

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674US04	SERIAL NO. Not yet assigned
	APPLICANT Zhang et al.	
	FILING DATE Herewith	GROUP Not yet assigned

U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,678,249	01/2004	Toskala et al. ⁴			
		6,778,830	08/2004	Oizumi et al.			
		6,892,071	05/2005	Park et al.			
		7,013,143	03/2006	Love et al.			
		7,346,035	03/2008	Lee et al.			
		7,414,989	08/2002	Kuchibhotla et al.			
		2002/0095635	07/2002	Wager et al.			
		2002/0191544	12/2002	Cheng et al.			
		2003/0007480	01/2003	Kim et al.			
		2003/0043786	03/2003	Kall et al.			
		2003/0054824	03/2003	Choi et al.			
		2003/0081692	05/2003	Kwan et al.			
		2003/0161284	08/2003	Chen			
		2003/0210668	11/2003	Malladi et al.			
		2004/0004954	01/2004	Terry et al.			
		2004/0072567	04/2004	Cao et al.			
		2004/0085934	05/2004	Balachandran et al.			
		2004/0120306	06/2004	Wigard et al.			
		2004/0160925	08/2004	Heo et al. ¹			
		2004/0202129	10/2004	Kolding et al.			
		2004/0203991	10/2004	Chen et al.			
		2004/0219917	11/2004	Love et al.			
		2004/0219919	11/2004	Whinnett et al.			
		2004/0219920	11/2004	Love et al.			
		2004/0228313	11/2004	Cheng et al.			
EXAMINER				DATE CONSIDERED			

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

1778462-1

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674US04	SERIAL NO. Not yet assigned
	APPLICANT Zhang et al.	
	FILING DATE Herewith	GROUP Not yet assigned

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		2005/0041694	02/2005	Liu			
		2005/0047354	03/2005	Zeira et al.			
		2005/0048920	03/2005	Liu			
		2005/0083888	04/2005	Smee et al.			
		2007/0047501	03/2007	Usuda et al. ²			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
		0 977 393	02/2000	EP ⁵				
		2 353 439	02/2001	GB				
		2001-128209	05/2001	JP			X**	
		2003112283	12/2005	RU			X**	
		2005110767	10/2006	RU			X**	
		00/074263	12/2000	WO ³				
		02/01893	01/2002	WO				
		03/003643	01/2003	WO				
		03/026231	03/2003	WO				
		03/053087	06/2003	WO				
		03/067953	08/2003	WO				
		03/088545	10/2003	WO				

OTHER DOCUMENTS

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.2 (October 2003).

EXAMINER	DATE CONSIDERED
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FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674US04	SERIAL NO. Not yet assigned
	APPLICANT Zhang et al.	
	FILING DATE Herewith	GROUP Not yet assigned

EXAMINER INITIAL	DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD (Release 6)," 3GPP TR 25.896 V6.0.0 (March 2004).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 1999)," 3GPP TS 25.212 V3.11.0 (September 2002).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)." 3GPP TS 25.321 V3.16.0 (September 2003).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 4)," 3GPP TS 25.212 V4.6.0 (September 2002).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.6.0 (September 2003).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.9.0 (June 2004).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 6)," 3GPP TS 25.212 V6.2.0 (June 2004).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)," 3GPP TS 25.321 V3.17.0 (June 2004).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 6)," 3GPP TS 25.321 V6.2.0 (June 2004).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.9.0 (September 2003).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.9.0 (June 2004).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.10.0 (June 2004).

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FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674US04	SERIAL NO. Not yet assigned
	APPLICANT Zhang et al.	
	FILING DATE Herewith	GROUP Not yet assigned

EXAMINER INITIAL	DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.6.0 (September 2003).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.1 (October 2003).
	3GPP, "Third Generation Partnership Project; Technical Specification Group Radio Access Network; FDD Enhanced Uplink; Overall Description; Stage 2 (Release 6)," 3GPP TS 25.309 V6.0.0 (September 2004).
	3GPP2 C.20003-C, "Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Release C, August 2004.
	3GPP2 C.S0004-C, "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.
	3GPP2 C.S0005-C, "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision c, July 23, 2004.
	GPP2 C.S0002-C, "Physical Layer Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.

X** Abstract only

¹ Corresponds to RU2004104196; ² Corresponds to RU 2006130462; ³ Corresponds to RU 2001135846; ⁴ Corresponds to WO 03/067953; ⁵ Corresponds to WO 98/47253.

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

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER		
First Named Inventor/Applicant Name:		Guodong Zhang		
Filer:		Ryan W. O Donnell/Dawn Casalvera		
Attorney Docket Number:		I-2-0674US04		
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	380	380
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1250

Electronic Acknowledgement Receipt

EFS ID:	11521649
Application Number:	13308950
International Application Number:	
Confirmation Number:	5805
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	24374
Filer:	Ryan W. O Donnell/Dawn Casalvera
Filer Authorized By:	Ryan W. O Donnell
Attorney Docket Number:	I-2-0674US04
Receipt Date:	01-DEC-2011
Filing Date:	
Time Stamp:	15:12:08
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	14606
Deposit Account	090435
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:
Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	I_2_0674US04_ADS.PDF	2191056 3b2c936a2af8f32103036e290f87c5e28bf6c6cc	no	6
Warnings:					
Information:					
2	Oath or Declaration filed	I_2_0674US04_Oath_Declaration.PDF	208671 efe41b6ebb2c7f246a91835a55cbabe69a28a38	no	4
Warnings:					
Information:					
3		I_2_0674US04_Continuation_Application.PDF	87015 ff24ffb93c4f87bfb7a14fec227e8f40b20bf953	yes	16
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	12	
	Claims		13	15	
	Abstract		16	16	
Warnings:					
Information:					
4	Drawings-only black and white line drawings	I_2_0674US04_Figures.PDF	572580 cbb32b362090f118e5b1919883323088a31b97c4	no	4
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
5	Transmittal Letter	I_2_0674US04_IDS_Transmittal.PDF	48553 5e54f7a664bfff1feba618a0bef34e24622ee4cf	no	2
Warnings:					
Information:					
6	Information Disclosure Statement (IDS) Form (SB08)	I_2_0674US04_PTO_Form1449.PDF	59860 f2b431984054f3a9f748eae76518975503ff0403	no	4
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					

7	Fee Worksheet (SB06)	fee-info.pdf	33281 0c007f25ff388bbc4163ece327156fc5705e842e	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			3201016		
<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>					

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	I-2-0674US04
		Application Number	
Title of Invention	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER		
<p>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.</p> <p>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.</p>			

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1					Remove
Applicant Authority		☒ Inventor		☐ Legal Representative under 35 U.S.C. 117	☐ Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Goudong		Zhang		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Farmingdale	State/Province	NY	Country of Residence i	US
Citizenship under 37 CFR 1.41(b) i		CN			
Mailing Address of Applicant:					
Address 1	490 Main Street, Apt. C8				
Address 2					
City	Farmingdale	State/Province	NY		
Postal Code	11735	Country i	US		
Applicant 2					Remove
Applicant Authority		☒ Inventor		☐ Legal Representative under 35 U.S.C. 117	☐ Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Sung-Hyuk		Shin		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Northvale	State/Province	NJ	Country of Residence i	US
Citizenship under 37 CFR 1.41(b) i		US			
Mailing Address of Applicant:					
Address 1	104 Eidner Way				
Address 2					
City	Northvale	State/Province	NJ		
Postal Code	07647	Country i	US		
Applicant 3					Remove
Applicant Authority		☒ Inventor		☐ Legal Representative under 35 U.S.C. 117	☐ Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Stephen	E.	Terry		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Northport	State/Province	NY	Country of Residence i	US

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	I-2-0674US04
		Application Number	
Title of Invention	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER		

Citizenship under 37 CFR 1.41(b) i		US	
Mailing Address of Applicant:			
Address 1	15 Summit Avenue		
Address 2			
City	Northport	State/Province	NY
Postal Code	11768	Country ⁱ	US

Applicant 4					Remove
Applicant Authority		☒ Inventor		☐ Legal Representative under 35 U.S.C. 117	☐ Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix	
	James	A.	Miller		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Verona	State/Province	NJ	Country of Residence i	US
Citizenship under 37 CFR 1.41(b) i		US			

Mailing Address of Applicant:					
Address 1	18 Louisburg Square				
Address 2					
City	Verona	State/Province	NJ		
Postal Code	07044	Country ⁱ	US		

Applicant 5						Remove
Applicant Authority		☒ Inventor		☐ Legal Representative under 35 U.S.C. 117	☐ Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Stephen	G.	Dick			
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service						
City	Nesconset	State/Province	NY	Country of Residence i	US	
Citizenship under 37 CFR 1.41(b) i		US				

Mailing Address of Applicant:					
Address 1	61 Bobann Drive				
Address 2					
City	Nesconset	State/Province	NY		
Postal Code	11767	Country ⁱ	US		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).	
☐ An Address is being provided for the correspondence Information of this application.	
Customer Number	24374

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	I-2-0674US04
		Application Number	
Title of Invention	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER		
Attorney Docket Number	I-2-0674US04	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	4	Suggested Figure for Publication (if any)	3

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.			
Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	24374		

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	11434330	2006-05-15		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
11434330	Continuation of	10962720	2004-10-12	7046648	2006-05-16

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	I-2-0674US04
		Application Number	
Title of Invention	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER		

Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
10962720	non provisional of	60578674	2004-06-10
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
10962720	non provisional of	60520692	2003-11-17
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
10962720	non provisional of	60519990	2003-11-14
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
10962720	non provisional of	60517656	2003-11-05
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

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
			☐ Yes ☒ No
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

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			Remove
If the Assignee is an Organization check here. ☒			
Organization Name	InterDigital Technology Corporation		
Mailing Address Information:			
Address 1	300 Delaware Avenue		
Address 2			
City	Wilmington	State/Province	DE
Country ⁱ	US	Postal Code	19801
Phone Number		Fax Number	
Email Address			
Additional Assignee Data may be generated within this form by selecting the Add button.			Add

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	I-2-0674US04
		Application Number	
Title of Invention	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER		

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	/Melissa D. Doogan/			Date (YYYY-MM-DD)	2011-12-01
First Name	Melissa	Last Name	Doogan	Registration Number	63025

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)).
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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63) ☒ Declaration Submitted with Initial Filing OR ☐ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)	Attorney Docket Number	I-2-0674.1US
	First Named Inventor	Zhang et al.
	COMPLETE IF KNOWN	
	Application Number	Not Yet Known
	Filing Date	Not Yet Known
	Group Art Unit	Not Yet Known
	Examiner Name	Not Yet Known

As a below named inventor, I hereby declare that:

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

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:

WIRELESS COMMUNICATION METHOD AND APPARATUS FOR COORDINATING NODE-B'S AND SUPPORTING ENHANCED UPLINK TRANSMISSIONS DURING HANDOVER

the specification of which
☒ is attached hereto
 OR
☐ was filed on (MM/DD/YYYY) as United States Application Number or PCT International Application Number and was amended on (MM/DD/YYYY) (if applicable).

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

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 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 of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
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I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	
60/517,656	11/5/2003	☐ Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.
60/519,990	11/14/2003	
60/520,692	11/17/2003	
60/578,674	06/10/2004	

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U.S. Parent Application or PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)

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Namely, the Attorneys of Volpe and Koenig, P.C.			

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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 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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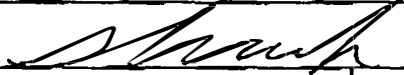
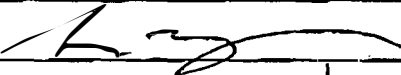
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DECLARATION**ADDITIONAL INVENTOR(S)**
Supplemental Sheet
Page 3 of 4

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DECLARATION**ADDITIONAL INVENTOR(S)****Supplemental Sheet**Page 4 of 4

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SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. Patent Application No. 11/434,330 filed on May 15, 2006, which is a continuation of U.S. Patent Application No. 10/962,720 filed October 12, 2004, now U.S. Patent 7,046,648 issued on May 16, 2006, which claims the benefit of U.S. Provisional Application Serial Nos. 60/578,674 filed June 10, 2004; 60/520,692 filed November 17, 2003; 60/519,990 filed November 14, 2003; and 60/517,656 filed November 5, 2003, which are incorporated by reference as if fully set forth.

FIELD OF INVENTION

[0002] The present invention is related to a wireless communication system. More particularly, the present invention is related to a method and apparatus for coordinating Node-Bs and supporting enhanced uplink (EU) transmissions during handover.

BACKGROUND

[0003] Many schemes have been proposed to improve coverage, throughput, and transmission latency for EU transmissions in third generation partnership project (3GPP). One of the developments is to move the functions for scheduling and assigning uplink (UL) physical channel resources from a radio network controller (RNC) to a Node-B. A Node-B can make more efficient decisions and manage UL radio resources on a short-term basis better than the RNC, even if the RNC retains overall control over Node-Bs. A similar approach has already been adopted in downlink for high speed data packet access (HSDPA) in both universal mobile telecommunication system (UMTS) frequency division duplex (FDD) and time division duplex (TDD) modes.

[0004] It has also been recognized that performance is greatly enhanced with the use of medium access control (MAC) level automatic repeat request (ARQ) and hybrid ARQ (H-ARQ). Application of these techniques during soft handover provides

additional significant benefits.

[0005] Figure 1 shows a conventional wireless multi-cell communication system 100 including a wireless transmit/receive unit (WTRU) 105, a Node-B 110, an RNC 115, and at least two cells 120A, 120B. Each of the cells 120A, 120B, is served by the Node-B 110. Node-B 110 is controlled by the RNC 115. When a change in the cell offering the best radio conditions is determined between cells 120A and 120B, a handover process is initiated.

[0006] An "intra-Node-B handover" occurs when a WTRU changes from one cell to another cell controlled by the same Node-B, as shown in Figure 1. An "inter-Node-B handover" occurs when a WTRU changes from one cell to another cell controlled by a different Node-B. In the latter case, the Node-B that controls the cell before the handover is called a source Node-B, and the Node-B that controls the cell after the handover is called a target Node-B.

[0007] During soft handover, a WTRU establishes a plurality of connections with a plurality of Node-Bs in an active set. In this situation, a problem may arise for scheduling and H-ARQ operation. A WTRU may receive conflicting EU transmission scheduling from more than one Node-B. It is also difficult for the WTRU to receive, decode and process H-ARQ positive and negative acknowledgements (ACKs/NACKs) generated by a plurality of Node-Bs. The soft buffer of an H-ARQ process in Node-Bs may be corrupted during soft handover.

[0008] One method to support H-ARQ across multiple Node-Bs, when the WTRU is in soft handover, is to place the ACK/NACK generation function in the RNC, which derives a single ACK/NACK based on the results from the multiple Node-Bs. However, this approach presents a significant delay to the ACK/NACK process, which is highly undesirable for performance reasons.

[0009] When a WTRU undergoes an inter-Node-B hard handover, there is a possibility that a source Node-B, which is a Node-B before hard handover is completed, may not successfully receive EU transmissions for data packets that have been NACKed prior to hard handover activation time. Other WTRUs competing for UL resources may not be provided with enough physical resources in the source cell. If

data blocks that have been NACKed prior to the handover are retransmitted to the source Node-B before the handover activation timer expires, those data blocks can be combined with the previous data blocks for H-ARQ decoding. In this way, the decoding takes the advantage of previous, although failed, transmissions of those data blocks in the source cell. If data blocks that have been NACKed prior to the handover are not retransmitted to the source Node-B before the handover activation timer is expired, they have to be transmitted again in the target cell as new data blocks. In this case, the previous transmissions of those data blocks in the source cell are not utilized.

SUMMARY

[0010] An enhanced uplink user equipment is in soft handover. A radio network controller selects a primary Node-B out of a plurality of Node-Bs supporting the soft handover. The radio network controller receiving successfully received enhanced uplink data packets from the plurality of Node-Bs. The radio network controller reordered the successfully received enhanced uplink data packets for in-sequence deliver. The primary Node-B sends specified scheduling information to the user equipment that the other Node-Bs does not transmit. At least the primary Node-B transmits acknowledgements and negative acknowledgements to the user equipment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] A more detailed understanding of the invention may be had from the following description, given by way of example and to be understood in conjunction with the accompanying drawings wherein:

[0012] Figure 1 shows a conventional wireless communication system;

[0013] Figure 2 shows a system which uses a UL scheduler located in a primary Node-B during soft handover for EU in accordance with the present invention;

[0014] Figure 3 shows a system which uses an ACK/NACK generation function located in a primary Node-B during soft handover for EU in accordance with the present invention;

[0015] Figure 4 is a flowchart of a process including method steps for

coordinating Node-Bs during soft handover in accordance with one embodiment of the present invention; and

[0016] Figure 5 is a flowchart of a process including method steps for prioritizing the transmission of NACKed data in a source Node-B before hard handover is completed in accordance with a separate embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] The present invention will be described with reference to the drawing figures wherein like numerals represent like elements throughout.

[0018] Hereafter, the terminology "WTRU" includes but is not limited to a user equipment (UE), a mobile station, a fixed or mobile subscriber unit, a pager, or any other type of device capable of operating in a wireless environment.

[0019] When referred to hereafter, the terminology "Node-B" includes but is not limited to a base station, a site controller, an access point or any other type of interfacing device in a wireless environment.

[0020] The present invention may be implemented in any type of wireless communication systems, such as UMTS - FDD, TDD, time division synchronous code division multiple access (TDSCDMA), code division multiple access 2000 (CDMA2000) (EV-DO and EV-DV) or any other type of wireless communication system.

[0021] The features of the present invention may be incorporated into an IC or be configured in a circuit comprising a multitude of interconnecting components.

[0022] Figure 2 shows a wireless multi-cell communication system 200 which uses a UL scheduler located in a primary Node-B in accordance with the present invention. The wireless multi-cell communication system 200 includes a WTRU 205, a plurality of Node-Bs 210 (i.e., 210A, 210B), an RNC 215 and a plurality of cells 260 (i.e., 260A, 260B, 260C). Cells 260A and 260C are served by the Node-B 210A. Cells 260B are served by the Node-Bs 210B. All of the Node-Bs 210 are controlled by the RNC 215.

[0023] During soft handover, the WTRU 205 establishes multiple connections with the Node-Bs 210 included in an active set. Each transmission from the WTRU

205 is processed independently at each of the Node-Bs 210. One of the Node-Bs 210 in the active set is designated as a primary Node-B 210A, and the other Node-Bs are designated as non-primary Node-Bs 210B.

[0024] As shown in Figure 2, the primary Node-B 210A includes a MAC entity 250A including a UL scheduler 255. Each of the non-primary Node-Bs 210B also includes a MAC entity 250B. Each of the MAC entities 250A, 250B, handles EU transmissions. The UL scheduler 255 in the MAC entity 250A is responsible for scheduling the EU transmissions.

[0025] In accordance with one embodiment of the present invention, the UL scheduler 255 is implemented only at the primary Node-B 210A during soft handover. The WTRU 205 receives a UL transmission schedule only from the primary Node-B 210A in a primary cell 260A. However, the primary Node-B 210A cannot send the scheduling information to the non-primary Node-Bs 210B in every transmission time interval (TTI). In order to allow the primary Node-B 210A to allocate resources for the WTRU 205 to transmit in cells controlled by the non-primary Node-Bs 210B, those resources scheduled by the primary Node-B 250A in a plurality of cells 260B controlled by the non-primary Node-Bs 210B cannot be assigned by the non-primary Node-Bs 210B. Therefore, some physical resources common to all of the cells in the active EU subset should be assigned and reserved by a particular Node-B for the WTRU 205 during the soft handover, so that those resources can be used only by the primary Node-B 210A.

[0026] The UL scheduler 255 located in the primary Node-B 210A considers the interference level caused by the EU transmission at any cell 260A, 260B, 260C, in the EU active subset to be below a predetermined maximum allowed interference level. Thus, the primary Node-B 250A limits the transmit power level of the WTRU 205 such that the interference levels are also within the maximum allowed interference levels at other cells 260B, 260C. To achieve this, the RNC 215 needs to relay necessary information, such as transmission power level and interference level, of the cells 260B controlled by the non-primary Node-Bs 210B to the primary Node-B 210A, which then uses the information to schedule the UL transmissions.

[0027] The EU scheduling information is transmitted to the WTRU 205 only by the primary Node-B 210A through the primary cell 260A. During soft handover, the WTRU 205 receives EU scheduling information only in the primary cell 260A, although the EU scheduling information is valid in all other cells 260B, 260C.

[0028] In one embodiment, the primary Node-B 250A is selected by either the RNC 215 or the WTRU 205. The RNC 215 may choose a Node-B that has the highest percentage of correctly received data blocks during a predefined time window as a primary Node-B.

[0029] In another embodiment, the RNC 215 generates statistics for each Node-B, such as a bit error rate (BER) or a frame error rate (FER), or the like, over a predetermined time period. Then, the RNC 215 may select a Node-B having the best performance to be the primary Node-B 210A. The RNC 215 then notifies the WTRU 205 and all other Node-Bs about the primary Node-B 210A via radio resource control (RRC) and Iub signaling, respectively.

[0030] In another embodiment, the WTRU 102 may choose a Node-B 210 that has the best downlink pilot power, (i.e., best downlink path loss or highest code power), as a primary Node-B 210A. The WTRU 205 measures the power of pilot signals received from all Node-Bs 210 and selects the Node-B 210 having the highest pilot power to be the primary Node-B 210A. The WTRU 205 then notifies all other Node-Bs about the primary Node-B 210A via fast physical layer signaling.

[0031] The WTRU 205 may report the downlink pilot power of all cells 260 to the RNC 215. The RNC 215 then chooses one Node-B 210 to be the primary Node-B 210a based on the combined uplink and downlink quality. The uplink quality of a cell 260 based on the percentage of correctly received data blocks, (or BER, FER, or the like), during a predefined time window, and the downlink quality of a cell 260 is based on the WTRU received downlink pilot power. Then, the RNC 215 notifies the WTRU 205 and all of the Node-Bs 210 about the primary Node-B 210A via RRC and Iub signaling, respectively.

[0032] The present invention is advantageous over prior art systems. Using the present invention, a WTRU does not receive conflicting scheduling of EU transmission

from Node-Bs during soft handover. In addition, EU transmission is scheduled in consideration of an interference level and radio resources in cells controlled by non-primary Node-Bs. Signaling delay from the primary Node-B 210A to the WTRU 205 is much lower as compared to signaling delay from the RNC 215 to the WTRU 205.

[0033] In a separate embodiment, Figure 3 shows a wireless multi-cell communication system 300, similar to the system 200 shown in Figure 2. As shown in Figure 3, the primary Node-B 210A includes a MAC entity 250A including an ACK/NACK generator 305. Only the primary Node-B 210A has the ACK/NACK generator 305. The primary Node-B 210A may perform H-ARQ with incremental redundancy, or only ARQ without implementing incremental redundancy.

[0034] Still referring to Figure 3, the primary Node-B 210A receives at least one data packet from the WTRU 205 through the primary cell 260A and performs an error check on the data packet. Any error checking method, such as a cyclic redundancy check (CRC), may be utilized. If the primary Node-B 210A correctly decodes the data packet, such as passing the CRC, the primary Node-B 210A transmits an ACK to the WTRU 205 and also transmits the correctly decoded data packet to the RNC 215. If the primary Node-B 210A fails to correctly decode the data packet, the primary Node-B 210A transmits a NACK to the WTRU 205.

[0035] The non-primary Node-Bs 210B also perform an error check on the data packet. However, the non-primary Node-Bs 210B do not send ACKs or NACKs to the WTRU 205. Instead, the non-primary Node-Bs send successfully decoded data packets to the RNC 215. During soft handover, only the primary Node-B 210A generates H-ARQ (or ARQ), ACKs and NACKs, and controls retransmissions.

[0036] The MAC layer WTRU identities received by the non-primary Node-Bs 210B may be used for routing of successfully received transmissions in a universal terrestrial radio access network (UTRAN). Since the non-primary Node-Bs 210B are not aware of which WTRUs have been scheduled for EU transmission by the primary Node-B 210A, the non-primary Node-Bs 210B may rely on in-band MAC layer signaling of the WTRU ID to route correctly received transmissions to the correct RNC radio link. Even though the primary Node-B 210A may be aware of which WTRU is

scheduled, the same method may be implemented by the primary Node-B 210A.

[0037] Preferably, the primary Node-B 210A may use soft combining to process transmissions, while the non-primary Node-Bs 210B may process each transmission without soft combining. If the primary Node-B sends a NACK to the WTRU 205, the NACKed data packet is stored in a buffer of the primary Node-B 210A, and the NACKed data packet is combined with a retransmitted data packet. In contrast, the non-primary Node-Bs 210B do not store the NACKed data packets. This eliminates the problem of soft buffer corruption between the Node-Bs 210, and the complexities of multiple independent ACKs and/or NACKs.

[0038] When an incremental combining process is implemented, measures should be taken to avoid soft buffer corruption. Sequence information or a new data indicator is required to enable a Node-B 210 to detect that the WTRU 205 is no longer repeating data for a particular WTRU H-ARQ process, but instead is sending new data. This is specifically required because the Node-B 210 has no other way to learn that a new transmission has started. Alternatively, the non-primary Node-Bs 210B may simply perform an ARQ, without using an incremental combining process. This eliminates the soft buffer corruption problem.

[0039] In the case where non-primary Node-Bs 210B perform simple ARQ without incremental combining, the WTRU 205 must transmit self-decodable data packets to ensure that all of the Node-Bs 210 may decode transmissions, regardless of the result of earlier transmissions. Preferably, the H-ARQ functionality is terminated at the Node-Bs 210. Each of the Node-Bs 210 sends to the RNC 215 successfully decoded data packets with explicit identification of transmission, such as a transmission sequence number (TSN). The RNC 215 may optionally use data packets delivered from the non-primary Node-Bs 210B. A MAC entity 310, located in the RNC 215, is used to implement an in-sequence delivery process for delivering data to higher layers over all of the packets received from the Node-Bs 210. After the RNC MAC entity 310 has completed its re-ordering process, it sends the data to a radio link control (RLC) (not shown). Missed packets are identified at the RNC 215 and the WTRU 205 is informed through RLC messaging.

[0040] Alternatively, EU transmissions may identify WTRU ID, H-ARQ process, transmission sequence and/or new data indication (NDI) to allow for soft combining in the non-primary Node-B's 210B. If this method is used to allow soft combining in the non-primary Node-Bs 210B, the primary Node-B 210A may not have to rely on scheduling and H-ARQ ACK/NACK decisions to determine when combining should be performed.

[0041] There are two options for the transmission of ACK/NACK messages. The first option is a synchronous transmission. The ACK/NACK messages are transmitted after a unique time delay with respect to the corresponding uplink transmission or the EU channel allocation message. The second option is an asynchronous transmission. There is no unique delay between the transmission of ACK/NACK messages and the corresponding uplink transmission or the EU channel allocation message. Explicit information in the ACK/NACK message identifies the corresponding uplink transmission to enable the WTRU 205 to make the correct association between the ACK/NACK message and the transmission. This association is made by either identifying the H-ARQ process number and/or a unique sequence number, such as a TSN with each ACK/NACK feedback message to the WTRU 205.

[0042] In a separate embodiment, preferably implemented for the asynchronous ACK/NACK feedback case, the non-primary Node-Bs 210B may provide H-ARQ ACK/NACK results to the primary Node-B 210A in order to avoid unnecessary retransmissions for transmissions that are not correctly received by the primary Node-B 210A, but are correctly received by the non-primary Node-Bs 210B. A non-primary Node-B 210B does not directly send an ACK or NACK message to the WTRU 205. The non-primary Node-Bs 210B sends ACK/NACK or CRC results to the RNC 215. Then, the RNC 215 sends ACK or CRC results to the primary Node-B 210A.

[0043] In order to speed up H-ARQ processing, the first ACK message from any non-primary Node-B 210B received by the RNC is preferably immediately forwarded to the primary Node-B 210A. The primary Node-B 210A also immediately generates an ACK message if the transmission is received correctly in the primary Node-B 210A without waiting for feedback from the non-primary Node-Bs 210B. The primary Node-

B 210A also generates an ACK message immediately upon reception of a forwarded ACK message from the RNC, even if other ACK messages may be forwarded. Since an ACK is generated if any of the paths are successful, an ACK can be generated as soon as the first successful transmission is found.

[0044] Alternatively, in order to simplify the design of the ACK/NACK generator 205, only a subset of the generating nodes may be used. For example, ACKs may be generated only at the RNC, or at the RNC and the primary Node-B 210A.

[0045] When the WTRU 205 sends an uplink transmission, for each H-ARQ process the WTRU 205 waits at least the time required for the primary Node-B 210A to send ACK/NACK feedback. For each H-ARQ process, if an ACK is received by the WTRU 205, the WTRU 205 may send new data in the next available or assigned opportunity.

[0046] A NACK message can only originate in the RNC 215 since it is the only node that has all of the information necessary in the soft handover to determine that there have been no successful receptions at any Node-B 210. The RNC 215 generates a NACK command if the RNC 215 receives no ACK from the Node-Bs 210 within a predetermined time interval. The RNC 215 forwards the NACK message to the WTRU 205 via the primary Node-B 210A.

[0047] It is also possible that this procedure can be implemented without an explicit NACK command. In this case, the lack of ACK reception within a particular period of time is considered the same as an explicit NACK command at either the primary Node-B 210A and/or the WTRU 205.

[0048] Figure 4 is a flowchart of a process 400 including method steps for coordinating Node-Bs during soft handover in accordance with one embodiment of the present invention. In step 405, the RNC 215 makes a decision to initiate an inter-Node-B soft handover. In step 410, the WTRU 205 establishes connections with at least two Node-Bs 210 in an active set. In step 415, one of the Node-Bs 210 in the active set is designated as a primary Node-B 210A and the one or more Node-B(s) 210 remaining in the active set are designated as a non-primary Node-Bs 210B. In step 420, the primary Node-B 210A controls UL transmissions during soft handover by

performing EU scheduling and H-ARQ operations.

[0049] Figure 5 is a flowchart of a process 500 including method steps for prioritizing the transmission of NACKed data in a source Node-B before hard handover is completed in accordance with a separate embodiment of the present invention. In step 505, the RNC 215 makes a decision to initiate a hard handover for a WTRU 205 connected to a source Node-B 210. In step 510, the RNC 215 informs the source Node-B 210 when the WTRU 205 will stop transmission and reception in the source cell 260. In step 515, the RNC 215 sends an activation timer to the source Node-B 210 to set the time for handover.

[0050] Still referring to Figure 5, if the source Node-B 210 determines that there are data packets that were previously NACKed, as many previously NACKed data packets as possible should be retransmitted before the handover activation timer expires. Otherwise, the system may lose the benefit of incrementally combining the previous transmission with the retransmission. Therefore, the source Node-B scheduler 255 takes the handover activation time into account when it schedules the data packets that have been NACKed. If there is not enough radio resource for the source Node-B 210 to schedule transmission of all the NACKed data packets in time, the source Node-B 210 should manage to schedule transmission of as many NACKed data packets as possible.

[0051] Still referring to Figure 5, in order to transmit as many NACKed data packets as possible before the activation timer expires, the source Node-B 210 adjusts the priority of transmissions (step 525) and, in step 530, the source node-B 210 adjusts the MCS of the transmissions (step 530). Higher priority of scheduling is given to the data packets that have been NACKed. If the radio resources are sufficient, a more robust MCS may be used to increase the probability of successful transmissions from the WTRU 205 to the source Node-B 210. In step 535, the handover is completed at the expiration of the activation timer.

[0052] In order for the WTRU 205 to understand that the scheduled uplink transmission is intended for data blocks with previous transmission failures, the source Node-B 210 uplink scheduler 255 may specify that the scheduled UL

transmission is intended for the data blocks that were previously NACKed. This may be implemented by including H-ARQ process identification in the UL scheduling information that is sent from the source Node-B 210 to the WTRU 205. By receiving the scheduling information from the source Node-B 210, the WTRU 205 knows that the scheduled transmission is for specific data associated with HARQ process identification sent together with the scheduling information.

[0053] While this invention has been particularly shown and described with reference to preferred embodiments, it will be understood by those skilled in the art that various changes in forms and details may be made therein without departing from the scope of the invention as described above.

* * *

CLAIMS

What is claimed is:

1. A wireless transmit/receive unit (WTRU) comprising:
a circuit configured to transmit enhanced uplink data to a plurality of cells of an active set using soft handover;
wherein at least a first of the plurality of cells is a primary cell and at least a second cell of the plurality of cells is not the primary cell;
wherein the circuit is further configured to receive first scheduling information from the primary cell and not receive the first scheduling information from the second cell; wherein the second cell does not transmit the first scheduling information;
wherein the circuit is further configured to receive hybrid automatic repeat request (HARQ) acknowledgments (ACKs) and HARQ negative acknowledgments (NACKs) from the primary cell and not receive the HARQ NACKs from the second cell;
wherein the second cell does not transmit the HARQ NACKs.
2. The WTRU of claim 1 wherein a radio network controller (RNC) designates the first of the plurality of cells as being the primary cell.
3. The WTRU of claim 1 wherein the enhanced uplink data transmissions include a WTRU identification.
4. The WTRU of claim 1 wherein the circuit is further configured to transmit the enhanced uplink data using synchronous HARQ transmission.
5. The WTRU of claim 1 wherein the circuit is further configured to have enhanced uplink data transmission scheduled such as to limit interference to the second cell.

6. A method comprising:
transmitting, by a wireless transmit/receive unit (WTRU), enhanced uplink data to a plurality of cells of an active set using soft handover;
wherein at least a first of the plurality of cells is a primary cell and at least a second cell of the plurality of cells is not the primary cell;
receiving, by the WTRU, first scheduling information from the primary cell and not receiving the first scheduling information from the second cell;
wherein the second cell does not transmit the first scheduling information;
receiving, by the WTRU, hybrid automatic repeat requests (HARQ) acknowledgments (ACKs) and negative acknowledgements (NACKs) from the primary cell and not receiving the HARQ NACKs from the second cell;
wherein the second cell does not transmit the HARQ NACKs.
7. The method of claim 6 wherein a radio network controller (RNC) designates the first of the plurality of cells as being the primary cell.
8. The method of claim 6 wherein the enhanced uplink data transmissions include a WTRU identification.
9. The method of claim 6 wherein the enhanced uplink data is transmitted using synchronous HARQ.
10. The method of claim 1 wherein the enhanced uplink data transmissions are scheduled such as to limit interference to the second cell.
11. A Node B comprising:
a circuit configured to receive enhanced uplink data from a first wireless transmit/receive unit (WTRU) in a first cell;
wherein the first WTRU is in soft handover and is transmitting the enhanced

uplink data to a plurality of cells of an active set;

wherein the first cell is primary cell and at least a second cell of the plurality of cells is not the primary cell;

wherein the circuit is further configured to transmit first scheduling information to the first WTRU using the first cell;

wherein the circuit is further configured to transmit hybrid automatic repeat requests (HARQ) acknowledgments (ACKs) and negative acknowledgments (NACKs) to the first WTRU using the first cell;

wherein the circuit is further configured to receive the enhanced uplink data from a second WTRU in the first cell; wherein the second WTRU is in soft handover and is transmitting the enhanced uplink data to the plurality of cells of the active set;

wherein the first cell is not the primary cell and at least a third cell of the plurality of cells is the primary cell;

wherein the circuit is further configured to not transmit first scheduling information to the second WTRU using the first cell;

wherein the second WTRU receives first scheduling information from the third cell; and

wherein the circuit is further configured to not transmit the HARQ NACKs to the second WTRU using the first cell; wherein the first WTRU receives the HARQ ACKS and NACKs from the third cell.

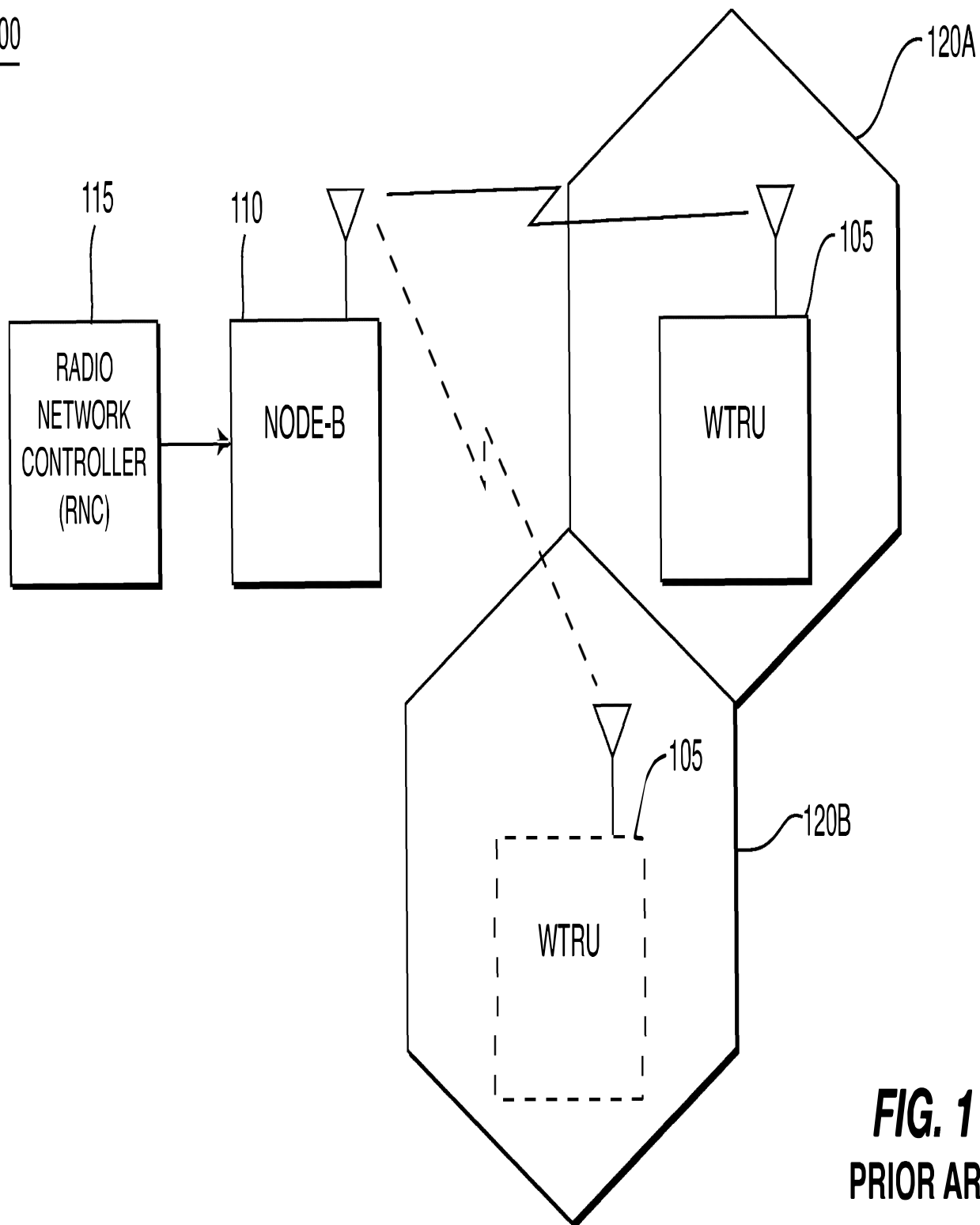
12. The Node B of claim 11 wherein the circuit is further configured to receive information from a radio network controller designating the first cell as being the primary cell.

13. The Node B of claim 12 wherein the enhanced uplink data transmissions include a WTRU identification.

ABSTRACT

An enhanced uplink user equipment is in soft handover. A radio network controller selects a primary Node-B out of a plurality of Node-Bs supporting the soft handover. The radio network controller receiving successfully received enhanced uplink data packets from the plurality of Node-Bs. The radio network controller reordered the successfully received enhanced uplink data packets for in-sequence deliver. The primary Node-B sends specified scheduling information to the user equipment that the other Node-Bs does not transmit. At least the primary Node-B transmits acknowledgements and negative acknowledgements to the user equipment.

100



1/4

FIG. 1
PRIOR ART

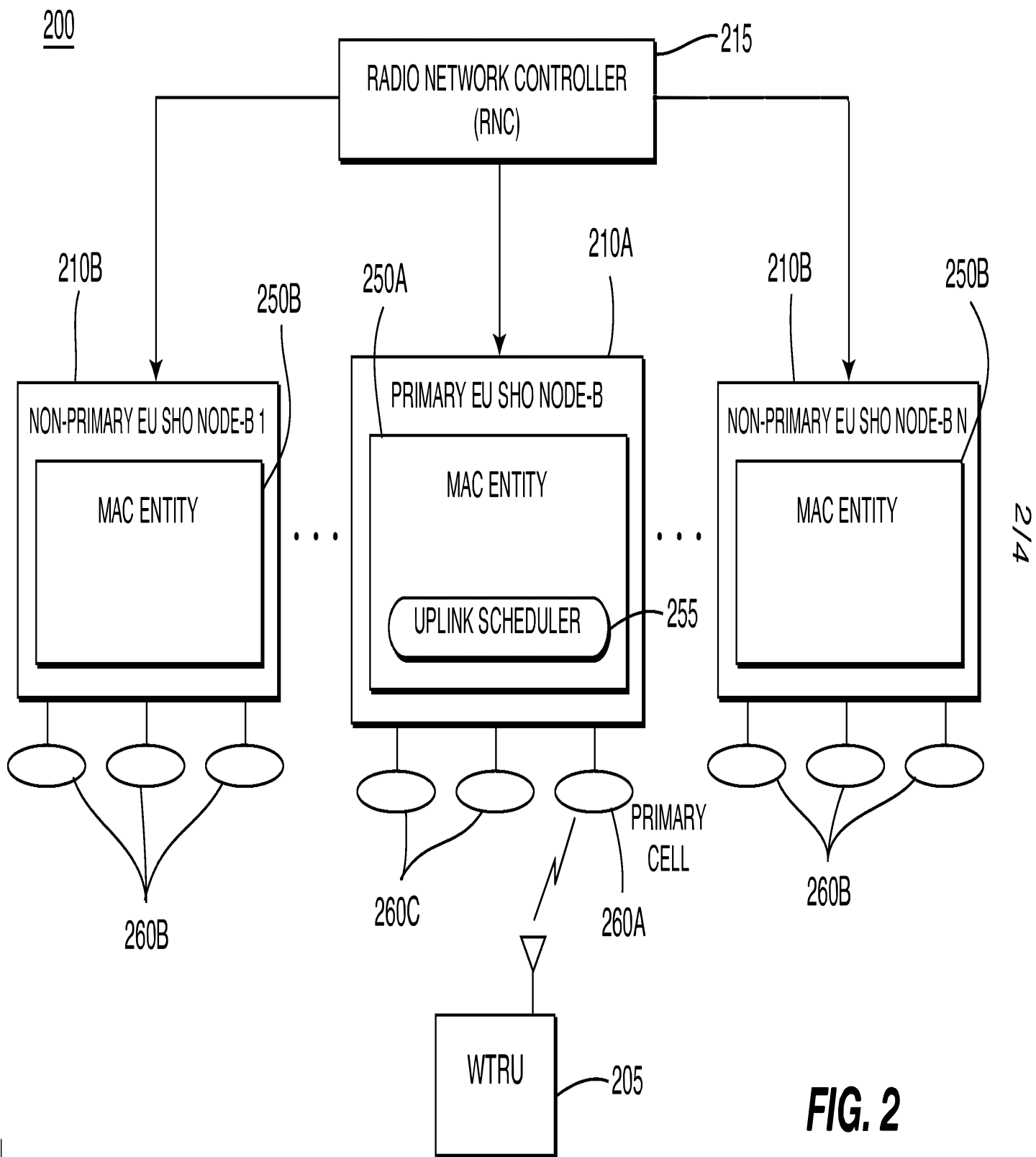


FIG. 2

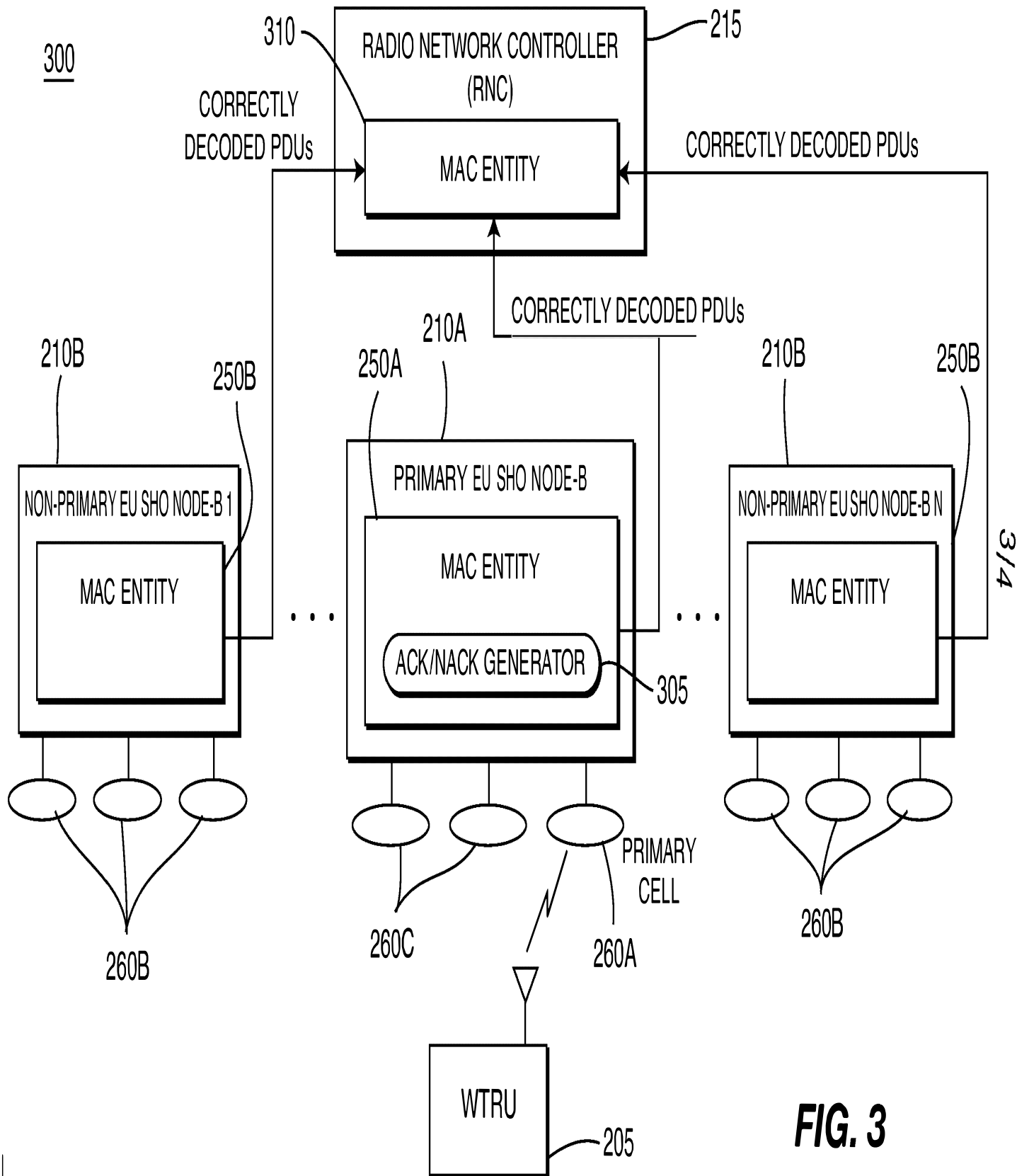


FIG. 3

400

4/4

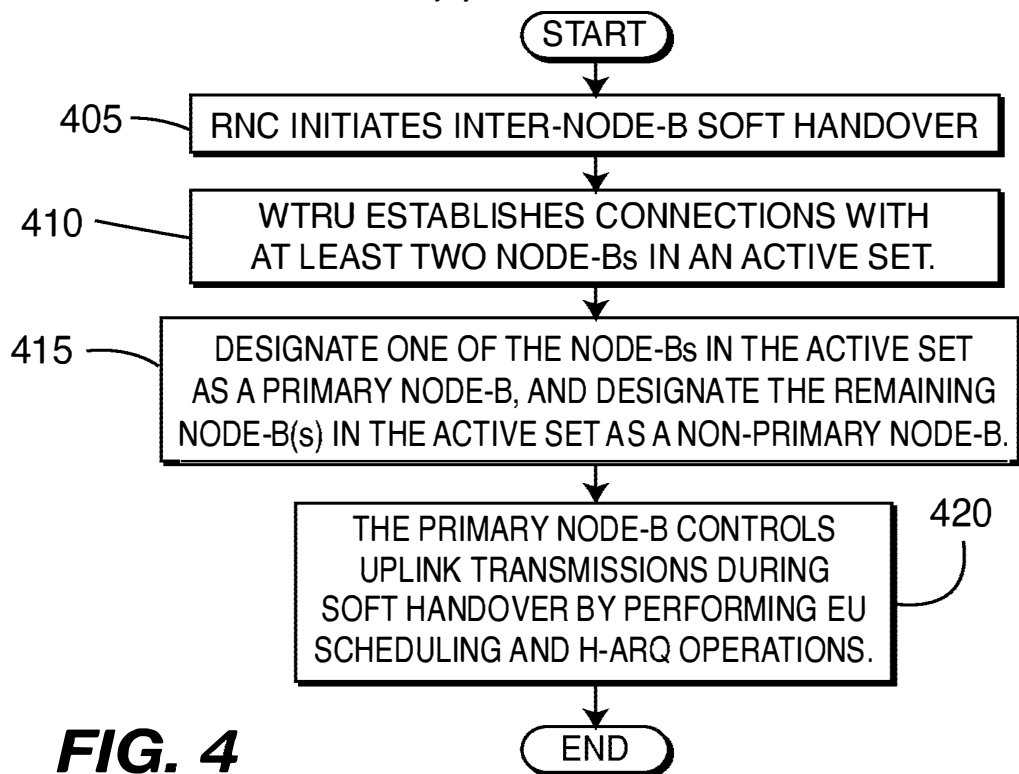


FIG. 4

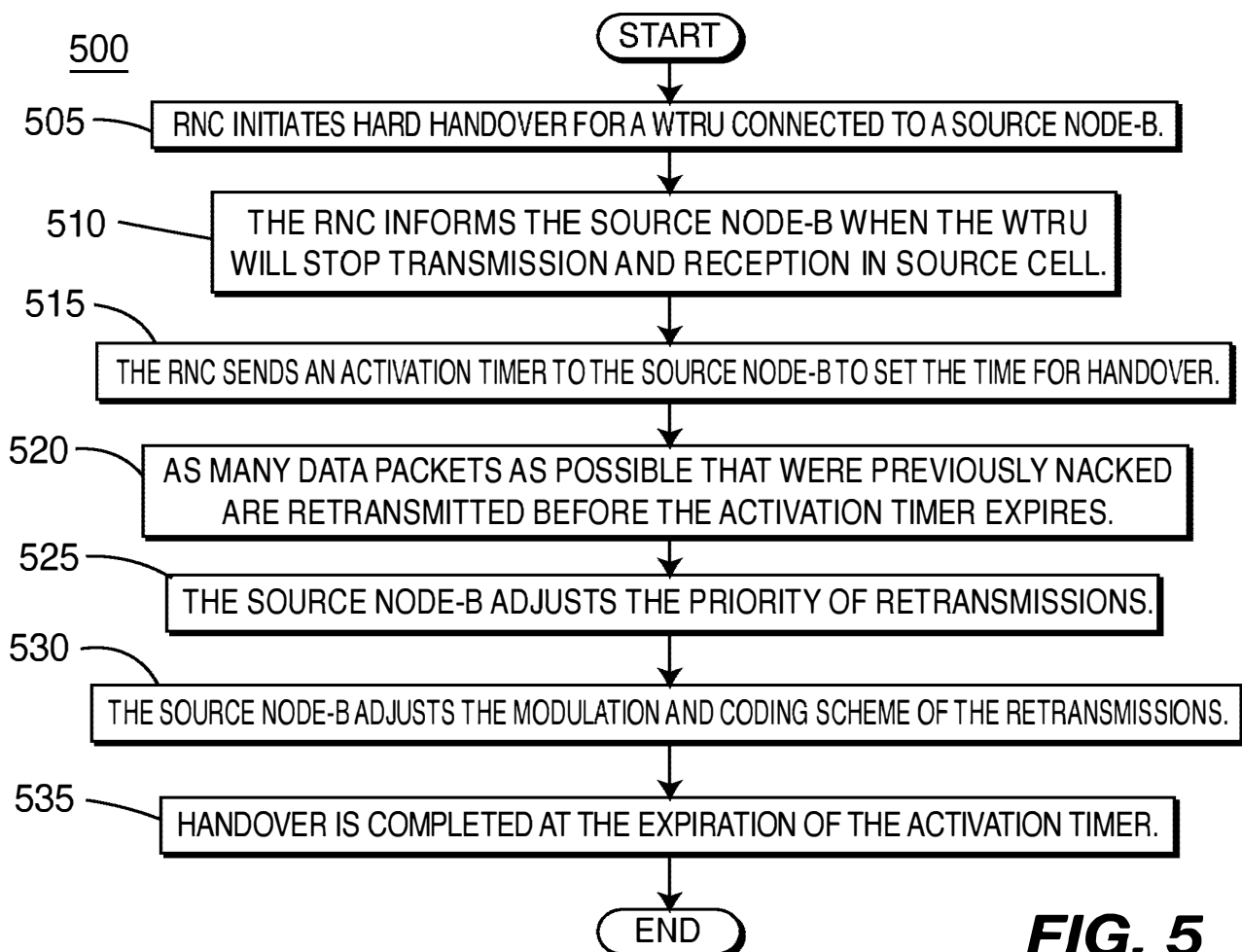


FIG. 5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the PATENT APPLICATION of:

Zhang et al.

Application No.: Not yet assigned

Confirmation No.: Not yet assigned

Filed: Herewith

For: SUPPORTING ENHANCED UPLINK
TRANSMISSION DURING SOFT
HANDOVER

Group: Not yet assigned

Examiner: Not yet assigned

Our File: I-2-0674US04

Date: December 1, 2011

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Further to Applicants' Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicants wish to bring to the Examiner's attention the material cited on the enclosed PTO Form 1449. Copies of the cited documents are not enclosed as they were provided in the parent application.

This Application is a continuation of Non-Provisional Application No. 11/434,330, filed on May 15, 2006, which is a continuation of Non-Provisional Application No. 10/962,720, filed on October 12, 2004, which issued on May 16, 2006 as U.S. Patent No. 7,046,648, which claims priority from Provisional Application No. 60/578,674, which was filed on June 10, 2004, Provisional Application No. 60/520,692,

which was filed on November 17, 2003, Provisional Application No. 60/519,990, which was filed on November 14, 2003, and Provisional Application No. 60/517,656, which was filed on November 5, 2003.

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the Form PTO-1449 indicating his consideration of the cited materials.

Respectfully submitted,

Zhang et al.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
13/308,950	12/01/2011	2473	1250	I-2-0674US04	13	3

CONFIRMATION NO. 5805

24374
VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

FILING RECEIPT



Date Mailed: 12/19/2011

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

INTERDIGITAL TECHNOLOGY CORPORATION, Wilmington, DE

Power of Attorney: The patent practitioners associated with Customer Number 24374

Domestic Priority data as claimed by applicant

This application is a CON of 11/434,330 05/15/2006
which is a CON of 10/962,720 10/12/2004 PAT 7046648
which claims benefit of 60/578,674 06/10/2004
and claims benefit of 60/520,692 11/17/2003
and claims benefit of 60/519,990 11/14/2003
and claims benefit of 60/517,656 11/05/2003

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

If Required, Foreign Filing License Granted: 12/13/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/308,950**

Projected Publication Date: 03/29/2012

Non-Publication Request: No

Early Publication Request: No
Title

SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER

Preliminary Class

370

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 13/308,950	
APPLICATION AS FILED - PART I							
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	380
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	620
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	250
TOTAL CLAIMS (37 CFR 1.16(j))	13	minus 20 = *			OR	x 60 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *				x 250 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s)) If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).							0.00
							0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
			TOTAL			TOTAL	1250
* 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)		SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =
	Application Size Fee (37 CFR 1.16(s))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =
	Application Size Fee (37 CFR 1.16(s))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.							

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674US04	SERIAL NO. 13/308,950
	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2473

U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,678,249	01/2004	Toskala et al. ⁴			
		6,778,830	08/2004	Oizumi et al.			
		6,892,071	05/2005	Park et al.			
		7,013,143	03/2006	Love et al.			
		7,346,035	03/2008	Lee et al.			
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		2003/0007480	01/2003	Kim et al.			
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		2004/0120306	06/2004	Wigard et al.			
		2004/0160925	08/2004	Heo et al. ¹			
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		2004/0203991	10/2004	Chen et al.			
		2004/0219917	11/2004	Love et al.			
		2004/0219919	11/2004	Whinnett et al.			
		2004/0219920	11/2004	Love et al.			
		2004/0228313	11/2004	Cheng et al.			

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	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2473

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		2005/0041694	02/2005	Liu			
		2005/0047354	03/2005	Zeira et al.			
		2005/0048920	03/2005	Liu			
		2005/0083888	04/2005	Smee et al.			
		2007/0047501	03/2007	Usuda et al. ²			

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
		0 977 393	02/2000	EP ⁵				
		2 353 439	02/2001	GB				
		2001-128209	05/2001	JP			X**	
	*	2002-0095231	12/2002	KR			X**	
		2003112283	12/2005	RU			X**	
		2005110767	10/2006	RU			X**	
		00/074263	12/2000	WO ³				
		02/01893	01/2002	WO				
		03/003643	01/2003	WO				
		03/026231	03/2003	WO				
		03/053087	06/2003	WO				
		03/067953	08/2003	WO				
		03/088545	10/2003	WO				

OTHER DOCUMENTS

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	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2473

EXAMINER INITIAL	DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.2 (October 2003).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD (Release 6)," 3GPP TR 25.896 V6.0.0 (March 2004).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 1999)," 3GPP TS 25.212 V3.11.0 (September 2002).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)." 3GPP TS 25.321 V3.16.0 (September 2003).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 4)," 3GPP TS 25.212 V4.6.0 (September 2002).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.6.0 (September 2003).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," 3GPP TS 25.212 V5.9.0 (June 2004).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 6)," 3GPP TS 25.212 V6.2.0 (June 2004).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 1999)," 3GPP TS 25.321 V3.17.0 (June 2004).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 6)," 3GPP TS 25.321 V6.2.0 (June 2004).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.9.0 (September 2003).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.9.0 (June 2004).

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

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674US04	SERIAL NO. 13/308,950
	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2473

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.10.0 (June 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.6.0 (September 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.1 (October 2003).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Radio Resource Control (RRC) protocol specification (Release 1999)," 3GPP TS 25.331 V3.16.0 (September 2003).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Radio Resource Control (RRC) protocol specification (Release 1999)," 3GPP TS 25.331 V3.20.0 (September 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Radio Resource Control (RRC); Protocol Specification (Release 4)," 3GPP TS 25.331 V4.11.0 (September 2003).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Radio Resource Control (RRC); Protocol Specification (Release 4)," 3GPP TS 25.331 V4.15.0 (June 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Radio Resource Control (RRC); Protocol Specification (Release 5)," 3GPP TS 25.331 V5.6.0 (September 2003).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Radio Resource Control (RRC); Protocol Specification (Release 5)," 3GPP TS 25.331 V5.10.0 (September 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Radio Resource Control (RRC); Protocol Specification (Release 6)," 3GPP TS 25.331 V6.3.0 (September 2004).
		3GPP, "Third Generation Partnership Project; Technical Specification Group Radio Access Network; FDD Enhanced Uplink; Overall Description; Stage 2 (Release 6)," 3GPP TS 25.309 V6.0.0 (September 2004).
		3GPP2 C.20003-C, "Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Release C, August 2004.

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

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674US04	SERIAL NO. 13/308,950
	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2473

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP2 C.S0004-C, "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems", 3 rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.
		3GPP2 C.S0005-C, "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems", 3 rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision c, July 23, 2004.
		GPP2 C.S0002-C, "Physical Layer Standard for cdma2000 Spread Spectrum Systems", 3 rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.

X** Abstract only

¹ Corresponds to RU2004104196; ² Corresponds to RU 2006130462; ³ Corresponds to RU 2001135846; ⁴ Corresponds to WO 03/067953; ⁵ Corresponds to WO 98/47253.

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

1) Family number: 41459113 (KR20020095231A)

© PatBase

Title: RADIO COMMUNICATION SYSTEM

Priority: GB20010004830 20010227 WO2002IB00317 20020131 KR20027014317 20021025

Family:	Publication number	Publication date	Application number	Application date
	KR100882145 B1	20090206	KR20027014317	20021025
	KR20020095231 A	20021220	KR20027014317	20021025

Designated states: AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR

International class (IPC 8-9): H04L 1/18 (Advanced/Invention);

H04L 1/18 (Advanced/Non-invention);
H04L 1/16 (Core/Invention)

International class (IPC 1-7): H04L 1/18

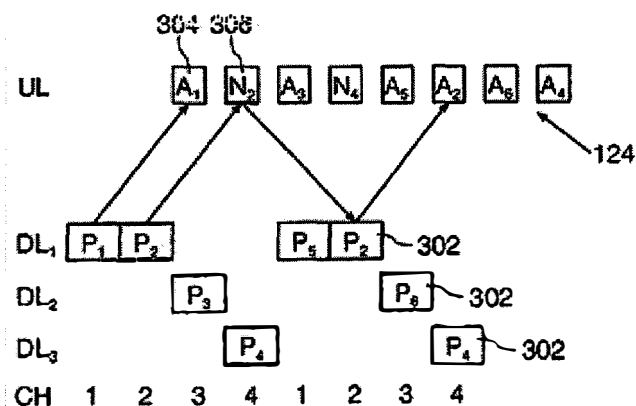
class (IPC 1-7):

[Classification](#)

[Explorer](#)

Abstract:

Source: KR20020095231A A radio communication system comprises a primary station which is arranged to transmit a series of data packets to a secondary station which operates according to an ARQ scheme for acknowledging correct reception of each packet. The primary station transmits error correction information relating to any packets that are not received correctly, thereby enabling the secondary station to extract correctly the data. The data packets are transmitted via a plurality of logical channels, so that an error in transmission of one packet does not hold up transmission of packets in other channels. Transfer of data transmission from one primary station to another is done by transferring each channel when correct reception of a data packet on that channel has been acknowledged, thereby avoiding the extra signalling required in transferring logical channels in which a data packet has been received in error and the error correction transmissions have not been completed.





(19) 대한민국특허청(KR)
(12) 등록특허공보(B1)

(45) 공고일자 2009년02월06일
(11) 등록번호 10-0882145
(24) 등록일자 2009년01월30일

(51) Int. Cl.

H04L 1/18 (2006.01)

(21) 출원번호 10-2002-7014317

(22) 출원일자 2002년10월25일

심사청구일자 2007년01월31일

변역문제출일자 2002년10월25일

(65) 공개번호 10-2002-0095231

(43) 공개일자 2002년12월20일

(86) 국제출원번호 PCT/IB2002/000317

국제출원일자 2002년01월31일

(87) 국제공개번호 WO 2002/69664

국제공개일자 2002년09월06일

(30) 우선권주장

0104830.5 2001년02월27일 영국(GB)

(56) 선행기술조사문헌

WO1997023110 A1

WO2000049760 A1

전체 청구항 수 : 총 9 항

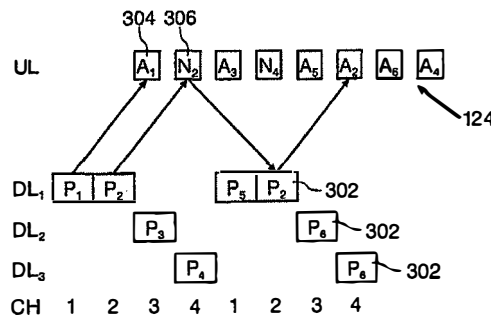
심사관 : 전용해

(54) 무선 통신 시스템

(57) 요약

무선 통신 시스템은 각각의 패킷의 정확한 수신에 대해 확인을 통지하기 위해 ARQ 방법에 따라 동작하는 2차국에 일련의 데이터 패킷들을 전송하기 위해 구성된 1차국을 포함한다. 1차국은 올바르게 수신되지 않은 임의의 패킷들에 관련된 에러 정정 정보를 전송하여 2차국이 데이터를 정확하게 추출할 수 있도록 해준다. 데이터 패킷들은 복수의 논리 채널들을 통해 전송되어, 한 패킷의 전송중 에러는 다른 채널들에서의 패킷들의 전송을 중지시키지 않는다. 한 1차국으로부터 다른 1차국으로의 데이터 전송의 이전(transfer)은 해당 채널상에서의 데이터 패킷의 올바른 수신이 확인통지된 때에 각각의 채널을 이전함으로써 이루어지므로, 데이터 패킷이 수신에 에러가 있고 에러 정정 정보의 전송이 아직 완료되지 않은 논리 채널들의 이전에 필요한 추가 시그널링이 회피된다.

대표도 - 도4



(81) 지정국

국내특허 : 중국, 일본, 대한민국

EP 유럽특허 : 오스트리아, 벨기에, 스위스, 사이
프러스, 독일, 덴마크, 스페인, 핀란드, 프랑스,
영국, 그리스, 아일랜드, 이탈리아, 룩셈부르크,
모나코, 네덜란드, 포르투갈, 스웨덴, 터키

특허청구의 범위

청구항 1

2차국에 일련의 데이터 패킷들을 전송하기 위한 수단을 갖는 1차국을 포함하는 무선 통신 시스템(radio communication system)에 있어서,

상기 2차국은:

각각의 패킷이 올바르게 수신되는지를 판정하기 위한 수단과;

상기 판정을 상기 1차국으로 시그널링하기 위한 수단을 포함하며,

상기 1차국은:

상기 2차국에 의해 올바르게 수신되지 못한 데이터 패킷에 대한 상기 2차국의 디코딩을 보조하기 위해, 상기 2차국에 의해 올바르게 수신되지 못한 데이터 패킷에 관한 에러 정정 정보를 전송하기 위한 수단과;

복수의 논리 채널을 통해 상기 일련의 데이터 패킷들을 전송하는 수단으로서, 적어도 하나의 채널상에서 데이터 패킷들의 지속적 전송을 가능하게 하고, 또 다른 채널상에서 에러 정정 정보가 전송되도록 하는, 상기 일련의 데이터 패킷 전송 수단과;

적어도 2개의 상기 논리 채널의 전송을 또 다른 1차국으로 이전하기(transferring) 위한 핸드오버 수단을 포함하며,

상기 핸드오버 수단은, 다른 논리 채널들의 상태와는 관계없이, 해당 논리 채널상에서 가장 최근에 전송된 패킷의 성공적 수신에 대한 확인통지(acknowledgement)를 수신한 것에 응답하여, 적어도 2개의 논리 채널들의 각각을 또 다른 1차국으로 개별적으로 이전하기 위한 수단을 포함하는, 무선 통신 시스템.

청구항 2

제1항에 있어서, 상기 에러 정정 정보는 상기 올바르게 수신되지 않은 데이터 패킷의 재전송을 포함하는 것을 특징으로 하는, 무선 통신 시스템.

청구항 3

제1항에 있어서, 상기 에러 정정 정보는 상기 2차국이 점증적 리던던시 방식(incremental redundancy scheme)을 채용하는 것을 가능하게 하는 것을 특징으로 하는, 무선 통신 시스템.

청구항 4

2차국에 일련의 데이터 패킷들을 전송하기 위한 수단을 포함하는 1차국에 있어서:

상기 2차국에 의해 전송된 신호로부터 각각의 패킷이 올바르게 수신되는지를 판정하기 위한 수단과;

상기 2차국에 의해 올바르게 수신되지 못한 데이터 패킷에 대한 상기 2차국의 디코딩을 보조하기 위해, 상기 2차국에 의해 올바르게 수신되지 못한 데이터 패킷에 관한 에러 정정 정보를 전송하기 위한 수단과;

복수의 논리 채널을 통해 상기 일련의 데이터 패킷들을 전송하는 수단으로서, 적어도 하나의 채널상에서 데이터 패킷들의 지속적 전송을 가능하게 하고, 또 다른 채널상에서 에러 정정 정보가 전송되도록 하는, 상기 일련의 데이터 패킷 전송 수단과;

적어도 2개의 상기 논리 채널의 전송을 또 다른 1차국으로 이전하기 위한 핸드오버 수단을 포함하고,

상기 핸드오버 수단은, 다른 논리 채널들의 상태와는 관계없이, 해당 논리 채널상에서 가장 최근에 전송된 패킷의 성공적 수신에 대한 확인통지를 수신한 것에 응답하여 적어도 2개의 논리 채널들의 각각을 또 다른 1차국으로 개별적으로 이전하기 위한 수단을 포함하는, 1차국.

청구항 5

제4항에 있어서, 상기 논리 채널들 모두는 또 다른 1차국으로 이전되는 것을 특징으로 하는, 1차국.

청구항 6

1차국으로부터 일련의 데이터 패킷을 수신하기 위한 수단을 포함하는 2차국에 있어서;

각각의 패킷이 올바르게 수신되는지를 판정하기 위한 수단과;

이러한 판정을 상기 1차국으로 시그널링하기 위한 수단과;

상기 2차국에 의해 올바르게 수신되지 못한 데이터 패킷에 대한 상기 2차국의 디코딩을 보조하기 위해, 상기 2차국에 의해 올바르게 수신되지 못한 데이터 패킷에 관한 에러 정정 정보를 상기 1차국으로부터 수신하기 위한 수단과;

복수의 논리 채널을 통해 상기 일련의 데이터 패킷들을 수신하는 수단으로서, 적어도 하나의 채널상에서 데이터 패킷들의 지속적 수신을 가능하게 하고, 또 다른 채널상에서 에러 정정 정보가 수신되도록 하는, 상기 일련의 데이터 패킷 수신 수단과;

또 다른 1차국으로부터의 적어도 2개의 상기 논리 채널의 수신을 개시하기 위한 핸드오버 수단을 포함하고,

상기 적어도 2개의 채널들 각각은, 다른 논리 채널들의 상태와는 관계없이, 각각의 논리 채널상에서 가장 최근에 전송된 패킷의 성공적 수신에 대한 상기 2차국에 의한 확인통지에 응답하여 상기 1차국으로부터 또 다른 1차국으로 이전되는, 2차국.

청구항 7

제6항에 있어서, 상기 2차국에 대한 후속된 데이터 패킷들의 전송을 위해 복수의 이용가능한 1차국들 중 적어도 하나의 1차국을 선택하기 위한 사이트 선택 수단이 제공되는 것을 특징으로 하는, 2차국.

청구항 8

일련의 데이터 패킷을 2차국에 전송하도록 구성된 1차국을 포함하는 무선 통신 시스템을 동작하는 방법에 있어서;

상기 2차국이 각각의 패킷이 올바르게 수신되었는지의 여부를 판정하여 상기 판정을 1차국에 시그널링하는 단계와;

상기 1차국이, 상기 2차국에 의해 올바르게 수신되지 못한 데이터 패킷에 대한 상기 2차국의 디코딩을 보조하기 위해, 상기 2차국에 의해 올바르게 수신되지 못한 데이터 패킷에 관한 에러 정정 정보를 전송하는 단계와;

복수의 논리 채널을 통해 상기 일련의 데이터 패킷들을 전송하는 단계로서, 적어도 하나의 채널상에서 데이터 패킷들의 지속적 전송을 가능하게 하고, 또 다른 채널상에서 에러 정정 정보가 전송되도록 하는, 상기 일련의 데이터 패킷 전송 단계와;

적어도 2개의 상기 논리 채널들의 전송을 또 다른 1차국으로 이전할 수 있게 하는 단계를 포함하고,

상기 적어도 2개의 채널들 각각은, 다른 논리 채널들의 상태와는 관계없이, 해당 논리 채널상에서 가장 최근에 전송된 패킷의 성공적 수신에 대한 확인통지를 수신한 것에 응답하여 또 다른 1차국으로 개별적으로 이전될 수 있는, 무선 통신 시스템 동작 방법.

청구항 9

제8항에 있어서, 상기 1차국은 각각의 논리 채널을 동일한 다른 1차국으로 이전하는, 무선 통신 시스템 동작 방법.

명세서

기술분야

<1> 본 발명은 무선 통신 시스템에 관한 것이며 또한 이와 같은 시스템에서 사용하기 위한 1차국 및 2차국과, 이와 같은 시스템을 동작하는 방법에 관한 것이다. 본 명세서는 UMTS(Universal Mobile Telecommunication System)를 특히 참조하여 시스템을 기술하지만, 이와 같은 기술은 다른 이동 무선 시스템에도 역시 동등하게 적용된다는 것을 이해하여야 한다.

배경 기술

- <2> 요구에 따라 적절한 속도로 큰 데이터 블록을 이동국(mobile station; MS)으로 다운로드할 수 있는 능력을 갖는 시스템에 대한 필요성이 이동 통신 분야에서 증가하고 있다. 이와 같은 데이터는 예를 들어 아마도 비디오 클립 등을 포함하는, 인터넷으로부터의 웹 페이지일 수도 있다. 전형적으로 특정 MS는 이와 같은 데이터를 간헐적으로만 요구할 것이므로, 고정된 대역폭의 전용 링크는 적절하지 않다. UMTS에서 이러한 요구를 충족하기 위해, 데이터 패킷을 4Mbps에 이르는 속도로 이동국에 용이하게 전송할 수 있는 HSDPA(High-Speed Downlink Packet Access) 방법이 개발되고 있다.
- <3> 공지된 무선 통신 시스템에서, 임의의 한 시점에서 MS는 일반적으로 하나의 기지국(BASE STATION, BS)과 통신한다. 호(call)의 과정에서 MS는, 예를 들어 자신의 BS로부터 멀리 이동함에 따라 통신 링크의 품질이 저하될 때나 또는 다른 셀들의 상대적 트래픽 부하의 조절을 요구할 때, 다른 BS로의 이전을 조사하기 위해 희망할 수도 있다. 한 BS로부터 다른 BS로 이전하는 과정은 핸드오버(handover)라 알려져 있다.
- <4> 현재 UMTS 명세에 따라 동작하는 시스템에서, MS는, 상당한 품질의 무선 링크가 유지될 것으로 기대되는 "액티브 세트"라 알려진 BS들의 목록을 유지한다. MS가 전용 채널 모드에 있고 액티브 세트에는 다수의 BS들이 있을 때, MS는 액티브 세트내의 BS들과 "소프트 핸드오버" 상태에 있다. 이 모드에서 업링크 전송은 액티브 세트내의 모든 BS들에 의해 수신되고, 액티브 세트 내의 모든 BS들은 실질적으로 동일한 다운링크 정보를 MS로 전송한다(전형적으로 데이터 및 대부분의 제어 정보는 동일할 것이나, 전력 제어 명령은 다를 수 있다). 이 "소프트 핸드오버" 접근법의 단점은 업링크 및 다운링크 전송 전력이 각각 개개의 무선 링크에 대해 최적화될 수 없다는 것이며, 이는, 업링크에서는 단지 한 세트의 전력 제어 명령만이 전송되는 반면, 다운링크를 통해 서로 다른 BS들로부터 전송된 전력 제어 명령들은 업링크 전송 전력에 대한 요구와 상충되기 때문이다.
- <5> 통상의 소프트 핸드오버 절차는 지속적인 접속이 유지되어야만 하는 음성 링크와 같은 실시간 서비스에 대해 특히 적합하다. 그러나, 패킷 데이터 링크의 경우, 무선 링크 및 트래픽 상태의 동적 변경을 허용하기 위해 각각의 데이터 패킷을 MS에 전송하기 위한 최적의 BS를 선택하는 것이 유리하다. 이와 같은 가능성들은 UMTS HSDPA 시스템의 경우에 상상해 볼 수 있다. 후속된 데이터 전송을 위해 BS를 선택하는 과정은 사이트 선택(site selection)이라 알려져 있으며, 통상, 무선 채널 품질의 측정치 및/또는 시스템 부하를 고려하여 이루어질 것이다. 이러한 선택은 MS, BS, 또는 이들의 조합에 의해 이루어질 수 있다. 제류중이며 미공개된 영국특허출원 제0104610.1호(출원인 참조번호 PHGB 010027)는, 이와 같은 사이트 선택 메커니즘이 어떻게 구현되는지를 상세히 개시하고 있다.
- <6> 제안된 HSDPA 실시예들은 각각의 데이터 패킷의 올바른 전달을 보장하기 위해 ARQ(Automatic Repeat reQuest)를 이용하는데, 이는 (다중 재전송에 기인한) 열악한 채널 상태하에서는 감소된 시스템의 처리량(throughput)보다는 정확한 데이터 전송이 더 중요한 것으로 여겨지기 때문이다. 한 제안된 HSDPA 방법은 n-채널 정지-대기(stop-and-wait) ARQ를 채용한다. 이와 같은 방법에 따르면, n개까지의 패킷들이 명확하게(positively) 확인을 통지받기 전까지 전송될 수도 있다. 이것은, 하나의 패킷이 올바르게 수신되지 않는다면, 에러와 함께 수신된 패킷의 재전송과 동시에 추가 패킷들이 다른 채널들상에 지속적으로 전송될 수도 있다는 점에서 종래의 정지-대기 ARQ 방법보다 처리량을 증가시키며 이점을 가진다.
- <7> 그러나, BS들간에 통신되어야만 하는 상태 정보(status information)의 양을 최소화(이것은 일반적으로 바람직한 것으로 간주됨)할 필요가 있다면, 사이트 선택에 응답하여 한 BS로부터 다른 BS로의 다운링크 패킷 채널의 이전(transfer)은, 패킷이 올바르게 수신되고 확인통지된 후이고 또한 재전송 대기중이 아닐 때에만 발생할 수 있다. 이것은, 한 패킷에 관련된 재전송이 원래-전송된 패킷과 동일하지는 않으나 추가적인 리던던트 정보(redundant information)를 포함하는 점증적 리던던시(incremental redundancy)를 이용한 ARQ의 경우에 특히 관련있다. 만일 이와 같은 방법이 이용되고 있다면, 명확하게 확인통지되지 않았던 패킷의 전송이 또 다른 BS에 전송될 경우 BS들간에 상당한 추가적인 상태 정보가 전송될 필요가 있을 것이다.
- <8> 한 제안된 n-채널 ARQ 방법에서, 특정 MS에 대한 모든 패킷들은, 그 MS로의 패킷들의 전송이 또 다른 BS로 전환되는 시점까지 특정 BS로부터 전송된다. 고속 다운링크 패킷 전송을 요구하는 많은 수의 MS들을 갖는 네트워크에서, 하나의 BS로부터 다른 BS로 n-채널 전송의 전체 상태를 이전하라는 요구는, 네트워크에서의 스케줄링 어려움과 과도한 시그널링 트래픽을 초래할 수 있다.

발명의 상세한 설명

<9> 본 발명의 목적은 전술한 문제점들을 해결하는 것이다.

<10> 본 발명의 제1 특징에 따르면 2차국에 일련의 데이터 패킷들을 전송하기 위한 수단을 갖는 1차국을 포함하는 무선 통신 시스템이 제공된다. 여기서, 2차국은 각각의 패킷이 올바르게 수신되는지를 판정하기 위한 수단과, 이 판정을 상기 1차국으로 시그널링하기 위한 수단을 포함하며, 상기 1차국은, 상기 2차국이 올바르게 수신하지 못한 데이터 패킷에 대한 상기 2차국의 패킷 디코딩을 보조하기 위해 상기 데이터 패킷에 관한 에러 정정 정보를 전송하기 위한 수단과, 복수의 논리 채널들을 통해 일련의 데이터 패킷들을 전송하여 적어도 하나의 채널상에서 데이터 패킷의 지속적 전송을 가능하게 하는 한편 또 다른 채널 상에서는 에러 정정 정보가 전송되도록 하기 위한 수단과, 적어도 2개의 논리 채널의 전송을 또 다른 1차국으로 이전하기(transferring) 위한 핸드오버 수단을 포함한다. 여기서, 핸드오버 수단은, 다른 논리 채널들의 상태와는 관계없이 해당 논리 채널상에서 가장 최근에 전송된 패킷의 성공적 수신에 대한 확인통지를 수신한 것에 응답하여 적어도 2개의 논리 채널들의 각각을 또 다른 1차국으로 개별적으로 이전하기 위한 수단을 포함한다.

<11> 데이터 채널들이 한번에 하나씩 이전될 수 있도록 함으로써, 에러 정정 정보를 전송시키는 과정 중에 있는 논리 채널을 이전하기 위해 요구되는 별도의 시그널링이 필요없게 되어 시스템 성능이 개선된다. 에러 정정 정보는 데이터 패킷의 재전송 또는 점증적 리던던시 방식의 이용을 포함한다. 논리 채널들이 모두 동일한 1차국에 이전될 필요는 없다.

<12> 본 발명의 제2 특징에 따르면, 일련의 데이터 패킷을 2차국에 전송하기 위한 수단과, 2차국에 의해 전송된 신호들로부터 각각의 패킷이 올바르게 수신되었는지의 여부를 판정하기 위한 수단과, 상기 2차국이 올바르게 수신하지 못한 데이터 패킷에 대한 상기 2차국의 패킷 디코딩을 보조하기 위해 상기 데이터 패킷에 관한 에러 정정 정보를 전송하기 위한 수단과, 복수의 논리 채널들을 통해 일련의 데이터 패킷들을 전송하여 적어도 하나의 채널상에서 데이터 패킷들의 지속적 전송을 가능하게 하는 한편 또 다른 채널 상에서는 에러 정정 정보가 전송되도록 하기 위한 수단과, 적어도 2개의 논리 채널을 또 다른 1차국으로 이전하기 위한 핸드오버 수단을 포함하는 1차국이 제공된다. 여기서, 핸드오버 수단은, 다른 논리 채널들의 상태와는 관계없이 해당 논리 채널상에서 가장 최근에 전송된 패킷의 성공적 수신에 대한 확인통지를 수신한 것에 응답하여 적어도 2개의 논리 채널들의 각각을 또 다른 1차국으로 개별적으로 이전하기 위한 수단을 포함한다.

<13> 본 발명의 제3 특징에 따르면, 1차국으로부터 일련의 데이터 패킷들을 수신하기 위한 수단과, 각각의 패킷이 올바르게 수신되는지를 판정하기 위한 수단과, 이 판정을 상기 1차국으로 시그널링하기 위한 수단과, 2차국의 패킷 디코딩을 보조하기 위해 2차국이 올바르게 수신하지 못한 데이터 패킷에 관한 에러 정정 정보를 1차국으로부터 수신하기 위한 수단과, 복수의 논리 채널들을 통해 일련의 데이터 패킷들을 수신하여 적어도 하나의 채널상에서 데이터 패킷들의 지속적 수신을 가능하게 하는 한편 또 다른 채널 상에서는 에러 정정 정보가 전송되도록 하기 위한 수단과, 또 다른 1차국으로부터의 적어도 2개의 논리 채널의 수신을 개시하기 위한 핸드오버 수단을 포함하는 2차국이 제공된다. 여기서, 적어도 2개의 채널들 각각은, 다른 논리 채널들의 상태와는 관계없이 각각의 논리 채널상에서 가장 최근에 전송된 패킷의 성공적 수신에 대한 2차국으로부터의 확인통지에 응답하여 1차국으로부터 또 다른 1차국으로 이전된다.

<14> 본 발명의 제4 특징에 따르면, 일련의 데이터 패킷들을 2차국으로 전송하기 위해 구성된 1차국을 포함하는 무선 통신 시스템을 동작하는 방법이 제공된다. 이 방법은 2차국이 각각의 패킷이 올바르게 수신되었는지의 여부를 판정하여 이 판정을 1차국에 시그널링하는 단계와, 1차국이 2차국의 패킷 디코딩을 보조하기 위해 2차국이 올바르게 수신하지 못한 데이터 패킷에 관한 에러 정정 정보를 전송하는 단계와, 복수의 논리 채널들을 통해 일련의 데이터 패킷들을 전송하여 적어도 하나의 채널상에서 데이터 패킷의 지속적 전송을 가능하게 하는 한편 또 다른 채널 상에서는 에러 정정 정보가 전송되도록 하는 단계와, 적어도 2개의 논리 채널들을 또 다른 1차국에 이전할 수 있게 되는 단계를 포함한다. 여기서, 적어도 2개의 채널들 각각은, 다른 논리 채널들의 상태와는 관계없이 해당 논리 채널상에서 가장 최근에 전송된 패킷의 성공적 수신에 대한 확인통지를 수신한 것에 응답하여 또 다른 1차국으로 개별적으로 이전될 수 있다.

<15> 본 발명은, 채널별로 하나의 BS로부터 또 다른 BS로의 n-채널 데이터 전송의 이전을 가능하게 하는 것은 시스템의 동작을 개선시킨다는 종래 기술에는 없던 인식에 기초하고 있다. 본 발명의 실시예들이 첨부된 도면들을 참조하여 예로서 기술될 것이다.

실시예

<21> 도 1을 참조하면, 무선 통신 시스템은 1차국(BS, 100)과 복수의 2차국(MS, 110)을 포함한다. BS(100)는 마이크

로컨트롤러(μC , 102)와, 안테나 수단(106)에 접속된 트랜시버 수단(transceiver means; Tx/Rx, 104)과, 전송 전력 레벨을 변경하기 위한 전력 제어 수단(PC, 107)과, PSTN 또는 다른 적절한 네트워크로의 접속을 위한 접속 수단(108)을 포함한다. 각각의 MS(110)는 마이크로컨트롤러(μC , 112)와, 안테나 수단(116)에 접속된 트랜시버 수단(Tx/Rx, 114)과, 전송 전력 레벨을 변경하기 위한 전력 제어 수단(PC, 118)을 포함한다. BS(100)로부터 MS(110)로의 통신은 다운링크 채널(122) 상에서 발생하는 반면, MS(110)로부터 BS(100)로의 통신은 업링크 채널(124) 상에서 발생한다.

- <22> HSDPA 시스템에서 동작하는 MS(110)가 도 2에 도시되어 있다. MS(110)는 3개의 각각의 BS(100a, 100b, 100c)와 3개의 양방향 통신 채널(226a, 226b, 226c)을 가지며, 각 채널은 업링크와 다운링크 채널을 포함한다. 임의의 주어진 시간에서 MS(110)는 BS들(100a, 100b, 100c)중 하나로부터 각각의 다운링크 채널(226a, 226b, 226c) 상에서 데이터 패킷들을 수신한다. 사이트 선택은, MS(110)가 후속된 데이터 패킷들을 전송하고자 하는 BS들(100a, 100b, 100c)중에서 선택함으로써 가능하게된다. 이와 같은 시스템의 동작은, 계류중이며 미공개인 영국 특허출원 제0111407.3호(출원인 참조번호 PHGB10069)호에 개시된 바와 같이, 사이트 선택과 ARQ 메시지들을 하나의 코드 워드로 결합함으로써 개선될 수 있다. 이와 같은 시스템의 동작은, 패킷 단위로 최적의 BS를 선택하게 하는 계류중이며 미공개인 영국특허출원 제 0103716.7호(출원인 참조 번호 PHGB010022)에서 개시하고 있는 바와 같이, 각각의 BS(100a, 100b, 100c)와의 병렬 전력 제어 루프를 동작하는 MS(110)에 의해 더욱 개선된다.
- <23> 공지된 방식으로 동작하는 4-채널 ARQ 방식의 한 예가 도 3에 도시되어 있다. Pn(여기서 n은 시퀀스 번호)으로 식별되는 데이터 패킷들(302)은 BS(100)로부터 MS(110)로의 다운링크 채널(DL; 122) 상에서 순서대로 전송된다. 각각의 패킷(302)은 제1 패킷에서 시작하여 차례로 논리 채널(CH)에 할당된다. 따라서, 패킷 P1은 채널 1에, 패킷 P2는 채널 2에 할당되는 식으로 할당된다. ARQ는 각각의 채널에 대해 독립되어 수행된다.
- <24> 도시된 시나리오에서, 제1 데이터 패킷 P1은 제1 논리 채널을 통해 전송되고 MS(110)에 의해 올바르게 수신된다. MS(110)는 업링크 채널(124) 상에서 확인통지(A1, 304)를 전송한다. 따라서, 다음 전송을 위해 채널 1이 스케줄링되면, 전송을 기다리는 다음 패킷 P5가 선택되어 MS(110)로 전송된다. 유사하게, 제2 데이터 패킷 P2는 제2 논리 채널을 통해 전송된다. 그러나, 이 패킷은 MS(110)에 의해 올바르게 수신되지 않고, 접수 실패통지(negative acknowledgement; N2, 306)가 발생된다. 따라서, 다음 전송을 위해 채널 2가 스케줄링되면, 패킷 P2가 다시 한번 전송된다. 이번에는 이 패킷이 올바르게 수신되고, 업링크 채널(124) 상에서 확인통지(304)가 발생되어 추가 패킷들(302)을 전송할 수 있도록 채널 2가 자유롭게 된다.
- <25> 이와 같은 방법은 단일 채널 ARQ 방법에 비해 개선된 처리량을 제공할 수 있는데, 이는 하나의 데이터 패킷(302)의 올바르게 못한 수신이 추가 데이터들이 다른 논리 채널들 상에서 전송되는 것을 방해하지 않기 때문이다. 그러나, 이 방법은 데이터 패킷들을 전송하는 BS(100)가 무선 채널 상태에 따라 당장이라도 변경될 수 있는 시스템에서는 문제를 발생시킬 수 있다. 특히, 아직 성공적으로 전송되지 않은 패킷(302)들 및 그들 각각의 논리 채널들에 관련된 정보와 함께, 가장 최근에 성공적으로 전송된 패킷(302) 양쪽 모두를 표시하기 위해서는, BS들(100a, 100b, 100c)간에는 상당한 시그널링이 필요할 것이다. 이것은, 각각의 실패된 패킷(302)의 전송의 정확한 상태가 시그널링될 필요가 있는 경우에 해당하는, 점증적 리던던시가 이용되는 경우에 특히 해당된다. 만일 시스템이 소수의 패킷마다 전송 BS들(100a, 100b, 100c)을 변경할 수 있다면(이것은 바람직한 옵션으로서 간주되고 있다), 시그널링 트래픽은 데이터 트래픽의 상당한 부분을 포함할 수도 있다.
- <26> 이 문제는 각각의 논리 채널이 서로 다른 BS(100a, 100b, 100c)에 의해 전송될 수 있도록 함으로써 본 발명에 따라 이루어진 시스템에 의해 해결된다. 도 4는 4개의 논리 채널 및 3개의 BS들(100a, 100b, 100c)을 갖는 이와 같은 방법의 동작을 도시하고 있다. 제1 BS(100a)는 제1 다운링크 채널(DL1)을 통해 논리 채널 1 및 논리 채널 2를 전송한다. 제2 BS(100b)는 제2 다운링크 채널(DL2)을 통해 논리 채널 3을 전송하고 제3 BS(100c)는 제3 다운링크 채널(DL3)을 통해 논리 채널 4를 전송한다. 이와 같은 시스템에서, 하나의 BS(100a, 100b, 100c)로부터 다른 BS로의 패킷 전송의 이전은 단순화되는데, 이는 각각의 논리 채널이 가장 최근에 전송된 패킷(302)이 올바르게 수신된 때에 이전될 수 있기 때문이다. 즉, 이것은 한 논리 채널상에서 제1 BS(100a)로부터 MS(110)로 전송되는 재전송이, 다른 논리 채널들상에서 제2 BS(100b)로부터 동일한 MS(110)로의 새로운 패킷들의 전송과 병렬로 이루어지는 결과를 초래한다.
- <27> 나아가, 본 발명에 따른 시스템에서, 가장 최근의 패킷이 성공적으로 확인통지된 때조차 모든 채널들을 새로운 BS로 이전할 필요는 없다. 그러나, 서로 다른 채널들은, 하나의 BS가 특정 MS로의 전체 패킷 트래픽을 감당하기에 충분하지 않은 용량을 가질 수도 있는 그러한 다른 BS들에서 가용 용량을 이용하기 위해 서로 다른 BS들로부터 지속적으로 전송될 필요가 있다. 사이트 선택 프로세스는, 전체 논리 채널들의 세트 대신에 하나 이상의

논리 채널들로 된 그룹에 대해 동작하도록 만들어질 수도 있다.

- <28> 도 4에 도시된 바와 같이, 논리 채널들은 MS(110)에서 단일의 데이터 스트림으로서 효율적으로 나타나도록 시간-멀티플렉싱(time-multiplexed)된다. 그러나, 예를 들어 주파수-멀티플렉싱, 코드-멀티플렉싱, 및 스페이스-멀티플렉싱과 같은 다른 병렬 전송 방법들이 대안으로서 (상기 멀티플렉싱 간의 결합 또는 시간-멀티플렉싱과 결합하여) 사용될 수도 있다. 스페이스-멀티플렉싱의 경우, 다른 ARQ 채널들마다 다른 로브(lobe)를 이용하여 MS(110)에서 지향성 안테나 패턴이 사용될 수도 있다.
- <29> 한 실시예에서, 특정 BS(100a, 100b, 100c)들에 대한 패킷의 맵핑은 서로 다른 BS들의 트래픽 로딩(traffic loading)에 따라 실행될 수 있다. 각각의 BS로부터의 패킷 레이트는 그들의 여분 용량에 비례할 것이다.
- <30> 또 다른 실시예에서, 특정 BS들에 대한 패킷들의 맵핑은 서로 다른 패킷들의 다른 QoS(Quality of Service) 요구에 따라 실행될 수도 있다. 서로 다른 QoS 요구는 MS(110) 상에서 실행중인 서로 다른 애플리케이션들로 향하는 패킷들 때문이다. 대안으로서, 서로 다른 QoS 요구를 갖는 패킷들이, 예를 들어 중요도에 따라 서로 다른 비트 클래스들을 출력하는 음성 코덱의 경우에서와 같이 동일한 애플리케이션으로부터 발생할 수도 있다. 낮은 BER(Bit Error Rate) 또는 낮은 전송 지연을 요구하는 데이터 패킷들은 가장 짧은 패킷 큐 및/또는 최상 품질 링크를 갖는 BS들로부터 MS(110)으로 전송될 것이다.
- <31> 본 발명은 네트워크에서 패킷 스케줄링에 대해, 그리고 트래픽을 가용 에어 인터페이스 자원들(air interface resources)에 매핑하는데 있어 보다 큰 융통성을 제공한다.
- <32> 상술한 실시예들이 UMTS FDD 시스템의 관점에서 기술되었지만, 본 발명은 이와 같은 시스템으로만 한정되는 것은 아니고 TDD(Time Division Duplex)를 포함한 광범위한 시스템들에 적용될 수도 있다.
- <33> 사실상 BS 선택이 다시 수행되기 이전에 전송된 데이터량은, 전송 MS를 변경하는 시스템 오버헤드에 따라, 한 개 이상의 패킷일 수 있다.
- <34> 상술한 실시예들에서, 각각의 데이터 패킷은 한 번에 하나의 BS로부터 MS(110)으로 전송된다. 그러나, 어떤 환경에서는 동일한 패킷이 하나 이상의 BS에 동시에 전송되는 것이 유익할 것이다. 예를 들어, 3개의 BS들(100a, 100b, 100c)이 폐쇄 루프 전력 제어하에 있는 경우, BS들 중 2개가 비슷한 전송 전력으로 동등하게 양호한 링크 품질을 제공한다면, (소프트 핸드오버 동안의 전송과 유사한 방식으로) 데이터 패킷 또는 패킷들은 이들 두 기지국으로부터 동시에 전송될 것이다.
- <35> 상술한 실시예들의 한 변형예에서, 1차국과 2차국 사이에는 하나 이상의 데이터 링크가 있을 수 있다. 예를 들어, 본 발명은 동일한 스테이션 쌍 사이에 있는 서로 다른 주파수의 무선 링크들간의 논리 채널 이전(transfer of logical channels)에도 적용될 수 있다.
- <36> 상술한 설명은 본 발명에 관련된 다양한 역할을 수행하는 BS(100a, 100b, 100c)에도 관련된다. 사실상 이들 태스크들은, 예를 들어, MS(100)에 직접 인터페이스하는 고정된 인프라스트럭처(infrastructure)의 일부인 노드 B, 또는 RNC(Radio Network Controller)에서 고 레벨에 있는, 고정된 인프라스트럭처의 다양한 부분들에 책임이 있다. 본 명세서에서, "기지국(base station)" 또는 "1차국(primary station)"이라는 용어는 본 발명의 한 실시예에 포함된 네트워크 고정 인프라스트럭처의 일부를 포함하는 것으로 이해되어야 한다.
- <37> 본 명세서에 기재된 내용으로부터, 다른 수정들이 가능하다는 것은 당업자에게 명백하다. 이와 같은 수정들은, 무선 통신 시스템의 설계, 제작 및 이용에 공지된 다른 특징들 및 그 구성요소중 일부를 본 명세서에서 설명된 특징에 추가하여 또는 대체하는 것을 포함할 수 있다.
- <38> 본 발명의 명세서 및 특허청구범위에서 구성요소 앞에 있는 단어 "a" 또는 "an"은 이와 같은 구성요소가 복수개 있는 것을 배제하지는 않는다. 또한, 단어 "포함하는"은 열거된 것 이외의 다른 구성요소나 단계의 존재를 배제하지 않는다.

도면의 간단한 설명

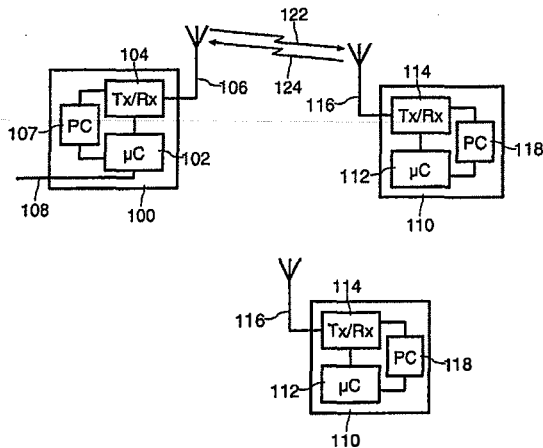
- <16> 도 1은 무선 통신 시스템의 개략적 블록도.
- <17> 도 2는 2차국이 복수의 1차국들 중 어느 것이 데이터를 전송할지를 선택할 수 있는 HSDPA 시스템의 개략적 블록도.
- <18> 도 3은 HSDPA에 대한 공지된 n-채널 ARQ 방법의 동작을 도시하는 도면.

<19> 도 4는 본 발명에 따른 n-채널 ARQ의 동작을 도시하는 도면.

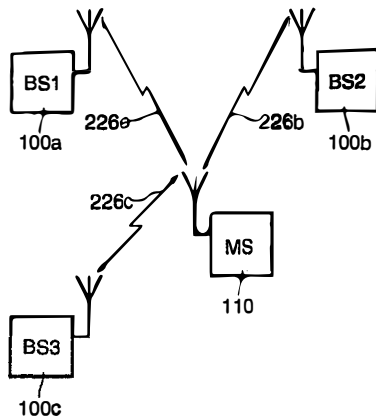
<20> 도면들에서 동일한 부분들에 대해서는 동일한 참조 번호가 사용되었다.

도면

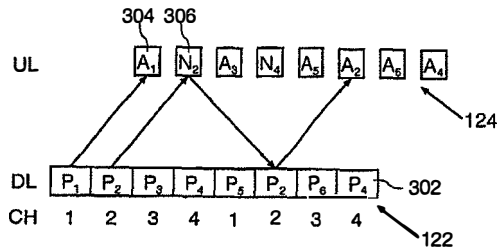
도면1



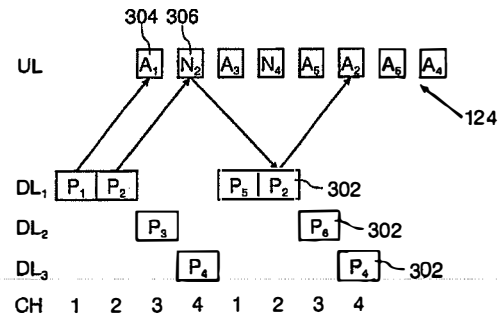
도면2



도면3



도면4



Electronic Acknowledgement Receipt

EFS ID:	11873065
Application Number:	13308950
International Application Number:	
Confirmation Number:	5805
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Goudong Zhang
Customer Number:	24374
Filer:	John Porrazza/Carey Kulp
Filer Authorized By:	John Porrazza
Attorney Docket Number:	I-2-0674US04
Receipt Date:	19-JAN-2012
Filing Date:	01-DEC-2011
Time Stamp:	14:01:48
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	IDS.pdf	53778 <small>21ecdc58644a857ecfd292d21720cc642272533b</small>	no	3

Warnings:

Information:

2	Information Disclosure Statement (IDS) Form (SB08)	pto1449.pdf	62334 c95cc7671a547820f855ee6976fa146caa7127	no	5
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	KR20020095231.pdf	557299 3c2b04e1fca44ac2cfc07ea08183d263be02e9	no	11
Warnings:					
Information:					
4	Non Patent Literature	KR_OA.pdf	101745 a55cc6c50687c6fa9000affe58b25432f9077076a	no	1
Warnings:					
Information:					
5	Non Patent Literature	25_331_V3_16_0.pdf	4776409 e0b21b1eeb33262fb91957f4c42088b23ae92b	no	875
Warnings:					
Information:					
6	Non Patent Literature	25_331_V3_20_0.pdf	4936513 41fa0cb34c2aee585d3986eb79eaa8d1cced81f4	no	879
Warnings:					
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7	Non Patent Literature	25_331_v4_11_0.pdf	3464035 55e0e8eb3e868f2b94c47e8a167457d88b985c22	no	717
Warnings:					
Information:					
8	Non Patent Literature	25_331_V4_15_0.pdf	5249572 6fe6c1b17309264a2d772ba0d797fda2749532d1	no	953
Warnings:					
Information:					
9	Non Patent Literature	25_331_V5_6_0.pdf	5161728 42eee56137098c7b2c6e3375a2f5813e3b04f21	no	1006
Warnings:					
Information:					
10	Non Patent Literature	25_331_V5_10_0.pdf	5687231 b04e4be3277d6705aaa1b64e642e432d8cb8588a	no	1047

Warnings:					
Information:					
11	Non Patent Literature	25_331_V6_3_0.pdf	5703802	no	1048
			e3cac7aff97aa0e223243eb1821a511e02733d1f		
Warnings:					
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			Total Files Size (in bytes):	35754446	
<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

In the PATENT APPLICATION of:

Zhang et al.

Application No.: 13/308,950

Confirmation No.: 5805

Filed: December 1, 2011

For: SUPPORTING
ENHANCED UPLINK TRANSMISSION
DURING SOFT HANDOVER

Group: 2473

Examiner: Not Yet Known

Our File: I-2-0674US04

Date: January 19, 2012

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Further to Applicants' Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicants wish to bring to the Examiner's attention the material cited on the enclosed Form PTO-1449.

The listed references include references previously cited in this application. Newly cited documents are indicated by an asterisk (*) on the enclosed Form PTO-1449. Copies of the newly cited documents are enclosed.

This Application is a continuation of Non-Provisional Application No. 11/434,330, which was filed on May 15, 2006, which is a continuation of Non-

Provisional Application No. 10/962,720, filed on October 12, 2004, which issued on May 16, 2006 as U.S. Patent No. 7,046,648, which claims priority from Provisional Application No. 60/578,674, which was filed on June 10, 2004, Provisional Application No. 60/520,692, which was filed on November 17, 2003, Provisional Application No. 60/519,990, which was filed on November 14, 2003, and Provisional Application No. 60/517,656, which was filed on November 5, 2003.

Pursuant to M.P.E.P § 609.04(a), since at least a portion of at least one item of information included in the Form PTO-1449 is not available in the English language, enclosed is an English translation of a communication from a foreign patent office, dated November 29, 2011.

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the Form PTO-1449 indicating his consideration of the cited materials.

Respectfully submitted,

Zhang et al.

By__/Melissa D. Doogan/_____
Melissa D. Doogan
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MDD/pck
Enclosures (10)



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/308,950	12/01/2011	Goudong Zhang	I-2-0674US04

CONFIRMATION NO. 5805

24374
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30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

PUBLICATION NOTICE



OC00000053419061

Title:SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER

Publication No.US-2012-0076095-A1

Publication Date:03/29/2012

NOTICE OF PUBLICATION OF APPLICATION

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

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

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

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

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

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

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674US04	SERIAL NO. 13/308,950
	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2473

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		2004/0219920	11/2004	Love et al.			
		2004/0228313	11/2004	Cheng et al.			

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

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674US04	SERIAL NO. 13/308,950
	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2473

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		2005/0041694	02/2005	Liu			
		2005/0047354	03/2005	Zeira et al.			
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		2005/0083888	04/2005	Smee et al.			
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EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
		0 977 393	02/2000	EP ⁵				
		2 353 439	02/2001	GB				
		2001-128209	05/2001	JP			X**	
		2002-0095231	12/2002	KR			X**	
		2003112283	12/2005	RU			X**	
		2005110767	10/2006	RU			X**	
		00/074263	12/2000	WO ³				
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		03/053087	06/2003	WO				
		03/067953	08/2003	WO				
		03/088545	10/2003	WO				

EXAMINER	DATE CONSIDERED
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	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2473

OTHER DOCUMENTS		
EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.2 (October 2003).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD (Release 6)," 3GPP TR 25.896 V6.0.0 (March 2004).
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 1999)," 3GPP TS 25.212 V3.11.0 (September 2002).
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		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 4)," 3GPP TS 25.212 V4.6.0 (September 2002).
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EXAMINER	DATE CONSIDERED
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	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2473

EXAMINER INITIAL	DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.9.0 (June 2004).
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	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Radio Resource Control (RRC) protocol specification (Release 1999)," 3GPP TS 25.331 V3.16.0 (September 2003).
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	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Radio Resource Control (RRC); Protocol Specification (Release 5)," 3GPP TS 25.331 V5.6.0 (September 2003).
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*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; UTRAN Iub interface NBAP signaling (Release 1999)," 3GPP TS 25.433 V3.14.2 (September 2004).

EXAMINER	DATE CONSIDERED
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	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2473

EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; UTRAN lub interface NBAP signaling (Release 1999)," 3GPP TS 25.433 V3.14.0 (September 2003).
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	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; UTRAN lub interface NBAP signaling (Release 5)," 3GPP TS 25.433 V5.10.0 (September 2004).
	*	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; UTRAN lub interface NBAP signaling (Release 6)," 3GPP TS 25.433 V6.3.0 (September 2004).
		3GPP, "Third Generation Partnership Project; Technical Specification Group Radio Access Network; FDD Enhanced Uplink; Overall Description; Stage 2 (Release 6)," 3GPP TS 25.309 V6.0.0 (September 2004).
		3GPP2 C.20003-C, "Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Release C, August 2004.
		3GPP2 C.S0004-C, "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.
		3GPP2 C.S0005-C, "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision c, July 23, 2004.
		GPP2 C.S0002-C, "Physical Layer Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision C, July 23, 2004.

X** Abstract only

¹ Corresponds to RU2004104196; ² Corresponds to RU 2006130462; ³ Corresponds to RU 2001135846; ⁴ Corresponds to WO 03/067953; ⁵ Corresponds to WO 98/47253.

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Electronic Acknowledgement Receipt

EFS ID:	12689501
Application Number:	13308950
International Application Number:	
Confirmation Number:	5805
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Goudong Zhang
Customer Number:	24374
Filer:	John Porrazza/Carey Kulp
Filer Authorized By:	John Porrazza
Attorney Docket Number:	I-2-0674US04
Receipt Date:	02-MAY-2012
Filing Date:	01-DEC-2011
Time Stamp:	17:52:16
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	ids.pdf	53033 adfa2bbb99f1b9513028a3023cc4a0e46104e885	no	2

Warnings:

Information:

2	Information Disclosure Statement (IDS) Form (SB08)	pto1449.pdf	62467 f78d05541f7d5280a756b961bc5b7f289af7b11c	no	5
Warnings:					
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3	Non Patent Literature	25_433_V3_14_0.pdf	1947756 a2d0dab4af56a1335bf05ef750c6622b5c66bf68	no	448
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Warnings:					
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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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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the PATENT APPLICATION of:

Zhang et al.

Application No.: 13/308,950

Confirmation No.: 5805

Filed: December 1, 2011

For: SUPPORTING
ENHANCED UPLINK TRANSMISSION
DURING SOFT HANDOVER

Group: 2473

Examiner: Kwang Bin Yao

Our File: I-2-0674US04

Date: May 2, 2012

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Further to Applicants' Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicants wish to bring to the Examiner's attention the material cited on the enclosed Form PTO-1449.

The listed references include references previously cited in this application. Newly cited documents are indicated by an asterisk (*) on the enclosed Form PTO-1449. Copies of the newly cited documents are enclosed.

This Application is a continuation of Non-Provisional Application No. 11/434,330, which was filed on May 15, 2006, which issued on March 6, 2012 as US

Patent 8,130,720, which is a continuation of Non-Provisional Application No. 10/962,720, filed on October 12, 2004, which issued on May 16, 2006 as U.S. Patent No. 7,046,648, which claims priority from Provisional Application No. 60/578,674, which was filed on June 10, 2004, Provisional Application No. 60/520,692, which was filed on November 17, 2003, Provisional Application No. 60/519,990, which was filed on November 14, 2003, and Provisional Application No. 60/517,656, which was filed on November 5, 2003.

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the Form PTO-1449 indicating his consideration of the cited materials.

Respectfully submitted,

Zhang et al.

By___/Thomas A. Mattioli/_____
Thomas A. Mattioli
Registration No. 56,773
(215) 568-6400

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United Plaza, Suite 1600
30 South 17th Street
Philadelphia, PA 19103

TAM/pck
Enclosures (8)

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0674US04	SERIAL NO. 13/308,950
	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2466

U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,678,249	01/2004	Toskala et al. ⁴			
		6,778,830	08/2004	Oizumi et al.			
		6,892,071	05/2005	Park et al. ⁶			
		7,013,143	03/2006	Love et al.			
		7,346,035	03/2008	Lee et al.			
		7,414,989	08/2002	Kuchibhotla et al.			
		2002/0095635	07/2002	Wager et al.			
		2002/0191544	12/2002	Cheng et al.			
		2003/0007480	01/2003	Kim et al.			
		2003/0043786	03/2003	Kall et al.			
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		2004/0219920	11/2004	Love et al.			
		2004/0228313	11/2004	Cheng et al.			

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	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2466

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		2005/0041694	02/2005	Liu			
		2005/0047354	03/2005	Zeira et al.			
		2005/0048920	03/2005	Liu			
		2005/0083888	04/2005	Smee et al.			
		2007/0047501	03/2007	Usuda et al. ²			

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EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
		0 977 393	02/2000	EP ⁵				
		2 353 439	02/2001	GB				
		2001-128209	05/2001	JP			X**	
		2002-0095231	12/2002	KR			X**	
		2003112283	12/2005	RU			X**	
		2005110767	10/2006	RU			X**	
		00/074263	12/2000	WO ³				
	*	00/35226	06/2000	WO				
		02/01893	01/2002	WO				
		03/003643	01/2003	WO				
		03/026231	03/2003	WO				
		03/053087	06/2003	WO				
		03/067953	08/2003	WO				
		03/088545	10/2003	WO				

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	APPLICANT Zhang et al.	
	FILING DATE December 1, 2011	GROUP 2466

OTHER DOCUMENTS		
EXAMINER INITIAL		DESCRIPTION (Including Author, Title, Date, Pertinent Pages, Etc.)
		3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Feasibility Study for Enhanced Uplink for UTRA FDD; (Release 6)," 3GPP TR 25.896 V1.0.2 (October 2003).
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	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 4)," 3GPP TS 25.321 V4.10.0 (June 2004).
	3GPP, "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Medium Access Control (MAC) protocol specification (Release 5)," 3GPP TS 25.321 V5.6.0 (September 2003).
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		3GPP, "Third Generation Partnership Project; Technical Specification Group Radio Access Network; FDD Enhanced Uplink; Overall Description; Stage 2 (Release 6)," 3GPP TS 25.309 V6.0.0 (September 2004).
		3GPP2 C.20003-C, "Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Release C, August 2004.
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		3GPP2 C.S0005-C, "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems", 3rd Generation Partnership Project 2 "3GPP2", Version 2.0, Revision c, July 23, 2004.
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X** Abstract only

¹ Corresponds to RU2004104196; ² Corresponds to RU 2006130462; ³ Corresponds to RU 2001135846; ⁴ Corresponds to WO 03/067953; ⁵ Corresponds to WO 98/47253; ⁶ Corresponds to US 2002/0045448.

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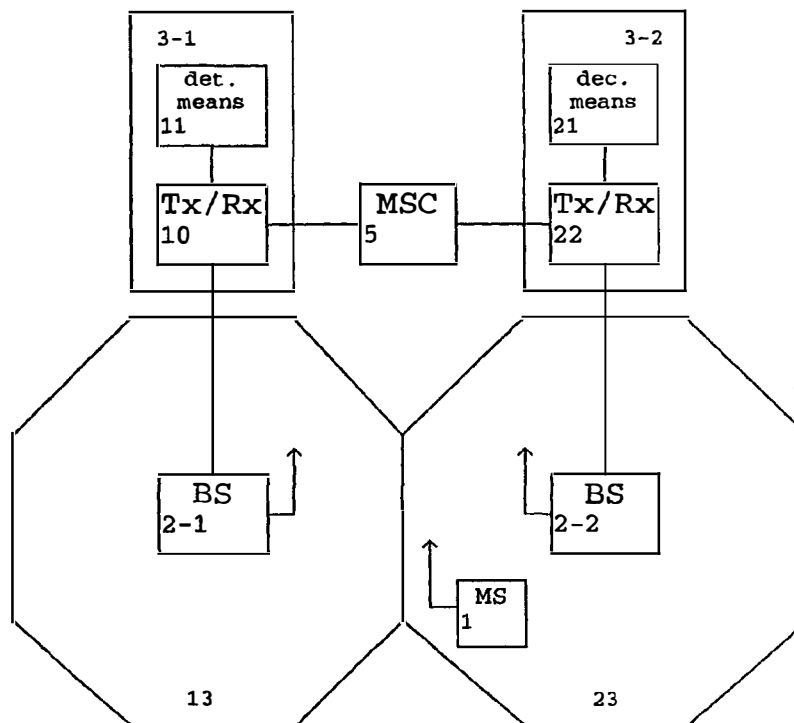
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : H04Q 7/38, 7/22	A1	(11) International Publication Number: WO 00/35226 (43) International Publication Date: 15 June 2000 (15.06.00)
(21) International Application Number: PCT/EP98/07932 (22) International Filing Date: 7 December 1998 (07.12.98) (71) Applicant (for all designated States except US): NOKIA NETWORKS OY [FI/FI]; P.O. Box 300, FIN-00045 Nokia Group (FI). (72) Inventor; and (75) Inventor/Applicant (for US only): LONGONI, Fabio [FI/FI]; Visamäki 5 E 38, FIN-02130 Espoo (FI). (74) Agent: PELLMANN, Hans-Bernd; Tiedtke-Bühling-Kinne, Bavariaring 4, D-80336 München (DE).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: CELL LOAD CONTROL METHOD AND SYSTEM

(57) Abstract

A method and system for performing cell load control in a mobile radio network using diversity connections between base stations is described, wherein the efficiency of the resource management in the radio network is improved by transmitting an external message containing a load information of a cell to a radio network controller not serving this cell. The transmission may be performed in response to a corresponding request transmitted by the radio network controller to another radio network controller which serves the corresponding radio cell. When the radio network controller has received the load information of the cell controlled by the other radio network controller, it may use the load information for deciding on a load status of the radio cell. Thereby, the resource management of radio network is more efficient and the load is maintained balanced among different cells, wherein a possible situation of cell congestion and high interference is avoided. Moreover, the active set management efficiency is improved, resulting in a higher connection quality, since the decision algorithm to change the active set is faster and more efficient. (Fig. 3)



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