方法及装置及系统，使得在空闲状态下的用户终端，在执行小区重选操作过程中能够尽可能的重选到属于同一个基站下的小区中，从而降低呼损率。

本发明的目的是通过以下技术方案实现的：

本发明提供了一种小区重选的实现方法，包括：

用户终端获取邻小区所在基站的身份信息，并根据所述基站的身份信息优先选择与用户终端当前小区所在基站的身份信息相同的小区。

所述的身份信息包括：当前小区的基站标识；或者，标识所述邻小区与当前小区属于相同或者不同基站的标识。

所述的优先选择包括：

若存在与当前小区处于同一基站下的邻小区，则直接在与当前小区处于同一基站下的邻小区中进行小区重选操作；

或者，

对与当前小区处于同一基站下的邻小区和/或处于不同基站下的邻小区的权重进行调整后，在调整权重后的邻小区中进行小区重选操作。

所述的对邻小区的权重进行调整的操作包括：增加与当前小区处于同一基站下的邻小区在小区重选过程中的权重；

和/或，

减少与当前小区处于不同基站下的邻小区在小区重选过程中的权重。

本发明所述的方法还包括：

将由运营商维护中心根据所需的呼损状况确定基站的各小区的呼损迟滞参数提供给各基站，并由各基站增加相应的基站的身份信息后，通过系统广播消息广播给用户终端。

所述的呼损迟滞参数包括：同基站呼损迟滞参数和/或不同基站呼损迟滞参数。

所述的对邻小区的权重进行调整的操作具体包括：

所述的用户终端收到所述的广播消息后，根据其中的基站的身份信息判断邻小区是否与当前小区属于同一基站；

根据判断结果将与当前小区处于同一基站下的邻小区的小区重选参数进行根据该小区的呼损迟滞参数的增加处理；和/或，将与当前小区处于不同基站下的邻小区的小区重选参数进行根据对应的该小区呼损迟滞参数的减少处理。

所述的增加处理，和/或，所述的减少处理具体包括：

根据判断结果将与当前小区处于同一基站下的邻小区的小区重选参数增加网络侧下发的同基站呼损迟滞参数；和/或，将与当前小区处于不同基站下的邻小区的小区重选参数减去网络侧下发的不同基站呼损迟滞参数；

或者，

根据判断结果将与当前小区处于同一基站下的邻小区对应的小区重选参数乘以网络侧下发的同基站呼损迟滞参数；和/或，将与当前小区处于不同基站下的邻小区对应的小区重选参数乘以网络侧下发的不同基站呼损迟滞参数。

本发明还提供了一种小区重选的实现装置，该装置设置于用户终端中，且所述的装置包括：

基站身份信息确定单元，用于确定邻小区所在基站的身份信息，并提供给小区重选处理单元；

小区重选处理单元，用于根据所述基站的身份信息优先选择与用户终端当前小区所在基站的身份信息相同的小区。

所述的基站身份信息确定单元包括：

广播消息接收单元，用于接收基站发来的包含有基站身份信息的广播消息，并提供给基站身份识别单元；

基站身份识别单元，用于根据所述的广播消息接收单元提供的信息确定邻小区所在基站的身份信息，并提供给小区重选处理单元。

本发明所述的装置还包括：

呼损迟滞参数接收单元，用于通过广播消息接收单元接收获取广播消息中承载的基站发送的呼损迟滞参数信息，并提供给小区重选处理单元；

且所述的小区重选处理单元包括：

判断处理单元，用于判断确定邻小区是否与用户终端当前所在小区处于同一基站下，并将判断结果提供给小区重选操作单元；

小区重选操作单元，用于根据判断处理单元的判断结果，利用所述的呼损迟滞参数调整优选与用户终端当前所在小区处于同一基站下的邻小区。

所述的小区重选操作单元具体包括：

小区重选参数调整单元，用于将用户终端当前所在小区处于同一基站下

的小区对应的小区重选参数进行针对该小区的呼损迟滞参数的增加处理，和/或，将用户终端当前所在小区处于不同基站下的小区对应的小区重选参数进行针对该小区的呼损迟滞参数的减少处理；

小区排序处理单元，用于根据调整后的各小区对应的小区重选参数进行排序处理；

小区选择单元，用于根据小区排序处理单元的排序结果进行小区重选。

本发明还提供了一种用于实现小区重选的系统，该系统包括设置于用户终端中的小区重选的实现装置，以及设置于基站中的标识处理单元和广播消息发送单元，其中，

标识处理单元，用于在系统广播消息中增加基站的身份信息；

广播消息发送单元，用于在基站控制的所有小区范围内广播所述的系统广播消息。

本发明所述的系统还包括：

呼损迟滞参数下发处理单元，用于确定运营商维护中心提供的各小区的呼损迟滞参数，并将所述的呼损迟滞参数添加到所述的系统广播消息中，之后，通过基站中的广播消息发送单元在基站控制的所有小区范围内广播发送该系统广播消息。

所述的呼损迟滞参数包括：同基站呼损迟滞参数和/或不同基站呼损迟滞参数。

由上述本发明提供的技术方案可以看出，本发明提出的考虑呼损影响参数的减少连接状态用户终端呼损的小区重选的实现方案，使得用户终端处于连接状态下的小区重选时，能够优先选择与当前小区处于相同基站下的小区，从而使用户终端能够尽量响应网络的寻呼，增加用户终端的业务接通率，减小了用户终端连接状态的设备呼损率，减少了用户的呼叫等待时间。

附图说明

图1为本发明所述的方法的具体实施过程示意图；

图2为本发明所述的系统的具体实施结构示意图。

具体实施方式

本发明的核心是在用户终端进行小区重选过程中，获取邻小区所在基站的身份信息，并根据所述基站的身份信息优先选择与用户终端当前小区所在基站的身份信息相同的小区。

所述的基站的身份信息可以为当前小区的基站标识，或者，标识所述的邻小区与当前小区属于相同基站或者不同基站的标识信息。

本发明中，所述的优先选择可以包括绝对优先选择和相对优先选择两种操作。所述的绝对优先选择是指只要存在处于同一基站下的邻小区，则仅在处于同一基站下的邻小区中进行小区重选；所述的相对优先选择是指当同时存在处于同一基站和不同基站下的邻小区时，则增加相应的处于同一基站下的邻小区在重选过程中的权重，之后，再将所有的邻小区进行排序，并根据排序结果进行小区重选操作，例如，可以通过引入呼损迟滞参数到小区重选中使得同一基站下的邻小区可以在重选过程中的权重得到增加。

为便于对本发明的理解，下面将结合附图对本发明的具体实施方式进行详细说明。

以引入呼损迟滞参数实现本发明为例，相应的本发明的一个具体实施方式的过程图如图1所示，具体包括：

步骤11：由运营商维护中心确定呼损迟滞参数，并向基站提供确定的呼损迟滞参数；

步骤12：基站获得运营商维护中心发送的呼损迟滞参数和基站的身份信

息后，在基站的系统广播消息中添加基站的身份信息和呼损迟滞参数，并在基站控制的所有小区范围内广播包含基站的身份信息和呼损迟滞参数的系统广播消息；

其中，所述的基站的身份信息可以为基站的标识信息，或者，也可以为用于标识相应的邻小区是否与当前小区处于同一基站下的标识，等等。

步骤13：用户终端收到包含基站的身份信息和呼损迟滞参数的系统广播消息后，判断邻小区和当前小区是否属于相同的基站，如果相同，则执行步骤14，否则，执行步骤15；

步骤14：通过所述的呼损迟滞参数提高该与当前小区处于不同基站下的邻小区在小区重选过程中的权重，即提高相应的邻小区在小区重选过程中被选中的可能性；

具体为：用户终端将该邻小区的呼损迟滞参数引入到小区重选排序操作中，并使得根据排序结果可以优先选择该与当前小区处于同一基站下的邻小区，所述的优先是指相对于与当前小区处于不同基站下的邻小区；

步骤15：通过所述的呼损迟滞参数降低该与当前小区处于不同基站下的邻小区在小区重选过程中的权重，即降低相应的邻小区在小区重选过程中被选中的可能性；

具体为：用户终端将该邻小区的呼损迟滞参数引入到小区重选排序操作中，并使得当存在与当前小区处于同一基站下的邻小区时，根据排序结果可以优先选择相应的与当前小区处于同一基站下的邻小区，所述的优先是指相对于与当前小区处于不同基站下的邻小区。

当小区重选的候选小区中同时包括与当前小区处于同一基站下的邻小区和处于不同基站下的邻小区时，所述的步骤14和步骤15可以同时执行，也可以仅执行其中一个步骤。总之，本发明的目的是实现当小区重选过程中待选择的重选小区中同时存在与当前小区处于同一基站下的邻小区和处于不同基

站下的邻小区时，能够尽可能地优先选择处于同一基站下的邻小区。

下面再以基于UMTS的R排序准则实现本发明为例来详细说明所述步骤14和15中的排序操作。

用户终端在R准则的计算中，可以应用呼损迟滞参数影响小区重选排序准则的计算结果。具体的处理方式可以为：使与用户终端处于相同基站下的小区的排序计算结果增加，和/或，使与用户终端处于不同基站下的小区的排序计算结果减少。排序计算结果增加或者减少的具体值可以取决于系统广播消息中下发的呼损迟滞参数值。

针对普遍采用的小区重选的R排序准则，应用呼损迟滞参数值影响R准则计算结果的一种计算方式为：

在LTE系统中，与用户终端处于相同基站下的小区的呼损迟滞参数可以是同基站呼损迟滞参数 $Q_{hyst_{n,sameNB}}$ ，与用户终端处于不同基站下的小区的呼损迟滞参数可以是不同基站呼损迟滞参数 $Q_{hyst_{n,differNB}}$ 。即，当用户终端的邻小区与当前小区处于同一个基站下时，用户终端采用 $Q_{hyst_{n,sameNB}}$ 作为呼损迟滞参数值；当用户终端的邻小区与当前小区处于不同基站下时，用户终端采用 $Q_{hyst_{n,differNB}}$ 作为呼损迟滞参数值。

本发明中，具体的利用所述的呼损迟滞参数调整小区重选参数 R_n 的实现方式包括以下几种：

(一) 如果系统广播消息中下发的是 $Q_{hyst_{n,sameNB}}$ ，那么在那些与当前小区处于相同基站的小区的R准则计算会加上 $Q_{hyst_{n,sameNB}}$ ，即可以为：

$$R_s = Q_{meas,s} + Q_{hyst_s} + Q_{offmbms} \quad (5)$$

$$R_n = Q_{meas,n} - Q_{offset_{s,n}} + Q_{offmbms} + Q_{hyst_{n,sameNB}} \quad (6)$$

例如：假设当前小区A属于基站1，其邻小区B和C分别属于基站1和基站2，在两个邻小区B和C的信号质量测量值相同的情况下，与当前小区属于相同基站的邻小区B的R值会由于 $Q_{hyst_{n,sameNB}}$ 参数的影响，排序在与当前小区

属于不同基站的邻小区C之前，从而使邻小区B成为小区重选结果，从而使得小区重选过程中，在一定条件下优先选择与当前小区处于不同基站下的邻小区作为用户终端的新的服务小区。

(二) 如果系统广播消息中下发的是 $Q_{\text{hyst}_{n,\text{differNB}}}$ ，那么在那些与当前小区处于不同基站的小区的R准则计算会减去这个 $Q_{\text{hyst}_{n,\text{differNB}}}$ ，即可以为：

$$R_s = Q_{\text{meas},s} + Q_{\text{hyst}_s} + Q_{\text{offmbms}} \quad (7)$$

$$R_n = Q_{\text{meas},n} - Q_{\text{offset}_{s,n}} + Q_{\text{offmbms}} - Q_{\text{hyst}_{n,\text{differNB}}} \quad (8)$$

例如：假设当前小区A属于基站1，其邻小区B和C分别属于基站1和基站2，在两个邻小区B和C的信号质量测量值相同的情况下，与当前小区属于不同基站的邻小区C的R值会由于 $Q_{\text{hyst}_{n,\text{differNB}}}$ 参数的影响，排序在邻小区B之后，从而使邻小区B成为小区重选结果。

(三) 如果系统广播消息中下发的参数同时包括所述的 $Q_{\text{hyst}_{n,\text{sameNB}}}$ 值和 $Q_{\text{hyst}_{n,\text{differNB}}}$ 值，则可以同时针对与当前小区处于同一基站的小区 and 处于不同基站的小区对应的小区重选参数利用所述的式(6)和式(8)进行调整，并根据调整后的结果进行邻小区排序，最后实现相应的小区重选操作。

在上述(一)、(二)和(三)所述的处理过程中，式(6)和式(8)分别为根据系统广播消息下发不同呼损迟滞参数值，小区重选排序采用增加和/或减去呼损迟滞参数值的具体排序方法对邻小区的排序值，即邻小区对应的小区重选参数值；式(5)和式(7)分别为对当前小区的排序值。

由上述对小区重选排序的具体处理过程可以看出，在应用呼损迟滞参数值影响R准则的计算结果时，对与当前小区处于相同基站的小区的R准则计算中可以加上该小区的呼损迟滞参数值；对与当前小区处于不同基站的小区的R准则计算中可以减去该小区的呼损迟滞参数值。也就是说在考虑呼损迟滞参数值的R准则中，从而对于与当前小区处于相同基站的小区有加值的处理，和/或，对于与当前小区处于不同基站的小区有减值的处理，以体现优选

与当前小区处于相同基站的小区的思想。

以上为应用呼损迟滞参数值影响R准则计算结果的一种计算方式，因为R准则仅为一个公式，可以将一些会影响小区重选的因素，比如，小区的信号强度，MBMS PL，以及HCS的因素等进行量化后，对这些量化值进行特定的运算（例如，相加或者相减）来得出R准则的计算结果，R值最高的小区作为小区重选的结果。

即，本发明涉及的小区重选的方法，也不限于上述对呼损迟滞参数值的相加或者相减方式，而是可以根据呼损迟滞参数值的具体设置情况和小区重选中需要考虑的其他因素，采取合适的方式来影响小区重选的排序准则。

例如：针对普遍采用的小区重选的R排序准则，应用呼损迟滞参数值影响R准则计算结果的另一种计算方式为：

在LTE系统中，与用户终端处于相同基站下的小区的呼损迟滞参数可以是 $Q_{offset_{n,sameNB}}$ ，与用户终端处于不同基站下的小区的呼损迟滞参数可以是 $Q_{offset_{n,differNB}}$ 。即，当用户终端的邻小区与当前小区处于同一个基站下时，用户终端采用 $Q_{offset_{n,sameNB}}$ 作为呼损迟滞参数值；当用户终端的邻小区与当前小区处于不同基站下时，用户终端采用 $Q_{offset_{n,differNB}}$ 作为呼损迟滞参数值。

也就是说，在网络中可以通过调整 $Q_{offset_{n,sameNB}}$ 和 $Q_{offset_{n,differNB}}$ 参数来达到使终端可以优先选择相同基站下的小区的目的。

此时，具体的利用所述的呼损迟滞参数调整小区重选参数 R_n 的实现方式包括以下几种：

（一）如果系统广播消息中下发的是 $Q_{offset_{n,sameNB}}$ ，那么在那些与当前小区处于相同基站的小区的R准则计算会在 $Q_{offset_{s,n}}$ 上乘以这个 $Q_{offset_{n,sameNB}}$ 值，即可以为：

$$R_s = Q_{meas,s} + Q_{offset_{s,n}} + Q_{offmbms} \quad (9)$$

$$R_n = Q_{\text{meas},n} - Q_{\text{offset},s,n} \times Q_{\text{offset},n,\text{sameNB}} + Q_{\text{offmbms}} \quad (10)$$

例如：假设当前小区A属于基站1，其邻小区B和C分别属于基站1和基站2，在两个邻小区B和C的信号质量测量值相同的情况下，与当前小区属于相同基站的邻小区B的R值会由于 $Q_{\text{offset},n,\text{sameNB}}$ 的影响（ $Q_{\text{offset},n,\text{sameNB}}$ 可以为小于1的任意数值，比如，设置 $Q_{\text{offset},n,\text{sameNB}} = 0.7$ ），即在 $Q_{\text{offset},s,n}$ 上乘以小于1的任意数值，相当于增大了邻小区B的 R_n 值，使得与当前小区属于相同基站的邻小区B排序在与当前小区属于不同基站的邻小区C之前，从而使得小区重选过程中，在一定条件下优先选择与当前小区处于不同基站下的邻小区作为用户终端的新的服务小区。

（二）如果系统广播消息中下发的是 $Q_{\text{offset},n,\text{differNB}}$ ，那么在那些与当前小区处于不同基站的小区的R准则计算会在 $Q_{\text{offset},s,n}$ 上乘以这个 $Q_{\text{offset},n,\text{differNB}}$ 值，即可以为：

$$R_s = Q_{\text{meas},s} + Q_{\text{hyst}_s} + Q_{\text{offmbms}} \quad (11)$$

$$R_n = Q_{\text{meas},n} - Q_{\text{offset},s,n} \times Q_{\text{offset},n,\text{differNB}} + Q_{\text{offmbms}} \quad (12)$$

例如：假设当前小区A属于基站1，其邻小区B和C分别属于基站1和基站2，在两个邻小区B和C的信号质量测量值相同的情况下，与当前小区属于相同基站的邻小区B的R值会由于 $Q_{\text{offset},n,\text{differNB}}$ 的影响（ $Q_{\text{offset},n,\text{differNB}}$ 可以为大于1的任意数值，比如，设置 $Q_{\text{offset},n,\text{differNB}} = 1.7$ ），即在 $Q_{\text{offset},s,n}$ 上乘以大于1的任意数值，相当于减小了邻小区B的 R_n 值，使得与当前小区属于相同基站的邻小区B排序在与当前小区属于不同基站的邻小区C之前，从而使得小区重选过程中，在一定条件下优先选择与当前小区处于不同基站下的邻小区作为用户终端的新的服务小区。

（三）如果系统广播消息中同时下发 $Q_{\text{offset},n,\text{sameNB}}$ 和 $Q_{\text{offset},n,\text{differNB}}$ ，即在与当前小区处于相同基站的小区的R准则计算会在 $Q_{\text{offset},s,n}$ 上乘以 $Q_{\text{offset},n,\text{sameNB}}$ ，同时，在与当前小区处于不同基站的小区的R准则计算会在

$Qoffset_{s,n}$ 上乘以 $Qoffset_{n,differNB}$ ，即在对邻小区的排序操作时，同时进行式(9)、式(10)、式(11)和式(12)的操作。

在上述处理过程中，式(10)和式(12)分别为根据系统广播消息下发不同呼损迟滞参数值，小区重选排序采用乘以该邻小区的呼损迟滞参数值的具体排序方法对邻小区的排序值，即邻小区对应的小区重选参数；式(9)和式(11)分别为对当前小区的排序值。

由上述对小区重选排序的具体处理过程可以看出，在应用呼损迟滞参数值影响R准则的计算结果时，对与当前小区处于相同基站的小区的R准则计算中的 $Qoffset_{s,n}$ 上乘以该小区的同基站呼损迟滞参数值 $Qoffset_{n,sameNB}$ ；对与当前小区处于不同基站的小区的R准则计算中的 $Qoffset_{s,n}$ 上乘以该小区的不同基站呼损迟滞参数值 $Qoffset_{n,differNB}$ ，若同时存在两参数，则 $Qoffset_{n,differNB}$ 参数值需要大于 $Qoffset_{n,sameNB}$ 参数值，比如，设置 $Qoffset_{n,sameNB} = 1.1$ ， $Qoffset_{n,differNB} = 1.2$ 。从而使得本发明的实现能够体现优选与当前小区处于相同基站的小区的思想。

另外，本发明中具体可以由采用不同的方法来确定所述的基站的身份信息，下面将以两个具体的例子进行说明。

第一种基站的身份信息的确定方式可以为：

首先，在基站的系统广播消息中添加当前基站的id（标识），并在此基站控制的所有小区范围内广播包含基站id的系统广播消息。用户终端对邻小区信号进行持续测量得到邻小区信号质量的测量值，同时，会监听邻小区的系统广播消息，即，用户终端能够读取当前小区的系统广播消息和邻小区的系统广播消息，得到当前小区和邻小区的基站id信息，这个基站id值即为此具体实施方式中的基站的身份信息。

根据基站的身份信息进行的排序处理为：

用户终端根据读取到的邻小区所在的基站的id与自己所在小区的基站id进

行比较，根据比较的结果决定是否应用从系统广播消息中获得的呼损迟滞参数来进行排序计算，以及应用相同基站的还是不同基站的呼损迟滞参数来进行排序计算。当邻小区所在的基站的id与自己所在小区的基站id属于同一个基站范围内时，用户终端对邻小区根据预先设定的基于相同基站的呼损迟滞参数的排序处理方式进行排序处理，例如，可以在排序计算结果（即小区重选参数）中增加该迟滞参数 $Q_{hyst_{n,sameNB}}$ 或者在参数 $Q_{offset_{s,n}}$ 上乘以该迟滞参数 $Q_{offset_{n,sameNB}}$ ；当邻小区所在的基站的id与自己所在小区的基站id不属于同一个基站范围内时，用户终端对邻小区根据预先设定的基于不同基站的呼损迟滞参数的排序处理方式进行排序处理，例如，可以在排序计算结果（即小区重选参数）中减去该迟滞参数 $Q_{hyst_{n,differNB}}$ 或者在参数 $Q_{offset_{s,n}}$ 上乘以该迟滞参数 $Q_{offset_{n,differNB}}$ 。

第二种基站的身份信息确定方式可以为：

首先，基站根据网关所配置的邻区列表，在下发系统广播消息之前，判断当前小区与所配置的邻小区是否和当前小区属于相同的基站，之后，在下发的系统广播消息的邻区列表中用特定的标识指示这个判断结果，比如，可以采用标识1表示该邻小区与当前小区属于不同的基站，用标识0表示该邻小区与当前小区属于相同的基站，等等。

根据基站的身份信息进行的排序处理为：

由用户终端对接收到的邻区列表中的标识信息加以判断，即以该标识信息和呼损迟滞参数来决定是否应用从系统广播消息中获得的呼损迟滞参数来进行排序计算。当用户终端收到的基站标识表示邻小区和当前小区属于同一个基站范围内时，用户终端对邻小区根据预先设定的基于相同基站的呼损迟滞参数的排序处理方式进行排序处理，例如，在排序计算结果（即小区重选参数）中增加该迟滞参数 $Q_{hyst_{n,sameNB}}$ 或者在参数 $Q_{offset_{s,n}}$ 上乘以该迟滞参数 $Q_{offset_{n,sameNB}}$ ；当用户终端收到的基站标识表示邻小区和当前小区不属于

同一个基站范围内时，用户终端对邻小区根据预先设定的基于不同基站的呼损迟滞参数的排序处理方式进行排序处理，例如，在排序计算结果（小区重选参数）中减去该迟滞参数 $Q_{\text{hyst}_{n,\text{differNB}}}$ 或者在参数 $Q_{\text{offset}_{s,n}}$ 上乘以该迟滞参数 $Q_{\text{offset}_{n,\text{differNB}}}$ 。

本发明涉及的系统的一个具体实施方式如图2所示，具体包括：

设置于用户终端中的小区重选的实现装置，以及设置于基站中的标识处理单元和广播消息发送处理单元，其中，

所述的标识处理单元用于在需要在基站下所有小区范围内广播的系统广播消息中增加基站的身份信息；

所述的广播消息发送单元用于在基站控制的所有小区范围内广播所述的系统广播消息。

而且，本发明所述的系统还可选地包括：

呼损迟滞参数下发处理单元，用于确定运营商维护中心提供的各小区的呼损迟滞参数，并将所述的呼损迟滞参数添加到所述的系统广播消息中，通过广播消息发送单元发送所述的呼损迟滞参数，之后，在基站控制的所有小区范围内广播发送该系统广播消息；其中，所述的呼损迟滞参数包括：同基站呼损迟滞参数和/或不同基站呼损迟滞参数。

本发明所述的小区重选的实现装置设置于用户终端中，且所述的装置包括：

基站身份信息确定单元

该单元用于确定邻小区所在基站的身份信息，并提供给小区重选处理单元，所述的基站身份信息确定单元包括：

广播消息接收单元，用于接收基站侧通过广播消息发送单元发来的包含有基站身份信息的广播消息，并提供给基站身份识别单元；

基站身份识别单元，用于根据所述的广播消息接收单元提供的信息确定

邻小区所在基站的身份信息，并提供给小区重选处理单元。

小区重选处理单元

该单元用于根据所述基站的身份信息优先选择与用户终端当前小区所在基站的身份信息相同的小区。

而且，所述的装置还可以包括：

呼损迟滞参数接收单元，用于通过广播消息接收单元接收广播消息中承载的基站发送的呼损迟滞参数信息，并提供给小区重选处理单元；

且所述的小区重选处理单元包括：

判断处理单元，邻小区是否与用户终端当前所在小区处于同一基站下，并将判断结果提供给小区重选操作单元；

小区重选操作单元，用于根据判断处理单元的判断结果，利用所述的呼损迟滞参数调整优选与用户终端当前所在小区处于同一基站下的邻小区，所述的小区重选操作单元具体包括以下三个处理单元：

小区重选参数调整单元，用于将用户终端当前所在小区处于同一基站下的小区对应的小区重选参数增加该小区的呼损迟滞参数，和/或，将用户终端当前所在小区处于不同基站下的小区对应的小区重选参数减去该小区的呼损迟滞参数；

小区排序处理单元，用于根据调整后的各小区对应的小区重选参数进行排序处理；

小区选择单元，用于根据小区排序处理单元的排序结果进行小区重选。

综上所述，本发明在小区重选准则中，考虑了连接状态时的用户终端的呼损率，引入了基站的身份信息和根据呼损状况的呼损迟滞参数。使得在LTE系统中，用户终端能够根据基站的身份信息和呼损迟滞参数来影响用户终端当前小区和邻小区的排序，使得用户终端所执行的小区重选能够尽可能的重选到属于同一个基站下的小区，从而使用户终端能够尽量响应网络的寻

呼，增加用户终端的业务接通率，减小了用户终端连接状态的设备呼损率。

以上所述，仅为本发明较佳的具体实施方式，但本发明的保护范围并不局限于此，任何熟悉本技术领域的技术人员在本发明揭露的技术范围内，可轻易想到的变化或替换，都应涵盖在本发明的保护范围之内。因此，本发明的保护范围应该以权利要求的保护范围为准。

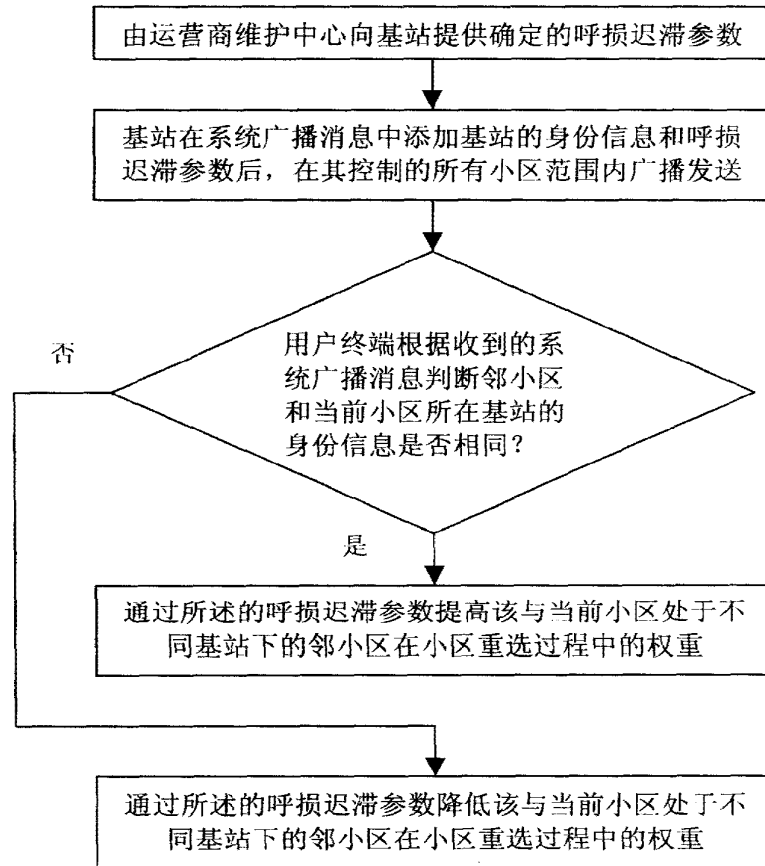


图 1

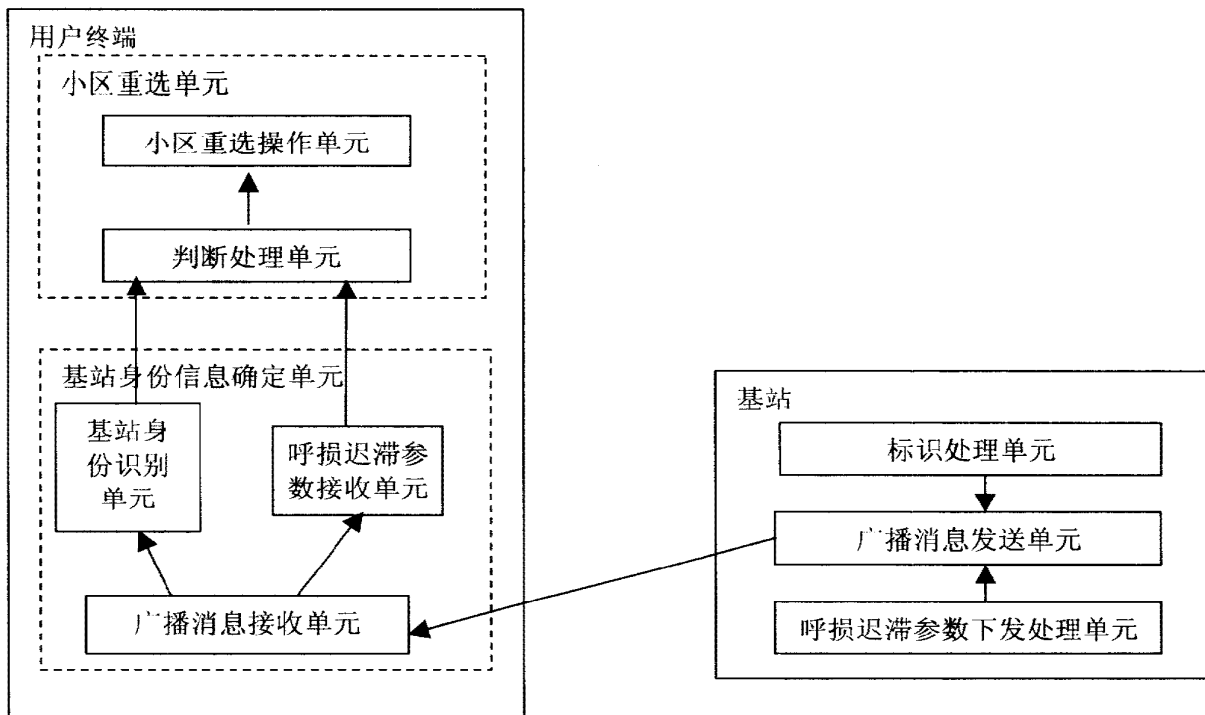


图2

PATENT COOPERATION TREATY
PCT
INTERNATIONAL SEARCH REPORT
(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <p style="text-align: center;">09SGHW017PCT</p>	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. <p style="text-align: center;">PCT/CN2009/071194</p>	International filing date (<i>day/month/year</i>) <p style="text-align: center;">08 Apr. 2009(08.04.2009)</p>	(Earliest)Priority date (<i>day/month/year</i>) <p style="text-align: center;">09 Apr. 2008(09.04.2008)</p>
Applicant <p style="text-align: center;">HUAWEI TECHNOLOGIES CO., LTD. et al.</p>		

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.

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:

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 43.6bis(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

the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

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 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

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/CN2009/071194

Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

A cell reselection method, terminal and system in mobile communication field are provided. The method includes: the terminal obtaining a private PRI (priority) list from a first system; the terminal performing cell reselection according to the private PRI list when the terminal resides in a cell of a second system. A terminal and system are provided in the present invention. In the present invention, the terminal performs cell reselection according to the private PRI list obtained from the first system, thus the second system would avoid making the private PRI list, and the problems of more signaling increase and high cost of network update caused by making the private PRI list in the prior art are solved.

INTERNATIONAL SEARCH REPORT

International application No. PCT/CN2009/071194

A. CLASSIFICATION OF SUBJECT MATTER <p style="text-align: center;">H04W36/00 (2009.01)j</p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>		
B. FIELDS SEARCHED <p>Minimum documentation searched (classification system followed by classification symbols)</p> <p style="text-align: center;">IPC: H04W36/12, H04W36/08, H04W36/-, H04Q</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)</p> <p>CNPAT,CNKI; EPODOC,WPI,PAJ: cell, reselect, select/choose, PRI/priority, system, different/second, LTE/long term evolution, search</p>		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN1965605A (NOKIA CORP) 16 May 2007 (16.05.2007) the whole document	1-12
A	CN1675957 A (MOTOROLA INC) 28 Sept. 2005 (28.09.2005) the whole document	1-12
A	CN1832601A (LG ELECTRONICS CHINA CO LTD) 13 Sept. 2006 (13.09.2006) the whole document	1-12
A	CN101132614A (HUAWEI TECHNOLOGY CO LTD) 27 Feb. 2008 (27.02.2008) the whole document	1-12
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents:	“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	
“A” document defining the general state of the art which is not considered to be of particular relevance “E” earlier application or patent but published on or after the international filing date “L” document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified) “O” document referring to an oral disclosure, use, exhibition or other means “P” document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search <p style="text-align: center;">01 Jul.2009 (01.07.2009)</p>	Date of mailing of the international search report <p style="text-align: center;">16 Jul. 2009 (16.07.2009)</p>	
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer <p style="text-align: center;">WANG Chunyan</p> Telephone No. (86-10)62411355	

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2009/071194

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN1965605A	16.05.2007	WO2005122621 A1	22.12.2005
		US2006009253 A1	12.01.2006
		EP1757147 A1	28.02.2007
		AU2005253278 A1	22.12.2005
		KR20070021311 A	22.02.2007
		JP2008502253 T	224.01.2008
		ZA200700196 A	28.05.2008
		INDELNP200607946 E	27.04.2007
CN1675957A	28.09.2005	GB2392346 A	25.02.2004
		WO2004019644 A1	04.03.2004
		AU2003237942 A1	11.03.2004
		EP1532832 A1	25.05.1005
		GB2392346 B	18.01.2006
		EP1532832 B1	05.07.2006
		DE60306658 E	17.08.2006
		DE60306658 T2	28.06.2007
CN1832601A	13.09.2006	KR20060098729 A	19.09.2006
		KR100672471 B1	24.01.2007
CN101132614 A	27.02.2008	None	

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION			
First Named Inventor/Applicant Name:	Michael ROBERTS			
Filer:	John B. Conklin/Leanna Bultema			
Attorney Docket Number:	HW707010			
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	330	330
Utility Search Fee	1111	1	540	540
Utility Examination Fee	1311	1	220	220
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 (\$)				1090

Electronic Acknowledgement Receipt

EFS ID:	8610990
Application Number:	12902933
International Application Number:	
Confirmation Number:	2965
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Customer Number:	77399
Filer:	John B. Conklin/Leanna Bultema
Filer Authorized By:	John B. Conklin
Attorney Docket Number:	HW707010
Receipt Date:	12-OCT-2010
Filing Date:	
Time Stamp:	17:39:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$1090
RAM confirmation Number	5227
Deposit Account	121216
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Transmittal of New Application	Application_Transmittal.pdf	132470 9dea3f44857f343b59c9191708fc93a67d0fd3fe	no	2
Warnings:					
Information:					
2	Application Data Sheet	ADS_.pdf	59982 e1aa8991d3c5fc5aab22845088307b7b2e33a6c5	no	5
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
3	Specification	Application.pdf	106525 a6538bb6ad4b688c913a6f64ad15c6d843b9ee5c	no	21
Warnings:					
Information:					
4	Drawings-only black and white line drawings	Drawings.pdf	94910 0c44abc2d5dadfe1d63d8257db7ccabaae6f2b38	no	3
Warnings:					
Information:					
5	Transmittal Letter	IDS_1st.pdf	64530 386afd2acbc6fb7e2d3df7c5def2a0c1756e5c0c	no	4
Warnings:					
Information:					
6	Information Disclosure Statement (IDS) Filed (SB/08)	1449Form_1st.pdf	24517 ea8af371821c2f78418a2c7c111e4d42fc51fc3	no	1
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Information:					
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7	Foreign Reference	WO2009045078.pdf	1617218 b241fa8cc4160a43212ae9bbd4aa503549030fed	no	33
Warnings:					
Information:					
8	Foreign Reference	CN1832601A.pdf	534616 eab05600796aaf61cc877f7998256c0f1d46c977	no	10
Warnings:					
Information:					

9	Foreign Reference	CN1675957A.pdf	1561553	no	31
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Warnings:					
Information:					
10	Foreign Reference	CN1965605A.pdf	1316874	no	24
			e3f9a0e940a2b5fcb2311d54d48c8b9754c83cc6		
Warnings:					
Information:					
11	Foreign Reference	CN101132614A.pdf	1191491	no	25
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Information:					
12	NPL Documents	3GPP_Evolved_Universal_Terrestrial_Radio_Access.pdf	275389	no	29
			f2f42f66bd5e49dbd0c44370014b5b1a43942c5a		
Warnings:					
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13	NPL Documents	PCT_WrittenOpinion.pdf	140101	no	4
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Warnings:					
Information:					
14	Fee Worksheet (PTO-875)	fee-info.pdf	32911	no	2
			a0d5113b4b901d4553cbb8e86ccce99f2f31879		
Warnings:					
Information:					
Total Files Size (in bytes):			7153087		

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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.

Date: 10/12/10

Approved for use through 7/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/902,933
---	---

APPLICATION AS FILED – PART I

(Column 1) (Column 2)

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$270 (\$135 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))		

SMALL ENTITY

RATE (\$)	FEE (\$)
N/A	
N/A	
N/A	
x\$26	
x\$110	
195	
TOTAL	

OR OTHER THAN SMALL ENTITY

RATE (\$)	FEE (\$)
N/A	330
N/A	540
N/A	220
x\$52	
x\$220	
390	
TOTAL	1090

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED – PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA
	Total (37 CFR 1.16(i))	*	Minus	**	=
Independent (37 CFR 1.16(h))	*	Minus	***	=	
Application Size Fee (37 CFR 1.16(s))					
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					

SMALL ENTITY

RATE (\$)	ADDITIONAL FEE (\$)
X =	
X =	
N/A	
TOTAL	
ADD'T FEE	

OR OTHER THAN SMALL ENTITY

RATE (\$)	ADDITIONAL FEE (\$)
X =	
X =	
N/A	
TOTAL	
ADD'T FEE	

(Column 1) (Column 2) (Column 3)

AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA
	Total (37 CFR 1.16(i))	*	Minus	**	=
Independent (37 CFR 1.16(h))	*	Minus	***	=	
Application Size Fee (37 CFR 1.16(s))					
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					

SMALL ENTITY

RATE (\$)	ADDITIONAL FEE (\$)
X =	
X =	
N/A	
TOTAL	
ADD'T FEE	

OR OTHER THAN SMALL ENTITY

RATE (\$)	ADDITIONAL FEE (\$)
X =	
X =	
N/A	
TOTAL	
ADD'T 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.

This collection of information is required by 37 CFR 1.16. 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, 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.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



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Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY. DOCKET NO, TOT CLAIMS, IND CLAIMS. Row 1: 12/902,933, 10/12/2010, 2617, 1090, HW707010, 20, 2

CONFIRMATION NO. 2965

FILING RECEIPT



77399
Leydig, Voit & Mayer, Ltd
(for Huawei Technologies Co., Ltd)
Two Prudential Plaza Suite 4900
180 North Stetson Avenue
Chicago, IL 60601

Date Mailed: 10/25/2010

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)

Michael ROBERTS, Kista, SWEDEN;
Johan Johansson, Kungsangen, SWEDEN;
Boyun Xie, Shenzhen, CHINA;
Min Huang, Shenzhen, CHINA;

Assignment For Published Patent Application

Huawei Technologies Co., Ltd., Shenzhen, CHINA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of PCT/CN2009/071194 04/08/2009

Foreign Applications

CHINA 200810091957.6 04/09/2008

If Required, Foreign Filing License Granted: 10/21/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US 12/902,933

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

Title

METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION

Preliminary Class

455

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

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

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 Assets Control, 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).



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

Table with 4 columns: APPLICATION NUMBER (12/902,933), FILING OR 371(C) DATE (10/12/2010), FIRST NAMED APPLICANT (Michael ROBERTS), ATTY. DOCKET NO./TITLE (HW707010)

CONFIRMATION NO. 2965

FORMALITIES LETTER



77399
Leydig, Voit & Mayer, Ltd
(for Huawei Technologies Co., Ltd)
Two Prudential Plaza Suite 4900
180 North Stetson Avenue
Chicago, IL 60601

Date Mailed: 10/25/2010

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given TWO MONTHS from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The oath or declaration is missing.
A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of \$130 for a non-small entity, must be submitted with the missing items identified in this notice.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is \$130 for a non-small entity

- \$130 Surcharge.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
<https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/hteffer/

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
12/902,933	10/12/2010	Michael ROBERTS	HW707010

CONFIRMATION NO. 2965

FORMALITIES LETTER

77399
Leydig, Voit & Mayer, Ltd
(for Huawei Technologies Co., Ltd)
Two Prudential Plaza Suite 4900
180 North Stetson Avenue
Chicago, IL 60601

Due Date
Response to Missing
Parts Due 12/25/10
(Initial) 05/25/11 (Final)



Date Mailed: 10/25/2010

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The oath or declaration is missing.
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Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

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SUMMARY OF FEES DUE:

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- **\$130** Surcharge.

Replies should be mailed to:

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Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
<https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/hteffer/

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

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

Declaration and Power of Attorney for Patent Application

專利申請聲明及委託書

Chinese Language Declaration

中文聲明

作為下述發明者，我在此宣告：

As a below named inventor, I hereby declare that:

我的住址、郵局地址和國籍均列在我名下，

My residence, post office address and citizenship are as stated next to my name.

我相信我是首創的、第一個和唯一的發明者（如只列出一人姓名）或是首創的、首位共同發明者（如列出數人姓名）。我提出作為專利申請要求的題目如下

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION

如不在下面小方格中打叉則須將說明書附此：

the specification of which is attached hereto unless the following box is checked:

以美國申請號碼或 PCT 國際申請號碼

was filed on 12 October 2010

as United States Application Number or PCT

International Application Number

12902933 and was amended on

(if applicable).

我在此聲明我已閱畢並理解上述說明書的內容，包括上述任何修正案所修正的權利要求。

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

按照聯邦法規第三十七節第一、五六條，我有責任提供支持專利權的實質性資料。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

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

Chinese Language Declaration

我申請享受按照美國法規第三十五節第一百一十九條(a)-(b)項或第 365 條(b)項列出的以下任何外國專利申請書或發明者證書或第 365 條(a)項列出任何 PCT 國際申請指定至少在美國以外的任何一個國家的外國優先權，具有優先權申請前立案日期的、任何外國專利申請書或發明者證書或是 PCT 國際申請書。

I hereby claim foreign priority under Title 35, United States Code, § 119(a)-(d) or § 365(b) of 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, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)
國外優先申請書

Priority Not Claimed
不要求優先權

200810091957.6 (Number) (號碼)	China (Country) (國名)	09 April 2008 (Day/Month/Year Filed) (申請日/月/年)	<input type="checkbox"/>
_____ (Number) (號碼)	_____ (Country) (國名)	_____ (Day/Month/Year Filed) (申請日/月/年)	<input type="checkbox"/>
_____ (Number) (號碼)	_____ (Country) (國名)	_____ (Day/Month/Year Filed) (申請日/月/年)	<input type="checkbox"/>

我申請享受被美國法規第 35 節 119(e)列出的以下任何美國臨時申請書的利益。

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

_____ (Application No.) (申請順序號碼)	_____ (Filing Date) (申請日期)	_____ (Application No.) (申請順序號碼)	_____ (Filing Date) (申請日期)
--	----------------------------------	--	----------------------------------

我申請享受按照美國法規第三十五節第一百二十條或第 365 條(c)項列出任何 PCT 國際申請所指定的美國列出的以下任何美國申請書的利益。如果此申請書中提出的每項權利要求的題目按美國法規或 PCT 國際申請第三十五節第一百二十條第一段的要求在以前的美國申請書中披露，則我有責任按照聯邦法規第三十五節第一、五六條(甲)條提供支持專利權的實質性資料，這一法規條文生效于以前申請的立案日期之後、但在美國或 PCT 國際申請立案日期之前。

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, 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 Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

PCT/CN2009/071194 (Application No.) (申請順序號碼)	08 April 2009 (Filing Date) (申請日期)	pending (Status) (patented, pending, abandoned) (狀況)(已獲專利權、申請中、取消)
_____ (Application No.) (申請順序號碼)	_____ (Filing Date) (申請日期)	_____ (Status) (patented, pending, abandoned) (狀況)(已獲專利權、申請中、取消)

我在此聲明根據我所知而作的所有聲明都真實無誤，所有有關資料和信息的聲明也真實無誤；我還知道，按照美國法規第十八節第一千零一項，任何蓄意偽造的聲明都將受到罰款或監禁，或同時受到兩種懲罰。這類蓄意偽造的聲明將危及此申請書或任何已頒發專利的效力。

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 of any patent issued thereon.

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

Chinese Language Declaration

委託書：

以列名發明者的身份，我在此指定下列律師和/或代理人執行此申請並從事與專利商標公署有關的所有業務(列出姓名和註冊號碼)：

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (list name and registration number)

PTO Customer Number **77399**

Leydig, Voit & Mayer, Ltd.

通訊地址

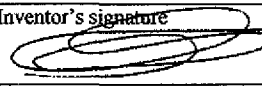
Send Correspondence to:

Address associated with Customer Number 77399

直撥電話(姓名及電話號碼)

Direct Telephone Calls to: *(name and telephone number)*

John B. Conklin, Reg. No. 30,369
312-616-5600

第一個或唯一的發明者全名	Full name of sole or first inventor Michael ROBERTS
發明者簽字	Inventor's signature  Date <u>26 Oct, 2010</u>
地址	Residence Sweden
國籍	Citizenship Swedish
郵局地址	Post Office Address Haukadalsgatan 3 PO Box 54, Kista Sweden

第二個共同發明者全名(如有)	Full name of second joint inventor, if any Johan JOHANSSON
第二個發明者簽字	Inventor's signature _____ Inventor's signature _____
地址	Residence Sweden
國籍	Citizenship Swedish
郵局地址	Post Office Address Haukadalsgatan 3 PO Box 54, Kista Sweden

(第三個和其他共同發明者需提供同樣資料和簽字。)

(Supply similar information and signature for third and subsequent joint inventors.)

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

Chinese Language Declaration

委託書：
 以列名發明者的身份，我在此指定下列律師和/或代理人執行此申請並從事與專利商標公署有關的所有業務(列出姓名和註冊號碼)：

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (list name and registration number)

PTO Customer Number **77399**

Leydig, Voit & Mayer, Ltd.

通訊地址

Send Correspondence to:

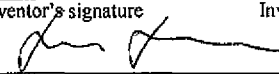
Address associated with Customer Number 77399

直接電話(姓名及電話號碼)

Direct Telephone Calls to: (name and telephone number)

John B. Conklin, Reg. No. 30,369
 312-616-5600

第一個或唯一的發明者全名	Full name of sole or first inventor Michael ROBERTS
發明者簽字	Inventor's signature Date
地址	Residence Sweden
國籍	Citizenship Swedish
郵局地址	Post Office Address Haukadalsgatan 3 PO Box 54, Kista Sweden

第二個共同發明者全名(如有)	Full name of second joint inventor, if any Johan JOHANSSON
第二個發明者簽字	Inventor's signature Inventor's signature  SEPT 20, 2010
地址	Residence Sweden
國籍	Citizenship Swedish
郵局地址	Post Office Address Haukadalsgatan 3 PO Box 54, Kista Sweden

(第三個和其他共同發明者需提供同樣資料和簽字。)

(Supply similar information and signature for third and subsequent joint inventors.)

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

第三個共同發明者全名(如有)	Full name of third joint inventor, if any Boyun XIE
第三個發明者簽字 日期	Inventor's signature Date Boyun XIE September 20, 2010
地址:	Residence Shenzhen, China
國籍	Citizenship China
郵局地址	Post Office Address Huawei Administration Building Bantian, Longgang District Shenzhen 518129, Guangdong P.R. China
第四個共同發明者全名(如有)	Full name of fourth joint inventor, if any Min HUANG
第四個發明者簽字 日期	Inventor's signature Date
地址:	Residence Shenzhen, China
國籍	Citizenship China
郵局地址	Post Office Address Huawei Administration Building Bantian, Longgang District Shenzhen 518129, Guangdong P.R. China
第五個共同發明者全名(如有)	Full name of fifth joint inventor, if any
第五個發明者簽字 日期	Inventor's signature Date
地址:	Residence Shenzhen, China
國籍	Citizenship China
郵局地址	Post Office Address Huawei Administration Building Bantian, Longgang District Shenzhen 518129, Guangdong P.R. China
第六個共同發明者全名(如有)	Full name of sixth joint inventor, if any
第六個發明者簽字 日期	Inventor's signature Date
地址:	Residence Shenzhen, China
國籍	Citizenship China
郵局地址	Post Office Address Huawei Administration Building Bantian, Longgang District Shenzhen 518129, Guangdong P.R. China

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

第三個共同發明者全名(如有)	Full name of third joint inventor, if any Boyun XIE
第三個發明者簽字 日期	Inventor's signature Date
地址	Residence Shenzhen, China
國籍	Citizenship China
郵局地址	Post Office Address Huawei Administration Building Bantian, Longgang District Shenzhen 518129, Guangdong P.R. China
第四個共同發明者全名(如有)	Full name of fourth joint inventor, if any Min HUANG
第四個發明者簽字 日期	Inventor's signature Date <i>Min HUANG</i> <i>2010-09-28</i>
地址	Residence Shenzhen, China
國籍	Citizenship China
郵局地址	Post Office Address Huawei Administration Building Bantian, Longgang District Shenzhen 518129, Guangdong P.R. China
第五個共同發明者全名(如有)	Full name of fifth joint inventor, if any
第五個發明者簽字 日期	Inventor's signature Date
地址	Residence Shenzhen, China
國籍	Citizenship China
郵局地址	Post Office Address Huawei Administration Building Bantian, Longgang District Shenzhen 518129, Guangdong P.R. China
第六個共同發明者全名(如有)	Full name of sixth joint inventor, if any
第六個發明者簽字 日期	Inventor's signature Date
地址	Residence Shenzhen, China
國籍	Citizenship China
郵局地址	Post Office Address Huawei Administration Building Bantian, Longgang District Shenzhen 518129, Guangdong P.R. China

Electronic Patent Application Fee Transmittal

Application Number:	12902933
Filing Date:	12-Oct-2010
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Filer:	John B. Conklin/Leanna Bultema
Attorney Docket Number:	HW707010

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Late filing fee for oath or declaration	1051	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:	8706390
Application Number:	12902933
International Application Number:	
Confirmation Number:	2965
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Customer Number:	77399
Filer:	John B. Conklin/Leanna Bultema
Filer Authorized By:	John B. Conklin
Attorney Docket Number:	HW707010
Receipt Date:	26-OCT-2010
Filing Date:	12-OCT-2010
Time Stamp:	16:54:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$130
RAM confirmation Number	3561
Deposit Account	121216
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Applicant Response to Pre-Exam Formalities Notice	NoticeofMissingParts.pdf	563943	no	2
			7ae5c075569aae9eceebbb5a98094289cc5b356e		
Warnings:					
Information:					
2	Oath or Declaration filed	Declaration.pdf	206882	no	6
			29b34d9a14aa36b1be1bebeea09d27c87eaa44f1		
Warnings:					
Information:					
3	Fee Worksheet (PTO-875)	fee-info.pdf	29911	no	2
			882da4082cdc5f8de6d01be23cd11d82e83a8d4		
Warnings:					
Information:					
Total Files Size (in bytes):			800736		

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.

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Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY. DOCKET NO, TOT CLAIMS, IND CLAIMS. Row 1: 12/902,933, 10/12/2010, 2617, 1220, HW707010, 20, 2

CONFIRMATION NO. 2965

UPDATED FILING RECEIPT



77399
Leydig, Voit & Mayer, Ltd
(for Huawei Technologies Co., Ltd)
Two Prudential Plaza Suite 4900
180 North Stetson Avenue
Chicago, IL 60601

Date Mailed: 11/02/2010

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

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Assignment For Published Patent Application

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Power of Attorney: The patent practitioners associated with Customer Number 77399

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Foreign Applications

CHINA 200810091957.6 04/09/2008

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The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US 12/902,933

Projected Publication Date: 02/10/2011

Non-Publication Request: No

Early Publication Request: No

Title

METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION

Preliminary Class

455

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leydig

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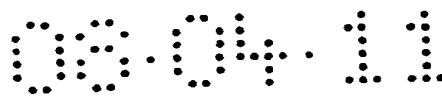
证 明

本证明之附件是向本局提交的下列专利申请文件副本。

申请 日： 2008年04月09日
申请 号： 200810091957.6
申 请 类 别： 发明专利
发 明 名 称： 小区重选的方法、终端及系统
申 请 人： 华为技术有限公司
发 明 人： 迈克尔·罗伯茨、约翰·约翰松、谢铂云、黄敏

中华人民共和国
国家知识产权局局长

2010 年 11 月 30 日



权利要求书

1、一种小区重选的方法，其特征在于，所述方法包括：

终端从长期演进系统中获取专用优先级列表；

所述终端驻留在非长期演进系统的小区时，根据所述专用优先级列表进行小区重选。

5

2、根据权利要求1所述的方法，其特征在于，所述终端从长期演进系统中获取专用优先级列表失败，则所述终端驻留在非长期演进系统的小区时，

根据公共优先级列表进行小区重选；或者，

根据按照小区信号质量准则进行测量的结果进行小区重选。

10

3、根据权利要求2所述的方法，其特征在于，

所述公共优先级列表为所述终端从所述长期演进系统中获取的公共优先级列表；

当所述终端未从所述长期演进系统中获取公共优先级列表时，所述公共优先级列表为所述终端从所述非长期演进系统中获取的公共优先级列表。

15

4、根据权利要求1所述的方法，其特征在于，还包括：

所述终端从长期演进系统中获取所述专用优先级列表的有效时间，所述有效时间超时前，所述终端根据所述专用优先级列表进行小区重选；

所述有效时间超时后，所述专用优先级列表无效。

20

5、根据权利要求2所述的方法，其特征在于，还包括：

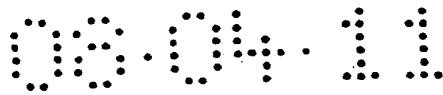
所述终端从所述非长期演进系统获取指示，所述指示用于通知所述终端以下任一项或者其组合：

所述非长期演进系统不下发公共优先级列表，所述终端保存从所述长期演进系统中获取的公共优先级列表；

25

所述专用优先级列表无效后，搜索长期演进系统的小区；

所述终端未保存所述专用优先级列表和所述公共优先级列表时，根据按照小区信号质量准则进行测量的结果进行小区重选，或者搜索长期演进系统的小区。



6、一种终端，其特征在于，包括：

第一获取模块，用于从长期演进系统中获取专用优先级列表；

第一存储模块，用于保存所述专用优先级列表；

第一处理模块，用于当所述终端驻留在非长期演进系统时，根据所述第一存储模块存储

5 的专用优先级列表进行小区重选。

7、根据权利要求 6 所述的终端，其特征在于，还包括：

第二获取模块，用于从所述长期演进系统和/或非长期演进系统中获取公共优先级列表；

第二存储模块，用于保存所述公共优先级列表；

10 第二处理模块，用于当所述终端驻留在非长期演进系统，且所述第一存储模块未保存有效的专用优先级列表时，根据所述第二存储模块存储的公共优先级列表进行小区重选。

8、根据权利要求 6 所述的终端，其特征在于，还包括：

第三获取模块，用于从非长期演进系统中获取指示；

15 第三存储模块，用于存储所述指示；

第三处理模块，用于根据所述第三存储模块存储的指示进行操作。

9、一种系统，其特征在于，所述系统包括网络侧设备和终端，

20 所述网络侧设备，用于向终端下发指示，所述指示用于通知所述终端以下任一项或者其组合：所述终端驻留的非长期演进系统不下发公共优先级列表，或者所述终端保存从长期演进系统中获取的公共优先级列表，或者所述终端保存的专用优先级列表无效后，搜索长期演进系统的小区，或者所述终端未保存专用优先级列表和公共优先级列表时，根据按照小区信号质量准则进行测量的结果进行小区重选，或者搜索长期演进系统的小区；

所述终端，用于接收所述网络侧设备的指示，并根据所述指示进行小区重选。

25 10、一种系统，其特征在于，所述系统包括：网络侧设备和终端；
所述网络侧设备位于长期演进系统中，包括：

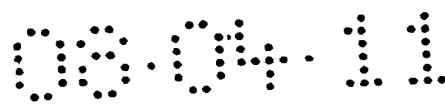
第一发送模块，用于发送专用优先级列表。

所述终端包括：

30 第一存储模块，用于接收并保存所述专用优先级列表；



第一处理模块，用于当所述终端驻留在非长期演进系统的小区时，根据所述专用优先级列表进行小区重选。



说明书

小区重选的方法、终端及系统

技术领域

5 本发明涉及移动通信领域，特别涉及一种小区重选的方法、终端及系统。

背景技术

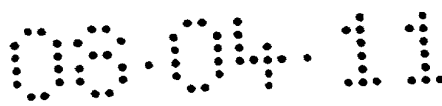
随着移动通信领域的发展，出现了多种移动通信系统，如全球移动通信系统(GSM, Global System For Mobile Communication)、全球移动通信演进系统(EDGE, Enhanced Data for GSM
10 Evolution)、GSM/EDGE 无线接入网(GERAN, GSM/EDGE Radio Access Network)系统、宽带码分多址接入(WCDMA, Wideband Code Division Multiple Access)系统、码分多址接入(CDMA, Code Division Multiple Access)系统、码分多址接入 2000(CDMA2000, Code Division Multiple Access 2000)系统、时分同步码分多址(TD-SCDMA, Time Division-Synchronous CDMA)系统，正在发展制定的长期演进(LTE, Long Term Evolution)系统，全球互通微波接入(WIMAX, World Interoperability for Microwave Access)系统等，其中 WCDMA 系统也可称为通用移动通信系统(UMTS, Universal Mobile Telecommunications System)。由于多种系统的出现，使得终端在移动中进行小区重选时面临本系统内多个频率可供选择，以及多个系统的小区可供选择，因此终端如何进行小区重选到合适的小区，如何减少测量以节省电量就成为重要的议题。

20 在目前的 LTE 中，出于终端减少测量负荷以节省电量的考虑，在终端进行小区重选时将按照优先级来决定驻留到哪个小区，即终端优先测量优先级高的频率或系统，如果优先级高的频率或系统小区满足小区重选准则，就重选到该小区，否则测量更低优先级的小区。如果驻留在低优先级小区则可能周期性测量高优先级小区。小区重选采用基于优先级的方法可以减少终端的测量，节省电量；同时好的优先级设置可以达到负荷平衡的目的。

25 现有的技术方案中，终端利用非 LTE 移动通信系统制定的专用优先级列表进行小区重选，接入网节点或者核心网节点为制定专用优先级需要增加的信令较多，由此导致升级成本较高。

发明内容

为了解决现有技术中非 LTE 系统为制定专用优先级列表而导致的信令增加过多、网络升



级成本过高的问题，本发明实施例提供了一种小区重选的方法、终端及系统。

本发明实施例提供了一种小区重选的方法，包括：

终端从长期演进系统中获取专用优先级列表；

所述终端驻留在非长期演进系统的小区时，根据所述专用优先级列表进行小区重选。

5 本发明实施例提供了一种终端，包括：

第一获取模块，用于从长期演进系统中获取专用优先级列表；

第一存储模块，用于保存所述专用优先级列表；

第一处理模块，用于当所述终端驻留在非长期演进系统时，根据所述第一存储模块存储的专用优先级列表进行小区重选。

10 本发明实施例提供了一种系统，所述系统包括：

所述网络侧设备，用于向终端下发指示，所述指示用于通知所述终端以下任一项或者其组合：所述终端驻留的非长期演进系统不下发公共优先级列表，或者所述终端保存从长期演进系统中获取的公共优先级列表，或者所述终端保存的专用优先级列表无效后，搜索长期演进系统的小区，或者所述终端未保存专用优先级列表和公共优先级列表时，根据按照小区信号质量准则进行测量的结果进行小区重选，或者搜索长期演进系统的小区；

所述终端，用于接收所述网络侧设备的指示，并根据所述指示进行小区重选。

本发明实施例还提供了一种系统，所述系统包括：网络侧设备和终端；

所述网络侧设备位于长期演进系统中，包括：

第一发送模块，用于发送专用优先级列表。

20 所述终端包括：

第一存储模块，用于接收并保存所述专用优先级列表；

第一处理模块，用于当所述终端驻留在非长期演进系统的小区时，根据所述专用优先级列表进行小区重选。

本发明实施例中，

25 终端使用在 LTE 获取的专用优先级列表进行小区重选，使非 LTE 系统可以免制定专用优先级列表，解决了现有技术中非 LTE 系统为制定专用优先级列表而导致的信令增加过多、网络升级成本过高的问题。

附图说明

30 图 1 是本发明实施例 6 提供的终端示意图。



具体实施方式

为使本发明的目的、技术方案和优点更加清楚，下面将结合附图对本发明实施方式作进一步地详细描述。

5 本发明实施例中，UMTS 或 GERAN 等系统未向终端下发专用优先级列表，则终端使用在 LTE 获取的专用优先级列表和该专用优先级列表的有效时间长度；终端可以使用 UMTS 或 GERAN 系统下发的公共优先级列表，也可以在 UMTS 或 GERAN 系统未下发公共优先级列表时，或者未接收到 UMTS 或 GERAN 系统下发的公共优先级列表时，使用从 LTE 系统获取的公共优先级列表。当终端同时保存专用优先级列表和公共优先级列表时，使用专用优先级
10 列表进行小区重选，当终端缺少专用优先级列表时，使用公共优先级列表进行小区重选。

需要说明的是，为了方便描述，本发明实施例以 UMTS 和 GERAN 系统作为例进行说明，并不影响本发明实施例适用于其他非 LTE 系统，例如：全球移动通信系统、宽带码分多址接入系统、码分多址接入系统、时分同步码分多址系统或全球互通微波接入系统。另外，本发明实施例中以小区重选过程相关性能测量值之一的小区重选信号质量为例进行说明。

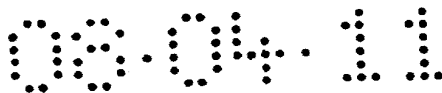
15 优先级列表中的优先级指频率或无线接入技术（RAT，Radio Access Technology）的优先级，另外，在 GERAN 中还可以指频段(Frequency Band)的优先级，优先级列表中包含服务小区所在频率以及相邻频率、相邻系统的优先级，还可以包括相邻系统的各个频率或频段分配的优先级。

20 下述实施例 1~实施例 4 以终端处于空闲状态即终端开机但没有在激活状态为例说明小区重选过程。

实施例 1

本实施例中，终端驻留在 LTE 系统的小区。LTE 系统通过专用信令下发专用优先级列表，通过系统广播信息下发公共优先级列表，UMTS 或 GERAN 系统下发公共优先级列表。从 UMTS 或 GERAN 系统广播信息下发的公共优先级列表指示优先级为
25 LTE>UMTS>GERAN；从 LTE 系统广播信息下发公共优先级列表，还可以在建立 RRC 连接时通过专用信令如 RRC 专用信令，或非接入层 NAS(Non-Stratum)消息下发公共优先级列表，下发的公共优先级列表指示 LTE>UMTS>GERAN；可以理解的是，以上优先级列表指示的优先级可以是相同的，也可以是不同的。从 LTE 专用信令下发的专用优先级列表指示
GERAN>UMTS>LTE。

30 本发明实施例 1 中小区重选的方法，具体包括如下步骤：



步骤 101: 终端驻留在 LTE 系统的小区时, 终端从 LTE 网络侧获取专用优先级列表和公共优先级列表, 并将这两个优先级列表保存。

步骤 102: 终端根据获取到的专用优先级列表进行小区重选, 由于专用优先级列表所示的优先级为 GERAN>UMTS>LTE, 终端从 LTE 系统的小区重选到 GERAN 系统的小区。

5 本领域技术人员可以理解的是, 终端首先根据专用优先级列表从 LTE 系统的小区重选至 GERAN 系统的小区, 如果该小区的信号质量不符合信号质量准则的要求, 则驻留在 GERAN 系统的小区的终端重新根据专用优先级列表进行小区重选至 UMTS 系统的小区。

步骤 103: 终端从 UMTS 或 GERAN 网络侧获取公共优先级列表, 并将这个公共优先级列表保存;

10 步骤 104: 终端在 UMTS 或 GERAN 系统的小区内从 UMTS 或 GERAN 系统广播信息获取指示;

其中, 该指示是由 UMTS 或 GERAN 的网络侧通过系统广播信息周期性下发的, 用于指示 UMTS 或 GERAN 系统下发的公共优先级列表是否可用; 本实施例以该指示所含的内容是 UMTS 或 GERAN 系统下发的公共优先级列表可用为例进行说明。

15 可以理解的是, UMTS 或 GERAN 的网络侧通过系统广播信息下发指示不受终端是否在该小区的限制。

步骤 105: 上述指示通知终端 UMTS 或 GERAN 下发的公共优先级列表可用, 终端删除从 LTE 获取的公共优先级列表;

20 其中, 终端删除从 LTE 获取的公共优先级列表为可选步骤, 也可以不删除从 LTE 获取的公共优先级列表, 仅将该列表标记为不可用。

步骤 106: 在 UMTS 或 GERAN 系统的小区内的终端在当前所在小区的信号质量下降到一定程度之前, 根据从 LTE 获取的专用优先级列表进行小区重选, 直到该专用优先级列表无效;

25 其中, 专用优先级列表的无效可以通过设置定时器实现, 即该定时器设定专用优先级列表的有效时间, 并在终端获取专用优先级列表时启动。在定时器超时之前, 由于专用优先级列表为 GERAN>UMTS>LTE, 终端只有在当前所在小区信号质量下降到一定程度(例如低于预设的门限值时)才会尝试重选到 LTE 系统的小区。专用优先级列表的有效时间可以由演进基站(eNodeB)通过专用无线资源控制(RRC, Radio Resource Control)专用信令, 如 RRC 连接释放(Connection Release)消息, 下发给终端, 或者由核心网节点通过非接入层(NAS, Non-Access Stratum)消息下发给终端, 终端在定时器超时之前, 处于专用优先级列表所示的

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优先级最高的小区，此时，终端根据该小区的信号质量来选择是否要进行小区重选，当该小区的信号质量下降至一设定门限的时候，终端就进行小区重选。

5 步骤 107：当专用优先级列表无效时，终端停止使用该专用优先级列表，并将其删除；终端采用公共优先级列表进行小区重选，由于公共优先级列表为 LTE>UMTS>GERAN，终端将重选到 LTE 系统的小区。

步骤 108：当终端驻留在 LTE 系统的小区，终端通过 TA 更新或者周期性 TA 更新从网络侧获取新的专用优先级列表以及该专用优先级列表的有效时间。

在本实施例中，步骤 103 为可选步骤，即 UMTS 或 GERAN 网络侧也可以不下发公共优先级列表，则终端使用从 LTE 系统获取的公共优先级列表；

10 在本实施例中，步骤 104 为可选步骤，如果 UMTS 或 GERAN 系统广播信息不下发该指示，则终端和网络侧默认 UMTS 或 GERAN 通过系统广播信息下发公共优先级列表，并且该公共优先级列表可用。

15 本实施例中，终端使用在 LTE 系统中获取的专用优先级列表和该专用优先级列表的有效时间进行小区重选，适用于 UMTS 或 GERAN 系统未向终端下发专用优先级列表的情况；在缺少专用优先级列表时，终端使用 UMTS 或 GERAN 系统下发的或者从 LTE 系统获取的公共优先级列表进行小区重选。本实施例终端使用在 LTE 获取的专用优先级列表进行小区重选，使非 LTE 系统可以免制定专用优先级列表，解决了现有技术中非 LTE 系统为制定专用优先级列表而导致的信令增加过多、网络升级成本过高的问题。

20 实施例 2

本实施例中，终端驻留在 UMTS 或 GERAN 系统的小区，系统 UMTS 或 GERAN 系统下发公共优先级列表，因此终端只能从 UMTS 或 GERAN 的系统广播信息中获取公共优先级列表并将该优先级列表保存，而无法获取 LTE 系统下发的专用优先级列表和公共优先级列表；从 UMTS 或 GERAN 系统广播信息下发的公共优先级列表指示优先级别为
25 LTE>UMTS>GERAN。进入 LTE 系统的小区后，LTE 系统通过系统广播信息下发公共优先级列表，从 LTE 系统广播信息下发的公共优先级列表指示 LTE>UMTS>GERAN；从 LTE 专用信令下发的专用优先级列表指示 GERAN >UMTS>LTE。

其中，终端首先驻留在 UMTS 或 GERAN 系统的小区的情况可能是在开机后或者从无覆盖区域回到覆盖区域时进行小区选择。例如，终端关机前最后驻留在 UMTS 或 GERAN 系统
30 的小区，关机时保存了该 UMTS 或 GERAN 系统的小区信息，则终端在开机后优先搜索 UMTS



或 GERAN 系统的小区；当有合适小区时终端驻留在该小区，或者终端未保存 UMTS 或 GERAN 系统的小区信息而开机后首先选择到 UMTS 或 GERAN 系统的小区；或者终端由无覆盖区域回到覆盖区域选择到 UMTS 或 GERAN 系统的小区驻留。

本发明实施例 2 中小区重选的方法，具体包括如下步骤：

5 步骤 201：终端从 UMTS 或 GERAN 的系统广播信息中获取公共优先级列表并将该优先级列表保存；

步骤 202：终端根据上述公共优先级列表进行小区重选，由于公共优先级列表的优先级为 LTE>UMTS>GERAN，终端将重选到 LTE 系统的小区。

10 步骤 203：当终端驻留在 LTE 系统的小区，终端通过 TA 更新或者周期性 TA 更新或者业务建立和释放过程从 LTE 系统的网络侧获取专用优先级列表，终端获取专用优先级列表后根据专用优先级列表进行小区重选到 GERAN 系统的小区。

本领域技术人员可以理解的，终端进入 GERAN 系统的小区后，本实施例之后的步骤 204~步骤 208 与上述实施例 1 的步骤 104~步骤 108 相似，此处不再赘述。其中，UMTS 或 GERAN 是否通过系统广播信息下发指示为可选。

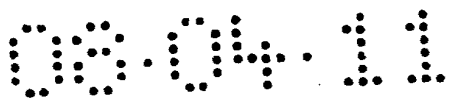
15 本实施例与上一实例不同的是，终端首先驻留在 UMTS 或 GERAN 系统的小区，UMTS 或 GERAN 系统未向终端下发专用优先级列表，但可以下发公共优先级列表，终端通过该公共优先级列表进行小区重选至 LTE 系统的小区中，重新获取 LTE 下发的专用优先级列表，再次进行小区重选。

20 本实施例中，终端使用在 LTE 系统中获取的专用优先级列表和该专用优先级列表的有效时间进行小区重选，适用于 UMTS 或 GERAN 系统未向终端下发专用优先级列表的情况；在缺少专用优先级列表时，终端使用 UMTS 或 GERAN 系统下发的或者从 LTE 系统获取的公共优先级列表进行小区重选。终端使用在 LTE 获取的专用优先级列表进行小区重选，使非 LTE 系统可以免制定专用优先级列表，解决了现有技术中非 LTE 系统为制定专用优先级列表而导致的信令增加过多、网络升级成本过高的问题。

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实施例 3

30 本实施例中，终端驻留在 LTE 系统的小区。LTE 系统通过专用信令下发专用优先级列表，通过系统广播信息下发公共优先级列表，UMTS 或 GERAN 系统未下发公共优先级列表。从 LTE 系统广播信息下发的公共优先级列表指示 LTE>UMTS>GERAN；从 LTE 专用信令下发的专用优先级列表指示 GERAN >UMTS>LTE。



本实施例小区重选的方法包括：

步骤 301：终端驻留在 LTE 系统的小区中，终端已经从 LTE 网络侧获取专用优先级列表和公共优先级列表，并将这两个优先级列表保存。

5 步骤 302：终端获取优先级列表后根据专用优先级列表进行小区重选，由于专用优先级列表为 GERAN>UMTS>LTE，终端从 LTE 系统的小区重选到 GERAN 系统的小区。

步骤 303：终端从 UMTS 或 GERAN 系统广播信息获取指示；

其中，该指示由 UMTS 或 GERAN 的网络侧通过系统广播信息向终端下发的，用于指示 UMTS 或 GERAN 系统不下发公共优先级列表，则终端保留从 LTE 获取的公共优先级列表。

10 步骤 304：终端上述指示通知终端 UMTS 或 GERAN 不下发可用的公共优先级列表，终端保留从 LTE 获取的公共优先级列表；

其中，该指示不限于包含上述内容，其还可以包含的扩展内容有：

(1) 通知终端当从 LTE 系统获取的专用优先级列表失效并被删除后，周期性搜索 LTE 系统的小区；

15 (2) 通知终端没有保存任何优先级信息时，采用现有的小区重选准则进行小区重选过程，即终端采用现有的按信号质量准则进行测量并进行比较的小区重选准则；

在具体实施的过程中，以上指示中可以包含的三种内容可以通过指示中包含的 1 个比特位确定是其中的某一个，也可以通过指示中包含的 2 个比特位同时提供三种选择。

20 在上述方案中，步骤 303 为必选步骤，终端通过该指示获得 UMTS 或 GERAN 不下发可用的公共优先级列表的信息，且终端没有保存公共优先级列表时，终端根据上述指示的扩展内容进行后续的操作。

本实施例步骤305~步骤307与实施例1中的步骤106~步骤108相似，此处不再赘述。

本实施例中，终端进入UMTS或GERAN系统的小区后，UMTS或GERAN系统不下发公共优先级列表，终端根据UMTS或GERAN系统下发的指示或者终端保存的从LTE获取的公共优先级列表进行后续动作。

25 本实施例中，终端使用在LTE获取的专用优先级列表进行小区重选，使非LTE系统可以免制定专用优先级列表，解决了现有技术中非LTE系统为制定专用优先级列表而导致的信令增加过多、网络升级成本过高的问题。同时，终端可以在未收到非LTE系统下发的公共优先级列表的情况下，使用在LTE获取的专用优先级列表，或者根据收到的指示进行后续操作，提高了小区重选的灵活性。

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实施例 4

本实施例中，终端驻留在 UMTS 或 GERAN 系统的小区中。系统 UMTS 或 GERAN 不
发公共优先级列表。LTE 系统可以通过专用信令下发专用优先级列表，通过系统广播信息下
发公共优先级列表，从 LTE 系统广播信息下发的公共优先级列表指示 LTE>UMTS>GERAN；

5 从 LTE 专用信令下发的专用优先级列表指示 GERAN >UMTS>LTE。

本实施小区重选的方法包括：

步骤 401：终端驻留在 UMTS 或 GERAN 系统的小区中，但终端未获取到专用优先级列
表和公共优先级列表；

步骤 402：UMTS 或 GERAN 系统的网络侧通过系统广播信息向终端下发指示。

10 步骤 403：终端在 UMTS 或 GERAN 系统的小区中从系统广播信息获取指示。

步骤 404：上述指示通知终端 UMTS 或 GERAN 系统的小区没有下发公共优先级列表；

或者该指示通知终端当专用优先级列表失效时周期性搜索 LTE 系统的小区；

或者该指示通知终端当没有保存任何优先级信息时采用现有的小区重选准则进行小区重
选过程。

15 步骤 405：终端重选到 LTE 系统的小区；

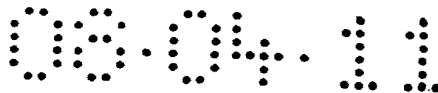
其中，终端可以通过周期性搜索 LTE 系统的小区而重选到该小区；也可能采用现有的小
区重选准则进行小区重选过程而重选到 LTE 系统的小区。

步骤 406：当终端驻留到 LTE 系统的小区，终端通过 TA 更新或者周期性 TA 更新或者业
务建立和释放过程从网络侧获取专用优先级列表，通过系统广播信息从网络侧获取公共优
20 级列表。终端获取优先级列表后根据专用优先级列表进行小区重选，由于专用优先级列表为
GERAN>UMTS>LTE，终端将从 LTE 系统的小区重选到 UMTS 或 GERAN 系统的小区。

步骤 406 之后的步骤与实施例 3 中所述的终端从 LTE 系统的小区重选到 UMTS 或 GERAN
系统的小区后所进行的步骤相似，此处不再赘述。

本实施例与实施例 3 的区别在于，终端首先处于 UMTS 或 GERAN 系统的小区中，且系
25 统 UMTS 或 GERAN 不下发公共优先级列表，终端根据系统 UMTS 或 GERAN 下发的指示进
行后续操作。

本实施例中，终端使用在 LTE 获取的专用优先级列表进行小区重选，使非 LTE 系统可以免
制定专用优先级列表，解决了现有技术中非 LTE 系统为制定专用优先级列表而导致的信令增
加过多、网络升级成本过高的问题。同时，终端可以在未收到非 LTE 系统下发的公共优先级
30 列表的情况下，使用在 LTE 获取的专用优先级列表，或者根据收到的指示进行后续操作，提



高了小区重选的灵活性。

下面的实施例以终端处于激活状态即终端在连接状态为例说明小区重选过程，激活状态的终端通过小区重选过程切换至新的小区中。

5 实施例 5

本实施例中，终端驻留在 LTE 系统的小区且终端处于激活状态，激活状态的终端从 LTE 系统的小区切换到 UMTS 或 GERAN 系统的小区。LTE 系统通过专用信令下发专用优先级列表，通过系统广播信息下发公共优先级列表，UMTS 或 GERAN 系统下发公共优先级列表。从 UMTS 或 GERAN 系统广播信息下发的公共优先级列表指示优先级为
10 LTE>UMTS>GERAN；从 LTE 系统广播信息下发的公共优先级列表指示
LTE>UMTS>GERAN；从 LTE 专用信令下发的专用优先级列表指示 GERAN>UMTS>LTE。

本实施例小区重选的方法包括：

步骤 501：在 LTE 系统的小区中处于激活状态的终端从 LTE 网络侧获取专用优先级列表和公共优先级列表，并将这两个优先级列表保存；

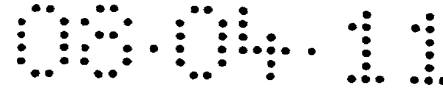
15 其中，终端在 RRC 连接建立的过程获取专用优先级列表具体为：终端在与 eNodeB 进行 RRC 连接建立过程中，当终端进入 RRC 连接状态时，获取新的专用优先级列表同时释放旧的专用优先级列表；

终端还可以在建立 RRC 连接后不释放当前专用优先级列表，只在 RRC 连接释放消息中以新的专用优先级列表覆盖上述当前专用优先级列表。

20 步骤 502：终端从 LTE 系统的小区切换到 UMTS 或 GERAN 系统的小区，并在 UMTS 或 GERAN 系统的小区中释放 RRC 连接；

当终端进入 UMTS 或 GERAN 系统的小区后，所执行的步骤 503~步骤 508 与实施例 1 中的步骤 103~步骤 108 相似，此处不再赘述。

25 本实施例的技术方案为处于激活状态的终端从 LTE 系统的小区重选/切换至 UMTS 或 GERAN 系统的小区。通过终端在 RRC 连接建立过程获取专用优先级列表；或者在建立 RRC 连接时不释放当前专用优先级列表，只在 RRC 连接释放消息中以新的专用优先级列表覆盖上述当前的专用优先级列表，解决了现有技术中终端在获取到新的专用优先级列表之前就删除了旧的专用优先级列表的问题；同时，本实施例中，终端使用在 LTE 获取的专用优先级列表进行小区重选，使非 LTE 系统可以免制定专用优先级列表，解决了现有技术中非 LTE 系统为
30 制定专用优先级列表而导致的信令增加过多、网络升级成本过高的问题。



实施例 6

参见图 6，本实施例提供了一种终端，包括：

第一获取模块，用于从长期演进系统中获取专用优先级列表；

第一存储模块，用于保存第一获取模块获取的专用优先级列表；

- 5 第一处理模块，用于当终端驻留在非长期演进系统时，根据第一存储模块存储的专用优先级列表进行小区重选。

进一步的，该终端还包括：

第二获取模块，用于从长期演进系统和/或非长期演进系统中获取公共优先级列表；

第二存储模块，用于保存第二获取模块获取的公共优先级列表；

- 10 第二处理模块，用于当终端驻留在非长期演进系统，且第一存储模块未保存有效的专用优先级列表时，根据第二存储模块存储的公共优先级列表进行小区重选。

进一步的，该终端还包括：

第三获取模块，用于从非长期演进系统中获取指示；

第三存储模块，用于存储该指示；

- 15 第三处理模块，用于根据第三存储模块存储的指示进行操作。

实施例 7

本实施例提供了一种系统，包括网络侧设备和终端。

网络侧设备，用于向终端下发指示，该指示用于通知所述终端以下任一项或者其组合：

- 20 终端驻留的非长期演进系统不下发公共优先级列表，或者终端保存从长期演进系统中获取的公共优先级列表，或者终端保存的专用优先级列表无效后，搜索长期演进系统的小区，或者终端未保存专用优先级列表和公共优先级列表时，根据按照小区信号质量准则进行测量的结果进行小区重选，或者搜索长期演进系统的小区；

终端，用于接收所述网络侧设备的指示，并根据所述指示进行小区重选。

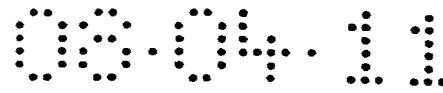
25

实施例 8

本实施例提供了一种系统，包括网络侧设备和终端。

网络侧设备位于长期演进系统中，包括第一发送模块，用于发送专用优先级列表。

- 30 终端包括用于接收并保存专用优先级列表的第一存储模块，以及当所述终端驻留在非长期演进系统的小区时，根据所述专用优先级列表进行小区重选的第一处理模块。



在上述实施例 6~8 中，非长期演进系统可以为：全球移动通信系统、全球移动通信演进系统、宽带码分多址接入系统、码分多址接入系统、时分同步码分多址系统或全球互通微波接入系统。

5 在上述实施例 6~8 中，终端使用在 LTE 获取的专用优先级列表进行小区重选，使非 LTE 系统可以免制定专用优先级列表，解决了现有技术中非 LTE 系统为制定专用优先级列表而导致的信令增加过多、网络升级成本过高的问题。

本发明实施例可以通过软件实现，相应的软件可以存储在可读取的存储介质中，例如计算机的硬盘、光盘或软盘中。

10 以上所述仅为本发明的较佳实施例，并不用以限制本发明，凡在本发明的精神和原则之内，所作的任何修改、等同替换、改进等，均应包含在本发明的保护范围之内。



说明书附图

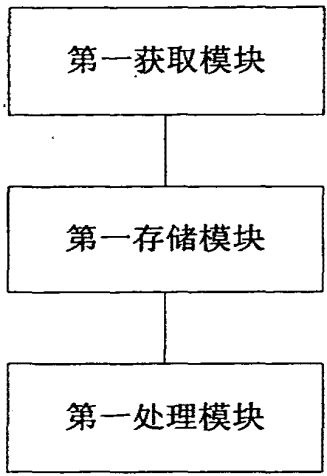
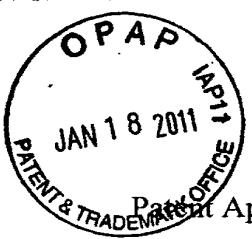


图 1



1 flu

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. 12/902,933

Confirmation No. 2965

Applicant: ROBERTS et al.

Filed: October 12, 2010

TC/AU: 2617

Examiner: CHO, Un C

Docket No.: HW707010 (Client Reference No. 0811316US)

Customer No.: 77399

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

CLAIM OF PRIORITY

Dear Sir:

In accordance with the provisions of 35 USC 119, Applicants claim the priority of the following application:

Application No. 200810091957.6, filed in China on April 9, 2008

A certified copy of the above-listed priority document is enclosed.

Respectfully submitted,

John B. Conklin, Reg. No. 30,369
LEYDIG, VOIT & MAYER, LTD.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6731
(312) 616-5600 (telephone)
(312) 616-5700 (facsimile)

Date: January 11, 2011

CERTIFICATE OF MAILING OR TRANSMISSION UNDER 37 CFR 1.8			
I hereby certify that this Response and all accompanying documents are, on the date indicated below, <input checked="" type="checkbox"/> being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop , Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or <input type="checkbox"/> being facsimile transmitted to the U.S. Patent and Trademark Office, Facsimile Number (571) 273-8300.			
Name (Print/Type)	Meghan Corbet		
Signature		Date	January 11, 2011



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

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes application details for Michael ROBERTS and examiner information.

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):

Chgpatent@leydig.com
uspatent@huawei.com

Office Action Summary	Application No. 12/902,933	Applicant(s) ROBERTS ET AL.	
	Examiner UN C. CHO	Art Unit 2617	

-- 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 12 October 2010.
- 2a) This action is **FINAL**.
- 2b) This action is non-final.
- 3) 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

- 4) Claim(s) 1-20 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-20 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 12 October 2010 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).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).
 - a) All b) Some * c) None of:
 - 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.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10/12/2010.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application
- 6) Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 10/12/2010 has been placed in record and considered by the examiner.

Double Patenting

2. Claims 1 – 20 of this application conflict with claims 1 – 20 of Application No. 12/955,392. 37 CFR 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more than one application. Applicant is required to either cancel the conflicting claims from all but one application or maintain a clear line of demarcation between the applications. See MPEP § 822.

3. Claims 1 – 20 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1 – 20 of copending Application No. 12/955,392. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

Conclusion


4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to UN C. CHO whose telephone number is (571)272-7919. The examiner can normally be reached on 9:00AM - 6:00PM.

Art Unit: 2617

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, George Eng can be reached on 571-272-7495. 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.

/UN C. CHO/
Primary Examiner, Art Unit 2617

<i>Index of Claims</i> 	Application/Control No. 12902933	Applicant(s)/Patent Under Reexamination ROBERTS ET AL.
	Examiner UN C CHO	Art Unit 2617

✓	Rejected
=	Allowed


-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

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

CLAIM		DATE							
Final	Original	01/12/2011							
	1	✓							
	2	✓							
	3	✓							
	4	✓							
	5	✓							
	6	✓							
	7	✓							
	8	✓							
	9	✓							
	10	✓							
	11	✓							
	12	✓							
	13	✓							
	14	✓							
	15	✓							
	16	✓							
	17	✓							
	18	✓							
	19	✓							
	20	✓							

Search Notes 	Application/Control No. 12902933	Applicant(s)/Patent Under Reexamination ROBERTS ET AL.
	Examiner UN C CHO	Art Unit 2617

SEARCHED			
Class	Subclass	Date	Examiner
455	435.1,435.2,435.3,436,437	1/12/2011	UC

SEARCH NOTES		
Search Notes	Date	Examiner
East Search including keywords, class/subclass, inventor, assignee	1/12/2010	UC

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

	/UN C CHO/ Primary Examiner.Art Unit 2617
--	--

Please type a plus sign (+) inside this box → +

Substitute for form 1449A/B/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	TBD
				Filing Date	October 12, 2010
				First Named Inventor	Michael ROBERTS
				Group Art Unit	TBD
				Examiner Name	TBD
Sheet	1	of	1	Attorney Docket Number	HW707010

U.S. PATENT DOCUMENTS						
Examiner Initials	Doc. No.	U.S. Patent Document		Name of Patentee or Applicant	Date of Publication	Filing Date If Appropriate
		Application or Patent Number	Kind Code			
	AA	20080268843	A1	Nokia Corp.	10/30/2008	

FOREIGN PATENT DOCUMENTS							
Examiner Initials	Doc. No.	Foreign Patent Document			Name of Patentee or Applicant	Date of Publication	Translation *
		Office	Application or Patent Number	Kind Code			
	AB	WO	2009045078	A2	LG Electronics Inc.	04/09/2009	
	AC	CN	1832601	A	LG Electronics China Co. Ltd.	09/13/2006	
	AD	CN	1675957	A	Motorola Inc.	09/28/2005	x
	AE	CN	1965605	A	Nokia Corp.	05/16/2007	x
	AF	CN	10113614	A	Huawei Technologies Co., Ltd.	02/27/2008	x

OTHER - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Doc. 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, page(s), volume-issue number (s), publisher, city and/or country where published.	Translation *
	AG	"3GPP TS 36.304-Evolved Universal Terrestrial Radio Access (E-UTRA)," March 2008, V8.1.0, 3 rd Generation Partnership Project, Valbonne, France.	
	AH	Written Opinion from the International Searching Authority in corresponding PCT Application No. PCT/CN2009/071194 (April 8, 2009).	

Examiner Signature	/Un Cho/	Date Considered	01/12/2011
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* If the reference is not in English, then at least one of the following is provided: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	("955392.ap."). PN.	US- PGPUB; USPAT	OR	OFF	2011/01/14 11:51
L4	4	(ROBERTS near3 MICHAEL).in. and huawei.as.	US- PGPUB; USPAT	OR	ON	2011/01/14 11:51
L6	3125	(455/435.1- 435.3).CCLS.	US- PGPUB; USPAT	OR	OFF	2011/01/14 11:53
L7	4559	(455/436).CCLS.	US- PGPUB; USPAT	OR	OFF	2011/01/14 11:53
L8	1294	(455/437).CCLS.	US- PGPUB; USPAT	OR	OFF	2011/01/14 11:53
L9	1224	((priority near3 list) or rank\$3) with (system near3 select\$3)	US- PGPUB; USPAT	OR	ON	2011/01/14 11:53
L12	13	9 and LTE	US- PGPUB; USPAT	OR	ON	2011/01/14 11:54
L13	121	LTE and 6	US- PGPUB; USPAT	OR	ON	2011/01/14 11:54
L14	328	LTE and 7	US- PGPUB; USPAT	OR	ON	2011/01/14 11:54
L15	41	LTE and 8	US- PGPUB; USPAT	OR	ON	2011/01/14 11:55
L16	17	9 and 6	US- PGPUB; USPAT	OR	ON	2011/01/14 11:55

L17	7	9 and 7	US- PGPUB; USPAT	OR	ON	2011/01/14 11:55
L18	3	9 and 8	US- PGPUB; USPAT	OR	ON	2011/01/14 11:55

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	0	("Term Removed").PN.	UPAD	OR	OFF	2011/01/14 11:51
L5	0	(ROBERTS near3 MICHAEL).in. and huawei.as.	USPAT; UPAD	OR	ON	2011/01/14 11:51

1/14/2011 11:55:26 AM

C:\Documents and Settings\ucho\My Documents\EAST\Workspaces\12902933
(system selection LTE to non-LTE).wsp



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

Table with 4 columns: APPLICATION NUMBER (12/902,933), FILING OR 371(C) DATE (10/12/2010), FIRST NAMED APPLICANT (Michael ROBERTS), ATTY. DOCKET NO./TITLE (HW707010)

CONFIRMATION NO. 2965

PUBLICATION NOTICE



77399
Leydig, Voit & Mayer, Ltd
(for Huawei Technologies Co., Ltd)
Two Prudential Plaza Suite 4900
180 North Stetson Avenue
Chicago, IL 60601

Title:METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION

Publication No.US-2011-0034169-A1
Publication Date:02/10/2011

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.

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application No. 12/902,933

Confirmation No. 2965

Applicant: ROBERTS et al.

Filed: October 12, 2010

TC/AU: 2617

Examiner: CHO, Un C.

Docket No.: HW707010 (Client Reference No. 0811316US)

Customer No.: 77399

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

REPLY TO OFFICE ACTION

Sir:

In reply to the Office action dated January 21, 2011, please consider the following remarks.

Remarks/Arguments begin on page 2 of this paper.

REMARKS/ARGUMENTS

Double Patenting Rejection

In response to the Office action dated January 21, 2011, Applicants hereby submit a terminal disclaimer in order to overcome the provisional double patenting rejection. In addition, the claims of the co-pending Application No. 12/955,392 have been amended. Therefore, the double patenting rejection should be rendered moot.

Conclusion

Applicants respectfully submit that the patent application is in condition for allowance. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

/Dimitry Kapmar/

Dimitry Kapmar, Reg. No. 62,998
LEYDIG, VOIT & MAYER, LTD.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6731
(312) 616-5600 (telephone)
(312) 616-5700 (facsimile)

Date: July 21, 2011

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.

**TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING
REJECTION OVER A PENDING "REFERENCE" APPLICATION**

Docket Number (Optional)

HW707010

In re Application of: ROBERTS et al.

Application No.: 12/902,933

Filed: October 12, 2010

For: Huawei Technologies Co., Ltd.

The owner*, Huawei Technologies Co., Ltd., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending **reference** Application Number 12/955,392, filed on November 29, 2010, as such term is defined in 35 U.S.C. 154 and 173, and as the term of any patent granted on said **reference** application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending **reference** application. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the **reference** application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term as defined in 35 U.S.C. 154 and 173 of any patent granted on said **reference** application, "as the term of any patent granted on said **reference** application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending **reference** application," in the event that: any such patent: granted on the pending **reference** application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.

Check either box 1 or 2 below, if appropriate.

1. For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

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.

2. The undersigned is an attorney or agent of record. Reg. No. 62,998

/Dimitry Kapmar/
Signature

July 21, 2011
Date

Dimitry Kapmar
Typed or printed name

312-616-5600
Telephone Number

- Terminal disclaimer fee under 37 CFR 1.20(d) is included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this statement. See MPEP § 324.

This collection of information is required by 37 CFR 1.321. 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 1.11 and 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, 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.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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.

Electronic Patent Application Fee Transmittal

Application Number:	12902933
Filing Date:	12-Oct-2010
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Filer:	Dimitry Kapmar/Leanna Bultema
Attorney Docket Number:	HW707010

Filed as Large Entity

Utility under 35 USC 111(a) 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 - 3 months with \$0 paid	1253	1	1110	1110

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Statutory or terminal disclaimer	1814	1	140	140
Total in USD (\$)				1250

Electronic Acknowledgement Receipt

EFS ID:	10570866
Application Number:	12902933
International Application Number:	
Confirmation Number:	2965
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Customer Number:	77399
Filer:	Dimitry Kapmar/Leanna Bultema
Filer Authorized By:	Dimitry Kapmar
Attorney Docket Number:	HW707010
Receipt Date:	21-JUL-2011
Filing Date:	12-OCT-2010
Time Stamp:	15:59:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$1250
RAM confirmation Number	2460
Deposit Account	121216
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Transmittal Letter	ROA-1st_Transmittal.pdf	61893 31db8fb15bb1363edc1a12e26f390400d205ff9a	no	1
Warnings:					
Information:					
2	Amendment/Req. Reconsideration-After Non-Final Reject	ROA-1st.pdf	21742 9499572896cda32bb9d1a2290e0ebec925b92027	no	2
Warnings:					
Information:					
3	Terminal Disclaimer Filed	TerminalDisclaimer.pdf	207486 87b5563a10196da346c73d4b45386e1a9afd2b1b	no	2
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32022 511b5bd414efc63edf2f5504d7805ca08c2b7c1c	no	2
Warnings:					
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Total Files Size (in bytes):			323143		

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 re Application of: ROBERTS et al.
 Application No. 12/902,933
 Confirmation No. 2965
 Filed: October 12, 2010

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

Sir:

Transmitted herewith is a reply to office action in the subject application.

- Small entity status is claimed for this application under 37 CFR 1.27.
- Petition for an extension of time for the period noted below, as well as for any additional period necessary to render the present submission timely. Please charge Deposit Account No. 12-1216 for the appropriate petition fee.
- Other: **TERMINAL DISCLAIMER**
- Please charge Deposit Account No. 12-1216 in the total amount indicated below.


					SMALL ENTITY		OTHER THAN A SMALL ENTITY	
TIME EXTENSION PETITION FEE		three-month			\$ 0.00		\$1,110.00	
subtract time extension fee previously paid		none			(\$ 0.00)		(\$ 0.00)	
CLAIM FEE	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	EXTRA CLAIMS PRESENT	RATE	ADD'L CLAIM FEE	RATE	ADD'L CLAIM FEE
TOTAL	20	MINUS	20	= 0	x 26 =	\$	x 52 =	\$0.00
INDEPENDENT	2	MINUS	2	= 0	x 110 =	\$	x 220 =	\$0.00
<input type="checkbox"/>	FIRST PRESENTATION OF MULTIPLE CLAIM				+ 195 =	\$	+ 390 =	\$0.00
OTHER FEES AS DESCRIBED: - TERMINAL DISCLAIMER FEE						\$		\$140.00
TOTAL AMOUNT TO BE CHARGED TO DEPOSIT ACCOUNT					TOTAL	\$	TOTAL	\$1,250.00

- The Commissioner is hereby authorized to charge any deficiencies in the following fees associated with this communication or credit any overpayment to Deposit Account No. 12-1216.
 - Any filing fees under 37 CFR 1.16 for the presentation of extra claims.
 - Any patent application processing fees under 37 CFR 1.17.

Respectfully submitted,

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LEYDIG, VOIT & MAYER, LTD.

By 
 Dimitry Kapmar, Reg. No. 62,998

Please type a plus sign (+) inside this box → +

Substitute for form 1449A/B/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	12/902,933
				Filing Date	10-12-2010
				First Named Inventor	ROBERTS, Michael
				Group Art Unit	2617
				Examiner Name	CHO, Un C
Sheet	1	of	1	Attorney Docket Number	HW707010

U.S. PATENT DOCUMENTS						
Examiner Initials	Doc. No.	U.S. Patent Document		Name of Patentee or Applicant	Date of Publication	Filing Date If Appropriate
		Application or Patent Number	Kind Code			
	A D	2007/0258410	A1	Huang et al.	November 8, 2007	
	A E	2004/0121777	A1	Schwarz et al.	June 24, 2004	

FOREIGN PATENT DOCUMENTS							
Examiner Initials	Doc. No.	Foreign Patent Document			Name of Patentee or Applicant	Date of Publication	Translation*
		Office	Application or Patent Number	Kind Code			
	A F	CN	100455112	C	Huawei Tech. Co., Ltd.	January 21, 2009	(b)
	A G	CN	1852559	A	Huawei Tech. Co., Ltd.	October 25, 2006	(b)
	A H	WO	2008/057359	A1	Interdigital Technology Corp.	May 15, 2008	
	A I	EP	2111074	A1	Huawei Tech. Co., Ltd.	October 21, 2009	
	A J	EP	0862346	A2	Nokia Mobile Phones Ltd.	September 2, 1998	

OTHER - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Doc. 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, page(s), volume-issue number (s), publisher, city and/or country where published.	Translation *
	A K	1 st Office Action in corresponding Chinese Application No. 200810091957.6 (April 8, 2010).	(a)
	A L	International Search Report in corresponding PCT Application No. PCT/CN2009/071194 (July 16, 2009).	
	A M	Extended European Search Report in corresponding European Application No. 09731049.4 (June 9, 2011).	
	A N	"Tdoc-R2-074001 – IDLE mode mobility control principles," 3GPP TSG RAN WG2 #59bis, 8-12 October 2007, 3 rd Generation Partnership Project, Shanghai, China.	
	A O	"TSGR2#6(99)808 – Cell Selection and Cell Reselection Criteria," TSG-RAN Working Group 2 (Radio layer 2 and Radio layer 3), 16-20 August 1999, 3 rd Generation Partnership Project, Sophia Antipolic, France.	
	A P	"R2-073622 – E-UTRA Cell Selection and Cell Reselection Aspects," 3GPP TSG-RAN WG2 Meeting #59, 20-24 August 2007, 3 rd Generation Partnership Project, Athens, Greece.	
	A Q	Image File Wrapper in corresponding US Application No. 12/902,933 (August 1, 2011).	

Examiner Signature	Date Considered
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* If the reference is not in English, then at least one of the following is provided: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.



Espacenet

Bibliographic data: CN 1852559 (A)

Residence reselecting based on subscriber priority

Publication date: 2006-10-25
Inventor(s): DU JIANCHENG [CN] ±
Applicant(s): HUAWEI TECH CO LTD [CN] ±
Classification: - international: *H04Q7/38*
 - European:
Application number: CN20051083806 20050707
Priority number(s): CN20051083806 20050707
Also published as: ● [CN 100455112 \(C\)](#)

Abstract of CN 1852559 (A)

Setting up users' priorities, the method includes following steps: (1) setting up sign of difference degree at network side, determining sensitive parameter of priority, and determining strong / weak instructive mark, and value of step length gain as well as sending down the said sign of difference degree, sensitive parameter, strong / weak instructive mark, and value of step length gain to user terminal; (2) based on received strong / weak instructive mark, value of step length gain, and sensitive parameter of priority determined from priority adjustment self setup, user terminal accomplishes reselecting differenced cells by using adjusted sensitive parameter of priority as parameter for reselecting cell. Based on current protocol, the invention only makes proper modification for network and terminal without need of large changing original system.

Last updated: 28.04.2011 Worldwide Database 5.7.23; 93p



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[56] 参考文献

US6526057B1 2003.2.25

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US2004/0141387A1 2004.7.22

审查员 王海荣

[74] 专利代理机构 北京德琦知识产权代理有限公司

代理人 张颖玲 王琦

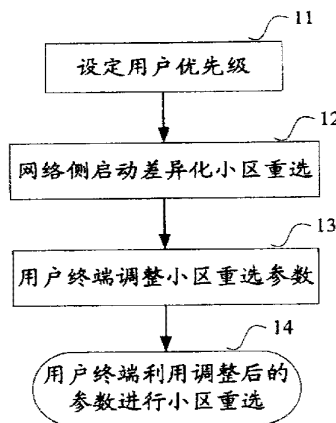
权利要求书 2 页 说明书 6 页 附图 1 页

[54] 发明名称

一种基于用户优先级的小区重选方法

[57] 摘要

本发明公开了一种基于用户优先级的小区重选方法，网络侧设定用户的优先级，该方法还包括以下步骤：A、网络侧设置差异化标志，确定优先级敏感参数，并确定强弱指示标志和步长增益的值，将所设置的差异化标志以及所确定的优先级敏感参数、强弱指示标志和步长增益下发给用户终端；B、用户终端收到指示进行差异化小区重选的差异化标志时，根据接收到的强弱指示标志和步长增益，以及网络侧为自身设定的优先级调整所确定的优先级敏感参数，用调整后的优先级敏感参数作为小区重选参数完成差异化小区重选。本发明的方法只需要在网络和终端的现有协议基础上做适当修改，不需要对原来系统作较大改动。



1、一种基于用户优先级的小区重选方法，其特征在于，网络侧设定用户的优先级，该方法还包括以下步骤：

A、网络侧设置差异化标志，确定优先级敏感参数，并确定强弱指示标志和步长增益的值，将所设置的差异化标志以及所确定的优先级敏感参数、强弱指示标志和步长增益下发给用户终端；

B、用户终端收到指示进行差异化小区重选的差异化标志时，根据接收到的强弱指示标志和步长增益，以及网络侧为自身设定的优先级调整所确定的优先级敏感参数，并将调整后的优先级敏感参数作为小区重选参数完成差异化小区重选。

2、根据权利要求1所述的方法，其特征在于，步骤A中所述设置差异化标志为：网络侧在启动差异化小区重选时设置一个差异化标志；或是网络侧预先设置一个差异化标志，在启动差异化小区重选时，将所述差异化标志置为有效。

3、根据权利要求1所述的方法，其特征在于，步骤A中所述确定优先级敏感参数为：网络侧在启动差异化小区重选时，选择一个或一个以上小区重选参数作为优先级敏感参数；或者网络侧与用户终端在启动差异化小区重选之前预先协商选择一个或一个以上小区重选参数作为优先级敏感参数。

4、根据权利要求1所述的方法，其特征在于，步骤A中所述确定强弱指示标志和步长增益的值为：由网络侧在启动差异化小区重选时设定；或由网络侧与用户终端在启动差异化小区重选之前预先协商设定。

5、根据权利要求1所述的方法，其特征在于，步骤B中所述调整优先级敏感参数为：计算步长增益与用户优先级的乘积，用优先级敏感参数加上或者减去计算得到的所述乘积。

6、根据权利要求1所述的方法，其特征在于，所述设定用户优先级是将国际移动用户识别码中的不同字段映射成为不同的优先级别，或是将接入类中的

不同字段映射为不同的用户优先级，或是在用户识别模块或通用用户身份识别模块卡中增加新的用户优先级字段，设定用户的优先级别。

7、根据权利要求1或6所述的方法，其特征在于，所述用户优先级划分为两个或两个以上。

一种基于用户优先级的小区重选方法

技术领域

本发明涉及移动通信技术，尤指一种基于用户优先级的小区重选方法。

背景技术

目前的小区重选机制中，存在从2G到3G小区重选、3G到2G小区重选、2G系统内小区重选以及3G系统内小区重选。所述小区重选是指移动用户终端（UE），以下称为用户终端，在空闲模式下，随时监测当前小区和相邻小区的信号质量，以便选择一个最好的小区提供服务。一般过程是：网络侧根据负载测量结果，确定下一步用户终端的分布策略，然后调整小区重选参数，并通过系统消息广播下发给小区内所有用户终端，用户终端据此进行小区重选，选择最好的小区提供服务。例如3G系统内的小区重选，网络侧根据负载测量结果，确定用户分布策略，然后调整小区重选参数，如滞后功率值（ Q_{hyst1} ）、相邻小区偏移（ $Q_{offset1}$ ）等，通过对这些小区重选参数的合理设置，以达到减少频繁重选以及分摊话务等目的。一般，用户终端将根据系统下发的小区重选参数，将实际的测量值映射为小区重选评估值，再通过比较各个小区重选评估值的大小来决定优选的小区。

从以上分析中，可以看出现有技术中的小区重选是面向小区，而不是针对用户的。如3G系统内的小区重选，根据小区的状态进行调整，如负载情况、话务情况，它并不是面向用户，即不支持用户差异化服务，不能根据用户的类别进行小区重选。例如：网络侧希望将低端用户尽量驻留在2G，而高端用户尽量驻留在3G，该任务就无法通过当前的小区重选机制完成。

发明内容

有鉴于此，本发明的主要目的在于提供一种基于用户优先级的小区重选方

法，该方法能够根据用户的优先级实现同时面向小区和用户的小区重选。

为达到上述目的，本发明的技术方案是这样实现的：

一种基于用户优先级的小区重选方法，网络侧设定用户的优先级，该方法还包括以下步骤：

A、网络侧设置差异化标志，确定优先级敏感参数，并确定强弱指示标志和步长增益的值，将所设置的差异化标志以及所确定的优先级敏感参数、强弱指示标志和步长增益下发给用户终端；

B、用户终端收到指示进行差异化小区重选的差异化标志时，根据接收到的强弱指示标志和步长增益，以及网络侧为自身设定的优先级调整所确定的优先级敏感参数，并将调整后的优先级敏感参数作为小区重选参数完成差异化小区重选。

其中，步骤A中所述设置差异化标志为：网络侧在启动差异化小区重选时设置一个差异化标志；或是网络侧预先设置一个差异化标志，在启动差异化小区重选时，将所述差异化标志置为有效。所述的确定优先级敏感参数为：网络侧在启动差异化小区重选时，选择一个或一个以上小区重选参数作为优先级敏感参数；或者网络侧与用户终端在启动差异化小区重选之前预先协商选择一个或一个以上小区重选参数作为优先级敏感参数。所述的确定强弱指示标志和步长增益的值为：由网络侧在启动差异化小区重选时设定；或由网络侧与用户终端在启动差异化小区重选之前预先协商设定。

其中，步骤B中所述调整优先级敏感参数为：计算步长增益与用户优先级的乘积，用优先级敏感参数加上或者减去计算得到的所述乘积。

其中，设定用户优先级是将国际移动用户识别码中的不同字段映射成为不同的优先级别，或是将接入类中的不同字段映射为不同的用户优先级，或是在用户识别模块或通用用户身份识别模块卡中增加新的用户优先级字段，设定用户的优先级别。其中，所述用户优先级划分为两个或两个以上。

本发明所提供的一种基于用户优先级的小区重选方法，根据用户的优先级调整小区重选参数，进行小区重选，使小区重选机制不仅面向小区，而且面向

用户。通过用户优先级将用户进行区分，完成小区重选过程中用户的差异化服务。

附图说明

图 1 为本发明实施例的流程图。

具体实施方式

为使本发明的目的、技术方案和优点更加清楚明白，以下举实施例，并参照附图，对本发明进一步详细说明。

本发明的核心思想是：对每个用户设定优先级，并增加设置用于完成差异化小区重选的标志和变量；用户终端根据设定的用户优先级，以及网络下发的用于差异化小区重选的标志和变量，调整小区重选参数完成差异化小区重选。这里，所谓差异化小区重选是指根据用户的差异比如针对不同用户的优先级调整小区重选参数，完成小区重选。

为完成本发明所提出的方法，至少需要在网络侧增加设置三个标志和一个变量以完成差异化小区重选。所述三个标志为：1) 差异化标志 (DifferFlag)，用来指示用户终端是否需要启动差异化小区重选；2) 优先级敏感标志 (ClassFlag)，网络侧通过为小区重选参数设置该标志，向用户终端指示此小区重选参数为优先级敏感参数；3) 强弱指示标志 (StrongWeakFlag)，网络侧通过为优先级敏感参数设置该标志，用来向用户终端指示是以降低的方式，或是提高方式对优先级敏感参数进行调整，将 StrongWeakFlag 标志置 0 表示提高，StrongWeakFlag 标志置 1 表示降低。所述一个变量是步长增益 (StepGain) 变量，表示使用用户优先级调整优先级敏感参数时所带来的增益。

其中，所谓优先级敏感参数是指：在实现差异化小区重选过程中，被确定为基于用户优先级调整的小区重选参数。优先级敏感参数可以由网络侧在发起差异化小区重选时确定，也可以由网络侧与用户终端预先协商确定，数量为一个或一个以上。优先级敏感参数的调整规则，由网络侧预先与用户终端协商确

定，为网络侧及用户终端所共知。例如，只选择一个优先级敏感参数 X ，则调整的规则可以是 $X \pm \text{SubClass} \cdot \text{StepGain}$ ，其中，用加号还是减号由 X 所对应的 **StrongWeakFlag** 标志决定。为了兼容原有系统并避免对原有系统的较大修改，可以尽量利用原有消息流中的空闲和保留字段来传输增加设置的标志和变量。

所述差异化标志在实际应用中两种设置方式：第一种是，网络侧在需要启动差异化小区重选时设置 **DifferFlag** 标志，并将所设置的 **DifferFlag** 标志下发给用户终端，用户终端检测到有该 **DifferFlag** 标志就启动差异化小区重选。第二种是，无论是否启动差异化小区重选，网络侧都设置一个 **DifferFlag** 标志，并将 **DifferFlag** 标志与 **StrongWeakFlag** 标志、**ClassFlag** 标志以及 **StepGain** 一起下发给用户终端，只是针对网络侧需要启动差异化小区重选的情况，**DifferFlag** 标志被设置为有效，针对不需要启动差异化小区重选的情况，**DifferFlag** 标志被设置为无效；用户终端收到置为有效的 **DifferFlag** 标志，则根据 **StrongWeakFlag** 标志、**ClassFlag** 标志及 **StepGain** 执行差异化小区重选；用户终端收到置为无效的 **DifferFlag** 标志，则忽略 **StrongWeakFlag** 标志、**ClassFlag** 标志及 **StepGain**，按照现有正常流程完成小区重选过程。下面仅以采用第二种方式设置 **DifferFlag** 标志为例。

本实施例的实施过程为：首先由网络运营商在用户终端加入网络前，根据具体的用户设定用户优先级。在网络运行阶段，由网络侧启动差异化小区重选，并通过广播信道给用户终端下发新设置的 **DifferFlag** 标志、**StrongWeakFlag** 标志、**ClassFlag** 标志以及 **StepGain** 变量。用户终端通过接收这些标志和变量，响应差异化小区重选，根据用户优先级利用下发的标志和变量调整小区重选参数，完成差异化的小区重选。具体步骤如图 1 所示：

步骤 11：用户终端在加入网络之前，由网络运营商根据用户的类别、重要性或特殊性设定用户优先级。

用户优先级的设定方法可以由用户的国际移动用户识别码（**IMSI**）映射得到用户优先级字段（**SubClass**），并存储在用户终端设备中。映射规则可由网络

侧任意选择。例如：可以将国际移动用户识别码中的移动国家码（MCC）字段进行映射得到用户优先级，将 000~399 映射为 SubClass=0，400~699 映射为 SubClass=1，700~999 映射为 SubClass=2；或者将其中的奇数映射为 SubClass=0，偶数映射为 SubClass=1。

也可以将接入类（AC）的不同字段映射为不同的用户优先级字段，并存储在用户终端设备中，映射方式为任意。其中接入类是存储在移动终端用户的 SIM 卡中，用来控制移动用户接入网络的参数。每一个普通用户都有一个接入类。接入类分为等级 0 至等级 9 十种。例如，在某些地区出现紧急状态或某个网络发生严重故障等等，可以利用 SIM 卡中的接入类控制用户接入网络。

或者还可以直接在用户识别模块（SIM）、或通用用户身份识别模块（USIM）卡中增加新的 SubClass 字段，用来设定用户的优先级别。例如：SubClass=1 表示用户优先级为 1，SubClass=2 表示用户优先级为 2。

用户优先级可以划为两个或多个，但为了避免系统的复杂性，通常将用户的优先级划分为 2 个级别。

步骤 12：网络侧根据负载测量结果以及实际运行状况，在需要启动差异化小区重选时，将 DifferFlag 标志置为有效。例如在网络过度拥挤或出现紧急状况时，允许优先级高的用户继续驻留，而优先级低的用户转移到其他小区中去。

网络侧在启动差异化小区重选过程时，首先确定用户优先级敏感参数，然后为所确定的优先级敏感参数分别设置 StrongWeakFlag 标志，最后，为每个优先级敏感参数设定各自的 StepGain，或者对所有的优先级敏感参数设定一个 StepGain。

其中，如果优先级敏感参数是由网络侧与用户终端预先协商确定，则将预先协商确定的小区重选参数作为优先级敏感参数，此时，网络侧已为预先协商确定的优先级敏感参数设置了 ClassFlag 标志；如果是在启动差异化小区重选过程中选择优先级敏感参数，则根据网络环境以及用户所需网络提供的服务选择优先级敏感参数，并为优先级敏感参数设置 ClassFlag 标志。例如，如果在本小区中由于网络过度拥挤，网络侧决定只需继续为优先级高的用户服务，则此时

选择的优先级敏感参数可以是有利于用户驻留的小区重选参数，设为 X ，为该优先级敏感参数设置 ClassFlag 标志，并将 StrongWeakFlag 标志置 0，表示以提高的方式调整优先级敏感参数，StepGain 的具体值可以根据经验值或者网络的环境确定。

当网络侧确定了用户差异化小区重选的优先级敏感参数、标志以及变量后，通过广播消息与原有小区重选参数一起下发给小区中的用户终端。

步骤 13: 用户终端在收到网络侧下发的广播消息后，检测到 DifferFlag 标志有效，则响应差异化小区重选机制，根据接收到的用于差异化小区重选的标志及变量进行小区重选参数的调整。

例如，在本小区中由于网络过度拥挤，网络侧决定只继续为优先级高的用户服务。假设，某用户终端的 SubClass=1，收到网络侧发送的差异化小区重选参数为 StepGain=2，StrongWeakFlag=0 以及确定的优先级敏感参数，本实施例中仅设一个优先级敏感参数 X ，用户终端则可以采用预先与网络侧协商的规则，调整所确定的优先级敏感参数。由于 StrongWeakFlag=0，因此调整的规则可以： $X + \text{SubClass} \cdot \text{StepGain}$ 。由此得到，当用户终端的优先级越高，相对于优先级低的用户终端，所获得的增益就越大，更有利于小区驻留。

步骤 14: 用户终端将调整后的优先级敏感参数代替该优先级敏感参数所对应的原小区重选参数，结合系统下发的其他用于小区重选的信息进行差异化小区重选。

至此，一种基于用户优先级的小区重选方法结束。

以上所述，仅为本发明的较佳实施例而已，并非用于限定本发明的保护范围。

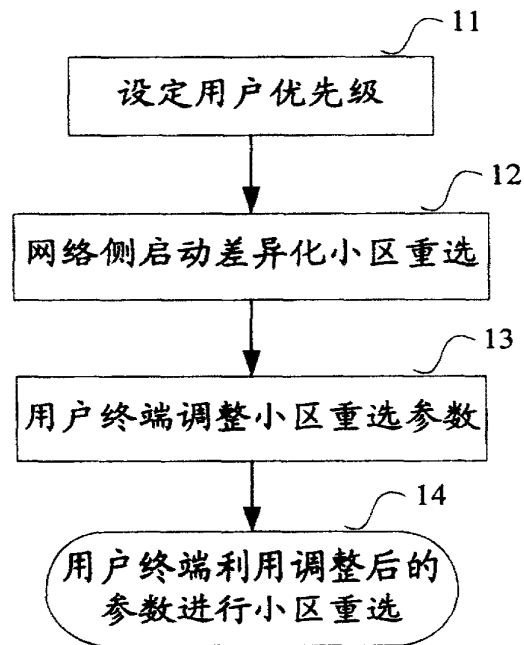



图 1

Residence reselecting based on subscriber priority

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Inventor(s): DU JIANCHENG [CN] +
Applicant(s): HUAWEI TECH CO LTD [CN] +
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Abstract of CN 1852559 (A)

Setting up users' priorities, the method includes following steps: (1) setting up sign of difference degree at network side, determining sensitive parameter of priority, and determining strong / weak instructive mark, and value of step length gain as well as sending down the said sign of difference degree, sensitive parameter, strong / weak instructive mark, and value of step length gain to user terminal; (2) based on received strong / weak instructive mark, value of step length gain, and sensitive parameter of priority determined from priority adjustment self setup, user terminal accomplishes reselecting differenced cells by using adjusted sensitive parameter of priority as parameter for reselecting cell. Based on current protocol, the invention only makes proper modification for network and terminal without need of large changing original system.

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Data supplied from the *espacenet* database — Worldwide



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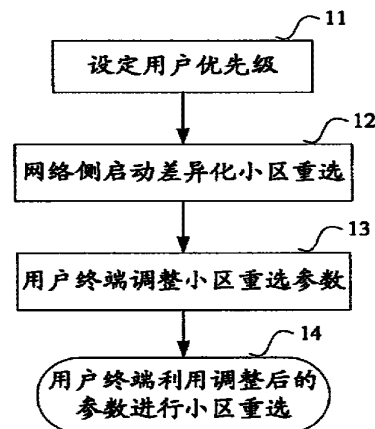
权利要求书 2 页 说明书 6 页 附图 1 页

[54] 发明名称

一种基于用户优先级的小区重选方法

[57] 摘要

本发明公开了一种基于用户优先级的小区重选方法，设定用户的优先级，该方法还包括以下步骤：A. 网络侧设置差异化标志，确定优先级敏感参数，并确定强弱指示标志和步长增益的值，将所设置的差异化标志以及所确定的优先级敏感参数、强弱指示标志和步长增益下发给用户终端；B. 用户终端根据接收到的强弱指示标志和步长增益，以及自身设定的优先级调整所确定的优先级敏感参数，用调整后的优先级敏感参数作为小区重选参数完成差异化小区重选。本发明的方法只需要在网络和终端的现有协议基础上做适当修改，不需要对原来系统作较大改动。



1、一种基于用户优先级的小区重选方法，其特征在于，设定用户的优先级，该方法还包括以下步骤：

A、网络侧设置差异化标志，确定优先级敏感参数，并确定强弱指示标志和步长增益的值，将所设置的差异化标志以及所确定的优先级敏感参数、强弱指示标志和步长增益下发给用户终端；

B、用户终端根据接收到的强弱指示标志和步长增益，以及自身设定的优先级调整所确定的优先级敏感参数，并将调整后的优先级敏感参数作为小区重选参数完成差异化小区重选。

2、根据权利要求1所述的方法，其特征在于，步骤A中所述设置差异化标志为：网络侧在启动差异化小区重选时设置一个差异化标志；或是网络侧预先设置一个差异化标志，在启动差异化小区重选时，将所述差异化标志置为有效。

3、根据权利要求1所述的方法，其特征在于，步骤A中所述确定优先级敏感参数为：网络侧在启动差异化小区重选时，选择一个或一个以上小区重选参数作为优先级敏感参数；或者网络侧与用户终端在启动差异化小区重选之前预先协商选择一个或一个以上小区重选参数作为优先级敏感参数。

4、根据权利要求1所述的方法，其特征在于，步骤A中所述确定强弱指示标志和步长增益的值为：由网络侧在启动差异化小区重选时设定；或由网络侧与用户终端在启动差异化小区重选之前预先协商设定。

5、根据权利要求1所述的方法，其特征在于，步骤B中所述调整优先级敏感参数为：将优先级敏感参数加上或者减去步长增益与用户优先级的乘积。

6、根据权利要求1所述的方法，其特征在于，所述设定用户优先级是将国际移动用户识别码中的不同字段映射成为不同的优先级别，或是将接入类中的不同字段映射为不同的用户优先级，或是在用户识别模块或通用用户身份识别模块卡中增加新的用户优先级字段，设定用户的优先级别。

7、根据权利要求 1 或 6 所述的方法，其特征在于，所述用户优先级划分为两个或两个以上。

一种基于用户优先级的小区重选方法

技术领域

本发明涉及移动通信技术，尤指一种基于用户优先级的小区重选方法。

背景技术

目前的小区重选机制中，存在从2G到3G小区重选、3G到2G小区重选、2G系统内小区重选以及3G系统内小区重选。所述小区重选是指移动用户终端（UE），以下称为用户终端，在空闲模式下，随时监测当前小区和相邻小区的信号质量，以便选择一个最好的小区提供服务。一般过程是：网络侧根据负载测量结果，确定下一步用户终端的分布策略，然后调整小区重选参数，并通过系统消息广播下发给小区内的所有用户终端，用户终端据此进行小区重选，选择最好的小区提供服务。例如3G系统内的小区重选，网络侧根据负载测量结果，确定用户分布策略，然后调整小区重选参数，如滞后功率值（ Q_{hyst1} ）、相邻小区偏移（ $Q_{offset1}$ ）等，通过对这些小区重选参数的合理设置，以达到减少频繁重选以及分摊话务等目的。一般，用户终端将根据系统下发的小区重选参数，将实际的测量值映射为小区重选评估值，再通过比较各个小区重选评估值的大小来决定优选的小区。

从以上分析中，可以看出现有技术中的小区重选是面向小区，而不是针对用户的。如3G系统内的小区重选，根据小区的状态进行调整，如负载情况、话务情况，它并不是面向用户，即不支持用户差异化服务，不能根据用户的类别进行小区重选。例如：网络侧希望将低端用户尽量驻留在2G，而高端用户尽量驻留在3G，该任务就无法通过当前的小区重选机制完成。

发明内容

有鉴于此，本发明的主要目的在于提供一种基于用户优先级的小区重选方

法，该方法能够根据用户的优先级实现同时面向小区和用户的小区重选。

为达到上述目的，本发明的技术方案是这样实现的：

一种基于用户优先级的小区重选方法，设定用户的优先级，该方法还包括以下步骤：

A、网络侧设置差异化标志，确定优先级敏感参数，并确定强弱指示标志和步长增益的值，将所设置的差异化标志以及所确定的优先级敏感参数、强弱指示标志和步长增益下发给用户终端；

B、用户终端根据接收到的强弱指示标志和步长增益，以及自身设定的优先级调整所确定的优先级敏感参数，并将调整后的优先级敏感参数作为小区重选参数完成差异化小区重选。

其中，步骤A中所述设置差异化标志为：网络侧在启动差异化小区重选时设置一个差异化标志；或是网络侧预先设置一个差异化标志，在启动差异化小区重选时，将所述差异化标志置为有效。所述的确定优先级敏感参数为：网络侧在启动差异化小区重选时，选择一个或一个以上小区重选参数作为优先级敏感参数；或者网络侧与用户终端在启动差异化小区重选之前预先协商选择一个或一个以上小区重选参数作为优先级敏感参数。所述的确定强弱指示标志和步长增益的值为：由网络侧在启动差异化小区重选时设定；或由网络侧与用户终端在启动差异化小区重选之前预先协商设定。

其中，步骤B中所述调整优先级敏感参数为：将优先级敏感参数加上或者减去步长增益与用户优先级的乘积。

其中，设定用户优先级是将国际移动用户识别码中的不同字段映射成为不同的优先级别，或是将接入类中的不同字段映射为不同的用户优先级，或是在用户识别模块或通用用户身份识别模块卡中增加新的用户优先级字段，设定用户的优先级别。

其中，所述用户优先级划分为两个或两个以上。

本发明所提供的一种基于用户优先级的小区重选方法，根据用户的优先级调整小区重选参数，进行小区重选，使小区重选机制不仅面向小区，而且面向

用户。通过用户优先级将用户进行区分，完成小区重选过程中用户的差异化服务。

附图说明

图 1 为本发明实施例的流程图。

具体实施方式

为使本发明的目的、技术方案和优点更加清楚明白，以下举实施例，并参照附图，对本发明进一步详细说明。

本发明的核心思想是：对每个用户设定优先级，并增加设置用于完成差异化小区重选的标志和变量；用户终端根据设定的用户优先级，以及网络下发的用于差异化小区重选的标志和变量，调整小区重选参数完成差异化小区重选。这里，所谓差异化小区重选是指根据用户的差异比如针对不同用户的优先级调整小区重选参数，完成小区重选。

为完成本发明所提出的方法，至少需要在网络侧增加设置三个标志和一个变量以完成差异化小区重选。所述三个标志为：1) 差异化标志 (DifferFlag)，用来指示用户终端是否需要启动差异化小区重选；2) 优先级敏感标志 (ClassFlag)，网络侧通过为小区重选参数设置该标志，向用户终端指示此小区重选参数为优先级敏感参数；3) 强弱指示标志 (StrongWeakFlag)，网络侧通过为优先级敏感参数设置该标志，用来向用户终端指示是以降低的方式，或是提高方式对优先级敏感参数进行调整，将 StrongWeakFlag 标志置 0 表示提高，StrongWeakFlag 标志置 1 表示降低。所述一个变量是步长增益 (StepGain) 变量，表示使用用户优先级调整优先级敏感参数时所带来的增益。

其中，所谓优先级敏感参数是指：在实现差异化小区重选过程中，被确定为基于用户优先级调整的小区重选参数。优先级敏感参数可以由网络侧在发起差异化小区重选时确定，也可以由网络侧与用户终端预先协商确定，数量为一个或一个以上。优先级敏感参数的调整规则，由网络侧预先与用户终端协商确

定，为网络侧及用户终端所共知。例如，只选择一个优先级敏感参数 X，则调整的规则可以是 $X \pm \text{SubClass} \cdot \text{StepGain}$ ，其中，用加号还是减号由 X 所对应的 StrongWeakFlag 标志决定。为了兼容原有系统并避免对原有系统的较大修改，可以尽量利用原有消息流中的空闲和保留字段来传输增加设置的标志和变量。

所述差异化标志在实际应用中两种设置方式：第一种是，网络侧在需要启动差异化小区重选时设置 DifferFlag 标志，并将所设置的 DifferFlag 标志下发给用户终端，用户终端检测到有该 DifferFlag 标志就启动差异化小区重选。第二种是，无论是否启动差异化小区重选，网络侧都设置一个 DifferFlag 标志，并将 DifferFlag 标志与 StrongWeakFlag 标志、ClassFlag 标志以及 StepGain 一起下发给用户终端，只是针对网络侧需要启动差异化小区重选的情况，DifferFlag 标志被设置为有效，针对不需要启动差异化小区重选的情况，DifferFlag 标志被设置为无效；用户终端收到置为有效的 DifferFlag 标志，则根据 StrongWeakFlag 标志、ClassFlag 标志及 StepGain 执行差异化小区重选；用户终端收到置为无效的 DifferFlag 标志，则忽略 StrongWeakFlag 标志、ClassFlag 标志及 StepGain，按照现有正常流程完成小区重选过程。下面仅以采用第二种方式设置 DifferFlag 标志为例。

本实施例的实施过程为：首先由网络运营商在用户终端加入网络前，根据具体的用户设定用户优先级。在网络运行阶段，由网络侧启动差异化小区重选，并通过广播信道给用户终端下发新设置的 DifferFlag 标志、StrongWeakFlag 标志、ClassFlag 标志以及 StepGain 变量。用户终端通过接收这些标志和变量，响应差异化小区重选，根据用户优先级利用下发的标志和变量调整小区重选参数，完成差异化的小区重选。具体步骤如图 1 所示：

步骤 11：用户终端在加入网络之前，由网络运营商根据用户的类别、重要性或特殊性设定用户优先级。

用户优先级的设定方法可以由用户的国际移动用户识别码（IMSI）映射得到用户优先级字段（SubClass），并存储在用户终端设备中。映射规则可由网络

侧任意选择。例如：可以将国际移动用户识别码中的移动国家码（MCC）字段进行映射得到用户优先级，将 000~399 映射为 SubClass=0，400~699 映射为 SubClass=1，700~999 映射为 SubClass=2；或者将其中的奇数映射为 SubClass=0，偶数映射为 SubClass=1。

也可以将接入类（AC）的不同字段映射为不同的用户优先级字段，并存储在用户终端设备中，映射方式为任意。其中接入类是存储在移动终端用户的 SIM 卡中，用来控制移动用户接入网络的参数。每一个普通用户都有一个接入类。接入类分为等级 0 至等级 9 十种。例如，在某些地区出现紧急状态或某个网络发生严重故障等等，可以利用 SIM 卡中的接入类控制用户接入网络。

或者还可以直接在用户识别模块（SIM）、或通用用户身份识别模块（USIM）卡中增加新的 SubClass 字段，用来设定用户的优先级别。例如：SubClass=1 表示用户优先级为 1，SubClass=2 表示用户优先级为 2。

用户优先级可以划为两个或多个，但为了避免系统的复杂性，通常将用户的优先级划分为 2 个级别。

步骤 12：网络侧根据负载测量结果以及实际运行状况，在需要启动差异化小区重选时，将 DifferFlag 标志置为有效。例如在网络过度拥挤或出现紧急情况时，允许优先级高的用户继续驻留，而优先级低的用户转移到其他小区中去。

网络侧在启动差异化小区重选过程时，首先确定用户优先级敏感参数，然后为所确定的优先级敏感参数分别设置 StrongWeakFlag 标志，最后，为每个优先级敏感参数设定各自的 StepGain，或者对所有的优先级敏感参数设定一个 StepGain。

其中，如果优先级敏感参数是由网络侧与用户终端预先协商确定，则将预先协商确定的小区重选参数作为优先级敏感参数，此时，网络侧已为预先协商确定的优先级敏感参数设置了 ClassFlag 标志；如果是在启动差异化小区重选过程中选择优先级敏感参数，则根据网络环境以及用户所需网络提供的服务选择优先级敏感参数，并为优先级敏感参数设置 ClassFlag 标志。例如，如果在本小区中由于网络过度拥挤，网络侧决定只需继续为优先级高的用户服务，则此时

选择的优先级敏感参数可以是有利于用户驻留的小区重选参数，设为 X，为该优先级敏感参数设置 ClassFlag 标志，并将 StrongWeakFlag 标志置 0，表示以提高的方式调整优先级敏感参数，StepGain 的具体值可以根据经验值或者网络的环境确定。

当网络侧确定了用户差异化小区重选的优先级敏感参数、标志以及变量后，通过广播消息与原有小区重选参数一起下发给小区中的用户终端。

步骤 13: 用户终端在收到网络侧下发的广播消息后，检测到 DifferFlag 标志有效，则响应差异化小区重选机制，根据接收到的用于差异化小区重选的标志及变量进行小区重选参数的调整。

例如，在本小区中由于网络过度拥挤，网络侧决定只继续为优先级高的用户服务。假设，某用户终端的 SubClass=1，收到网络侧发送的差异化小区重选参数为 StepGain=2，StrongWeakFlag=0 以及确定的优先级敏感参数，本实施例中仅设一个优先级敏感参数 X，用户终端则可以采用预先与网络侧协商的规则，调整所确定的优先级敏感参数。由于 StrongWeakFlag=0，因此调整的规则可以： $X + \text{SubClass} \cdot \text{StepGain}$ 。由此得到，当用户终端的优先级越高，相对于优先级低的用户终端，所获得的增益就越大，更有利于小区驻留。

步骤 14: 用户终端将调整后的优先级敏感参数代替该优先级敏感参数所对应的原小区重选参数，结合系统下发的其他用于小区重选的信息进行差异化小区重选。

至此，一种基于用户优先级的小区重选方法结束。

以上所述，仅为本发明的较佳实施例而已，并非用于限定本发明的保护范围。

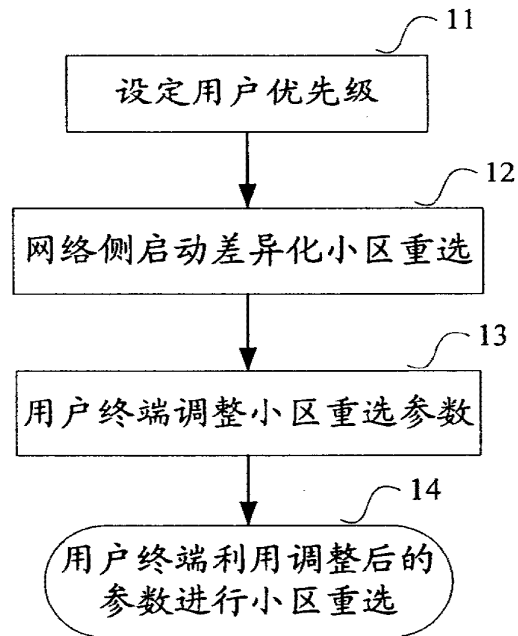


图 1

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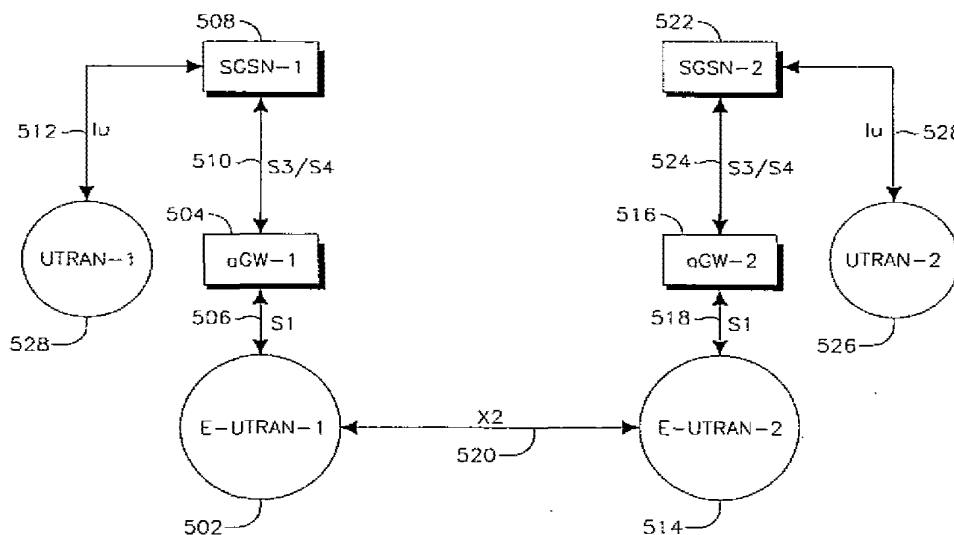
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(54) Title: LTE RESELECTABLE-ONLY CELLS AND CELL INFO LIST FOR HANDOVER



(57) Abstract: A method of determining handover capable cells in a wireless transmit/receive unit (WTRU). The method includes the WTRU receiving a cell list from an e Node-B, and the WTRU determining a handover status of a cell based on the cell list.

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[0001] LTE RESELECTABLE-ONLY CELLS AND
 CELL INFO LIST FOR HANDOVER

[0002] FIELD OF INVENTION

[0003] The present invention is related to wireless communication systems. In particular, a method and apparatus is disclosed for determining handover capable cells in a WTRU.

[0004] BACKGROUND

[0005] A goal of the Long Term Evolution (LTE) program of the Third Generation Partnership Project (3GPP) is to bring new technology, network architecture, configurations and applications and services to wireless networks in order to provide improved spectral efficiency, reduced latency, faster user experiences and richer applications and services with less cost. LTE's aim is to create an Evolved Universal Terrestrial Radio Access Network (E-UTRAN).

[0006] Figure 1 is a diagram of a typical mobile network 100 in accordance with the prior art. The S3 interface 102 and the S4 interface 104 provide paths for an E-UTRAN to communicate with legacy networks, such as a UTRAN 108 or a GSM/EDGE Radio Access Network (GERAN) 110. In order to route data streams that have been handed over between the E-UTRAN 106 and the UTRAN 108 and between the E-TURAN 106 and the GERAN 110 via mobility management entity (MME)/user plane entity (UPE) 112 and a serving GPRS support node (SGSN) 114, the S3 interface 102 and the S4 interface 106 preferably are used. As S2 interface 116 may provide a handover path between the E-UTRAN 106 and a non-3GPP Internet Protocol (IP) network or a wireless local area network (WLAN) 120.

[0007] Figure 2 shows typical interfaces 200 between an E-UTRAN and an evolved packet core (EPC) in accordance with the prior art. An X2 interface 202 between Node Bs (eNBs) 204 handles point-to-point handover traffic between the

eNBs 204. The S1 interface 206 provides a point-to-point handover path between the eNB 204 and the EPC through an access gateway (aGW) 208.

[0008] A typical cellular environment may include legacy cells, LTE cells, and non-3GPP cells. If the S3 and S4 interfaces (102 and 104 of Figure 1, respectively) are not present, due to, for example, delay in deployment or equipment failure, handover is not possible between the LTE cells and the legacy cells. Additionally, if the X2 interface (202 of Figure 2) is not available due to, for example, installation limitations or operational problems, handover may not occur from LTE cell to LTE cell. Also, the S2 interface (116 of Figure 1) may be required for handover between an LTE cell and a wireless local area network (WLAN).

[0009] Typically, a `neighboring_cell_info_list` is broadcast to the WTRUs in a cell. The list includes information as to the capabilities of neighboring cells, so that a WTRU can determine whether a cell can be selected or reselected while the WTRU is in IDLE mode.

[0010] The `neighboring_cell_info_list` does not provide information that the WTRU can use for handover. Cells that are not handover possible should not be measured for handover while a WTRU is in ACTIVE mode, and subsequent operations such as measurement reporting and the like should be reduced, if not eliminated.

[0011] SUMMARY

[0012] A method is disclosed for determining handover capable cells in a wireless transmit/receive unit (WTRU). The method preferably includes the WTRU receiving a cell list from an e Node-B, and the WTRU determining a handover status of a cell based on the cell list.

[0013] BRIEF DESCRIPTION OF THE DRAWINGS

[0014] A more detailed understanding may be had from the following description, given by way of example and to be understood in conjunction with the accompanying drawings wherein:

[0015] Figure 1 is a diagram of a typical mobile network in accordance with the prior art;

[0016] Figure 2 shows typical interfaces between an E-UTRAN and an EPC in accordance with the prior art; and

[0017] Figure 3 shows an exemplary wireless system, including an eNB and a plurality of WTRUs, configured in accordance with one embodiment;

[0018] Figure 4 is a functional block diagram of an eNB and a WTRU of a wireless communication system in accordance with one embodiment; and

[0019] Figure 5 is a diagram of a mobile network in accordance with one embodiment.

[0020] DETAILED DESCRIPTION

[0021] When referred to hereafter, the terminology "wireless transmit/receive unit (WTRU)" includes but is not limited to a user equipment (UE), a mobile station, a fixed or mobile subscriber unit, a pager, a cellular telephone, a personal digital assistant (PDA), a computer, or any other type of user device capable of operating in a wireless environment. When referred to hereafter, the terminology "base station" includes but is not limited to a Node-B, a site controller, an access point (AP), or any other type of interfacing device capable of operating in a wireless environment.

[0022] Turning now to Figure 3, there is shown an exemplary wireless communication system 300 configured in accordance with the present invention. The wireless communication system 300 may include a plurality of wireless communication devices, such as an eNB 310 and a plurality of WTRUs 320, capable of wirelessly communicating with one another. Although the wireless communication devices depicted in the wireless communication system 300 are shown as an eNB and WTRUs, it should be understood that any combination of wireless devices may comprise the wireless communication system 300. That is, the wireless communication system 300 may comprise any combination of eNBs, access points (APs), WTRUs, stations (STAs), and the like.

[0023] For example, the wireless communication system 300 may include

an eNB and client device operating in an infrastructure mode, WTRUs operating in ad-hoc mode, nodes acting as wireless bridges, or any combination thereof. However, the wireless communication system 300 may be any other type of wireless communication system.

[0024] Figure 4 is a functional block diagram of an eNB 310 and a WTRU 320 of the wireless communication system 300 of Figure 3. As shown in Figure 4, the eNB 310 and the WTRU 320 are in wireless communication with one another. In addition to the components that may be found in a typical eNB, the eNB 310 includes a processor 415, a receiver 416, a transmitter 417, and an antenna 418. The processor 415 is configured to generate, transmit, and receive data packets. The receiver 416 and the transmitter 417 are in communication with the processor 415. The antenna 418 is in communication with both the receiver 416 and the transmitter 417 to facilitate the transmission and reception of wireless data.

[0025] Similarly, in addition to the components that may be found in a typical WTRU, the WTRU 120 may include a processor 425, a receiver 426, a transmitter 427, and an antenna 428. The processor 425 is configured to generate, transmit, and receive data packets. The receiver 436 and the transmitter 427 are in communication with the processor 425. The antenna 428 is in communication with both the receiver 426 and the transmitter 427 to facilitate the transmission and reception of wireless data.

[0026] Figure 5 is a diagram of a mobile network 500 in accordance with one embodiment. E-UTRAN 1 502 communicates with aGW-1 504 over a first S1 connection 506. aGW-1 504 communicates with SGSN-1 508 over a first S3/S4 interface 510 and SGSN-1 508 communicates with UTRAN-1 528 over a first Iu connection 512. E-UTRAN 2 514 communicates with aGW-2 516 over a second S1 connection 518. E-UTRAN 1 502 and E-UTRAN 2 514 may communicate directly over the X2 interface 520. The E-UTRAN 2 514 communicates with aGW-2 516 over the second S1 interface 518 and aGW-2 516 communicates with SGSN-2 522 over a second S3/S4 interface 524. Lastly SGSN-2 522 communicates with UTRAN-2 526 over a second Iu 528 interface.

[0027] The status of the interfaces shown in Figure 5 may affect inter-cell relationships and WTRU operations. Handover operations between two E-UTRAN cells occur over the X2 interface 520. If the X2 interface 520 is not operational due to, for example, connection problems or installation issues, WTRU handover between two E-UTRAN cells is not possible. Similarly, in order to effectuate handover between the cells of the E-UTRAN and the cells of a UTRAN or GERAN, the S3/S4 interfaces (510,524) must be operational.

[0028] As shown in Figure 5, the WTRU handover is possible between UTRAN-1 528 and E-UTRAN 1 502 if the first S3/S4 interface 510 is operational. If it is assumed that the second S3/S4 interface 524 is not operational, there may not be handover between E-UTRAN 2 514 and UTRAN-2 526. If a S1 interface is functional, the E-UTRAN cells are able to support cell selection and cell reselection. An eNB may check and determine if the S1, S2, S3/S4 and the X2 interfaces are functional.

[0029] A WTRU in IDLE mode checks a neighboring_cell_list in order for the WTRU to perform selection, reselection and handover. The cells to which handover is not possible, but are available for selection or reselection, should be designated as such in the WTRU's neighboring_cell_list so that the WTRU may camp on or navigate through those cells. Therefore, in the neighboring_cell_list, the cells to which handover is not possible should be designated as "reselectable only" cells. This may enable the WTRU to access those cells for paging, for example, and to allow WTRU originated calls, for another example, if no other cells can cover the particular geographical area or to increase network coverage capacities for load balancing purpose.

[0030] In general, for a WTRU that is LTE compliant, cells can be categorized as cells to which handover is not selectable but where handover is possible, cells that are not selectable and handover is not possible, and cells that are selectable but where handover is not possible, and cells that are reselectable and to which handover is possible.

[0031] Therefore, the neighboring_cell_info_list may include a cell information attribute that indicates if handover is possible, if selection is

possible, both, or neither. A LTE compliant WTRU may use this information to make handover decisions and cell measurement decisions. The WTRU need not waste resources measuring cells to which handover is not possible.

[0032] Table 1 shows the columns and rows in a neighboring_cell_info_list table. Only those cells marked with a "Yes" in the "handover possible" column may be measured by the WTRU for handover. Cells not possessing that attribute may not be measured, for example, cell-6 and cell-7 in Table 1, in order to save power and boost performance as well as to prevent any malfunction in a handover operation.

[0033] The neighboring_cell_info_list includes a row for each neighboring cell, and columns to indicate cell attributes. It may be used for LTE cells, Wideband Code Division Multiple Access (WCDMA) cells, Global System for Mobile communications (GSM) cells and Wireless Local Area Network (WLAN) cells, for example.

[0034] Once the WTRU receives the neighboring_cell_info_list from an eNB, the WTRU, in IDLE mode, may determine which cells to measure for reselection based on the entry in the "Idle mode indicator" column. A "Yes" entry means reselection to that cell is possible. After the determination, the WTRU may begin measurements.

[0035] If the WTRU is in ACTIVE mode, it may determine which cells to measure for handover based on an entry in the "Handover possible" column. A "YES" entry means handover to that cell is possible, so the WTRU may begin to measure that cell.

[0036] TABLE 1 - "Handover Possible" indicator field included in the neighboring cell list

Number field	Priority indicator	Very high data rates	High data rates	Speech only	Dependency field	Idle mode indicator	Handover Possible	Technology indicator	Cell description
1	1	Yes	Yes	No	-	No	Yes	LTE	LTE cell suitable for all services, which should be not selected by idle WTRUs, could be measured for handover (HO)
2	1	Yes	Yes	Yes	-	Yes	Yes	WCDMA	WCDMA cell suitable for all services (HSPA capable), which can be selected by idle WTRUs, could be measured for HO
3	2	No	Yes	Yes	-	Yes	Yes	WCDMA	WCDMA cell suitable for all services (not HSPA capable), which can be selected by idle WTRUs, could be measured for HO
4	2	Yes	Yes	Yes	1	Yes	Yes	WCDMA	WCDMA pico cell suitable for all services under the umbrella of cell, and could be measured for HO
5	4	No	No	Yes	-	No	Yes	GSM	GSM cell (not GPRS capable) which should be not selected by idle WTRUs, and could be measured for HO
6	4	No	Yes	No	3	No	No	WLAN	WLAN cell not suitable for speech services, not handover possible, no measurement for HO
7	2	Yes	Yes	Yes	-	Yes	No	WCDMA	Not handover possible, no measurement for HO, but could be selected/reselected

[0037] EMBODIMENTS

[0038] 1. A method of determining handover capable cells in a wireless transmit/receive unit (WTRU) comprising the WTRU receiving a cell list from an e Node-B.

[0039] 2. The method as in embodiment 1 further comprising the WTRU determining a handover status of a cell based on the cell list.

[0040] 3. The method as in embodiment 1 or 2 wherein the cell list comprises a database of cell capability information.

[0041] 4. The method as in embodiment 3 wherein the cell capability information includes a designation of handover status.

[0042] 5. The method as in embodiment 3 or 4 wherein the cell capability information includes a designation of reselection status.

[0043] 6. The method as in any one of embodiments 1-5 further comprising an eNB checking operational status of an inter-network communication interface.

[0044] 7. The method as in embodiment 6 wherein the eNB determines handover status and reselection status based on the checking of the operational status of the inter-network communications interface.

[0045] 8. The method as in embodiment 6 or 7 further comprising the eNB adjusting an entry in the cell list based on the handover status and the reselection status.

[0046] 9. The method as in embodiment 8 further comprising the eNB transmitting the cell list to the WTRU.

[0047] 10. The method as in any one of embodiments 6-9 wherein the inter-network communications interface comprises an S1 interface, an S2 interface and S3 interface an S4 interface or an X2 interface.

[0048] 11. The method as in any one of embodiments 4-10 further comprising the eNB adjusting an entry in the cell list wherein the entry indicates the designation of handover status.

[0049] 12. The method as in any one of embodiments 5-11 further comprising the eNB adjusting an entry in the cell list wherein the entry indicates the designation of reselection status.

[0050] 13. A wireless transmit receive unit (WTRU) configured to read a cell list and measure a neighbor cell based on the cell list.

[0051] 14. The WTRU as in embodiment 13 wherein the WTRU is further configured to, in IDLE mode, measure reselectable cells based on the cell list.

[0052] 15. The WTRU as in embodiment 13 or 14 wherein the WTRU is further configured to, in ACTIVE mode, measure a handover capable cell based on the cell list.

[0053] 16. An e Node B (eNB) configured to adjust entries in a cell list based on a condition of an inter-network interface.

[0054] 17. The eNB as in embodiment 16 wherein the eNB is further configured to transmit the cell list to a wireless transmit receive unit (WTRU).

[0055] 18. The eNB as in embodiment 16 or 17 wherein the eNB is configured to adjust an entry in a cell list to indicate a handover status of a neighbor cell.

[0056] 19. A cell list contained in a wireless transmit receive unit (WTRU), the cell list comprising an indication of a neighbor cell's handover capability

[0057] Although the features and elements are described in the embodiments in particular combinations, each feature or element can be used alone without the other features and elements of the embodiments or in various combinations with or without other features and elements. The methods or flow charts provided may be implemented in a computer program, software, or firmware tangibly embodied in a computer-readable storage medium for execution by a general purpose computer or a processor. Examples of computer-readable storage mediums include a read only memory (ROM), a random access memory (RAM), a register, cache memory, semiconductor memory devices, magnetic media such as internal hard disks and removable disks, magneto-optical media, and optical media such as CD-ROM disks, and digital versatile disks (DVDs).

[0058] Suitable processors include, by way of example, a general purpose processor, a special purpose processor, a conventional processor, a digital signal processor (DSP), a plurality of microprocessors, one or more microprocessors in association with a DSP core, a controller, a microcontroller, Application Specific Integrated Circuits (ASICs), Field Programmable Gate Arrays (FPGAs) circuits, any other type of integrated circuit (IC), and/or a state machine.

[0059] A processor in association with software may be used to implement a radio frequency transceiver for use in a wireless transmit receive unit (WTRU), user equipment (UE), terminal, base station, radio network controller (RNC), or any host computer. The WTRU may be used in conjunction with modules, implemented in hardware and/or software, such as a camera, a video camera

module, a videophone, a speakerphone, a vibration device, a speaker, a microphone, a television transceiver, a hands free headset, a keyboard, a Bluetooth® module, a frequency modulated (FM) radio unit, a liquid crystal display (LCD) display unit, an organic light-emitting diode (OLED) display unit, a digital music player, a media player, a video game player module, an Internet browser, and/or any wireless local area network (WLAN) module.

*

*

*

CLAIMS

What is claimed is:

1. A method of determining handover capable cells in a wireless transmit/receive unit (WTRU) comprising:
the WTRU receiving a cell list from an e Node-B; and
the WTRU determining a handover status of a cell based on the cell list.

2. The method as in claim 1 wherein the cell list comprises a database of cell capability information.

3. The method as in claim 1 wherein the cell capability information includes a designation of handover status.

4. The method as in claim 1 wherein the cell capability information includes a designation of reselection status.

5. The method as in claim 1 further comprising an eNB checking operational status of an inter-network communication interface.

6. The method as in claim 5 wherein the eNB determines handover status and reselection status based on the checking of the operational status of the inter-network communications interface.

7. The method as in claim 6 further comprising the eNB adjusting an entry in the cell list based on the handover status and the reselection status.

8. The method as in claim 7 further comprising the eNB transmitting the cell list to the WTRU.

9. The method as in claim 5 wherein the inter-network communications interface comprises an S1 interface, an S2 interface and S3 interface an S4 interface or an X2 interface.

10. The method as in claim 7 further comprising the eNB adjusting an entry in the cell list wherein the entry indicates the designation of handover status.

11. The method as in claim 7 further comprising the eNB adjusting an entry in the cell list wherein the entry indicates the designation of reselection status.

12. A wireless transmit receive unit (WTRU) configured to read a cell list and measure a neighbor cell based on the cell list.

13. The WTRU as in claim 12 wherein the WTRU is further configured to, in IDLE mode, measure reselectable cells based on the cell list.

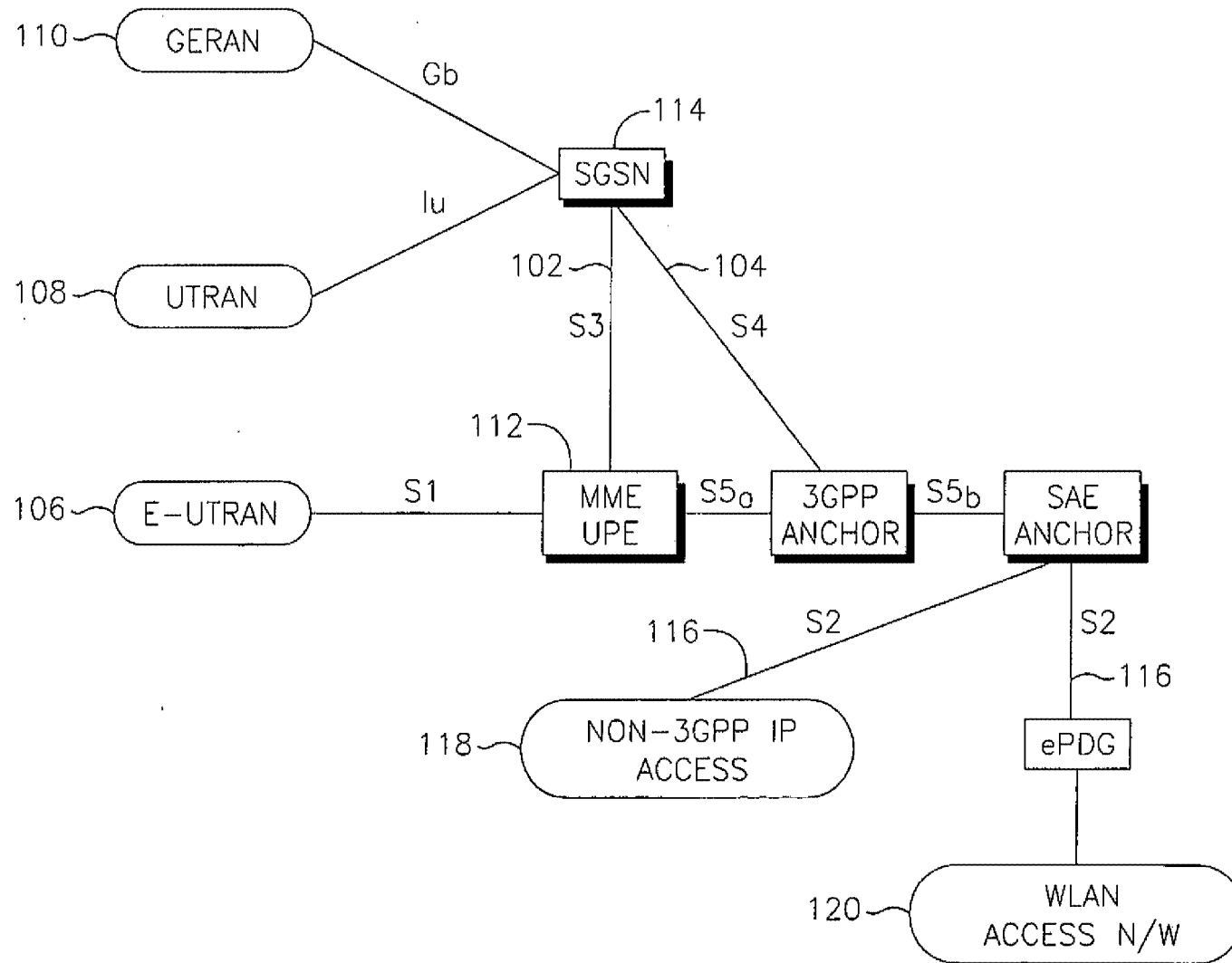
14. The WTRU as in claim 12 wherein the WTRU is further configured to, in ACTIVE mode, measure a handover capable cell based on the cell list.

15. An e Node B (eNB) configured to adjust entries in a cell list based on a condition of an inter-network interface.

16. The eNB as in claim 15 wherein the eNB is further configured to transmit the cell list to a wireless transmit receive unit (WTRU).

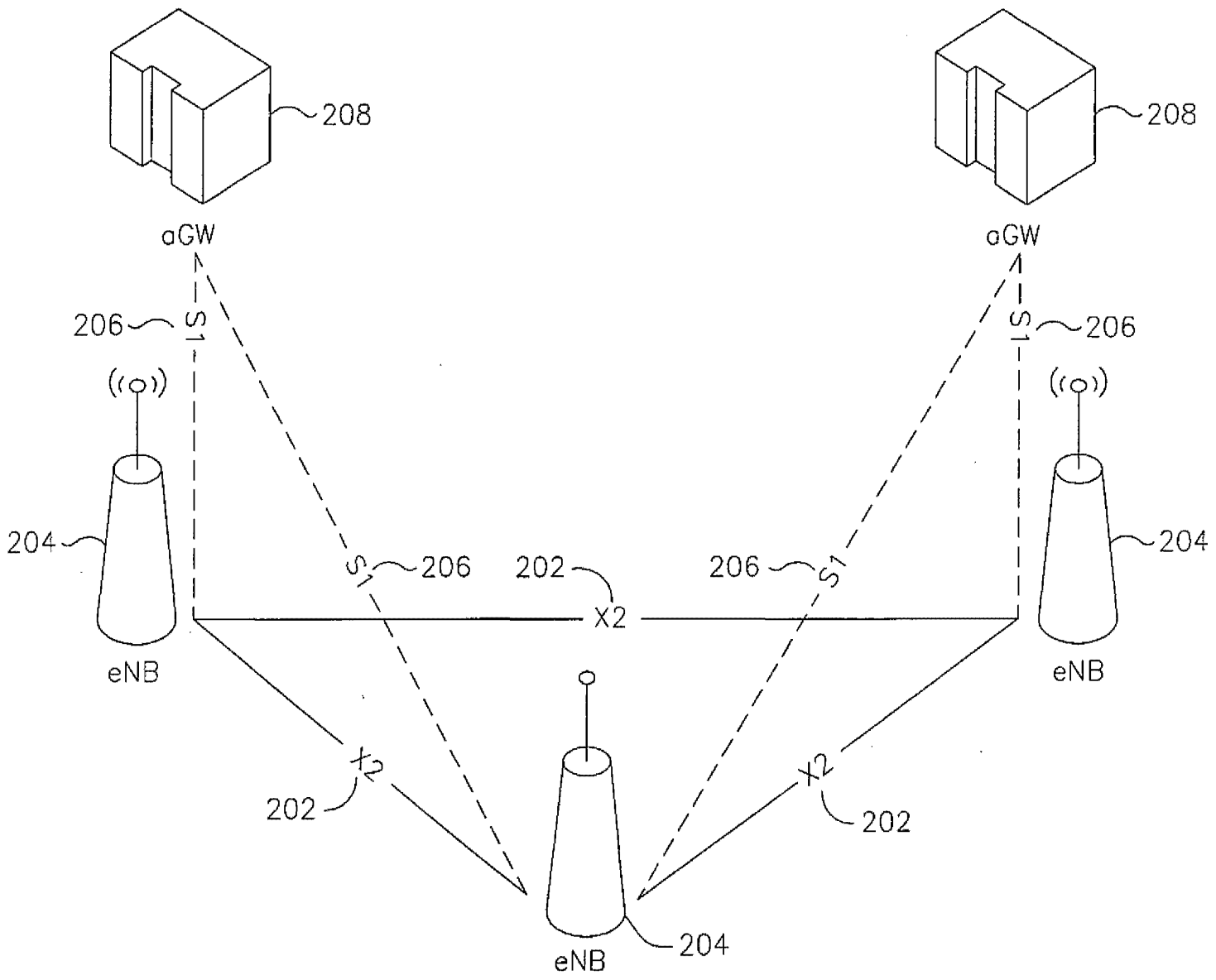
17. The eNB as in claim 15 wherein the eNB is configured to adjust an entry in a cell list to indicate a handover status of a neighbor cell.

18. A cell list contained in a wireless transmit receive unit (WTRU), the cell list comprising an indication of a neighbor cell's handover capability.



PRIOR ART

FIG. 1



PRIOR ART
FIG.2

200

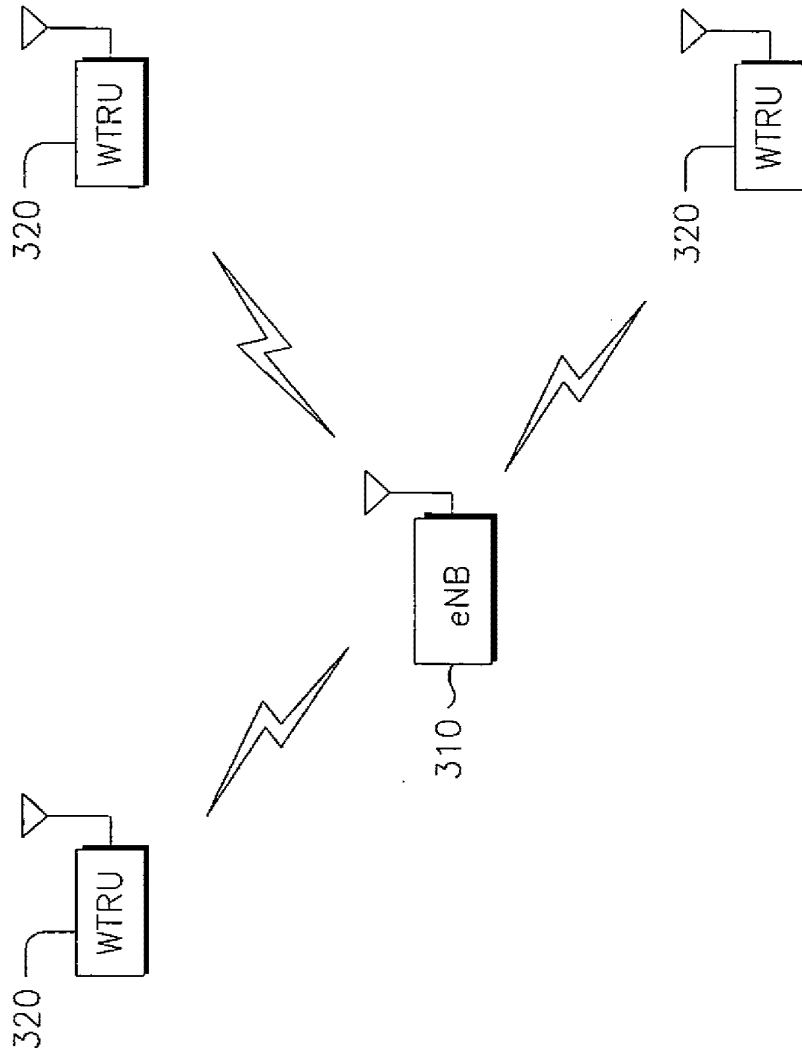


FIG.3

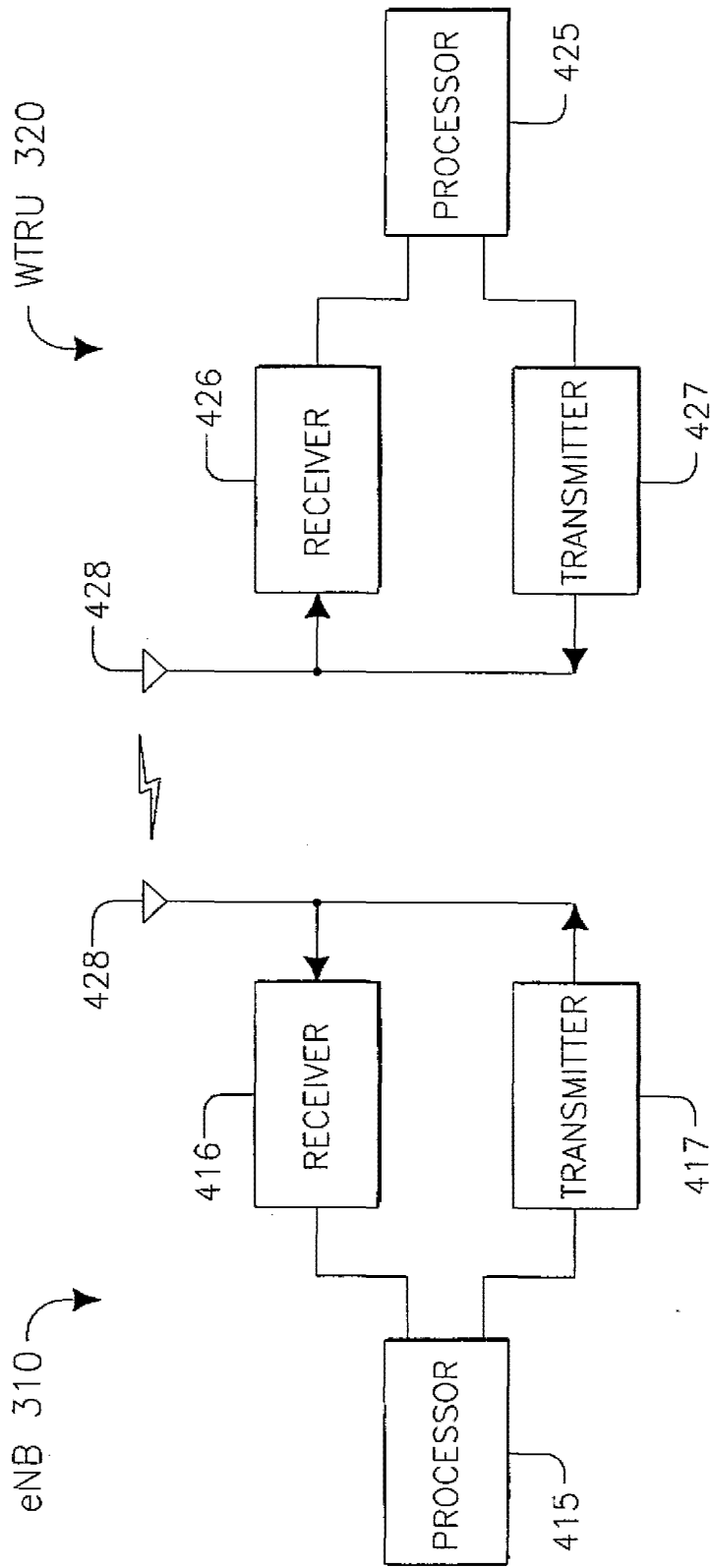


FIG.4

5/5

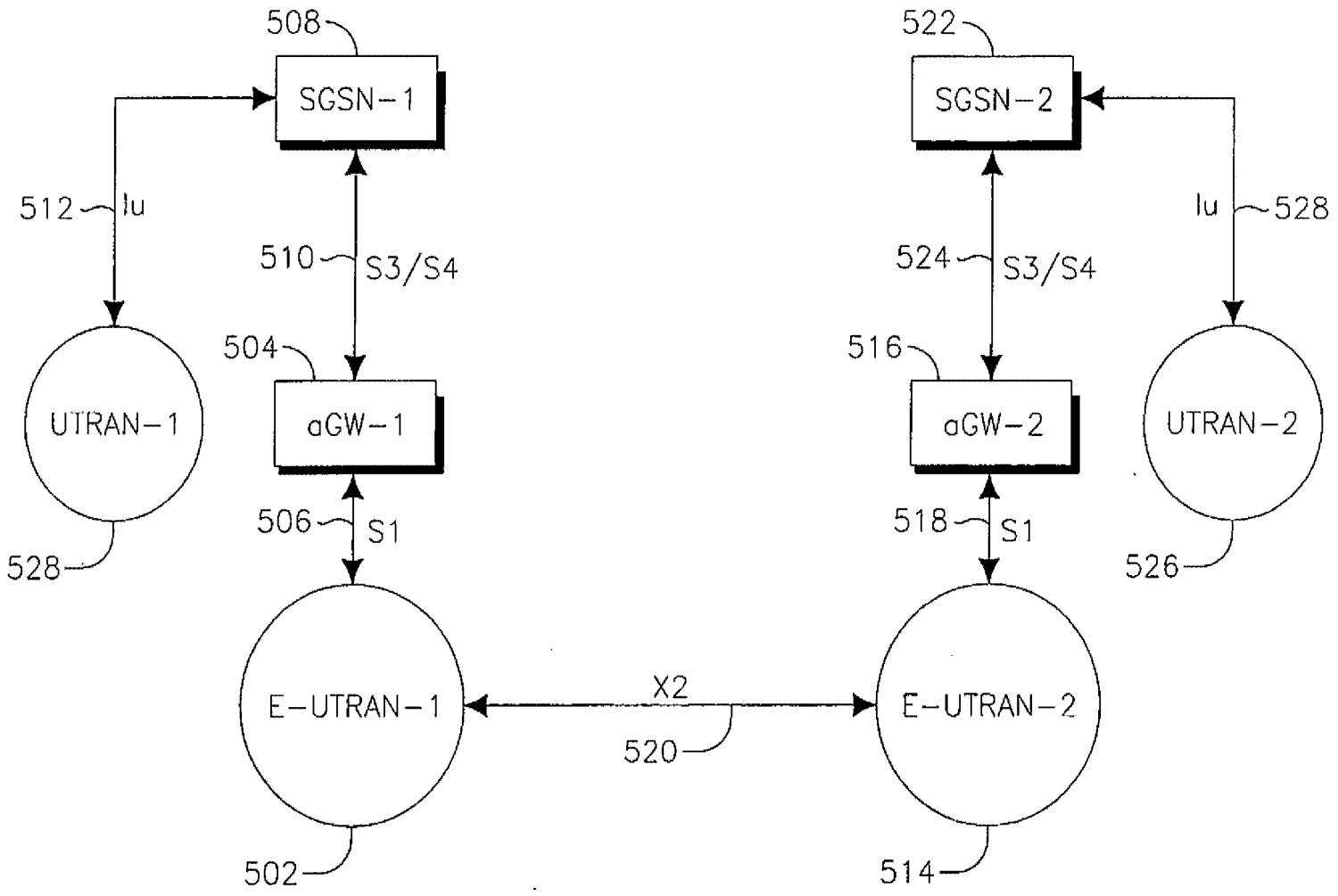


FIG.5

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2007/023013

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04Q7/38

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)
H04Q

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	US 6 546 251 B1 (DALSGAARD LARS [FI] ET AL) 8 April 2003 (2003-04-08) column 6, lines 26-65 column 7, line 25 - column 8, line 30	1-18
A	US 2004/192313 A1 (OTTING MARCIA JEAN [US]) 30 September 2004 (2004-09-30) paragraphs [0028] - [0035]	1-18

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier 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.
- *8* document member of the same patent family

Date of the actual completion of the international search

20 March 2008

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/023013

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		WO 2004095853 A2	04-11-2004

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(54) **METHOD, SYSTEM AND NETWORK DEVICE FOR OBTAINING CELL RESELECTION PRIORITY**

(57) A method, a system, and a network device for obtaining cell reselection priority are disclosed. According to one method aspect, the network obtains information for calculating priority; and the network determines a terminal-specific private priority list according to the information, and delivers the determined private priority list specific to the terminal through special signaling; or the terminal obtains all or part of the information for calculating priority from the network, and determines its private priority list according to the obtained information; or both the network and the terminal determine the terminal-specific private priority list according to the information.

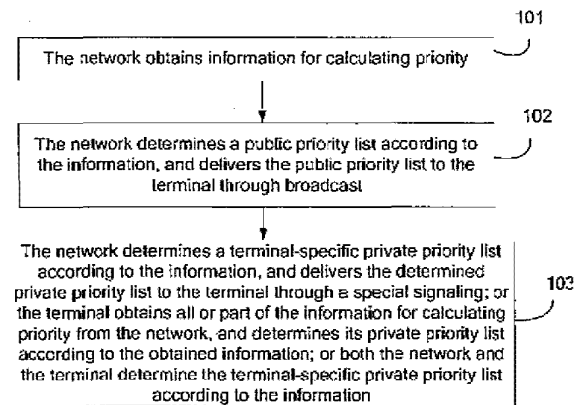


FIG. 1

Description

[0001] This application claims priority to Chinese Patent Application No. 200810002818.1, filed with the Chinese Patent Office on January 04, 2008 and entitled "Method and System for Obtaining Cell Reselection Priority", which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to communication technologies, and in particular, to a method, a system, and a network device for obtaining cell reselection priority.

BACKGROUND

[0003] With the development of mobile communication technologies, more and more mobile communication systems come forth, for example, Global System For Mobile Communication (GSM) which is also known as the 2nd Generation (2G) mobile communication system; Wideband Code Division Multiple Access (WCDMA), Code Division Multiple Access 2000 (CDMA2000), and Time Division-Synchronous CDMA (TD-SCDMA), which are also known as the 3rd Generation (3G) mobile communication systems; and the systems currently under development such as Long Term Evolution (LTE) and World Interoperability for Microwave Access (WiMAX). If different systems coexist, when a moving terminal performs cell reselection, multiple frequencies within a system and the cells of multiple systems are available for selection. Therefore, it is important to reselect a proper cell, reduce the measurement and save power consumption.

[0004] In the existing LTE system, to obtain cell reselection priority cannot be performed.

SUMMARY

[0005] A method, a system, and a network device for obtaining cell reselection priority are disclosed according to aspects of the present invention so that the terminal can obtain public priority and private priority and can provide relevant information for the processes such as cell reselection and cell search.

[0006] A method for obtaining cell reselection priority is disclosed according to one aspect. The method includes the steps of a network obtaining information for calculating priority; and the network determining a private priority list specific to a terminal according to the information, and delivering the determined private priority list specific to the terminal through special signaling; or the terminal obtaining all or part of the information for calculating the priority from the network, and determining the private priority list specific to the terminal according to the obtained information; or the network and the terminal determining the private priority list specific to the terminal according to the obtained information.

[0007] A system for obtaining cell reselection priority is disclosed according to another aspect. The system includes a network-side entity, adapted to: obtain information for calculating priority, determine a public priority list and a terminal-specific private priority list according to the information, and deliver the public priority list and the private priority list specific to the terminal.

[0008] A network device is disclosed according to a still further aspect. The network device includes an information obtaining unit, adapted to obtain information for calculating priority; a priority determining unit, adapted to determine a private priority list according to the information obtained by the information obtaining unit; and a priority delivering unit, adapted to deliver the private priority list.

[0009] The technical solution under the present invention reveals that: In the embodiments of the present invention, a network and/or a terminal determines the private priority of the cell, frequency, or system; and when the network determines the private priority, the network delivers the determined private priority list specific to the terminal through special signaling. When the terminal and/or the network determines the private priority, the network delivers the information about the determined priority or the independently determined private priority list specific to the terminal; and the terminal can determine a private priority list according to the information or the private priority list determined by the network in view of the information stored by the terminal. Therefore, relevant information is provided for the processes such as cell reselection and cell search, the power consumption caused by terminal measurement is reduced, and energy efficiency is accomplished. When cell reselection is required, the terminal evaluates cell reselection to determine the cell to be reselected according to the private priority list of the cell, frequency or system, the exclusive conditions which currently affect cell reselection, or further according to the public priority list. In this way, it is certain that the terminal can select a proper cell.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a flowchart of a method for a terminal to obtain cell reselection priority in an embodiment of the present

invention;

[0011] FIG. 2 is a flowchart of a cell reselection method in an embodiment of the present invention;

[0012] FIG. 3 shows a structure of a network device in a first embodiment of network device in the present invention;

[0013] FIG. 4 shows a structure of a network device in a second embodiment of network device in the present invention;

[0014] FIG. 5 shows a structure of a terminal in a first terminal embodiment in the present invention; and

[0015] FIG. 6 shows a structure of a terminal in a second terminal embodiment in the present invention.

DETAILED DESCRIPTION

[0016] In order to make the technical solution under the present invention clearer, the present invention is hereinafter described in detail by reference to accompanying drawings and preferred embodiments.

[0017] In an LTE system, the reselection of different-frequency and different-system cells is principally based on priority. The corresponding priority is formulated for different frequencies and systems. When the terminal performs cell reselection, the terminal decides to reside on a specific cell according to priority. That is, the terminal measures the frequency or system of higher priority first. If the cell of the frequency or system of higher priority meets the cell reselection conditions, the terminal reselects the cell; otherwise, the terminal measures the cell of lower priority. When the terminal resides on a lower-priority cell, the terminal measures the cell of the frequency of system of higher priority periodically. If the higher-priority cell meets the reselection conditions, the terminal reselects the higher-priority cell.

[0018] When the terminal performs cell reselection, it is necessary to determine the priority of the cell, frequency or system so that the terminal can determine the cell for residing according to the priority. Priority falls into two types: public priority and private priority. Public priority refers to the priority which is specific to a cell, frequency or system and is the same to all terminals in a cell. Private priority refers to priority specific to a terminal. Different terminals in a cell may have different private priority.

[0019] In embodiments of the present invention, a priority level may be assigned to each frequency layer or system adjacent to the serving cell, thus generating a private priority list and a public priority list.

[0020] The priority of a cell, frequency, or system depends on many factors. For example, in an LTE system, the factors include but are not limited to:

terminal capability: This information may be stored on the core network and the terminal;

cell bandwidth: This information may be stored on an evolved Node B (eNB);

subscription information: This information may be stored on the core network and the terminal;

service provider policy: This information may be stored on the core network and the eNB;

history service information: This information may be stored on the core network and the terminal;

mobility or history mobility information: This information may be stored on the terminal;

residing load: This information may be stored on the eNB;

service load: This information may be stored on the eNB;

whether the network is shared: This information may be stored on the core network;

whether it is in support of broadcast and multicast services; or

whether the base station is home base station;

or any combination thereof.

[0021] Such information may be stored on different network entities or terminals. Therefore, methods and systems for obtaining cell reselection priority under the present invention may be implemented in different ways.

[0022] In embodiments of the present invention, a network and/or a terminal determines the private priority of the cell, frequency, or system; and, when the network determines the private priority, the network delivers the determined private priority list specific to the terminal through special signaling.

[0023] A system for obtaining cell reselection priority in a first embodiment of the present invention includes:

a network-side entity, adapted to: obtain information for calculating priority, and determine a public priority list and a terminal-specific private priority list according to the obtained information, then deliver the public priority list to the terminal through broadcast channel and deliver the private priority list specific to the terminal through special signaling; and

a terminal, adapted to receive the public priority list and the private priority list.

[0024] For an LTE system, the network-side entity that determines the public priority list may be an eNB, and the network-side entity that determines the private priority list may be an eNB or a Mobile Management Entity (MME).

[0025] In this embodiment, the terminal may be further adapted to determine a new private priority list according to the existing private priority list and the information stored in the terminal for calculating priority.

[0026] A system for obtaining cell reselection priority in a second embodiment of the present invention includes:

- a network-side entity, adapted to: obtain information for calculating priority, and deliver all or part of the information to the terminal through broadcast channel and/or a special signaling; and
- a terminal, adapted to: receive the information for calculating priority, and determine a private priority list according to the received information and the information stored in the terminal for calculating priority.

[0027] In this embodiment, the network-side entity may be further adapted to: determine a public priority list according to the obtained information for calculating priority, and deliver the public priority list to the terminal through broadcast channel.

[0028] The network-side entity may also be adapted to notify the terminal of the algorithm for calculating the priority so that the terminal can determine the private priority list according to the algorithm when delivering all or part of the information to the terminal.

[0029] In this embodiment, the network-side entity includes an eNB and/or an MME.

[0030] A method for obtaining cell reselection priority is disclosed in an embodiment of the present invention. As shown in FIG. 1, the method includes the following:

[0031] Block 101: The network obtains the information for calculating priority. The information may be one of or any combination of the information items listed above.

[0032] Block 102: The network determines a public priority list according to the obtained information, then delivers the public priority list to a terminal through broadcast channel. This block is optional.

[0033] The network-side eNB may calculate the public priority of the cell, frequency or system according to the information, for example, cell bandwidth, and service provider policy, for calculating priority, and generate a public priority list and deliver it to the terminal. The features of different systems may be considered in calculating the public priority, for example, the order of priority of different systems may be set to: LTE > WCDMA > GSM.

[0034] Block 103: The network determines a terminal-specific private priority list according to the information, and delivers the determined private priority list specific to the terminal through special signaling. Alternatively, the terminal obtains all or part of the information for calculating priority from the network, and determines its private priority list according to the obtained information. Or, the network and the terminal determine the terminal-specific private priority list according to the obtained information.

[0035] The process of the network determining the private priority, the process of the terminal determining the private priority, and the process of the network and the terminal determining the private priority are detailed below, taking an LTE system as an example.

[0036] I. The network-side eNB determines the private priority.

[0037] When the terminal enters the Radio Resource Control Connected (RRC_CONNECTED) state, the eNB obtains the information for calculating priority. The information includes the information stored by the eNB and the information obtained from the MME. The information stored by the eNB includes the cell bandwidth information; and the information obtained by the eNB from the MME includes: terminal capability, subscription information, service provider policy, history service information, and whether the network is shared. According to such information, the eNB calculates and generates a private priority list specific to the terminal, and sends the private priority list specific to the terminal through special signaling. The special signaling may be an RRC Connection Release Request or an RRC Connection Reconfiguration.

[0038] Besides, the eNB calculates and generates a public priority list according to the obtained information such as cell bandwidth and service provider policy, and delivers the public priority list through broadcast channel. The features of different systems may be considered in calculating the public priority, for example, the order of priority of different systems may be set to: LTE > WCDMA > GSM.

[0039] Example 1: It is assumed that a terminal is in a macro cell; one of the neighboring cells is a macro cell which is not overloaded, and the terminal supports all services provided by the neighboring cell; another neighboring cell is a home base station cell.

[0040] Table 1 sets out the information which is obtained by the eNB for calculating priority:

Table 1

Factor	Priority level (0-5) and its meaning	Priority weight	Description
Subscription information	0: Proper 3: Default 5: No subscription	20%	If the terminal has not subscribed to the service of the cell, the cell is of the lowest priority or excluded

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(continued)

Factor	Priority level (0-5) and its meaning	Priority weight	Description
Terminal capabilities	0: Proper 3: Default 5: Not supported	20%	If the terminal capabilities do not support the service of the cell, the cell is of the lowest priority or excluded
Service provider's policy	3: Default	20%	Service provider policy
History service information	3: Default	10%	History service information
Network sharing	3: Default	10%	Whether the Network is shared
Cell bandwidth	3: Default	10%	Cell bandwidth
Support of broadcast and multicast services	3: Default	10%	Broadcast and multicast services

- The eNB calculates the priority of the neighboring macro cell according to the priority weight:
 $Priority\ level = 0 * 20\% + 0 * 20\% + 3 * 20\% + 3 * 10\% + 3 * 10\% + 3 * 10\% + 3 * 10\% = 1.8$; the priority level is rounded up to 2, which is relatively high;
 The priority of another neighboring home base station cell is 0, which is the highest.
 Therefore, the generated private priority list includes the priority levels of two cells, namely, (2, 0).
- The eNB delivers the private priority list specific to the terminal through special signaling.
- The eNB determines the public priority list to be (0, 0) according to the service provider policy, and delivers the public priority list to the terminal.

[0041] Example 2: It is assumed that the terminal is in a macro cell. There are three neighboring cells, two of which are macro cells on different frequency layers in the LTE system; one of the two macro cells (cell 1) is overloaded, and the terminal capabilities support all the services provided by cell 1; the other neighboring cell (cell 2) is not overloaded; and there is a neighboring cell (cell 3) in the WCDMA system, and the terminal has not subscribed to the WCDMA service.

[0042] Table 2 sets out the information which is obtained by the eNB for calculating priority:

Table 2

Factor	Priority level (0-5) and its meaning	Priority weight	Description
Subscription information	0: Proper 3: Default 5: No subscription	20%	If the terminal has not subscribed to the service of the cell, the cell is of the lowest priority or excluded
Terminal capabilities	0: Proper 3: Default 5: Not supported	20%	If the terminal capabilities do not support the service of the cell, the cell is of the lowest priority or excluded
Service provider policy	3: Default	20%	Service provider policy
History service information	3: Default	10%	History service information
Network sharing	3: Default	10%	Whether the Network is shared
Cell bandwidth	3: Default	10%	Cell bandwidth
Support of broadcast and multicast services	3: Default	10%	Broadcast and multicast services

1. The eNB calculates the priority of the neighboring macro cell according to the priority weight:

Cell 1 on frequency layer: Because this cell is overloaded, the priority level is 5, which is the lowest;
 Cell 2 on frequency layer: Priority level = $0 * 25\% + 0 * 25\% + 3 * 20\% + 3 * 10\% + 3 * 10\% + 3 * 10\% + 3 * 10\%$ = 1.8; the priority level is rounded up to 2, which is relatively high; and
 Cell 3: The terminal has not subscribed to the cell, and there list two processing approaches: One is to exclude, namely, the cell is blacklisted and the terminal is unable to reselect the cell; another is to set the priority level of the cell as 5, which is the lowest, in which case the terminal can reside on the cell, but can initiate no normal service except emergency calls for lack of subscription.

Therefore, the private priority list includes the priority levels of three cells, namely, (5, 2, 5).

2. The eNB delivers the private priority list specific to the terminal through special signaling.

3. The eNB determines the public priority list to be (0, 0, 3) according to the service provider policy, and delivers the public priority list to the terminal.

[0043] II. The network-side MME determines the private priority.

[0044] The MME obtains the information for calculating priority, including: terminal capabilities, subscription information, service provider policy, history service information, and whether the network is shared. According to such information, the MME calculates and generates a private priority list specific to the terminal. When the terminal enters the RRC_CONNECTED state, the MME delivers the private priority list specific to the terminal through special signaling. The special signaling may be a NAS message such as Attach process signaling or Tracking/Location/Route Area (TA/LA/RA) update process signaling.

[0045] Besides, the eNB calculates and generates a public priority list according to the obtained information such as cell bandwidth and service provider policy, and delivers the public priority list through broadcast channel.

[0046] For example, it is assumed that the terminal is in a macro cell; there are three neighboring cells, two of which are macro cells on different frequency layers in the LTE system. One of the two macro cells (cell 1) is overloaded, and the terminal capabilities support all the services provided by cell 1; the other neighboring cell (cell 2) is not overloaded; and there is a neighboring cell (cell 3) in the WCDMA system, while the terminal has not subscribed to the WCDMA service.

[0047] Table 3 sets out the information which is obtained by the MME for calculating priority:

Table 3

Factor	Priority level (0-5) and its meaning	Priority weight	Description
Subscription information	0: Proper 3: Default 5: No subscription	25%	If the terminal has not subscribed to the service of the cell, the cell is of the lowest priority or excluded
Terminal capabilities	0: Proper 3: Default 5. Not supported	25%	If the terminal capabilities do not support the service of the cell, the cell is of the lowest priority or excluded
Service provider policy	3: Default	20%	Service provider policy
History service information	3: Default	10%	History service information
Network sharing	3: Default	10%	Whether the Network is shared or not
Support of broadcast and multicast services	3: Default	10%	Broadcast and multicast services

1. The MME calculates the priority of the neighboring macro frequency layer or the system according to the priority weight:

Cell 1 on frequency layer: Because this cell is overloaded, the priority level is 5, which is the lowest;
 Cell 2 on frequency layer: Priority level = $0 * 25\% + 0 * 25\% + 3 * 20\% + 3 * 10\% + 3 * 10\% + 3 * 10\% + 3 * 10\%$ = 1.8; the priority level is rounded up to 2, which is relatively higher; and

Cell3: The cell is in a different system and the terminal has not subscribed to the cell, and there list two processing approaches: One is to exclude, namely, the cell is blacklisted and the terminal is unable to reselect the cell; another is to set the priority level of the cell to be 5, which is the lowest, in which case the terminal can reside on the cell, but can initiate no normal service except emergency calls for lack of subscription.

- The MME generates a private priority list which includes the priority levels of three cells, namely, (5, 2, 5).
- 2. The MME delivers the private priority list specific to the terminal through special signaling.
- 3. The eNB determines the public priority list to be (0, 0, 3) according to the service provider policy, and delivers the public priority list to the terminal.

[0048] III. The terminal determines the private priority.

[0049] The network (including the eNB and the MME) obtains the relevant information. Such information may be the information inaccessible to the terminal, for example, cell bandwidth, service provider policy, and whether the network is shared. The network delivers the obtained information (optionally including the algorithm for calculating the priority) to the terminal through broadcast and/or special signaling. After receiving the above information, the terminal formulates a private priority list for cell reselection in view of the received information and the information stored by the terminal, for example, terminal capabilities, subscription information, history service information, mobility or history mobility information.

[0050] When the information received by the terminal includes an algorithm for calculating priority, the terminal may calculate the priority of the cell according to the algorithm delivered by the network. When the information received by the terminal does not include the algorithm for calculating priority, the terminal may calculate the priority of the cell according to its own algorithm.

[0051] For example, it is assumed that the terminal is in a macro cell; there are three neighboring cells, two of which are macro cells on different frequency layers in the LTE system are macro cells. One of the two cells (cell 1) is overloaded, and the terminal capabilities support all the services provided by the cell; the other neighboring cell (cell 2) is not overloaded; and there is a neighboring cell (cell 3) in the WCDMA system, yet the terminal has not subscribed to the WCDMA service.

[0052] The algorithm obtained by the terminal from the network calculates the priority according to the priority weight. Table 4 sets out the information parameters for calculating the priority:

Table 4

Factor	Cell1	Cell2	Cell3	Description
Service provider policy	High (LTE)	High (LTE)	Medium (WCDMA)	Service provider policy
Network sharing	Supported	Supported	Not supported	Whether the network is shared or not
Cell bandwidth	10 MHz	20 MHz	5 MHz	Cell bandwidth

[0053] Table 5 sets out the information which is obtained by the terminal from the network, and the information stored by the terminal for calculating priority:

Table 5

Factor	Priority level (0-5) and its meaning	Priority weight	Description
Subscription information	0: Proper 3: Default 5: No subscription	25%	If the terminal has not subscribed to the service of the cell, the cell is of the lowest priority or excluded
Terminal capabilities	0: Proper 3: Default 5. Not supported	25%	If the terminal capabilities do not support the service of the cell, the cell is of the lowest priority or excluded
Service provider policy	3: Default	20%	Service provider policy
History service information	3: Default	10%	History service information

(continued)

Factor	Priority level (0-5) and its meaning	Priority weight	Description
Network sharing	3: Default	10%	Whether the network is shared
Support of broadcast and multicast services	3: Default	10%	Broadcast and multicast services

1. According to the obtained parameter list and the algorithm for calculating priority in addition to the terminal's own parameters, the terminal calculates the priority level of the frequency layer and the system of the neighboring macro cell in view of the priority weight:

Cell 1 on frequency layer: Because this cell is overloaded, the priority level is 5, which is the lowest;
 Cell 2 on frequency layer: Priority level = $0 * 20\% + 0 * 20\% + 3 * 20\% + 3 * 10\% + 3 * 10\% + 3 * 10\% + 3 * 10\%$ = 1.8; the priority level is rounded up to 2, which is relatively higher; and
 Cell 3: The cell is in a different system and the terminal has not subscribed to the cell, and there list two processing approaches: One is to exclude, namely, the cell is blacklisted and the terminal is unable to reselect the cell; the other is to set the priority level of the cell to be 5, which is the lowest, in which case the terminal can reside on the cell, but can initiate no normal service except emergency calls for lack of subscription.

According to the calculated priority, the terminal generates a private priority list which includes the priority levels of three cells, namely, (5, 2, 5).

2. The eNB determines the public priority list to be (0, 0, 3) according to the service provider policy, and delivers the public priority list to the terminal.

[0054] IV. The eNB and the terminal determine the private priority jointly.

[0055] When the terminal enters the RRC_CONNECTED state, the eNB obtains the information required for calculating the priority. Such information includes the information stored by the eNB and the information obtained from the MME. For example, the information stored by the eNB includes the cell bandwidth information; and the information obtained by the eNB from the MME includes: terminal capability, subscription information, service provider policy, history service information, and whether the network is shared. According to the obtained information, or such information inaccessible to the terminal (for example, cell bandwidth, and service provider policy) among the obtained information, the eNB calculates out and generates a private priority list specific to the terminal, and sends the private priority list specific to the terminal through special signaling. The special signaling may be an RRC Connection Release Request or an RRC Connection Reconfiguration. According to the received priority list and the information stored by the terminal, the terminal calculates the private priority list.

[0056] Besides, the eNB calculates and generates a public priority list according to the obtained information such as cell bandwidth and service provider policy, and delivers the public priority list through broadcast channel. The features of different systems may be considered in calculating the public priority, for example, the order of priority of different systems may be set to: LTE > WCDMA > GSM.

[0057] For example, it is assumed that the terminal is in a macro cell; there are three neighboring cells, two of which are macro cells on different frequency layers in the LTE system. One of the two cells (cell 1) is overloaded, and the terminal capabilities support all the services provided by the cell; the other (cell 2) is not overloaded; and there is a neighboring cell (cell 3) in the WCDMA system, yet the terminal has not subscribed to the WCDMA service.

[0058] Table 6 sets out the information which is obtained by the eNB for calculating priority:

Table 6

Factor	Priority level (0-5)	Priority weight	Description
Service provider policy	3: Default	50%	Service provider policy
Network sharing	3: Default	25%	Whether the network is shared
Cell bandwidth	3: Default	25%	Broadcast and multicast services

1. The eNB calculates and generates a priority list according to the information inaccessible to the terminal.

Cell 1 on frequency layer: Because this cell is overloaded, the priority level is 5, which is the lowest;

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Cell 2 on frequency layer: Priority level = $3 * 50\% + 3 * 25\% + 3 * 25\% = 3$; the priority level is medium; and
 Cell 3: The cell is in a different system and the terminal has not subscribed to the cell. There are two processing
 approaches: One is to exclude, namely, the cell is blacklisted and the terminal is unable to reselect the cell; another
 is to set the priority level of the cell to be 5, which is the lowest, in which case the terminal can reside on the cell,
 but can initiate no normal service except emergency calls for lack of subscription.

The MME generates a private priority list which includes the priority levels of three cells, namely, (5, 3, 5), and
 delivers the private priority list specific to the terminal.

2. It is assumed that the information stored in the terminal is shown in Table 7:

Table 7

Factor	Priority level (0-5)	Priority weight	Description
Subscription information	0: Proper 3: Default 5: No subscription	20%	If the terminal has not subscribed to the service of the cell, the cell is of the lowest priority or excluded
Terminal capabilities	0: Proper 3: Default 5. Not supported	20%	If the terminal capabilities do not support the service of the cell, the cell is of the lowest priority or excluded
History service information	3: Default	10%	History service information
Support of broadcast and multicast services	3: Default	10%	Broadcast and multicast services

The terminal calculates the final priority level according to the priority list delivered by the eNB and the information stored in the terminal.

Cell 1 on frequency layer: Because this cell is overloaded, the priority level is 5, which is the lowest;
 Cell 2 on frequency layer: Priority level = $0 * 20\% + 0 * 20\% + 3 * 10\% + 3 * 10\% + 3 * 40\% = 1.8$; the priority level is rounded up to 2, which is relatively higher; and
 Cell 3: The cell is in a different system and the terminal has not subscribed to the cell, and there list two processing approaches: one is to exclude, namely, the cell is blacklisted and the terminal is unable to reselect the cell; the other is to set the priority level of the cell to be 5, which is the lowest, in which case the terminal can reside on the cell, but can initiate no normal service except emergency calls for lack of subscription.
 The terminal generates a final private priority list which includes the priority levels of three cells, namely, (5, 2, 5).

[0059] V. The MME and the terminal jointly determine the private priority.

[0060] The MME obtains the information required for calculating priority. According to the obtained information or according to the information inaccessible to the terminal (for example, service provider policy, and network sharing) in the obtained information, the MME calculates and generates a private priority list specific to the terminal. When the terminal enters the RRC_CONNECTED state, the MME delivers the private priority list specific to the terminal through special signaling. The special signaling may be a NAS message such as Attach process signaling or TAU/LA/RA update process signaling.

[0061] In embodiments of the present invention, a network and/or a terminal determines the private priority of the cell, frequency, or system. When the network determines the private priority, the network delivers the determined private priority list specific to the terminal through special signaling. When the terminal and/or the network determines the private priority, the network delivers the information about the determined priority or the independently determined private priority list specific to the terminal; and the terminal can determine a private priority list according to the received information or the private priority list determined by the network in view of the information stored by the terminal. Therefore, relevant information is provided for the processes such as cell reselection and cell search, the power consumption caused by terminal measurement is reduced, and energy efficiency is accomplished. Further, the network may deliver the public priority list to the terminal through broadcast so that the terminal may combine the private priority level with the public priority level in the evaluation of cell reselection.

[0062] It is noted that in the foregoing embodiments, the algorithm for calculating priority is not limited to the weight-based algorithm; other algorithms such as function-based algorithms may also apply. In the function-based algorithms, various factors may be input into a function, and the corresponding priority level is output.

[0063] Moreover, in the foregoing solutions where the eNB or MME determines the priority level, when the eNB or MME delivers the private priority list specific to the terminal, a validity period (for example, one hour, or one day) of the private priority list and/or a validity scope (for example, valid only within this TA/LA/RA, or valid only in this cell) may be notified to the terminal. The validity period and/or the validity scope may also be sent together to the terminal as information in the private priority list. Once the validity period expires or the terminal leaves the validity scope, the terminal starts the public priority policy. The public priority policy may be sent by the MME or eNB to the terminal through special signaling, or sent by the eNB to the terminal through broadcast. When the terminal performs TA/LA/RA update or initiates a service again, the terminal obtains and uses the new private priority policy calculated and configured by the MME or eNB.

[0064] When cell reselection is required and the terminal is in idle mode, the terminal evaluates cell reselection to determine the cell to be reselected according to the private priority list of the cell, frequency or system, the exclusive conditions which currently affect cell reselection, or further according to the public priority list. In this way, it will assure the terminal to select a proper cell.

[0065] FIG. 2 is a flowchart of a cell reselection method in an embodiment of the present invention. The method includes the following:

[0066] Block 201: The terminal obtains a priority list for cell reselection.

[0067] For details, the description in the foregoing embodiments serves as a reference. The network and/or the terminal determines the private priority list of the terminal according to the information for calculating priority, and the network determines the public priority list and delivers it to the terminal through broadcast.

[0068] Block 202: When cell reselection is required, the terminal obtains the exclusive conditions that currently affect cell reselection. Such conditions include: home base station; or load of the cell, frequency or system; or combination thereof.

[0069] The network may broadcast the delivered load indication of the cell, frequency or system to obtain the load information. Preferably, the network delivers the load indication of the cell, frequency or system only when the load of the cell, frequency or system changes from normal to overload or from overload to normal. The network indicates the terminal in the cell through paging when the load of the neighboring cell, frequency or system changes (for example, when the load of the cell, frequency or system changes from normal to overload or from overload to normal).

[0070] Block 203: The terminal determines the cell to be reselected according to the private priority list and the exclusive conditions.

[0071] The terminal may perform cell reselection evaluation by considering only the private priority list instead of the public priority list, namely, according to the private priority list and the exclusive conditions. The terminal may also perform cell reselection evaluation by considering the public priority list and the exclusive conditions. Alternatively, the terminal may perform cell reselection evaluation by considering the private priority list and the public priority list, namely, according to the private priority list, the public priority list and the exclusive conditions to determine the cell to be reselected.

[0072] In practice, the terminal may set out the exclusive conditions (for example, home base station, and load information of the cell, frequency or system) in the priority-related factors separately, then check whether the private priority list carries the exclusive conditions. If the private priority list carries the exclusive conditions, the terminal considers the exclusive conditions first and then performs cell reselection evaluation according to the order of priority. The cell that meets the requirements is reselected, as detailed below with examples.

[0073] 1. The terminal receives a public priority list and a private priority list.

[0074] It is assumed that the exclusive conditions are set out in Table 8:

Table 8

Factor	Priority level (0-5) and its meaning	Description
Home base station	Highest (0)	If a neighboring cell is a home base station accessible to the terminal, this cell is preferred; if the cell reselection criteria are fulfilled, this cell is preferred; otherwise, other factors are considered
Load (may include residing load and service load)	Lowest (5, in the case of overload)	If the neighboring cell, the frequency or the system is overloaded, the cell, the frequency or the system is of the lowest priority or excluded

(continued)

Factor	Priority level (0-5) and its meaning	Description
Speed/migration information		The terminal obtains its own speed and performs cell reselection evaluation in view of the priority

[0075] Example 1: It is assumed that a terminal is in a macro cell; one of the neighboring cells is a macro cell which is not overloaded, and the terminal supports all services provided by the neighboring cell; another neighboring cell is a home base station cell.

[0076] The private priority list obtained by the terminal is (2, 0), and the public priority list obtained is (0, 0). The public priority list is ignored, and the private priority list is applied to perform cell reselection evaluation.

(1) First, the neighboring home base station cell (whose priority level is 0) is measured and evaluated. According to the cell reselection criteria, if the cell fulfills the reselection criteria, the home base station cell is reselected; if it does not fulfill the reselection criteria, the cell of a lower priority level (for example, the neighboring macro cell whose priority level is 2) is further measured.

(2) The load indication of the neighboring cell or the frequency of the neighboring cell is obtained through broadcast. When the load indication indicates no overload, the cell reselection evaluation is performed according to the measured signal quality. If the signal quality of the neighboring cell fulfills the reselection criteria, the terminal reselects the neighboring cell which is a macro cell.

(3) In the cell reselection evaluation, the corresponding operations may be performed in view of the speed. For example, for the terminal of a high speed, the corresponding parameter (for example, a reselection timer "Treselction" or a Hysteresis value) is scaled through a spreading factor in the cell reselection evaluation so that the terminal can reselect the new cell more quickly.

[0077] Example 2: It is assumed that the terminal is in a macro cell; there are three neighboring cells, two of which are macro cells on different frequency layers in the LTE system. One of the two cells (cell 1) is overloaded, and the terminal capabilities support all the services provided by the cell; the other neighboring cell (cell 2) is not overloaded; and there is a neighboring cell (cell 3) in the WCDMA system, yet the terminal has not subscribed to the WCDMA service.

[0078] I. After obtaining the priority list, the terminal ignores the public priority list, and applies the private priority list (5, 2, 5) to perform cell reselection evaluation.

(1) First, the terminal checks for any home base station in the neighboring cells. If no home base station exists in the neighboring cells, the terminal continues evaluating according to the private priority list.

(2) The terminal measures the cell of a higher priority level (cell 2). If the signal quality of cell 2 fulfills the cell reselection criteria, the terminal reselects cell 2; otherwise, the terminal continues to measure the cell of lower priority (cell 1).

(3) In the cell reselection evaluation, further operations, for example, changing the spreading factor, may be performed in view of the speed.

[0079] II. The terminal takes all priority-related factors into account to obtain the priority level and perform cell reselection factor, namely, without setting out the exclusive conditions.

[0080] It is noted that such a method of determining priority is applicable not only to cell reselection, but also to cell selection. When the terminal performs cell selection, the terminal may prefer the residing cell according to the information stored in the terminal. If no information is stored, the terminal may measure the frequency-layer cell of higher priority first according to the broadcast priority level.

[0081] A network device is disclosed in an embodiment of the present invention. As shown in FIG. 3, the network device 300 includes: an information obtaining unit 301, a priority determining unit 302, and a priority delivering unit 303. The information obtaining unit 301 is adapted to obtain information for calculating priority.

The priority determining unit 302 is adapted to determine a private priority list according to the information obtained by the information obtaining unit 301.

The priority delivering unit 303 is adapted to deliver the private priority list through special signaling.

[0082] Further, the priority determining unit 302 is adapted to determine a public priority list according to the information obtained by the information obtaining unit 301. Accordingly, the priority delivering unit 303 is adapted to deliver the public priority list through broadcast.

[0083] The network device in this embodiment may further include a load information delivering unit 304, which is

adapted to deliver the load information of the cell, frequency or system through broadcast.

[0084] The network device in another embodiment of the present invention is shown in FIG. 4. The network device 400 in this embodiment includes an information obtaining unit 401 and a sending unit 402.

The information obtaining unit 401 is adapted to obtain information for calculating priority.

5 The sending unit 402 is adapted to: deliver all or part of the information obtained by the information obtaining unit through broadcast and/or special signaling, and deliver the algorithm for calculating priority.

[0085] The network device in the foregoing two embodiments may be an eNB or MME in the LTE system.

[0086] A terminal is disclosed in an embodiment of the present invention. As shown in FIG. 5, the terminal includes: a priority list receiving unit 501, a condition obtaining unit 502, and an evaluating unit 503.

10 The priority list receiving unit 501 is adapted to receive the private priority list from the network through special signaling. The condition obtaining unit 502 is adapted to obtain exclusive conditions when cell reselection is required.

The evaluating unit 503 is adapted to determine the cell to be reselected according to the private priority list and the exclusive conditions.

15 **[0087]** The terminal in this embodiment may further include a storing unit 504 and a priority determining unit 505. The storing unit 504 is adapted to store information for calculating priority. The priority determining unit 505 is adapted to determine a new private priority list according to the private priority list received by the priority list receiving unit 501 and the information stored in the storing unit 504. In this way, the evaluating unit 503 determines the cell to be reselected according to the new private priority list and the exclusive conditions.

20 **[0088]** In the terminal in this embodiment, the priority list receiving unit 501 can be further adapted to receive the public priority list from the network through broadcast. Accordingly, the evaluating unit 503 can be further adapted to determine the cell to be reselected according to the private priority list, the public priority list, and the exclusive conditions.

[0089] A terminal in an embodiment of the present invention is shown in FIG. 6. The terminal 600 includes: a receiving unit 601, a storing unit 602, and a priority determining unit 603.

25 The receiving unit 601 is adapted to receive the information delivered by the network for calculating priority through broadcast or special signaling.

The storing unit 602 is adapted to store the information for calculating priority.

The priority determining unit 603 is adapted to determine a private priority list according to the information received by the receiving unit 601 and the information stored by the storing unit 602.

30 **[0090]** The receiving unit 601 is further adapted to receive the algorithm delivered by the network for calculating priority. In this way, the priority determining unit 603 can determine the private priority list according to the information received by the receiving unit 601, the algorithm for calculating priority, and the information stored by the storing unit 602.

35 **[0091]** The terminal in this embodiment may further include a condition obtaining unit and an evaluating unit (not illustrated in the figure). The condition obtaining unit is adapted to obtain exclusive conditions when cell reselection is required. The evaluating unit is adapted to determine the cell to be reselected according to the private priority list determined by the priority determining unit 603 and the exclusive conditions.

[0092] Besides, the receiving unit 601 in this embodiment may further be adapted to receive the public priority list from the network through broadcast. Accordingly, the evaluating unit may further be adapted to determine the cell to be reselected according to the private priority list, the public priority list, and the exclusive conditions.

40 **[0093]** It is understandable to those skilled in the art that all or part of the blocks in the foregoing embodiments may be performed through hardware instructed by a program. The program may be stored in a computer-readable storage medium such as ROM/RAM, magnetic disk, and compact disk.

45 **[0094]** Detailed above are the embodiments of the present invention. Although the invention is described through some exemplary embodiments, the invention is not limited to such embodiments. It is apparent that those skilled in the art can make various modifications and variations to the invention without departing from the spirit and scope of the invention. The invention is intended to cover the modifications and variations provided that they fall in the scope of protection defined by the following claims or their equivalents.

Claims

50

1. A method for obtaining cell reselection priority, the method comprising:

obtaining, by a network, information for calculating priority;
and

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determining, by the network, a private priority list specific to a terminal according to the obtained information, and delivering the determined private priority list specific to the terminal through special signaling; or
obtaining, by the terminal, all or part of the obtained information for calculating priority from the network, and determining the private priority list specific to the terminal according to the obtained information; or

determining, by the network and the terminal, the private priority list specific to the terminal according to the obtained information.

5 2. The method according to claim 1, wherein the information for calculating priority comprises one or combination of the information of:

terminal capability, cell bandwidth, subscription information, service provider policy, history service information, mobility or history mobility information, residing load, service load, whether the network is shared, whether it is in support of broadcast and multicast services, and whether the base station is home base station.

10 3. The method according to claim 1, the network determining a private priority list to a terminal, and delivering the determined private priority list specific to the terminal through special signaling comprises:

15 an eNodeB determines a private priority list specific to the terminal according to the obtained information for calculating priority;
the eNodeB delivers the private priority list specific to the terminal through Radio Resource Control (RRC) Connection Release Request or RRC Connection Reconfiguration to the terminal.

20 4. The method according to claim 1, the network determining a private priority list specific to a terminal, and delivering the determined private priority list specific to the terminal through special signaling comprises:

25 a Mobile Management Entity (MME) determines a private priority list specific to the terminal according to the obtained information for calculating priority;
the MME delivers the private priority list specific to the terminal through Non-Access Stratum (NAS) message to the terminal.

5. The method according to claim 4, wherein the NAS message is Attach process signaling or Tracking/Location/Route (TA/LA/RA) update process signaling.

30 6. The method according to claim 1, further comprising: when the network delivers the private priority list specific to the terminal through special signaling, the network informs the terminal of a validity period or a validity scope of the private priority list specific to the terminal.

35 7. The method according to claim 1, wherein determining the private priority list of the terminal according to the obtained information comprises:

the terminal determines the private priority list specific to its own according to the obtained information and information for calculating priority stored in the terminal.

40 8. The method according to claim 7, further comprising:

obtaining, by the terminal, the algorithm for calculating priority from the network; and
determining, by the terminal, the private priority list specific to the terminal according to the obtained algorithm.

45 9. The method according to claim 1, wherein the network and the terminal determining the private priority list specific to the terminal comprises:

50 determining, by the network, the private priority list specific to the terminal according to the obtained information for calculating priority;
delivering, by the network, the private priority list specific to the terminal to the terminal;
determining, by the terminal, a new private priority list specific to the terminal, according to the private priority list determined and delivered by the network and the information stored in the terminal.

55 10. The method according to any one of the claims 1 to 9, further comprising:

determining, by the network, a public priority list according to the obtained information for calculating priority;
sending, by the network, the public priority list through broadcast to the terminal.

11. A system for obtaining cell reselection priority, comprising:

5 a network-side entity, adapted to obtain information for calculating priority, determine a public priority list and a private priority list specific to a terminal according to the obtained information, and deliver the public priority list and the private priority list specific to the terminal.

10 12. The system according to claim 11, wherein the network-side entity which determines the public priority list is an eNodeB, and the network-side entity which determines the private priority list specific to the terminal is an eNodeB or a Mobile Management Entity (MME).

13. The system according to claim 11 or 12, wherein the terminal is configured to determine a new priority list, according to the private priority list and the information for calculating priority stored in the terminal.

15 14. A network device, comprising:

an information obtaining unit, adapted to obtain information for calculating priority;
a priority determining unit, adapted to determine a private priority list specific to a terminal according to the information obtained by the information obtaining unit; and
a priority delivering unit, adapted to deliver the private priority list specific to the terminal.

20 15. The network device according to claim 14, wherein the priority determining unit is further configured to determine a public priority list, according to information obtained by the information obtaining unit; the priority delivering unit is further configured to deliver the public priority list through broadcast.

25 16. The network device according to claim 14, further comprising: a load information delivering unit, which is configured to deliver the load information of the cell, frequency or system through broadcast or paging.

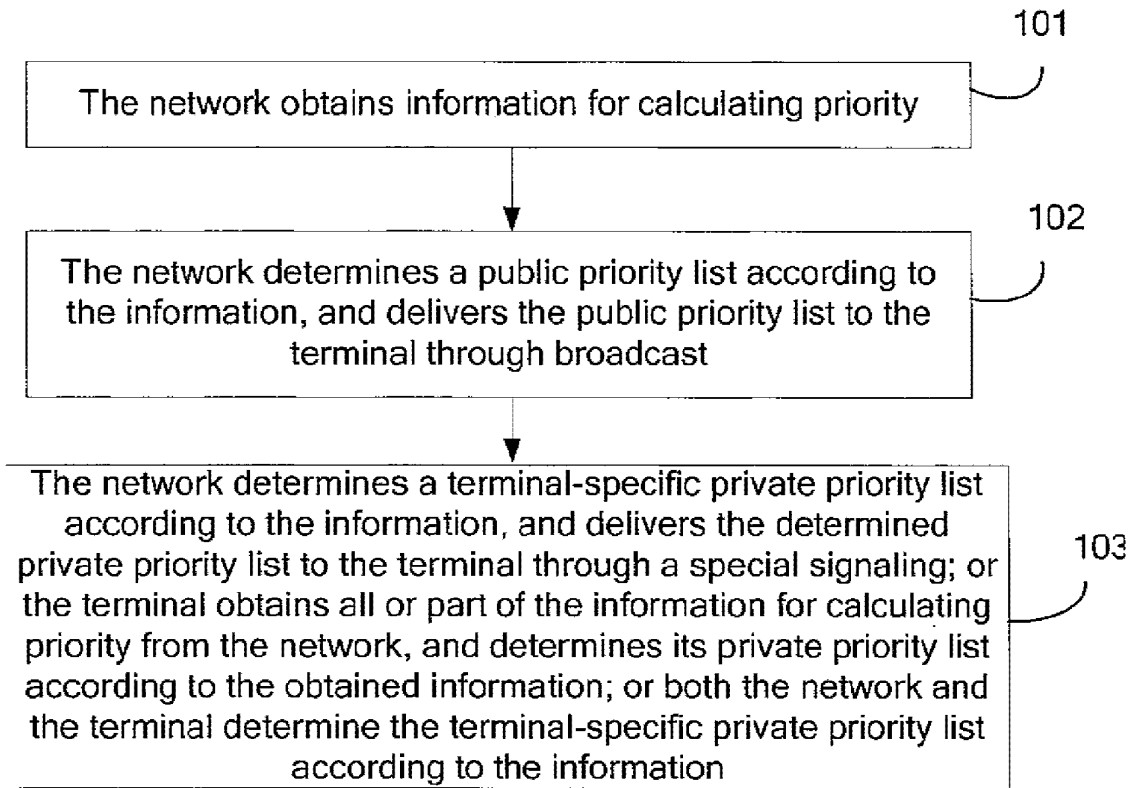


FIG. 1

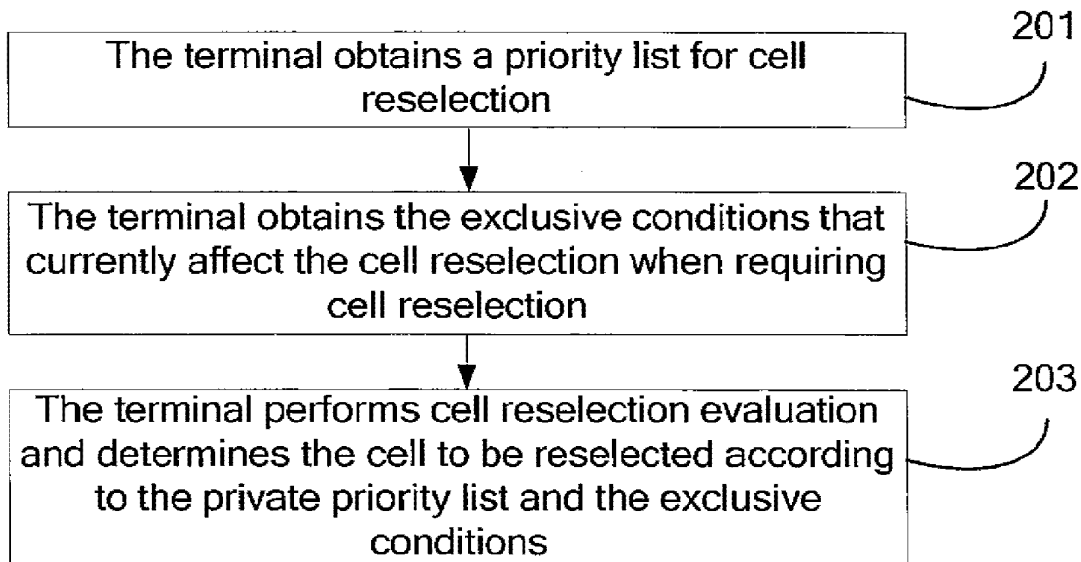


FIG. 2

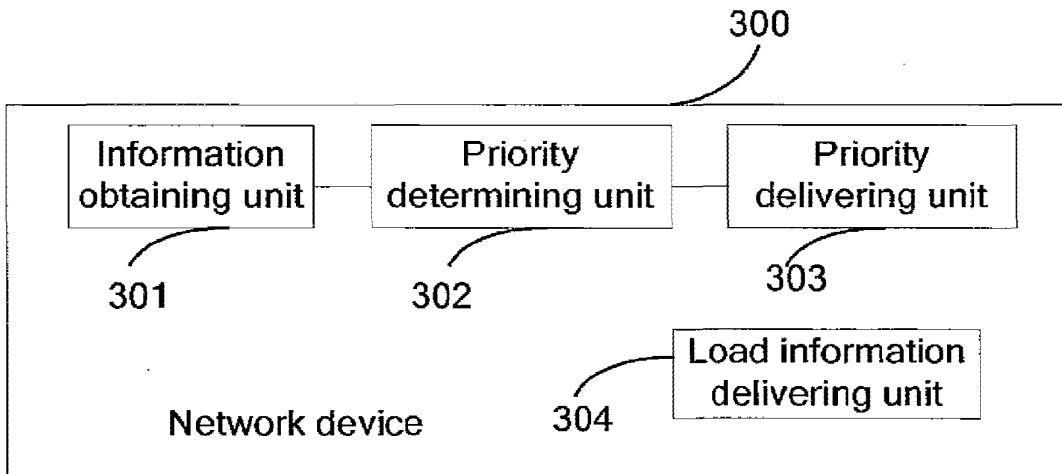


FIG. 3

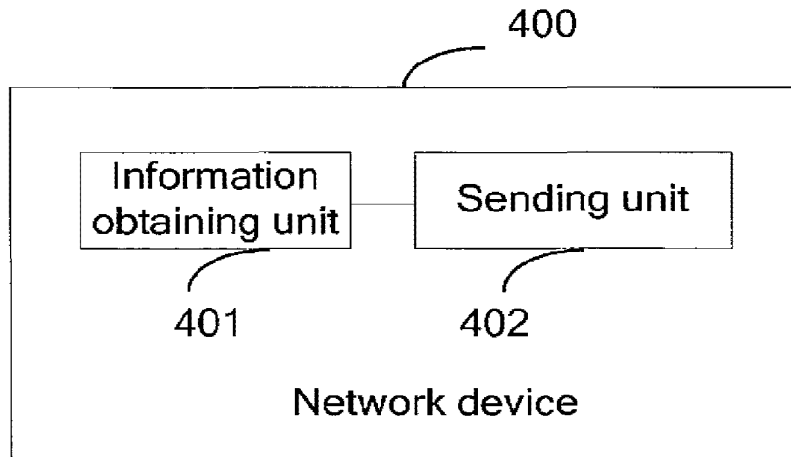


FIG. 4

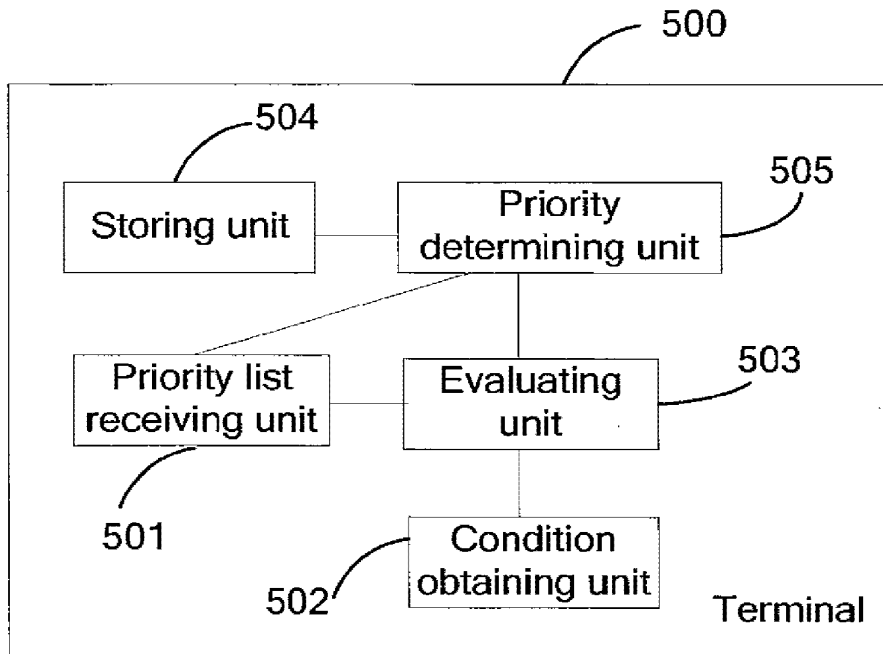


FIG. 5

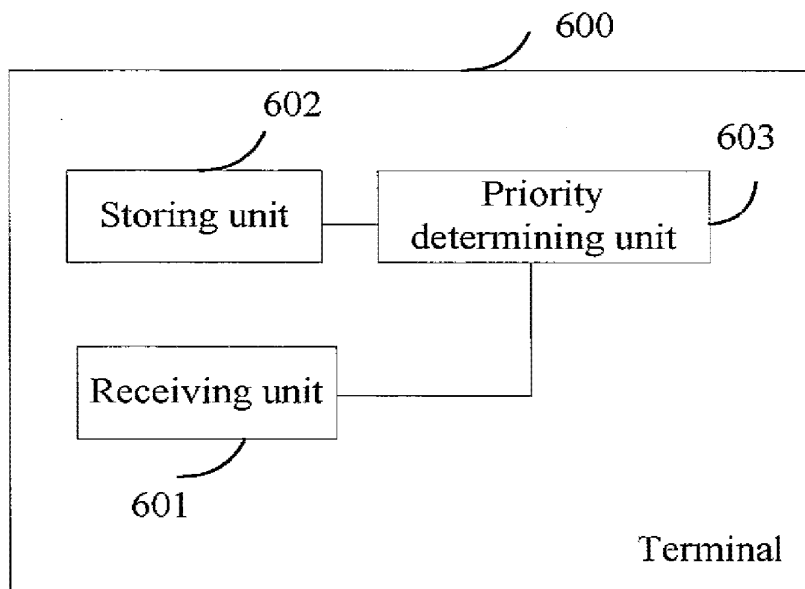


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2008/073891

A. CLASSIFICATION OF SUBJECT MATTER
 H04W36/08 (2009.01) i
 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)
 IPC: H04Q;H04W;H04L.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 WPI,EPODOC,PAJ,3GPP,IEEE,CNPAT,CPRS:priority, cell. select+, reselect+, special, particular, table, list, bearer, calculat+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN1852559A (HUAWEI TECHNOLOGIES CO., LTD.) 25 Oct. 2006 (25.10.2006) page 3 line 6 to page 6 line 20 in description	1-16
A	CN1255270A (NOKIA MOBILE PHONES LTD.) 31 May 2000 (31.05.2000) the whole document	1-16
A	CN1822700A (NIPPON ELECTRIC CO.) 23 Aug. 2006 (23.08.2006) the whole document	1-16
A	KR10-2006-0046937A (LG ELECTRONICS INC.) 18 May 2006 (18.05.2006) the whole document	1-16

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"I" 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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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(54) **Cell prioritising in a cellular radio system**

(57) In a cellular radio system (30) the terminals (35) are arranged to set up and maintain radio communication with the base stations (31, 32, 33, 34) in the cells (31a, 32a, 33a, 34a). Regarding the setting up and maintaining of radio communication at least one terminal

(35) is arranged to favour at least one cell (32a, 33a) with respect to other cells (31a, 34a), in a manner independent of other terminals. The priority data relating to a terminal are stored in a central database (37), from which they are transmitted to the terminal when it registers.

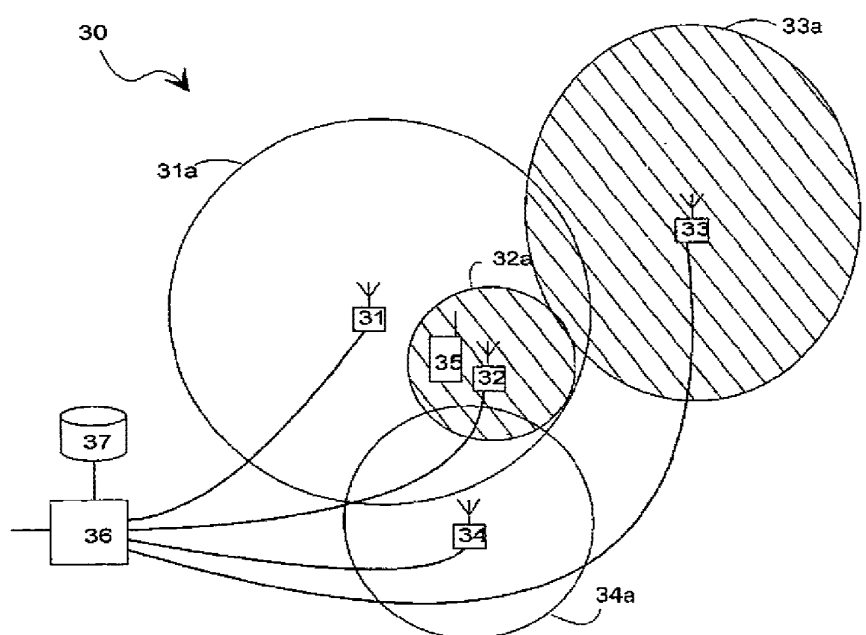


Fig. 2

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Description

The invention relates generally to the routing of radio communication between base stations and terminals in a cellular radio system. Particularly the invention relates to a method and equipment with which the terminals can be individually controlled to give priority to particular base stations.

A cellular radio system comprises stationary base stations, each having a particular coverage area, and terminals which can move in relation to the base stations and their coverage areas. The coverage areas are also called cells. In this patent application a mobile phone is treated as an illustrative terminal. When a particular mobile phone is switched on, it somehow tries to find the best received signal of a base station and tries to register with the so called location area (LA) which this base station represents. Registration means that the mobile phone informs the mobile network through the base station that it can receive calls via that location area, to which said base station is associated. In the idle mode a mobile phone regularly receives messages transmitted by the base station in order to detect paging messages, which represent an incoming telephone call, and other messages intended for this mobile phone. At the same time the mobile phone monitors the power of signals transmitted by other adjacent base stations, so that it rapidly can shift base stations, when required.

The idle mode operation of a mobile phone according to the GSM system (Global System for Mobile telecommunications) and its extension the DCS1800 (Digital Communications System at 1800 MHz) is described below, in order to explain the background of the invention. Said functions are described in more detail in the EBU (European Broadcasting Union) and ETSI (European Telecommunications Standards Institute) standards ETS 300 535 (GSM 03.22) and ETS 300 578 (GSM 05.08). To a person skilled in the art it is obvious that as a background of the invention the main part of these studies can be generalised so that they are applicable to all digital cellular radio systems.

There are four requirements on a cell, so that a mobile phone normally can camp within it:

- the cell must belong to the network of the selected operator;
- the cell must not be barred by the network;
- the location area represented by the cell must not be included in the list of forbidden location areas defined for each mobile phone; and
- the attenuation on the radio path between the mobile phone and the base station must be lower than a certain threshold value defined by the operator (for short this requirement is called the path loss criterion).

A cell which meets the above listed requirements is called a suitable cell. When a mobile phone is switched on it receives the so called BCCH signals (Broadcast Control CHannel) and runs through them in their order of strength, and begins to operate in a suitable cell with the strongest signal. The BCCH signal can also contain a recommendation value attached to the cell which tells whether the cell is recommended by the system or not. The mobile phone begins to operate in a not recommended cell only if no suitable recommended cells are available. This step is called cell selection.

The mobile phone will regularly check whether there is a suitable cell in the vicinity which is more advantageous regarding the radio communication, and if required the mobile phone will perform cell reselection. The mobile phone can select a new cell for three alternative reasons:

- according to particular cell reselection criteria the new cell is better than the current cell;
- some characteristics of the current cell change, so that this cell is not anymore suitable, but the new cell is suitable; or
- the mobile phone detects that the downlink signalling connection is interrupted in the current cell.

Cell selection and cell reselection are based on two parameters calculated by the mobile phone, the so called C1 and C2 parameters defined in the standard ETS 300 578 (GSM 05.08). Of these the first one, the C1 parameter, describes the power level received by the mobile phone from the examined base station, in relation to the minimum value of the received power level defined by the system and the maximum permissible transmission power of the mobile phone. The value of the C2 parameter is influenced by the value of the C1 parameter and two correction factors, of which the first one is an offset parameter transmitted by the base station and the second one is a time delay, which aims at preventing rapid consecutive cell reselections by the mobile phone.

Successful management of radio communication or the optimal routing of connections between the terminals and the base stations has an essential effect on the service level which the radio system is able to provide to the users. Particularly in areas with very dense traffic the cells can be partly or totally overlapping, whereby it is required that the mobile phones and other terminals can be controlled to use particular cells and avoid particular other cells in order to guarantee a uniform service level. As an example we could consider an office building which is located within the coverage area of a public cellular radio system, but which also has an internal wireless communication system operating

as an extension to the public system, whereby the wireless system is based on so called nano cells or pico cells having a size of one room or a few rooms. For a mobile phone belonging to an employee working in the building it is often more advantageous to operate in a cell of the building's internal system than in a cell of the public cellular radio system. The operator managing the cellular radio system can for each mobile phone also define a so called home area comprising a single cell or a few cells of the public cellular radio system, where the mobile phone is offered cheaper tariffs or other benefits in the home area. On the other hand it is advantageous to define some cells as handover cells only, whereby it is desired that no mobile phones operate in such a cell for a longer period than required by the handover function.

In a system according to the prior art described above there are no possibilities to realise priority cells relating to individual mobile phones. The first correction factor or the offset parameter associated with the C2 parameter's definition can be used for general prioritising, so that a certain value of the offset parameter transmitted by a base station causes all mobile phones to generate a C2 parameter value indicating a disadvantageous cell selection. However, a prioritising of this type does not function differently for each mobile phone, but it is identical for all mobile phones.

From the patent publication US 4,916,728 (Blair) a practice is known in which a mobile phone can operate in networks managed by several different operators. In order to be able to select the network of the most advantageous operator the mobile phone goes through several receive frequencies, decodes the SID codes (System IDentification) from the signals transmitted by the base stations, and tunes to that frequency on which the received SID code indicates the most advantageous operator. The information about the advantages of different operators is stored in the memory of the mobile phones, so in this arrangement different mobile phones react differently on the information transmitted by the base stations. However, in this method it is not possible to have the mobile phones to function differently, except for the selection of the operator, because all base stations in the network of a certain operator transmit the same SID code.

The PCT application publication WO 95/24809 (Motorola Inc.) treats a system in which the central equipment checks, based on the identity transmitted by the mobile station, whether this mobile station is authorised to a certain service in a particular area. If particular regional restrictions and/or restrictions relating to individual mobile phones are defined for the service, then the central equipment can either refuse to provide any services to a particular mobile phone in said region, or allow the use of only one service, e.g. data communications. However, in order to change the offered services the mobile phone must move, because the restrictions are always the same in a particular region. Thus in this method it is not possible to influence the cell selection or cell reselection when the mobile phone or another terminal of the cellular radio system is stationary.

From the Finnish patent application no. FI 952965 and the corresponding European patent publication no. EP 749 254 A1 (Nokia Mobile Phones Oy) there is known a multi-level home area pricing for a mobile phone of a cellular radio system, in which a certain binary character string is stored in the mobile phone. Then each base station transmits its own binary identity at regular intervals and the mobile phone uses the binary character string stored in it as a mask, with which it selects particular bits from the character string transmitted by the base station as the object for a logical comparison operation. If said logical comparison operation generates the correct result the mobile phone construes itself to be in the home area or in another area where a particular regional service is available. Using different logical comparison operations it is possible to form a number of individual areas, or areas located in a mutual hierarchy in which the mobile phone can obtain different services from the cellular radio system. Even this practice is not applicable for proper cell prioritising, because the services are regional and the offered services change only when the mobile phone is moving.

In addition to the above mentioned known methods there are a number of known methods and systems in which a mobile phone or another terminal of a cellular radio system can detect whether or not it operates in a priority cell associated to this device, and provide information about this to the user. However, in any of these methods a user or a terminal is not able to contribute to the cell selection and to decide whether a certain cell selection is retained even when the terminal is stationary.

This invention seeks to provide a method and a system which, for each terminal, are able to effectively influence in which cell of the cellular radio system the terminal of the cellular radio system begins to operate when it is switched on, and which cell it selects in connection with cell reselection. This invention also seeks to provide that the method and the system according to the invention are flexible and able to accommodate changes made in the priority definitions.

The advantages of the invention are attained in a terminal of the cellular radio system by adding, to the calculation operation controlling the cell selection and the cell reselection, a step and/or a factor which depends on the contents of the list of priority cells given to the terminal.

The cellular radio system according to the invention is characterized in that regarding the setting up and maintaining of radio communication at least one terminal is arranged to favour at least one cell with respect to other cells, in a manner independent of other terminals.

In accordance with this invention a terminal, which is characterized in that regarding the setting up and maintaining of radio communication it is arranged to favour at least one cell with respect to other cells in a manner independent of

other terminals.

Further the invention relates to a method for realizing priority cells. The method according to the invention is characterized in that regarding the setting up and maintaining of radio communication it utilizes priority data relating to individual terminals in order to favour at least one cell with respect to other cells, in a manner independent of other terminals.

In the arrangement according to the invention it is possible to define for each terminal of the cellular radio system one cell or several cells in which the terminal shall try to operate as far as the quality of the radio communication allows it. A list of priority cells relating to individual terminal is stored in a certain database of the system from which it is read and transmitted sufficiently often to the terminal, preferably always when the terminal is registered or when it shifts location area, or when the list of priority cells is altered. Thus the terminal always has an updated list of the priority cells.

In cell reselection the terminal can be made to favour the priority cells, in the simplest manner by programming it so that when the C2 parameter of the priority cell is calculated the offset parameter and the delay factor are given zero values, or they are given other such values which generate a C2 parameter value representing a particularly preferred selection of a cell. Via the base stations the system can transmit to the terminal a message, in which particular flag bits or other information sections allow the terminals to apply cell prioritizing or deny it. This message is preferably the same as the message which includes the list of the priority cells.

In accordance with an aspect of this invention a cellular radio system is provided, which comprises terminals, cells and stationary network equipment, and which is arranged to set up radio communication between the terminals and base stations in the cells, wherein radio communication between the terminals and base stations in the cells, wherein radio communication between one terminal is based upon priority information which is relevant to that terminal and independent of other terminals. The priority information may be stored in the terminal itself, or in the stationary network equipment.

The cellular radio system may, for example, be a system such as GSM, or network of a certain operator, such as that of Vodaphone in the UK. In the latter case in particular, the priority information may be used to balance the likely traffic levels between certain base stations (especially in areas of that network with dense traffic where the cells often partially or totally overlap).

The invention is described in more detail below with reference to preferred embodiments presented as examples, and to the enclosed figures, in which:

- figure 1 shows schematically a message transmitted by the cellular radio system;
- figure 2 shows schematically a cellular radio system which applies cell prioritising; and
- figure 3 illustrates an embodiment of a method according to the invention.

Figure 1 shows schematically a so called priority information (PI) message, with which a cellular radio system according to the preferred embodiment of the invention controls cell priorities in individual terminals. It has the following fields:

11 Header

The header defines that this is a message transmitting priority information from the cellular radio system to a particular terminal. The invention does not otherwise restrict the contents or the structure of the header.

12 CI format

With the aid of this field the systems tells whether the terminal should base its operation only on the cell identity (CI) code, on a combination of the cell identity and the location area code (LAC), or only on the LAC of the base station. The system can have cells which have the same cell identity but are located in different location areas, whereby also the LAC is required in order to have an unequivocal identification of the cell. To the user the terminal can also on a display present information relating to a single cell (CI or CI+LAC), to several cells (several cell identities or the LAC + several cell identities), or to the whole location area code (LAC).

13 Display txt

With the aid of this field the systems defines whether the terminal will present to the user the messages mentioned in connection with the previous field only in the idle mode, or also during a call.

14 Txt format

With the aid of this field the systems defines whether the terminal will present to the user a text which is common to all cells, or only text which is unique to the cell.

15 Text CI

With the aid of this field the systems defines how the below presented short text messages and the priority cells are related to each other (ref. cells 20 and 22).

16 Delay?

The description of prior art presented the time delay (the so called penalty time) used in the calculation of the C2 parameter, during which delay a particular cell only recently included in the list of suitable cells gets as its C2 parameter a value showing a disadvantageous selection. In this field the system can give an instruction to the terminal, according to which the terminal does not apply the time delay in the calculation of the C2 parameter for the priority cells.

17 Offset?

The description of prior art presented the offset parameter used in the calculation of the C2 parameter, with which it is possible to have priorities relating to a base station. In this field the system can give to the terminal an instruction, according to which it does not apply the offset parameter in the calculation of the C2 parameter for the priority cells.

18 Hysteresis

CRH (Cell Reselection Hysteresis) means that the terminal which shifted cells and base stations can not immediately shift back to its previous cell. The aim of the CRH is to reduce the number of cell reselections between the location areas. If the new cell is in a different location area than the current cell, then the C2 parameter is not applied as such, but with the addition of the value indicated in the CRH. With this field the system can give the terminal an instruction according to which it does not apply hysteresis on the priority cells, whereby the terminal easily shifts to a priority cell, even if this cell would be in a different location area. The hysteresis prevents a terminal, which shifted into a priority cell, from immediately shifting back to a non-priority cell located in a different location area.

20 CI

This field contains the identities of all priority cells. They can be in a sequence, whereby the next field contains the respective LAC codes in a sequence, or the fields 20 and 21 can alternate so that the cell identity (CI) and the LAC are presented in sequence for each priority cell. The preferred length of one cell identity (CI) is for instance 2 octets (16 bits).

21 LAC

For each priority cell this field contains the respective location area code (LAC), and the length of the field is preferably 2 octets (16 bits). The alternatives for the mutual order of the CI and LAC codes were described above.

22 Text

This field contains short text messages (e.g. 16 octets or eight alphanumeric characters per message), which are intended to be displayed to the user in the display of the terminal when the terminal operates in the respective cell (ref. fields 13, 15 and 20). The text messages can relate to a cell, to a cell group, or to a location area (ref. field 12).

23

The invention does not otherwise limit the contents of the PI message 10, so that it may also contain other fields than those listed above.

Figure 2 shows a cellular radio system 30 which has base stations 31, 32, 33 and 34 with their coverage areas or cells 31a, 32a, 33a and 34a. The block 36 simply represents the other stationary parts of the cellular radio network, such as base station controllers, switch equipment, connections to other communication networks, and so on. A da-

tabase 37 is also connected to this block. The operation of a mobile phone 35 in the cellular radio system 30 is discussed below.

Let's assume that the priority cells 32a and 33a are defined for the mobile phone 35, which is shown by the hatched lines in these cells. The cell identities representing these cells and the other parameters controlling the priority practice of the mobile phone are stored in the database 37, which physically can be located at a mobile services switching centre (MSC; not shown in the figure) or at some other location where the operator managing the cellular radio system 30 generates so called intelligent network (IN) services for the network. When the mobile phone 35 is switched on, or when it otherwise arrives in the area of the cellular radio system 30 it will set up a connection to a base station in a manner known per se, and then according to prior art it transmits a so called IMSI Attach request to the network 36, whereby it is registered to operate within the network area, and its location is updated in the location databases (not shown in the figure) of the network. In an arrangement according to a preferred embodiment of the invention the network 36 then transmits to the mobile phone a PI message (priority information) according to figure 1, which contains a list of priority cell identities read from the database 37, whereby the message is a prior art USSD message (Unstructured Supplementary Service Data) or SMS message (Short Message Service).

The list of priority cell identities and the other parameters regarding the priority practice could of course also be permanently stored in the memory of the mobile phone 35, but the above described use of the database associated to the network provides some particular advantages. The most important of these is the automatic updating of the information in the mobile phone. If the priority data is altered, e.g. when a new base station is installed, or due to an altered contract between the operator and the user, then the operator or any other quarter realizing the changes will record these changes in the database 37, whereby the mobile phone 35 will obtain updated information when it registers the next time, without having to visit an authorised sales representative in order to update the software. It is also possible to present an embodiment in which altered information in the database 37 automatically generates an update message from the network to the mobile phone 35 without a need to reregister. When the priority information is stored in a database of the network a dishonest user is not able to change the priority settings as easily as if the data were permanently stored in the mobile phone. The priority data can also be defined to be identical for a certain user group, whereby all mobile phones associated to the group receive PI messages which are substantially identical. The group settings are simply changed by altering the data in the database 37.

Let's assume that the mobile phone 35 has transmitted an IMSI Attach request via a non-priority base station 31 and has, via the same base station, received information about the priority cell identities. The mobile phone 35 begins to receive SI messages (System Information) transmitted on the BCCH channels by other base stations in a manner known per se, whereby it will obtain the cell identities of the other cells. For cell reselection the mobile phone generates a list of possible new cells in addition to the current cell, whereby the C2 parameters calculated for the cells are the decisive factors which determine the order in the list. In the situation shown in figure 2 the C2 parameter calculated for the cell 32a shows that it is more advantageous than the cell 31a, whereby the mobile phone selects the cell 32a as a new cell. A practice for generating an advantageous value for the C2 parameter of a priority cell is shown in more detail below as an example.

When the C2 parameter is calculated it is advantageous that in the PI message the mobile phone 35 is instructed not to observe the time delays of the priority cells (field 16 in figure 1), whereby the priority cell 32a immediately appears as a very advantageous cell on the cell reselection list. If the mobile phone 35 is at that border of the cell 32a which is close to the non-priority cell's 31a base station 31, then it probably will receive the signal transmitted by the last mentioned base station as a stronger signal than that transmitted by the base station 32. In order to have the mobile phone also in this situation to select the priority cell 32a, the offset parameters and PI messages transmitted by the base stations 31 and 32 must be arranged so that the PI message instructs the mobile phone to calculate the C2 parameter of the priority cell 32a without the offset parameter, but to calculate the C2 parameter of the non-priority cell 31a with the offset parameter (field 17 in figure 1), whereby the C2 parameter representing the priority cell 32a will be as advantageous as possible also at the fringes of the cell 32a.

According to figure 1 the PI message contains information about whether hysteresis should be applied also in the case of priority cells (field 18 in figure 1). The hysteresis can be the above mentioned CRH hysteresis or the time hysteresis according to paragraph 6.2.2 in the standard GSM 05.08. In figure 2 the priority cell 32a is in whole within the area of the non-priority cell 31a, so that in certain situations it may happen that both cells appear to the mobile phone 35 as being almost equal regarding the cell reselection. If application of the hysteresis is prevented when cell reselection would mean shifting from a non-priority cell into a priority cell, then the mobile phone can always be made to shift rapidly from the cell 31a back to cell 32a, but to delay a shift in the opposite direction.

Next we show in more detail an exemplary practice to calculate the C2 parameter so that the above presented functions are obtained. For non-priority cells the mobile phone calculates the C2 parameters in a prior art manner known per se, i.e. by using the formulas

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$$C2(T) = C1 + CELL_RESELECT_OFFSET - TEMPORARY_OFFSET * H(PENALTY_TIME - T), \text{ when } PENALTY_TIME \neq 11111,$$

5 and

$$C2 = C1 - CELL_RESELECT_OFFSET, \text{ when } PENALTY_TIME = 11111,$$

10 where the step function H(x) is defined as

$$H(x) = 0, \text{ when } x < 0,$$

15 and

$$H(x) = 1, \text{ when } x \geq 0.$$

20 The above mentioned offset parameter relating to a base station is here shown with the name CELL_RESELECT_OFFSET according to the GSM standards, and the above mentioned delay factor is the product of the temporary offset parameter TEMPORARY_OFFSET and the step function H, in which the value of the step function H depends on the relation between the examination moment and the defined delay PENALTY_TIME. The values of the correction factors for priority cells depend on the PI message received by the mobile phone. If the delay? field of the PI message contains a certain value (e.g. 1), then the mobile phone gives the TEMPORARY_OFFSET a zero value when the C2 parameter of the priority cell is calculated. Correspondingly, if the offset? field of the PI message contains a certain value (e.g. 1), then the mobile phone gives the CELL_RESELECT_OFFSET a zero value in the calculation of the C2 parameter for the priority cell, when PENALTY_TIME is 11111.

25 30 The modified C2 parameter could also be called C2_PRIORITY_CELL. It is advantageous if the mobile phone uses modified C2 parameter calculation only when its current cell is a non-priority cell. The operation of the mobile phone can be formulated as an algorithm in pseudo-language as follows, each step followed by a corresponding reference designator is Fig. 3:

IF (current cell is a priority cell) 301
 THEN calculate C1 and C2 for N cells with the highest power 302
 IF(at least 1 priority cell, including current cell, with $C1 > 0$) 303
 THEN select the best priority cell in the order
 determined by C2 304
 ELSE select the best non-priority cell in the order determined by C2 305
 ELSE
 IF(any of the neighbour cells, except the current cell, is a priority cell)306
 THEN {
 select N cells with highest power 307,
 calculate C2_PRIORITY_CELL for the priority cells within the N cells,
 calculate C2 for non-priority cells within the N cells, 308
 select best cell in the order determined
 by C2 / C2_PRIORITY_CELL} 309
 ELSE {
 calculate C1 and C2 for N cells with highest level, 310
 select the best cell in the order determined by C2} 311

The effect of the hysteresis, whether it is used or not, does not appear in the above described algorithm, but in the light of what was presented above it is simple to add the hysteresis as a part of the comparison of the C2 or C2_PRIORITY_CELL values.

To the operator managing a cellular radio system the invention presents a wide range of possibilities to control cell priorities relating to one device. This is very advantageous, because from the network's point of view all terminals do not behave identically, so that the use of a single standard pattern for all devices would inevitably cause disadvantageous functions in some devices. As an example we may consider a situation in which a user daily moves through or past a priority cell without staying too long in the cell (for instance, the cell may be in a building, which the user with his terminal daily passes at a high speed in his car along the highway). While the cell generally speaking is a priority cell, it is not worth for the mobile phone to use this cell during such a rapid passing, because a short visit to a cell only hinders the synchronisation of the terminal in the network and causes extra signalling traffic. The operator can program the computer which monitors the system operation so that it will detect the corresponding cases. In the detected cases the respective terminal can be instructed to use a delay factor in the calculation of the C2 parameter for said priority cell, whereby during a rapid passing the cell's C2 parameter does not have time to rise to a level which would indicate advantageous cell reselection. By testing and simulating it is possible to find other corresponding situations in which the system operation can be optimised by selecting parameters relating to individual devices.

In prior art systems a terminal of the cellular radio system includes a certain fixed amount of cells in a list, on the basis of which it performs cell reselection. The length of a commonly used list is six cells. In order to better find the priority cells the length of the list can be increased to comprise e.g. as many cells as there are cells in the BA(BCCH) or BA(SACCH) messages (BCCH Allocation - Broadcast Control Channel / Slow Associated Control Channel) transmitted by the base station of the current cell. It is worth to extend the list, particularly when the terminal does not otherwise detect priority cells in the neighbourhood, but assumes on the basis of the stored handover history, or on the basis of the received LAC codes and/or cell identities, that there may be priority cells in the neighbourhood, which

do not appear in the short list. Then the difference to prior art is that the terminal does not have to check all possible BCCH frequencies, but it can simply increase the number of cell identities which it keeps in its memory. The scanning of all frequencies would require more power and take more time, and the ability to receive a paging message representing an incoming call would be reduced. If there are no priority cells in the list an alternative to an extended list would be that the terminal continuously replaces the last cell in the list, so that it would get at least one priority cell on the list.

Above we presented a priority arrangement with cells of only two levels: priority cells and non-priority cells. One user can also have several geographically different "home areas", such as for instance the area at home and at the place of work. The system can regard these areas as being of equal value, so if they are very close to each other or even touch each other, they form one priority home area. However, as the cells have individual different cell identities and text attached to it (ref. the field 23 in figure 1) and they can have different LAC codes, then the terminal can display a different text message to the user, depending on in which priority cell of the home area it operates. Further the invention does not restrict the use of priorities at different levels, which can be realised with suitable offset parameters and control instructions transmitted via the PI message.

The terminal must receive SI messages of the so called type 3 which are transmitted by other base stations, so that it will be able to detect the cell identities of adjacent cells. This might result in that the terminal does not receive a simultaneously transmitted paging message representing an incoming call. In order to make this happen as seldom as possible the terminal must receive the SI messages of type 3 relatively seldom, e.g. only once in 30 minutes.

It will be evident in view of the foregoing description that various modifications may be made within the scope of the present invention.

The scope of the present disclosure includes any novel feature or combination of features disclosed therein either explicitly or implicitly or any generalisation thereof irrespective of whether or not it relates to the claimed invention or mitigates any or all of the problems addressed by the present invention. The applicant hereby gives notice that new claims may be formulated to such features during prosecution of this application or of any such further application derived therefrom.

Claims

1. A cellular radio system (30), which comprises terminals (35), cells (31a, 32a, 33a, 34a) and stationary network equipment (36, 37), of which said terminals are arranged to set up and maintain radio communication with the base stations (31, 32, 33, 34) in the cells, **characterized** in that regarding the setting up and maintaining of radio communication at least one terminal (35) is arranged to favour at least one cell (32a, 33a) with respect to other cells (31a, 34a), in a manner independent of other terminals.
2. A cellular radio system according to claim 1, **characterized** in that the stationary network equipment comprises a database (37) for storing cell priority data relating to individual terminals.
3. A cellular radio system according to claim 2, **characterized** in that the stationary network equipment is arranged to supply information to the terminal about priority data stored in the database relating to the terminal, as a response to an excitation, which is one of the following: the terminal registers with the cellular radio system, the terminal's location data changes in the cellular radio system, the priority data in said database is altered, a predetermined time has passed since the previous message to the terminal, which contained priority data relating to the terminal.
4. A cellular radio system terminal (35), which is arranged to set up and maintain radio communication with the base stations (31, 32, 33, 34) in the cells (31a, 32a, 33a, 34a) of the cellular radio system, **characterized** in that regarding the setting up and maintaining of radio communication the terminal is arranged to favour at least one cell (32a, 33a) with respect to other cells (31a, 34a), in a manner independent of other terminals.
5. A terminal according to claim 4 which is further arranged to maintain a list of possible cells for cell reselection and to arrange said list in an order which is based on a parameter calculated for each cell, **characterized** in that for priority cells it is arranged to alter the parameter calculation relating to the cell, so that said parameter gets a particularly advantageous value in the case of a priority cell.
6. A method to realise cell prioritizing in a cellular radio system (30) comprising terminals (35), cells (31a, 32a, 33a, 34a) and stationary network equipment (36, 37), of which said terminals are arranged to set up and maintain radio communication with the base stations in the cells, **characterized** in that regarding the setting up and maintaining of radio communication it utilizes priority data relating to a terminal in order to favour at least one cell (32a, 33a)

with respect to other cells (31a, 34a), in a manner independent of other terminals.

- 5
7. A method according to claim 6, **characterized** in that the priority data relating to a terminal is stored in a database (37) of the stationary network equipment, and that the priority data is transmitted to the terminal as a response to an excitation, which is one of the following: the terminal registers with the cellular radio system, the terminal's location data changes in the cellular radio system, the priority data in said database is altered, a predetermined time has passed since the previous message to the terminal, which contained priority data relating to the terminal.
- 10
8. A method according to claim 6 or claim 7, in which a terminal further maintains a list of possible cells for cell reselection and arranges said list in an order based on a parameter which is calculated for each cell, **characterized** in that for priority cells the terminal alters the parameter calculation relating to the cell, so that said parameter gets a particularly advantageous value in the case of a priority cell.
- 15
9. A method according to any of claims 6 to 8, **characterized** in that the priority data relating to a terminal comprises at least the priority cell identity (20) and information about the fact whether or not the terminal shall apply an offset parameter (17), a delay factor (16) relating to the cell, and cell reselection hysteresis in the calculation of the parameter relating to a priority cell.
- 20
10. A method according to any of claims 6 to 9, **characterized** in that the terminal does not apply the delay factor relating to the cell nor the cell reselection hysteresis when it calculates the parameter relating to a cell, in a situation where cell reselection represents shifting from a non-priority cell to a priority cell.
- 25
11. A method of selecting a cell in a cellular telecommunication network for establishing radio communication, the method comprising transmitting to a radio telephone network cell information over which radio communication can be established; transmitting to the radio telephone priority information relevant to the radio telephone for at least one of the cells where this information is independent of other radio telephones; the radiotelephone performing cell selection over which radio communication is to be established based on the transmitted cell and priority information.
- 30
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- 55

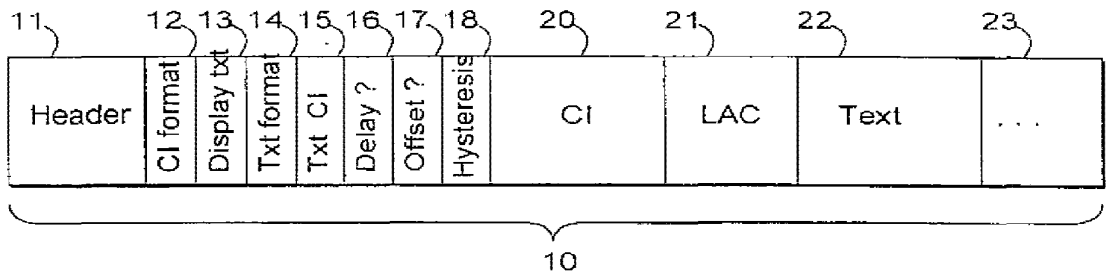


Fig. 1

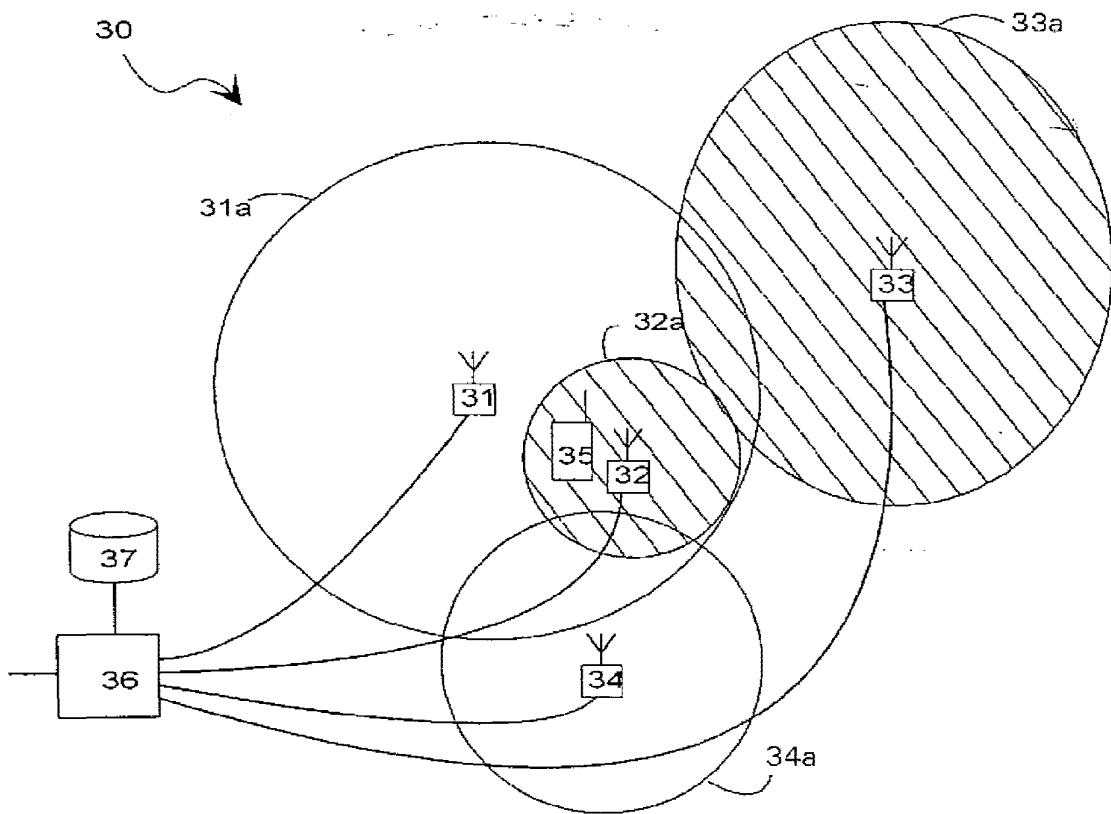


Fig. 2

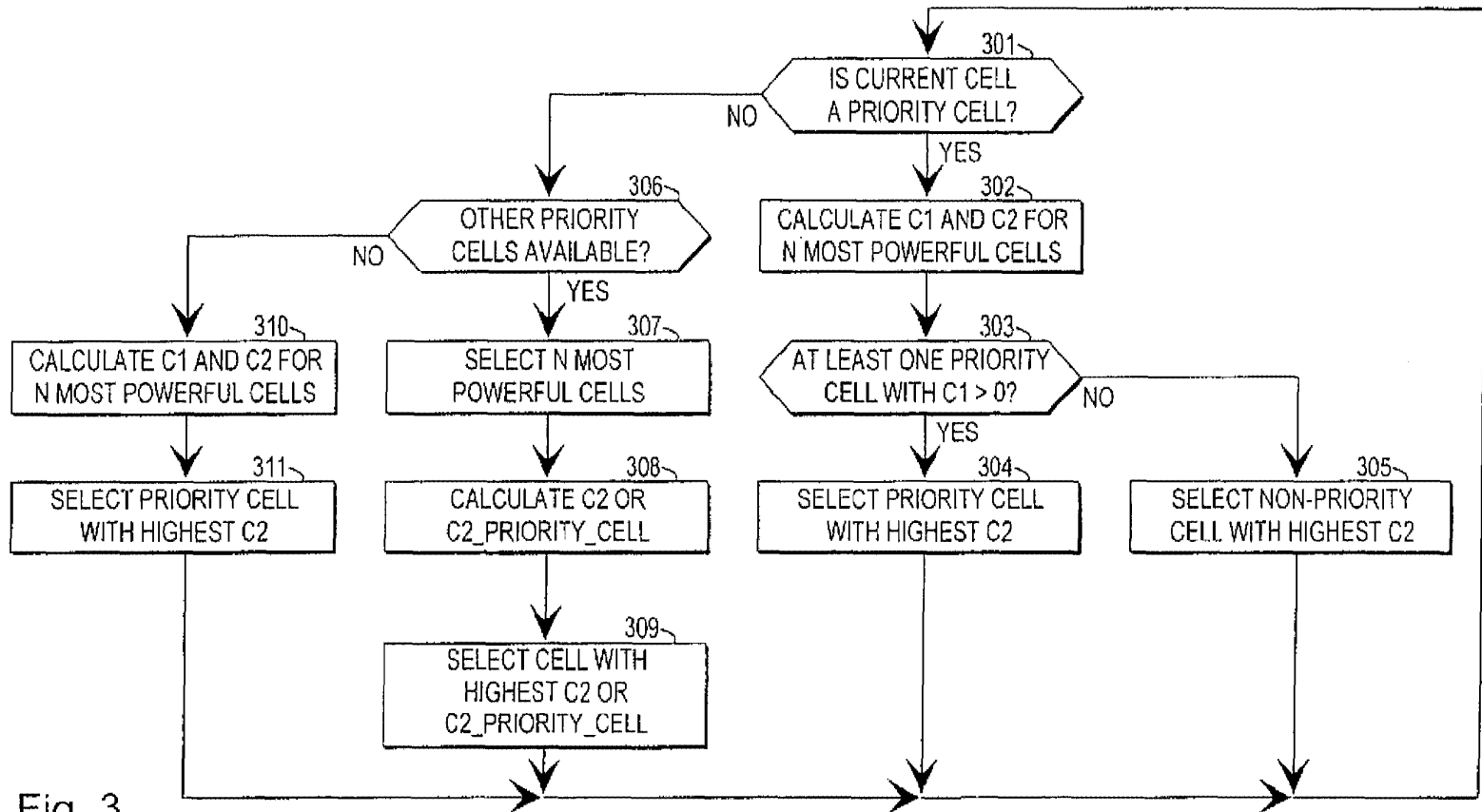
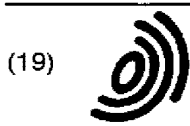


Fig. 3



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 European Patent Office
 Office européen des brevets



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(71) Applicant: NOKIA MOBILE PHONES LTD.
 02150 Espoo (FI)

(54) Cell prioritising in a cellular radio system

(57) In a cellular radio system (30) the terminals (35) are arranged to set up and maintain radio communication with the base stations (31, 32, 33, 34) in the cells (31a, 32a, 33a, 34a). Regarding the setting up and maintaining of radio communication at least one terminal (35) is arranged to favour at least one cell (32a, 33a) with respect to other cells (31a, 34a), in a manner independent of other terminals. The priority data relating to a terminal are stored in a central database (37), from which they are transmitted to the terminal when it registers.

nal (35) is arranged to favour at least one cell (32a, 33a) with respect to other cells (31a, 34a), in a manner independent of other terminals. The priority data relating to a terminal are stored in a central database (37), from which they are transmitted to the terminal when it registers.

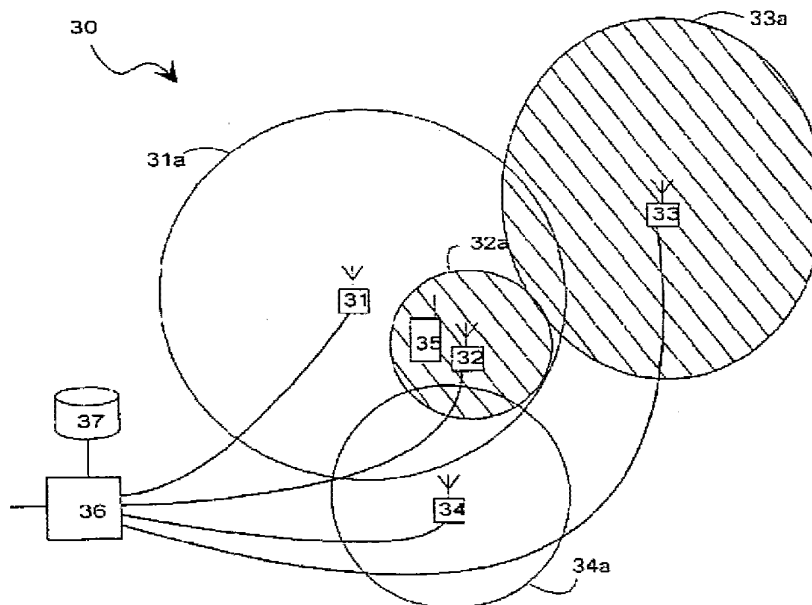


Fig. 2



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 30 1527

DOCUMENTS CONSIDERED TO BE RELEVANT					
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)		
X	WO 95 07010 A (LEIH GEORGE ;LENSINK ANDRE (NL); NEDERLAND PTT (NL); LEVELT WILLEM) 9 March 1995 (1995-03-09) * page 9, line 11 - page 11, line 27 *	1,2,4,6	H04Q7/38		
X	WO 96 06512 A (ERICSSON TELEFON AB L M ;FRISELL HOEGLIN ANITA (SE); BALCK KENNETH) 29 February 1996 (1996-02-29) * page 11, line 15 - page 12, line 23 * * page 14, line 12 - page 15, line 15 * * page 22, line 2 - line 6 * * page 23, line 33 - line 34 *	6			
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A	"Digital cellular telecommunications system (Phase 2); Radio subsystem link control (GSM 05.08) " ETSI ETS 300 578, 31 January 1997 (1997-01-31), XP002111809 Sophia Antipolis, France * page 13, line 17 - page 14, line 17 *	8-10			
A	WO 94 30023 A (DERVAN ADEN WILLIAM ;CELLTRACE COMMUNICATIONS LTD (GB); MICHAELS W) 22 December 1994 (1994-12-22)		<table border="1"> <tr> <td>TECHNICAL FIELDS SEARCHED (Int.Cl.6)</td> </tr> <tr> <td>H04Q</td> </tr> </table>	TECHNICAL FIELDS SEARCHED (Int.Cl.6)	H04Q
TECHNICAL FIELDS SEARCHED (Int.Cl.6)					
H04Q					
The present search report has been drawn up for all claims					
Place of search: BERLIN		Date of completion of the search: 13 August 1999	Examiner: RothlÜbbers, C		
CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document		T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document			

EPO FORM 1503 03/92 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 98 30 1527

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13-08-1999

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 98 30 1527

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13-08-1999

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2009/071194

A. CLASSIFICATION OF SUBJECT MATTER		
H04W36/00 (2009.01)i		
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)		
IPC: H04W36/12, H04W36/08, H04W36/-, H04Q		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
CNPAT,CNKI; EPODOC,WPI,PAJ: cell, reselect, select/choose, PRI/priority, system, different/second, LTE/long term evolution, search		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN1965605A (NOKIA CORP) 16 May 2007 (16.05.2007) the whole document	1-12
A	CN1675957 A (MOTOROLA INC) 28 Sept. 2005 (28.09.2005) the whole document	1-12
A	CN1832601A (LG ELECTRONICS CHINA CO LTD) 13 Sept. 2006 (13.09.2006) the whole document	1-12
A	CN101132614A (HUAWEI TECHNOLOGY CO LTD) 27 Feb. 2008 (27.02.2008) the whole document	1-12
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
<p>* Special categories of cited documents:</p> <p>“A” document defining the general state of the art which is not considered to be of particular relevance</p> <p>“E” earlier application or patent but published on or after the international filing date</p> <p>“J” 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)</p> <p>“O” document referring to an oral disclosure, use, exhibition or other means</p> <p>“P” document published prior to the international filing date but later than the priority date claimed</p>	<p>“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</p> <p>“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</p> <p>“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</p> <p>“&”document member of the same patent family</p>	
Date of the actual completion of the international search 01 Jul.2009 (01.07.2009)		Date of mailing of the international search report 16 Jul. 2009 (16.07.2009)
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451		Authorized officer WANG Chunyan Telephone No. (86-10)62411355

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2009/071194

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Form PCT/ISA/210 (patent family annex) (April 2007)

Electronic Patent Application Fee Transmittal

Application Number:	12902933
Filing Date:	12-Oct-2010
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Filer:	John B. Conklin/Meghan Corbet
Attorney Docket Number:	HW707010

Filed as Large Entity

Utility under 35 USC 111(a) 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:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt

EFS ID:	10640308
Application Number:	12902933
International Application Number:	
Confirmation Number:	2965
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Customer Number:	77399
Filer:	John B. Conklin/Meghan Corbet
Filer Authorized By:	John B. Conklin
Attorney Docket Number:	HW707010
Receipt Date:	01-AUG-2011
Filing Date:	12-OCT-2010
Time Stamp:	16:07:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$180
RAM confirmation Number	2696
Deposit Account	121216
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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9	Non Patent Literature	PCT-ISR.pdf	327665 28dfa93b1b734e4fccd0d3f6c2b6e06ed135fb46	no	2
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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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application No. 12/902,933

Confirmation No. 2965

Applicant: ROBERTS et al.

Filed: October 12, 2010

TC/AU: 2617

Examiner: CHO, Un C

Docket No.: HW707010 (Client Reference No. 0811316US)

Customer No.: 77399

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

INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 CFR 1.97 and 1.98, the references listed on the enclosed Form PTO-1449 and/or Substitute Form PTO-1449 ("Form 1449") are submitted for consideration by the Examiner in the examination of the above-identified patent application.

The full consideration of the references in their entirety by the Examiner is respectfully requested and encouraged. Also, it is respectfully requested that the references be entered into the record of the present application and that the Examiner initial the appropriate area on the enclosed Form 1449, thereby indicating the Examiner's consideration of each of the references.

The submission of the references listed on the Form 1449 is for the purpose of providing a complete record and is not a concession that the references listed thereon are prior art to the invention claimed in the patent application. The right is expressly reserved to establish an invention date earlier than the above-identified filing date in order to remove any reference submitted herewith as prior art should it be deemed appropriate to do so.

Further, the submission of the references is not to be taken as a concession that any reference represents art that is relevant or analogous to the claimed invention. Accordingly, the right to argue that any reference is not properly within the scope of prior art relevant to an examination of the claims in the above-identified application is also expressly reserved.

The Information Disclosure Statement is being filed:

- within** any one of the following time periods: (a) within three months of the filing date of a national application other than a continued prosecution application under 37 CFR 1.53(d); (b) within three months of the date of entry of the national stage as set forth in 37 CFR 1.491 of an international application; (c) before the mailing date

of a first Office Action on the merits; or (d) before the mailing of a first Office Action after the filing of a request for continued examination under 37 CFR 1.114.

- Note: This submission includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.
- after** (a), (b), (c) or (d) above, but before the mailing date of a final action under 37 CFR 1.113, a Notice of Allowance under 37 CFR 1.311, or an action that otherwise closes prosecution in the application, and includes *one* of:
- the Statement under 37 CFR 1.97(e) (see “Statement under 37 CFR 1.97(e)” below).
- Note: This submission includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.
- or –
- the fee of \$180 set forth in 37 CFR 1.17(p) (see “Fees” below).
- on or after** the mailing date of a final action under 37 CFR 1.113 or a Notice of Allowance under 37 CFR 1.311, or an action that otherwise closes prosecution in the application, and on or before payment of the issue fee, and includes the Statement under 37 CFR 1.97(e) (see “Statement under 37 CFR 1.97(e)” below), and the fee of \$180 as set forth in 37 CFR 1.17(p) (see “Fees” below).
- on or after** the mailing date of a Notice of Allowance under 37 CFR 1.311, and on or before payment of the issue fee, and **within** thirty days of receiving each item of information contained in the Information Disclosure Statement, and includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), and the fee of \$180 as set forth in 37 CFR 1.17(p) (see “Fees” below). NOTE: This is for original applications except applications for a design patent, filed on or after May 29, 2000, wherein a paper containing only an Information Disclosure Statement in compliance with 37 CFR 1.97 and 1.98 is being filed.

Citation to Other Patent Applications

- The following U.S. patent applications are hereby brought to the attention of the Examiner. The U.S. patent applications claim subject matter that may be considered by the Examiner to be similar to the subject matter claimed in the above-identified patent application. Accordingly, these U.S. patent applications and/or the prosecution pertaining thereto may include information considered to be material to the prosecution of the above-identified patent application. Since the Examiner has electronic access to the prosecution histories of these U.S. patent applications, copies of prosecution materials therefrom are not provided herewith, but will be promptly provided if the Examiner so desires and requests same.

U.S. APPLICATIONS		STATUS <i>(check one)</i>		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Never Issued: Abandoned/Expired
1. 12/955,392	November 29, 2010		X	
2.				
3.				

Copies of the References

- Copies of any U.S. patents and published patent applications that are listed on the accompanying Form 1449 are not enclosed herewith. Copies of any other references identified on the accompanying Form 1449 are enclosed herewith.
- For each reference not in the English language, attached is at least one of the following: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.
- The references listed on the enclosed Form 1449 were previously identified in the parent application(s) of the present application, and copies of the references were furnished at that time. Accordingly, additional copies of the references are not submitted herewith, so as not to burden the file with duplicate copies of references. The Examiner is respectfully requested to carefully review the references in accordance with the requirements set out in the Manual of Patent Examining Procedure. In accordance with 37 CFR 1.98(d), the details of the parent application(s) relied upon for an earlier filing date under 35 USC 120 in which copies of the references were previously furnished are set out below:

U.S. APPLICATIONS		STATUS <i>(check one)</i>		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Abandoned
1.				
2.				
3.				

Statement under 37 CFR 1.97(e)

- The **undersigned** hereby states 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 patent application not more than three months prior to the filing of the Information Disclosure Statement.
- The **undersigned** hereby states 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 patent application, and, to the knowledge of the undersigned 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.

Statement under 37 CFR 1.704(d)

- The **undersigned** hereby states 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 application and that this communication was not received by any individual designated in 37 CFR 1.56(c) more than thirty days prior to the filing of the Information Disclosure Statement.

Fees

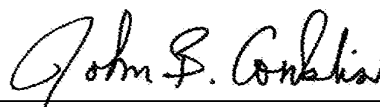
- No fee** is owed by the applicant(s).
 Charge Deposit Account No. 12-1216 in the amount of **\$180.00** (37 CFR 1.17(p)).

Authorization to Charge Additional Fees

- If any additional fees are owed in connection with this communication, please charge Deposit Account No. 12-1216.


Instructions as to Overpayment

- Credit Account No. 12-1216.
 Refund



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(312) 616-5600 (telephone)
(312) 616-5700 (facsimile)


Date:

Application Number 	Application/Control No. 12/902,933	Applicant(s)/Patent under Reexamination ROBERTS ET AL.

Document Code - DISQ	Internal Document – DO NOT MAIL
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TERMINAL DISCLAIMER	<input checked="" type="checkbox"/> APPROVED	<input type="checkbox"/> DISAPPROVED
Date Filed : 07/21/2011	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:
Dorethea Lawrence

Application Number 	Application/Control No. 12/902,933	Applicant(s)/Patent under Reexamination ROBERTS ET AL.

Document Code - DISQ	Internal Document – DO NOT MAIL
-----------------------------	--

TERMINAL DISCLAIMER	<input checked="" type="checkbox"/> APPROVED	<input type="checkbox"/> DISAPPROVED
Date Filed : 07/21/2011	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:
Dorethea Lawrence

U.S. Patent and Trademark Office



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

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes application details for Michael ROBERTS and examiner information.

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):

Chgpatent@leydig.com
uspatent@huawei.com

Office Action Summary	Application No. 12/902,933	Applicant(s) ROBERTS ET AL.	
	Examiner UN C. CHO	Art Unit 2617	

-- 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 21 July 2011.
- 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) 1-20 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) 1-4,6-9,11-18 and 20 is/are rejected.
- 8) Claim(s) 5,10 and 19 is/are objected to.
- 9) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 10) The specification is objected to by the Examiner.
- 11) The drawing(s) filed on _____ 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).
- 12) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
 - 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.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 8/1/2011.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application
- 6) Other: _____.

Response to Arguments

1. Applicant's arguments with respect to claims 1 – 4, 6 – 9, 11 – 18 and 20 have been considered but are moot in view of the new ground(s) of rejection.

Terminal Disclaimer

2. The terminal disclaimer filed on 7/21/2011 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of any patent granted on Application Number 12/955,392 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

4. The information disclosure statement (IDS) submitted on 8/1/2011 has been placed in record and considered by the examiner.

Claim Rejections - 35 USC § 103

5. 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

Art Unit: 2617

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1 – 4, 7 – 9, 11 – 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ore et al. (US 2008/0268843 A1) in view of Carpenter (US 2007/0191006 A1).

Regarding claim 1, Ore teaches a method for cell reselection (see Abstract), comprising: obtaining, by a terminal (user equipment; Fig. 1, element 110), a dedicated priority list (priority list is received by the user equipment; Page 3, Paragraph 0031) and performing, by the terminal, cell reselection according to the dedicated priority list, when the terminal camps on a cell of a second system (when the user equipment finds itself connected in a different access technology the user equipment refers to its priority list to search, measure and reselect to a suitable cell in a higher priority access technology; Page 3, Paragraph 0038).

However, Ore does not specifically disclose receiving a valid time of the dedicated priority list from a system. In an analogous art, Carpenter teaches that the user equipment receives a valid time of the priority list from a system (the user equipment makes use of a validity timer that is associated with the list; Page 8, Paragraphs 0062 – 0063). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the technique of Carpenter to the system of Ore in order to provide methods and apparatus for automatically selecting a wireless communication network where a home network operator may “steer” user equipment to any desired network immediately and effectively.

Regarding claim 2, Ore teaches wherein the first system is a Long Term Evolution (LTE) system (Evolved UTRAN which is UTRAN-LTE) and the second system is a non-LTE system (UTRAN or GERAN which is non-LTE) (Page 4, Paragraph 0057).

Regarding claim 3, the combination of Ore and Carpenter teaches performing, by the terminal camping on the cell of the non-LTE system (Ore: Page 3, Paragraph 0038), cell reselection according to the dedicated priority list before the valid time expires (a list with a valid timer is present and the system can instruct the user equipment to make the selection immediately, thus it would have been obvious to one of ordinary skill in the art to recognize that making an immediate selection while a valid timer is running would allow cell reselection prior to the expiration of the valid timer; Carpenter: Page 8, Paragraphs 0063 – 0064).

Regarding claim 4, Ore teaches performing cell reselection according to a public priority list, *or* performing cell reselection according to a result measured in accordance with a cell signal quality criterion, *or* searching for a cell of the LTE system (the user equipment may utilize the priority list and measured signal strength and/or quality for performing cell reselection; Page 3, Paragraphs 0037 – 0039).

Regarding claim 7, the combination of Ore and Carpenter teaches wherein the dedicated priority list and the valid time of the dedicated priority list are carried in a dedicated signaling (Ore discloses that the priorities may be signaled to the UE via system information signaling; Page 3, Paragraph 0031 and 0037 and Carpenter discloses that the list and the validity timer may be programmed by the home network operator; Page 7, Paragraph 0058 and Page 8, Paragraphs 0062 – 0063).

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Regarding claim 8, Ore teaches wherein the dedicated priority list comprises priority level information of different Radio Access Technology (RAT) (Page 3, Paragraph 0033).

Regarding claim 9, the combination of Ore and Carpenter discloses all the limitations as shown in claim 1 including a first storage (memory 114), configured to store the dedicated priority list (the UE 110 stores in the memory 114 the list of priorities; Ore: Page 3, Paragraph 0031) and the valid time of the dedicated priority list (Carpenter: Page 7, Paragraph 0059 and Page 8, Paragraphs 0062 – 0063 wherein the list and the validity timer may be stored in the user equipment memory).

Regarding claim 11, the claim is interpreted and rejected for the same reason as set forth in claim 3.

Regarding claim 12, the claim is interpreted and rejected for the same reason as set forth in claim 2.

Regarding claim 13, the claim is interpreted and rejected for the same reason as set forth in claim 7.

Regarding claim 14, the claim is interpreted and rejected for the same reason as set forth in claim 8.

Regarding claim 15, the combination of Ore and Carpenter discloses all the limitation as shown in claim 9 including the network-side device is configured to send the dedicated priority list (Ore: Page 3, Paragraph 0037 wherein the network provides to the UE the dedicated priority list).

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Regarding claim 16, the claim is interpreted and rejected for the same reason as set forth in claim 2.

Regarding claim 17, the claim is interpreted and rejected for the same reason as set forth in claim 7.

Regarding claim 18, the claim is interpreted and rejected for the same reason as set forth in claim 8.

Regarding claim 20, the claim is interpreted and rejected for the same reason as set forth in claim 3.

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Ore and Carpenter as applied to claim 2 above, and further in view of Lee et al. (US 2009/0181676 A1).

Regarding claim 6, the combination of Ore and Carpenter do not specifically teach obtaining, by the terminal, an indication from the non-LTE system, wherein the indication is used to notify the terminal at least *one* of the following: searching for a cell of the LTE system when the dedicated priority list is invalid; searching for a cell of the LTE system when the terminal does not store the dedicated priority list and the public priority list; and performing cell reselection according to a result measured in accordance with a cell signal quality criterion when the terminal does not store the dedicated priority list and the public priority list. In an analogous art, Lee teaches searching for a cell of the LTE system when the terminal does not store the dedicated priority list and the public priority list (the cell reselection criteria is based on a highest

Art Unit: 2617

signal characteristic value regardless of the priority at the time of initial cell selection; Page 5, Paragraph 0075). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the technique of Lee to the modified system of Ore and Carpenter in order to ensure quality of service of user equipment and reducing power consumption for movement of the UE in a wireless communication system.

Allowable Subject Matter

8. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 5, Ore, Carpenter and Lee either alone or in combination fails to teach obtaining, by the terminal, an indication from the non-LTE system when the terminal camps on the cell of the non-LTE system, wherein the indication is used to notify the terminal that the non-LTE system will not deliver the public priority list, and/or notify the terminal to store the public priority list obtained from the LTE system.

Regarding claim 10, Ore, Carpenter and Lee either alone or in combination fails to teach a second obtaining unit, configured to obtain a public priority list from the first system; a second storage, configured to store the public priority list; and a second processing unit, configured to perform cell reselection according to the public priority list stored in the second storage when the terminal camps on the second system and the first storage does not store a valid dedicated priority list.

Regarding claim 19, the claim is interpreted and objected for the same reason as set forth in claim 10.

9. Claims 5, 10 and 19 are 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.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to UN C. CHO whose telephone number is (571)272-7919. The examiner can normally be reached on 9:00AM - 6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, George Eng can be reached on 571-272-7495. 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.

Application/Control Number: 12/902,933
Art Unit: 2617

Page 9

/UN C. CHO/
Primary Examiner, Art Unit 2617

Notice of References Cited	Application/Control No. 12/902,933	Applicant(s)/Patent Under Reexamination ROBERTS ET AL.	
	Examiner UN C. CHO	Art Unit 2617	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-2007/0191006	08-2007	Carpenter, Paul Marcus	455/435.2
*	B US-2009/0181676	07-2009	LEE et al.	455/436
	C US-			
	D US-			
	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
	N				
	O				
	P				
	Q				
	R				
	S				
	T				

NON-PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)				
	U				
	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. 12902933	Applicant(s)/Patent Under Reexamination ROBERTS ET AL.
	Examiner UN C CHO	Art Unit 2617

✓	Rejected
=	Allowed


-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

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

CLAIM		DATE							
Final	Original	01/12/2011	09/06/2011						
	1	✓	✓						
	2	✓	✓						
	3	✓	✓						
	4	✓	✓						
	5	✓	○						
	6	✓	✓						
	7	✓	✓						
	8	✓	✓						
	9	✓	✓						
	10	✓	○						
	11	✓	✓						
	12	✓	✓						
	13	✓	✓						
	14	✓	✓						
	15	✓	✓						
	16	✓	✓						
	17	✓	✓						
	18	✓	✓						
	19	✓	○						
	20	✓	✓						

Search Notes 	Application/Control No. 12902933	Applicant(s)/Patent Under Reexamination ROBERTS ET AL.
	Examiner UN C CHO	Art Unit 2617

SEARCHED			
Class	Subclass	Date	Examiner
455	435.1,435.2,435.3,436,437	1/12/2011	UC

SEARCH NOTES		
Search Notes	Date	Examiner
East Search including keywords, class/subclass, inventor, assignee	1/12/2010	UC
Update East Search	9/6/2011	UC

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

	/UN C CHO/ Primary Examiner.Art Unit 2617
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Please type a plus sign (+) inside this box →



Substitute for form 1449A/B/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	12/902,933
				Filing Date	10-12-2010
				First Named Inventor	ROBERTS, Michael
				Group Art Unit	2617
Examiner Name	CHO, Un C				
Attorney Docket Number	HW707010				
Sheet	1	of	1		

U.S. PATENT DOCUMENTS						
Examiner Initials	Doc. No.	U.S. Patent Document		Name of Patentee or Applicant	Date of Publication	Filing Date If Appropriate
		Application or Patent Number	Kind Code			
	A D	2007/0258410	A1	Huang et al.	November 8, 2007	
	A E	2004/0121777	A1	Schwarz et al.	June 24, 2004	

FOREIGN PATENT DOCUMENTS							
Examiner Initials	Doc. No.	Foreign Patent Document			Name of Patentee or Applicant	Date of Publication	Translation*
		Office	Application or Patent Number	Kind Code			
	A F	CN	100455112	C	Huawei Tech. Co., Ltd.	January 21, 2009	(b)
	A G	CN	1852559	A	Huawei Tech. Co., Ltd.	October 25, 2006	(b)
	A H	WO	2008/057359	A1	Interdigital Technology Corp.	May 15, 2008	
	A I	EP	2111074	A1	Huawei Tech. Co., Ltd.	October 21, 2009	
	A J	EP	0862346	A2	Nokia Mobile Phones Ltd.	September 2, 1998	

OTHER - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Doc. 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, page(s), volume-issue number (s), publisher, city and/or country where published.	Translation *
	A K	1 st Office Action in corresponding Chinese Application No. 200810091957.6 (April 8, 2010).	(a)
	A L	International Search Report in corresponding PCT Application No. PCT/CN2009/071194 (July 16, 2009).	
	A M	Extended European Search Report in corresponding European Application No. 09731049.4 (June 9, 2011).	
	A N	"Tdoc-R2-074001 – IDLE mode mobility control principles," 3GPP TSG RAN WG2 #59bis, 8-12 October 2007, 3 rd Generation Partnership Project, Shanghai, China.	
	A O	"TSGR2#6(99)808 – Cell Selection and Cell Reselection Criteria," TSG-RAN Working Group 2 (Radio layer 2 and Radio layer 3), 16-20 August 1999, 3 rd Generation Partnership Project, Sophia Antipolic, France.	
	A P	"R2-073622 – E-UTRA Cell Selection and Cell Reselection Aspects," 3GPP TSG-RAN WG2 Meeting #59, 20-24 August 2007, 3 rd Generation Partnership Project, Athens, Greece.	
	A Q	Image File Wrapper in corresponding US Application No. 12/902,933 (August 1, 2011).	

Examiner Signature	/Un Cho/	Date Considered	08/28/2011
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* If the reference is not in English, then at least one of the following is provided: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /U.C./

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application No. 12/902,933

Confirmation No. 2965

Applicant: ROBERTS et al.

Filed: October 12, 2010

TC/AU: 2617

Examiner: CHO, UN C.

Docket No. HW707010 (Client Reference No. 0811316US)

Customer No. 77399

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

REPLY TO OFFICE ACTION

Sir:

In reply to the Office action dated September 14, 2011 please enter the following amendments and consider the following remarks.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

LISTING OF THE CLAIMS

1. (Currently Amended) A method for cell reselection, comprising:
obtaining, by a terminal, a dedicated priority list and a valid time of the dedicated priority list from a [[first]] Long Term Evolution (LTE) system; and
performing, by the terminal, cell reselection according to the dedicated priority list and the valid time of the dedicated priority list, when the terminal camps on a cell of a [[second]] non-LTE system.
2. (Canceled)
3. (Currently Amended) The method according to claim [[2]]1, wherein the method further comprises:
when the terminal camps on a cell of the non-LTE system, the performing cell reselection according to the dedicated priority list and the valid time comprises: performing, by the terminal camping on the cell of the non-LTE system, cell reselection according to the dedicated priority list before the valid time expires.
4. (Currently Amended) The method according to claim [[2]]1, wherein when the terminal camps on the cell of the non-LTE system, the dedicated priority list is invalid after the valid time expires, the method further comprises:
performing cell reselection according to a public priority list, or
performing cell reselection according to a result measured in accordance with a cell signal quality criterion, or
searching for a cell of the LTE system.
5. (Currently Amended) The method according to claim [[4]]21, wherein when the public priority list is obtained by the terminal from the LTE system, the method further comprises:
obtaining, by the terminal, an indication from the non-LTE system when the terminal camps on the cell of the non-LTE system, wherein the indication is used to do one of: notify the terminal that the non-LTE system will not deliver the public priority list[[,.]] and[[/or]] notify the terminal to store the public priority list obtained from the LTE system.

6. (Currently Amended) The method according to claim [[2]]1, further comprising: obtaining, by the terminal, an indication from the non-LTE system, wherein the indication is used to notify the terminal that is engaged in at least one of the following:

- searching for a cell of the LTE system when the dedicated priority list is invalid;
- searching for a cell of the LTE system when the terminal does not store the dedicated priority list and the public priority list; and
- performing cell reselection according to a result measured in accordance with a cell signal quality criterion when the terminal does not store the dedicated priority list and the public priority list.

7. (Currently Amended) The method according to claim [[2]]1, wherein the dedicated priority list and the valid time of the dedicated priority list are carried in a dedicated signaling signal.

8. (Currently Amended) The method according to claim [[2]]1, wherein the dedicated priority list comprises ~~priority level information of different Radio Access Technology (RAT)~~ one of the following:

- priority level of a frequency or a Radio Access Technology, RAT;
- priority levels of the frequency of the serving cell, adjacent frequencies of the serving cell, and frequencies of the neighboring systems; and
- priority levels assigned for each frequency or Frequency Band of a neighboring system.

9. (Currently Amended) A terminal, comprising:

- ~~a first~~ an obtaining unit, configured to obtain a dedicated priority list and a valid time of the dedicated priority list from a [[first]] Long Term Evolution (LTE) system;
- a ~~first~~ storage unit, configured to store the dedicated priority list and the valid time of the dedicated priority list; and
- a ~~first~~ processing unit, configured to perform cell reselection according to the dedicated priority list and the valid time of the dedicated priority list stored in the first storage when the terminal camps on a [[second]] non-LTE system.

10-12. (Canceled)

13. (Currently Amended) The terminal according to claim ~~[[10]]~~9, wherein the dedicated priority list and the valid time of the dedicated priority list are carried in a dedicated ~~signaling~~ signal.

14. (Currently Amended) The terminal according to claim ~~[[10]]~~9, wherein the dedicated priority list comprises ~~priority level information of different Radio Access Technologies (RATs)~~; one of the following:

priority level of a frequency or a Radio Access Technology, RAT; or
priority levels of the frequency of the serving cell, adjacent frequencies of the serving cell, and frequencies of the neighboring systems; or
priority levels assigned for each frequency or Frequency Band of a neighboring system.

15. (Original) A system, comprising a network-side device and a terminal according to claim 9, wherein the network-side device is configured to send the dedicated priority list.

16. (Canceled)

17. (Original) The system according to claim 15, wherein the dedicated priority list and the valid time of the dedicated priority list are carried in a dedicated signaling.

18. (Currently Amended) The system according to claim 15, wherein the dedicated priority list comprises ~~priority level information of different Radio Access Technologies (RATs)~~; one of the following:

priority level of a frequency or a Radio Access Technology, RAT; or
priority levels of the frequency of the serving cell, adjacent frequencies of the serving cell, and frequencies of the neighboring systems; or
priority levels assigned for each frequency or Frequency Band of a neighboring system.

19-20. (Canceled)

21. (New) The method according to claim 4, wherein the public priority list is

obtained by the terminal from one of the LTE system and the non-LTE system.

22. (New) The terminal according to claim 9, wherein when the terminal camps on the cell of the non-LTE system, the processing unit is further configured to perform cell reselection according to the dedicated priority list before the valid time expires.

23. (New) The terminal according to claim 22, further comprising:
a second obtaining unit, configured to obtain a public priority list from one of the LTE system and the non-LTE system;
a second storage unit, configured to store the public priority list; and
a second processing unit, configured to perform cell reselection according to a public priority list, when the terminal camps on the cell of the non-LTE system and the dedicated priority list is invalid after the valid time expires.

24. (New) The system according to claim 15, wherein the processing unit is further configured to perform cell reselection according to the dedicated priority list, when the terminal camps on the cell of the non-LTE system and before the valid time expires.

25. (New) The system according to claim 24, further comprising:
a second obtaining unit, configured to obtain a public priority list from one of the LTE system and the non-LTE system;
a second storage unit, configured to store the public priority list; and
a second processing unit, configured to perform cell reselection according to a public priority list, when the terminal camps on the cell of the non-LTE system and the dedicated priority list is invalid after the valid time expires.

This listing of claims replaces all prior versions, and listings, of claims in the application.

*REMARKS**Allowable Subject Matter*

Applicants gratefully acknowledge the Office Action's observation that claims 5, 10 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Applicants elect to defer rewriting the objected-to claims until the Examiner has an opportunity to reconsider the base claims in light of the remarks as contained herein.

Status of the Claims

In the Office action dated September 14, 2011, claims 1-4, 6-9, 11-18 and 20 are rejected. Claims 5, 10 and 19 are objected to.

In this response, claims 1, 3-9, 13-14 and 18 are amended. New claims 21- 25 are added. No new matter has been introduced by way of these amendments and additions. Claims 2, 10-12, 16 and 19-20 are canceled. New claim 21 is supported by paragraph [0021] of the specification. New claims 22 and 24 are supported by original claim 3. New claims 23 and 25 are supported by original claim 4 and paragraphs [0021] and [0095] of the specification. The amendments to claims 8, 14 and 18 are supported by paragraph [0025] of the specification.

Thus, claims 1, 3-9, 13-15, 17-18, and 21-25 are pending in this patent application, including independent claims 1 and 9.

Reconsideration of the pending claims 1, 3-9, 13-15, 17-18, and 21-25 in light of the following remarks is respectfully requested.

Claim Rejections Under 35 U.S.C. 103(a)

Claims 1-4, 7-9, 11-18 and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ore (U.S. Patent Publication No. 2008/0268843) in view of Carpenter (U.S. Patent Publication No. 2007/0191006).

Applicants respectfully traverse the Office Action's rejection of claims 1-4, 7-9, 11-18 and 20 under 35 U.S.C. § 103 (a) as being unpatentable over Ore in view of Carpenter. A *prima facie* case of obviousness has not been established with respect to these claims for at least the reason that Ore in view of Carpenter does not teach or suggest each and every element recited in currently amended independent claim 1. Each element of claim 1 is recited

in currently amended independent claim 9, which is written as a hardware claim instead of a method claim.

Amended claim 1 recites a method for cell reselection, comprising:

obtaining, by a terminal, a dedicated priority list and a valid time of the dedicated priority list from an LTE system; and performing, by the terminal, cell reselection according to the dedicated priority list and the valid time of the dedicated priority list, when the terminal camps on a cell of a non-LTE system.

Neither Ore nor Carpenter discloses each and every feature defined in claim 1.

As the Office Action asserts, Ore teaches a method for cell reselection. In Ore, *when the UE finds itself not connected to the highest priority access technology*, the UE refers to its priority list to *reselect a suitable cell of a higher priority access technology*. However, contrary to the assertion in the Office action, Ore does not teach:

when the user equipment finds itself connected in a different access technology the user equipment refers to its priority list to search, measure and reselect a suitable cell in a higher priority access technology

(see page 3 of the Office action, referencing page 3, paragraph [0038] of Ore).

Although priority list is mentioned in Ore, nevertheless, Ore fails to disclose the priority list is obtained from an LTE system. In addition, the priority list disclosed in Ore appears to be used “when the UE is commanded by the network to abandon the current network” and in such case to “determine which radio access technology the UE should reselect to.” (See Ore, at paragraph [0038].) However, in claim 1, the dedicated priority list obtained from the LTE system is used by the terminal when the terminal camps on a cell of a non-LTE system. Therefore, Ore does not teach that the UE can *obtain a dedicated priority list from an LTE system and use the dedicated priority list to perform reselection when the UE camps on a cell of a non-LTE system*, as disclosed in claim 1.

Furthermore, as acknowledged in the Office action (see Office action, page 3, paragraph [0003]), Ore does not disclose *receiving a valid time of the dedicated priority list from a system*.

Therefore, Ore fails to teach or suggest:

obtaining, by a terminal, a dedicated priority list and a valid time of the dedicated priority list from an LTE system; and performing, by the terminal, cell reselection according to the dedicated priority list and the valid time of the dedicated priority list, when the terminal camps on a cell of a non-LTE system

as recited in amended independent claim 1 and similarly recited in amended independent claim 9.

Carpenter fails to cure the deficiencies of Ore because Carpenter fails to disclose those features recited in independent claim 1 and similarly recited in independent claim 9, which are not recited by Ore.

Carpenter discloses a method for automatically selecting a wireless communication network by user equipment using a “steered” PLMN (see Carpenter, paragraph [0048]). Specifically, Carpenter discloses that “[t]he user equipment may *receive the steered network identification (i.e. the SPLMN)*” (see Carpenter, at paragraph [0058]), and “*a ‘validity timer’ may be associated with the SPLMN.*” “Using this feature, the user equipment *uses the SPLMN for the validity time period and then utilize a different network thereafter*” (Carpenter, paragraph [0063]). Further, in Carpenter, it is explicitly disclosed that the SPLMN is “*uniquely associated with the roaming region*” (Carpenter, paragraph [0060]). That is to say, the SPLMN in Carpenter is merely *a network identification* and cannot be considered as a dedicated priority list. Accordingly, the validity timer is only associated with a network identification (i.e., SPLMN), but is *not associated with the list*, as alleged in the Office action (See Office Action, page 3 paragraph 3). Therefore, Carpenter fails to teach or suggest: “*obtaining, by a terminal, a dedicated priority list and a valid time of the dedicated priority list from an LTE system*” as recited in amended independent claim 1, and similarly recited in amended independent claim 9.

Furthermore, Carpenter does not disclose a UE which can *obtain a dedicated priority list from an LTE system and use the dedicated priority list to perform reselection when the UE camps on a cell of a non-LTE system*. Therefore, Carpenter also fails to teach or suggest “*performing, by the terminal, cell reselection according to the dedicated priority list and the valid time of the dedicated priority list, when the terminal camps on a cell of a non-LTE system*” as recited in amended independent claim 1, and similarly recited in amended independent claim 9.

In view of the above remarks, neither Carpenter nor Ore, whether taken alone or in combination, disclose or suggest each and every feature recited by amended independent claims 1 and 9. Applicants therefore respectfully submit that independent claims 1 and 9, as amended, are patentable over the combination of Ore and Carpenter. Applicants also respectfully submit that dependent claims 3-8, 13-15, 17-18, and 21-25 are also patentable at least by virtue of their dependence from allowable independent claims 1 and 9. Accordingly,

Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. § 103(a) rejection of claims 1-4, 7-9, 11-18 and 20.

Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Ore and Carpenter as applied to claim 2 above, and further in view of Lee (U.S. Patent Publication No. 2009/0181676).

The rejection of claim 6 is traversed for at least the following reason: Lee only discloses that “the UE may select a cell having a highest signal characteristic value without considering the priority at the time of initial cell selection” (see Lee, paragraph [0075]). That is to say, in Lee, the reason that the UE does not consider the priority list is the selected cell has the highest signal characteristic value.

In contrast, Lee does not disclose or suggest the limitation of claim 6 that recites searching for a cell of the LTE system “when the terminal does not store the dedicated priority list and the public priority list.” The selection criteria disclosed in Lee and the condition for searching recited by claim 6 are different, and the Office Action improperly equates one with the other.

Therefore, Applicants respectfully submit that Ore and Carpenter in view of Lee, whether alone or in combination, fail to disclose each and every element recited by claim 6. Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. § 103(a) rejection of claim 6.

CONCLUSION

Applicants respectfully submit that the patent application is in condition for allowance. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

/John B. Conklin/

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Date: February 14, 2012

Electronic Acknowledgement Receipt

EFS ID:	12076942
Application Number:	12902933
International Application Number:	
Confirmation Number:	2965
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Customer Number:	77399
Filer:	John B. Conklin/Leanna Bultema
Filer Authorized By:	John B. Conklin
Attorney Docket Number:	HW707010
Receipt Date:	14-FEB-2012
Filing Date:	12-OCT-2010
Time Stamp:	18:03:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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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 Letter	ROA-2nd_Transmittal.pdf	59504 <small>b17794f6431e458746621b0f6a8736fa1fa4a024</small>	no	1

Warnings:

Information:

2	Amendment/Req. Reconsideration-After Non-Final Reject	ROA-2nd.pdf	117296	no	10
			a0ec799bf37f7c81846215cd1c3af20113a6d 8bc		

Warnings:

Information:

Total Files Size (in bytes):	176800
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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 re Application of: ROBERTS et al.
 Application No. 12/902,933
 Confirmation No. 2965
 Filed: October 12, 2010

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

Sir:

Transmitted herewith is a reply to office action in the subject application.

- Small entity status is claimed for this application under 37 CFR 1.27.
- Petition for an extension of time for the period noted below, as well as for any additional period necessary to render the present submission timely. Please charge Deposit Account No. 12-1216 for the appropriate petition fee.
- Other:
- Please charge Deposit Account No. 12-1216 in the total amount indicated below.

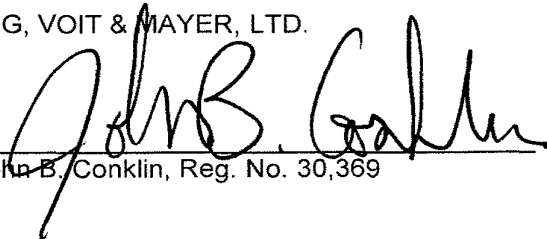
					SMALL ENTITY		OTHER THAN A SMALL ENTITY	
TIME EXTENSION PETITION FEE			\$560.00		\$ 0.00		\$560.00	
subtract time extension fee previously paid			none		(\$ 0.00)		(\$ 0.00)	
CLAIM FEE	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	EXTRA CLAIMS PRESENT	RATE	ADD'L CLAIM FEE	RATE	ADD'L CLAIM FEE
TOTAL	18	MINUS	20	= 0	x 30 =	\$	x 60 =	\$0.00
INDEPENDENT	2	MINUS	2	= 0	x 125 =	\$	x 250 =	\$0.00
<input type="checkbox"/>	FIRST PRESENTATION OF MULTIPLE CLAIM				+ 225 =	\$	+ 450 =	\$0.00
OTHER FEES AS DESCRIBED:					\$		\$0.00	
TOTAL AMOUNT TO BE CHARGED TO DEPOSIT ACCOUNT					TOTAL	\$	TOTAL	\$0.00

- The Commissioner is hereby authorized to charge any deficiencies in the following fees associated with this communication or credit any overpayment to Deposit Account No. 12-1216.
 - Any filing fees under 37 CFR 1.16 for the presentation of extra claims.
 - Any patent application processing fees under 37 CFR 1.17.

Respectfully submitted,

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By 
 John B. Conklin, Reg. No. 30,369

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 Substitute for Form PTO-875	Application or Docket Number 12/902,933	Filing Date 10/12/2010	<input type="checkbox"/> To be Mailed
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APPLICATION AS FILED – PART I			OTHER THAN SMALL ENTITY				
	(Column 1)	(Column 2)	SMALL ENTITY <input type="checkbox"/>	OR		SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A		OR	N/A	
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (j), or (m))</small>	N/A	N/A	N/A		OR	N/A	
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A		OR	N/A	
TOTAL CLAIMS <small>(37 CFR 1.16(j))</small>	minus 20 =	*	X \$ =		OR	X \$ =	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =		OR	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	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).				OR		
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>					OR		
			TOTAL		OR	TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED – PART II					OTHER THAN SMALL ENTITY				
	(Column 1)	(Column 2)	(Column 3)		SMALL ENTITY	OR		SMALL ENTITY	
AMENDMENT	02/14/2012	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)
	Total <small>(37 CFR 1.16(i))</small>	* 18	Minus ** 20	= 0	X \$ =		OR	X \$60=	0
	Independent <small>(37 CFR 1.16(h))</small>	* 2	Minus ***3	= 0	X \$ =		OR	X \$250=	0
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>						OR		
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>						OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

	(Column 1)	(Column 2)	(Column 3)		SMALL ENTITY	OR		SMALL ENTITY	
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)
	Total <small>(37 CFR 1.16(i))</small>	*	Minus **	=	X \$ =		OR	X \$ =	
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus ***	=	X \$ =		OR	X \$ =	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>						OR		
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>						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:
/DEBRA R. WYATT/

This collection of information is required by 37 CFR 1.16. 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, 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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Please type a plus sign (+) inside this box → +

Substitute for form 1449A/B/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	12/902,933
				Filing Date	October 12, 2010
				First Named Inventor	ROBERTS, Michael
				Group Art Unit	2617
				Examiner Name	Un C. CHO
Sheet	1	of	1	Attorney Docket Number	HW707010

U.S. PATENT DOCUMENTS						
Examiner Initials	Doc. No.	U.S. Patent Document		Name of Patentee or Applicant	Date of Publication	Filing Date If Appropriate
		Application or Patent Number	Kind Code			

FOREIGN PATENT DOCUMENTS							
Examiner Initials	Doc. No.	Foreign Patent Document			Name of Patentee or Applicant	Date of Publication	Translation*
		Office	Application or Patent Number	Kind Code			
	AR	KR	1020050017514	A	Pantech Co., Ltd.	February 25, 2005	(b)
	AS	KR	1020060099462	A	Samsung Electronics Co., Ltd.	September 19, 2006	(b)

OTHER - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Doc. 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, page(s), volume-issue number (s), publisher, city and/or country where published.	Translation *
	AT	U.S. PATENT AND TRADEMARK OFFICE, First Office Action in U.S. Patent Application No. 12/955,392 (February 10, 2011)	
	AU	U.S. PATENT AND TRADEMARK OFFICE, Final Office Action in U.S. Patent Application No. 12/955,392 (April 28, 2011)	
	AV	U.S. PATENT AND TRADEMARK OFFICE, First Office Action in U.S. Patent Application No. 13/270,089 (February 3, 2012)	
	AW	KOREAN INTELLECTUAL PROPERTY OFFICE, Office Action in Korean Patent Application No. 10-2010-7023997 (July 1, 2011)	(a)

Examiner Signature	Date Considered
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* If the reference is not in English, then at least one of the following is provided: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.

(19) KOREAN INTELLECTUAL PROPERTY OFFICE

KOREAN PATENT ABSTRACTS

(11) Publication number: 1020050017514 A
 (43) Publication date: 22.02.2005

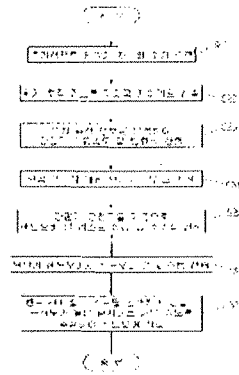
(21) Application number: 1020030056443 (71) Applicant: PANTECH CO., LTD.
 (22) Application date: 14.08.2003 (72) Inventor: LIM, KYOUNG HYUN
 (51) Int. Cl: H04B 7/26

(54) HAND-OVER METHOD IN A MOBILE COMMUNICATION SYSTEM, SPECIALLY CONCERNED IN ATTEMPTING A HAND-OVER TO ADJACENT CELLS ACCORDING TO A PRIORITY OF A HAND-OVER CELL LIST BY ON THE BASIS OF A MOVING SPEED AND A DIRECTION OF A TERMINAL

(57) Abstract:

PURPOSE: A hand-over method in a mobile communication system is provided to calculate a moving speed and a direction of a mobile terminal, and to make a hand-over cell list according to terminal proximity, thereby attempting a hand-over process to adjacent cells by a priority of the hand-over cell list based on the terminal proximity.

CONSTITUTION: A mobile communication terminal periodically tracks a self location according to a location tracking algorithm (S21). Location tracking information is transmitted to a base station controller through a base station(S22). The base station controller analyzes the location tracking information, and outputs a moving speed and a direction of the mobile terminal (S23). On the basis of the moving speed and the direction of the mobile terminal, terminal proximity for adjacent cells is calculated(S24). The base station controller makes a hand-over cell list including channel information on each adjacent cell by high proximity, and regularly renews the hand-over cell list(S25). The base station controller confirms whether a hand-over process is requested to the mobile terminal. If so, the base station controller transmits the hand-over cell list to the mobile terminal through the base station(S26). The mobile terminal searches the hand over cell list, and extracts channel information by high proximity to attempt the hand-over process(S27).



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For more registration information

Legal Status

No.	Receipt/Delivery No.	Receipt/Delivery Date	Document Title (KOR.)	Status (KOR.)
1	1-1-2003-0300558-19	2003.08.14	Patent Application (특허출원서)	Acceptance (수리)
2	9-1-9999-9999999-89	2005.05.13	Request for Prior Art Search	Acceptance

			(선행기술조사위원회)	(수리)
3	9-1-2005-0036720-61	2005.06.16	Report of Prior Art Search (선행기술조사보고서)	Acceptance (수리)
4	9-5-2005-0386675-51	2005.08.09	Notification of reason for refusal (의견제출통지서)	Dispatched (발송처리완료)
5	1-1-2005-0562270-12	2005.10.05	Amendment to Description, etc. (명세서등보정서)	Regarded as an acceptance of amendment (보정승인간주)
6	1-1-2005-0562271-57	2005.10.05	Written Opinion (의견서)	Acceptance (수리)
7	9-5-2005-0648647-51	2005.12.21	Decision to grant (등록결정서)	Dispatched (발송처리완료)
8	4-1-2007-5073254-00	2007.05.11	Notification of change of applicant's information (출원인정보변경(경정)신고서)	Acceptance (수리)

(19) 대한민국특허청(KR)
(12) 공개특허공보(A)

(51) Int. Cl.⁷
H04B 7/28

(11) 공개번호 10-2005-0017514
(43) 공개일자 2005년02월22일

(21) 출원번호	10-2003-0056443
(22) 출원일자	2003년08월14일
(71) 출원인	주식회사 팬택 서울특별시 영등포구 여의도동 25-12 신송센타빌딩
(72) 발명자	임경현 서울특별시영등포구당산동2가대우아파트101-303
(74) 대리인	김영철

심사청구 : 있음

(54) 이동통신 시스템에서의 핸드오버 방법

요약

본 발명은 이동통신 단말기의 이동속도 및 방향성을 기반으로 한 각 인접 셀들에 대한 단말기 근접도에 따라 핸드오버를 시도하게 함으로써 보다 정확한 핸드오버가 가능하도록 한 이동통신 시스템에서의 핸드오버 방법에 관한 것이다.

본 발명은 이동통신 단말기의 주기적인 위치 추적 정보를 기반으로 단말기 이동속도 및 방향성을 산출하고, 이를 이용하여 단말기 근접도를 계산해서 핸드오버 셀 리스트를 작성하여 이동통신 단말기의 핸드오버시 전송해 주고, 이동통신 단말기에서 핸드오버 셀 리스트 상의 우선순위에 따라 인접 셀로의 핸드오버를 시도함으로써, 이동통신 단말기가 이동중인 경우에도 보다 신속하고 정확하게 핸드오버를 수행할 수 있게 되고, 결국 보다 안정적으로 통화중인 호를 유지할 수 있게 된다.

또한, 본 발명은 단말기 근접도를 기반으로 한 핸드오버 셀 리스트 상의 우선순위에 따라 인접 셀로의 핸드오버 처리를 수행함으로써, 핸드오버에 실패하더라도 즉시 채널을 복원할 수 있어 호가 단절되는 빈도수를 줄일 수 있게 된다.

도면도

도2

색인어

기지국 제어기, 이동통신 단말기, 핸드오버, 이동속도, 방향성, 핸드오버 셀 리스트

참고문헌

도면의 간단한 설명

도 1은 이동통신 단말기에 대한 핸드오버 동작을 설명하기 위한 네트워크 환경을 예시한 도면.
도 2는 본 발명에 따른 이동통신 시스템에서의 핸드오버 방법을 설명하기 위한 동작 순서도.

발명의 상세한 설명

발명의 목적

발명이 속하는 기술분야 및 그 분야의 종래기술

본 발명은 이동통신 단말기의 핸드오버에 관한 것으로, 특히 이동통신 단말기의 이동속도 및 방향성을 기반으로 한 각 인접 셀들에 대한 단말기 근접도에 따라 핸드오버를 시도하게 함으로써 보다 정확한 핸드오버가 가능하도록 한 이동통신 시스템에서의 핸드오버 방법에 관한 것이다.

일반적으로, 이동통신 단말기는 이동성과 휴대성을 기본으로 하고 있으며, 그 보급이 확산되면서 서비스 품질을 향상시키고자 하는 연구가 활발히 진행되고 있는데, 이러한 서비스 품질 향상 중의 하나가 통신 단절이 없는 이동성을 제공하기 위해 핸드오버(Handover) 기능을 수행하는 것이라 할 수 있다.

한편으로, 이동통신 서비스 방식의 하나인 GSM(Global System for Mobile communication) 방식은 유럽국 기간 로밍을 위한 광대역 유럽형 비동기식 통신 규격으로, 주파수 분할 다중 액세스(FDMA) 및 시간 분할 다중 액세스(TDMA)를 같이 사용하여 가입자를 분리 수용한다.

그리고, 이러한 GSM 네트워크에서는 이동통신 단말기가 하나의 셀로부터 다른 셀로 이동하는 경우 단지 하나의 핸드오버(handover) 할 채널만을 할당해 주고, 핸드오버에 실패할 경우 다시 본래의 서빙 셀에 할당된 채널로 복원하는 동작을 수행하고 있다.

예를 들어, 임의의 이동통신 단말기가 첨부된 도면 도 1과 같이 A 셀에서 C 셀로 이동하는 경우 C 셀과의 핸드오버에 실패할 경우 다시 서빙 셀인 A 셀에 할당된 채널로 복원하려고 한다. 하지만, 도 1에서와 같이 이동통신 단말기가 이미 1셀과 근접한 위치로 이동한 상태라면 A 셀에 할당된 채널로의 복원은 실패할 가능성이 높고, 결국 호(call)가 지속되지 못하고 단절되는 현상이 발생하게 된다.

전술한 바와 같이, 종래의 GSM 프로토콜에 의해 제공되는 핸드오버 방식에 따르면, 이동통신 단말기의 핸드오버시 단지 하나의 핸드오버 채널만을 할당해 주고, 핸드오버에 실패할 경우 다시 본래의 서빙 셀에 할당된 채널로 복원하도록 하고 있는 바, 이동통신 단말기가 이동중인 경우 핸드오버에 실패할 확률이 높아서 호가 지속되지 못하고 단절되는 문제점이 있었다.

발명이 이루고자 하는 기술적 과제

본 발명은 전술한 바와 같은 문제점을 해결하기 위한 것으로 그 목적은, 이동통신 단말기의 주기적인 위치 추적 정보를 기반으로 단말기 이동속도 및 방향성을 산출하고, 이를 이용하여 단말기 근접도를 계산해서 핸드오버 셀 리스트를 작성하여 이동통신 단말기의 핸드오버시 전송해 줌으로써, 이동통신 단말기에서 자신의 이동속도 및 방향성을 기반으로 한 핸드오버 셀 리스트 상의 우선순위에 따라 인접 셀로의 핸드오버를 시도할 수 있도록 하는데 있다.

본 발명의 다른 목적은, 이동통신 단말기의 이동속도 및 방향성을 기반으로 한 핸드오버 셀 리스트 상의 우선순위에 따라 인접 셀로의 핸드오버를 시도하게 함으로써, 이동통신 단말기가 이동중인 경우에도 보다 신속하고 정확하게 핸드오버를 수행할 수 있도록 하고, 나아가 보다 안정적으로 통화중인 호를 유지할 수 있도록 하는데 있다.

본 발명의 또 다른 목적은, 단말기 근접도를 기반으로 한 핸드오버 셀 리스트 상의 우선순위에 따라 인접 셀로의 핸드오버 처리를 수행하게 함으로써, 핸드오버에 실패하더라도 즉시 채널을 복원하여 호가 단절되는 빈도수를 줄일 수 있도록 하는데 있다.

발명의 구성 및 작용

상술한 바와 같은 목적을 해결하기 위한 본 발명의 특징은, 이동통신 단말기의 주기적인 위치 추적 정보를 기반으로 각 인접 셀들에 대한 단말기 근접도를 계산하는 과정과; 상기 단말기 근접도에 따라 인접 셀들에 대한 채널 정보를 포함하는 핸드오버 셀 리스트를 작성하여 상기 이동통신 단말기의 핸드오버시 전송해 주는 과정과; 상기 이동통신 단말기에서 핸드오버 셀 리스트를 참조하여 단말기 근접도가 높은 순서대로 채널 정보를 추출하여 대응하는 인접 셀로의 핸드오버를 시도하는 과정을 포함하는 이동통신 시스템에서의 핸드오버 방법을 제공하는데 있다.

그리고, 상술한 이동통신 시스템에서의 핸드오버 방법은, 상기 이동통신 단말기에서 주기적으로 자신의 위치를 추적하여 셀 중심에서의 거리, 방향 및 측정 주기를 포함하는 위치 추적 정보를 상위 시스템으로 전송해 주는 과정을 더 포함하는 것을 특징으로 한다.

또한, 상기 단말기 근접도를 계산하는 과정은, 이동통신 단말기로부터 주기적으로 전송되는 위치 추적 정보를 분석하여 그 단말기의 이동속도 및 방향성을 산출하는 단계와; 상기에서 산출한 단말기 이동속도 및 방향성을 기반으로 각 인접 셀들에 대한 단말기 근접도를 계산하는 단계를 포함하는 것을 특징으로 한다.

이하, 본 발명에 따른 실시예를 첨부한 도면을 참조하여 상세하게 설명하면 다음과 같다.

본 발명에서는 이동통신 시스템을 구성하는 네트워크 상의 기지국 제어기(또는 그 상위의 망 요소)에서 이동통신 단말기의 이동속도 및 방향성을 기반으로 이동통신 단말기의 인접 셀에 대한 근접도를 계산하여 핸드오버 셀 리스트를 작성해서 이동통신 단말기의 핸드오버시 전송해 주고, 이동통신 단말기에서는 핸드오버 셀 리스트 상의 우선순위에 따라 핸드오버를 시도함으로써, 이동통신 단말기가 이동중인 경우에도 보다 신속하고 정확하게 핸드오버를 수행할 수 있게 된다.

즉, 본 발명에 따른 이동통신 시스템에서의 핸드오버 방법은 상술한 바와 같이 이동통신 단말기와 기지국 제어기 간의 상호 연동성에 의해 제공되는데, 이때 이동통신 단말기는 주기적으로 자신의 위치를 추적하여 해당되는 위치 추적 정보를 기지국을 통해 기지국 제어기 측으로 전송하고, 핸드오버시 기지국 제어기로부터 전송받은 핸드오버 셀 리스트를 참조하여 그 우선순위에 따라 인접 셀로의 핸드오버를 시도한다.

그리고, 기지국 제어기는 이동통신 단말기로부터 주기적으로 전송되는 위치 추적 정보를 분석하여 그 단말

기의 이동속도 및 방향성을 산출하고, 이를 기반으로 이동통신 단말기의 인접 셀에 대한 근접도를 계산하여 근접도가 높은 순서대로 핸드오버 셀 리스트를 작성한 후, 이렇게 작성한 핸드오버 셀 리스트를 해당되는 이동통신 단말기의 핸드오버시 전송해 준다.

이와 같은 이동통신 단말기와 기지국 제어기 간의 상호 연동성을 기반으로 하는 본 발명에 따른 이동통신 시스템에서의 핸드오버 동작을 첨부한 도면 도 1 및 도 2를 참조하여 설명하면 다음과 같다.

먼저, 본 발명의 핸드오버 동작을 설명하기에 앞서, 그 설명의 이해를 돕기 위해 첨부된 도면 도 1과 같이 다중 셀로 구성된 이동통신 시스템에서 임의의 이동통신 단말기가 A 셀에서 C 셀을 거쳐 1 셀 방향으로 이동하는 경우를 가정하여 설명하기로 한다.

이때, 서빙 셀인 A 셀에 위치한 이동통신 단말기는 자신이 측정하는 수신레벨(rxlevel)값과 수신품질(rxquality)값을 A 셀의 기지국 쪽, 기지국 A로 전송하게 되고, 기지국 A는 이동통신 단말기로부터 전송되는 수신레벨값 및 수신품질값을 분석하여 핸드오버가 필요한지를 확인하게 되며, 이때 핸드오버가 필요한 것으로 확인되는 경우 해당되는 이동통신 단말기로 핸드오버 커맨드(Handover Command)를 요구하게 된다.

그러면, 이동통신 단말기는 RACH(Random Access Channel)를 통해 타이밍 정보 요청 신호를 핸드오버할 셀 즉, C 셀로 전송하고, C 셀은 RACH를 보고 타이밍이 얼마나 틀어졌는지를 계산하여 이동통신 단말기로 전송해 줌으로써, 이동통신 단말기의 핸드오버가 이루어지게 된다.

이러한 절차를 통해 핸드오버가 이루어지는 상황에서, 이동통신 단말기는 주기적으로 자신의 위치를 추적하게 되는데, 예를 들어 통화중인 경우에는 26 프레임마다 하나씩 존재하는 마이클 프레임을 이용해서 인접하는 셀로부터 각각 1 버스트 간격(burst term)으로 신호를 받아 위치 추적으로 하거나, GPS 위성을 이용하여 위치 추적으로 하는 등 기존의 위치 추적 알고리즘에 따라 자신의 위치를 주기적으로 추적하게 되며(스텝 S21), 이러한 위치 추적 정보 즉, 서빙 셀인 A 셀의 중심(즉, 기지국 A)에서의 거리, 방향 및 측정 주기 등을 포함하는 위치 추적 정보를 기지국 A를 통해 기지국 제어기(도면에 도시되어 있지 않음)로 전송하게 된다(스텝 S22).

이에, 기지국 제어기는 이동통신 단말기로부터 주기적으로 전송되는 위치 추적 정보를 분석하여 해당되는 이동통신 단말기의 이동속도 및 방향성을 산출하게 되고(스텝 S23), 이렇게 산출한 이동통신 단말기의 이동속도 및 방향성을 기반으로 각 인접 셀들(A-K)에 대한 단말기 근접도를 계산하게 되며(스텝 S24), 이때 계산된 단말기 근접도를 기준으로 해당되는 단말기 근접도가 높은 순서대로 각 인접 셀에 대한 채널 정보를 포함하는 핸드오버 셀 리스트를 작성하여 주기적으로 갱신하게 된다(스텝 S25).

그리고, 기지국 제어기는 이동통신 단말기로부터 전송되는 위치 추적 정보에 따라 핸드오버 셀 리스트를 작성하여 이를 주기적으로 갱신하면서, 해당되는 이동통신 단말기에 대한 핸드오버 요청이 있는지를 확인하여, 핸드오버 요청이 있는 경우 앞에서 작성한 핸드오버 셀 리스트를 기지국을 통해 이동통신 단말기로 전송해 주게 된다(스텝 S26).

이후, 이동통신 단말기는 기지국 제어기로부터 전송받은 핸드오버 셀 리스트를 검색하여, 그 우선순위에 따라 즉, 단말기 근접도가 높은 순서대로 채널 정보를 추출하여 핸드오버를 시도하게 되는데(스텝 S27), 우선 단말기 근접도가 가장 높은 인접 셀인 C 셀에 대한 채널 정보를 핸드오버 시도할 채널 정보로 추출한 후에 이를 기반으로 핸드오버를 시도하게 되며, 이와 같이 이동통신 단말기는 자신의 이동속도 및 방향성을 기반으로 핸드오버를 시도함에 따라 기존에 비해 정확한 핸드오버를 수행할 수 있게 된다.

또한, 이동통신 단말기에서 단말기 근접도가 가장 높은 인접 셀로의 핸드오버를 시도하였으나, 핸드오버에 실패한 경우에는 시스템 측면에서의 오류를 제외하면 그 원인을 핸드오버 시도할 인접 셀의 선택이 잘못되었음을 의미하는데, 기존에는 핸드오버에 실패한 경우 다시 본래의 서빙 셀에 할당된 채널로 복원하려고 하는데 반하여, 본 발명에서는 이동통신 단말기의 이동속도 및 방향성을 고려하여 다음으로 단말기 근접도가 높은 인접 셀에 대한 채널 정보를 핸드오버 시도할 채널 정보로 추출한 후에 이를 기반으로 핸드오버를 시도함으로써, 핸드오버에 실패한 경우에도 즉시 채널을 다시 복원할 가능성이 높아 호가 단절되는 빈도수를 줄일 수 있게 된다. 특히, 위의 실시예에서 셀의 관리 범위가 작고 이동통신 단말기의 이동속도가 빠른 경우 한번 핸드오버에 실패했을 때 해당되는 이동통신 단말기는 인접 셀인 C 셀을 거쳐 1 셀까지 이동해 갔을 가능성이 높은데도 종래에는 다시 A 셀로 복원하려는데 반하여, 본 발명에서는 단말기 근접도가 다음으로 높은 인접 셀인 I 셀에 대한 채널 정보를 이용하여 핸드오버를 시도하게 된다.

보다 바람직하게는, 핸드오버에 실패한 경우 무조건 다음으로 단말기 근접도가 높은 인접 셀에 대한 채널 정보를 이용하여 핸드오버를 시도하는 것이 아니라, 셀의 관리 범위와 이동통신 단말기의 이동속도 및 방향성을 함께 고려하여 핸드오버에 실패했던 인접 셀에 대한 채널 정보를 이용하여 핸드오버를 재시도하도록 제어함으로써, 보다 정확한 핸드오버를 수행할 수 있게 된다.

예를 들어, 도 1과 같은 경우 이동통신 단말기로부터 전송되는 두 시점간의 위치 추적 정보를 분석하여 즉, 이동통신 단말기가 A 셀에 위치했을 때의 위치 추적 정보와 C 셀로 이동했을 때의 위치 추적 정보를 이용하여 아래와 같은 알고리즘에 따라 단말기 근접도를 계산하여 핸드오버 셀 리스트를 작성할 수 있는데, 먼저 이동통신 단말기의 방향성과 관련하여 이를 방향성 가중치로 산출하면, 이는 이동통신 단말기의 위치가 'd-c < 0' 이면 방향성 가중치를 '1'로, 'b-a > 0'이면 방향성 가중치를 '0.5'로 산출하게 된다.

그리고, 이동속도와 관련하여 이를 이동속도 가중치로 산출하면, 이는 단말기 이동속도가 일정속도 예컨대 '100km/h' 이상이고 방향성(d-c 또는 b-a)이 음수이면 이동속도 가중치를 '*3'으로, 방향성이 양수이면 이동속도 가중치를 '/3'으로 산출하게 되고, 단말기 이동속도가 '100km/h' 미만이고 방향성(d-c 또는 b-a)이 음수이면 이동속도 가중치를 '*1'로, 방향성이 양수이면 이동속도 가중치를 '/1'로 산출하게 된다.

이와 같이 이동통신 단말기의 이동속도 및 방향성을 산출한 상태에서, 만약 이동통신 단말기의 현재 속도가 160km/h 라고 가정하고, A 셀과 C 셀 사이에서 거리 팩터를 계산해 보면, A 셀은 'b(최후 상태에서 기지국과 단말기 간의 거리)*0.5(방향성 가중치)/3(이동속도 가중치)'이 되고, C 셀은 'd(최후 상태에서 기지국과 단말기 간의 거리)*1(방향성 가중치)*3(이동속도 가중치)'이 된다. 따라서, C 셀에 대한 거리 팩터

가 더 큰 값으로 계산되고, 이는 현재 이동통신 단말기가 C 셀에 더 근접해 있음을 의미한다.

이러한 방식으로 인접 셀들에 대해서 앞의 파라미터를 전부 산출한 후에 그 값이 큰 순서대로 인접 셀들에 대한 채널 정보를 정렬함으로써, 현재 이동통신 단말기의 위치와 이동속도 및 방향성을 기반으로 한 핸드오버 셀 리스트를 작성할 수 있게 되며, 이렇게 작성된 핸드오버 셀 리스트를 핸드오버할 이동통신 단말기로 전송해 줌으로써 보다 정확한 핸드오버를 시도할 수 있게 된다.

또한, 본 발명에 따른 실시예는 상술한 것으로 한정되지 않고, 본 발명과 관련하여 통상의 지식을 가진자에게 자명한 범위내에서 여러 가지의 대안, 수정 및 변경하여 실시할 수 있다.

발명의 효과

이상과 같이, 본 발명은 이동통신 단말기의 주기적인 위치 추적 정보를 기반으로 단말기 이동속도 및 방향성을 산출하고, 이를 이용하여 단말기 근접도를 계산해서 핸드오버 셀 리스트를 작성하여 이동통신 단말기의 핸드오버시 전송해 주고, 이동통신 단말기에서 핸드오버 셀 리스트 상의 우선순위에 따라 인접 셀로의 핸드오버를 시도함으로써, 이동통신 단말기가 이동중인 경우에도 보다 신속하고 정확하게 핸드오버를 수행할 수 있게 되고, 결국 보다 안정적으로 통화중인 호를 유지할 수 있게 된다.

또한, 본 발명은 단말기 근접도를 기반으로 한 핸드오버 셀 리스트 상의 우선순위에 따라 인접 셀로의 핸드오버 처리를 수행함으로써, 핸드오버에 실패하더라도 즉시 채널을 복원할 수 있어 호가 단절되는 빈도수를 줄일 수 있게 된다.

청구의 범위

청구항 1

이동통신 단말기의 주기적인 위치 추적 정보를 기반으로 각 인접 셀들에 대한 단말기 근접도를 계산하는 과정과;

상기 단말기 근접도에 따라 인접 셀들에 대한 채널 정보를 포함하는 핸드오버 셀 리스트를 작성하여 상기 이동통신 단말기의 핸드오버시 전송해 주는 과정과;

상기 이동통신 단말기에서 핸드오버 셀 리스트를 참조하여 단말기 근접도가 높은 순서대로 채널 정보를 추출하여 대응하는 인접 셀로의 핸드오버를 시도하는 과정을 포함하는 것을 특징으로 하는 이동통신 시스템에서의 핸드오버 방법.

청구항 2

제 1항에 있어서,

상기 이동통신 단말기에서 주기적으로 자신의 위치를 추적하여 셀 중심에서의 거리, 방향 및 측정 주기를 포함하는 위치 추적 정보를 상위 시스템으로 전송해 주는 과정을 더 포함하는 것을 특징으로 하는 이동통신 시스템에서의 핸드오버 방법.

청구항 3

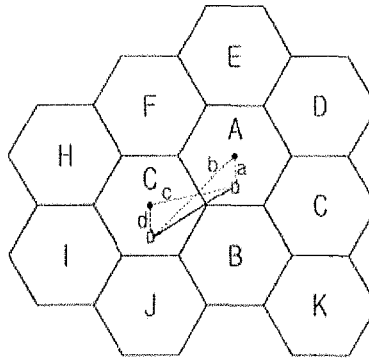
제 1항에 있어서,

상기 단말기 근접도를 계산하는 과정은, 이동통신 단말기로부터 주기적으로 전송되는 위치 추적 정보를 분석하여 그 단말기의 이동속도 및 방향성을 산출하는 단계와;

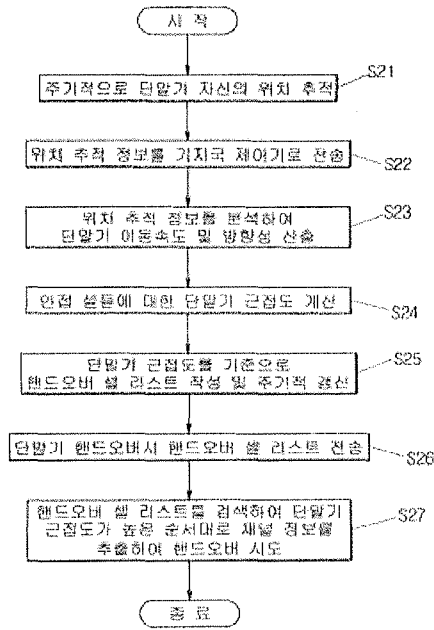
상기에서 산출한 단말기 이동속도 및 방향성을 기반으로 각 인접 셀들에 대한 단말기 근접도를 계산하는 단계를 포함하는 것을 특징으로 하는 이동통신 시스템에서의 핸드오버 방법.

도면

도면1



도면2





Espacenet

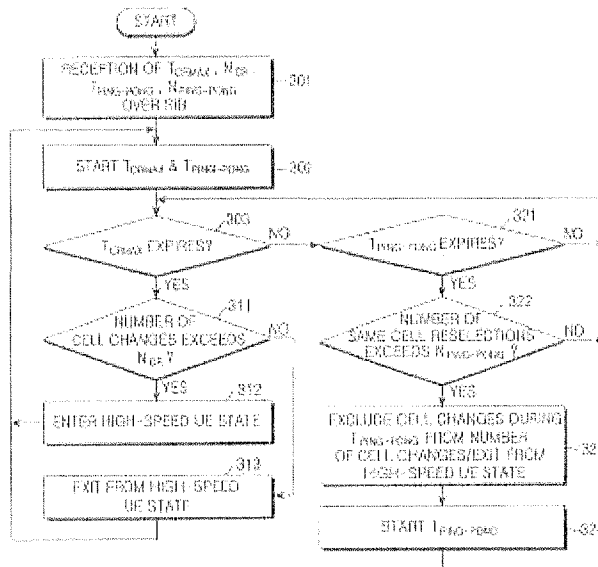
Bibliographic data: US2006258386 (A1) — 2006-11-16

Cell reselection method and apparatus for preventing ping-pong in a mobile communications system

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Abstract of US2006258386 (A1)

A method and apparatus are provided for enabling a UE to perform accurate and efficient cell reselection in a cellular mobile communications system. If reselection to the same cell is repeated, the UE releases itself from a high-speed UE state or excludes the number of reselections to the same cell from the number of cell changes counted for a duration set for deciding as to the high-speed UE state, according to a ping-pong duration threshold and a ping-pong occurrence number threshold. The UE uses a non-scaled down cell reselection time limit in a non-high-speed UE state, and a scaled-down cell reselection time limit in the high-speed UE state. Thus, the UE reselects to a non-serving cell having the highest ranking continuously for the cell reselection time limit.



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심사항구 : 있음

(54) 이동통신 시스템에서 핑-퐁을 방지하기 위한 셀 재선택방법 및 장치

요약

본 발명은 셀룰러 이동통신 시스템에서 사용자 단말기(UE)가 셀 재선택을 정확하고 효율적으로 수행하도록 하는 방법 및 장치에 관한 것이다. 단말기는 핑-퐁 기준 시간(Tping-pong)과 핑-퐁 기준 회수(Nping-pong)를 사용하여, 동일 셀에 대한 셀 재선택이 반복하여 일어나는 경우 고속 상태를 벗어나거나 상기 같은 셀의 셀 재선택 회수를 고속 상태 판단을 위한 셀 변경 회수의 카운트에서 배제한다. 단말기는 비-고속 상태에서는 스케일링 다운되지 않은 셀 재선택 제한 시간을 사용하고, 고속 상태에서는 스케일링 다운된 셀 재선택 제한 시간을 사용하여, 상기 셀 재선택 제한 시간 동안 계속하여 가장 높은 우선순위를 가지는 비-서빙 셀을 재선택 하게 된다. 이러한 본 발명은 셀 재선택의 핑-퐁을 방지한다.

도표도

도3

색인어

Ping-pong, cell reselection, high speed UE

참고문헌

도면의 간단한 설명

- 도 1은 전형적인 셀룰러 이동통신 시스템의 셀 환경을 나타낸 도면.
- 도 2는 본 발명의 제1 실시예에 따른 시그널링 흐름도.
- 도 3은 본 발명의 제1 실시예에 따른 단말기의 동작을 나타낸 흐름도.
- 도 4는 본 발명의 제2 실시예에 따른 시그널링 흐름도.

- 도 5는 본 발명의 제2 실시예에 따라 Tping-pong을 수신한 단말기의 동작을 나타낸 흐름도.
- 도 6은 본 발명의 제2 실시예에 따라 Nping-pong을 수신한 단말기의 동작을 나타낸 흐름도.
- 도 7은 본 발명의 제3 실시예에 따른 단말기의 동작을 나타낸 흐름도.
- 도 8은 본 발명의 바람직한 실시예에 따른 단말기의 구조를 나타낸 블록도.

발명의 상세한 설명

발명의 목적

발명이 속하는 기술분야 및 그 분야의 종래기술

본 발명은 이동통신 시스템에 관한 것으로서, 특히 사용자 단말기(User Equipment: UE)가 셀 재선택을 정확하고 효율적으로 수행하도록 하는 방법 및 장치에 관한 것이다.

오늘날 이동통신 시스템은 초기의 음성 위주의 서비스를 제공하는 데서 벗어나 데이터 서비스 및 멀티미디어 서비스 제공을 위한 고속, 고품질의 무선 데이터 패킷 통신시스템으로 발전하고 있다. 특히 유럽식 이동통신 시스템인 GSM(Global System for Mobile Communications)과 GPRS(General Packet Radio Services)를 기반으로 하고 광대역 부호분할 다중접속(Wideband Code Division Multiple Access: 이하 WCDMA라 칭함)을 사용하는 제3 세대 이동통신 시스템인 UMTS(Universal Mobile Telecommunication Service) 시스템은, 이동 전화나 컴퓨터 사용자들이 전 세계 어디에 있든지 간에 패킷 기반의 텍스트, 디지털화된 음성이나 비디오 및 멀티미디어 데이터를 2 Mbps 이상의 고속으로 전송할 수 있는 일관된 서비스를 제공한다.

UMTS 시스템은 코어 네트워크(Core Network: 이하 CN이라 칭하기로 한다.)와 복수개의 무선 네트워크 서브 시스템(Radio Network Subsystem, 이하 RNS라 칭하기로 한다.)들로 구성된다. 상기 복수개의 RNS들은 UTRAN(UMTS Terrestrial Radio Access Network)을 구성한다. 상기 RNS들은 무선 네트워크 제어기(Radio Network Controller, 이하 RNC라 칭하기로 한다.) 및 복수개의 기지국(Node B)들로 구성된다. 상기 RNC들은 그 역할(role)에 따라 서빙 RNC(SRNC), 드리프트 RNC(DRNC), 제어 RNC(CRNC)로 분류된다. 상기 서빙 RNC는 사용자 단말기의 정보를 관리하고 상기 CN과의 데이터 전송을 담당하며, 상기 드리프트 RNC는 UE와 직접 무선으로 접속한다. 상기 제어 RNC는 기지국을 각각의 무선 자원을 제어한다.

상기 RNC들은 자신이 관리하는 복수 개의 기지국들에 대해 무선자원을 할당하며, 상기 기지국들은 사용자 단말기에게 상기 RNC로부터 할당된 무선자원을 실제로 제공한다. 상기 무선자원은 셀 별로 구성되어 있으며, 각 기지국이 제공하는 무선자원은 해당 기지국이 관리하는 특정 셀에 관한 무선 자원을 의미한다. 상기 사용자 단말기는 상기 기지국들이 관리하는 특정 셀에 관한 무선자원을 이용하여 무선채널을 설정하며, 상기 설정된 무선채널을 통해 데이터를 송/수신한다. 상기 사용자 단말은 셀별로 구성되는 물리채널만을 인식하므로 기지국과 셀 간의 구별은 무의미하다. 따라서 본 명세서에서는 기지국과 셀을 혼용해서 사용하기로 한다.

전용 채널을 가지고 있지 않은 사용자 단말기가 한 셀로부터 다른 셀로 이동할 때 셀 재선택(Cell Reselection) 절차가 수행된다. 셀 재선택 절차 중에, 단말기는 주변의 셀들(즉 인접 셀들)의 신호를 측정하고, 측정 결과를 보고하며, 최종적으로 셀 선택/재선택을 수행하게 된다. 셀 재선택의 목적은, 단말기가 캠프(camp)할 최적 셀(best cell)을 정확하게 찾아내며, 상기 찾아낸 최적 셀을 서빙 셀로 설정하는 것이다.

셀 재선택을 위해, 먼저 단말기는 서빙 셀에서 방송 채널(Broadcast Channel: BCH)를 통해 송신되는 시스템 정보 블록(System Information Block: SIB)으로부터 주파수내/주파수간 및 RAT 셀 재선택을 위한 인접 셀 리스트를 획득하고, 상기 각 셀들에 대한 신호세기 측정값, 셀 선택을 위한 S_criteria 값을, 셀 재선택의 우선순위화(ranking)를 위한 R 값을 계산하며, 상기 R 값들에 따른 우선순위(rank)에 의해, 최적의 셀(best suitable cell)을 재선택한다. 이때 상기 셀을 재선택하기 위한 조건은 다음과 같다.

단말기가 현재 서빙 셀에서 캠프(camp)한지 1초가 지났으며, 인접셀 리스트에 포함된 셀들 중에서 가장 우선순위가 높은 셀이, 미리 정해지는 Treselection 동안 서빙 셀보다 계속해서 높은 우선순위를 가진다면, 단말기는 상기 우선순위가 가장 높은 셀을 재선택하여 서빙 셀로 설정하게 된다. 여기서 Treselection 값은 SIB를 통해 단말기에게 전송된다. 상기 Treselection 값은 셀 재선택에 있어서 단말기가 순간적으로 높은 우선순위를 가지는 셀을 재선택하는 것을 방지함으로써, 비교적 짧은 시간 동안 셀 재선택이 반복하여 수행되는 핑-퐁(ping-pong) 현상을 막기 위한 것이다.

Treselection은 고속(high speed) UE와 저속(low speed) UE에게 각각 다르게 적용된다. SIB를 통해 단말기에게 전송되는 Treselection은 저속 UE에게 적용되는 값이며, 고속 UE는 상기 SIB를 통한 Treselection을 스케일링다운(scaling down)하여 사용한다. 고속 UE를 위하여 Treselection을 얼마나 스케일링 다운할 것인가는, 역시 SIB를 통해 통지되는 Treselection을 위한 주파수내 스케일링 인자(intra-frequency Scaling Factor for Treselection)에 따라 결정된다. 예를 들어 Treselection = 5s(second)로 설정되어 있으며 상기 스케일링 인자가 0.2로 설정되어 있다면, 고속 UE를 위한 Treselection은 5 * 0.2 = 1s로 설정된다. 비-계층적 셀 구조(Hierarchical Cell Structures: HCS)에서, 단말기가 서빙 셀을 변경한 회수(즉 셀 변경 회수)가 미리 정해지는 nonHCS-Tcrmax 동안 nonHCS-Ncr번을 초과하면, 상기 단말기는 자기 자신을 고속 UE로 인식한다. 상기 nonHCS-Tcrmax와 nonHCS-Ncr 값은 SIB를 통해 전송된다.

그런데 단말기가 고속으로 이동하던 중 셀들 간의 중첩(overlapping)된 영역인 핸드오버 지역으로 진입하며, 상기 핸드오버 지역에 멈추어 있는 정적(stationary) 상태가 되거나 혹은 저속으로 이동하게 될 수 있다. 이러한 경우 상기 핸드오버 지역에서의 빈번한 셀 재선택으로 인해 셀 변경 회수가 지속적으로 카운트되며, 단말기는 계속해서 고속 UE 상태에서 스케일링 다운된 Treselection을 사용하게 된다. 이러한 경우

단말기는 스케일링 다문된 Treselection이다 셀 재선택을 반복하며 수행하게 되며, 결과적으로 셀 재선택의 횡-폭을 더욱 신감하게 하는 문제점이 발생하였다. 따라서 단말기의 셀 재선택을 보다 정확하고 효율적으로 수행할 수 있도록 하기 위한 시스템 및 방법을 필요로 하게 되었다.

본 발명이 이루고자 하는 기술적 과제

따라서 상기한 바와 같이 동작되는 종래 기술의 문제점을 해결하기 위하여 참안된 본 발명은, 단말기가 셀 재선택에서 발생할 수 있는 횡-폭 현상의 탐지를 통해 고속인지의 여부를 정확히 판단하는 방법 및 장치를 제공한다.

본 발명은, 단말기에게 셀 재선택 횡-폭을 탐지하기 위한 파라미터들을 시그널링하고 상기 파라미터들에 따른 단말기의 동작과, 상기 동작을 위한 단말기의 구조를 제공한다.

본 발명은, 단말기가 셀 재선택 횡-폭을 탐지하며 셀 재선택을 보다 정확하고 효율적으로 수행하도록 하기 위한 방법 및 장치를 제공한다.

본 발명의 바람직한 실시예는, 기존 주기(Tcrmax) 동안 기존 회수(Ncr) 이상 셀 재선택이 발생하면 단말기를 고속 상태로 판단하며 제1 셀 재선택 제한 시간(Treselection 1)에 따라 셀 재선택을 수행하는 이 동통신 시스템에서, 횡-폭을 방지하기 위한 셀 재선택 방법에 있어서,

단말기의 동일 셀에 대한 셀 재선택 회수가 미리 정해지는 횡-폭 판단시간(Tping-pong) 동안 미리 정해지는 동일 셀 재선택 기준 회수(Nping-pong)를 초과하면, 상기 단말을 비-고속 상태로 설정하는 과정과,

단말기 비-고속 상태에서 상기 제1 셀 재선택 제한시간보다 긴 제2 셀 재선택 제한 시간(Treselection 2)에 따라 선택적으로 셀 재선택을 수행하는 과정을 포함하는 것을 특징으로 한다.

본 발명의 바람직한 다른 실시예는, 기존 주기(Tcrmax) 동안 기존 회수(Ncr) 이상 셀 재선택이 발생하면 단말기를 고속 상태로 판단하며 제1 셀 재선택 제한 시간(Treselection 1)에 따라 셀 재선택을 수행하는 이동통신 시스템에서, 횡-폭을 방지하기 위한 셀 재선택 방법에 있어서,

단말기의 동일 셀에 대한 셀 재선택 회수가 미리 정해지는 횡-폭 판단시간(Tping-pong) 동안 미리 정해지는 동일 셀 재선택 기준 회수(Nping-pong)를 초과하면, 상기 횡-폭 판단시간(Tping-pong) 동안 미리 정해지 선택 회수 또는 동일 셀에 대한 셀 재선택 회수를 상기 기존 주기(Tcrmax) 동안의 셀 재선택 회수에서 배제하는 과정과,

상기 기존 주기의 셀 재선택 회수가 상기 기준 회수를 초과하지 않으면 상기 단말을 비-고속 상태로 설정하는 과정과,

상기 비-고속 상태에서 상기 제1 셀 재선택 제한시간보다 긴 제2 셀 재선택 제한 시간 (Treselection 2)에 따라 선택적으로 셀 재선택을 수행하는 과정을 포함하는 것을 특징으로 한다.

본 발명의 구성 및 작용

이하 첨부된 도면을 참조하여 본 발명의 바람직한 실시예에 대한 동작 원리를 상세히 설명한다. 하기에서 본 발명을 설명함에 있어 관련된 공지 기능 또는 구성에 대한 구체적인 설명이 본 발명의 요지를 불필요하게 혼릴 수 있다고 판단되는 경우에는 그 상세한 설명을 생략할 것이다. 그리고 후술되는 용어들은 본 발명에서의 기능을 고려하여 정의된 용어들로서 이는 사용자, 운용자의 의도 또는 관례 등에 따라 달라질 수 있다. 그러므로 그 정의는 본 명세서 전반에 걸친 내용을 토대로 내려져야 할 것이다.

도 1은 본 발명에 따른 셀룰러 이동통신 시스템의 셀 환경을 예시한 것이다. 여기에서는 셀 A와 셀 B가 같은 레벨을 가지는 비-HCS 환경을 간단하게 도시하였다. 셀 A와 셀 B는 동일한 레벨을 가지는 비-고속 상태에 있다. 즉 핸드오버 지역으로 진입함에 따라 UMTS 시스템에 관련된 3pp(3rd Generation Partnership Project) 표준에 의해, 셀 재선택을 수행한다. 여기에서는 단지 하나의 인접 셀만을 도시하였으나, 실제로 단말기(100)는 인접한 복수의 인접 셀들에 셀 재선택 여부를 판단하게 된다.

도 1을 참조하면, 과정 101에서 사용자 단말기(100)는 셀 A로부터 셀 B의 방향으로 고속으로 이동하고 있다. 여기서 셀 A는 서빙 셀이 되고, 셀 B는 인접 셀이 된다. 단말기(100)는 서빙 셀 A와 인접 셀 B의 중첩된 영역, 즉 핸드오버 지역으로 진입함에 따라 UMTS 시스템에 관련된 3pp(3rd Generation Partnership Project) 표준에 의해, 셀 재선택을 수행한다. 여기에서는 단지 하나의 인접 셀만을 도시하였으나, 실제로 단말기(100)는 인접한 복수의 인접 셀들에 셀 재선택 여부를 판단하게 된다.

3pp 표준에서는, 아이들(idle) 모드, URA(UMTS Routing Area)/CELL_PCH(Paging Channel), CELL_FACH(Forward Access Channel) 상태 중 어느 하나의 단말기(100)에 대해, 셀 재선택을 위한 기준을 명시하고 있다. 셀 재선택을 위한 기준은 주파수내(intra-frequency)/주파수간(inter-frequency) 및 RAT(Radio Access Technology)에 따라 각각 다르다.

단말기(100)는 서빙 셀 A로부터 SIB(System Information Block)를 통해 전송받은 신호세기 임계값을 Sintrasearch, Sintersearch, Ssearchrathm 보다, 서빙 셀 A의 수신 신호 세기(Sx)가 같거나 작은 값을 가리게 되면, 각각 주파수내, 주파수간, RAT간(inter-RAT) 셀 재선택을 위한 출점과, 셀 재선택 과정을 수행한다. 상기 Sintrasearch, Sintersearch, Ssearchrathm은 각각 주파수내, 주파수간, RAT간 셀 재선택을 위한 기준이 되는 임계값들이다.

다음으로 단말기(100)는 셀 재선택을 위해 먼저 서빙 셀 A의 SIB11/12를 통해 제공되는 인접 셀 리스트 중

에서 하기 <수학식 1>을 만족시키는 셀을 찾는다. 하기에는 FDD(Frequency Division Duplex)를 사용하는 셀과 TDD(Time Division Duplex)를 사용하는 셀을 구분하여 나타내었다.

TDD 셀: $Srxlev > 0$

$Squal = Qqualmeas - Qqualmin$

$Srxlev = Qrxlevmeas - Qrxlevmin - Pcompensation$

여기서 $Srxlev$ 는 셀 선택을 위한 수신 레벨값(Cell selection RX level value) (dB)를 나타내며, $Squal$ 은 셀 선택을 위한 퀄리티 값(Cell selection quality value) (dB)를 나타낸다. $Squal$ 은 FDD 셀에만 적용된다. 예를 들어, FDD 셀의 경우 수신 레벨값 $Srxlev$ 과 퀄리티 값 $Squal$ 이 0보다 큰 값을 가지는 셀은 셀 재선택을 위한 최소 자격을 가지게 된다.

$Qqualmeas$ 는 측정된 셀 퀄리티값(Measured cell quality value) [dB]를 나타내며, CPICH(Common Pilot Channel)의 잡음 대비 칩 에너지(E_c/N_0)로 계산되는 값이다. $Qqualmin$ 는 셀(즉 서빙 셀)에서 최소로 요구하는 퀄리티 레벨(Minimum required quality level in the cell) [dB]를 나타내며, SIB에 실려 상기 셀로부터 방송되는 값이다. 즉, $Squal$ 값이 0보다 크려면 대상(target) 셀에서 측정된 CPICH의 E_c/N_0 값($Qqualmeas$)이 상기 셀에서 최소로 요구하는 값($Qqualmin$)보다 커야 한다는 것이다.

$Qrxlevmeas$ 는 측정된 셀 수신 레벨값(Measured cell RX level value) [dBm]를 나타내며 FDD 셀에서는 CPICH의 RSCP(Received Signal Code Power) 값으로, TDD 셀에서는 P-CCPCH(Primary Common Control Physical Channel)의 RSCP 값으로 계산된다. $Qrxlevmin$ 는 셀(즉 서빙 셀)에서 최소로 요구하는 수신 레벨 [dBm]을 나타내며, SIB에 실려 상기 셀로부터 방송되는 값이다. $Pcompensation$ 은 "UE_TXPWR_MAX_RACH - P_MAX"와 0 중 큰 값 [dB]로 계산된다. 여기서 UE_TXPWR_MAX_RACH는 단말기가 송출하는 RACH(Random Access Channel)의 최대 송신 전력을 의미하고, P_MAX는 단말기가 송출하는 전체 송신 전력을 의미한다. $Srxlev$ 가 0보다 큰 값을 가지려면, 대상 셀에서 측정된 CPICH 혹은 P-CCPCH의 RSCP 값($Qrxlevmeas$)이, 최소로 요구하는 값($Qrxlevmin$)과 보상 값($Pcompensation$)의 합보다 커야 한다.

단말기(100)는 상기 <수학식 1>을 만족하는 셀들 중에서 적합 셀(suitable cell)들을 찾는다. 적합 셀이란, 셀 선택을 위한 최소 임계조건 $S_criteria$ 를 만족하면서 상기 단말기(100)가 캠핑(camping)을 할 수 있는 셀을 나타낸다. 상기 단말기(100)가 캠핑을 할 수 있는 셀인지 아닌지는 해당 대상 셀의 MIB(Master Information Block)/SIB(System Information Block)를 통해 전송되는 정보를 통해 판단할 수 있다. 즉, 상기 $S_criteria$ 를 만족하는 대상 셀이, 단말기(100)가 선택할 수 있는 코어 네트워크 오퍼레이터를 나타내는 PLMN(Public Land Mobile Network)에 속해있으며 차단(barred)되어 있지 않고, 금지된(forbidden) LA(Location Area)에 속해있지 않는 셀이면, 적합 셀이라 할 수 있다.

단말기(100)는 상기 적합 셀들을 하기 <수학식 2>와 같이 나타내어지는 R 값에 의해 순위화(Ranking)한다. 예를 들어, 서빙 셀의 수신 신호 세기 S_x 가 $S_{intrasearch}$ 보다 작은 값을 가지게 되어 주파수내 셀 재선택을 위한 측정을 수행하게 되면, 단말기(100)는 서빙 셀과 동등한 주파수를 사용하는 인접 셀들에 대해 측정을 수행한다. 상기 측정 결과 적합 셀들이 발견되면, 상기 적합 셀들의 R 값에 따라 상기 적합 셀들을 순위화한다.

$$R_n = Q_{meas,n} + Q_{offsets,n} + Q_{offsets,n} - T_{0n} + (1 - L_n)$$

여기서, R_s 는 서빙 셀의 R값을 나타내며, R_n 은 인접 셀의 R값을 나타낸다. $Q_{meas,s}$ 는 서빙 셀의 측정된 결과로서, FDD 셀의 경우 CPICH E_c/N_0 또는 CPICH RSCP의 평균값이 되고, TDD 셀의 경우 P-CCPCH RSCP의 평균값이 되며, GSM의 경우 수신한 신호 레벨의 평균값을 나타낸다. 마찬가지로 $Q_{meas,n}$ 은 인접 셀의 측정된 결과를 나타낸다. $Q_{hyst,s}$ 는 히스테리시스(hysteresis) 값을 나타내며, $Q_{offsets,n}$ 은 서빙 셀과 인접 셀 간의 오프셋을 나타낸다. $Q_{offsets,n}$ 은 MBMS(Multicast Broadcast Multimedia Service)를 이용하는 단말기가 상기 MBMS 서비스를 제공하는 주파수 대역으로 이동하기 위한 오프셋 값을 나타내며, T_{0n} 은 HCS에서 적용되는 핑-퐁 현상을 방지하기 위한 파라미터이다. L_n 은, HCS에서 서빙 셀의 HCS에 따른 레벨, 즉 HCS_PRIORITY가 인접 셀과 같을 때에는 0의 값을 가지며, 다를 때에는 1의 값을 가진다. 상기 $Q_{offsets,n}$ 은 MBMS 서비스를 수신하는 단말기에만 적용되는 파라미터이며, $T_{0n} + (1 - L_n)$ 은 HCS일 때에만 적용되는 파라미터이다. 만약, 단말기(100)가 MBMS 서비스를 수신하지 않으며 비-HCS 에서라면, 상기 <수학식 2>는 하기와 같이 간단화된다.

$$R_n = Q_{meas,n} + Q_{offsets,n}$$

상기와 같이 R 값들이 구해지면, 단말기(100)는 서빙 셀에서 캠핑한지 소정 시간(즉 1초)가 지났으며, 인접셀 리스트에 포함된 셀들 중에서 가장 우선순위(즉 R 값)가 높은 셀(여기에서는 셀 B)이, 셀 재선택 제한시간인 $T_{reselction}$ 동안 서빙 셀보다 계속해서 높은 우선순위를 가진다면, 단말기는 상기 셀 B를 서빙 셀로서 재선택하게 된다.

이때 단말기(100)는 셀 A에서 실제로 고속으로 이동하고 있는 고속 UE 상태이므로, 셀 A에서 SIB를 통해 방송되는 $T_{reselction}$ 을 스케일링다운한 값을 사용하고 있다. 과정 102에서 단말기(100)는 핸드오버 지역에 진입하면서 멈추어 서거나 저속으로 이동하고 있다. 즉 실제로 단말기(100)는 정적/저속 UE 상태가 된다. 이때, 상기 과정 102에서 단말기(100)의 고속 여부 판단을 위한 T_{crmax} 가 아직 타임아웃되지 않았다면, 과정 103에서 단말기(100)는 아직 정적/저속 UE 상태로써 판단하지 않으며 고속 UE 상태를 유지하면서 N_{cr} 를 검사하게 된다.

즉, 단말기(100)는 상기 T_{crmax} 가 타임아웃될 때까지 고속 UE 상태로 인식하고 있기 때문에, 셀을 재선택함에 있어서 스케일링 다운된 $T_{reselction}$ 값을 계속해서 사용하게 된다. 그러나 실질적으로 단말기(100)

0)는 실질적으로 정적/저속 UE 상태임에도 불구하고, 핸드오버 지역에서 스케일링 다운된 Treselection 값을 사용함으로써, 과정 104와 같이 셀 재선택 핑-퐁이 계속하여 발생한다.

즉, 실질적으로는 단말기(100)가 정적/저속 UE 상태이기 때문에 핑-퐁을 방지할 수 있는 원래의 Treselection 값을 사용해야 하는데, 도 1과 같은 경우 단말기(100)가 스케일링 다운된 Treselection 값을 사용함으로써 일순간의 높은 우선순위의 셀을 재선택할 수 있게 된다. 따라서 셀 재선택에 있어서의 핑-퐁이 발생할 수 있다. 예를 들어 단말기(100)가 수신 신호 세기가 계속해서 높은 셀을 안정적으로 재선택할 수 있도록 하기 위해 Treselection = 5s를 사용하여야 한다. 그런데 위와 같이 스케일링 다운된 Treselection = 1s를 사용한다면, 단말기(100)는 핸드오버 지역의 불안정한 라디오 세기의 측정에 의해 1s 마다 셀 A와 셀 B를 반복적으로 선택하게 된다.

도 1에서 보이는 것과 같이 핑-퐁이 발생하게 되면, Tcrmax가 타임아웃되기 전에 셀 변경 회수는 Ncr번을 초과할 수 있다. 이는 상기 셀 변경 회수가 동일 셀을 반복하여 재선택한 회수를 포함하기 때문이다. 이때 단말기(100)는 실질적으로 고속 UE 상태가 아님에도 불구하고 고속 UE 상태로 오인하게 되며, 상기 오인에 의해 계속적으로 스케일링 다운된 Treselection 값을 사용하여 핑-퐁을 계속하게 된다. 예를 들어 nNcr이 8로 설정되어 있고 핑-퐁에 의해 매 1초마다 A, B, A, B, A, B, A, B..의 반복적인 셀 재선택이 Tcrmax 동안 8 번을 초과하여 발생하게 되면, 실질적으로 상기 단말기(100)가 정적/저속 UE 상태임에도 불구하고 고속 UE 상태로 잘못 인식하게 되고, 계속적으로 스케일링 다운된 Treselection 값을 사용하여, 상기 핑-퐁이 계속 된다.

상기 도 1과 같은 핑-퐁을 탐지하기 위해 본 발명에서는 세 가지의 실시예들을 개시한다. 하기의 설명에서, 파라미터들의 명칭 등은 본 발명에서의 기능을 고려하여 정의된 용어로서 이는 사용자, 운용자의 의도 또는 관례 등에 따라 달라질 수 있다.

첫 번째 실시예는 핑-퐁 기준시간 Tping-pong와 핑-퐁 기준 회수 Nping-pong을 사용한다. 단말기는 Tping-pong 동안 같은 셀이 Nping-pong번을 초과하여 재선택될 때 핑-퐁임을 판단하여, 고속 UE 상태로부터 벗어나거나, 또는 단말기는 상기 Tping-pong 동안 같은 셀이 Nping-pong 번을 초과하여 재선택될 때, 상기 Tping-pong 동안의 셀 변경 회수(즉 셀 재선택 회수)를 Ncr와의 비교에서 배제한다. 여기서 상기 Tping-pong와 Nping-pong은 상기 Tcrmax 및 Ncr보다 각각 작은 값들을 가진다.

두 번째 실시예는 하나의 파라미터 Tping-pong 혹은 Nping-pong 만을 사용한다. Tping-pong만이 사용되는 경우, Tping-pong 동안 이전에 재선택되었던 셀이 다시 재선택되면, 단말기는 고속 UE 상태로부터 벗어나거나, 또는 Tping-pong동안의 셀 변경 회수를 Ncr와의 비교에서 배제한다. Nping-pong만이 사용되는 경우, Tcrmax 동안 같은 셀이 재선택되는 회수가 Nping-pong번을 초과한다면, 단말기는 고속 UE 상태를 벗어나거나 또는 상기 같은 셀을 재선택한 회수를 Ncr와의 비교에서 배제한다. 이때 상기 같은 셀을 재선택한 회수는 '1'로 간주한다. 마찬가지로 상기 Tping-pong와 Nping-pong은 상기 Tcrmax 및 Ncr보다 각각 작은 값들을 가진다.

세 번째 실시예는 별도의 파라미터를 대신 Tcrmax를 이용한다. 단말기는 Tcrmax 동안 같은 셀이 재선택되면 상기 같은 셀을 중복하여 재선택한 회수를 Ncr와의 비교에서 배제한다. 이때 상기 같은 셀을 재선택한 회수는 '1'로 간주한다.

하기에서 각각의 실시예에 대해 보다 상세히 설명한다.

<<제1 실시예>>

도 2는 본 발명의 제1 실시예에 따른 시그널링 흐름도를 나타낸 것이다. 여기서 참조번호 201은 단말기가 위치하는 서빙 셀을 나타내며, 참조번호 202는 상기 셀(201)을 제어하는 RNC를 나타낸다.

도 2를 참조하면, 과정 211에서 RNC(202)는 스케일링 다운된 Treselection에 의해 발생할 수 있는 핑-퐁을 판단하기 위해 적절하게 설정된 파라미터들 Tping-pong 및 Nping-pong을 포함하는 S1B를 셀(201)로 전달한다. 셀(201)은 상기 Tping-pong와 Nping-pong을 포함하는 S1B를 방송한다. 상기 셀(201)에 위치하는 아이들 모드, URA/CELL_PCH, CELL_FACH 모드의 단말기들은, 상기 S1B에 포함된 Tping-pong, Nping-pong을 수신하여 저장한다. 도시하지 않을 것이나, 상기 S1B는 셀 재선택을 판단하기 위한 각종 파라미터들과, 특히 Tcrmax 및 Ncr를 더 포함할 수 있다. 여기서 상기 Tping-pong와 Nping-pong은 상기 Tcrmax 및 Ncr보다 각각 작은 값들을 가진다.

만일 Tping-pong 동안 같은 셀을 재선택한 회수가 Nping-pong번을 초과하면, 단말기는 핑-퐁이 발생하고 있음으로 간주하고 고속 UE 상태를 벗어난다. 만일 이미 비-고속 UE 상태, 즉 정적/저속 UE 상태에 있다면, 현재 상태를 유지한다. 다른 경우, 단말기는 Tping-pong 동안 발생한 셀 변경 회수를 Tcrmax 동안의 셀 변경 회수에서 배제한다. Tping-pong 값은 일반적으로 Tcrmax 보다 작은 값으로 설정될 수 있다.

도 3은 본 발명의 제1 실시예에 따른 단말기의 동작을 나타낸 흐름도이다.

도 3을 참조하면, 과정 301에서 단말기는 서빙 셀의 S1B를 통해 Tcrmax, Ncr, Tping-pong, Nping-pong을 수신한다. 과정 302에서 단말기는 상기 Tcrmax, Tping-pong로 설정된 타이머들을 시작한다. 여기서 Tcrmax는 고속 UE 판단을 할 때 사용하는 타이머 값이며, Tping-pong은 스케일링 다운된 Treselection으로 인한 핑-퐁을 판단할 때 사용하는 타이머 값을 나타낸다.

과정 303에서 단말기는 상기 Tcrmax가 만기되었는지를 체크한다. 만약 상기 Tcrmax가 만기되지 않았다면, 과정 321로 진행하여 상기 Tping-pong이 만기되었는지를 체크한다. 만약 상기 Tping-pong이 만기되었다면, 과정 322로 진행하여 Tping-pong동안 같은 셀을 재선택한 회수가 Nping-pong번을 초과했는지를 체크한다. 상기 과정 322에서 Tping-pong 동안 같은 셀이 Nping-pong번을 초과하여 다시 재선택된다면, 과정 323으로 가서 단말기는 고속 UE 상태를 벗어나거나 또는 상기 Tping-pong동안 발생한 셀 변경 회수를 Tcrmax 동안의 셀 변경 회수에서 배제한다. 여기서 Tping-pong 동안의 셀 변경 회수는 동일 셀을 재선택한 회수가 되거나 혹은 서로 다른 셀을 재선택한 전체 회수가 될 수 있다. 도 3에서는 단말기의 가능한 두 가지 동작을 모두 기술하였다. 과정 324에서는 Tping-pong로 설정된 타이머가 다시 시작된다.

도시하지 않을 것이지만, 상기 과정 322에서 Tping-pong동안 같은 셀을 재선택한 회수가 Nping-pong변을 초과하지 않았다면, Tping-pong동안 발생한 셀 변경 회수는 Tcrmax 동안의 셀 변경 회수에 포함된다. 상기 Tcrmax 동안의 셀 변경 회수는, 고속 UE인지의 여부를 판단하기 위하여 과정 311에서와 같이 Ncr과 비교된다.

한편 상기 과정 303에서 상기 Tcrmax가 만기되었다면, 과정 311로 가서 단말기는 Tcrmax동안의 셀 변경 회수가 Ncr변을 초과하는지를 체크한다. 상기 Tcrmax동안의 셀 변경 회수가 Ncr변을 초과했다면, 과정 312로 가서 상기 단말기는 고속 UE 상태로 들어간다. 반면 상기 Tcrmax 동안의 셀 변경 회수가 Ncr변을 초과하지 못했다면, 과정 313으로 가서 상기 단말기는 고속 UE 상태를 벗어난다. 상기 과정 313에서 상기 단말기가 고속 UE 상태가 아니었다면, 계속해서 정적/저속 UE 상태를 유지한다.

상기 고속 UE 상태에서, 상기 단말기는 스케일링 다운된 Tresizelection에 따라 셀 재선택을 선택적으로 수행하게 된다. 구체적으로 상기 단말기는 어느 한 인접 셀이, 상기 스케일링 다운된 Tresizelection 동안 서빙 셀보다 계속해서 높은 우선순위를 가진다면, 단말기는 상기 인접 셀을 서빙 셀로서 재선택하게 된다. 고속 UE 상태를 벗어났다면 스케일링 다운되지 않은, 즉 원래의 Tresizelection이 사용된다.

<<제2 실시예>>

도 4는 본 발명의 제2 실시예에 따른 시그널링 흐름도를 나타낸 것이다. 여기서 참조번호 401은 단말기가 위치하는 서빙 셀을 나타내며, 참조번호 402는 상기 셀(401)을 제어하는 CRNC를 나타낸다.

도 4를 참조하면, 과정 411에서 RNC(302)는 스케일링 다운된 Tresizelection에 의해 발생할 수 있는 핑-퐁을 판단하기 위해 적절히 설정된 Tping-pong 또는 Nping-pong을 포함하는 SIB를 셀(401)로 전달한다. 셀(401)은 상기 Tping-pong 혹은 Nping-pong을 포함하는 IB를 방송한다. 상기 셀(401)에 위치하는 단말기들은 상기 SIB에 포함된 Tping-pong 혹은 Nping-pong을 수신하여 저장한다. 도시하지 않을 것이나, 상기 SIB는 셀 재선택을 판단하기 위한 각종 파라미터들, 특히 Tcrmax 및 Ncr를 더 포함할 수 있다.

단말기는 각각의 파라미터에 대해 하기와 같이 동작한다.

만약 Tping-pong을 수신하였고 Tping-pong 동안 한번 재선택되었던 셀이 한번이라도 다시 재선택된다면, 단말기는 Tping-pong동안 발생한 셀 변경 회수를 Tcrmax 동안의 셀 변경 회수에서 배제한다. 반면 Nping-pong만을 수신하였다면, 단말기는 Tcrmax 동안 같은 셀을 재선택한 회수가 Nping-pong변을 초과하는지를 판단한다. Tcrmax 동안 같은 셀을 재선택한 회수가 Nping-pong변을 초과한다면, 상기 단말기는 고속 UE 상태를 벗어나거나 또는 상기 같은 셀을 중복하여 재선택한 회수를 Ncr과의 비교를 위한 Tcrmax 동안의 셀 변경 회수에서 배제한다. 예를 들어 Nping-pong이 30이고 Tcrmax동안 특정 셀 X가 4회 중복하여 재선택되었다면, 단말기는 상기 셀 X에 대한 셀 변경 회수를 4회가 아닌 1회로 카운트한다.

도 5는 본 발명의 제2 실시예에 따라 Tping-pong을 수신한 단말기의 동작을 나타낸 흐름도이다. 도 3과 비교하면, 단말기는 Nping-pong을 수신하지 않으며, Tping-pong이 만기되었을 때 도 3과 다르게 동작한다.

도 5를 참조하면, 과정 501에서 단말기는 서빙 셀의 SIB를 통해 Tcrmax, Ncr 및 Tping-pong을 수신한다. 이때 Nping-pong은 수신되지 않는다. 과정 502에서 단말기는 상기 Tcrmax, Tping-pong을 설정된 타이머들을 시작한다. 과정 503에서 단말기는 상기 Tcrmax가 만기되었는지를 체크한다. 만약 상기 Tcrmax가 만기되지 않았다면, 과정 521로 진행하여 상기 Tping-pong이 타임아웃되었는지를 체크한다. 만약 상기 Tping-pong이 타임아웃되었다면, 과정 522로 진행하여 Tping-pong동안 같은 셀의 재선택이 발생하였는지를 체크한다. Tping-pong동안 같은 셀이 한번이라도 재선택되었다면, 과정 523으로 가서 단말기는 상기 Tping-pong 동안 발생한 셀 변경 회수를 Tcrmax 동안의 셀 변경 회수에서 배제한다. 과정 524에서 Tping-pong을 설정된 타이머가 다시 시작된다.

상기 과정 522에서 Tping-pong동안 같은 셀이 재선택되지 않았다면, Tping-pong동안 발생한 셀 변경 회수는 Tcrmax 동안의 셀 변경 회수에 포함된다. 상기 Tcrmax 동안의 셀 변경 회수는, 고속 UE인지의 여부를 판단하기 위하여 과정 511에서와 같이 Ncr과 비교된다.

한편 상기 과정 503에서 상기 Tcrmax가 만기되었다면, 과정 511로 가서 단말기는 Tcrmax 동안의 셀 변경 회수가 Ncr변을 초과하는지를 체크한다. 상기 Tcrmax 동안의 셀 변경 회수가 Ncr변을 초과했다면, 과정 512로 가서 상기 단말기는 고속 UE 상태로 들어간다. 만약 상기 Tcrmax동안의 셀 변경 회수가 Ncr변을 초과하지 못했다면, 과정 513으로 가서 상기 단말기는 고속 UE 상태를 벗어난다. 상기 과정 513에서 상기 단말기가 고속 UE 상태가 아니었다면, 계속해서 비-고속 UE 상태, 즉 정적/저속 UE 상태를 유지한다.

상기 고속 UE 상태에서, 상기 단말기는 스케일링 다운된 Tresizelection에 따라 셀 재선택을 선택적으로 수행하게 된다. 구체적으로 상기 단말기는 어느 한 인접 셀이, 상기 스케일링 다운된 Tresizelection 동안 서빙 셀보다 계속해서 높은 우선순위를 가진다면, 단말기는 상기 인접 셀을 서빙 셀로서 재선택하게 된다. 고속 UE 상태를 벗어났다면 스케일링 다운되지 않은 Tresizelection이 사용된다.

도 6은 본 발명의 제2 실시예에 따라 Nping-pong을 수신한 단말기의 동작을 나타낸 흐름도이다.

도 6을 참조하면, 과정 601에서 단말기는 서빙 셀의 SIB를 통해 Tcrmax, Ncr, Nping-pong을 수신한다. 이때 Tping-pong은 수신되지 않는다. 과정 602에서 단말기는 상기 Tcrmax로 설정된 타이머를 시작한다. 과정 603에서 단말기는 상기 Tcrmax가 만기되기까지 대기한다. 만약 상기 Tcrmax가 만기되었다면, 과정 611로 가서 단말기는 Tcrmax 동안 같은 셀을 재선택한 회수가 Nping-pong변을 초과하는지를 체크한다.

만약 같은 셀의 재선택 회수가 Nping-pong변을 초과하였다면, 과정 612로 가서 단말기는 고속 UE 상태를 벗어나거나 또는 상기 같은 셀에 대한 중복되는 재선택 회수를 Tcrmax 동안의 셀 변경 회수에서 배제한다. 즉, 특정 셀 X에 대해 Nping-pong변을 초과한 M번의 셀 재선택이 발생했을 때, 단말기는 상기 셀 X에 대한 셀 변경 회수를 1번으로 계산하고, 나머지 M-1번의 셀 재선택 회수는 버린다. 도 6에서는 단말기의 가능한 두 가지 동작을 모두 기술하였다. 만약 과정 612에서 단말기가 바로 고속 UE 상태에서 벗어나는 경우, 과정 612에서 과정 613으로 진행하는 대신 과정 602로 복귀한다.

상기 과정 611에서 같은 셀을 재선택한 회수가 Nping-pong변을 초과하지 않거나 또는 과정 612에서 상기 셀을 위한 셀 변경 회수를 1로 설정하면, 과정 613으로 가서 단말기는 Tcrmax동안의 셀 변경 회수가 Ncr를 초과했는지를 체크한다. 만약 상기 Tcrmax 동안의 셀 변경 회수가 Ncr변을 초과했다면, 과정 614로 가서 단말기는 고속 UE 상태로 들어간다. 만약 상기 Tcrmax 동안의 셀 변경 회수가 Ncr변을 초과하지 못했다면, 과정 615에 가서 단말기는 고속 UE 상태를 벗어난다. 상기 과정 615에서 만약 상기 단말기가 고속 UE 상태가 아니었다면, 계속해서 정적/저속 UE 상태를 유지한다.

상기 고속 UE 상태에서, 상기 단말기는 스케일링 다운된 Treselection에 따라 셀 재선택을 선택적으로 수행하게 된다. 구체적으로 상기 단말기는 어느 한 인접 셀이, 상기 스케일링 다운된 Treselection 동안 서빙 셀보다 계속해서 높은 우선순위를 가진다면, 단말기는 상기 인접 셀을 서빙 셀로서 재선택하게 된다. 고속 UE 상태를 벗어났다면 스케일링 다운되지 않은 Treselection이 사용된다.

<<제3 실시예>>

제3 실시예에서는 ping-pong을 탐지하기 위한 새로운 파라미터를 시그널링하는 대신 단말기의 동작만을 정의한다.

도 7은 본 발명의 제3 실시예에 따른 단말기의 동작을 나타낸 흐름도이다.

도 7을 참조하면, 과정 701에서 단말기는 서빙 셀의 SIB를 통해 Tcrmax, Ncr를 수신한다. 과정 702에서 단말기는 상기 Tcrmax로 설정된 타이머를 스타트한다. 과정 703에서 단말기는 상기 Tcrmax가 만기되었는지를 체크한다. 만약 상기 Tcrmax가 만기되지 않았다면, 과정 704로 가서 셀 재선택이 발생했는지를 체크한다. 만약 셀 재선택이 발생하지 않았다면 과정 703으로 복귀한다. 반면 셀 재선택이 발생하였다면, 과정 705로 가서 단말기는 상기 재선택된 셀이 상기 Tcrmax동안 이미 재선택된 적이 있는지를 체크한다. 만약 상기 재선택된 셀이 상기 Tcrmax동안 이미 재선택된 적이 있다면, 과정 706으로 가서 단말기는 상기 재선택된 셀의 셀 재선택 회수를 Tcrmax 동안의 셀 변경 회수에서 배제한다. 만약 상기 재선택된 셀이 이전에 선택된 적이 없는 새로운 셀이라면, 과정 707에서 단말기는 상기 재선택된 셀의 셀 재선택 회수를 상기 셀 변경 회수에 포함시킨다.

한편, 상기 과정 703에서 상기 Tcrmax가 만기되었다면, 과정 711로 가서 단말기는 Tcrmax 동안의 셀 변경 회수가 Ncr변을 초과하는지를 체크한다. 만약 상기 Tcrmax 동안의 셀 변경 회수가 Ncr변을 초과하면, 과정 712로 가서 상기 단말기는 고속 UE 상태로 들어간다. 반면 상기 Tcrmax 동안의 셀 변경 회수가 Ncr변을 초과하지 못했다면, 과정 713으로 가서 상기 단말기는 고속 UE 상태를 벗어난다. 상기 과정 713에서 상기 단말기가 고속 UE 상태가 아니었다면, 계속해서 비-고속 UE 상태, 즉 정적/저속 UE 상태를 유지한다.

상기 고속 UE 상태에서, 상기 단말기는 스케일링 다운된 Treselection에 따라 셀 재선택을 선택적으로 수행하게 된다. 구체적으로 상기 단말기는 어느 한 인접 셀이, 상기 스케일링 다운된 Treselection 동안 서빙 셀보다 계속해서 높은 우선순위를 가진다면, 단말기는 상기 인접 셀을 서빙 셀로서 재선택하게 된다. 고속 UE 상태를 벗어났다면 스케일링 다운되지 않은 Treselection이 사용된다.

도 8은 본 발명의 바람직한 실시예에 따른 단말기의 구조를 나타낸 블록도로서, 도시한 바와 같이 SIB 수신부(810)와 셀 재선택 파라미터 저장부(820)와 UE 상태 판단부(830)와 2개의 타이머들(832, 834)과 셀 재선택 제어부(840)와 무선 인터페이스부(850)가 도시되었다. 여기에서는 대표적으로 제1 실시예에 따른 동작을 설명하기로 한다.

도 8을 참조하면, SIB 수신부(810)는 무선 인터페이스부(850)를 통해 서빙 셀의 SIB를 수신한다. 상기 SIB에 포함된 Tcrmax, Ncr, Tping-pong, Nping-pong 및 Treselection 등은 셀 재선택 관련 파라미터로서 추출되며, 셀 재선택 파라미터 저장부(820)에 저장된다. 상기 파라미터들 중 Tcrmax, Tping-pong은 타이머들(832, 834)로 각각 제공되고, 타이머들(832, 834)은 Tcrmax, Tping-pong을 제공받는 즉시 스타트된다. 여기서 Tcrmax는 고속 UE 판단을 할 때 사용하는 타이머 값이며, Tping-pong은 스케일링 다운된 Treselection으로 인한 ping-pong을 판단할 때 사용하는 타이머 값을 나타낸다. 또한 상기 파라미터들 중 Ncr, Nping-pong은 UE 상태 판단부(830)로 제공된다.

UE 상태 판단부(830)는 셀 재선택 제어부(840)로부터 셀 재선택 통지 신호를 수신한다. 상기 셀 재선택 통지 신호는, 셀 재선택이 일어날 때마다 상기 셀 재선택의 대상 셀을 나타내는 셀 아이디를 포함하여 UE 상태 판단부(830)로 제공되며, 이를 통해 UE 상태 판단부(830)는 셀 변경 회수를 카운트한다. 이때 UE 상태 판단부(830)는, 각 셀별로 셀 재선택 회수를 카운트하여, 동일 셀의 재선택이 발생하였는지를 모니터링하고 있다.

UE 상태 판단부(830)는 상기 셀 재선택 통지 신호를 이용하여 셀 변경 회수를 카운트하면서, Tcrmax 타이머(832)로부터 Tcrmax의 타임아웃 신호가 발생하였는지를 판단한다. 만약 Tcrmax 타임아웃 신호가 발생하지 않았다면, Tping-pong 타이머(834)로부터 Tping-pong의 타임아웃 신호가 발생하였는지를 판단한다. 만약 상기 Tping-pong 타임아웃 신호가 발생하였다면, UE 상태 판단부(830)는, 셀 재선택 제어부(840)로부터 제공받은 셀 재선택 통지 신호를 이용하여 상기 Tping-pong동안 같은 셀을 재선택한 회수를 판단하고, 상기 Tping-pong동안 같은 셀을 재선택한 회수가 Nping-pong변을 초과했는지를 체크한다.

상기 Tping-pong 동안 같은 셀이 Nping-pong변을 초과하여 재선택된다면, UE 상태 판단부(830)는 고속 UE 상태를 벗어나거나 또는 상기 Tping-pong동안 발생한 셀 변경 회수를 Tcrmax 동안의 셀 변경 회수에서 배제한다. 여기서 Tping-pong 동안의 셀 변경 회수는 동일 셀을 재선택한 회수가 되거나 혹은 서로 다른 셀을 재선택한 전체 회수가 될 수 있다. 그리고 나면 UE 상태 판단부(830)는 Tping-pong 타이머(834)가 다시 스타트시킨다.

반면, Tcrmax 타이머(832)로부터 Tcrmax 타임아웃 신호가 발생하였으면, UE 상태 판단부(830)는 Tcrmax동안의 셀 변경 회수가 Ncr변을 초과하는지를 판단한다. 상기 Tcrmax동안의 셀 변경 회수가 Ncr변을 초과했다면, UE 상태 판단부(830)는 단말기가 고속 UE 상태인 것으로 판단한다. UE 상태를 셀 재선택 제어부(840)에게로 통지한다. 반면 상기 Tcrmax 동안의 셀 변경 회수가 Ncr변을 초과하지 못했다면, UE 상태 판단부(830)는 단말기가 비-고속 UE 상태, 즉 정적/저속 UE 상태인 것으로 판단하고, UE 상태를 셀 재선택

제어부(840)에게로 통지한다.

셀 재선택 제어부(840)는 무선 인터페이스부(850)에서 측정된 각 셀의 측정 결과를 기초로 하여, 셀 재선택의 수행 여부와 셀 재선택의 대상 셀을 판단한다. 단말기가 고속 UE 상태인 경우, 셀 재선택 제어부(840)는 스케일링 다운된 Treselection에 따라 셀 재선택을 선택적으로 수행한다. 구체적으로 고속 UE 상태에서 어느 한 인접 셀이, 상기 스케일링 다운된 Treselection 동안 서빙 셀보다 계속해서 높은 우선순위를 가진다면, 셀 재선택 제어부(840)는 서빙 셀을 상기 인접 셀로 설정하기 위한 셀 재선택 지시 신호를 무선 인터페이스부(850)로 전달한다. 반면 단말기가 고속 UE 상태가 아니라면, 셀 재선택 제어부(840)는 스케일링 다운되지 않은, 즉 원래의 Treselection을 사용한다. 즉 정적/저속 UE 상태에서 어느 한 인접 셀이, 상기 스케일링 다운되지 않은 Treselection 동안 서빙 셀보다 계속해서 높은 우선순위를 가진다면, 셀 재선택 제어부(840)는 서빙 셀을 상기 인접 셀로 설정하기 위한 셀 재선택 지시 신호를 무선 인터페이스부(850)로 전달한다. 무선 인터페이스부(850)는 상기 셀 재선택 지시 신호가 있을 시, 해당 지시된 인접 셀을 서빙 셀로서 인식하여, 상기 새로운 서빙 셀의 방송 채널을 감지한다.

한편 본 발명의 상세한 설명에서는 구체적인 실시예에 관해 설명하였으나, 본 발명의 범위에서 벗어나지 않는 한도 내에서 여러 가지 변형이 가능함은 물론이다. 그러므로 본 발명의 범위는 설명된 실시예에 국한되지 않으며, 후술되는 특허청구의 범위뿐만 아니라 이 특허청구의 범위와 균등한 것들에 의해 정해져야 한다.

실행의 효과

이상에서 상세히 설명한 바와 같이 동작하는 본 발명에 있어서, 개시되는 발명 중 대표적인 것에 의하여 얻어지는 효과를 간단히 설명하면 다음과 같다.

본 발명은, 정적/저속 UE 상태의 사용자 단말기가 고속 UE 상태를 위한 셀 재선택 파라미터(즉 Treselection)를 잘못 사용함에 따라 셀 재선택의 핑-퐁이 지속적으로 발생하게 되는 문제점을 해소하여, 단말과 시스템의 불필요한 자원 소모를 감소시키고 단말기의 통화 품질을 향상시킬 수 있는 효과가 있다.

청구의 범위

청구항 1

이동통신 시스템에서 핑-퐁을 방지하기 위한 셀 재선택 방법에 있어서,
셀 재선택 절차를 제어하기 위한 제1 및 제2 기준 시간과 제1 및 제2 기준 회수를 획득하는 과정과, 여기서 상기 제2 기준 시간 및 상기 제2 기준 회수는 각각 상기 제1 기준 시간 및 제1 기준 회수보다 작은 값들을 가지며,
상기 제2 기준 시간 동안 단말의 동일 셀에 대한 셀 재선택 회수가 상기 제2 기준 회수(Nping-pong)를 초과하면, 단말을 비-고속 상태로 설정하는 과정과,
상기 제1 기준 시간 동안 상기 단말의 셀 변경 회수가 상기 제1 기준 회수를 초과하지 않으면, 상기 단말을 비-고속 상태로 설정하는 과정과,
상기 제2 기준 시간 동안의 동일 셀에 대한 셀 재선택 회수가 상기 제2 기준 회수를 초과하지 않고, 상기 제1 기준 시간 동안 상기 단말의 셀 변경 회수가 상기 제1 기준 회수를 초과하면, 상기 단말을 고속 상태로 설정하는 과정과,
상기 비-고속 상태의 상기 단말이, 미리 정해지는 셀 재선택 제한시간에 따라 선택적으로 셀 재선택을 수행하는 과정과,
상기 고속 상태의 상기 단말이, 스케일링 다운된 상기 셀 재선택 제한시간에 따라 선택적으로 셀 재선택을 수행하는 과정을 포함하는 것을 특징으로 하는 셀 재선택 방법.

청구항 2

제 1 항에 있어서, 상기 셀 재선택 제한시간에 따라 셀 재선택을 수행하는 과정은,
상기 비-고속 상태의 상기 단말이 감지한 인접 셀이, 상기 셀 재선택 제한시간 동안 계속하여 상기 단말의 서빙 셀보다 높은 셀 재선택 우선순위를 가지면, 상기 인접 셀로 셀 재선택을 수행하는 것을 특징으로 하는 셀 재선택 방법.

청구항 3

제 1 항에 있어서, 상기 스케일링 다운된 셀 재선택 제한시간에 따라 셀 재선택을 수행하는 과정은,
상기 고속 상태의 상기 단말이 감지한 인접 셀이, 스케일링 다운된 상기 셀 재선택 제한시간 동안 계속하여 상기 단말의 서빙 셀보다 높은 셀 재선택 우선순위를 가지면, 상기 인접 셀로 셀 재선택을 수행하는 것을 특징으로 하는 셀 재선택 방법.

청구항 4

제 1 항에 있어서, 상기 제1 및 제2 기준 시간과 상기 제1 및 제2 기준 회수는, 상기 단말의 서빙 셀로부터 송신되는 시스템 정보 블록(SIB)에 포함되는 것을 특징으로 하는 셀 재선택 방법.

청구항 5

제 4 항에 있어서, 상기 SIB는,

상기 셀 재선택 제한시간과 상기 셀 재선택 제한시간의 스케일링 다운을 위한 스케일링 인자를 더 포함하는 것을 특징으로 하는 셀 재선택 방법.

청구항 6

이동통신 시스템에서 핑-퐁을 방지하기 위한 셀 재선택 방법에 있어서,

셀 재선택 절차를 제어하기 위한 제1 및 제2 기준 시간과 제1 및 제2 기준 회수를 획득하는 과정과, 여기서 상기 제2 기준 시간 및 상기 제2 기준 회수는 각각 상기 제1 기준 시간 및 제1 기준 회수보다 작은 값을 가지며,

상기 제2 기준 시간 동안 단말의 동일 셀에 대한 셀 재선택 회수가 상기 제2 기준 회수(Nping-pong)를 초과하면, 상기 제2 기준 시간 동안의 셀 재선택 회수 또는 상기 동일 셀에 대한 셀 재선택 회수를 상기 제1 기준 시간 동안의 셀 변경 회수에서 배제하는 과정과,

상기 제1 기준 시간 동안 상기 단말의 셀 변경 회수가 상기 제1 기준 회수를 초과하지 않으면, 상기 단말을 비-고속 상태로 설정하는 과정과,

상기 제2 기준 시간 동안의 동일 셀에 대한 셀 재선택 회수가 상기 제2 기준 회수를 초과하지 않고, 상기 제1 기준 시간 동안 상기 단말의 셀 변경 회수가 상기 제1 기준 회수를 초과하면, 상기 단말을 고속 상태로 설정하는 과정과,

상기 비-고속 상태의 상기 단말이, 미리 정해지는 셀 재선택 제한시간에 따라 선택적으로 셀 재선택을 수행하는 과정과,

상기 고속 상태의 상기 단말이, 스케일링 다운된 상기 셀 재선택 제한시간에 따라 선택적으로 셀 재선택을 수행하는 과정을 포함하는 것을 특징으로 하는 셀 재선택 방법.

청구항 7

제 6 항에 있어서, 상기 셀 재선택 제한시간에 따라 셀 재선택을 수행하는 과정은,

상기 비-고속 상태의 상기 단말이 감지한 인접 셀이, 상기 셀 재선택 제한시간 동안 계속하여 상기 단말의 서빙 셀보다 높은 셀 재선택 우선순위를 가지면, 상기 인접 셀로 셀 재선택을 수행하는 것을 특징으로 하는 셀 재선택 방법.

청구항 8

제 6 항에 있어서, 상기 스케일링 다운된 셀 재선택 제한시간에 따라 셀 재선택을 수행하는 과정은,

상기 고속 상태의 상기 단말이 감지한 인접 셀이, 스케일링 다운된 상기 셀 재선택 제한시간동안 계속하여 상기 단말의 서빙 셀보다 높은 셀 재선택 우선순위를 가지면, 상기 인접 셀로 셀 재선택을 수행하는 것을 특징으로 하는 셀 재선택 방법.

청구항 9

제 6 항에 있어서, 상기 제1 및 제2 기준 시간과 상기 제1 및 제2 기준 회수는, 상기 단말의 서빙 셀로부터 송신되는 시스템 정보 블록(SIB)에 포함되는 것을 특징으로 하는 셀 재선택 방법.

청구항 10

제 9 항에 있어서, 상기 SIB는,

상기 셀 재선택 제한시간과 상기 셀 재선택 제한시간의 스케일링 다운을 위한 스케일링 인자를 더 포함하는 것을 특징으로 하는 셀 재선택 방법.

청구항 11

이동통신 시스템에서 핑-퐁을 방지하기 위한 셀 재선택을 수행하는 사용자 단말 장치에 있어서,

셀 재선택 절차를 제어하기 위한 제1 및 제2 기준 시간과 제1 및 제2 기준 회수를 획득하여 저장하는 파라미터 저장부와, 여기서 상기 제2 기준 시간 및 상기 제2 기준 회수는 각각 상기 제1 기준 시간 및 제1 기

준 회수보다 작은 값들을 가지며,
 상기 제1 기준 시간 및 상기 제2 기준 시간으로 각각 설정되는 제1 및 제2 타이머들과,
 상기 제2 타이머가 만기되기까지 단말의 동일 셀에 대한 셀 재선택 회수가 상기 제2 기준 회수(Nping-pong)를 초과하면, 상기 제2 기준 시간 동안의 셀 재선택 회수 또는 상기 동일 셀에 대한 셀 재선택 회수를 상기 제1 기준 시간 동안의 셀 변경 회수에서 배제하고,
 상기 제1 타이머가 만기되기까지 상기 단말의 셀 변경 회수가 상기 제1 기준 회수를 초과하지 않으면, 상기 단말을 비-고속 상태로 설정하고,
 상기 제2 타이머가 만기되기까지 동일 셀에 대한 셀 재선택 회수가 상기 제2 기준 회수를 초과하지 않고, 상기 제1 타이머가 만기되기까지 상기 단말의 셀 변경 회수가 상기 제1 기준 회수를 초과하면, 상기 단말을 고속 상태로 설정하는 단말 상태 판단부와,
 상기 비-고속 상태에서는 미리 정해지는 셀 재선택 제한시간을 이용하고, 상기 고속 상태에서는 스케일링 다운된 상기 셀 재선택 제한시간을 이용하며, 선택적으로 셀 재선택을 수행하는 셀 재선택 제어부를 포함하는 것을 특징으로 하는 사용자 단말 장치.

청구항 12

제 11 항에 있어서, 상기 단말 상태 판단부는,
 상기 제2 기준 시간 동안의 동일 셀에 대한 셀 재선택 회수가 상기 제2 기준 회수를 초과하지 않고, 상기 제1 기준 시간 동안 상기 단말의 셀 변경 회수가 상기 제1 기준 회수를 초과하면, 상기 단말을 고속 상태로 설정하는 것을 특징으로 하는 사용자 단말 장치.

청구항 13

제 11 항에 있어서, 상기 셀 재선택 제어부는,
 상기 비-고속 상태의 상기 단말이 감지한 인접 셀이, 상기 셀 재선택 제한시간 동안 계속하며 상기 단말의 서빙 셀보다 높은 셀 재선택 우선순위를 가지면, 상기 인접 셀로 셀 재선택을 수행하는 것을 특징으로 하는 사용자 단말 장치.

청구항 14

제 11 항에 있어서, 상기 셀 재선택 제어부는,
 상기 고속 상태의 상기 단말이 감지한 인접 셀이, 스케일링 다운된 상기 셀 재선택 제한시간 동안 계속하며 상기 단말의 서빙 셀보다 높은 셀 재선택 우선순위를 가지면, 상기 인접 셀로 셀 재선택을 수행하는 것을 특징으로 하는 사용자 단말 장치.

청구항 15

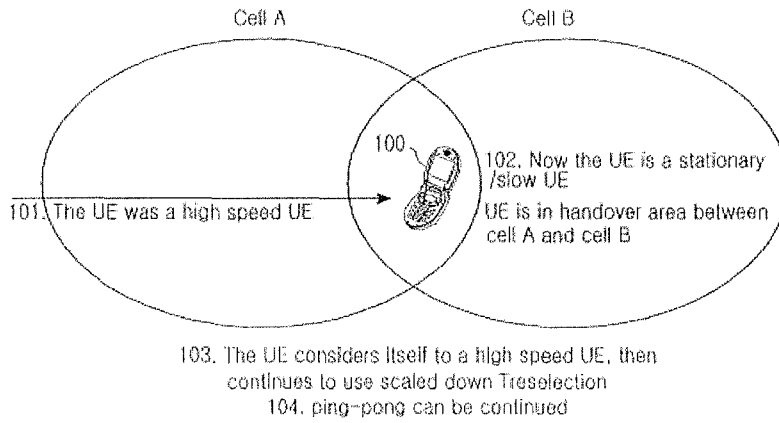
제 11 항에 있어서, 상기 단말의 서빙 셀로부터 송신되는 시스템 정보 블록(SIB)을 수신하고 상기 SIB에 포함된 상기 제1 및 제2 기준 시간과 상기 제1 및 제2 기준 회수를 추출하여 상기 파라미터 저장부로 전달하는 SIB 수신부를 더 포함하는 것을 특징으로 하는 사용자 단말 장치.

청구항 16

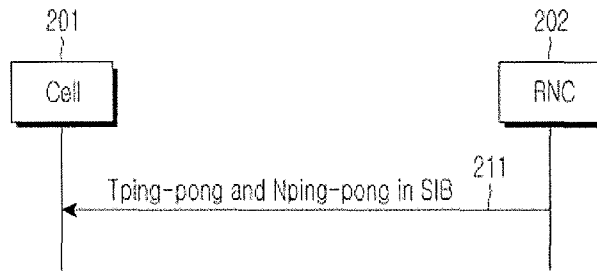
제 15 항에 있어서, 상기 SIB는,
 상기 셀 재선택 제한시간과 상기 셀 재선택 제한시간의 스케일링 다운을 위한 스케일링 인자를 더 포함하는 것을 특징으로 하는 사용자 단말 장치.

도 8

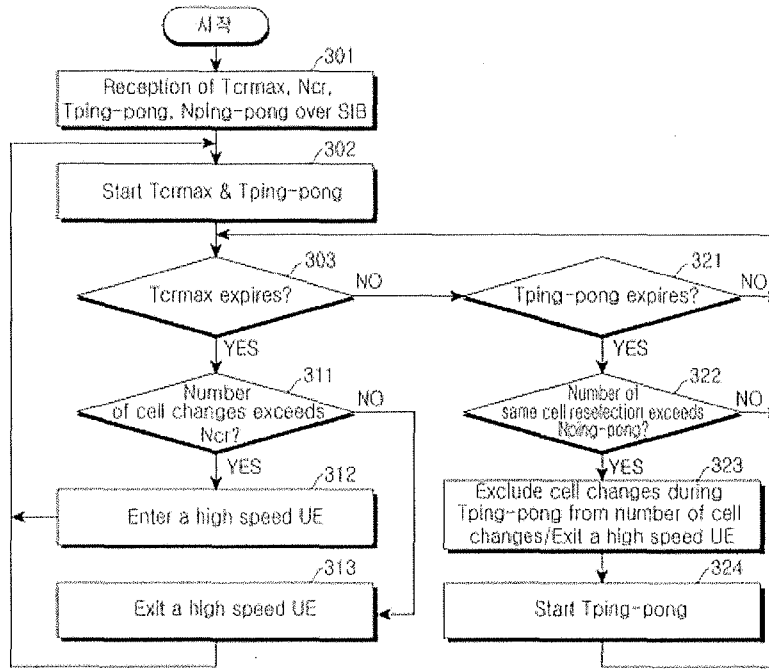
도 8A



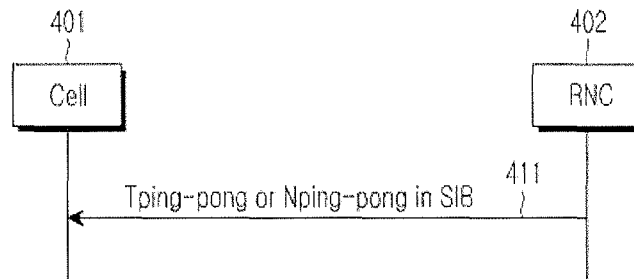
도 8B



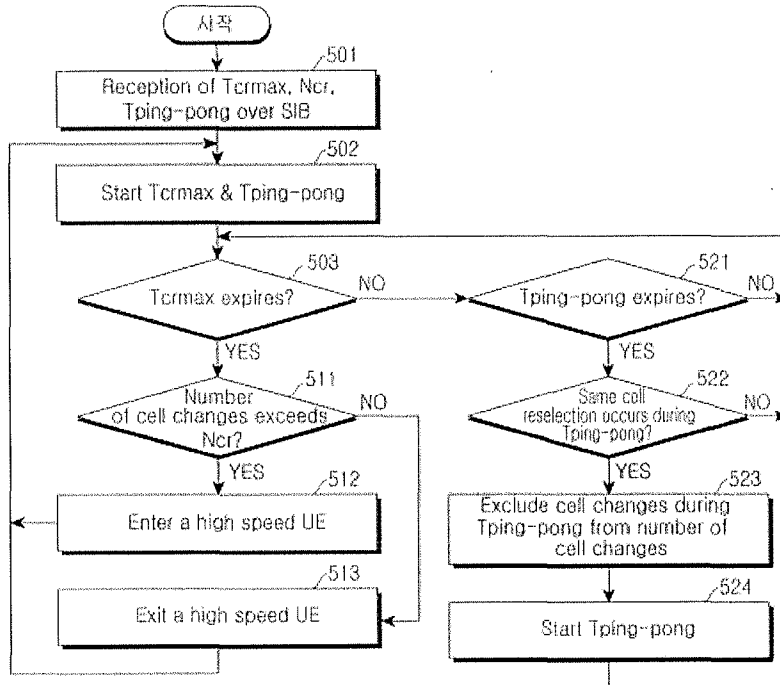
도면3



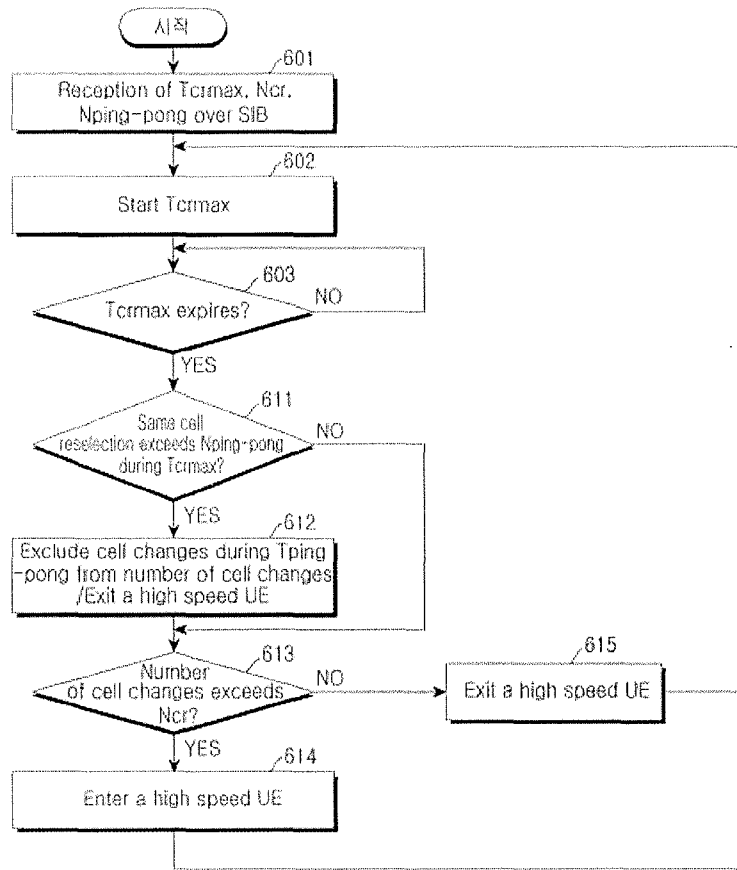
도면4



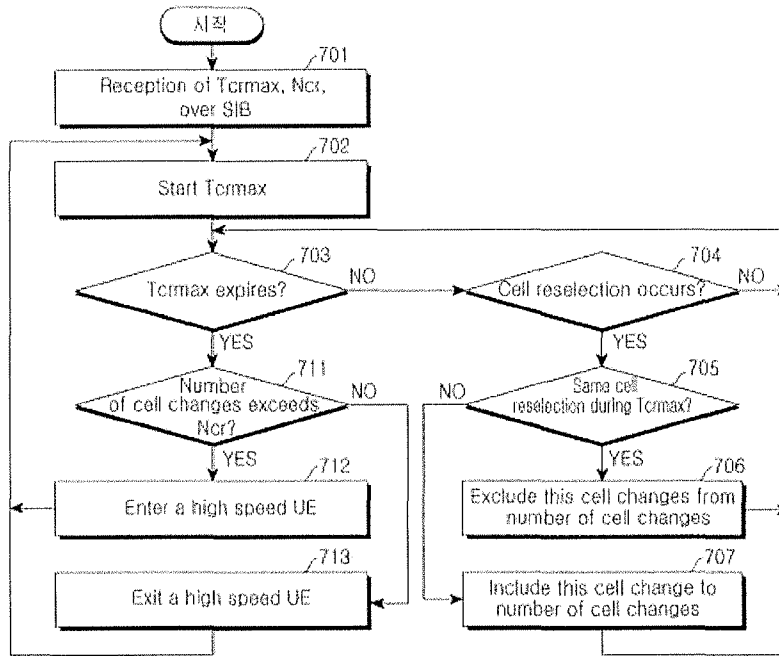
도 95



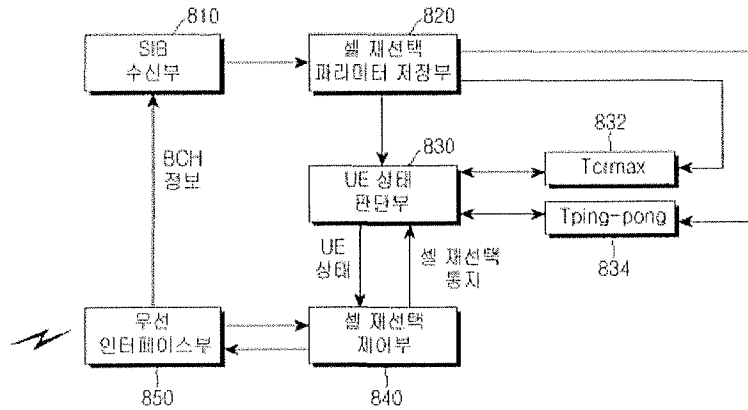
도 15B



도 7



도 8



Electronic Patent Application Fee Transmittal

Application Number:	12902933
Filing Date:	12-Oct-2010
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Filer:	John B. Conklin/Mary Beth Haugh
Attorney Docket Number:	HW707010

Filed as Large Entity

Utility under 35 USC 111(a) 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:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt

EFS ID:	12117927
Application Number:	12902933
International Application Number:	
Confirmation Number:	2965
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Customer Number:	77399
Filer:	John B. Conklin/Mary Beth Haugh
Filer Authorized By:	John B. Conklin
Attorney Docket Number:	HW707010
Receipt Date:	21-FEB-2012
Filing Date:	12-OCT-2010
Time Stamp:	12:37:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$180
RAM confirmation Number	16240
Deposit Account	121216
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Transmittal Letter	IDS_3.pdf	151330 278b6915c52075b8acb46aca918d5641eac152	no	4
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Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	1449Form_3.pdf	93698 5b31e95ae216483765d26b177c5bb370cc37f6c0	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	KR_20050017514.pdf	392262 304d1a8001f9cb5aa09dbe90746ba937e87ad83	no	7
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5	Non Patent Literature	OA_1st_12955392.pdf	10969904 c269b9286c8ad5078e780fd1169cc93e6488fe05	no	12
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6	Non Patent Literature	OA_Final_12955392.pdf	9218926 6788c7ce0a57b1be385ea162919e884fd5c8d23	no	11
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Warnings:	
Information:	
Total Files Size (in bytes):	29331469
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application No. 12/902,933

Confirmation No. 2965

Applicant: ROBERTS et al.

Filed: October 12, 2010

TC/AU: 2617

Examiner: Un C. CHO

Docket No.: HW707010 (Client Reference No. 0811316US)

Customer No.: 77399

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

INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 CFR 1.97 and 1.98, the references listed on the enclosed Form PTO-1449 and/or Substitute Form PTO-1449 ("Form 1449") are submitted for consideration by the Examiner in the examination of the above-identified patent application.

The full consideration of the references in their entirety by the Examiner is respectfully requested and encouraged. Also, it is respectfully requested that the references be entered into the record of the present application and that the Examiner initial the appropriate area on the enclosed Form 1449, thereby indicating the Examiner's consideration of each of the references.

The submission of the references listed on the Form 1449 is for the purpose of providing a complete record and is not a concession that the references listed thereon are prior art to the invention claimed in the patent application. The right is expressly reserved to establish an invention date earlier than the above-identified filing date in order to remove any reference submitted herewith as prior art should it be deemed appropriate to do so.

Further, the submission of the references is not to be taken as a concession that any reference represents art that is relevant or analogous to the claimed invention. Accordingly, the right to argue that any reference is not properly within the scope of prior art relevant to an examination of the claims in the above-identified application is also expressly reserved.

The Information Disclosure Statement is being filed:

- within** any one of the following time periods: (a) within three months of the filing date of a national application other than a continued prosecution application under 37 CFR 1.53(d); (b) within three months of the date of entry of the national stage as set forth in 37 CFR 1.491 of an international application; (c) before the mailing date

of a first Office Action on the merits; or (d) before the mailing of a first Office Action after the filing of a request for continued examination under 37 CFR 1.114.

- Note: This submission includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.
- after** (a), (b), (c) or (d) above, but before the mailing date of a final action under 37 CFR 1.113, a Notice of Allowance under 37 CFR 1.311, or an action that otherwise closes prosecution in the application, and includes *one* of:
- the Statement under 37 CFR 1.97(e) (see “Statement under 37 CFR 1.97(e)” below).
- Note: This submission includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.
- or –
- the fee of \$180 set forth in 37 CFR 1.17(p) (see “Fees” below).
- on or after** the mailing date of a final action under 37 CFR 1.113 or a Notice of Allowance under 37 CFR 1.311, or an action that otherwise closes prosecution in the application, and on or before payment of the issue fee, and includes the Statement under 37 CFR 1.97(e) (see “Statement under 37 CFR 1.97(e)” below), and the fee of \$180 as set forth in 37 CFR 1.17(p) (see “Fees” below).
- on or after** the mailing date of a Notice of Allowance under 37 CFR 1.311, and on or before payment of the issue fee, and **within** thirty days of receiving each item of information contained in the Information Disclosure Statement, and includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), and the fee of \$180 as set forth in 37 CFR 1.17(p) (see “Fees” below). NOTE: This is for original applications except applications for a design patent, filed on or after May 29, 2000, wherein a paper containing only an Information Disclosure Statement in compliance with 37 CFR 1.97 and 1.98 is being filed.

Citation to Other Patent Applications

- The following U.S. patent applications are hereby brought to the attention of the Examiner. The U.S. patent applications claim subject matter that may be considered by the Examiner to be similar to the subject matter claimed in the above-identified patent application. Accordingly, these U.S. patent applications and/or the prosecution pertaining thereto may include information considered to be material to the prosecution of the above-identified patent application. Since the Examiner has electronic access to the prosecution histories of these U.S. patent applications, copies of prosecution materials therefrom are not provided herewith, but will be promptly provided if the Examiner so desires and requests same.

U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Never Issued: Abandoned/Expired
1. 12/955,392	November 29, 2010		X	
2.				
3.				

Copies of the References

- Copies of any U.S. patents and published patent applications that are listed on the accompanying Form 1449 are not enclosed herewith. Copies of any other references identified on the accompanying Form 1449 are enclosed herewith.
- For each reference not in the English language, attached is at least one of the following: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.
- The references listed on the enclosed Form 1449 were previously identified in the parent application(s) of the present application, and copies of the references were furnished at that time. Accordingly, additional copies of the references are not submitted herewith, so as not to burden the file with duplicate copies of references. The Examiner is respectfully requested to carefully review the references in accordance with the requirements set out in the Manual of Patent Examining Procedure. In accordance with 37 CFR 1.98(d), the details of the parent application(s) relied upon for an earlier filing date under 35 USC 120 in which copies of the references were previously furnished are set out below:

U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Abandoned
1.				
2.				
3.				

Statement under 37 CFR 1.97(e)

- The **undersigned** hereby states 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 patent application not more than three months prior to the filing of the Information Disclosure Statement.
- The **undersigned** hereby states 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 patent application, and, to the knowledge of the undersigned 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.

Statement under 37 CFR 1.704(d)

The **undersigned** hereby states 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 application and that this communication was not received by any individual designated in 37 CFR 1.56(c) more than thirty days prior to the filing of the Information Disclosure Statement.

Fees

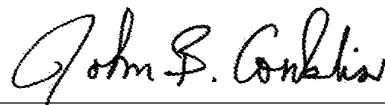
- No fee is owed by the applicant(s).
- Charge Deposit Account No. 12-1216 in the amount of **\$180.00** (37 CFR 1.17(p)).

Authorization to Charge Additional Fees

If any additional fees are owed in connection with this communication, please charge Deposit Account No. 12-1216.

Instructions as to Overpayment

- Credit Account No. 12-1216.
- Refund



John B. Conklin, Reg. No. 30,369
 LEYDIG, VOIT & MAYER, LTD.
 Two Prudential Plaza, Suite 4900
 180 North Stetson Avenue
 Chicago, Illinois 60601-6731
 (312) 616-5600 (telephone)
 (312) 616-5700 (facsimile)

Date: February 21, 2012

PLUS Search Results for S/N 12902933, Searched Fri Jun 15 09:27:15 EDT 2012

The Patent Linguistics Utility System (PLUS) is a USPTO automated search system for U.S. Patents from 1971 to the present PLUS is a query-by-example search system which produces a list of patents that are most closely related linguistically to the application searched. This search was prepared by the staff of the Scientific and Technical Information Center, SIRA.

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Please type a plus sign (+) inside this box →

Substitute for form 1449A/B/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				Complete if Known		
				Application Number	12/902,933	
				Filing Date	October 12, 2010	
				First Named Inventor	ROBERTS, Michael	
				Group Art Unit	2617	
				Examiner Name	PATEL, Mahendra R	
Sheet 1 of 1	Attorney Docket Number		HW707010			

U.S. PATENT DOCUMENTS						
Examiner Initials	Doc. No.	U.S. Patent Document		Name of Patentee or Applicant	Date of Publication	Filing Date If Appropriate
		Application or Patent Number	Kind Code			

FOREIGN PATENT DOCUMENTS							
Examiner Initials	Doc. No.	Foreign Patent Document			Name of Patentee or Applicant	Date of Publication	Translation *
		Office	Application or Patent Number	Kind Code			
	AX	EP	0862346	A2	Nokia Mobile Phones, Ltd.	Sept. 2, 1998	
	AY	EP	2111074	A1	Huawei Tech. Co., Ltd.	Oct. 21, 2009	
	AZ	WO	2008057359	A1	Interdigital Tech. Corp.	May 15, 2008	

OTHER - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Doc. 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, page(s), volume-issue number (s), publisher, city and/or country where published.	Translation *
	BA	Extended European Search Report in corresponding European Patent Application No. 12168647.1 (June 25, 2012).	
	BB	"R2-073622 – E-UTRA Cell Selection and Cell Reselection Aspects," 3GPP TSG-RAN WG2 Meeting #59, August 2007, 3GPP, Valbonne, France.	
	BC	"Tdoc-R2-074001 – IDLE Mode Mobility Control Principles," 3GPP TSG RAN WG2 #59bis, October 2007, 3GPP, Valbonne, France.	
	BD	"TSGR2#6(99)808 – Cell Selection and Cell Reselection Criteria," TSG-RAN Working Group 2 (Radio layer 2 and Radio layer 3), August 1999, 3GPP, Valbonne, France,	

Examiner Signature		Date Considered	
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* If the reference is not in English, then at least one of the following is provided: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.

Electronic Acknowledgement Receipt

EFS ID:	13386517
Application Number:	12902933
International Application Number:	
Confirmation Number:	2965
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Customer Number:	77399
Filer:	John B. Conklin/Andrew Dragstrem
Filer Authorized By:	John B. Conklin
Attorney Docket Number:	HW707010
Receipt Date:	31-JUL-2012
Filing Date:	12-OCT-2010
Time Stamp:	17:39:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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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 Letter	IDS4.pdf	150006 <small>da42d66bc66ba9f36f195dcd115d67fe07b0af46</small>	no	4

Warnings:

Information:

2	Foreign Reference	EP0862346A2.PDF	6665454 f92e8a598429dcb7636e84b54400af9b63fe5ad2	no	16
Warnings:					
Information:					
3	Foreign Reference	EP2111074A1.PDF	6990544 abada692a718aefe88e9ca7471a73ba96c97782	no	20
Warnings:					
Information:					
4	Foreign Reference	WO2008057359A1.PDF	5273324 3ab0f6bfc7d16b3a146dca40c74ccb7d35136dde	no	22
Warnings:					
Information:					
5	Non Patent Literature	EESR.PDF	6079000 129ff179864bc57a7b9cfa1d576c8754ae1337b3	no	13
Warnings:					
Information:					
6	Non Patent Literature	R2-073622.PDF	4641872 116c8d4b0433683051369353bad689f818a60319	no	12
Warnings:					
Information:					
7	Non Patent Literature	R-074001.PDF	3286598 36df5946799d6f617a0b380154a873d9b27aa94f	no	8
Warnings:					
Information:					
8	Non Patent Literature	XP008074349.PDF	1806621 5f954885520d23dfd5018dd298bb42a43a89997f	no	10
Warnings:					
Information:					
9	Information Disclosure Statement (IDS) Form (SB08)	1449Form_4.pdf	92286 82e45b39f8ee34ecefec81b2e4e1339c1b3d100f	no	1
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application No. 12/902,933

Confirmation No. 2965

Applicant: ROBERTS et al.

Filed: October 12, 2010

TC/AU: 2617

Examiner: PATEL, Mahendra R

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Customer No.: 77399

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

INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 CFR 1.97 and 1.98, the references listed on the enclosed Form PTO-1449 and/or Substitute Form PTO-1449 ("Form 1449") are submitted for consideration by the Examiner in the examination of the above-identified patent application.

The full consideration of the references in their entirety by the Examiner is respectfully requested and encouraged. Also, it is respectfully requested that the references be entered into the record of the present application and that the Examiner initial the appropriate area on the enclosed Form 1449, thereby indicating the Examiner's consideration of each of the references.

The submission of the references listed on the Form 1449 is for the purpose of providing a complete record and is not a concession that the references listed thereon are prior art to the invention claimed in the patent application. The right is expressly reserved to establish an invention date earlier than the above-identified filing date in order to remove any reference submitted herewith as prior art should it be deemed appropriate to do so.

Further, the submission of the references is not to be taken as a concession that any reference represents art that is relevant or analogous to the claimed invention. Accordingly, the right to argue that any reference is not properly within the scope of prior art relevant to an examination of the claims in the above-identified application is also expressly reserved.

The Information Disclosure Statement is being filed:

- within** any one of the following time periods: (a) within three months of the filing date of a national application other than a continued prosecution application under 37 CFR 1.53(d); (b) within three months of the date of entry of the national stage as set forth in 37 CFR 1.491 of an international application; (c) before the mailing date

of a first Office Action on the merits; or (d) before the mailing of a first Office Action after the filing of a request for continued examination under 37 CFR 1.114.

- Note: This submission includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.
- after** (a), (b), (c) or (d) above, but before the mailing date of a final action under 37 CFR 1.113, a Notice of Allowance under 37 CFR 1.311, or an action that otherwise closes prosecution in the application, and includes *one* of:
- the Statement under 37 CFR 1.97(e) (see “Statement under 37 CFR 1.97(e)” below).
- Note: This submission includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.

– or –

- the fee of \$180 set forth in 37 CFR 1.17(p) (see “Fees” below).
- on or after** the mailing date of a final action under 37 CFR 1.113 or a Notice of Allowance under 37 CFR 1.311, or an action that otherwise closes prosecution in the application, and on or before payment of the issue fee, and includes the Statement under 37 CFR 1.97(e) (see “Statement under 37 CFR 1.97(e)” below), and the fee of \$180 as set forth in 37 CFR 1.17(p) (see “Fees” below).
- Note: This submission includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.

Statement under 37 CFR 1.97(e)

- The **undersigned** hereby states 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 patent application not more than three months prior to the filing of the Information Disclosure Statement.
- The **undersigned** hereby states 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 patent application, and, to the knowledge of the undersigned 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.

Statement under 37 CFR 1.704(d)

- The **undersigned** hereby states that each item of information contained in the Information Disclosure Statement was first cited in any communication from a patent office in a counterpart foreign or international application or from the Office and that this communication was not received by any individual designated in 37 CFR 1.56(c) more than thirty days prior to the filing of the Information Disclosure Statement.

Citation to Other Patent Applications

- The following U.S. patent applications are hereby brought to the attention of the Examiner. The U.S. patent applications claim subject matter that may be considered by the Examiner to be similar to the subject matter claimed in the above-identified patent application. Accordingly, these U.S. patent applications and/or the prosecution pertaining thereto may include information considered to be material to the prosecution of the above-identified patent application. Since the Examiner has electronic access to the prosecution histories of these U.S. patent applications, copies of prosecution materials therefrom are not provided herewith, but will be promptly provided if the Examiner so desires and requests same.

U.S. APPLICATIONS		STATUS <i>(check one)</i>		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Never Issued: Abandoned/Expired
1.				
2.				
3.				

Copies of the References

- Copies of any U.S. patents and published patent applications that are listed on the accompanying Form 1449 are not enclosed herewith. Copies of any other references identified on the accompanying Form 1449 are enclosed herewith.
- For each reference not in the English language, attached is at least one of the following: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.
- The references listed on the enclosed Form 1449 were previously identified in the parent application(s) of the present application, and copies of the references were furnished at that time. Accordingly, additional copies of the references are not submitted herewith, so as not to burden the file with duplicate copies of references. The Examiner is respectfully requested to carefully review the references in accordance with the requirements set out in the Manual of Patent Examining Procedure. In accordance with 37 CFR 1.98(d), the details of the parent application(s) relied upon for an earlier filing date under 35 USC 120 in which copies of the references were previously furnished are set out below:

U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Abandoned
1.				
2.				
3.				

Fees

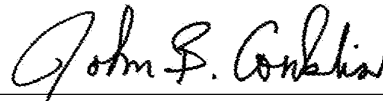
- No fee** is owed by the applicant(s).
- Charge Deposit Account No. 12-1216 in the amount of **\$180.00** (37 CFR 1.17(p)).

Authorization to Charge Additional Fees

- If any additional fees are owed in connection with this communication, please charge Deposit Account No. 12-1216.

Instructions as to Overpayment

- Credit Account No. 12-1216.
- Refund



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(54) **Cell prioritising in a cellular radio system**

(57) In a cellular radio system (30) the terminals (35) are arranged to set up and maintain radio communication with the base stations (31, 32, 33, 34) in the cells (31a, 32a, 33a, 34a). Regarding the setting up and maintaining of radio communication at least one terminal

(35) is arranged to favour at least one cell (32a, 33a) with respect to other cells (31a, 34a), in a manner independent of other terminals. The priority data relating to a terminal are stored in a central database (37), from which they are transmitted to the terminal when it registers.

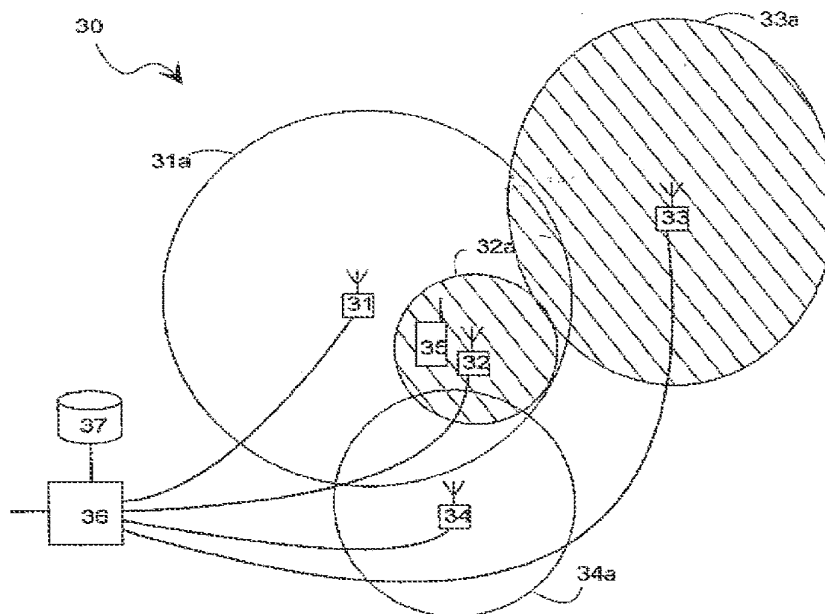


Fig. 2

Description

The invention relates generally to the routing of radio communication between base stations and terminals in a cellular radio system. Particularly the invention relates to a method and equipment with which the terminals can be individually controlled to give priority to particular base stations.

A cellular radio system comprises stationary base stations, each having a particular coverage area, and terminals which can move in relation to the base stations and their coverage areas. The coverage areas are also called cells. In this patent application a mobile phone is treated as an illustrative terminal. When a particular mobile phone is switched on, it somehow tries to find the best received signal of a base station and tries to register with the so called location area (LA) which this base station represents. Registration means that the mobile phone informs the mobile network through the base station that it can receive calls via that location area, to which said base station is associated. In the idle mode a mobile phone regularly receives messages transmitted by the base station in order to detect paging messages, which represent an incoming telephone call, and other messages intended for this mobile phone. At the same time the mobile phone monitors the power of signals transmitted by other adjacent base stations, so that it rapidly can shift base stations, when required.

The idle mode operation of a mobile phone according to the GSM system (Global System for Mobile telecommunications) and its extension the DCS1800 (Digital Communications System at 1800 MHz) is described below, in order to explain the background of the invention. Said functions are described in more detail in the EBU (European Broadcasting Union) and ETSI (European Telecommunications Standards Institute) standards ETS 300 535 (GSM 03.22) and ETS 300 578 (GSM 05.08). To a person skilled in the art it is obvious that as a background of the invention the main part of these studies can be generalised so that they are applicable to all digital cellular radio systems.

There are four requirements on a cell, so that a mobile phone normally can camp within it:

- the cell must belong to the network of the selected operator;
- the cell must not be barred by the network;
- the location area represented by the cell must not be included in the list of forbidden location areas defined for each mobile phone; and
- the attenuation on the radio path between the mobile phone and the base station must be lower than a certain threshold value defined by the operator (for short this requirement is called the path loss criterion).

A cell which meets the above listed requirements is called a suitable cell. When a mobile phone is switched on it receives the so called BCCH signals (Broadcast Control Channel) and runs through them in their order of strength, and begins to operate in a suitable cell with the strongest signal. The BCCH signal can also contain a recommendation value attached to the cell which tells whether the cell is recommended by the system or not. The mobile phone begins to operate in a not recommended cell only if no suitable recommended cells are available. This step is called cell selection.

The mobile phone will regularly check whether there is a suitable cell in the vicinity which is more advantageous regarding the radio communication, and if required the mobile phone will perform cell reselection. The mobile phone can select a new cell for three alternative reasons:

- according to particular cell reselection criteria the new cell is better than the current cell;
- some characteristics of the current cell change, so that this cell is not anymore suitable, but the new cell is suitable; or
- the mobile phone detects that the downlink signalling connection is interrupted in the current cell.

Cell selection and cell reselection are based on two parameters calculated by the mobile phone, the so called C1 and C2 parameters defined in the standard ETS 300 578 (GSM 05.08). Of these the first one, the C1 parameter, describes the power level received by the mobile phone from the examined base station, in relation to the minimum value of the received power level defined by the system and the maximum permissible transmission power of the mobile phone. The value of the C2 parameter is influenced by the value of the C1 parameter and two correction factors, of which the first one is an offset parameter transmitted by the base station and the second one is a time delay, which aims at preventing rapid consecutive cell reselections by the mobile phone.

Successful management of radio communication or the optimal routing of connections between the terminals and the base stations has an essential effect on the service level which the radio system is able to provide to the users. Particularly in areas with very dense traffic the cells can be partly or totally overlapping, whereby it is required that the mobile phones and other terminals can be controlled to use particular cells and avoid particular other cells in order to guarantee a uniform service level. As an example we could consider an office building which is located within the coverage area of a public cellular radio system, but which also has an internal wireless communication system operating

as an extension to the public system, whereby the wireless system is based on so called nano cells or pico cells having a size of one room or a few rooms. For a mobile phone belonging to an employee working in the building it is often more advantageous to operate in a cell of the building's internal system than in a cell of the public cellular radio system. The operator managing the cellular radio system can for each mobile phone also define a so called home area comprising a single cell or a few cells of the public cellular radio system, where the mobile phone is offered cheaper tariffs or other benefits in the home area. On the other hand it is advantageous to define some cells as handover cells only, whereby it is desired that no mobile phones operate in such a cell for a longer period than required by the handover function.

In a system according to the prior art described above there are no possibilities to realise priority cells relating to individual mobile phones. The first correction factor or the offset parameter associated with the C2 parameter's definition can be used for general prioritising, so that a certain value of the offset parameter transmitted by a base station causes all mobile phones to generate a C2 parameter value indicating a disadvantageous cell selection. However, a prioritising of this type does not function differently for each mobile phone, but it is identical for all mobile phones.

From the patent publication US 4,916,728 (Blair) a practice is known in which a mobile phone can operate in networks managed by several different operators. In order to be able to select the network of the most advantageous operator the mobile phone goes through several receive frequencies, decodes the SID codes (System IDentification) from the signals transmitted by the base stations, and tunes to that frequency on which the received SID code indicates the most advantageous operator. The information about the advantages of different operators is stored in the memory of the mobile phones, so in this arrangement different mobile phones react differently on the information transmitted by the base stations. However, in this method it is not possible to have the mobile phones to function differently, except for the selection of the operator, because all base stations in the network of a certain operator transmit the same SID code.

The PCT application publication WO 95/24809 (Motorola Inc.) treats a system in which the central equipment checks, based on the identity transmitted by the mobile station, whether this mobile station is authorised to a certain service in a particular area. If particular regional restrictions and/or restrictions relating to individual mobile phones are defined for the service, then the central equipment can either refuse to provide any services to a particular mobile phone in said region, or allow the use of only one service, e.g. data communications. However, in order to change the offered services the mobile phone must move, because the restrictions are always the same in a particular region. Thus in this method it is not possible to influence the cell selection or cell reselection when the mobile phone or another terminal of the cellular radio system is stationary.

From the Finnish patent application no. FI 952965 and the corresponding European patent publication no. EP 749 254 A1 (Nokia Mobile Phones Oy) there is known a multi-level home area pricing for a mobile phone of a cellular radio system, in which a certain binary character string is stored in the mobile phone. Then each base station transmits its own binary identity at regular intervals and the mobile phone uses the binary character string stored in it as a mask, with which it selects particular bits from the character string transmitted by the base station as the object for a logical comparison operation. If said logical comparison operation generates the correct result the mobile phone construes itself to be in the home area or in another area where a particular regional service is available. Using different logical comparison operations it is possible to form a number of individual areas, or areas located in a mutual hierarchy in which the mobile phone can obtain different services from the cellular radio system. Even this practice is not applicable for proper cell prioritising, because the services are regional and the offered services change only when the mobile phone is moving.

In addition to the above mentioned known methods there are a number of known methods and systems in which a mobile phone or another terminal of a cellular radio system can detect whether or not it operates in a priority cell associated to this device, and provide information about this to the user. However, in any of these methods a user or a terminal is not able to contribute to the cell selection and to decide whether a certain cell selection is retained even when the terminal is stationary.

This invention seeks to provide a method and a system which, for each terminal, are able to effectively influence in which cell of the cellular radio system the terminal of the cellular radio system begins to operate when it is switched on, and which cell it selects in connection with cell reselection. This invention also seeks to provide that the method and the system according to the invention are flexible and able to accommodate changes made in the priority definitions.

The advantages of the invention are attained in a terminal of the cellular radio system by adding, to the calculation operation controlling the cell selection and the cell reselection, a step and/or a factor which depends on the contents of the list of priority cells given to the terminal.

The cellular radio system according to the invention is characterized in that regarding the setting up and maintaining of radio communication at least one terminal is arranged to favour at least one cell with respect to other cells, in a manner independent of other terminals.

In accordance with this invention a terminal, which is characterized in that regarding the setting up and maintaining of radio communication it is arranged to favour at least one cell with respect to other cells in a manner independent of

other terminals.

Further the invention relates to a method for realizing priority cells. The method according to the invention is characterized in that regarding the setting up and maintaining of radio communication it utilizes priority data relating to individual terminals in order to favour at least one cell with respect to other cells, in a manner independent of other terminals.

In the arrangement according to the invention it is possible to define for each terminal of the cellular radio system one cell or several cells in which the terminal shall try to operate as far as the quality of the radio communication allows it. A list of priority cells relating to individual terminal is stored in a certain database of the system from which it is read and transmitted sufficiently often to the terminal, preferably always when the terminal is registered or when it shifts location area, or when the list of priority cells is altered. Thus the terminal always has an updated list of the priority cells.

In cell reselection the terminal can be made to favour the priority cells, in the simplest manner by programming it so that when the C2 parameter of the priority cell is calculated the offset parameter and the delay factor are given zero values, or they are given other such values which generate a C2 parameter value representing a particularly preferred selection of a cell. Via the base stations the system can transmit to the terminal a message, in which particular flag bits or other information sections allow the terminals to apply cell prioritizing or deny it. This message is preferably the same as the message which includes the list of the priority cells.

In accordance with an aspect of this invention a cellular radio system is provided, which comprises terminals, cells and stationary network equipment, and which is arranged to set up radio communication between the terminals and base stations in the cells, wherein radio communication between the terminals and base stations in the cells, wherein radio communication between one terminal is based upon priority information which is relevant to that terminal and independent of other terminals. The priority information may be stored in the terminal itself, or in the stationary network equipment.

The cellular radio system may, for example, be a system such as GSM, or network of a certain operator, such as that of Vodaphone in the UK. In the latter case in particular, the priority information may be used to balance the likely traffic levels between certain base stations (especially in areas of that network with dense traffic where the cells often partially or totally overlap).

The invention is described in more detail below with reference to preferred embodiments presented as examples, and to the enclosed figures, in which:

- figure 1 shows schematically a message transmitted by the cellular radio system;
- figure 2 shows schematically a cellular radio system which applies cell prioritising; and
- figure 3 illustrates an embodiment of a method according to the invention.

Figure 1 shows schematically a so called priority information (PI) message, with which a cellular radio system according to the preferred embodiment of the invention controls cell priorities in individual terminals. It has the following fields:

11 Header

The header defines that this is a message transmitting priority information from the cellular radio system to a particular terminal. The invention does not otherwise restrict the contents or the structure of the header.

12 CI format

With the aid of this field the systems tells whether the terminal should base its operation only on the cell identity (CI) code, on a combination of the cell identity and the location area code (LAC), or only on the LAC of the base station. The system can have cells which have the same cell identity but are located in different location areas, whereby also the LAC is required in order to have an unequivocal identification of the cell. To the user the terminal can also on a display present information relating to a single cell (CI or CI+LAC), to several cells (several cell identities or the LAC + several cell identities), or to the whole location area code (LAC).

13 Display txt

With the aid of this field the systems defines whether the terminal will present to the user the messages mentioned in connection with the previous field only in the idle mode, or also during a call.

14 Txt format

With the aid of this field the systems defines whether the terminal will present to the user a text which is common to all cells, or only text which is unique to the cell.

15 Text CI

With the aid of this field the systems defines how the below presented short text messages and the priority cells are related to each other (ref. cells 20 and 22).

16 Delay?

The description of prior art presented the time delay (the so called penalty time) used in the calculation of the C2 parameter, during which delay a particular cell only recently included in the list of suitable cells gets as its C2 parameter a value showing a disadvantageous selection. In this field the system can give an instruction to the terminal, according to which the terminal does not apply the time delay in the calculation of the C2 parameter for the priority cells.

17 Offset?

The description of prior art presented the offset parameter used in the calculation of the C2 parameter, with which it is possible to have priorities relating to a base station. In this field the system can give to the terminal an instruction, according to which it does not apply the offset parameter in the calculation of the C2 parameter for the priority cells.

18 Hysteresis

CRH (Cell Reselection Hysteresis) means that the terminal which shifted cells and base stations can not immediately shift back to its previous cell. The aim of the CRH is to reduce the number of cell reselections between the location areas. If the new cell is in a different location area than the current cell, then the C2 parameter is not applied as such, but with the addition of the value indicated in the CRH. With this field the system can give the terminal an instruction according to which it does not apply hysteresis on the priority cells, whereby the terminal easily shifts to a priority cell, even if this cell would be in a different location area. The hysteresis prevents a terminal, which shifted into a priority cell, from immediately shifting back to a non-priority cell located in a different location area.

20 CI

This field contains the identities of all priority cells. They can be in a sequence, whereby the next field contains the respective LAC codes in a sequence, or the fields 20 and 21 can alternate so that the cell identity (CI) and the LAC are presented in sequence for each priority cell. The preferred length of one cell identity (CI) is for instance 2 octets (16 bits).

21 LAC

For each priority cell this field contains the respective location area code (LAC), and the length of the field is preferably 2 octets (16 bits). The alternatives for the mutual order of the CI and LAC codes were described above.

22 Text

This field contains short text messages (e.g. 16 octets or eight alphanumeric characters per message), which are intended to be displayed to the user in the display of the terminal when the terminal operates in the respective cell (ref. fields 13, 15 and 20). The text messages can relate to a cell, to a cell group, or to a location area (ref. field 12).

23

The invention does not otherwise limit the contents of the PI message 10, so that it may also contain other fields than those listed above.

Figure 2 shows a cellular radio system 30 which has base stations 31, 32, 33 and 34 with their coverage areas or cells 31a, 32a, 33a and 34a. The block 36 simply represents the other stationary parts of the cellular radio network, such as base station controllers, switch equipment, connections to other communication networks, and so on. A da-

Database 37 is also connected to this block. The operation of a mobile phone 35 in the cellular radio system 30 is discussed below.

Let's assume that the priority cells 32a and 33a are defined for the mobile phone 35, which is shown by the hatched lines in these cells. The cell identities representing these cells and the other parameters controlling the priority practice of the mobile phone are stored in the database 37, which physically can be located at a mobile services switching centre (MSC; not shown in the figure) or at some other location where the operator managing the cellular radio system 30 generates so called intelligent network (IN) services for the network. When the mobile phone 35 is switched on, or when it otherwise arrives in the area of the cellular radio system 30 it will set up a connection to a base station in a manner known per se, and then according to prior art it transmits a so called IMSI Attach request to the network 36, whereby it is registered to operate within the network area, and its location is updated in the location databases (not shown in the figure) of the network. In an arrangement according to a preferred embodiment of the invention the network 36 then transmits to the mobile phone a PI message (priority information) according to figure 1, which contains a list of priority cell identities read from the database 37, whereby the message is a prior art USSD message (Unstructured Supplementary Service Data) or SMS message (Short Message Service).

The list of priority cell identities and the other parameters regarding the priority practice could of course also be permanently stored in the memory of the mobile phone 35, but the above described use of the database associated to the network provides some particular advantages. The most important of these is the automatic updating of the information in the mobile phone. If the priority data is altered, e.g. when a new base station is installed, or due to an altered contract between the operator and the user, then the operator or any other quarter realizing the changes will record these changes in the database 37, whereby the mobile phone 35 will obtain updated information when it registers the next time, without having to visit an authorised sales representative in order to update the software. It is also possible to present an embodiment in which altered information in the database 37 automatically generates an update message from the network to the mobile phone 35 without a need to reregister. When the priority information is stored in a database of the network a dishonest user is not able to change the priority settings as easily as if the data were permanently stored in the mobile phone. The priority data can also be defined to be identical for a certain user group, whereby all mobile phones associated to the group receive PI messages which are substantially identical. The group settings are simply changed by altering the data in the database 37.

Let's assume that the mobile phone 35 has transmitted an IMSI Attach request via a non-priority base station 31 and has, via the same base station, received information about the priority cell identities. The mobile phone 35 begins to receive SI messages (System Information) transmitted on the BCCH channels by other base stations in a manner known per se, whereby it will obtain the cell identities of the other cells. For cell reselection the mobile phone generates a list of possible new cells in addition to the current cell, whereby the C2 parameters calculated for the cells are the decisive factors which determine the order in the list. In the situation shown in figure 2 the C2 parameter calculated for the cell 32a shows that it is more advantageous than the cell 31a, whereby the mobile phone selects the cell 32a as a new cell. A practice for generating an advantageous value for the C2 parameter of a priority cell is shown in more detail below as an example.

When the C2 parameter is calculated it is advantageous that in the PI message the mobile phone 35 is instructed not to observe the time delays of the priority cells (field 16 in figure 1), whereby the priority cell 32a immediately appears as a very advantageous cell on the cell reselection list. If the mobile phone 35 is at that border of the cell 32a which is close to the non-priority cell's 31a base station 31, then it probably will receive the signal transmitted by the last mentioned base station as a stronger signal than that transmitted by the base station 32. In order to have the mobile phone also in this situation to select the priority cell 32a, the offset parameters and PI messages transmitted by the base stations 31 and 32 must be arranged so that the PI message instructs the mobile phone to calculate the C2 parameter of the priority cell 32a without the offset parameter, but to calculate the C2 parameter of the non-priority cell 31a with the offset parameter (field 17 in figure 1), whereby the C2 parameter representing the priority cell 32a will be as advantageous as possible also at the fringes of the cell 32a.

According to figure 1 the PI message contains information about whether hysteresis should be applied also in the case of priority cells (field 18 in figure 1). The hysteresis can be the above mentioned CRH hysteresis or the time hysteresis according to paragraph 6.2.2 in the standard GSM 05.08. In figure 2 the priority cell 32a is in whole within the area of the non-priority cell 31a, so that in certain situations it may happen that both cells appear to the mobile phone 35 as being almost equal regarding the cell reselection. If application of the hysteresis is prevented when cell reselection would mean shifting from a non-priority cell into a priority cell, then the mobile phone can always be made to shift rapidly from the cell 31a back to cell 32a, but to delay a shift in the opposite direction.

Next we show in more detail an exemplary practice to calculate the C2 parameter so that the above presented functions are obtained. For non-priority cells the mobile phone calculates the C2 parameters in a prior art manner known per se, i.e. by using the formulas

$$C2(T) = C1 + CELL_RESELECT_OFFSET - TEMPORARY_OFFSET * H(PENALTY_TIME - T), \text{ when } PENALTY_TIME < 11111,$$

H(PENALTY_TIME - T), when PENALTY_TIME < 11111,

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and

$$C2 = C1 - CELL_RESELECT_OFFSET, \text{ when } PENALTY_TIME = 11111,$$

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where the step function H(x) is defined as

$$H(x) = 0, \text{ when } x < 0,$$

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and

$$H(x) = 1, \text{ when } x \geq 0.$$

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The above mentioned offset parameter relating to a base station is here shown with the name CELL_RESELECT_OFFSET according to the GSM standards, and the above mentioned delay factor is the product of the temporary offset parameter TEMPORARY_OFFSET and the step function H, in which the value of the step function H depends on the relation between the examination moment and the defined delay PENALTY_TIME. The values of the correction factors for priority cells depend on the PI message received by the mobile phone. If the delay? field of the PI message contains a certain value (e.g. 1), then the mobile phone gives the TEMPORARY_OFFSET a zero value when the C2 parameter of the priority cell is calculated. Correspondingly, if the offset? field of the PI message contains a certain value (e.g. 1), then the mobile phone gives the CELL_RESELECT_OFFSET a zero value in the calculation of the C2 parameter for the priority cell, when PENALTY_TIME is 11111.

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The modified C2 parameter could also be called C2_PRIORITY_CELL. It is advantageous if the mobile phone uses modified C2 parameter calculation only when its current cell is a non-priority cell. The operation of the mobile phone can be formulated as an algorithm in pseudo-language as follows, each step followed by a corresponding reference designator is Fig. 3:

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IF (current cell is a priority cell) 301
 THEN calculate C1 and C2 for N cells with the highest power 302
 IF(at least 1 priority cell, including current cell, with $C1 > 0$) 303
 THEN select the best priority cell in the order
 determined by C2 304
 ELSE select the best non-priority cell in the order determined by C2 305
 ELSE
 IF(any of the neighbour cells, except the current cell, is a priority cell)306
 THEN {
 select N cells with highest power 307,
 calculate C2_PRIORITY_CELL for the priority cells within the N cells,
 calculate C2 for non-priority cells within the N cells, 308
 select best cell in the order determined
 by C2 / C2_PRIORITY_CELL} 309
 ELSE {
 calculate C1 and C2 for N cells with highest level, 310
 select the best cell in the order determined by C2} 311

The effect of the hysteresis, whether it is used or not, does not appear in the above described algorithm, but in the light of what was presented above it is simple to add the hysteresis as a part of the comparison of the C2 or C2_PRIORITY_CELL values.

To the operator managing a cellular radio system the invention presents a wide range of possibilities to control cell priorities relating to one device. This is very advantageous, because from the network's point of view all terminals do not behave identically, so that the use of a single standard pattern for all devices would inevitably cause disadvantageous functions in some devices. As an example we may consider a situation in which a user daily moves through or past a priority cell without staying too long in the cell (for instance, the cell may be in a building, which the user with his terminal daily passes at a high speed in his car along the highway). While the cell generally speaking is a priority cell, it is not worth for the mobile phone to use this cell during such a rapid passing, because a short visit to a cell only hinders the synchronisation of the terminal in the network and causes extra signalling traffic. The operator can program the computer which monitors the system operation so that it will detect the corresponding cases. In the detected cases the respective terminal can be instructed to use a delay factor in the calculation of the C2 parameter for said priority cell, whereby during a rapid passing the cell's C2 parameter does not have time to rise to a level which would indicate advantageous cell reselection. By testing and simulating it is possible to find other corresponding situations in which the system operation can be optimised by selecting parameters relating to individual devices.

In prior art systems a terminal of the cellular radio system includes a certain fixed amount of cells in a list, on the basis of which it performs cell reselection. The length of a commonly used list is six cells. In order to better find the priority cells the length of the list can be increased to comprise e.g. as many cells as there are cells in the BA(BCCH) or BA(SACCH) messages (BCCH Allocation - Broadcast Control Channel / Slow Associated Control Channel) transmitted by the base station of the current cell. It is worth to extend the list, particularly when the terminal does not otherwise detect priority cells in the neighbourhood, but assumes on the basis of the stored handover history, or on the basis of the received LAC codes and/or cell identities, that there may be priority cells in the neighbourhood, which

do not appear in the short list. Then the difference to prior art is that the terminal does not have to check all possible BCCH frequencies, but it can simply increase the number of cell identities which it keeps in its memory. The scanning of all frequencies would require more power and take more time, and the ability to receive a paging message representing an incoming call would be reduced. If there are no priority cells in the list an alternative to an extended list would be that the terminal continuously replaces the last cell in the list, so that it would get at least one priority cell on the list.

Above we presented a priority arrangement with cells of only two levels: priority cells and non-priority cells. One user can also have several geographically different "home areas", such as for instance the area at home and at the place of work. The system can regard these areas as being of equal value, so if they are very close to each other or even touch each other, they form one priority home area. However, as the cells have individual different cell identities and text attached to it (ref. the field 23 in figure 1) and they can have different LAC codes, then the terminal can display a different text message to the user, depending on in which priority cell of the home area it operates. Further the invention does not restrict the use of priorities at different levels, which can be realised with suitable offset parameters and control instructions transmitted via the PI message.

The terminal must receive SI messages of the so called type 3 which are transmitted by other base stations, so that it will be able to detect the cell identities of adjacent cells. This might result in that the terminal does not receive a simultaneously transmitted paging message representing an incoming call. In order to make this happen as seldom as possible the terminal must receive the SI messages of type 3 relatively seldom, e.g. only once in 30 minutes.

It will be evident in view of the foregoing description that various modifications may be made within the scope of the present invention.

The scope of the present disclosure includes any novel feature or combination of features disclosed therein either explicitly or implicitly or any generalisation thereof irrespective of whether or not it relates to the claimed invention or mitigates any or all of the problems addressed by the present invention. The applicant hereby gives notice that new claims may be formulated to such features during prosecution of this application or of any such further application derived therefrom.

Claims

1. A cellular radio system (30), which comprises terminals (35), cells (31a, 32a, 33a, 34a) and stationary network equipment (36, 37), of which said terminals are arranged to set up and maintain radio communication with the base stations (31, 32, 33, 34) in the cells, **characterized** in that regarding the setting up and maintaining of radio communication at least one terminal (35) is arranged to favour at least one cell (32a, 33a) with respect to other cells (31a, 34a), in a manner independent of other terminals.
2. A cellular radio system according to claim 1, **characterized** in that the stationary network equipment comprises a database (37) for storing cell priority data relating to individual terminals.
3. A cellular radio system according to claim 2, **characterized** in that the stationary network equipment is arranged to supply information to the terminal about priority data stored in the database relating to the terminal, as a response to an excitation, which is one of the following: the terminal registers with the cellular radio system, the terminal's location data changes in the cellular radio system, the priority data in said database is altered, a predetermined time has passed since the previous message to the terminal, which contained priority data relating to the terminal.
4. A cellular radio system terminal (35), which is arranged to set up and maintain radio communication with the base stations (31, 32, 33, 34) in the cells (31a, 32a, 33a, 34a) of the cellular radio system, **characterized** in that regarding the setting up and maintaining of radio communication the terminal is arranged to favour at least one cell (32a, 33a) with respect to other cells (31a, 34a), in a manner independent of other terminals.
5. A terminal according to claim 4 which is further arranged to maintain a list of possible cells for cell reselection and to arrange said list in an order which is based on a parameter calculated for each cell, **characterized** in that for priority cells it is arranged to alter the parameter calculation relating to the cell, so that said parameter gets a particularly advantageous value in the case of a priority cell.
6. A method to realise cell prioritizing in a cellular radio system (30) comprising terminals (35), cells (31a, 32a, 33a, 34a) and stationary network equipment (36, 37), of which said terminals are arranged to set up and maintain radio communication with the base stations in the cells, **characterized** in that regarding the setting up and maintaining of radio communication it utilizes priority data relating to a terminal in order to favour at least one cell (32a, 33a)

with respect to other cells (31a, 34a), in a manner independent of other terminals.

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7. A method according to claim 6, **characterized** in that the priority data relating to a terminal is stored in a database (37) of the stationary network equipment, and that the priority data is transmitted to the terminal as a response to an excitation, which is one of the following: the terminal registers with the cellular radio system, the terminal's location data changes in the cellular radio system, the priority data in said database is altered, a predetermined time has passed since the previous message to the terminal, which contained priority data relating to the terminal.
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8. A method according to claim 6 or claim 7, in which a terminal further maintains a list of possible cells for cell reselection and arranges said list in an order based on a parameter which is calculated for each cell, **characterized** in that for priority cells the terminal alters the parameter calculation relating to the cell, so that said parameter gets a particularly advantageous value in the case of a priority cell.
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9. A method according to any of claims 6 to 8, **characterized** in that the priority data relating to a terminal comprises at least the priority cell identity (20) and information about the fact whether or not the terminal shall apply an offset parameter (17), a delay factor (16) relating to the cell, and cell reselection hysteresis in the calculation of the parameter relating to a priority cell.
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10. A method according to any of claims 6 to 9, **characterized** in that the terminal does not apply the delay factor relating to the cell nor the cell reselection hysteresis when it calculates the parameter relating to a cell, in a situation where cell reselection represents shifting from a non-priority cell to a priority cell.
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11. A method of selecting a cell in a cellular telecommunication network for establishing radio communication, the method comprising transmitting to a radio telephone network cell information over which radio communication can be established; transmitting to the radio telephone priority information relevant to the radio telephone for at least one of the cells where this information is independent of other radio telephones; the radiotelephone performing cell selection over which radio communication is to be established based on the transmitted cell and priority information.
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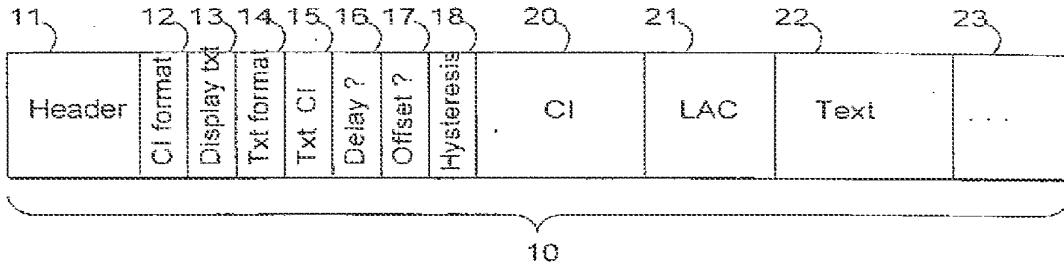


Fig. 1

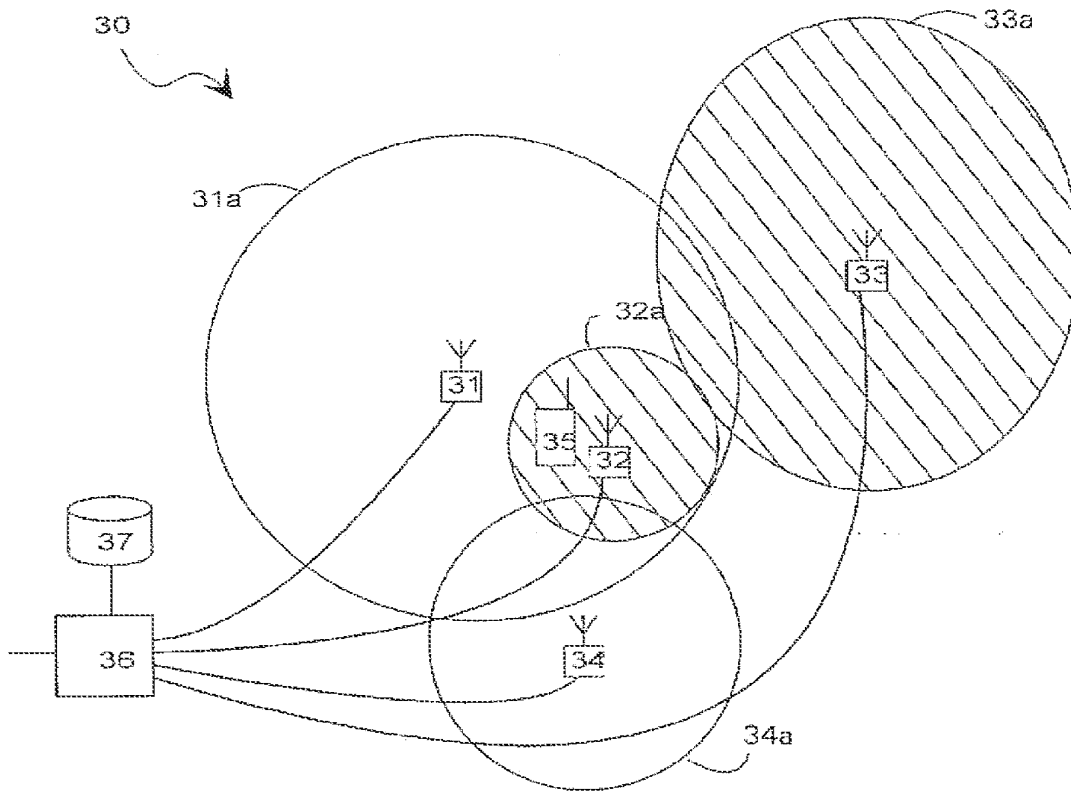


Fig. 2

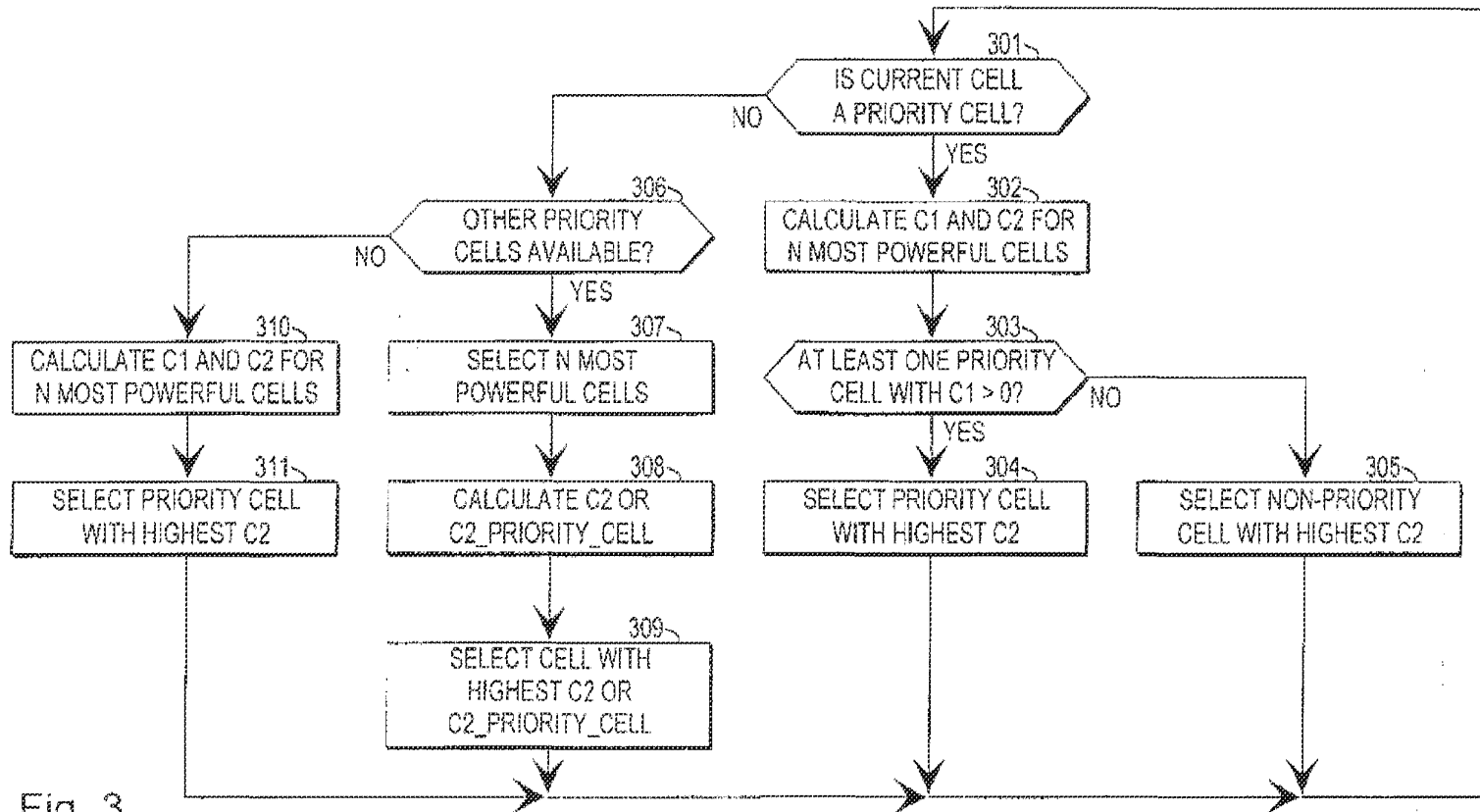
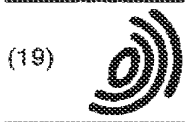
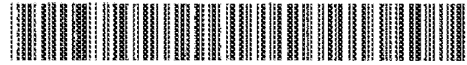


Fig. 3



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(54) Cell prioritising in a cellular radio system

(57) In a cellular radio system (30) the terminals (35) are arranged to set up and maintain radio communication with the base stations (31, 32, 33, 34) in the cells (31a, 32a, 33a, 34a). Regarding the setting up and maintaining of radio communication at least one terminal (35) is arranged to favour at least one cell (32a, 33a) with respect to other cells (31a, 34a), in a manner independent of other terminals. The priority data relating to a terminal are stored in a central database (37), from which they are transmitted to the terminal when it registers.

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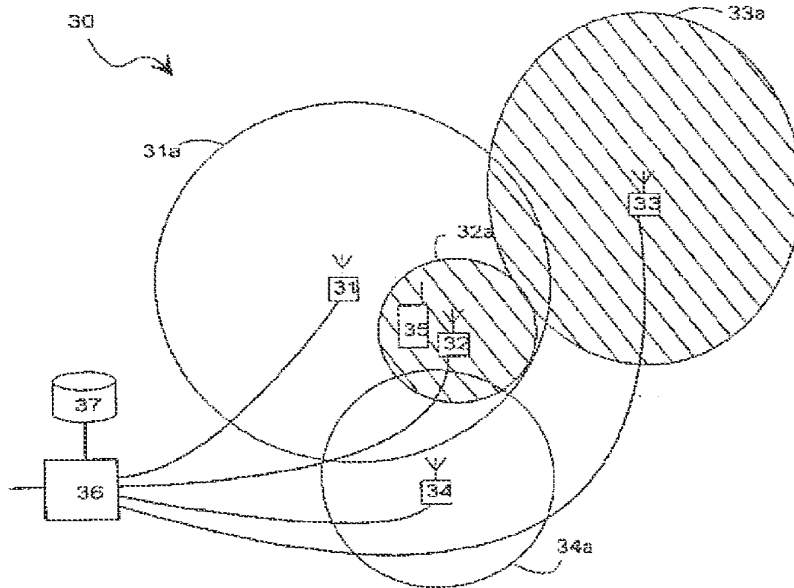


Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
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Place of search BERLIN		Date of completion of the search 13 August 1999	Examiner Rothluebbers, C
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons * : member of the same patent family, corresponding document	
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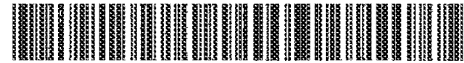
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(54) **METHOD, SYSTEM AND NETWORK DEVICE FOR OBTAINING CELL RESELECTION PRIORITY**

(57) A method, a system, and a network device for obtaining cell reselection priority are disclosed. According to one method aspect, the network obtains information for calculating priority; and the network determines a terminal-specific private priority list according to the information, and delivers the determined private priority list specific to the terminal through special signaling; or the terminal obtains all or part of the information for calculating priority from the network, and determines its private priority list according to the obtained information; or both the network and the terminal determine the terminal-specific private priority list according to the information.

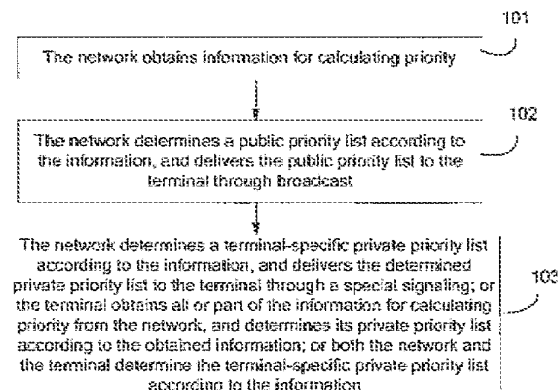


FIG. 1

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Description

[0001] This application claims priority to Chinese Patent Application No. 200810002818.1, filed with the Chinese Patent Office on January 04, 2008 and entitled "Method and System for Obtaining Cell Reselection Priority", which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to communication technologies, and in particular, to a method, a system, and a network device for obtaining cell reselection priority.

BACKGROUND

[0003] With the development of mobile communication technologies, more and more mobile communication systems come forth, for example, Global System For Mobile Communication (GSM) which is also known as the 2nd Generation (2G) mobile communication system; Wideband Code Division Multiple Access (WCDMA), Code Division Multiple Access 2000 (CDMA2000), and Time Division-Synchronous CDMA (TD-SCDMA), which are also known as the 3rd Generation (3G) mobile communication systems; and the systems currently under development such as Long Term Evolution (LTE) and World Interoperability for Microwave Access (WiMAX). If different systems coexist, when a moving terminal performs cell reselection, multiple frequencies within a system and the cells of multiple systems are available for selection. Therefore, it is important to reselect a proper cell, reduce the measurement and save power consumption.

[0004] In the existing LTE system, to obtain cell reselection priority cannot be performed.

SUMMARY

[0005] A method, a system, and a network device for obtaining cell reselection priority are disclosed according to aspects of the present invention so that the terminal can obtain public priority and private priority and can provide relevant information for the processes such as cell reselection and cell search.

[0006] A method for obtaining cell reselection priority is disclosed according to one aspect. The method includes the steps of a network obtaining information for calculating priority; and the network determining a private priority list specific to a terminal according to the information, and delivering the determined private priority list specific to the terminal through special signaling; or the terminal obtaining all or part of the information for calculating the priority from the network, and determining the private priority list specific to the terminal according to the obtained information; or the network and the terminal determining the private priority list specific to the terminal according to the obtained information.

[0007] A system for obtaining cell reselection priority is disclosed according to another aspect. The system includes a network-side entity, adapted to: obtain information for calculating priority, determine a public priority list and a terminal-specific private priority list according to the information, and deliver the public priority list and the private priority list specific to the terminal.

[0008] A network device is disclosed according to a still further aspect. The network device includes an information obtaining unit, adapted to obtain information for calculating priority; a priority determining unit, adapted to determine a private priority list according to the information obtained by the information obtaining unit; and a priority delivering unit, adapted to deliver the private priority list.

[0009] The technical solution under the present invention reveals that: In the embodiments of the present invention, a network and/or a terminal determines the private priority of the cell, frequency, or system; and when the network determines the private priority, the network delivers the determined private priority list specific to the terminal through special signaling. When the terminal and/or the network determines the private priority, the network delivers the information about the determined priority or the independently determined private priority list specific to the terminal; and the terminal can determine a private priority list according to the information or the private priority list determined by the network in view of the information stored by the terminal. Therefore, relevant information is provided for the processes such as cell reselection and cell search, the power consumption caused by terminal measurement is reduced, and energy efficiency is accomplished. When cell reselection is required, the terminal evaluates cell reselection to determine the cell to be reselected according to the private priority list of the cell, frequency or system, the exclusive conditions which currently affect cell reselection, or further according to the public priority list. In this way, it is certain that the terminal can select a proper cell.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a flowchart of a method for a terminal to obtain cell reselection priority in an embodiment of the present

invention;

[0011] FIG. 2 is a flowchart of a cell reselection method in an embodiment of the present invention;

[0012] FIG. 3 shows a structure of a network device in a first embodiment of network device in the present invention;

[0013] FIG. 4 shows a structure of a network device in a second embodiment of network device in the present invention;

[0014] FIG. 5 shows a structure of a terminal in a first terminal embodiment in the present invention; and

[0015] FIG. 6 shows a structure of a terminal in a second terminal embodiment in the present invention.

DETAILED DESCRIPTION

[0016] In order to make the technical solution under the present invention clearer, the present invention is hereinafter described in detail by reference to accompanying drawings and preferred embodiments.

[0017] In an LTE system, the reselection of different-frequency and different-system cells is principally based on priority. The corresponding priority is formulated for different frequencies and systems. When the terminal performs cell reselection, the terminal decides to reside on a specific cell according to priority. That is, the terminal measures the frequency or system of higher priority first. If the cell of the frequency or system of higher priority meets the cell reselection conditions, the terminal reselects the cell; otherwise, the terminal measures the cell of lower priority. When the terminal resides on a lower-priority cell, the terminal measures the cell of the frequency of system of higher priority periodically. If the higher-priority cell meets the reselection conditions, the terminal reselects the higher-priority cell.

[0018] When the terminal performs cell reselection, it is necessary to determine the priority of the cell, frequency or system so that the terminal can determine the cell for residing according to the priority. Priority falls into two types: public priority and private priority. Public priority refers to the priority which is specific to a cell, frequency or system and is the same to all terminals in a cell. Private priority refers to priority specific to a terminal. Different terminals in a cell may have different private priority.

[0019] In embodiments of the present invention, a priority level may be assigned to each frequency layer or system adjacent to the serving cell, thus generating a private priority list and a public priority list.

[0020] The priority of a cell, frequency, or system depends on many factors. For example, in an LTE system, the factors include but are not limited to:

terminal capability: This information may be stored on the core network and the terminal;

cell bandwidth: This information may be stored on an evolved Node B (eNB);

subscription information: This information may be stored on the core network and the terminal;

service provider policy: This information may be stored on the core network and the eNB;

history service information: This information may be stored on the core network and the terminal;

mobility or history mobility information: This information may be stored on the terminal;

residing load: This information may be stored on the eNB;

service load: This information may be stored on the eNB;

whether the network is shared: This information may be stored on the core network;

whether it is in support of broadcast and multicast services; or

whether the base station is home base station;

or any combination thereof.

[0021] Such information may be stored on different network entities or terminals. Therefore, methods and systems for obtaining cell reselection priority under the present invention may be implemented in different ways.

[0022] In embodiments of the present invention, a network and/or a terminal determines the private priority of the cell, frequency, or system; and, when the network determines the private priority, the network delivers the determined private priority list specific to the terminal through special signaling.

[0023] A system for obtaining cell reselection priority in a first embodiment of the present invention includes:

a network-side entity, adapted to: obtain information for calculating priority, and determine a public priority list and a terminal-specific private priority list according to the obtained information, then deliver the public priority list to the terminal through broadcast channel and deliver the private priority list specific to the terminal through special signaling; and

a terminal, adapted to receive the public priority list and the private priority list.

[0024] For an LTE system, the network-side entity that determines the public priority list may be an eNB, and the network-side entity that determines the private priority list may be an eNB or a Mobile Management Entity (MME).

[0025] In this embodiment, the terminal may be further adapted to determine a new private priority list according to the existing private priority list and the information stored in the terminal for calculating priority.

[0026] A system for obtaining cell reselection priority in a second embodiment of the present invention includes:

a network-side entity, adapted to: obtain information for calculating priority, and deliver all or part of the information to the terminal through broadcast channel and/or a special signaling; and
 a terminal, adapted to: receive the information for calculating priority, and determine a private priority list according to the received information and the information stored in the terminal for calculating priority.

[0027] In this embodiment, the network-side entity may be further adapted to: determine a public priority list according to the obtained information for calculating priority, and deliver the public priority list to the terminal through broadcast channel.

[0028] The network-side entity may also be adapted to notify the terminal of the algorithm for calculating the priority so that the terminal can determine the private priority list according to the algorithm when delivering all or part of the information to the terminal.

[0029] In this embodiment, the network-side entity includes an eNB and/or an MME.

[0030] A method for obtaining cell reselection priority is disclosed in an embodiment of the present invention. As shown in FIG. 1, the method includes the following:

[0031] Block 101: The network obtains the information for calculating priority. The information may be one of or any combination of the information items listed above.

[0032] Block 102: The network determines a public priority list according to the obtained information, then delivers the public priority list to a terminal through broadcast channel. This block is optional.

[0033] The network-side eNB may calculate the public priority of the cell, frequency or system according to the information, for example, cell bandwidth, and service provider policy, for calculating priority, and generate a public priority list and deliver it to the terminal. The features of different systems may be considered in calculating the public priority, for example, the order of priority of different systems may be set to: LTE > WCDMA > GSM.

[0034] Block 103: The network determines a terminal-specific private priority list according to the information, and delivers the determined private priority list specific to the terminal through special signaling. Alternatively, the terminal obtains all or part of the information for calculating priority from the network, and determines its private priority list according to the obtained information. Or, the network and the terminal determine the terminal-specific private priority list according to the obtained information.

[0035] The process of the network determining the private priority, the process of the terminal determining the private priority, and the process of the network and the terminal determining the private priority are detailed below, taking an LTE system as an example.

[0036] I. The network-side eNB determines the private priority.

[0037] When the terminal enters the Radio Resource Control Connected (RRC_CONNECTED) state, the eNB obtains the information for calculating priority. The information includes the information stored by the eNB and the information obtained from the MME. The information stored by the eNB includes the cell bandwidth information; and the information obtained by the eNB from the MME includes: terminal capability, subscription information, service provider policy, history service information, and whether the network is shared. According to such information, the eNB calculates and generates a private priority list specific to the terminal, and sends the private priority list specific to the terminal through special signaling. The special signaling may be an RRC Connection Release Request or an RRC Connection Reconfiguration.

[0038] Besides, the eNB calculates and generates a public priority list according to the obtained information such as cell bandwidth and service provider policy, and delivers the public priority list through broadcast channel. The features of different systems may be considered in calculating the public priority, for example, the order of priority of different systems may be set to: LTE > WCDMA > GSM.

[0039] Example 1: It is assumed that a terminal is in a macro cell; one of the neighboring cells is a macro cell which is not overloaded, and the terminal supports all services provided by the neighboring cell; another neighboring cell is a home base station cell.

[0040] Table 1 sets out the information which is obtained by the eNB for calculating priority:

Table 1

Factor	Priority level (0-5) and its meaning	Priority weight	Description
Subscription information	0: Proper 3: Default 5: No subscription	20%	If the terminal has not subscribed to the service of the cell, the cell is of the lowest priority or excluded

(continued)

Factor	Priority level (0-5) and its meaning	Priority weight	Description
Terminal capabilities	0: Proper 3: Default 5: Not supported	20%	If the terminal capabilities do not support the service of the cell, the cell is of the lowest priority or excluded
Service provider's policy	3: Default	20%	Service provider policy
History service information	3: Default	10%	History service information
Network sharing	3: Default	10%	Whether the Network is shared
Cell bandwidth	3: Default	10%	Cell bandwidth
Support of broadcast and multicast services	3: Default	10%	Broadcast and multicast services

- The eNB calculates the priority of the neighboring macro cell according to the priority weight:
 $Priority\ level = 0 * 20\% + 0 * 20\% + 3 * 20\% + 3 * 10\% + 3 * 10\% + 3 * 10\% + 3 * 10\% = 1.8$; the priority level is rounded up to 2, which is relatively high;
 The priority of another neighboring home base station cell is 0, which is the highest.
 Therefore, the generated private priority list includes the priority levels of two cells, namely, (2, 0).
- The eNB delivers the private priority list specific to the terminal through special signaling.
- The eNB determines the public priority list to be (0, 0) according to the service provider policy, and delivers the public priority list to the terminal.

[0041] Example 2: It is assumed that the terminal is in a macro cell. There are three neighboring cells, two of which are macro cells on different frequency layers in the LTE system; one of the two macro cells (cell 1) is overloaded, and the terminal capabilities support all the services provided by cell 1; the other neighboring cell (cell 2) is not overloaded; and there is a neighboring cell (cell 3) in the WCDMA system, and the terminal has not subscribed to the WCDMA service.

[0042] Table 2 sets out the information which is obtained by the eNB for calculating priority:

Table 2

Factor	Priority level (0-5) and its meaning	Priority weight	Description
Subscription information	0: Proper 3: Default 5: No subscription	20%	If the terminal has not subscribed to the service of the cell, the cell is of the lowest priority or excluded
Terminal capabilities	0: Proper 3: Default 5: Not supported	20%	If the terminal capabilities do not support the service of the cell, the cell is of the lowest priority or excluded
Service provider policy	3: Default	20%	Service provider policy
History service information	3: Default	10%	History service information
Network sharing	3: Default	10%	Whether the Network is shared
Cell bandwidth	3: Default	10%	Cell bandwidth
Support of broadcast and multicast services	3: Default	10%	Broadcast and multicast services

1. The eNB calculates the priority of the neighboring macro cell according to the priority weight:

Cell 1 on frequency layer: Because this cell is overloaded, the priority level is 5, which is the lowest;
 Cell 2 on frequency layer: Priority level = $0 * 25\% + 0 * 25\% + 3 * 20\% + 3 * 10\% + 3 * 10\% + 3 * 10\% + 3 * 10\% = 1.8$; the priority level is rounded up to 2, which is relatively high; and
 Cell 3: The terminal has not subscribed to the cell, and there list two processing approaches: One is to exclude, namely, the cell is blacklisted and the terminal is unable to reselect the cell; another is to set the priority level of the cell as 5, which is the lowest, in which case the terminal can reside on the cell, but can initiate no normal service except emergency calls for lack of subscription.

Therefore, the private priority list includes the priority levels of three cells, namely, (5, 2, 5).

2. The eNB delivers the private priority list specific to the terminal through special signaling.
3. The eNB determines the public priority list to be (0, 0, 3) according to the service provider policy, and delivers the public priority list to the terminal.

[0043] II. The network-side MME determines the private priority.

[0044] The MME obtains the information for calculating priority, including: terminal capabilities, subscription information, service provider policy, history service information, and whether the network is shared. According to such information, the MME calculates and generates a private priority list specific to the terminal. When the terminal enters the RRC_CONNECTED state, the MME delivers the private priority list specific to the terminal through special signaling. The special signaling may be a NAS message such as Attach process signaling or Tracking/Location/Route Area (TA/LA/RA) update process signaling.

[0045] Besides, the eNB calculates and generates a public priority list according to the obtained information such as cell bandwidth and service provider policy, and delivers the public priority list through broadcast channel.

[0046] For example, it is assumed that the terminal is in a macro cell; there are three neighboring cells, two of which are macro cells on different frequency layers in the LTE system. One of the two macro cells (cell 1) is overloaded, and the terminal capabilities support all the services provided by cell 1; the other neighboring cell (cell 2) is not overloaded; and there is a neighboring cell (cell 3) in the WCDMA system, while the terminal has not subscribed to the WCDMA service.

[0047] Table 3 sets out the information which is obtained by the MME for calculating priority:

Table 3

Factor	Priority level (0-5) and its meaning	Priority weight	Description
Subscription information	0: Proper 3: Default 5: No subscription	25%	If the terminal has not subscribed to the service of the cell, the cell is of the lowest priority or excluded
Terminal capabilities	0: Proper 3: Default 5: Not supported	25%	If the terminal capabilities do not support the service of the cell, the cell is of the lowest priority or excluded
Service provider policy	3: Default	20%	Service provider policy
History service information	3: Default	10%	History service information
Network sharing	3: Default	10%	Whether the Network is shared or not
Support of broadcast and multicast services	3: Default	10%	Broadcast and multicast services

1. The MME calculates the priority of the neighboring macro frequency layer or the system according to the priority weight:

Cell 1 on frequency layer: Because this cell is overloaded, the priority level is 5, which is the lowest;
 Cell 2 on frequency layer: Priority level = $0 * 25\% + 0 * 25\% + 3 * 20\% + 3 * 10\% + 3 * 10\% + 3 * 10\% + 3 * 10\% = 1.8$; the priority level is rounded up to 2, which is relatively higher; and

Cell 3: The cell is in a different system and the terminal has not subscribed to the cell, and there list two processing approaches: One is to exclude, namely, the cell is blacklisted and the terminal is unable to reselect the cell; another is to set the priority level of the cell to be 5, which is the lowest, in which case the terminal can reside on the cell, but can initiate no normal service except emergency calls for lack of subscription.

The MME generates a private priority list which includes the priority levels of three cells, namely, (5, 2, 5).
 2. The MME delivers the private priority list specific to the terminal through special signaling.
 3. The eNB determines the public priority list to be (0, 0, 3) according to the service provider policy, and delivers the public priority list to the terminal.

[0048] III. The terminal determines the private priority.

[0049] The network (including the eNB and the MME) obtains the relevant information. Such information may be the information inaccessible to the terminal, for example, cell bandwidth, service provider policy, and whether the network is shared. The network delivers the obtained information (optionally including the algorithm for calculating the priority) to the terminal through broadcast and/or special signaling. After receiving the above information, the terminal formulates a private priority list for cell reselection in view of the received information and the information stored by the terminal, for example, terminal capabilities, subscription information, history service information, mobility or history mobility information.

[0050] When the information received by the terminal includes an algorithm for calculating priority, the terminal may calculate the priority of the cell according to the algorithm delivered by the network. When the information received by the terminal does not include the algorithm for calculating priority, the terminal may calculate the priority of the cell according to its own algorithm.

[0051] For example, it is assumed that the terminal is in a macro cell; there are three neighboring cells, two of which are macro cells on different frequency layers in the LTE system are macro cells. One of the two cells (cell 1) is overloaded, and the terminal capabilities support all the services provided by the cell; the other neighboring cell (cell 2) is not overloaded; and there is a neighboring cell (cell 3) in the WCDMA system, yet the terminal has not subscribed to the WCDMA service.

[0052] The algorithm obtained by the terminal from the network calculates the priority according to the priority weight. Table 4 sets out the information parameters for calculating the priority:

Table 4

Factor	Cell1	Cell2	Cell3	Description
Service provider policy	High (LTE)	High (LTE)	Medium (WCDMA)	Service provider policy
Network sharing	Supported	Supported	Not supported	Whether the network is shared or not
Cell bandwidth	10 MHz	20 MHz	5 MHz	Cell bandwidth

[0053] Table 5 sets out the information which is obtained by the terminal from the network, and the information stored by the terminal for calculating priority:

Table 5

Factor	Priority level (0-5) and its meaning	Priority weight	Description
Subscription information	0: Proper 3: Default 5: No subscription	25%	If the terminal has not subscribed to the service of the cell, the cell is of the lowest priority or excluded
Terminal capabilities	0: Proper 3: Default 5: Not supported	25%	If the terminal capabilities do not support the service of the cell, the cell is of the lowest priority or excluded
Service provider policy	3: Default	20%	Service provider policy
History service information	3: Default	10%	History service information

(continued)

Factor	Priority level (0-5) and its meaning	Priority weight	Description
Network sharing	3: Default	10%	Whether the network is shared
Support of broadcast and multicast services	3: Default	10%	Broadcast and multicast services

1. According to the obtained parameter list and the algorithm for calculating priority in addition to the terminal's own parameters, the terminal calculates the priority level of the frequency layer and the system of the neighboring macro cell in view of the priority weight:

Cell 1 on frequency layer: Because this cell is overloaded, the priority level is 5, which is the lowest;
 Cell 2 on frequency layer: Priority level = $0 * 20\% + 0 * 20\% + 3 * 20\% + 3 * 10\% + 3 * 10\% + 3 * 10\% + 3 * 10\% = 1.8$; the priority level is rounded up to 2, which is relatively higher; and
 Cell 3: The cell is in a different system and the terminal has not subscribed to the cell, and there list two processing approaches: One is to exclude, namely, the cell is blacklisted and the terminal is unable to reselect the cell; the other is to set the priority level of the cell to be 5, which is the lowest, in which case the terminal can reside on the cell, but can initiate no normal service except emergency calls for lack of subscription.

According to the calculated priority, the terminal generates a private priority list which includes the priority levels of three cells, namely, (5, 2, 5).

2. The eNB determines the public priority list to be (0, 0, 3) according to the service provider policy, and delivers the public priority list to the terminal.

[0054] IV. The eNB and the terminal determine the private priority jointly.

[0055] When the terminal enters the RRC_CONNECTED state, the eNB obtains the information required for calculating the priority. Such information includes the information stored by the eNB and the information obtained from the MME. For example, the information stored by the eNB includes the cell bandwidth information; and the information obtained by the eNB from the MME includes: terminal capability, subscription information, service provider policy, history service information, and whether the network is shared. According to the obtained information, or such information inaccessible to the terminal (for example, cell bandwidth, and service provider policy) among the obtained information, the eNB calculates out and generates a private priority list specific to the terminal, and sends the private priority list specific to the terminal through special signaling. The special signaling may be an RRC Connection Release Request or an RRC Connection Reconfiguration. According to the received priority list and the information stored by the terminal, the terminal calculates the private priority list.

[0056] Besides, the eNB calculates and generates a public priority list according to the obtained information such as cell bandwidth and service provider policy, and delivers the public priority list through broadcast channel. The features of different systems may be considered in calculating the public priority, for example, the order of priority of different systems may be set to: LTE > WCDMA > GSM.

[0057] For example, it is assumed that the terminal is in a macro cell; there are three neighboring cells, two of which are macro cells on different frequency layers in the LTE system. One of the two cells (cell 1) is overloaded, and the terminal capabilities support all the services provided by the cell; the other (cell 2) is not overloaded; and there is a neighboring cell (cell 3) in the WCDMA system, yet the terminal has not subscribed to the WCDMA service.

[0058] Table 6 sets out the information which is obtained by the eNB for calculating priority:

Table 6

Factor	Priority level (0-5)	Priority weight	Description
Service provider policy	3: Default	50%	Service provider policy
Network sharing	3: Default	25%	Whether the network is shared
Cell bandwidth	3: Default	25%	Broadcast and multicast services

1. The eNB calculates and generates a priority list according to the information inaccessible to the terminal.

Cell 1 on frequency layer: Because this cell is overloaded, the priority level is 5, which is the lowest;

Cell 2 on frequency layer: Priority level = $3 * 50\% + 3 * 25\% + 3 * 25\% = 3$; the priority level is medium; and
 Cell 3: The cell is in a different system and the terminal has not subscribed to the cell. There are two processing
 approaches: One is to exclude, namely, the cell is blacklisted and the terminal is unable to reselect the cell; another
 is to set the priority level of the cell to be 5, which is the lowest, in which case the terminal can reside on the cell,
 but can initiate no normal service except emergency calls for lack of subscription.
 The MME generates a private priority list which includes the priority levels of three cells, namely, (5, 3, 5), and
 delivers the private priority list specific to the terminal.

2. It is assumed that the information stored in the terminal is shown in Table 7:

Table 7

Factor	Priority level (0-5)	Priority weight	Description
Subscription information	0: Proper 3: Default 5: No subscription	20%	If the terminal has not subscribed to the service of the cell, the cell is of the lowest priority or excluded
Terminal capabilities	0: Proper 3: Default 5: Not supported	20%	If the terminal capabilities do not support the service of the cell, the cell is of the lowest priority or excluded
History service information	3: Default	10%	History service information
Support of broadcast and multicast services	3: Default	10%	Broadcast and multicast services

The terminal calculates the final priority level according to the priority list delivered by the eNB and the information stored in the terminal.

Cell 1 on frequency layer: Because this cell is overloaded, the priority level is 5, which is the lowest;
 Cell 2 on frequency layer: Priority level = $0 * 20\% + 0 * 20\% + 3 * 10\% + 3 * 10\% + 3 * 40\% = 1.8$; the priority level is rounded up to 2, which is relatively higher; and
 Cell 3: The cell is in a different system and the terminal has not subscribed to the cell, and there list two processing approaches: one is to exclude, namely, the cell is blacklisted and the terminal is unable to reselect the cell; the other is to set the priority level of the cell to be 5, which is the lowest, in which case the terminal can reside on the cell, but can initiate no normal service except emergency calls for lack of subscription.
 The terminal generates a final private priority list which includes the priority levels of three cells, namely, (5, 2, 5).

[0059] V. The MME and the terminal jointly determine the private priority.

[0060] The MME obtains the information required for calculating priority. According to the obtained information or according to the information inaccessible to the terminal (for example, service provider policy, and network sharing) in the obtained information, the MME calculates and generates a private priority list specific to the terminal. When the terminal enters the RRC_CONNECTED state, the MME delivers the private priority list specific to the terminal through special signaling. The special signaling may be a NAS message such as Attach process signaling or TA/LA/RA update process signaling.

[0061] In embodiments of the present invention, a network and/or a terminal determines the private priority of the cell, frequency, or system. When the network determines the private priority, the network delivers the determined private priority list specific to the terminal through special signaling. When the terminal and/or the network determines the private priority, the network delivers the information about the determined priority or the independently determined private priority list specific to the terminal; and the terminal can determine a private priority list according to the received information or the private priority list determined by the network in view of the information stored by the terminal. Therefore, relevant information is provided for the processes such as cell reselection and cell search, the power consumption caused by terminal measurement is reduced, and energy efficiency is accomplished. Further, the network may deliver the public priority list to the terminal through broadcast so that the terminal may combine the private priority level with the public priority level in the evaluation of cell reselection.

[0062] It is noted that in the foregoing embodiments, the algorithm for calculating priority is not limited to the weight-based algorithm; other algorithms such as function-based algorithms may also apply. In the function-based algorithms, various factors may be input into a function, and the corresponding priority level is output.

[0063] Moreover, in the foregoing solutions where the eNB or MME determines the priority level, when the eNB or MME delivers the private priority list specific to the terminal, a validity period (for example, one hour, or one day) of the private priority list and/or a validity scope (for example, valid only within this TA/LA/RA, or valid only in this cell) may be notified to the terminal. The validity period and/or the validity scope may also be sent together to the terminal as information in the private priority list. Once the validity period expires or the terminal leaves the validity scope, the terminal starts the public priority policy. The public priority policy may be sent by the MME or eNB to the terminal through special signaling, or sent by the eNB to the terminal through broadcast. When the terminal performs TA/LA/RA update or initiates a service again, the terminal obtains and uses the new private priority policy calculated and configured by the MME or eNB.

[0064] When cell reselection is required and the terminal is in idle mode, the terminal evaluates cell reselection to determine the cell to be reselected according to the private priority list of the cell, frequency or system, the exclusive conditions which currently affect cell reselection, or further according to the public priority list. In this way, it will assure the terminal to select a proper cell.

[0065] FIG. 2 is a flowchart of a cell reselection method in an embodiment of the present invention. The method includes the following:

[0066] Block 201: The terminal obtains a priority list for cell reselection.

[0067] For details, the description in the foregoing embodiments serves as a reference. The network and/or the terminal determines the private priority list of the terminal according to the information for calculating priority, and the network determines the public priority list and delivers it to the terminal through broadcast.

[0068] Block 202: When cell reselection is required, the terminal obtains the exclusive conditions that currently affect cell reselection. Such conditions include: home base station; or load of the cell, frequency or system; or combination thereof.

[0069] The network may broadcast the delivered load indication of the cell, frequency or system to obtain the load information. Preferably, the network delivers the load indication of the cell, frequency or system only when the load of the cell, frequency or system changes from normal to overload or from overload to normal. The network indicates the terminal in the cell through paging when the load of the neighboring cell, frequency or system changes (for example, when the load of the cell, frequency or system changes from normal to overload or from overload to normal).

[0070] Block 203: The terminal determines the cell to be reselected according to the private priority list and the exclusive conditions.

[0071] The terminal may perform cell reselection evaluation by considering only the private priority list instead of the public priority list, namely, according to the private priority list and the exclusive conditions. The terminal may also perform cell reselection evaluation by considering the public priority list and the exclusive conditions. Alternatively, the terminal may perform cell reselection evaluation by considering the private priority list and the public priority list, namely, according to the private priority list, the public priority list and the exclusive conditions to determine the cell to be reselected.

[0072] In practice, the terminal may set out the exclusive conditions (for example, home base station, and load information of the cell, frequency or system) in the priority-related factors separately, then check whether the private priority list carries the exclusive conditions. If the private priority list carries the exclusive conditions, the terminal considers the exclusive conditions first and then performs cell reselection evaluation according to the order of priority. The cell that meets the requirements is reselected, as detailed below with examples.

[0073] 1. The terminal receives a public priority list and a private priority list.

[0074] It is assumed that the exclusive conditions are set out in Table 8:

Table 8

Factor	Priority level (0-5) and its meaning	Description
Home base station	Highest (0)	If a neighboring cell is a home base station accessible to the terminal, this cell is preferred; if the cell reselection criteria are fulfilled, this cell is preferred; otherwise, other factors are considered
Load (may include residing load and service load)	Lowest (5, in the case of overload)	If the neighboring cell, the frequency or the system is overloaded, the cell, the frequency or the system is of the lowest priority or excluded

(continued)

Factor	Priority level (0-5) and its meaning	Description
Speed/migration information		The terminal obtains its own speed and performs cell reselection evaluation in view of the priority

[0075] Example 1: It is assumed that a terminal is in a macro cell; one of the neighboring cells is a macro cell which is not overloaded, and the terminal supports all services provided by the neighboring cell; another neighboring cell is a home base station cell.

[0076] The private priority list obtained by the terminal is (2, 0), and the public priority list obtained is (0, 0). The public priority list is ignored, and the private priority list is applied to perform cell reselection evaluation.

(1) First, the neighboring home base station cell (whose priority level is 0) is measured and evaluated. According to the cell reselection criteria, if the cell fulfills the reselection criteria, the home base station cell is reselected; if it does not fulfill the reselection criteria, the cell of a lower priority level (for example, the neighboring macro cell whose priority level is 2) is further measured.

(2) The load indication of the neighboring cell or the frequency of the neighboring cell is obtained through broadcast. When the load indication indicates no overload, the cell reselection evaluation is performed according to the measured signal quality. If the signal quality of the neighboring cell fulfills the reselection criteria, the terminal reselects the neighboring cell which is a macro cell.

(3) In the cell reselection evaluation, the corresponding operations may be performed in view of the speed. For example, for the terminal of a high speed, the corresponding parameter (for example, a reselection timer "Treselction" or a Hysteresis value) is scaled through a spreading factor in the cell reselection evaluation so that the terminal can reselect the new cell more quickly.

[0077] Example 2: It is assumed that the terminal is in a macro cell; there are three neighboring cells, two of which are macro cells on different frequency layers in the LTE system. One of the two cells (cell 1) is overloaded, and the terminal capabilities support all the services provided by the cell; the other neighboring cell (cell 2) is not overloaded; and there is a neighboring cell (cell 3) in the WCDMA system, yet the terminal has not subscribed to the WCDMA service.

[0078] 1. After obtaining the priority list, the terminal ignores the public priority list, and applies the private priority list (5, 2, 5) to perform cell reselection evaluation.

(1) First, the terminal checks for any home base station in the neighboring cells. If no home base station exists in the neighboring cells, the terminal continues evaluating according to the private priority list.

(2) The terminal measures the cell of a higher priority level (cell 2). If the signal quality of cell 2 fulfills the cell reselection criteria, the terminal reselects cell 2; otherwise, the terminal continues to measure the cell of lower priority (cell 1).

(3) In the cell reselection evaluation, further operations, for example, changing the spreading factor, may be performed in view of the speed.

[0079] II. The terminal takes all priority-related factors into account to obtain the priority level and perform cell reselection factor, namely, without setting out the exclusive conditions.

[0080] It is noted that such a method of determining priority is applicable not only to cell reselection, but also to cell selection. When the terminal performs cell selection, the terminal may prefer the residing cell according to the information stored in the terminal. If no information is stored, the terminal may measure the frequency-layer cell of higher priority first according to the broadcast priority level.

[0081] A network device is disclosed in an embodiment of the present invention. As shown in FIG. 3, the network device 300 includes: an information obtaining unit 301, a priority determining unit 302, and a priority delivering unit 303. The information obtaining unit 301 is adapted to obtain information for calculating priority.

The priority determining unit 302 is adapted to determine a private priority list according to the information obtained by the information obtaining unit 301.

The priority delivering unit 303 is adapted to deliver the private priority list through special signaling.

[0082] Further, the priority determining unit 302 is adapted to determine a public priority list according to the information obtained by the information obtaining unit 301. Accordingly, the priority delivering unit 303 is adapted to deliver the public priority list through broadcast.

[0083] The network device in this embodiment may further include a load information delivering unit 304, which is

adapted to deliver the load information of the cell, frequency or system through broadcast.

[0084] The network device in another embodiment of the present invention is shown in FIG. 4. The network device 400 in this embodiment includes an information obtaining unit 401 and a sending unit 402.

The information obtaining unit 401 is adapted to obtain information for calculating priority.

5 The sending unit 402 is adapted to: deliver all or part of the information obtained by the information obtaining unit through broadcast and/or special signaling, and deliver the algorithm for calculating priority.

[0085] The network device in the foregoing two embodiments may be an eNB or MME in the LTE system.

[0086] A terminal is disclosed in an embodiment of the present invention. As shown in FIG. 5, the terminal includes: a priority list receiving unit 501, a condition obtaining unit 502, and an evaluating unit 503.

10 The priority list receiving unit 501 is adapted to receive the private priority list from the network through special signaling. The condition obtaining unit 502 is adapted to obtain exclusive conditions when cell reselection is required.

The evaluating unit 503 is adapted to determine the cell to be reselected according to the private priority list and the exclusive conditions.

[0087] The terminal in this embodiment may further include a storing unit 504 and a priority determining unit 505. The storing unit 504 is adapted to store information for calculating priority. The priority determining unit 505 is adapted to determine a new private priority list according to the private priority list received by the priority list receiving unit 501 and the information stored in the storing unit 504. In this way, the evaluating unit 503 determines the cell to be reselected according to the new private priority list and the exclusive conditions.

[0088] In the terminal in this embodiment, the priority list receiving unit 501 can be further adapted to receive the public priority list from the network through broadcast. Accordingly, the evaluating unit 503 can be further adapted to determine the cell to be reselected according to the private priority list, the public priority list, and the exclusive conditions.

[0089] A terminal in an embodiment of the present invention is shown in FIG. 6. The terminal 600 includes: a receiving unit 601, a storing unit 602, and a priority determining unit 603.

20 The receiving unit 601 is adapted to receive the information delivered by the network for calculating priority through broadcast or special signaling.

The storing unit 602 is adapted to store the information for calculating priority.

The priority determining unit 603 is adapted to determine a private priority list according to the information received by the receiving unit 601 and the information stored by the storing unit 602.

[0090] The receiving unit 601 is further adapted to receive the algorithm delivered by the network for calculating priority. In this way, the priority determining unit 603 can determine the private priority list according to the information received by the receiving unit 601, the algorithm for calculating priority, and the information stored by the storing unit 602.

[0091] The terminal in this embodiment may further include a condition obtaining unit and an evaluating unit (not illustrated in the figure). The condition obtaining unit is adapted to obtain exclusive conditions when cell reselection is required. The evaluating unit is adapted to determine the cell to be reselected according to the private priority list determined by the priority determining unit 603 and the exclusive conditions.

[0092] Besides, the receiving unit 601 in this embodiment may further be adapted to receive the public priority list from the network through broadcast. Accordingly, the evaluating unit may further be adapted to determine the cell to be reselected according to the private priority list, the public priority list, and the exclusive conditions.

[0093] It is understandable to those skilled in the art that all or part of the blocks in the foregoing embodiments may be performed through hardware instructed by a program. The program may be stored in a computer-readable storage medium such as ROM/DRAM, magnetic disk, and compact disk.

[0094] Detailed above are the embodiments of the present invention. Although the invention is described through some exemplary embodiments, the invention is not limited to such embodiments. It is apparent that those skilled in the art can make various modifications and variations to the invention without departing from the spirit and scope of the invention. The invention is intended to cover the modifications and variations provided that they fall in the scope of protection defined by the following claims or their equivalents.

Claims

- 50
1. A method for obtaining cell reselection priority, the method comprising:
 - obtaining, by a network, information for calculating priority;
 - and
 - 55 determining, by the network, a private priority list specific to a terminal according to the obtained information, and delivering the determined private priority list specific to the terminal through special signaling; or
 - obtaining, by the terminal, all or part of the obtained information for calculating priority from the network, and determining the private priority list specific to the terminal according to the obtained information; or

determining, by the network and the terminal, the private priority list specific to the terminal according to the obtained information.

5 2. The method according to claim 1, wherein the information for calculating priority comprises one or combination of the information of:

terminal capability, cell bandwidth, subscription information, service provider policy, history service information, mobility or history mobility information, residing load, service load, whether the network is shared, whether it is in support of broadcast and multicast services, and whether the base station is home base station.

10 3. The method according to claim 1, the network determining a private priority list to a terminal, and delivering the determined private priority list specific to the terminal through special signaling comprises:

15 an eNodeB determines a private priority list specific to the terminal according to the obtained information for calculating priority;
the eNodeB delivers the private priority list specific to the terminal through Radio Resource Control (RRC) Connection Release Request or RRC Connection Reconfiguration to the terminal.

20 4. The method according to claim 1, the network determining a private priority list specific to a terminal, and delivering the determined private priority list specific to the terminal through special signaling comprises:

25 a Mobile Management Entity (MME) determines a private priority list specific to the terminal according to the obtained information for calculating priority;
the MME delivers the private priority list specific to the terminal through Non-Access Stratum (NAS) message to the terminal.

5. The method according to claim 4, wherein the NAS message is Attach process signaling or Tracking/Location/Route (TA/LA/RA) update process signaling.

30 6. The method according to claim 1, further comprising: when the network delivers the private priority list specific to the terminal through special signaling, the network informs the terminal of a validity period or a validity scope of the private priority list specific to the terminal.

35 7. The method according to claim 1, wherein determining the private priority list of the terminal according to the obtained information comprises:

the terminal determines the private priority list specific to its own according to the obtained information and information for calculating priority stored in the terminal.

40 8. The method according to claim 7, further comprising:

obtaining, by the terminal, the algorithm for calculating priority from the network; and
determining, by the terminal, the private priority list specific to the terminal according to the obtained algorithm.

45 9. The method according to claim 1, wherein the network and the terminal determining the private priority list specific to the terminal comprises:

50 determining, by the network, the private priority list specific to the terminal according to the obtained information for calculating priority;
delivering, by the network, the private priority list specific to the terminal to the terminal;
determining, by the terminal, a new private priority list specific to the terminal, according to the private priority list determined and delivered by the network and the information stored in the terminal.

55 10. The method according to any one of the claims 1 to 9, further comprising:

determining, by the network, a public priority list according to the obtained information for calculating priority;
sending, by the network, the public priority list through broadcast to the terminal.

11. A system for obtaining cell reselection priority, comprising:

5 a network-side entity, adapted to obtain information for calculating priority, determine a public priority list and a private priority list specific to a terminal according to the obtained information, and deliver the public priority list and the private priority list specific to the terminal.

10 12. The system according to claim 11, wherein the network-side entity which determines the public priority list is an eNodeB, and the network-side entity which determines the private priority list specific to the terminal is an eNodeB or a Mobile Management Entity (MME).

13. The system according to claim 11 or 12, wherein the terminal is configured to determine a new priority list, according to the private priority list and the information for calculating priority stored in the terminal.

14. A network device, comprising:

15 an information obtaining unit, adapted to obtain information for calculating priority;
a priority determining unit, adapted to determine a private priority list specific to a terminal according to the information obtained by the information obtaining unit; and
a priority delivering unit, adapted to deliver the private priority list specific to the terminal.

20 15. The network device according to claim 14, wherein the priority determining unit is further configured to determine a public priority list, according to information obtained by the information obtaining unit; the priority delivering unit is further configured to deliver the public priority list through broadcast.

25 16. The network device according to claim 14, further comprising: a load information delivering unit, which is configured to deliver the load information of the cell, frequency or system through broadcast or paging.

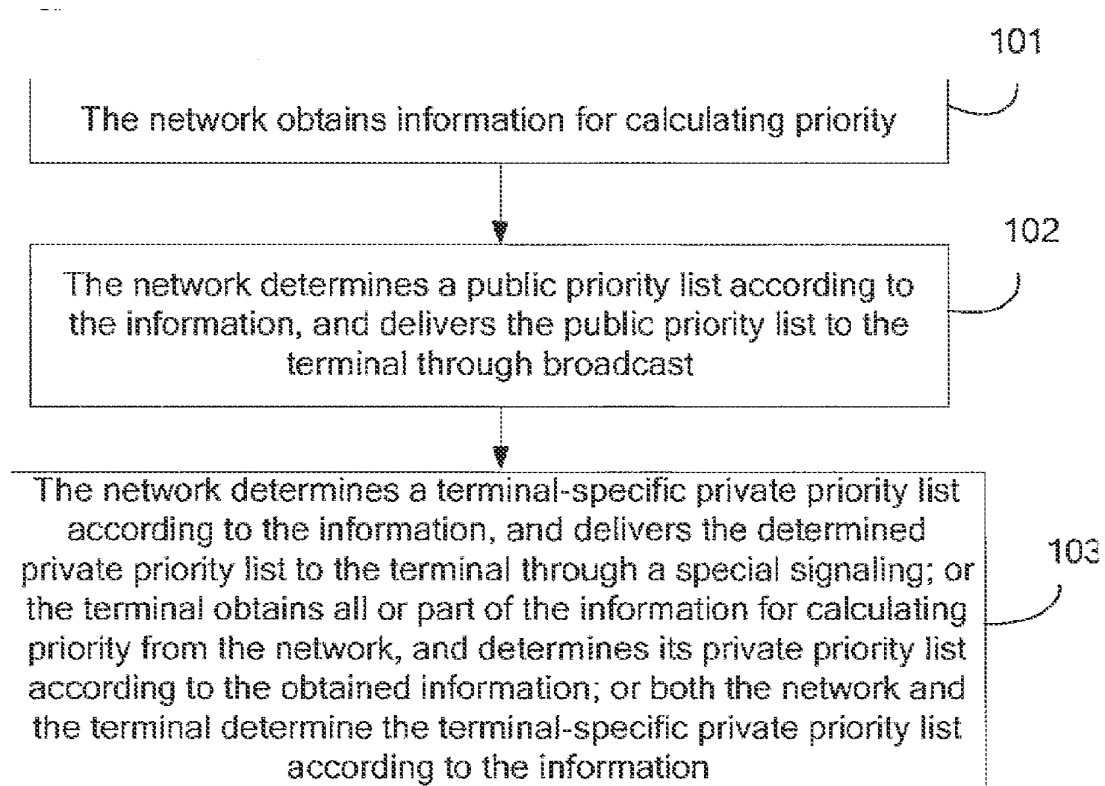


FIG. 1

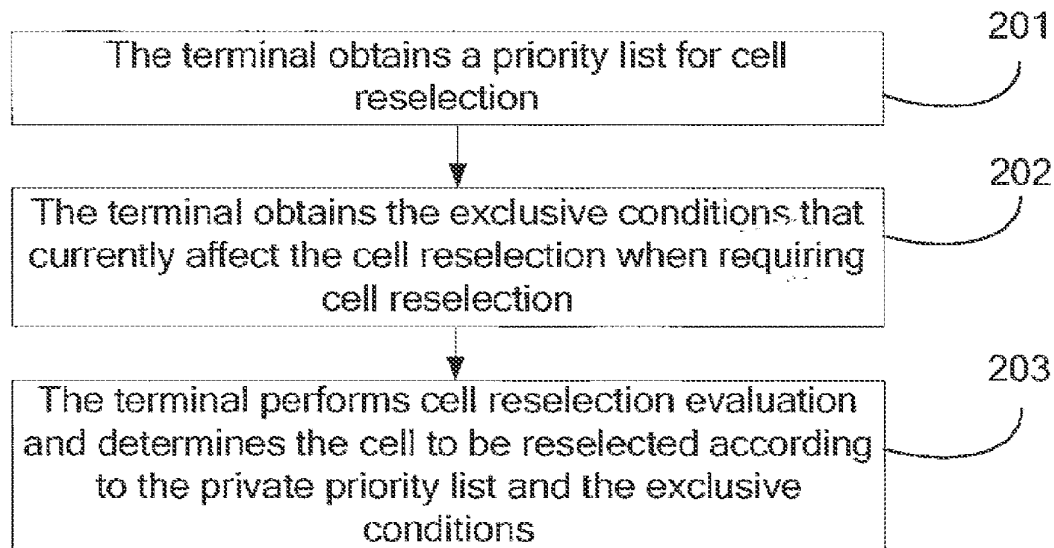


FIG. 2

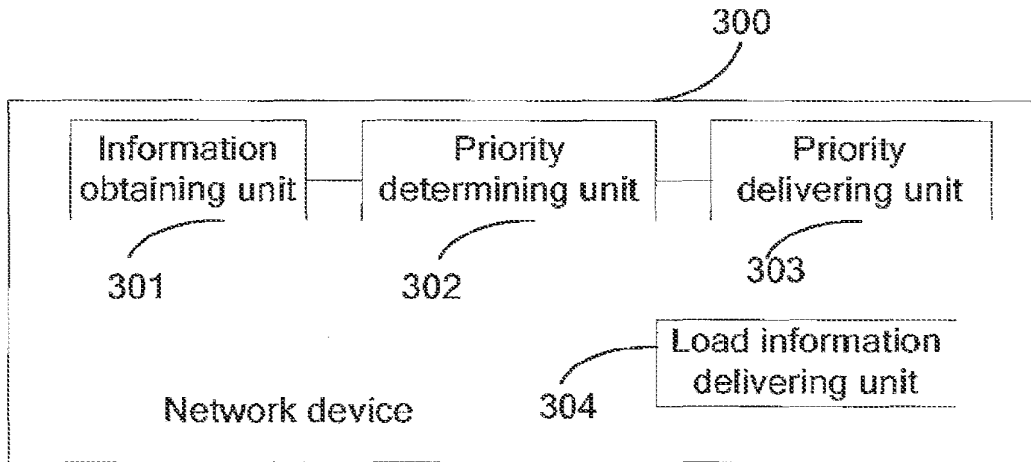


FIG. 3

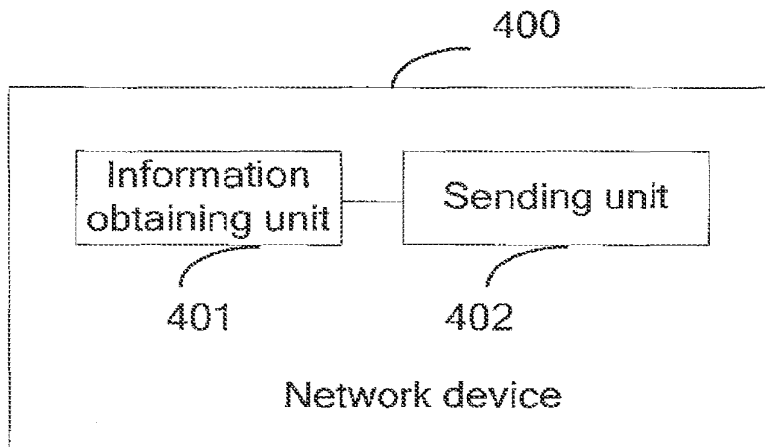


FIG. 4

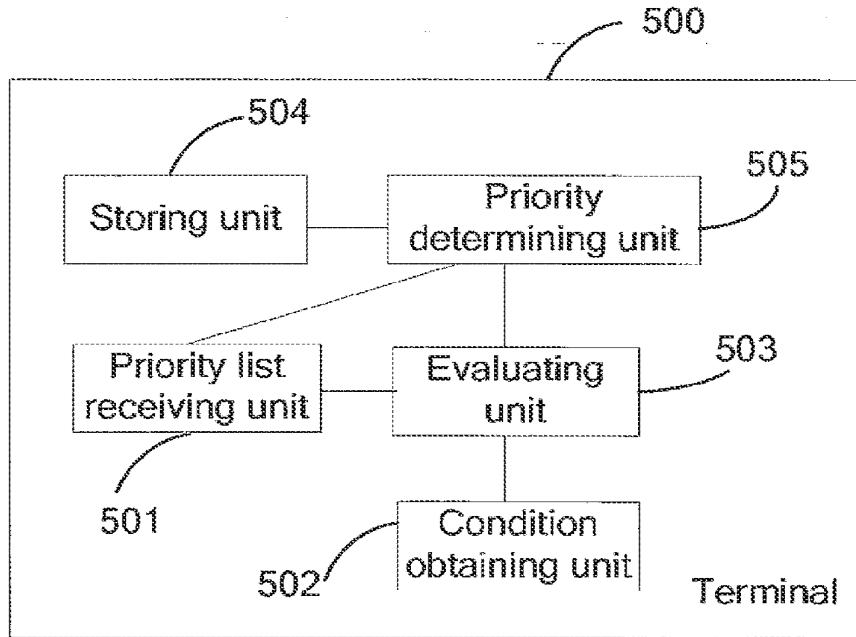


FIG. 5

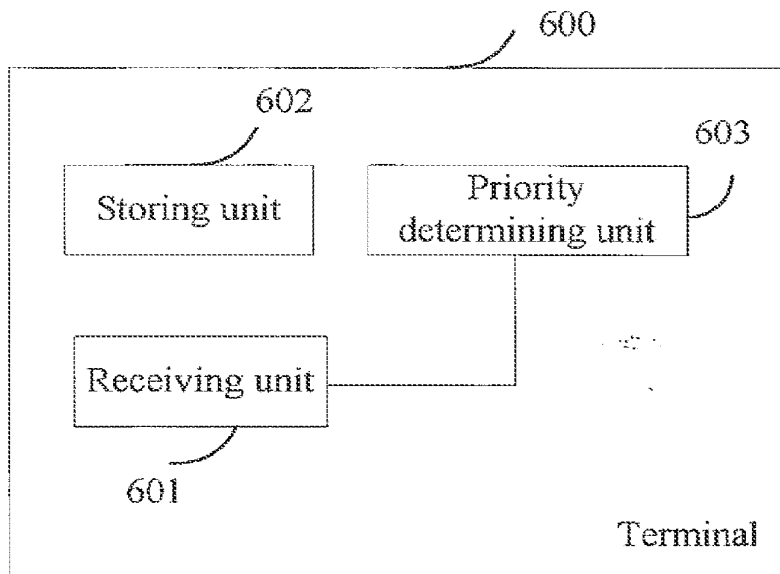


FIG. 6

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER		
H04W36/08 (2009.01) i 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) IPC: H04Q; H04W; H04L.		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPI,EPODOC,PAJ,3GPP,IEEE,CNPAT,CPRS:priority, cell, select+, resselect+, special, particular, table, list, bearer, calculat+		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN1852559A (HUAWEI TECHNOLOGIES CO., LTD.) 25 Oct. 2006 (25.10.2006) page 3 line 6 to page 6 line 20 in description	1-16
A	CN1255270A (NOKIA MOBILE PHONES LTD.) 31 May 2000 (31.05.2000) the whole document	1-16
A	CN1822700A (NIPPON ELECTRIC CO.) 23 Aug. 2006 (23.08.2006) the whole document	1-16
A	KR10-2006-0046937A (LG ELECTRONICS INC.) 18 May 2006 (18.05.2006) the whole document	1-16
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents:	"I"	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
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"P" document published prior to the international filing date but later than the priority date claimed		
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Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN1852559A	25.10.2006	NONE	
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KR10-2006-0046937A	18.05.2006	NONE	

Form PCT/ISA/210 (patent family annex) (April 2007)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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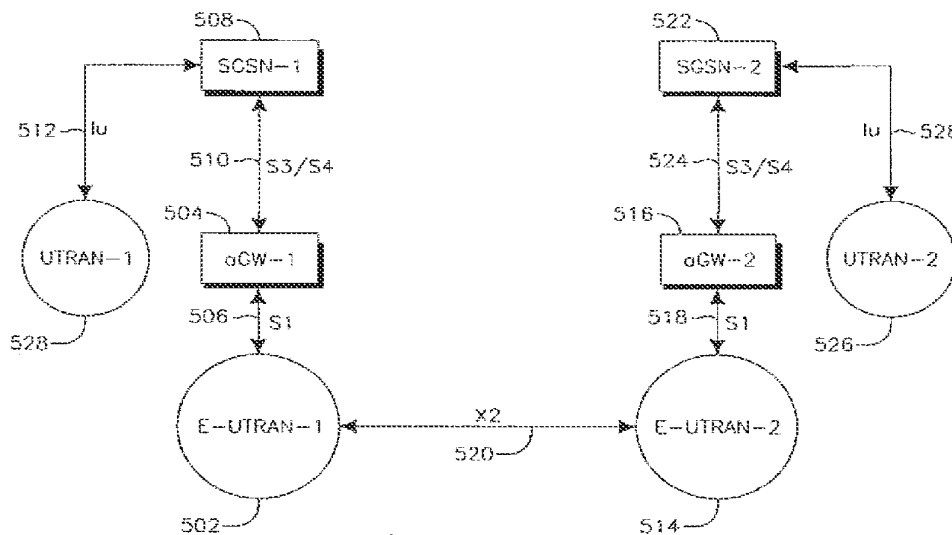
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(54) Title: LTE RESELECTABLE-ONLY CELLS AND CELL INFO LIST FOR HANDOVER



(57) Abstract: A method of determining handover capable cells in a wireless transmit/receive unit (WTRU). The method includes the WTRU receiving a cell list from an e Node-B, and the WTRU determining a handover status of a cell based on the cell list.

WO 2008/057359 A1

[0001] LTE RESELECTABLE-ONLY CELLS AND
CELL INFO LIST FOR HANDOVER

[0002] FIELD OF INVENTION

[0003] The present invention is related to wireless communication systems. In particular, a method and apparatus is disclosed for determining handover capable cells in a WTRU.

[0004] BACKGROUND

[0005] A goal of the Long Term Evolution (LTE) program of the Third Generation Partnership Project (3GPP) is to bring new technology, network architecture, configurations and applications and services to wireless networks in order to provide improved spectral efficiency, reduced latency, faster user experiences and richer applications and services with less cost. LTE's aim is to create an Evolved Universal Terrestrial Radio Access Network (E-UTRAN).

[0006] Figure 1 is a diagram of a typical mobile network 100 in accordance with the prior art. The S3 interface 102 and the S4 interface 104 provide paths for an E-UTRAN to communicate with legacy networks, such as a UTRAN 108 or a GSM/EDGE Radio Access Network (GERAN) 110. In order to route data streams that have been handed over between the E-UTRAN 106 and the UTRAN 108 and between the E-TURAN 106 and the GERAN 110 via mobility management entity (MME)/user plane entity (UPE) 112 and a serving GPRS support node (SGSN) 114, the S3 interface 102 and the S4 interface 106 preferably are used. As S2 interface 116 may provide a handover path between the E-UTRAN 106 and a non-3GPP Internet Protocol (IP) network or a wireless local area network (WLAN) 120.

[0007] Figure 2 shows typical interfaces 200 between an E-UTRAN and an evolved packet core (EPC) in accordance with the prior art. An X2 interface 202 between Node Bs (eNBs) 204 handles point-to-point handover traffic between the

eNBs 204. The S1 interface 206 provides a point-to-point handover path between the eNB 204 and the EPC through an access gateway (aGW) 208.

[0008] A typical cellular environment may include legacy cells, LTE cells, and non-3GPP cells. If the S3 and S4 interfaces (102 and 104 of Figure 1, respectively) are not present, due to, for example, delay in deployment or equipment failure, handover is not possible between the LTE cells and the legacy cells. Additionally, if the X2 interface (202 of Figure 2) is not available due to, for example, installation limitations or operational problems, handover may not occur from LTE cell to LTE cell. Also, the S2 interface (116 of Figure 1) may be required for handover between an LTE cell and a wireless local area network (WLAN).

[0009] Typically, a neighboring_cell_info_list is broadcast to the WTRUs in a cell. The list includes information as to the capabilities of neighboring cells, so that a WTRU can determine whether a cell can be selected or reselected while the WTRU is in IDLE mode.

[0010] The neighboring_cell_info_list does not provide information that the WTRU can use for handover. Cells that are not handover possible should not be measured for handover while a WTRU is in ACTIVE mode, and subsequent operations such as measurement reporting and the like should be reduced, if not eliminated.

[0011] SUMMARY

[0012] A method is disclosed for determining handover capable cells in a wireless transmit/receive unit (WTRU). The method preferably includes the WTRU receiving a cell list from an e Node-B, and the WTRU determining a handover status of a cell based on the cell list.

[0013] BRIEF DESCRIPTION OF THE DRAWINGS

[0014] A more detailed understanding may be had from the following description, given by way of example and to be understood in conjunction with the accompanying drawings wherein:

[0015] Figure 1 is a diagram of a typical mobile network in accordance with the prior art;

[0016] Figure 2 shows typical interfaces between an E-UTRAN and an EPC in accordance with the prior art; and

[0017] Figure 3 shows an exemplary wireless system, including an eNB and a plurality of WTRUs, configured in accordance with one embodiment;

[0018] Figure 4 is a functional block diagram of an eNB and a WTRU of a wireless communication system in accordance with one embodiment; and

[0019] Figure 5 is a diagram of a mobile network in accordance with one embodiment.

[0020] DETAILED DESCRIPTION

[0021] When referred to hereafter, the terminology "wireless transmit/receive unit (WTRU)" includes but is not limited to a user equipment (UE), a mobile station, a fixed or mobile subscriber unit, a pager, a cellular telephone, a personal digital assistant (PDA), a computer, or any other type of user device capable of operating in a wireless environment. When referred to hereafter, the terminology "base station" includes but is not limited to a Node-B, a site controller, an access point (AP), or any other type of interfacing device capable of operating in a wireless environment.

[0022] Turning now to Figure 3, there is shown an exemplary wireless communication system 300 configured in accordance with the present invention. The wireless communication system 300 may include a plurality of wireless communication devices, such as an eNB 310 and a plurality of WTRUs 320, capable of wirelessly communicating with one another. Although the wireless communication devices depicted in the wireless communication system 300 are shown as an eNB and WTRUs, it should be understood that any combination of wireless devices may comprise the wireless communication system 300. That is, the wireless communication system 300 may comprise any combination of eNBs, access points (APs), WTRUs, stations (STAs), and the like.

[0023] For example, the wireless communication system 300 may include

an eNB and client device operating in an infrastructure mode, WTRUs operating in ad-hoc mode, nodes acting as wireless bridges, or any combination thereof. However, the wireless communication system 300 may be any other type of wireless communication system.

[0024] Figure 4 is a functional block diagram of an eNB 310 and a WTRU 320 of the wireless communication system 300 of Figure 3. As shown in Figure 4, the eNB 310 and the WTRU 320 are in wireless communication with one another. In addition to the components that may be found in a typical eNB, the eNB 310 includes a processor 415, a receiver 416, a transmitter 417, and an antenna 418. The processor 415 is configured to generate, transmit, and receive data packets. The receiver 416 and the transmitter 417 are in communication with the processor 415. The antenna 418 is in communication with both the receiver 416 and the transmitter 417 to facilitate the transmission and reception of wireless data.

[0025] Similarly, in addition to the components that may be found in a typical WTRU, the WTRU 120 may include a processor 425, a receiver 426, a transmitter 427, and an antenna 428. The processor 425 is configured to generate, transmit, and receive data packets. The receiver 426 and the transmitter 427 are in communication with the processor 425. The antenna 428 is in communication with both the receiver 426 and the transmitter 427 to facilitate the transmission and reception of wireless data.

[0026] Figure 5 is a diagram of a mobile network 500 in accordance with one embodiment. E-UTRAN 1 502 communicates with aGW-1 504 over a first S1 connection 506. aGW-1 504 communicates with SGSN-1 508 over a first S3/S4 interface 510 and SGSN-1 508 communicates with UTRAN-1 528 over a first Iu connection 512. E-UTRAN 2 514 communicates with aGW-2 516 over a second S1 connection 518. E-UTRAN 1 502 and E-UTRAN 2 514 may communicate directly over the X2 interface 520. The E-UTRAN 2 514 communicates with aGW-2 516 over the second S1 interface 518 and aGW-2 516 communicates with SGSN-2 522 over a second S3/S4 interface 524. Lastly SGSN-2 522 communicates with UTRAN-2 526 over a second Iu 528 interface.

[0027] The status of the interfaces shown in Figure 5 may affect inter-cell relationships and WTRU operations. Handover operations between two E-UTRAN cells occur over the X2 interface 520. If the X2 interface 520 is not operational due to, for example, connection problems or installation issues, WTRU handover between two E-UTRAN cells is not possible. Similarly, in order to effectuate handover between the cells of the E-UTRAN and the cells of a UTRAN or GERAN, the S3/S4 interfaces (510,524) must be operational.

[0028] As shown in Figure 5, the WTRU handover is possible between UTRAN-1 528 and E-UTRAN 1 502 if the first S3/S4 interface 510 is operational. If it is assumed that the second S3/S4 interface 524 is not operational, there may not be handover between E-UTRAN 2 514 and UTRAN-2 526. If a S1 interface is functional, the E-UTRAN cells are able to support cell selection and cell reselection. An eNB may check and determine if the S1, S2, S3/S4 and the X2 interfaces are functional.

[0029] A WTRU in IDLE mode checks a neighboring_cell_list in order for the WTRU to perform selection, reselection and handover. The cells to which handover is not possible, but are available for selection or reselection, should be designated as such in the WTRU's neighboring_cell_list so that the WTRU may camp on or navigate through those cells. Therefore, in the neighboring_cell_list, the cells to which handover is not possible should be designated as "reselectable only" cells. This may enable the WTRU to access those cells for paging, for example, and to allow WTRU originated calls, for another example, if no other cells can cover the particular geographical area or to increase network coverage capacities for load balancing purpose.

[0030] In general, for a WTRU that is LTE compliant, cells can be categorized as cells to which handover is not selectable but where handover is possible, cells that are not selectable and handover is not possible, and cells that are selectable but where handover is not possible, and cells that are reselectable and to which handover is possible.

[0031] Therefore, the neighboring_cell_info_list may include a cell information attribute that indicates if handover is possible, if selection is

possible, both, or neither. A LTE compliant WTRU may use this information to make handover decisions and cell measurement decisions. The WTRU need not waste resources measuring cells to which handover is not possible.

[0032] Table 1 shows the columns and rows in a neighboring_cell_info_list table. Only those cells marked with a "Yes" in the "handover possible" column may be measured by the WTRU for handover. Cells not possessing that attribute may not be measured, for example, cell-6 and cell-7 in Table 1, in order to save power and boost performance as well as to prevent any malfunction in a handover operation.

[0033] The neighboring_cell_info_list includes a row for each neighboring cell, and columns to indicate cell attributes. It may be used for LTE cells, Wideband Code Division Multiple Access (WCDMA) cells, Global System for Mobile communications (GSM) cells and Wireless Local Area Network (WLAN) cells, for example.

[0034] Once the WTRU receives the neighboring_cell_info_list from an eNB, the WTRU, in IDLE mode, may determine which cells to measure for reselection based on the entry in the "Idle mode indicator" column. A "Yes" entry means reselection to that cell is possible. After the determination, the WTRU may begin measurements.

[0035] If the WTRU is in ACTIVE mode, it may determine which cells to measure for handover based on an entry in the "Handover possible" column. A "YES" entry means handover to that cell is possible, so the WTRU may begin to measure that cell.

[0036] TABLE 1 - "Handover Possible" indicator field included in the neighboring cell list

Number field	Priority indicator	Very high data rates	High data rates	Speech only	Dependency field	Idle mode indicator	Handover Possible	Technology indicator	Cell description
1	1	Yes	Yes	No	-	No	Yes	LTE	LTE cell suitable for all services, which should be not selected by idle WTRUs, could be measured for handover (HO)
2	1	Yes	Yes	Yes	-	Yes	Yes	WCDMA	WCDMA cell suitable for all services (HSPA capable), which can be selected by idle WTRUs, could be measured for HO
3	2	No	Yes	Yes	-	Yes	Yes	WCDMA	WCDMA cell suitable for all services (not HSPA capable), which can be selected by idle WTRUs, could be measured for HO
4	2	Yes	Yes	Yes	1	Yes	Yes	WCDMA	WCDMA pico cell suitable for all services under the umbrella of cell, and could be measured for HO
5	4	No	No	Yes	-	No	Yes	GSM	GSM cell (not GPRS capable) which should be not selected by idle WTRUs, and could be measured for HO
6	4	No	Yes	No	3	No	No	WLAN	WLAN cell not suitable for speech services, not handover possible, no measurement for HO
7	2	Yes	Yes	Yes	-	Yes	No	WCDMA	Not handover possible, no measurement for HO, but could be selected/reselected

[0037] EMBODIMENTS

[0038] 1. A method of determining handover capable cells in a wireless transmit/receive unit (WTRU) comprising the WTRU receiving a cell list from an e Node-B.

[0039] 2. The method as in embodiment 1 further comprising the WTRU determining a handover status of a cell based on the cell list.

[0040] 3. The method as in embodiment 1 or 2 wherein the cell list comprises a database of cell capability information.

[0041] 4. The method as in embodiment 3 wherein the cell capability information includes a designation of handover status.

[0042] 5. The method as in embodiment 3 or 4 wherein the cell capability information includes a designation of reselection status.

- [0043] 6. The method as in any one of embodiments 1-5 further comprising an eNB checking operational status of an inter-network communication interface.
- [0044] 7. The method as in embodiment 6 wherein the eNB determines handover status and reselection status based on the checking of the operational status of the inter-network communications interface.
- [0045] 8. The method as in embodiment 6 or 7 further comprising the eNB adjusting an entry in the cell list based on the handover status and the reselection status.
- [0046] 9. The method as in embodiment 8 further comprising the eNB transmitting the cell list to the WTRU.
- [0047] 10. The method as in any one of embodiments 6-9 wherein the inter-network communications interface comprises an S1 interface, an S2 interface and S3 interface an S4 interface or an X2 interface.
- [0048] 11. The method as in any one of embodiments 4-10 further comprising the eNB adjusting an entry in the cell list wherein the entry indicates the designation of handover status.
- [0049] 12. The method as in any one of embodiments 5-11 further comprising the eNB adjusting an entry in the cell list wherein the entry indicates the designation of reselection status.
- [0050] 13. A wireless transmit receive unit (WTRU) configured to read a cell list and measure a neighbor cell based on the cell list.
- [0051] 14. The WTRU as in embodiment 13 wherein the WTRU is further configured to, in IDLE mode, measure reselectable cells based on the cell list.
- [0052] 15. The WTRU as in embodiment 13 or 14 wherein the WTRU is further configured to, in ACTIVE mode, measure a handover capable cell based on the cell list.
- [0053] 16. An e Node B (eNB) configured to adjust entries in a cell list based on a condition of an inter-network interface.

[0054] 17. The eNB as in embodiment 16 wherein the eNB is further configured to transmit the cell list to a wireless transmit receive unit (WTRU).

[0055] 18. The eNB as in embodiment 16 or 17 wherein the eNB is configured to adjust an entry in a cell list to indicate a handover status of a neighbor cell.

[0056] 19. A cell list contained in a wireless transmit receive unit (WTRU), the cell list comprising an indication of a neighbor cell's handover capability

[0057] Although the features and elements are described in the embodiments in particular combinations, each feature or element can be used alone without the other features and elements of the embodiments or in various combinations with or without other features and elements. The methods or flow charts provided may be implemented in a computer program, software, or firmware tangibly embodied in a computer-readable storage medium for execution by a general purpose computer or a processor. Examples of computer-readable storage mediums include a read only memory (ROM), a random access memory (RAM), a register, cache memory, semiconductor memory devices, magnetic media such as internal hard disks and removable disks, magneto-optical media, and optical media such as CD-ROM disks, and digital versatile disks (DVDs).

[0058] Suitable processors include, by way of example, a general purpose processor, a special purpose processor, a conventional processor, a digital signal processor (DSP), a plurality of microprocessors, one or more microprocessors in association with a DSP core, a controller, a microcontroller, Application Specific Integrated Circuits (ASICs), Field Programmable Gate Arrays (FPGAs) circuits, any other type of integrated circuit (IC), and/or a state machine.

[0059] A processor in association with software may be used to implement a radio frequency transceiver for use in a wireless transmit receive unit (WTRU), user equipment (UE), terminal, base station, radio network controller (RNC), or any host computer. The WTRU may be used in conjunction with modules, implemented in hardware and/or software, such as a camera, a video camera

module, a videophone, a speakerphone, a vibration device, a speaker, a microphone, a television transceiver, a hands free headset, a keyboard, a Bluetooth® module, a frequency modulated (FM) radio unit, a liquid crystal display (LCD) display unit, an organic light-emitting diode (OLED) display unit, a digital music player, a media player, a video game player module, an Internet browser, and/or any wireless local area network (WLAN) module.

*

*

*

CLAIMS

What is claimed is:

1. A method of determining handover capable cells in a wireless transmit/receive unit (WTRU) comprising:
 - the WTRU receiving a cell list from an e Node-B; and
 - the WTRU determining a handover status of a cell based on the cell list.
2. The method as in claim 1 wherein the cell list comprises a database of cell capability information.
3. The method as in claim 1 wherein the cell capability information includes a designation of handover status.
4. The method as in claim 1 wherein the cell capability information includes a designation of reselection status.
5. The method as in claim 1 further comprising an eNB checking operational status of an inter-network communication interface.
6. The method as in claim 5 wherein the eNB determines handover status and reselection status based on the checking of the operational status of the inter-network communications interface.
7. The method as in claim 6 further comprising the eNB adjusting an entry in the cell list based on the handover status and the reselection status.
8. The method as in claim 7 further comprising the eNB transmitting the cell list to the WTRU.

9. The method as in claim 5 wherein the inter-network communications interface comprises an S1 interface, an S2 interface and S3 interface an S4 interface or an X2 interface.

10. The method as in claim 7 further comprising the eNB adjusting an entry in the cell list wherein the entry indicates the designation of handover status.

11. The method as in claim 7 further comprising the eNB adjusting an entry in the cell list wherein the entry indicates the designation of reselection status.

12. A wireless transmit receive unit (WTRU) configured to read a cell list and measure a neighbor cell based on the cell list.

13. The WTRU as in claim 12 wherein the WTRU is further configured to, in IDLE mode, measure reselectable cells based on the cell list.

14. The WTRU as in claim 12 wherein the WTRU is further configured to, in ACTIVE mode, measure a handover capable cell based on the cell list.

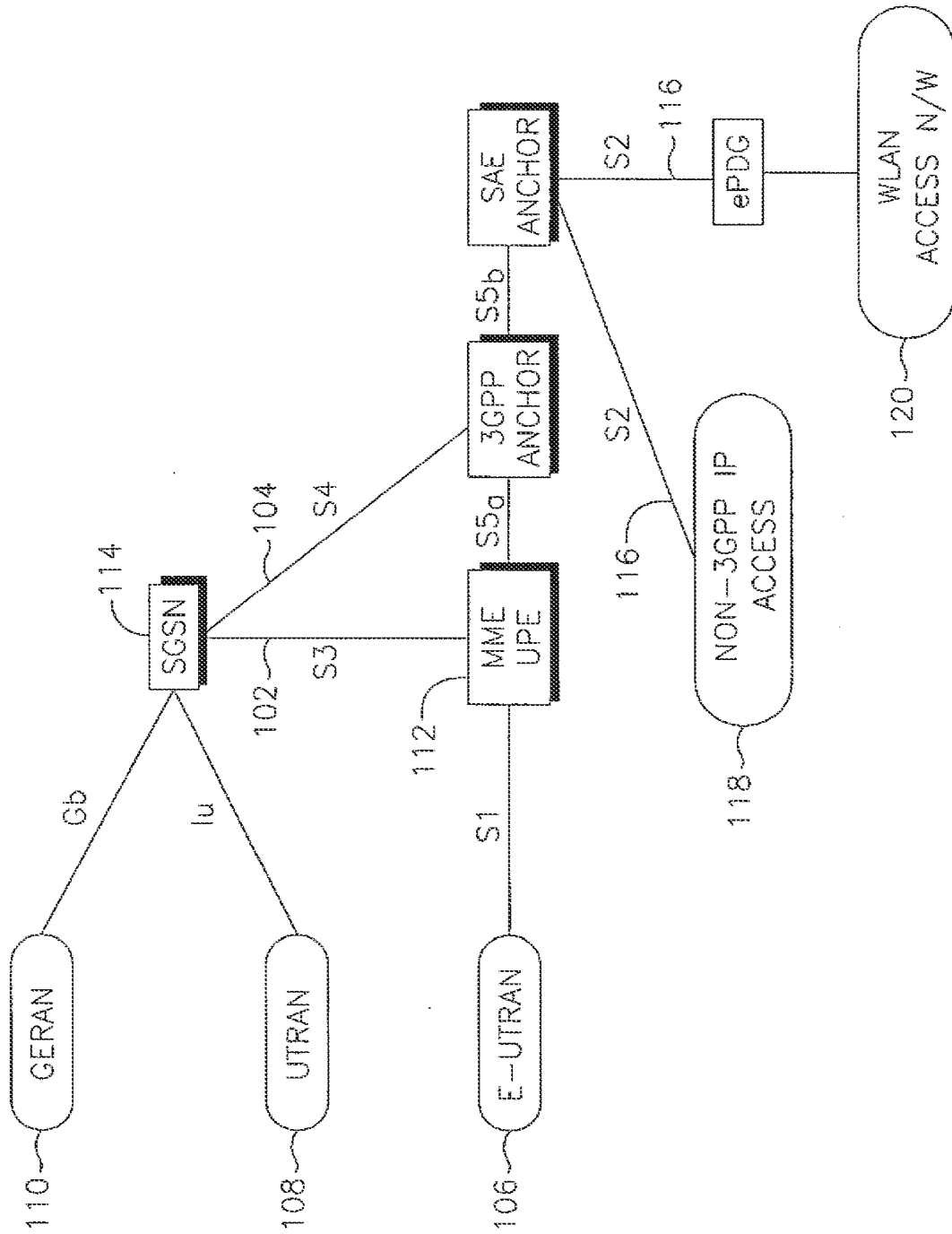
15. An e Node B (eNB) configured to adjust entries in a cell list based on a condition of an inter-network interface.

16. The eNB as in claim 15 wherein the eNB is further configured to transmit the cell list to a wireless transmit receive unit (WTRU).

17. The eNB as in claim 15 wherein the eNB is configured to adjust an entry in a cell list to indicate a handover status of a neighbor cell.

18. A cell list contained in a wireless transmit receive unit (WTRU), the cell list comprising an indication of a neighbor cell's handover capability.

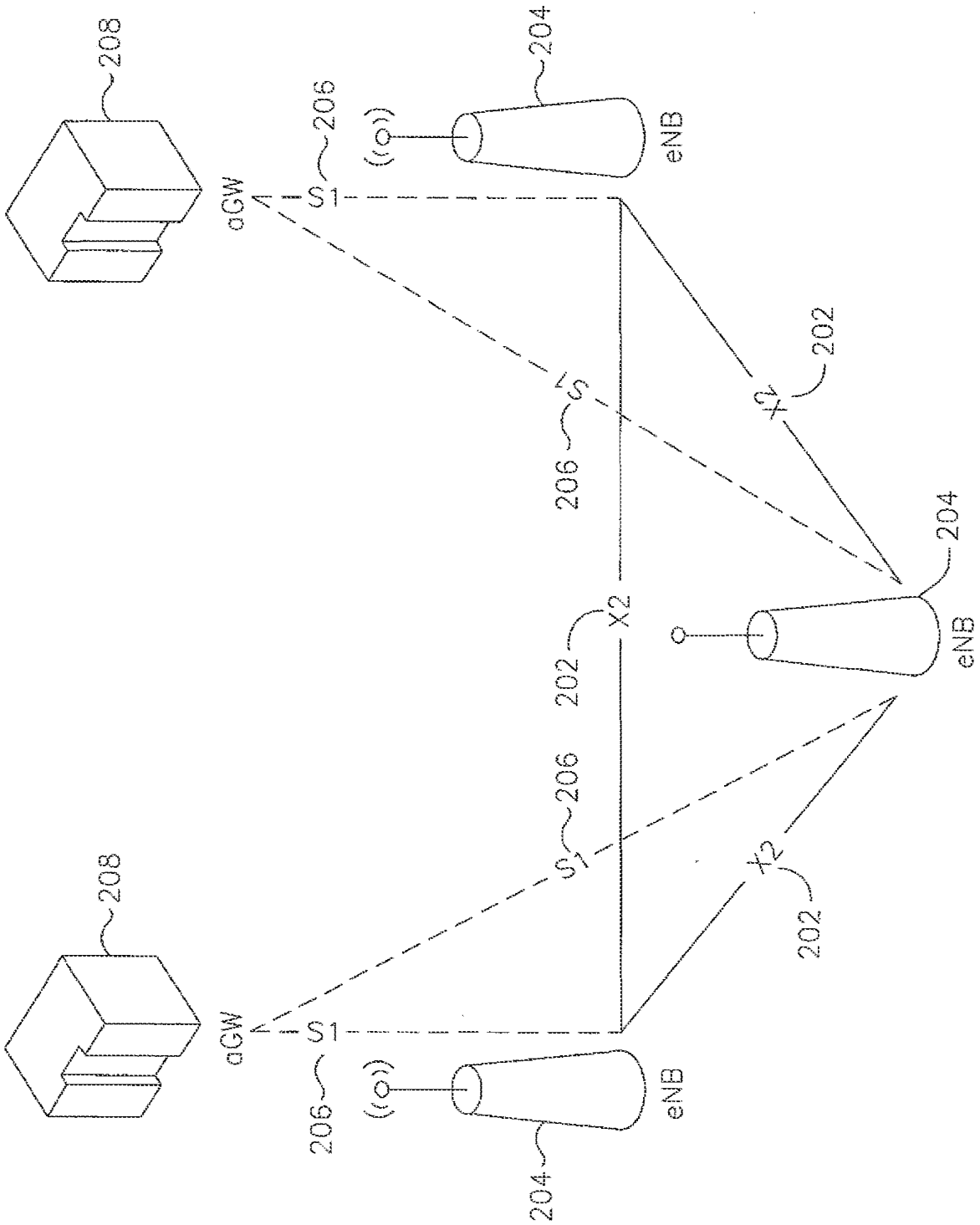
100



PRIOR ART

FIG.1

200



PRIOR ART
FIG.2

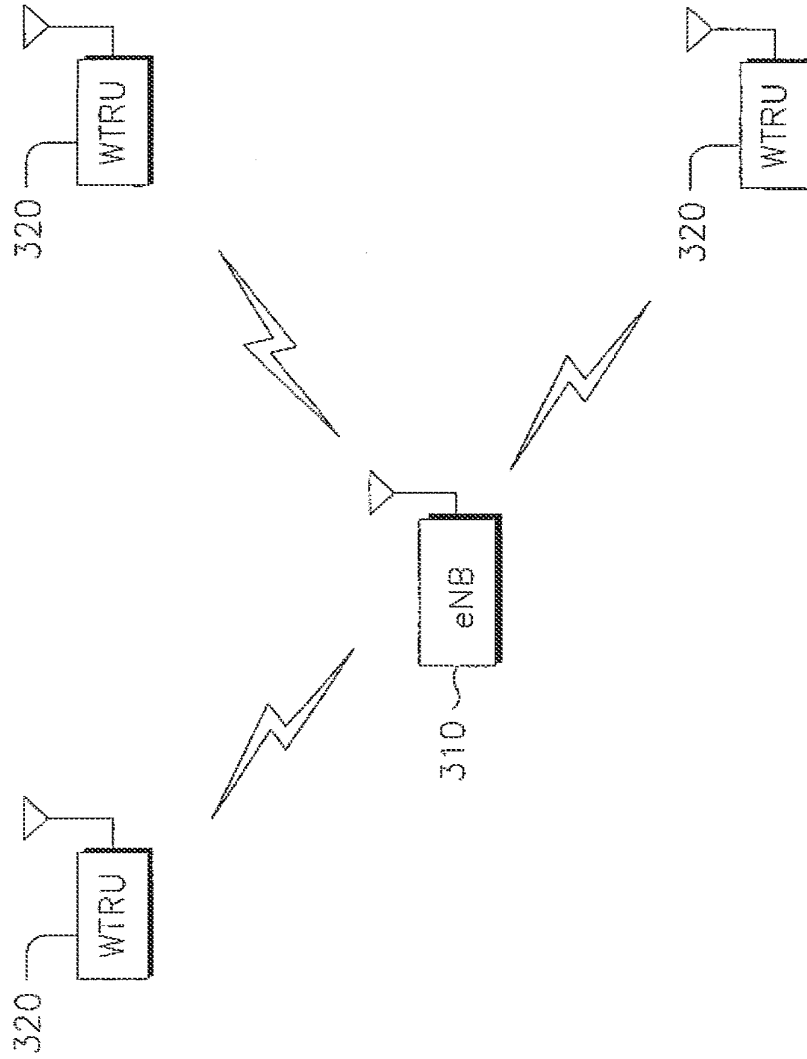


FIG.3

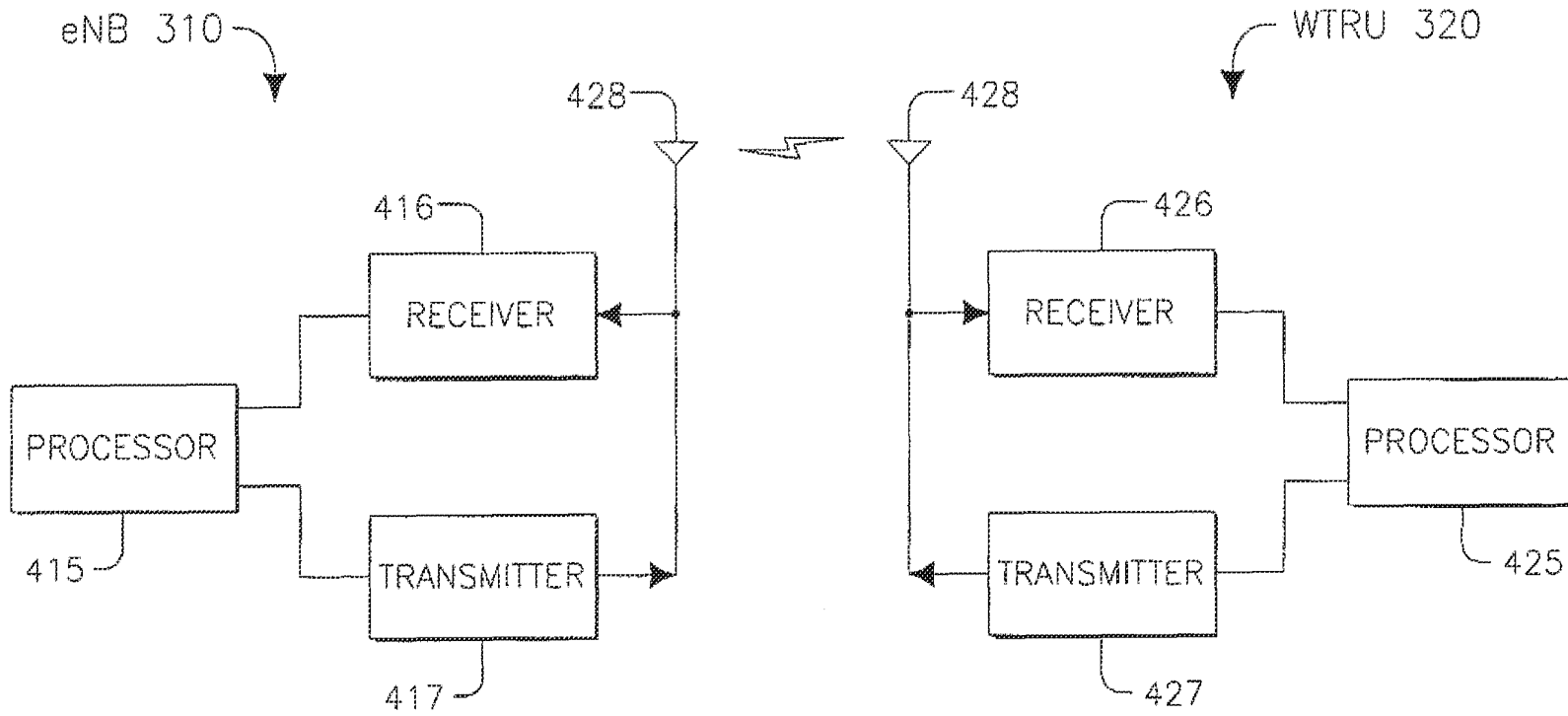


FIG.4

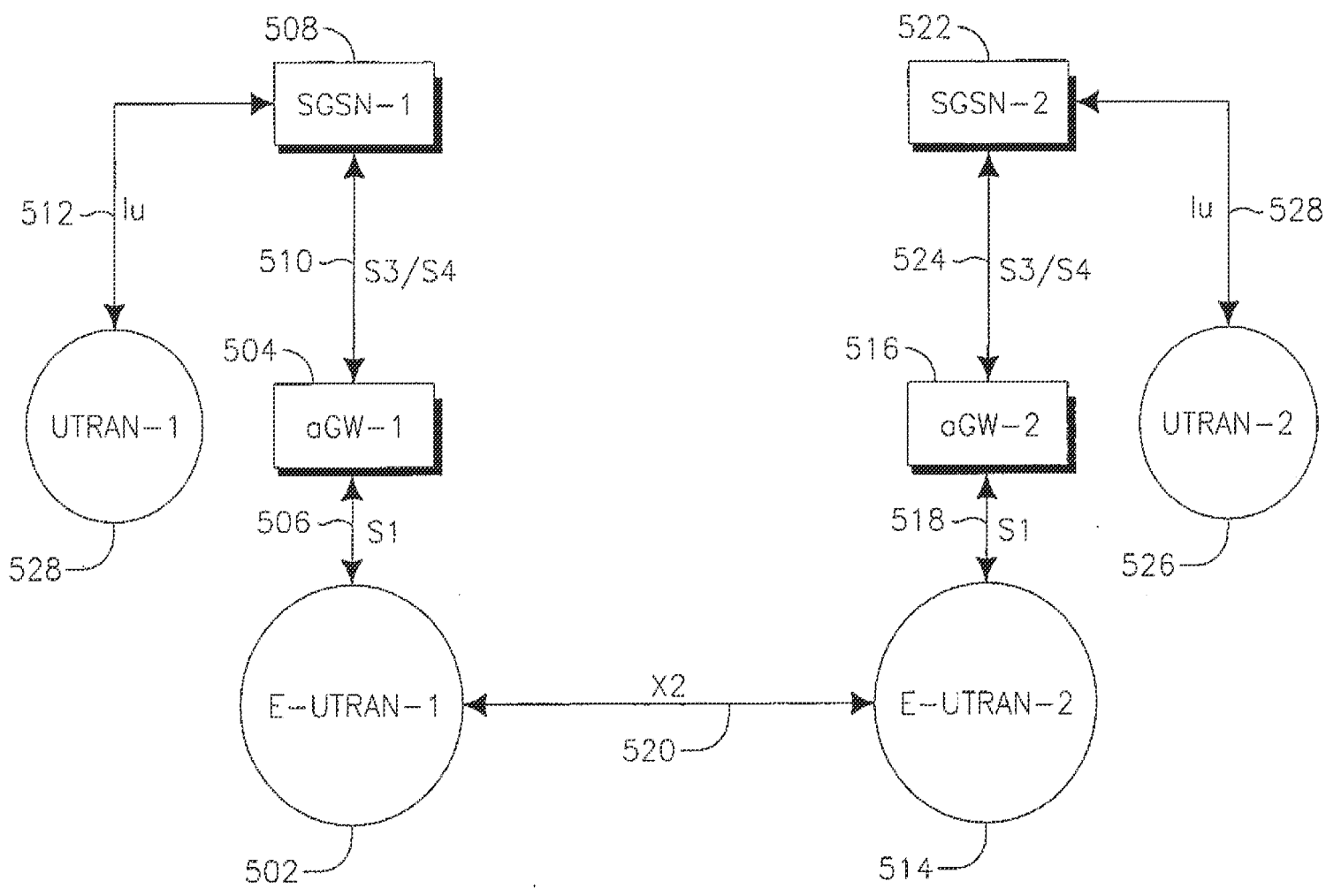


FIG.5

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2007/023013

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04Q7/38

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)
H04Q

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	US 6 546 251 B1 (DALSGAARD LARS [FI] ET AL) 8 April 2003 (2003-04-08) column 6, lines 26-65 column 7, line 25 - column 8, line 30	1-18
A	US 2004/192313 A1 (OTTING MARCIA JEAN [US]) 30 September 2004 (2004-09-30) paragraphs [0028] - [0035]	1-18

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier 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.
- *Z* document member of the same patent family

Date of the actual completion of the international search

20 March 2008

Date of mailing of the international search report

31/03/2008

Name and mailing address of the ISA/
European Patent Office, P.B. 5818 Patentlaan 2
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Authorized officer
Schut, Gerhard

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/023013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6546251	B1	08-04-2003	
		AT 255318 T	15-12-2003
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		JP 2002525938 T	13-08-2002
US 2004192313	A1	30-09-2004	
		WO 2004095853 A2	04-11-2004



NOTICE OF ALLOWANCE AND FEE(S) DUE

77399 7590 08/10/2012
Leydig, Voit & Mayer, Ltd
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Chicago, IL 60601

Table with 2 columns: EXAMINER (PATEL, MAHENDRA R), ART UNIT (2617), PAPER NUMBER

DATE MAILED: 08/10/2012

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

12/902,933 10/12/2010 Michael ROBERTS HW707010 2965
TITLE OF INVENTION: METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION

Table with 7 columns: APPLN. TYPE, SMALL ENTITY, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE

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 SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

- A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.
B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

- A. Pay TOTAL FEE(S) DUE shown above, or
B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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

**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.

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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.

77399 7590 08/10/2012

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 (for Huawei Technologies Co., Ltd)
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 180 North Stetson Avenue
 Chicago, IL 60601

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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.
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12/902,933 10/12/2010 Michael ROBERTS HW707010 2965

TITLE OF INVENTION: METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional NO \$1740 \$300 \$0 \$2040 11/13/2012

EXAMINER	ART UNIT	CLASS-SUBCLASS
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PATEL, MAHENDRA R 2617 455-435300

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "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.</p>	<p>2. For printing on the patent front page, list</p> <p>(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____</p> <p>(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. 2 _____</p> <p>3 _____</p>
---	---

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

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> 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).</p>
---	---

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

a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Values: 12/902,933, 10/12/2010, Michael ROBERTS, HW707010, 2965

77399 7590 08/10/2012
Leydig, Voit & Mayer, Ltd
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Two Prudential Plaza Suite 4900
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Chicago, IL 60601

EXAMINER

PATEL, MAHENDRA R

ART UNIT PAPER NUMBER

2617

DATE MAILED: 08/10/2012

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.

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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.

Notice of Allowability

Application No.

12/902,933

Examiner

MAHENDRA PATEL

Applicant(s)

ROBERTS ET AL.

Art Unit

2617

-- 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 02/14/2012.
- 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 1,4-9,13-15,17,18 and 21-25.
- 4. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - 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. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 - 6. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) hereto or 2) to Paper No./Mail Date ____.
 - (b) 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).**
- 7. 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. Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3. Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 07/31/2012
- 4. Examiner's Comment Regarding Requirement for Deposit of Biological Material
- 5. Notice of Informal Patent Application
- 6. Interview Summary (PTO-413), Paper No./Mail Date 08/01/2012 .
- 7. Examiner's Amendment/Comment
- 8. Examiner's Statement of Reasons for Allowance
- 9. Other ____.

/MAHENDRA PATEL/
Examiner, Art Unit 2617

/Jean A Gelin/
Acting SPE, Art Unit 2617

Examiner-Initiated Interview Summary	Application No. 12/902,933	Applicant(s) ROBERTS ET AL.	
	Examiner MAHENDRA PATEL	Art Unit 2617	

All participants (applicant, applicant's representative, PTO personnel):

- (1) MAHENDRA PATEL. (3)_____.
- (2) John B. Conklin. (4)_____.

Date of Interview: 01 August 2012.

Type: Telephonic Video Conference
 Personal [copy given to: applicant applicant's representative]

Exhibit shown or demonstration conducted: Yes No.
If Yes, brief description: _____.

Issues Discussed 101 112 102 103 Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 1,2,4,5 and 9.

Identification of prior art discussed: _____.

Substance of Interview

(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Claim 1 is broad and does not disclose key steps of invention. it is recommended to incorporate limitations from claim 2 and 3 into all independent claims.

Applicant has amended claims as per recommendation and submitted for examiner's amendment

Claims have been entered via examiner's amendment as per 37 CFR 1.312.

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Attachment

/MAHENDRA PATEL/
Examiner, Art Unit 2617

/Jean A Gelin/
Acting SPE, Art Unit 2617

DETAILED ACTION

1. This communication is in response to the amendment filed on 02/14/2012.
Application No: 12/902933.

Terminal Disclaimer

The terminal disclaimer disclaiming the terminal portion of any patent granted on this application has been reviewed and is accepted. **The terminal disclaimer has been recorded** on 07/21/2011.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with John B. Conklin on Aug 01, 2012.

3. The claims have been amended as follows:

This listing of claims replaces all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS

1. (Currently Amended) A method for cell reselection, comprising:

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obtaining, by a terminal, a dedicated priority list and a valid time of the dedicated priority list from a Long Term Evolution (LTE) system; and

performing, by the terminal, cell reselection according to the dedicated priority list and the valid time of the dedicated priority list, when the terminal camps on a cell of a non-LTE system;

wherein, when the terminal camps on a cell of the non-LTE system, the performing cell reselection according to the dedicated priority list and the valid time comprises:

performing, by the terminal camping on the cell of the non-LTE system, cell reselection according to the dedicated priority list before the valid time expires, wherein when the terminal camps on the cell of the non-LTE system, the dedicated priority list is invalid after the valid time expires.

2. (Canceled)

3. (Canceled)

4. (Previously Presented) The method according to claim 1, wherein when the terminal camps on the cell of the non-LTE system, the dedicated priority list is invalid after the valid time expires, the method further comprises:

performing cell reselection according to a public priority list, or

performing cell reselection according to a result measured in accordance with a cell signal quality criterion, or

searching for a cell of the LTE system.

5. (Currently Amended) The method according to claim [[2]]1, wherein when the public priority list is obtained by the terminal from the LTE system, the method further comprises:

obtaining, by the terminal, an indication from the non-LTE system when the terminal camps on the cell of the non-LTE system, wherein the indication is used to do one

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of: notify the terminal that the non-LTE system will not deliver the public priority list and notify the terminal to store the public priority list obtained from the LTE system.

6. (Previously Presented) The method according to claim [[2]]1, further comprising: obtaining, by the terminal, an indication from the non-LTE system, wherein the indication is used to notify the terminal that is engaged in one of the following:

- searching for a cell of the LTE system when the dedicated priority list is invalid;
- searching for a cell of the LTE system when the terminal does not store the dedicated priority list and the public priority list; and
- performing cell reselection according to a result measured in accordance with a cell signal quality criterion when the terminal does not store the dedicated priority list and the public priority list.

7. (Previously Presented) The method according to claim 1, wherein the dedicated priority list and the valid time of the dedicated priority list are carried in a dedicated signal.

8. (Previously Presented) The method according to claim 1, wherein the dedicated priority list comprises one of the following:

- priority level of a frequency or a Radio Access Technology, RAT;
- priority levels of the frequency of the serving cell, adjacent frequencies of the serving cell, and frequencies of the neighboring systems; and
- priority levels assigned for each frequency or Frequency Band of a neighboring system.

9. (Currently Amended) A terminal[[,.]] comprising:
[[an]]a first obtaining unit, configured to obtain a dedicated priority list and a valid time of the dedicated priority list from a Long Term Evolution (LTE) system;
a storage unit, configured to store the dedicated priority list and the valid time of the dedicated priority list; and

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a processing unit, configured to perform cell reselection according to the dedicated priority list and the valid time of the dedicated priority list stored in the first storage unit when the terminal camps on a non-LTE system

wherein, when the terminal camps on a cell of the non-LTE system, the performing cell reselection according to the dedicated priority list and the valid time comprises:

performing, by the terminal camping on the cell of the non-LTE system, cell reselection according to the dedicated priority list before the valid time expires, wherein when the terminal camps on the cell of the non-LTE system, the dedicated priority list is invalid after the valid time expires.

10-12. (Canceled)

13. (Previously Presented) The terminal according to claim 9, wherein the dedicated priority list and the valid time of the dedicated priority list are carried in a dedicated signal.

14. (Previously Presented) The terminal according to claim 9, wherein the dedicated priority list comprises one of the following:

priority level of a frequency or a Radio Access Technology, RAT; or

priority levels of the frequency of the serving cell, adjacent frequencies of the serving cell, and frequencies of the neighboring systems; or

priority levels assigned for each frequency or Frequency Band of a neighboring system.

15. (Original) A system, comprising a network-side device and a terminal according to claim 9, wherein the network-side device is configured to send the dedicated priority list.

16. (Canceled)

17. (Original) The system according to claim 15, wherein the dedicated priority list and the valid time of the dedicated priority list are carried in a dedicated signaling.

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18. (Previously Presented) The system according to claim 15, wherein the dedicated priority list comprises one of the following:

- priority level of a frequency or a Radio Access Technology, RAT; or
- priority levels of the frequency of the serving cell, adjacent frequencies of the serving cell, and frequencies of the neighboring systems; or
- priority levels assigned for each frequency or Frequency Band of a neighboring system.

19-20. (Canceled)

21. (Previously Presented) The method according to claim 4, wherein the public priority list is obtained by the terminal from one of the LTE system and the non-LTE system.

22. (Previously Presented) The terminal according to claim 9, wherein when the terminal camps on the cell of the non-LTE system, the processing unit is further configured to perform cell reselection according to the dedicated priority list before the valid time expires.

23. (Previously Presented) The terminal according to claim 22, further comprising:
a second obtaining unit, configured to obtain a public priority list from one of the LTE system and the non-LTE system;
a second storage unit, configured to store the public priority list; and
a second processing unit, configured to perform cell reselection according to a public priority list, when the terminal camps on the cell of the non-LTE system and the dedicated priority list is invalid after the valid time expires.

24. (Previously Presented) The system according to claim 15, wherein the processing unit is further configured to perform cell reselection according to the dedicated priority list, when the terminal camps on the cell of the non-LTE system and before the valid time expires.

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25. (Previously Presented) The system according to claim 24, further comprising:
a second obtaining unit, configured to obtain a public priority list from one of the LTE system and the non-LTE system;
a second storage unit, configured to store the public priority list; and
a second processing unit, configured to perform cell reselection according to a public priority list, when the terminal camps on the cell of the non-LTE system and the dedicated priority list is invalid after the valid time expires.

Reasons for allowance

4. An examiner's Response to the record appears below.
5. Examiner acknowledges that in view of the amendment filed, the amended claims are in condition for allowance.
6. Claims 1, 4-9, 13-15, 17-18 and 21-25 are allowed.
7. The following is an examiner's statement of reasons for allowance:
8. The reason for allowance is based on the remarks filed on 02/14/2012 and that prior arts of record **fail to teach the limitations as a whole claim** in combination with the underlined features, as summarized below:

wherein, when the terminal camps on a cell of the non-LTE system, the performing cell reselection according to the dedicated priority list and the valid time comprises:
performing, by the terminal camping on the cell of the non-LTE
system, cell reselection according to the dedicated priority list before the valid

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time expires, wherein when the terminal camps on the cell of the non-LTE system, the dedicated priority list is invalid after the valid time expires.

9. Applicant's independent claim 1 comprises a particular combination of underlined features, which is neither taught nor-suggested by prior art as a whole claim.

Similarly other independent claim 9 comprises a particular combination of underlined features with different wording, which is neither taught nor-suggested by prior art as a whole claim.

Dependent claims are deemed allowable for the same reasons as corresponding independent claims.

Prior Art References

10. The cited combined references of Ore and Carpenter fairly teaches an electronic device to receive through from a wireless communications network a prioritized list of radio access technologies; to store the prioritized list of radio access technologies in a memory of the electronic device; and to consult the prioritized list of radio access technologies during cell selection and reselection operations. In variants the radio access technologies listed in the prioritized list of radio access technologies can be E-UTRAN, UTRAN or GERAN. In a further variant to consult the prioritized list may mean to compare at least one of a signal measurement and a quality measurement with at least one threshold established for a certain radio access technology appearing in the prioritized list, and to select/reselect to the certain radio access

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technology only if the at least one of the signal measurement and the quality measurement exceeds the threshold.

11. However cited references, alone or in any combination, neither discloses nor fairly suggests combination of features, specifically, obtaining, by a terminal, a dedicated priority list and a valid time of the dedicated priority list from an LTE system; and performing, by the terminal, cell reselection according to the dedicated priority list and the valid time of the dedicated priority list, when the terminal camps on a cell of a non-LTE system.

12. The present invention reduces signaling overhead, in summary, In the current LTE system, considering that the terminal should reduce measurement overhead to save power energy, when performing cell reselection, the terminal will decide a cell on which the terminal is to camp according to the priority.

13. **Therefore, when taken as a whole, and incorporating all the respective limitations, none of the prior art discloses the features as claimed.**

Conclusion

14. 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 submission should be clearly labeled "Comments on Statement of Reasons for Allowance."

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15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahendra Patel whose telephone number is 571-270-7499. The examiner can normally be reached on 9:30 AM to 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean Gelin can be reached on (571) 272-7842. 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.

/MAHENDRA PATEL/
Examiner, Art Unit 2617
/Jean A Gelin/
Acting SPE, Art Unit 2617

Notice of References Cited	Application/Control No. 12/902,933	Applicant(s)/Patent Under Reexamination ROBERTS ET AL.	
	Examiner MAHENDRA PATEL	Art Unit 2617	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-2004/0162074 A1	08-2004	Chen, Rex Huan-Yueh	455/437
*	B US-2006/0251023 A1	11-2006	Choi, Yoon-Suk	370/331
*	C US-2009/0181676 A1	07-2009	LEE et al.	455/436
	D US-			
	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
	N				
	O				
	P				
	Q				
	R				
	S				
	T				

NON-PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)				
	U				
	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.

Search Notes 	Application/Control No. 12902933	Applicant(s)/Patent Under Reexamination ROBERTS ET AL.
	Examiner UN C CHO	Art Unit 2617

SEARCHED			
Class	Subclass	Date	Examiner
455	435.1,435.2,435.3,436,437, 411	1/12/2011	UC
370	252, 449, 398	8/1/2012	MP
345	501	8/1/2012	MP
718	104	8/1/2012	MP

SEARCH NOTES		
Search Notes	Date	Examiner
East Search including keywords, class/subclass, inventor, assignee	1/12/2010	UC
Update East Search	8/1/2012	MP
Limited NPL search	8/1/2012	MP
PLUS search	8/1/2012	MP

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
455	435.3, 411, 436	8/1/2012	MP

	/UN C CHO/ Primary Examiner.Art Unit 2617
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BIB DATA SHEET

CONFIRMATION NO. 2965

SERIAL NUMBER 12/902,933	FILING or 371(c) DATE 10/12/2010 RULE	CLASS 455	GROUP ART UNIT 2617	ATTORNEY DOCKET NO. HW707010	
APPLICANTS Michael ROBERTS, Kista, SWEDEN; Johan Johansson, Kungsangen, SWEDEN; Boyun Xie, Shenzhen, CHINA; Min Huang, Shenzhen, CHINA; ** CONTINUING DATA ***** This application is a CON of PCT/CN2009/071194 04/08/2009 ** FOREIGN APPLICATIONS ***** CHINA 200810091957.6 04/09/2008 ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 10/21/2010					
Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 35 USC 119(a-d) conditions met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Verified and /MAHENDRA R PATEL/ Acknowledged Examiner's Signature	<input type="checkbox"/> Met after Allowance Initials	STATE OR COUNTRY SWEDEN	SHEETS DRAWINGS 3	TOTAL CLAIMS 20	INDEPENDENT CLAIMS 2
ADDRESS Leydig, Voit & Mayer, Ltd (for Huawei Technologies Co., Ltd) Two Prudential Plaza Suite 4900 180 North Stetson Avenue Chicago, IL 60601 UNITED STATES					
TITLE METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION					
FILING FEE RECEIVED 1220	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

Issue Classification 	Application/Control No. 12902933	Applicant(s)/Patent Under Reexamination ROBERTS ET AL.
	Examiner MAHENDRA PATEL	Art Unit 2617

ORIGINAL				INTERNATIONAL CLASSIFICATION									
CLASS		SUBCLASS		CLAIMED				NON-CLAIMED					
455		435.3		H	0	4	W	36 / 00 (2009.01.01)					
CROSS REFERENCE(S)													
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)												
455	436	411											

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input checked="" type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	11	17												
	2	12	18												
	3		19												
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9	14														
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	16														

/MAHENDRA PATEL/ Examiner.Art Unit 2617 (Assistant Examiner)	08/01/2012 (Date)	Total Claims Allowed: 17	
/JEAN GELIN/ Primary Examiner.Art Unit 2617 (Primary Examiner)	08/04/2012 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Please type a plus sign (+) inside this box → +

Substitute for form 1449A/B/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	12/902,933
				Filing Date	October 12, 2010
				First Named Inventor	ROBERTS, Michael
				Group Art Unit	2617
				Examiner Name	PATEL, Mahendra R
Sheet	1	of	1	Attorney Docket Number	HW707010

U.S. PATENT DOCUMENTS						
Examiner Initials	Doc. No.	U.S. Patent Document		Name of Patentee or Applicant	Date of Publication	Filing Date If Appropriate
		Application or Patent Number	Kind Code			

FOREIGN PATENT DOCUMENTS							
Examiner Initials	Doc. No.	Foreign Patent Document			Name of Patentee or Applicant	Date of Publication	Translation *
		Office	Application or Patent Number	Kind Code			
	A X	EP	0862346	A2	Nokia Mobile Phones, Ltd.	Sept. 2, 1998	
	A Y	EP	2111074	A1	Huawei Tech. Co., Ltd.	Oct. 21, 2009	
	A Z	WO	2008057359	A1	Interdigital Tech. Corp.	May 15, 2008	

OTHER - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Doc. 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, page(s), volume-issue number (s), publisher, city and/or country where published.	Translation *
	BA	Extended European Search Report in corresponding European Patent Application No. 12168647.1 (June 25, 2012).	
	BB	"R2-073622 – E-UTRA Cell Selection and Cell Reselection Aspects," 3GPP TSG-RAN WG2 Meeting #59, August 2007, 3GPP, Valbonne, France.	
	BC	"Tdoc-R2-074001 – IDLE Mode Mobility Control Principles," 3GPP TSG RAN WG2 #59bis, October 2007, 3GPP, Valbonne, France.	
	BD	"TSGR2#6(99)808 – Cell Selection and Cell Reselection Criteria," TSG-RAN Working Group 2 (Radio layer 2 and Radio layer 3), August 1999, 3GPP, Valbonne, France,	

Examiner Signature	/Mahendra Patel/	Date Considered	08/01/2012
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* If the reference is not in English, then at least one of the following is provided: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	526	((MICHAEL) near2 (ROBERTS)).INV.	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 17:41
L2	159	((JOHAN) near2 (JOHANSSON)).INV.	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 17:41
L3	7	((BOYUN) near2 (XIE)).INV.	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 17:41
L4	648	((MIN) near2 (HUANG)).INV.	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 17:41
L5	1608637	((Mobile adj (device\$2 or terminal or station or handset\$2) or (user adj equipment) or (wireless or cell\$1phone or cellphone or PDA) or (personal adj access adj communication\$2) or (PACS) or subscriber\$2)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	OFF	2012/08/01 17:42
L6	881817	(("455"/\$.ccls. or ("370"/\$.ccls. or ("375"/\$.ccls. or ("345"/\$.ccls. Or ("378"/\$.ccls. Or ("710"/\$.ccls. Or ("713"/\$.ccls. Or ("719"/\$.ccls. Or ("718"/\$.ccls. Or ("358"/\$.ccls.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	OFF	2012/08/01 17:44
L7	3	(2008/0268843 2007/0191006)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	OFF	2012/08/01 17:48
L15	5	("20080268843" or "20070191006")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	OFF	2012/08/01 17:50
L20	5	("12902933")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	OFF	2012/08/01 18:36
L27	0	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and ((device or mobile or station terminal) (US-PGPUB; USPAT; USOCR;	AND	ON	2012/08/01 19:34

		camp\$4 cell) (performing (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4))).clm. and (@ad<"20080409")	FPRS; EPO; JPO; DERWENT; IBM_TDB			
L28	0	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and ((device or mobile or station terminal) (camp\$4 cell) (performing (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4))).ab. and (@ad<"20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2012/08/01 19:34
L29	358	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and ((device or mobile or station terminal) (camp\$4 cell) (performing (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4))) and (@ad<"20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2012/08/01 19:34
L30	0	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and ((device or mobile or station terminal) (camp\$4 cell) (performing (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4))) and (@ad<"20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/08/01 19:35
L31	0	(((device or mobile or station terminal) (camp\$4 cell) (performing (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4) (LTE))) and (@ad<"20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/08/01 19:35
L34	0	(((mobile or device or station terminal) (performing (selection or reselection) (rank\$4 or priori\$4) and ((approved or valid or assigned) (tim\$4 expir\$4) (LTE) (camp\$4 cell)))) and (@ad<"20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/08/01 19:38
L36	0	(((performing (selection or reselection) (rank\$4 or priori\$4) and ((approved or valid or assigned) (tim\$4 expir\$4) (camp\$4 cell)))) and (@ad<"20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/08/01 19:38
L37	6	((MICHAEL) near2 (ROBERTS)).INV. and (LTE camp\$4 priority)	US-PGPUB; USPAT; USOCR	SAME	OFF	2012/08/01 19:39
L40	0	((("20070258410" "20070191006" "20080268843" "20090181676" "20040121777").PN.).INV.	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 19:40
L41	5	((("20070258410" "20070191006" "20080268843" "20090181676" "20040121777").PN.)	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 19:41
L42	2	((("20070258410" "20070191006"	US-PGPUB;	AND	OFF	2012/08/01

		"20080268843" "20090181676" "20040121777").PN.) and (LTE camp\$4 priority)	USPAT; USOCR			19:41
L43	0	(("6421334" "7209747" "20060035662" "20060251023" "6961570" "20090086853" "6434389" "20070183372" "20040162074" "20040208142" "20030224790" "20050220042" "20070115894" "20050026597" "20060104225" "20020126629" "20070049325" "20070202892").PN.) and (LTE camp\$4 priority)	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 19:42
L44	4	(("6421334" "7209747" "20060035662" "20060251023" "6961570" "20090086853" "6434389" "20070183372" "20040162074" "20040208142" "20030224790" "20050220042" "20070115894" "20050026597" "20060104225" "20020126629" "20070049325" "20070202892").PN.) and (camp\$4 priority)	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 19:42
L45	0	(("6421334" "7209747" "20060035662" "20060251023" "6961570" "20090086853" "6434389" "20070183372" "20040162074" "20040208142" "20030224790" "20050220042" "20070115894" "20050026597" "20060104225" "20020126629" "20070049325" "20070202892").PN.) and (camp\$4 priority) (tim\$4 expire\$4)	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 19:44
L46	1	(("20040053630" "5930721").PN.) and (camp\$4 priority)	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 19:45
L47	2	(("20040053630" "5930721").PN.) and (camp\$4 priority)	US-PGPUB; USPAT; USOCR	OR	OFF	2012/08/01 19:45
L48	15	((JOHAN) near2 (JOHANSSON)).INV. and (camp\$4 priority)	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 19:46
L49	6	((BOYUN) near2 (XIE)).INV. and (camp\$4 priority)	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 19:46
L50	9	((MIN) near2 (HUANG)).INV. and (camp\$4 priority)	US-PGPUB; USPAT; USOCR	AND	OFF	2012/08/01 19:46
L51	30	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and ((device or mobile or station terminal) (camp\$4 cell) (performing (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4))) and (@ad<"20080409") and (camp\$4 same priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2012/08/01 19:46
L52	7	(Cell selection network LTE) and (@ad<"20080409") and (camp\$4	US-PGPUB; USPAT;	AND	ON	2012/08/01 19:47

		same priority)	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
L53	0	(Cell selection network LTE).ti. and (@ad<"20080409") and (camp\$4 same priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2012/08/01 19:48
L54	6	(("7072651" "20040058679" "6334052" "20070195803" "20070202875" "20060114871" "20040224689").PN.) and (@ad<"20080409") and (camp\$4 same priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2012/08/01 19:50
L55	17	(L5) and (LTE camp\$4 priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2012/08/01 19:54
L56	0	(L5) and (@ad<"20080409") and (LTE camp\$4 priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2012/08/01 19:55
L57	0	(L6) and (@ad<"20080409") and (LTE camp\$4 priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	OFF	2012/08/01 19:55

8/ 1/ 2012 8:00:03 PM

C:\Users\mpatel4\Documents\EAST\Workspaces\EAST Workspace - 12902933 - CellReselction_LTE_CON_POST.wsp


EAST Search History

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L21	0	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and (terminal camps on cell LTE performing cell reselection dedicated priority list valid time non-LTE dedicated priority list before the valid time expires terminal camps on the cell of the non-LTE invalid after valid time expires).clm.	US-PGPUB; USPAT; UPAD	AND	ON	2012/08/01 19:27
L22	3	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and (terminal camp\$4 cell LTE performing reselection dedicat\$4 priori\$4 valid tim\$4 non-LTE expires non-LTE invalid).clm.	US-PGPUB; USPAT; UPAD	AND	ON	2012/08/01 19:29
L23	3	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and ((device or mobile or station terminal) (camp\$4 cell LTE) (performing (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4) non-LTE)).clm.	US-PGPUB; USPAT; UPAD	AND	ON	2012/08/01 19:32
L25	4	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and ((device or mobile or station terminal) (camp\$4 cell) (performing (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4))).clm.	US-PGPUB; USPAT; UPAD	AND	ON	2012/08/01 19:32
L26	0	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and ((device or mobile or station terminal) (camp\$4 cell) (performing (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4))).clm. and (@ad<"20080409")	US-PGPUB; USPAT; UPAD	AND	ON	2012/08/01 19:33

8/ 1/ 2012 7:52:35 PM

C:\Users\mpatel4\Documents\EAST\Workspaces\EAST Workspace - 12902933 - CellReselction_LTE_CON_POST.wsp

Index of Claims 	Application/Control No. 12902933	Applicant(s)/Patent Under Reexamination ROBERTS ET AL.
	Examiner UN C CHO	Art Unit 2617

✓	Rejected
=	Allowed

-	Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

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

CLAIM		DATE							
Final	Original	01/12/2011	09/06/2011	08/01/2012					
	1	✓	✓	=					
	2	✓	✓	-					
	3	✓	✓	-					
	4	✓	✓	=					
	5	✓	○	=					
	6	✓	✓	=					
	7	✓	✓	=					
	8	✓	✓	=					
	9	✓	✓	=					
	10	✓	○	-					
	11	✓	✓	-					
	12	✓	✓	-					
	13	✓	✓	=					
	14	✓	✓	=					
	15	✓	✓	=					
	16	✓	✓	-					
	17	✓	✓	=					
	18	✓	✓	=					
	19	✓	○	-					
	20	✓	✓	-					
	21			=					
	22			=					
	23			=					
	24			=					
	25			=					



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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes application details for Michael ROBERTS and examiner information for PATEL, MAHENDRA R.

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):

Chgpatent@leydig.com
uspatent@huawei.com

**Supplemental
Notice of Allowability**

Application No.

12/902,933

Examiner

MAHENDRA PATEL

Applicant(s)

ROBERTS ET AL.

Art Unit

2617

-- 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 09/18/2012.
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 ____.
4. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - 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. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) hereto or 2) to Paper No./Mail Date ____.
 - (b) 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).
7. 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)

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. <input type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>02/21/2012</u> 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | <ol style="list-style-type: none"> 5. <input type="checkbox"/> Notice of Informal Patent Application 6. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date ____. 7. <input type="checkbox"/> Examiner's Amendment/Comment 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input type="checkbox"/> Other ____. |
|--|---|

/MAHENDRA PATEL/
Examiner, Art Unit 2617

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application No. 12/902,933

Confirmation No. 2965

Applicant: ROBERTS et al.

Filed: October 12, 2010

TC/AU: 2617

Examiner: Un C. CHO

Docket No.: HW707010 (Client Reference No. 0811316US)

Customer No.: 77399

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

INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 CFR 1.97 and 1.98, the references listed on the enclosed Form PTO-1449 and/or Substitute Form PTO-1449 ("Form 1449") are submitted for consideration by the Examiner in the examination of the above-identified patent application.

The full consideration of the references in their entirety by the Examiner is respectfully requested and encouraged. Also, it is respectfully requested that the references be entered into the record of the present application and that the Examiner initial the appropriate area on the enclosed Form 1449, thereby indicating the Examiner's consideration of each of the references.

The submission of the references listed on the Form 1449 is for the purpose of providing a complete record and is not a concession that the references listed thereon are prior art to the invention claimed in the patent application. The right is expressly reserved to establish an invention date earlier than the above-identified filing date in order to remove any reference submitted herewith as prior art should it be deemed appropriate to do so.

Further, the submission of the references is not to be taken as a concession that any reference represents art that is relevant or analogous to the claimed invention. Accordingly, the right to argue that any reference is not properly within the scope of prior art relevant to an examination of the claims in the above-identified application is also expressly reserved.

The Information Disclosure Statement is being filed:

- within** any one of the following time periods: (a) within three months of the filing date of a national application other than a continued prosecution application under 37 CFR 1.53(d); (b) within three months of the date of entry of the national stage as set forth in 37 CFR 1.491 of an international application; (c) before the mailing date

Application No. 12/902,933

Information Disclosure Statement

of a first Office Action on the merits; or (d) before the mailing of a first Office Action after the filing of a request for continued examination under 37 CFR 1.114.

- Note: This submission includes the Statement under 37 CFR 1.704(d) (see "Statement under 37 CFR 1.704(d)" below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.
- after** (a), (b), (c) or (d) above, but before the mailing date of a final action under 37 CFR 1.113, a Notice of Allowance under 37 CFR 1.311, or an action that otherwise closes prosecution in the application, and includes *one* of:
- the Statement under 37 CFR 1.97(e) (see "Statement under 37 CFR 1.97(e)" below).
- Note: This submission includes the Statement under 37 CFR 1.704(d) (see "Statement under 37 CFR 1.704(d)" below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.
- or –
- the fee of \$180 set forth in 37 CFR 1.17(p) (see "Fees" below).
- on or after** the mailing date of a final action under 37 CFR 1.113 or a Notice of Allowance under 37 CFR 1.311, or an action that otherwise closes prosecution in the application, and on or before payment of the issue fee, and includes the Statement under 37 CFR 1.97(e) (see "Statement under 37 CFR 1.97(e)" below), and the fee of \$180 as set forth in 37 CFR 1.17(p) (see "Fees" below).
- on or after** the mailing date of a Notice of Allowance under 37 CFR 1.311, and on or before payment of the issue fee, and **within** thirty days of receiving each item of information contained in the Information Disclosure Statement, and includes the Statement under 37 CFR 1.704(d) (see "Statement under 37 CFR 1.704(d)" below), and the fee of \$180 as set forth in 37 CFR 1.17(p) (see "Fees" below). NOTE: This is for original applications except applications for a design patent, filed on or after May 29, 2000, wherein a paper containing only an Information Disclosure Statement in compliance with 37 CFR 1.97 and 1.98 is being filed.

Citation to Other Patent Applications

- The following U.S. patent applications are hereby brought to the attention of the Examiner. The U.S. patent applications claim subject matter that may be considered by the Examiner to be similar to the subject matter claimed in the above-identified patent application. Accordingly, these U.S. patent applications and/or the prosecution pertaining thereto may include information considered to be material to the prosecution of the above-identified patent application. Since the Examiner has electronic access to the prosecution histories of these U.S. patent applications, copies of prosecution materials therefrom are not provided herewith, but will be promptly provided if the Examiner so desires and requests same.

Application No. 12/902,933

Information Disclosure Statement

U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Never Issued: Abandoned/Expired
1. 12/955,392	November 29, 2010		X	
2.				
3.				

Copies of the References

- Copies of any U.S. patents and published patent applications that are listed on the accompanying Form 1449 are not enclosed herewith. Copies of any other references identified on the accompanying Form 1449 are enclosed herewith.
- For each reference not in the English language, attached is at least one of the following: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.
- The references listed on the enclosed Form 1449 were previously identified in the parent application(s) of the present application, and copies of the references were furnished at that time. Accordingly, additional copies of the references are not submitted herewith, so as not to burden the file with duplicate copies of references. The Examiner is respectfully requested to carefully review the references in accordance with the requirements set out in the Manual of Patent Examining Procedure. In accordance with 37 CFR 1.98(d), the details of the parent application(s) relied upon for an earlier filing date under 35 USC 120 in which copies of the references were previously furnished are set out below:

U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Abandoned
1.				
2.				
3.				

Statement under 37 CFR 1.97(e)

- The **undersigned** hereby states 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 patent application not more than three months prior to the filing of the Information Disclosure Statement.
- The **undersigned** hereby states 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 patent application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in the Information Disclosure Statement was known to any individual designated in

Application No. 12/902,933

Information Disclosure Statement

37 CFR 1.56(c) more than three months prior to the filing of the Information Disclosure Statement.

Statement under 37 CFR 1.704(d)

The **undersigned** hereby states 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 application and that this communication was not received by any individual designated in 37 CFR 1.56(c) more than thirty days prior to the filing of the Information Disclosure Statement.

Fees

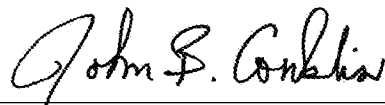
No fee is owed by the applicant(s).
 Charge Deposit Account No. 12-1216 in the amount of **\$180.00** (37 CFR 1.17(p)).

Authorization to Charge Additional Fees

If any additional fees are owed in connection with this communication, please charge Deposit Account No. 12-1216.

Instructions as to Overpayment

Credit Account No. 12-1216.
 Refund



John B. Conklin, Reg. No. 30,369
LEYDIG, VOIT & MAYER, LTD.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6731
(312) 616-5600 (telephone)
(312) 616-5700 (facsimile)

Date: February 21, 2012

/Mahendra Patel/

09/19/2012



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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 12/902,933, 10/12/2010, Michael ROBERTS, HW707010, 2965
Row 2: 77399, 7590, 10/19/2012, (for Huawei Technologies Co., Ltd) Two Prudential Plaza Suite 4900, 180 North Stetson Avenue, Chicago, IL 60601, EXAMINER PATEL, MAHENDRA R, ART UNIT 2645, PAPER NUMBER, NOTIFICATION DATE 10/19/2012, DELIVERY MODE 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):

Chgpatent@leydig.com
uspatent@huawei.com

**supplemental
Notice of Allowability**

Application No.

12/902,933

Examiner

MAHENDRA PATEL

Applicant(s)

ROBERTS ET AL.

Art Unit

2645

-- 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 10/01/2012.
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 ____.
4. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - 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. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) hereto or 2) to Paper No./Mail Date ____.
 - (b) 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).**
7. 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. Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 02/21/2012
4. Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. Notice of Informal Patent Application
6. Interview Summary (PTO-413), Paper No./Mail Date ____.
7. Examiner's Amendment/Comment
8. Examiner's Statement of Reasons for Allowance
9. Other ____.

/MAHENDRA PATEL/
Examiner, Art Unit 2645

Please type a plus sign (+) inside this box → +

Substitute for form 1449A/B/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	12/902,933
				Filing Date	October 12, 2010
				First Named Inventor	ROBERTS, Michael
				Group Art Unit	2617
				Examiner Name	Un C. CHO
Sheet	1	of	1	Attorney Docket Number	HW707010

U.S. PATENT DOCUMENTS						
Examiner Initials	Doc. No.	U.S. Patent Document		Name of Patentee or Applicant	Date of Publication	Filing Date If Appropriate
		Application or Patent Number	Kind Code			

FOREIGN PATENT DOCUMENTS							
Examiner Initials	Doc. No.	Foreign Patent Document			Name of Patentee or Applicant	Date of Publication	Translation*
		Office	Application or Patent Number	Kind Code			
	AR	KR	1020050017514	A	Pantech Co., Ltd.	February 25, 2005	(b)
	AS	KR	1020060099462	A	Samsung Electronics Co., Ltd.	September 19, 2006	(b)

OTHER - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Doc. 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, page(s), volume-issue number (s), publisher, city and/or country where published.	Translation *
	AT	U.S. PATENT AND TRADEMARK OFFICE, First Office Action in U.S. Patent Application No. 12/955,392 (February 10, 2011)	
	AU	U.S. PATENT AND TRADEMARK OFFICE, Final Office Action in U.S. Patent Application No. 12/955,392 (April 28, 2011)	
	AV	U.S. PATENT AND TRADEMARK OFFICE, First Office Action in U.S. Patent Application No. 13/270,089 (February 3, 2012)	
	AW	KOREAN INTELLECTUAL PROPERTY OFFICE, Office Action in Korean Patent Application No. 10-2010-7023997 (July 1, 2011)	(a)

Examiner Signature	/Mahendra Patel/	Date Considered	10/03/2012
--------------------	------------------	-----------------	------------

* If the reference is not in English, then at least one of the following is provided: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.

Request for Continued Examination (RCE) Transmittal

Address to:
Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application No.	12/902,933
Confirmation No.	2965
Filing Date	October 12, 2010
First Named Inventor	ROBERTS, Michael
Group Art Unit	2645
Examiner Name	PATEL, Mahendra R
Attorney Docket No.	HW707010
Client Reference No.	0811316US

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

1. Submission required under 37 CFR 1.114

- a. Previously submitted
 - i. Consider the amendment(s)/reply under 37 CFR 1.116 previously filed on
(Any unentered amendment(s) referred to above will be entered.)
 - ii. Consider the arguments in the Appeal Brief or Reply Brief previously filed on
 - iii. Other:
- b. Enclosed
 - i. Amendment/Reply
 - ii. Affidavit(s)/Declaration(s)
 - iii. Information Disclosure Statement (IDS)
 - iv. Form PTO-1449
 - v. Copies of References listed in Form PTO-1449
(except for U.S. patents and applications)
 - vi. Other:

2. Miscellaneous

- a. Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months. (Period of suspension shall not exceed 3 months; fee under 37 CFR 1.17(i) required.)
- b. Applicant claims small entity status. See 37 CFR 1.27
- c. Other:

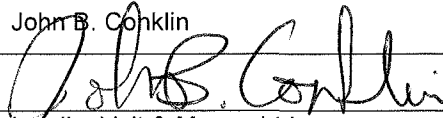
3. Fees - The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

- a. Please charge Deposit Account No. 12-1216 in the total amount indicated below.
 - i. RCE fee of \$930.00 (large entity) required under 37 CFR 1.17(e) \$930.00
 - ii. One-month extension of time fee of \$ 0.00 (37 CFR 1.136 and 1.17) \$ 0.00
 - iii. An extension for two months has already been secured and the fee paid therefor of \$ 0.00 is deducted from the total fee due for the total amount of extension now requested. \$ 0.00
 - iv. Petition for an extension of time (including the period noted above, if checked), as well as for any additional period necessary to render the present submission timely. Please charge Deposit Account No. 12-1216 for the appropriate petition fee.
 - v. Suspension of action fee of \$130.00 (37 CFR 1.17(i)) \$ 0.00
 - vi. Other:
 - vii. Claim fee

CLAIM FEE	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	EXTRA CLAIMS PRESENT	RATE	ADD'L CLAIM FEE	RATE	ADD'L CLAIM FEE
TOTAL				=	x 30 =		x 60 =	\$0.00
INDEPENDENT				=	x 125 =		x 250 =	\$0.00
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE CLAIM					+ 225 =		+ 450 =	\$0.00
Total amount to be charged to Deposit Account								\$930.00

b. The Commissioner is hereby authorized to charge any deficiencies in the above fees or to credit any overpayments to Deposit Account No. 12-1216.

SIGNATURE OF APPLICANT, ATTORNEY OR AGENT REQUIRED

Name (Print/Type)	John B. Conklin	Registration No. (Attorney/Agent)	30,369
Signature		Date	November 12, 2012
Address	Leydig, Voit & Mayer, Ltd. Two Prudential Plaza, Suite 4900 180 North Stetson Avenue Chicago, Illinois 60601-6731	Phone	(312) 616-5600 (telephone) (312) 616-5700 (facsimile)

Please type a plus sign (+) inside this box → +

Substitute for form 1449A/B/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	12/902,933
				Filing Date	October 12, 2010
				First Named Inventor	ROBERTS, Michael
				Group Art Unit	2645
				Examiner Name	PATEL, Mahendra R
Sheet	1	of	1	Attorney Docket Number	HW707010

U.S. PATENT DOCUMENTS						
Examiner Initials	Doc. No.	U.S. Patent Document		Name of Patentee or Applicant	Date of Publication	Filing Date If Appropriate
		Application or Patent Number	Kind Code			
	BE	8,041,355	B2	Roberts et al.	Oct. 18, 2011	
	BF	2001/0011019	A1	Jokimies	Aug. 2, 2001	

FOREIGN PATENT DOCUMENTS							
Examiner Initials	Doc. No.	Foreign Patent Document			Name of Patentee or Applicant	Date of Publication	Translation *
		Office	Application or Patent Number	Kind Code			

OTHER - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Doc. 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, page(s), volume-issue number (s), publisher, city and/or country where published.	Translation *
	BG	"TS 25.304 – 3 rd Generation Partnership Project; Technical Specification Group Radio Access Network; User Equipment (UE) Procedures in Idle Mode and Procedures for Cell Reselection in Connected Mode (Release 8)," 3GPP Technical Specification, March 2008, V8.1.0, 3GPP, Valbonne, France	
	BH	"TS 36.331 – 3 rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol Specification (Release 8)," 3GPP Technical Specification, March 2008, V8.1.0, 3GPP, Valbonne, France.	
	BI	"TS 25.331 – Radio Resource Control; Protocol Specification (Release 8)," 3GPP Technical Specification, December 2007, v8.1.0, 3GPP Valbonne, France.	

Examiner Signature	Date Considered
--------------------	-----------------

* If the reference is not in English, then at least one of the following is provided: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application No. 12/902,933

Confirmation No. 2965

Applicant: ROBERTS, Michael

Filed: October 12, 2010

TC/AU: 2645

Examiner: PATEL, Mahendra R

Docket No.: HW707010 (Client Reference No. 0811316US)

Customer No.: 77399

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

INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 CFR 1.97 and 1.98, the references listed on the enclosed Form PTO-1449 and/or Substitute Form PTO-1449 ("Form 1449") are submitted for consideration by the Examiner in the examination of the above-identified patent application.

The full consideration of the references in their entirety by the Examiner is respectfully requested and encouraged. Also, it is respectfully requested that the references be entered into the record of the present application and that the Examiner initial the appropriate area on the enclosed Form 1449, thereby indicating the Examiner's consideration of each of the references.

The submission of the references listed on the Form 1449 is for the purpose of providing a complete record and is not a concession that the references listed thereon are prior art to the invention claimed in the patent application. The right is expressly reserved to establish an invention date earlier than the above-identified filing date in order to remove any reference submitted herewith as prior art should it be deemed appropriate to do so.

Further, the submission of the references is not to be taken as a concession that any reference represents art that is relevant or analogous to the claimed invention. Accordingly, the right to argue that any reference is not properly within the scope of prior art relevant to an examination of the claims in the above-identified application is also expressly reserved.

The Information Disclosure Statement is being filed:

- within** any one of the following time periods: (a) within three months of the filing date of a national application other than a continued prosecution application under 37 CFR 1.53(d); (b) within three months of the date of entry of the national stage as set forth in 37 CFR 1.491 of an international application; (c) before the mailing date

of a first Office Action on the merits; or (d) before the mailing of a first Office Action after the filing of a request for continued examination under 37 CFR 1.114.

- Note: This submission includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.
- after** (a), (b), (c) or (d) above, but before the mailing date of a final action under 37 CFR 1.113, a Notice of Allowance under 37 CFR 1.311, or an action that otherwise closes prosecution in the application, and includes *one* of:
- the Statement under 37 CFR 1.97(e) (see “Statement under 37 CFR 1.97(e)” below).
- Note: This submission includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.

– *or* –

- the fee of \$180 set forth in 37 CFR 1.17(p) (see “Fees” below).
- on or after** the mailing date of a final action under 37 CFR 1.113 or a Notice of Allowance under 37 CFR 1.311, or an action that otherwise closes prosecution in the application, and on or before payment of the issue fee, and includes the Statement under 37 CFR 1.97(e) (see “Statement under 37 CFR 1.97(e)” below), and the fee of \$180 as set forth in 37 CFR 1.17(p) (see “Fees” below).
- Note: This submission includes the Statement under 37 CFR 1.704(d) (see “Statement under 37 CFR 1.704(d)” below), such that no reduction in patent term adjustment is warranted by the filing of this Information Disclosure Statement.

Statement under 37 CFR 1.97(e)

- The **undersigned** hereby states 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 patent application not more than three months prior to the filing of the Information Disclosure Statement.
- The **undersigned** hereby states 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 patent application, and, to the knowledge of the undersigned 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.

Statement under 37 CFR 1.704(d)

- The **undersigned** hereby states that each item of information contained in the Information Disclosure Statement was first cited in any communication from a patent office in a counterpart foreign or international application or from the Office and that this communication was not received by any individual designated in 37 CFR 1.56(c) more than thirty days prior to the filing of the Information Disclosure Statement.

Citation to Other Patent Applications

- The following U.S. patent applications are hereby brought to the attention of the Examiner. The U.S. patent applications claim subject matter that may be considered by the Examiner to be similar to the subject matter claimed in the above-identified patent application. Accordingly, these U.S. patent applications and/or the prosecution pertaining thereto may include information considered to be material to the prosecution of the above-identified patent application. Since the Examiner has electronic access to the prosecution histories of these U.S. patent applications, copies of prosecution materials therefrom are not provided herewith, but will be promptly provided if the Examiner so desires and requests same.

U.S. APPLICATIONS		STATUS <i>(check one)</i>		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Never Issued: Abandoned/Expired
1.				
2.				
3.				

Copies of the References

- Copies of any U.S. patents and published patent applications that are listed on the accompanying Form 1449 are not enclosed herewith. Copies of any other references identified on the accompanying Form 1449 are enclosed herewith.
- For each reference not in the English language, attached is at least one of the following: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.
- The references listed on the enclosed Form 1449 were previously identified in the parent application(s) of the present application, and copies of the references were furnished at that time. Accordingly, additional copies of the references are not submitted herewith, so as not to burden the file with duplicate copies of references. The Examiner is respectfully requested to carefully review the references in accordance with the requirements set out in the Manual of Patent Examining Procedure. In accordance with 37 CFR 1.98(d), the details of the parent application(s) relied upon for an earlier filing date under 35 USC 120 in which copies of the references were previously furnished are set out below:

U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Abandoned
1.				
2.				
3.				

Fees

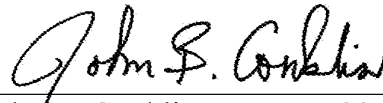
- No fee** is owed by the applicant(s).
- Charge Deposit Account No. 12-1216 in the amount of **\$180.00** (37 CFR 1.17(p)).

Authorization to Charge Additional Fees

- If any additional fees are owed in connection with this communication, please charge Deposit Account No. 12-1216.

Instructions as to Overpayment

- Credit Account No. 12-1216.
- Refund



John B. Conklin, Reg. No. 30,369
 LEYDIG, VOIT & MAYER, LTD.
 Two Prudential Plaza, Suite 4900
 180 North Stetson Avenue
 Chicago, Illinois 60601-6731
 (312) 616-5600 (telephone)
 (312) 616-5700 (facsimile)

Date: November 12, 2012

Electronic Patent Application Fee Transmittal

Application Number:	12902933
Filing Date:	12-Oct-2010
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Filer:	John B. Conklin/Andrew Dragstrem
Attorney Docket Number:	HW707010

Filed as Large Entity

Utility under 35 USC 111(a) 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:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Request for continued examination	1801	1	930	930
Total in USD (\$)				930

Electronic Acknowledgement Receipt

EFS ID:	14202964
Application Number:	12902933
International Application Number:	
Confirmation Number:	2965
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Customer Number:	77399
Filer:	John B. Conklin/Andrew Dragstrem
Filer Authorized By:	John B. Conklin
Attorney Docket Number:	HW707010
Receipt Date:	12-NOV-2012
Filing Date:	12-OCT-2010
Time Stamp:	14:16:57
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$930
RAM confirmation Number	11360
Deposit Account	121216
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Request for Continued Examination (RCE)	RCE-Transmittal.pdf	84440 ec28a3ede9c902c8ff434f205f86cad1023078e4	no	1
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	1449Form_5.pdf	91181 3088d318a3e883f2a74a5d6e761c53a19a67d70f	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Transmittal Letter	IDS5.pdf	149964 621543b3566c610ad5ca3984931aa1af9e63020e	no	4
Warnings:					
Information:					
4	Non Patent Literature	25304-810.pdf	414142 4d9a66fb3d776d9edf13219f6dbe84700816e604	no	41
Warnings:					
Information:					
5	Non Patent Literature	25331-810.pdf	5969219 c5d3348367105551e3bb91e23f188a89967076d5	no	1471
Warnings:					
Information:					
6	Non Patent Literature	36331-810.pdf	694148 ed1c53f4c4c1a0e569e68687794bd3ced83bfb48	no	122
Warnings:					
Information:					
7	Fee Worksheet (SB06)	fee-info.pdf	30360 5caf1157e75f306b1c8f289b918d32de6eb403b	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			7433454		

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.



NOTICE OF ALLOWANCE AND FEE(S) DUE

77399 7590 11/28/2012
Leydig, Voit & Mayer, Ltd
(for Huawei Technologies Co., Ltd)
Two Prudential Plaza Suite 4900
180 North Stetson Avenue
Chicago, IL 60601

EXAMINER

PATEL, MAHENDRA R

ART UNIT PAPER NUMBER

2645

DATE MAILED: 11/28/2012

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

12/902,933 10/12/2010 Michael ROBERTS HW707010 2965

TITLE OF INVENTION: METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION

Table with 7 columns: APPLN. TYPE, SMALL ENTITY, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE

nonprovisional NO \$1770 \$300 \$0 \$2070 02/28/2013

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 SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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

**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)

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.

77399 7590 11/28/2012
Leydig, Voit & Mayer, Ltd
 (for Huawei Technologies Co., Ltd)
 Two Prudential Plaza Suite 4900
 180 North Stetson Avenue
 Chicago, IL 60601

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.
-----------------	-------------	----------------------	---------------------	------------------

12/902,933 10/12/2010 Michael ROBERTS HW707010 2965

TITLE OF INVENTION: METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional NO \$1770 \$300 \$0 \$2070 02/28/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
----------	----------	----------------

PATEL, MAHENDRA R 2645 455-435300

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, 1 _____
- (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. 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.
- 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 _____ (enclose an extra copy of this form).

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

- a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
- b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
12/902,933 10/12/2010 Michael ROBERTS HW707010 2965

77399 7590 11/28/2012
Leydig, Voit & Mayer, Ltd
(for Huawei Technologies Co., Ltd)
Two Prudential Plaza Suite 4900
180 North Stetson Avenue
Chicago, IL 60601

EXAMINER

PATEL, MAHENDRA R

ART UNIT PAPER NUMBER

2645

DATE MAILED: 11/28/2012

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.

Notice of Allowability

Application No.

12/902,933

Examiner

MAHENDRA PATEL

Applicant(s)

ROBERTS ET AL.

Art Unit

2645

-- 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 11/12/2012.
- 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 1,4-9,13-15,17,18 and 21-25. 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).
 - 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 11/12/2012
- 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 _____.

/MAHENDRA PATEL/
Primary Examiner, Art Unit 2645

DETAILED ACTION

1. This communication is in response to the application filed on 11/12/2012.
Application No: 12/902933.

Art Unit- Location

The Art Unit location of your application in the USPTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Art Unit 2645.

Terminal Disclaimer

2. The terminal disclaimer disclaiming the terminal portion of any patent granted on this application has been reviewed and is accepted. The terminal disclaimer has been recorded on 07/21/2011.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on 11/12/2012 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Reasons for allowance

4. An examiner's Response to the record appears below.
5. Examiner acknowledges that in view of the amendment filed, the amended claims are in condition for allowance.

Art Unit: 2645

6. Claims 1, 4-9, 13-15, 17, 18 and 21-25 are allowed.
7. The following is an examiner's statement of reasons for allowance:
8. The reason for allowance is based on the remarks filed on 02/14/2012, Examiner's amendment claims submitted (see Notice of allowance 08/10/2012), and that prior arts of record **fail to teach the limitations as a whole claim** in combination with the underlined features, as summarized below:

Obtaining, by a terminal, a dedicated priority list and a valid time of the dedicated priority list from a Long Term Evolution (LTE) system; and

performing, by the terminal, cell reselection according to the dedicated priority list and the valid time of the dedicated priority list, when the terminal camps on a cell of a non-LTE system

wherein, when the terminal camps on a cell of the non-LTE system, the performing cell reselection according to the dedicated priority list and the valid time comprises:

performing, by the terminal camping on the cell of the non-LTE system, cell reselection according to the dedicated priority list before the valid time expires,

wherein when the terminal camps on the cell of the non-LTE system, the dedicated priority list is invalid after the valid time expires.

9. Applicant's independent claim 1 comprises a particular combination of underlined features, which is neither taught nor-suggested by prior art as a whole claim.

Similarly other independent claim 9 comprises a particular combination of underlined features with analogous wording, which is neither taught nor-suggested by prior art as a whole claim.

Dependent claims are deemed allowable for the same reasons as corresponding independent claims.

Prior Art References

Art Unit: 2645

10. The cited combined references of **Ore** and **Carpenter** fairly teaches a method for prioritizing radio access technologies during cell selection and reselection operations.

Particularly, **Ore teaches**, an electronic device to receive through from a wireless communications network a prioritized list of radio access technologies; to store the prioritized list of radio access technologies in a memory of the electronic device; and to consult the prioritized list of radio access technologies during cell selection and reselection operations. In variants the radio access technologies listed in the prioritized list of radio access technologies can be E-UTRAN, UTRAN or GERAN. In a further variant to consult the prioritized list may mean to compare at least one of a signal measurement and a quality measurement with at least one threshold established for a certain radio access technology appearing in the prioritized list, and to select/reselect to the certain radio access technology only if the at least one of the signal measurement and the quality measurement exceeds the threshold.

Carpenter teaches Methods and apparatus for automatically selecting a wireless communication network by user equipment using a "steered" PLMN. In an automatic network selection procedure, a scanning operation is performed to receive one or more network identifications corresponding to one or more available wireless communication networks in a coverage area. The user equipment attempts to select a wireless communication network in the coverage area by comparing the received network identifications from the scanning operation with the steered network identification. If a match between a received network identification and the steered network identification is identified, a wireless communication network corresponding to the received network identification that matches the steered network identification is selected and registered with by the user equipment.

11. However **cited references, alone or in any combination, neither discloses nor fairly suggests combination of features, specifically**, obtaining, by a terminal, a dedicated priority list and a valid time of the dedicated priority list from an LTE system; and performing, by

Art Unit: 2645

the terminal, cell reselection according to the dedicated priority list and the valid time of the dedicated priority list, when the terminal camps on a cell of a non-LTE system.

12. **The present invention provides an improved method for reducing signaling overhead.** In an LTE system, when performing cell reselection, the terminal will decide a cell on which the terminal is to camp according to the priority, and **thereby reducing power usages.** The priority-based cell reselection method may reduce the measurements by the terminal and save power energy.

13. **Therefore, when taken as a whole, and incorporating all the respective limitations, none of the prior art discloses the features as claimed.**

Conclusion

14. 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 submission should be clearly labeled "Comments on Statement of Reasons for Allowance."

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahendra Patel whose telephone number is 571-270-7499. The examiner can normally be reached on 9:30 AM to 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Addy can be reached on (571) 272-7795. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2645

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.

/MAHENDRA PATEL/
Primary Examiner, Art Unit 2645

Notice of References Cited	Application/Control No. 12/902,933	Applicant(s)/Patent Under Reexamination ROBERTS ET AL.	
	Examiner MAHENDRA PATEL	Art Unit 2645	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-2010/0216468 A1	08-2010	Kazmi et al.	455/435.3
B	US-			
C	US-			
D	US-			
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
N					
O					
P					
Q					
R					
S					
T					

NON-PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)				
U					
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.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S58	5	"12902933"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	OFF	2012/11/16 23:42
S62	14	((MIN) near2 (HUANG)).INV. and (LTE priority search)	US-PGPUB; USPAT; USOCR	AND	OFF	2012/11/17 00:02
S61	11	((JOHAN) near2 (JOHANSSON)).INV. and (LTE priority search)	US-PGPUB; USPAT; USOCR	AND	OFF	2012/11/17 00:02
S60	7	((MICHAEL) near2 (ROBERTS)).INV. and (LTE priority search)	US-PGPUB; USPAT; USOCR	AND	OFF	2012/11/17 00:02
S59	8	((BOYUN) near2 (XIE)).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2012/11/17 00:02
S63	6	((MICHAEL) near2 (ROBERTS)).INV. and (LTE camp\$4 priority)	US-PGPUB; USPAT; USOCR	SAME	ON	2012/11/17 00:03
S64	8	(priority same camp\$4) and (Cell selection network LTE) and (@ad< "20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2012/11/17 00:10
S66	0	(S65) and (@ad< "20080409") and (LTE camp\$4 priority)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2012/11/17 07:31
S65	1673973	((Mobile adj (device\$2 or terminal or station or handset\$2) or (user adj equipment) or (wireless or cell\$1phone or cellphone or PDA) or (personal adj access adj communication\$2) or (PACS) or subscriber\$2)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	OFF	2012/11/17 07:31
S67	1	(LTE camp\$4 priority) and (S65) and (@ad< "20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	OFF	2012/11/17 07:32

S68	0	(tim\$4 expi\$4) and (LTE camp\$4 priorit\$4) and (@ad<"20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	OFF	2012/11/17 07:34
S70	2	((("20040162074" "20060251023" "20070191006" "20080268843" "20090181676" "8041355" "20090181676" "20010011019" "20080268843").PN.) and (tim\$4 expi\$4) and (LTE camp\$4 priorit\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	OFF	2012/11/17 07:35
S69	0	((("20040162074" "20060251023" "20070191006" "20080268843" "20090181676" "8041355" "20090181676" "20010011019" "20080268843").PN.) and (tim\$4 expi\$4) and (LTE camp\$4 priorit\$4) and (@ad<"20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	OFF	2012/11/17 07:35
S71	0	(((device or mobile or station terminal) (camp\$4 cell) (performing (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4) (LTE)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/11/17 07:42
S72	6	(((performing (selection or reselection) (rank\$4 or priori\$4) and ((approved or valid or assigned) (tim\$4 expir\$4) (camp\$4 cell))))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/11/17 07:43
S73	10	((("20070258410" "20070191006" "20080268843" "20090181676" "20040121777").PN.) and (rank\$4 or priori\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/11/17 07:45
S74	3	((("20070258410" "20070191006" "20080268843" "20090181676" "20040121777").PN.) and (rank\$4 or priori\$4) and (load\$9) and ((tim\$4) (expir\$\$ or over or stop\$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	WITH	ON	2012/11/17 07:47
S75	5	((((selection or reselection) (LTE) (rank\$4 or priori\$4) and ((approved or valid or assigned) (tim\$4 expir\$4) (camp\$4 cell))))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/11/17 07:48
S76	0	((((selection or reselection) (LTE) (rank\$4 or priori\$4) and ((approved or valid or assigned) (tim\$4 expir\$4) (camp\$4 cell)))) and (@ad<"20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	SAME	ON	2012/11/17 07:49

			DERWENT; IBM_TDB			
S79	1	((MIN) near2 (HUANG)).INV. and (camp\$4 priority) and (@ad< "20080409")	US-PGPUB; USPAT; USOCR	AND	OFF	2012/11/17 07:50
S78	0	((BOYUN) near2 (XIE)).INV. and (@ad< "20080409")	US-PGPUB; USPAT; USOCR	AND	ON	2012/11/17 07:50
S77	4	((JOHAN) near2 (JOHANSSON)).INV. and (camp\$4 priority) and (@ad< "20080409")	US-PGPUB; USPAT; USOCR	AND	OFF	2012/11/17 07:50
S80	2	(priority same camp\$4) and (Cell selection network LTE) and (@ad< "20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/11/17 07:51
S81	8	(Obtain\$6 or receiv\$4 or get\$4 or send\$4 or transmit\$5) (terminal or device or pda or smart\$phone or cell\$phone) (dedicat\$4 priorit\$4 tim\$4) ((Long Term Evolution) or (LTE))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/11/17 08:06
S82	0	(Obtain\$6 or receiv\$4 or get\$4 or send\$4 or transmit\$5) (terminal or device or pda or smart\$phone or cell\$phone) (dedicat\$4 priorit\$4 tim\$4) ((Long Term Evolution) or (LTE)) and (@ad< "20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/11/17 08:07
S83	3	((("20040121777" "20080268843" "20010011019" "20070191006" "20070258410" "8041355" "20090181676").PN.) and (LTE))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2012/11/17 08:13
S84	2	(network LTE) and (priority camp\$4 tim\$4) and (Cell selection) and (Obtain\$6 or receiv\$4 or get\$4 or send\$4 or transmit\$5) and (@ad< "20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/11/17 08:16
S85	1	(network LTE) and (priority camp\$4 tim\$4) and (Cell selection) and (Obtain\$6 or receiv\$4 or get\$4 or send\$4 or transmit\$5) (dedicat\$4 priorit\$4 tim\$4) and (@ad< "20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/11/17 08:18
S86	0	(network LTE) and (priority camp\$4 tim\$4) and (Cell selection) and (Obtain\$6 or receiv\$4 or get\$4 or send\$4 or transmit\$5) (dedicat\$4 priorit\$4 tim\$4) (expir\$4 or stop or interv\$4) and (@ad< "20080409")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	SAME	ON	2012/11/17 08:22


S96	48	(US-20110034169-\$ or US-20110065434-\$ or US-20120083276-\$ or US-20010011019-\$ or US-20110110254-\$ or US-20090260008-\$ or US-20100118334-\$).did. or (US-8041355-\$ or US-8185111-\$ or US-5903832-\$ or US-5940760-\$ or US-5999811-\$ or US-6978142-\$ or US-5940397-\$ or US-4380065-\$ or US-5838334-\$ or US-5995120-\$ or US-4385382-\$ or US-4591973-\$ or US-4602341-\$ or US-4621326-\$ or US-4760390-\$ or US-4768149-\$ or US-4816208-\$ or US-4989133-\$ or US-5261117-\$ or US-5293470-\$ or US-5355517-\$ or US-5487061-\$ or US-5636359-\$ or US-5757799-\$ or US-5796793-\$ or US-5796395-\$).did. or (US-5819184-\$ or US-5889779-\$ or US-5901295-\$ or US-5961652-\$ or US-6002409-\$ or US-6005866-\$ or US-6157836-\$ or US-6253225-\$ or US-6334062-\$ or US-6440780-\$ or US-6449494-\$ or US-6792091-\$ or US-6819447-\$ or US-5722078-\$ or US-5924038-\$).did.	US-PGPUB; USPAT	AND	OFF	2012/11/17 08:43
L2	9	((US-20110034169-\$ or US-20110065434-\$ or US-20120083276-\$ or US-20010011019-\$ or US-20110110254-\$ or US-20090260008-\$ or US-20100118334-\$).did. or (US-8041355-\$ or US-8185111-\$ or US-5903832-\$ or US-5940760-\$ or US-5999811-\$ or US-6978142-\$ or US-5940397-\$ or US-4380065-\$ or US-5838334-\$ or US-5995120-\$ or US-4385382-\$ or US-4591973-\$ or US-4602341-\$ or US-4621326-\$ or US-4760390-\$ or US-4768149-\$ or US-4816208-\$ or US-4989133-\$ or US-5261117-\$ or US-5293470-\$ or US-5355517-\$ or US-5487061-\$ or US-5636359-\$ or US-5757799-\$ or US-5796793-\$ or US-5796395-\$).did. or (US-5819184-\$ or US-5889779-\$ or US-5901295-\$ or US-5961652-\$ or US-6002409-\$ or US-6005866-\$ or US-6157836-\$ or US-6253225-\$ or US-6334062-\$ or US-6440780-\$ or US-6449494-\$ or US-6792091-\$ or US-6819447-\$ or US-5722078-\$ or US-5924038-\$).did.) and (cell selection re\$selection) (priority) (tim\$4)	US-PGPUB; USPAT	AND	OFF	2012/11/17 10:05
L7	8	((US-20110034169-\$ or US-20110065434-\$ or US-20120083276-\$ or US-20010011019-\$ or US-20110110254-\$ or US-20090260008-\$ or US-20100118334-\$).did. or (US-8041355-\$ or US-8185111-\$ or US-5903832-\$ or US-5940760-\$ or US-5999811-\$ or US-6978142-\$ or US-5940397-\$ or US-4380065-\$ or US-5838334-\$ or US-5995120-\$ or US-4385382-\$ or US-4591973-\$ or US-	US-PGPUB; USPAT	AND	OFF	2012/11/17 10:12

		4602341-\$ or US-4621326-\$ or US-4760390-\$ or US-4768149-\$ or US-4816208-\$ or US-4989133-\$ or US-5261117-\$ or US-5293470-\$ or US-5355517-\$ or US-5487061-\$ or US-5636359-\$ or US-5757799-\$ or US-5796793-\$ or US-5796395-\$).did. or (US-5819184-\$ or US-5889779-\$ or US-5901295-\$ or US-5961652-\$ or US-6002409-\$ or US-6005866-\$ or US-6157836-\$ or US-6253225-\$ or US-6334062-\$ or US-6440780-\$ or US-6449494-\$ or US-6792091-\$ or US-6819447-\$ or US-5722078-\$ or US-5924038-\$).did.) and (cell selection re\$selection) (priority) ((period or interal or tim\$4) (expir\$4 or invalid or delay)) (camp\$4)				
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L9	5	((US-20110034169-\$ or US-20110065434-\$ or US-20120083276-\$ or US-20010011019-\$ or US-20110110254-\$ or US-20090260008-\$ or US-20100118334-\$).did. or (US-8041355-\$ or US-8185111-\$ or US-5903832-\$ or US-5940760-\$ or US-5999811-\$ or US-6978142-\$ or US-5940397-\$ or US-4380065-\$ or US-5838334-\$ or US-5995120-\$ or US-4385382-\$ or US-4591973-\$ or US-4602341-\$ or US-4621326-\$ or US-4760390-\$ or US-4768149-\$ or US-4816208-\$ or US-4989133-\$ or US-5261117-\$ or US-5293470-\$ or US-5355517-\$ or US-5487061-\$ or US-5636359-\$ or US-5757799-\$ or US-	US-PGPUB; USPAT	AND	OFF	2012/11/17 10:16

5796793-\$ or US-5796395-\$.did. or (US-5819184-\$ or US-5889779-\$ or US-5901295-\$ or US-5961652-\$ or US- 6002409-\$ or US-6005866-\$ or US- 6157836-\$ or US-6253225-\$ or US- 6334062-\$ or US-6440780-\$ or US- 6449494-\$ or US-6792091-\$ or US- 6819447-\$ or US-5722078-\$ or US- 5924038-\$.did.) and (cell selection re\$selection) (priority) ((period or interal or tim\$4) (invalid)) (camp\$4)				
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11/ 17/ 2012 10:28:55 AM

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CellReselction_LTE_CON_POST.wsp

Search Notes 	Application/Control No. 12902933	Applicant(s)/Patent Under Reexamination ROBERTS ET AL.
	Examiner UN C CHO	Art Unit 2617

SEARCHED			
Class	Subclass	Date	Examiner
455	435.1,435.2,435.3,436,437, 411, 437, 449	1/12/2011	UC
370	252, 449, 398	8/1/2012	MP
345	501	8/1/2012	MP
718	104	8/1/2012	MP

SEARCH NOTES		
Search Notes	Date	Examiner
East Search including keywords, class/subclass, inventor, assignee	1/12/2010	UC
East search (Updated)	11/16/2012	MP
Limited NPL search, WIPO / PCT search	8/1/2012	MP
PLUS search	8/1/2012	MP
Inventor search	11/16/2012	MP

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
455	435.3, 411, 436, 449	11/16/2012	MP
370	252	11/16/2012	MP

	/UN C CHO/ Primary Examiner.Art Unit 2617
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EAST Search History

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S92	0	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and ((Obtain\$6 or receiv\$4 or get\$4 or send\$4 or transmit\$5) (terminal or device or pda or smart\$phone or cell\$phone) (dedicat\$4 priorit\$4) ((Long Term Evolution) or (LTE)) (camp\$4 cell) (perform\$4 (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4))).clm. and (@ad<"20080409")	US-PGPUB; USPAT; UPAD	AND	ON	2012/11/17 08:33
S93	5	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and ((Obtain\$6 or receiv\$4 or get\$4 or send\$4 or transmit\$5) (terminal or device or pda or smart\$phone or cell\$phone) (dedicat\$4 priorit\$4) ((Long Term Evolution) or (LTE)) (camp\$4 cell) (perform\$4 (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4))).clm.	US-PGPUB; USPAT; UPAD	AND	ON	2012/11/17 08:33
S95	3	("455"/\$.ccls. or "370"/\$.ccls. or "345"/\$.ccls. or "708"/\$.ccls.) and ((device or mobile or station terminal) (camp\$4 cell LTE) (performing (selection or reselection) (assign\$4 or dedicat\$4) (rank\$4 or priori\$4) (approved or valid or assigned) (tim\$4 expir\$4) non-LTE)).clm.	US-PGPUB; USPAT; UPAD	AND	ON	2012/11/17 08:35

11/17/2012 8:42:26 AM

C:\Users\mpatel4\Documents\EAST\Workspaces\EAST Workspace - 12902933 - CellReselction_LTE_CON_POST.wsp

Issue Classification 	Application/Control No. 12902933	Applicant(s)/Patent Under Reexamination ROBERTS ET AL.
	Examiner MAHENDRA PATEL	Art Unit 2617

ORIGINAL					INTERNATIONAL CLASSIFICATION													
CLASS		SUBCLASS			CLAIMED					NON-CLAIMED								
455		435.3			H	0	4	W	36 / 00 (2009.01.01)									
CROSS REFERENCE(S)																		
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)																	
455	436	411	449															
370	252																	

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input checked="" type="checkbox"/> T.D. <input type="checkbox"/> R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	11	17												
	2	12	18												
	3		19												
2	4		20												
3	5	13	21												
4	6	14	22												
5	7	15	23												
6	8	16	24												
7	9	17	25												
	10														
	11														
	12														
8	13														
9	14														
10	15														
	16														

NONE	Total Claims Allowed:					
(Assistant Examiner)	(Date)	17				
/MAHENDRA PATEL/ Primary Examiner.Art Unit 2645	11/16/2012	<table border="1" style="width: 100%;"> <tr> <td>O.G. Print Claim(s)</td> <td>O.G. Print Figure</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> </table>	O.G. Print Claim(s)	O.G. Print Figure	1	1
O.G. Print Claim(s)	O.G. Print Figure					
1	1					
(Primary Examiner)	(Date)					

Please type a plus sign (+) inside this box → +

Substitute for form 1449A/B/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	12/902,933
				Filing Date	October 12, 2010
				First Named Inventor	ROBERTS, Michael
				Group Art Unit	2645
				Examiner Name	PATEL, Mahendra R
Sheet	1	of	1	Attorney Docket Number	HW707010

U.S. PATENT DOCUMENTS						
Examiner Initials	Doc. No.	U.S. Patent Document		Name of Patentee or Applicant	Date of Publication	Filing Date If Appropriate
		Application or Patent Number	Kind Code			
	BE	8,041,355	B2	Roberts et al.	Oct. 18, 2011	
	BF	2001/0011019	A1	Jokimies	Aug. 2, 2001	

FOREIGN PATENT DOCUMENTS							
Examiner Initials	Doc. No.	Foreign Patent Document			Name of Patentee or Applicant	Date of Publication	Translation *
		Office	Application or Patent Number	Kind Code			

OTHER - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Doc. 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, page(s), volume-issue number (s), publisher, city and/or country where published.	Translation *
	BG	"TS 25.304 – 3 rd Generation Partnership Project; Technical Specification Group Radio Access Network; User Equipment (UE) Procedures in Idle Mode and Procedures for Cell Reselection in Connected Mode (Release 8)," 3GPP Technical Specification, March 2008, V8.1.0, 3GPP, Valbonne, France	
	BH	"TS 36.331 – 3 rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol Specification (Release 8)," 3GPP Technical Specification, March 2008, V8.1.0, 3GPP, Valbonne, France.	
	BI	"TS 25.331 – Radio Resource Control; Protocol Specification (Release 8)," 3GPP Technical Specification, December 2007, v8.1.0, 3GPP Valbonne, France.	

Examiner Signature	/Mahendra Patel/	Date Considered	11/18/2012
--------------------	------------------	-----------------	------------

* If the reference is not in English, then at least one of the following is provided: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.

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)

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.

77399 7590 08/10/2012
Leydig, Voit & Mayer, Ltd
 (for Huawei Technologies Co., Ltd)
 Two Prudential Plaza Suite 4900
 180 North Stetson Avenue
 Chicago, IL 60601

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.
12/902,933	10/12/2010	Michael ROBERTS	HW707010	2965

TITLE OF INVENTION: METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1740	\$300	\$0	\$2040	11/13/2012

EXAMINER	ART UNIT	CLASS-SUBCLASS
PATEL, MAHENDRA R	2617	455-435300

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, 1 Leydig, Voit & Mayer, Ltd.
 (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. 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: Huawei Technologies Co., Ltd.
 (B) RESIDENCE: (CITY and STATE OR COUNTRY) Shenzhen, CHINA

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 12-1216 (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)
 a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
 b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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: John B. Conklin Date: December 14, 2012
 Typed or printed name: John B. Conklin Registration No. 30,369

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:	12902933
Filing Date:	12-Oct-2010
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Filer:	John B. Conklin/Leanna Bultema
Attorney Docket Number:	HW707010

Filed as Large Entity

Utility under 35 USC 111(a) 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	1770	1770
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				2070

Electronic Acknowledgement Receipt

EFS ID:	14477935
Application Number:	12902933
International Application Number:	
Confirmation Number:	2965
Title of Invention:	METHOD, TERMINAL, AND SYSTEM FOR CELL RESELECTION
First Named Inventor/Applicant Name:	Michael ROBERTS
Customer Number:	77399
Filer:	John B. Conklin/Leanna Bultema
Filer Authorized By:	John B. Conklin
Attorney Docket Number:	HW707010
Receipt Date:	14-DEC-2012
Filing Date:	12-OCT-2010
Time Stamp:	17:56:57
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$2070
RAM confirmation Number	5603
Deposit Account	121216
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Issue Fee Payment (PTO-85B)	IssueFeeTransmittal.pdf	104623	no	1
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Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	31930	no	2
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Warnings:

Information:

Total Files Size (in bytes):			136553		
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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.

Please type a plus sign (+) inside this box → +

Substitute for form 1449A/B/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				Complete if Known	
				Application Number	TBD
				Filing Date	October 12, 2010
				First Named Inventor	Michael ROBERTS
				Group Art Unit	TBD
				Examiner Name	TBD
Sheet	1	of	1	Attorney Docket Number	HW707010

Change(s) applied to document: /L K.H./ 8/2012

U.S. PATENT DOCUMENTS							
Examiner Initials	Doc. No.	U.S. Patent Document		Name of Patentee or Applicant	Date of Publication	Filing Date If Appropriate	
		Application or Patent Number	Kind Code				
/L K.H./	A A	20080268843	A1	Nokia Corp. Ore; Ivan; et al.	10/30/2008		

FOREIGN PATENT DOCUMENTS							
Examiner Initials	Doc. No.	Foreign Patent Document			Name of Patentee or Applicant	Date of Publication	Translation *
		Office	Application or Patent Number	Kind Code			
	A B	WO	2009045078	A2	LG Electronics Inc.	04/09/2009	
	A C	CN	1832601	A	LG Electronics China Co. Ltd.	09/13/2006	
	A D	CN	1675957	A	Motorola Inc.	09/28/2005	x
	A E	CN	1965605	A	Nokia Corp.	05/16/2007	x
	A F	CN	10113614	A	Huawei Technologies Co., Ltd.	02/27/2008	x

OTHER - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Doc. 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, page(s), volume-issue number (s), publisher, city and/or country where published.	Translation *
	A G	"3GPP TS 36.304-Evolved Universal Terrestrial Radio Access (E-UTRA)," March 2008, V8.1.0, 3 rd Generation Partnership Project, Valbonne, France.	
	A H	Written Opinion from the International Searching Authority in corresponding PCT Application No. PCT/CN2009/071194 (April 8, 2009).	

Examiner Signature	/Un Cho/	Date Considered	01/12/2011
--------------------	----------	-----------------	------------

* If the reference is not in English, then at least one of the following is provided: (a) an English translation in whole or in part or (b) a concise statement of relevance in the form of, for example, an English language counterpart, an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office.



APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/902,933	04/02/2013	8412197	HW707010	2965

77399 7590 03/13/2013
 Leydig, Voit & Mayer, Ltd
 (for Huawei Technologies Co., Ltd)
 Two Prudential Plaza Suite 4900
 180 North Stetson Avenue
 Chicago, IL 60601

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.

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