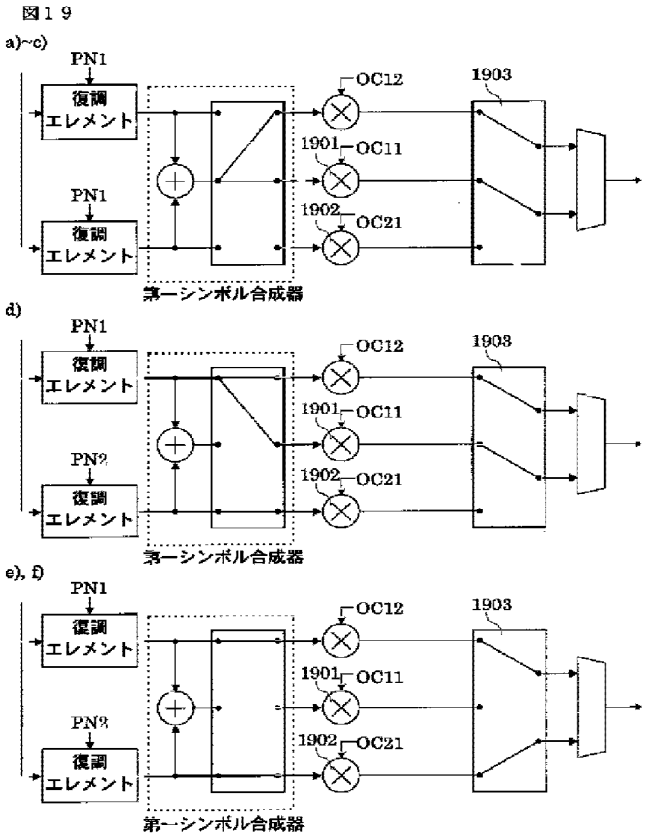
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1903
第一シンボル合成器

Electronic Acknowledgement Receipt

EFS ID:	26533457
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Sandy Yi
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	03-AUG-2016
Filing Date:	29-SEP-2015
Time Stamp:	14:31:43
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$180
RAM confirmation Number	080416INTEFSW14321300
Deposit Account	220493
Authorized User	Sandy Yi

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

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Other Reference-Patent/App/Search documents	05252016_JP_OA_with_partial_translation.PDF	977766 5ae20278fe41c764067e286cde327969a679307c	no	13
Warnings:					
Information:					
2	Other Reference-Patent/App/Search documents	0674KR10_OA.PDF	210861 42516d6ec7bc907ccb3de59fa5387ad6db69a439	no	7
Warnings:					
Information:					
3	Foreign Reference	JP2001008251.PDF	362811 1c5349fbed4a68383abf978fd24d0e231d588bf0	no	8
Warnings:					
Information:					
4	Foreign Reference	WO2002102109.PDF	2680069 744002ac776cf016af6e581dc23a99d63af96209	no	62
Warnings:					
Information:					
5	Foreign Reference	JP2000217139.pdf	1261996 427cfa9d7717a3f21ad7cdbad3404da9f8abd77f	no	21
Warnings:					
Information:					
6	Information Disclosure Statement (IDS) Form (SB08)	SIG_2_0674US06_SB08a.PDF	1035480 0e3ae49dd871b2493b49b6955eac8ed7d446f180	no	4
Warnings:					
Information:					

7	Transmittal Letter	20160803_SIG_2_0674US06_SIDS_transmittal.pdf	61821 c7cbf346ecf42a04ed83a1c00eb42e423e0cedc0	no	3
Warnings:					
Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	30982 26f022f268f9ca0cc4a4dfc43098635ac98eb108	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	6621786		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/869,313	09/29/2015	Guodong Zhang	SIG-2-0674US06	1070

3624 7590 08/11/2016

VOLPE AND KOENIG, P.C.
UNITED PLAZA
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103

EXAMINER	
ROBERTS, BRIAN S	

ART UNIT	PAPER NUMBER
2466	

NOTIFICATION DATE	DELIVERY MODE
08/11/2016	ELECTRONIC

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

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

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

eoffice@volpe-koenig.com

UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
Address : COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
14/869,313	29 September, 2015	ZHANG ET AL.	SIG-2-0674US06

VOLPE AND KOENIG, P.C.
UNITED PLAZA
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103

EXAMINER	
BRIAN ROBERTS	
ART UNIT	PAPER
2466	20160805

DATE MAILED:

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Commissioner for Patents

The IDS filed on 08/03/2016 has been considered.

/BRIAN ROBERTS/
Primary Examiner, Art Unit 2466

PTO-90C (Rev.04-03)

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6628631	B1	2003-09-30	Mazawa et al.	U.S. equivalent for JP2000-217139A
	2	8682325	B1	2014-03-25	Cooper	U.S. equivalent for JP2001-8251A

If you wish to add additional U.S. Patent citation information please click the Add button. Add

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20030171118	A1	2003-09-11	Miya	U.S. equivalent for WO 02/102109A1

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FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2000-217139	JP	A	2000-08-04	Hitachi, Ltd.	U.S. equivalent - US 6628631B1	☒
	2	2001-8251	JP	A	2001-01-12	NEC Corporation	U.S. equivalent - US 8682325B1	☒

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /BSR/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14869313
	Filing Date	2015-09-29
	First Named Inventor	Guodong Zhang
	Art Unit	2466
	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

	3	02/102109	WO	A1	2002-12-19	MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.	U.S. equivalent - US 2003/0171118A1	☒

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

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		

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

EXAMINER SIGNATURE

Examiner Signature	/Brian Roberts/	Date Considered	08/05/2016

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

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

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14869313
	Filing Date	2015-09-29
	First Named Inventor	Guodong Zhang
	Art Unit	2466
	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2016-08-03
Name/Print	Abhik A. Huq	Registration Number	40656

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

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

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PART B - FEE(S) TRANSMITTAL

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

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

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

3624 7590 07/22/2016
VOLPE AND KOENIG, P.C.
UNITED PLAZA
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103

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

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/869,313	09/29/2015	Guodong Zhang	SIG-2-0674US06	1070

TITLE OF INVENTION: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	10/24/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
ROBERTS, BRIAN S	2466	370-331000

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

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

1 Volpe and Koenig, P.C.
2
3

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

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

(A) NAME OF ASSIGNEE: Signal Trust for Wireless Innovation
(B) RESIDENCE: (CITY and STATE OR COUNTRY): Wilmington, DE

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

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

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- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 220493 (enclose an extra copy of this form).

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

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Abhik A. Huq/ Date September 1, 2016

Typed or printed name Abhik A. Huq Registration No. 40,656

IPR2023-01270 Page 448

Electronic Patent Application Fee Transmittal

Application Number:	14869313
Filing Date:	29-Sep-2015
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Filer:	Abhik A. Huq/Karen Schlauch
Attorney Docket Number:	SIG-2-0674US06

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

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

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

Electronic Acknowledgement Receipt

EFS ID:	26814809
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Karen Schlauch
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	01-SEP-2016
Filing Date:	29-SEP-2015
Time Stamp:	15:29:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$960
RAM confirmation Number	090216INTEFSW15301600
Deposit Account	8084
Authorized User	Karen Schlauch
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

37 CFR 1.20 (Post Issuance fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	SIG_2_0674US06_IssueFee_20160901.PDF	1619061 e8761a74058393adb7c83b52d26b0c9cc0c53372	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30851 dc132c729b0ab927595e8bae871da0aa0012c8ad	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1649912		

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

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

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14/869,313
Filing Date	2015-09-29
First Named Inventor	Zhang et al.
Art Unit	2414
Examiner Name	Not Yet Known
Attorney Docket Number	SIG-2-0674US06

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		5,794,149	08/1998	Hoo			
		5,946,320	08/1999	Decker et al.			
		6,434,396	08/2002	Rune			
		6,507,567	01/2003	Willars[22]			
		6,643,813	11/2003	Johansson et al.			
		6,678,249	01/2004	Toskala et al.[4]			
		6,678,523	01/2004	Ghosh et al.[7]			
		6,778,830	08/2004	Oizumi et al.			
		6,892,071	05/2005	Park et al.[6]			
		6,907,245	06/2005	Ohlsson et al.[8]			
		6,915,465	07/2005	Fujiwara et al.			
		6,977,888	12/2005	Frenger et al.			
		7,013,143	03/2006	Love et al.			
		7,046,648	05/2006	Zhang et al.			
		7,054,633	05/2006	Seo et al.[19]			
		7,103,729	09/2006	Altahan et al.			
		7,124,350	10/2006	Chao et al.			
		7,158,504	01/2007	Kadaba et al.[9]			
		7,185,256	02/2007	Miki et al.[10]			
		7,206,598	04/2007	Attar et al.			
		7,269,420	09/2007	Heo et al.			
		7,283,508	10/2007	Choi et al.			
		7,315,741	01/2008	Chun			
		7,317,700	01/2008	Hwang			
		7,346,035	03/2008	Lee et al.			
		7,403,513	07/2008	Lee et al.			
		7,414,989 08/2008	~~08/2002~~	Kuchibhotla et al.			
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		8,023,463	09/2011	Dick et al.			

Change(s) applied to document, /J.E./ 8/4/2016

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.R./

3923984-1

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/869,313	10/04/2016	9462526	SIG-2-0674US06	1070

3624 7590 09/14/2016

VOLPE AND KOENIG, P.C.
UNITED PLAZA
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

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

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

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

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

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

Guodong Zhang, Syosset, NY;
SIGNAL TRUST FOR WIRELESS INNOVATION, Wilmington, DE;
Sung-Hyuk Shin, Northvale, NJ;
Stephen E. Terry, Northport, NY;
James M. Miller, Verona, NJ;
Stephen G. Dick, Nesconset, NY;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	14869313	Filing Date	2016-09-29	Docket Number (if applicable)	SIG-2-0674US06	Art Unit	2466
First Named Inventor	Guodong Zhang			Examiner Name	Brian S. Roberts		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, to any international application that does not comply with the requirements of 35 U.S.C. 371, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV.

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☐ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☒ Other
Petition to Withdraw An Application from Issue After Payment of the Issue Fee

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 220493

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

Signature of Registered U.S. Patent Practitioner			
Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2016-09-26
Name	Abhik A. Huq	Registration Number	40656

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of: Zhang et al.	Our File: SIG-2-0674US06
Application No.: 14/869,313	Date: September 26, 2016
Confirmation No.:1070	
Filed: September 29, 2015	
For: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER	
Group: 2466	
Examiner: Brian S. Roberts	

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB/08a. Copies of the newly cited documents are enclosed.

Pursuant to 37 C.F.R. §1.98(a)(2)(ii), copies of the cited U.S. publications and/or patent documents have not been included.

This Application is a continuation of U.S. Patent Application No. 13/908,242, which was filed June 3, 2013, which is a continuation of U.S. Patent Application No. 13/308,950, filed December 1, 2011, which issued June 4, 2013 as U.S. Patent No. 8,457,072, which is a continuation of U.S. Patent Application No. 11/434,330, filed May 15, 2006, which issued March 6, 2012 as U.S. Patent No. 8,130,720, which is a

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

Applicants would like to bring the following Applications to the Examiner's attention: U.S. Patent Application No. 13/236,133, filed September 19, 2011; U.S. Patent Application No. 10/925,426, filed August 25, 2004, which issued September 20, 2011 as U.S. Patent No. 8,023,463; Provisional Application No. 60/585,174, filed July 2, 2004; Provisional Application No. 60/520,207, filed November 14, 2003; Provisional Application No. 60/508,797, filed October 3, 2003; Provisional Application No. 60/507,554, filed October 1, 2003; and Provisional Application No. 60/497,747, filed August 25, 2003.

Pursuant to 37 C.F.R. § 1.704(d), the undersigned certifies that each new item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application, and that this communication was not received by any individual designated in § 1.56(c) more than thirty (30) days prior to the filing of this Information Disclosure Statement.

Copies of the communications, i.e. an Office Action in corresponding Taiwan Patent Application No.: 104139614 mailed August 25, 2016, and corresponding U.S.

Patent Application No. 15/212,402 mailed September 20, 2016, are submitted herewith.

This Supplemental Information Disclosure Statement is being filed after issue of patent along with Request for Continued Examination Transmittal and Petition to Withdraw an Application from Issue after Payment of the Issue Fee.

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the PTO Form SB/08a indicating consideration of the cited materials.

Respectfully submitted,

Signal Trust for Wireless Innovation

By /Abhik A. Huq/
Abhik A. Huq
Registration No. 40,656

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
Philadelphia, PA 19103
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

AAH/gvo
Enclosure

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6650905	B1	2003-11-18	Toskala et al.	
	2	6754496	B2	2004-06-22	Mohebbi et al.	
	3	6977888	B1	2005-12-20	Frenger et al.	Corresponds to TW536896B
	4	7065359	B2	2006-06-20	Chuah et al.	
	5	7185256	B2	2007-02-27	Miki et al.	Corresponds to JP2002-009741A
	6	7848290	B2	2010-12-07	Cheng et al.	

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14869313
	Filing Date	2015-09-29
	First Named Inventor	Guodong Zhang
	Art Unit	2466
	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

	1	20030176195	A1	2003-09-18	Dick et al.	Corresponds to TW200303689A
	2	20060274712	A1	2006-12-07	Malladi et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2002-009741	JP	A	2002-01-11	NTT DOCOMO, INC.	Corresponds to US7,185,256B2	☐
	2	2007-511135	JP	A	2007-04-26	INTERDIGITAL TECHNOLOGY CORPORATION	Corresponds to WO2005/048503A2	☐
	3	536896	TW	B	2003-06-11	TELEFONAKTIEBOLAG ET L M ERICSSON	Corresponds to US6,977,888B1	☐
	4	200303689	TW	A	2003-09-01	INTERDIGITAL TECHNOLOGY CORPORATION	Corresponds to US2003/0176195A1	☐
	5	2005/048503	WO	A2	2005-05-26	INTERDIGITAL TECHNOLOGY CORPORATION	Corresponds to JP2007-511135A	☐

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

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14869313
	Filing Date	2015-09-29
	First Named Inventor	Guodong Zhang
	Art Unit	2466
	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

	1		☐

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2016-09-26
Name/Print	Abhik A. Huq	Registration Number	40,656

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

(19)日本国特許庁（ＪＰ）　(12)**公開特許公報（Ａ）**　(11)特許出願公開番号
特開2002－9741
（P2002－9741A）
(43)公開日　平成14年１月11日(2002.1.11)

(51)Int.Cl.[7]	識別記号	ＦＩ		テーマコード（参考）
Ｈ０４Ｌ　1/16		Ｈ０４Ｌ　1/16		５Ｋ０１４
Ｈ０４Ｂ　7/26			1/02	５Ｋ０３４
Ｈ０４Ｑ　7/38		Ｈ０４Ｂ　7/26	Ｃ	５Ｋ０５９
Ｈ０４Ｌ　1/02			１０９Ｍ	５Ｋ０６７
29/08		Ｈ０４Ｌ　13/00	３０７Ｚ	

審査請求　未請求　請求項の数13　ＯＬ　（全 22 頁）

(21)出願番号　特願2000－191789(P2000－191789)

(22)出願日　平成12年６月26日(2000.6.26)

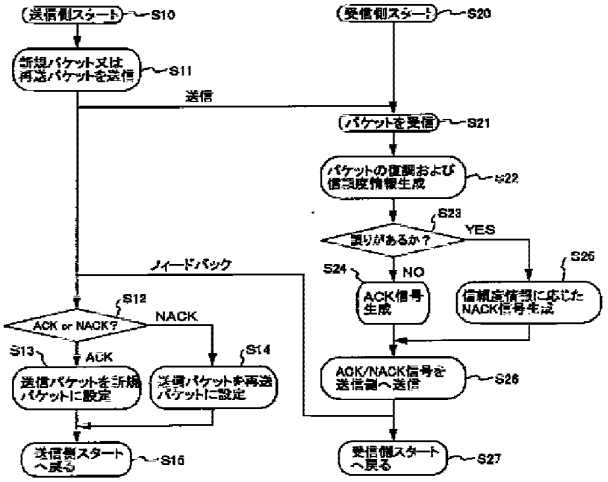
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(74)代理人　100070150
弁理士　伊東　忠彦

最終頁に続く

(54)【発明の名称】　自動再送要求を行う通信方法及び基地局装置

(57)【要約】
【課題】　ＡＲＱ方式におけるＡＣＫ／ＮＡＣＫ信号を利用して、伝送特性を改善することを目的とする。
【解決手段】　送信側では、パケットを送信する（Ｓ１１）。受信側では、そのパケットを受信し（Ｓ２１）、その復調パケットの信頼度情報を得る（Ｓ２２）。復調パケットに誤りが含まれるかどうかを検出する（Ｓ２３）。この誤り検出結果と、パケット信頼度を用いて、３段階以上で示されるＡＣＫ／ＮＡＣＫ信号を生成し（Ｓ２４、Ｓ２５）、送信側へフイードバックする。送信側では、ＡＣＫ／ＮＡＣＫ信号を受信して、ＡＣＫかＮＡＣＫかの識別を行う（Ｓ１２）。ＡＣＫ信号を受信した場合は、送信パケットを新規パケットに設定する（Ｓ１３）。また、ＮＡＣＫ信号を受信した場合は、送信パケットを再送パケットに設定する（Ｓ１４）。

受信側で、3段階以上で示されるACK／NACk信号を生成する場合を説明するための図



【特許請求の範囲】
【請求項１】　受信パケットに誤りがないことを示すＡＣＫ信号と誤りが含まれていることを示すＮＡＣＫ信号を、受信側から送信側に送信して、自動再送要求を行う通信方法において、
前記受信側で、前記受信パケットの復調の際に受信パケットの信頼度を求め、
前記受信側は、前記送信側に、前記ＡＣＫ／ＮＡＣＫ信号により前記受信パケットの信頼度を３段階以上の段階をもって通知することを特徴とする通信方法。
【請求項２】　請求項１記載の通信方法において、
前記受信パケットに誤りが含まれている場合、
前記受信パケットの信頼度に基づいて、再送パケットと合成するために前記受信パケットを保存するか否かを決定することを特徴とする通信方法。
【請求項３】　請求項１記載の通信方法において、
前記受信側から送信された前記ＡＣＫ／ＮＡＣＫ信号に基づいて、前記送信側の送信パラメータの制御を行うことを特徴とする自動再送要求を行う通信方法。
【請求項４】　受信側での受信品質が一定になるように、送信側の電力制御を行う移動通信方式における通信方法であって、受信パケットに誤りがないことを示すＡＣＫ信号と誤りが含まれていることを示すＮＡＣＫ信号を、受信側から送信側に送信して、自動再送要求を行う通信方法において、
前記送信側で、前記ＡＣＫ／ＮＡＣＫ信号と送信電力制御信号を用いて、前記送信側の送信パラメータの制御を行うことを特徴とする通信方法。
【請求項５】　請求項４記載の通信方法において、
前記送信側における送信パラメータ制御により、前記送信側から送信される情報伝送速度が変更された場合、
前記受信側で既送信パケットと合成できるように、再構築した再送パケットを再送することを特徴とする通信方法。
【請求項６】　移動通信方式における受信パケットに誤りがないことを示すＡＣＫ信号と誤りが含まれていることを示すＮＡＣＫ信号を、受信側から送信側に送信して、自動再送要求を行う通信方法において、
移動局から送信された信号を複数の基地局が同時に受信する上りリンクサイトダイバーシチ受信を行う場合、
受信側の前記複数の基地局でＡＣＫ／ＮＡＣＫ信号を生成して前記移動局及び前記複数の基地局の上位局に送信し、送信側の前記移動局で複数基地局からのＡＣＫ／ＮＡＣＫ信号を用いて再送制御を行うことを特徴とする通信方法。
【請求項７】　請求項６記載の通信方法において、
前記複数の基地局の上位局は、前記複数の基地局からＡＣＫ／ＮＡＣＫ信号を受信して、ｎ（ｎは１以上）個以上のＡＣＫ信号を受信したとき、ＡＣＫ信号を生成して、各基地局に送信することを特徴とする通信方法。
【請求項８】　請求項６又は７記載の通信方法において、
前記移動局は、前記複数の基地局からＡＣＫ／ＮＡＣＫ信号を受信して、ｎ（ｎは１以上）個以上のＡＣＫ信号を受信したとき、受信側で正常に受信したと判断することを特徴とする通信方法。
【請求項９】　移動通信方式における受信パケットに誤りがないことを示すＡＣＫ信号と誤りが含まれていることを示すＮＡＣＫ信号を、受信側から送信側に送信して、自動再送要求を行う通信方法において、
移動局から送信された信号を複数の基地局が同時に受信する上りリンクサイトダイバーシチ受信を行う場合、
前記複数の基地局の上位局でＡＣＫ／ＮＡＣＫ信号を生成し、前記複数の基地局は、上位局で生成した同一のＡＣＫ／ＮＡＣＫ信号を、前記移動局に送信することを特徴とする通信方法。
【請求項１０】　移動通信方式における受信パケットに誤りがないことを示すＡＣＫ信号と誤りが含まれていることを示すＮＡＣＫ信号を、受信側から送信側に送信して、自動再送要求を行う通信方法において、
複数の基地局から送信された信号を、移動局で受信する下りリンクサイトダイバーシチ受信を行う場合、
前記移動局において、受信パケットを復調してＡＣＫ／ＮＡＣＫ信号を生成して送信し、
前記複数の基地局の上位局は、前記ＡＣＫ／ＮＡＣＫ信号を受信して、ｎ（ｎは１以上）個以上のＡＣＫ信号を受信したとき、前記複数の基地局で正常に受信したと判断して、前記複数の基地局での再送制御が行われることを特徴とする通信方法。
【請求項１１】　ＡＣＫ／ＮＡＣＫ信号を用いて、自動再送要求を行う基地局であって、移動局から送信された信号を複数の基地局が同時に受信して上りリンクサイトダイバーシチ受信を行う基地局において、
ＡＣＫ／ＮＡＣＫ信号を生成して移動局及び複数の基地局の上位局に送信する手段と、
前記複数の基地局の前記上位局からの同一のＡＣＫ／ＮＡＣＫ信号を受信する手段とを有することを特徴とする基地局。
【請求項１２】　ＡＣＫ／ＮＡＣＫ信号を用いて、自動再送要求を行う基地局であって、移動局から送信された信号を複数の基地局が同時に受信して上りリンクサイトダイバーシチ受信を行う基地局において、
受信した受信パケットを前記複数の基地局の上位局に転送する手段と、
前記複数の基地局の前記上位局からの同一のＡＣＫ／ＮＡＣＫ信号を受信して、受信した信号を転送する手段とを有することを特徴とする基地局。
【請求項１３】　ＡＣＫ／ＮＡＣＫ信号を受信して、再送制御を行う基地局であって、移動局から送信されたＡＣＫ／ＮＡＣＫ信号を複数の基地局が同時に受信して下

りリンクサイトダイバーシチ受信を行う基地局において、
受信したＡＣＫ／ＮＡＣＫ信号を前記複数の基地局の上位局に転送する手段と、
前記複数の基地局の上位局から前記ＡＣＫ／ＮＡＣＫ信号に関する信号を受信して、再送制御を行う手段とを有することを特徴とする基地局。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は移動通信環境下において、自動再送要求(ＡＲＱ)を用いるパケット伝送に関するものである。

【０００２】

【従来の技術】近年、インターネットの普及に伴い、移動通信におけるデータ通信の需要が飛躍的に伸びてきており、次世代移動通信方式(IMT-2000)よりもさらに高速、大容量の移動通信の実現が期待されている。データ通信においては、様々な伝送速度、要求品質を有する情報の伝送が要求されるため、データを一定量のパケットに分割して送信するパケット伝送が有効である。

【０００３】また、データ通信では、音声通信と異なりデータに誤りが存在することが許されないことを考慮すると、自動再送要求(ＡＲＱ：Automatic Repeat reQuest)が有効な方法である(参考文献"Automatic repeat request error control schemes、"S.Lin、D.J.Costello、and M.J. Miller、IEEE Trans.Commun.Mag.、vol.22、PP.5-17、Dec.1984)。ＡＲＱは、送信側で、情報信号系列に誤り検出符号を付加したパケットを送信し、受信側において、受信パケットに誤りが検出された場合、そのパケットの再送要求を送信側へ行う。送信側では、再送要求を受けたパケットを再度送信し、受信側で誤りが検出されなくなるまで繰り返す技術である。これにより、エラーフリー伝送が実現できる。

【０００４】ＡＲＱでは、伝搬路環境が悪い場合、再送要求が頻発し、特性が大幅に劣化する。これを改善するため、誤り検出符号に加え、誤り訂正符号を用いて、誤りの発生を低減するHybrid ＡＲＱが提案されている。Hybrid ＡＲＱには、既送信パケットと同一のパケットを送信するType-Iと、既送信パケットと再送パケットでは、異なる消去規則によるパンクチャド符号を用いて送信するType-II/IIIがある。受信側の処理は、Type-Iでは、受信パケットに誤りを含む場合、受信側で保存しておき、再送パケットが受信された後、両パケットをシンボル毎に合成することにより、受信信号電力対雑音電力比(ＳＮＲ)の向上を図るパケット合成（Packet Combining）を行う方法が検討されている(参考文献"A Diversity Combining DS/CDMA system with convolutional encoding and Viterbi decoding、"S.Souissi and S.Wicker IEEE Trans.Veh. Techol.、vol.44、No.2、PP.304-312、May 1995)。

【０００５】一方、Type-II/IIIでは、既送信パケットと再送パケットの消去規則に基づき、原符号を復元し、低い符号化率の原符号で復号することにより、符号化率の向上を図ることができる符号合成（Code Combining）を行う(参考文献、"Rate-compatible punctured convolutional codes and their applications ," J.Hagenauer, IEEE Trans.Commun.、vol.36、pp.389-400、April 1988)。

【０００６】また、IMT-2000では、最大２Mbpsの情報伝送が実現されるが、今後の需要を考えると、さらなる高速化が必要である。そこで、伝搬路状況が良好な場合には、変調多値数、符号化率を変更することにより、帯域を広げることなく、伝送速度を向上させることのできる、可変レート方式の適用が検討されている(参考文献、"可変シンボルレート・変調多値数適応変調方式の伝送特性、"上豊樹、三瓶政一、森永規彦、RCS95-30、1995)。また、可変レート方式を用いた場合のＡＲＱに関しては、"適応変調方式を用いたパンクチャド符号化Type-II Hybid ＡＲＱ方式、"内條正志、三瓶政一、森永規彦、神尾享秀、RCS96-20. 1996において、検討されている。この文献では、受信側で伝搬路状況を推定し、その結果に基づいて、変調多値数、符号化率、シンボルレートといった送信パラメータを決定している。

【０００７】一方で、IMT-2000とのコモナリテイを考えると、アクセス方式としてはＣＤＭＡが有力であり、ＣＤＭＡ特有の技術である、送信電力制御、サイトダイバーシチとＡＲＱとの複合的な技術が要求されている。ＣＤＭＡは、同一周波数を他ユーザと共有するため、所要以上の電力を送信すると、その帯域を使えるユーザ数が減少する。そこで、送信電力を必要以上に送信しないために、送信電力制御を行っている。例えば、受信側での受信電力が、均一になるように、受信側から送信側に送信電力制御信号（例えば、送信側の電力を上げるコマンド又は送信側の電力を下げるコマンド；ＴＰＣ）を送信して、送信側の送信電力を制御する。

【０００８】また、ＣＤＭＡでは、１周波数繰り返しであるために、２つ以上のセルからの信号を時間的にオーバーラップして受信/送信するサイトダイバーシチを行っている。

【０００９】

【発明が解決しようとする課題】従来、自動再送要求において送信側へフイードバックされるＡＣＫ／ＮＡＣＫ信号は、再送要求の制御信号としてしか用いられていない。しかしながら、ＡＣＫ信号が連続してフィードバックされた場合、その送受信間の通信状況が良いことを示しており、ＮＡＣＫ信号が連続する場合は、通信状況が悪いことを示している。

【００１０】そこで、本発明は、ＡＲＱ方式におけるＡＣＫ／ＮＡＣＫ信号を利用して、伝送特性を改善することを目的としている。

【００１１】
【課題を解決するための手段】上記課題を解決するために、本件発明は、以下の特徴を有する課題を解決するための手段を採用している。
【００１２】請求項１に記載された発明は、受信パケットに誤りがないことを示すＡＣＫ信号と誤りが含まれていることを示すＮＡＣＫ信号を、受信側から送信側に送信して、自動再送要求を行う通信方法において、前記受信側で、前記受信パケットの復調の際に受信パケットの信頼度を求め、前記受信側は、前記送信側に、前記ＡＣＫ／ＮＡＣＫ信号により前記受信パケットの信頼度を３段階以上の段階をもって通知することを特徴とする。
【００１３】請求項１記載の発明によれば、受信側の受信パケットの信頼度に応じて、送信側で、伝送状態に適合した送信制御を行うことができるようになる。
【００１４】請求項２に記載された発明は、請求項１記載の通信方法において、前記受信パケットに誤りが含まれている場合、前記受信パケットの信頼度に基づいて、再送パケットと合成するために前記受信パケットを保存するか否かを決定することを特徴とする。
【００１５】請求項２記載の発明によれば、信頼度の低い受信パケットを使用して合成することに伴う、信号の劣化を防止することができる。
【００１６】請求項３に記載された発明は、請求項１記載の通信方法において、前記受信側から送信された前記ＡＣＫ／ＮＡＣＫ信号に基づいて、前記送信側の送信パラメータの制御を行うことを特徴とする。
【００１７】請求項３記載の発明によれば、受信側の受信パケットの信頼度に応じて、送信側で、伝送状態に適合した送信パラメータの設定を行うことができるようになる。
【００１８】請求項４に記載された発明は、受信側での受信品質が一定になるように、送信側の電力制御を行う移動通信方式における通信方法であって、受信パケットに誤りがないことを示すＡＣＫ信号と誤りが含まれていることを示すＮＡＣＫ信号を、受信側から送信側に送信して、自動再送要求を行う通信方法において、前記送信側で、前記ＡＣＫ／ＮＡＣＫ信号と送信電力制御信号を用いて、前記送信側の送信パラメータの制御を行うことを特徴とする。
【００１９】請求項４記載の発明によれば、ＡＣＫ／ＮＡＣＫ信号と送信電力制御信号を用いることにより、精度の高い送信制御を行うことができる。
【００２０】請求項５に記載された発明は、請求項４記載の通信方法において、前記送信側における送信パラメータ制御により、前記送信側から送信される情報伝送速度が変更された場合、前記受信側で既送信パケットと合成できるように、再構築した再送パケットを再送することを特徴とする。
【００２１】請求項５記載の発明によれば、受信側で既送信パケットと合成できるように、再構築した再送パケットを再送することにより、受信側で既送信パケットと受信パケットを合成することができ、信頼性の高い信号を受信することができる。
【００２２】請求項６に記載された発明は、移動通信方式における受信パケットに誤りがないことを示すＡＣＫ信号と誤りが含まれていることを示すＮＡＣＫ信号を、受信側から送信側に送信して、自動再送要求を行う通信方法において、移動局から送信された信号を複数の基地局が同時に受信する上りリンクサイトダイバーシチ受信を行う場合、受信側の前記複数の基地局でＡＣＫ／ＮＡＣＫ信号を生成して移動局及び前記複数の基地局の上位局に送信し、送信側の移動局で複数基地局からのＡＣＫ／ＮＡＣＫ信号を用いて再送制御を行うことを特徴とする。
【００２３】請求項６記載の発明によれば、上りリンクサイトダイバーシチ受信を行っている場合でも、上位局と移動局がパケット誤りの有無の判断を独立に行うことが可能となる。特に移動局では、上位局からの最終的な判断を待つことなく独立に再送制御を行うことができるため、処理遅延を低減できると共に、送信バッファ量を削減することができる。
【００２４】請求項７に記載された発明は、請求項６記載の通信方法において、前記複数の基地局の上位局は、前記複数の基地局からＡＣＫ／ＮＡＣＫ信号を受信して、ｎ（ｎは１以上）個以上のＡＣＫ信号を受信したとき、ＡＣＫ信号を生成して、各基地局に送信することを特徴とする。
【００２５】請求項８に記載された発明は、請求項６又は７記載の通信方法において、前記移動局は、前記複数の基地局からＡＣＫ／ＮＡＣＫ信号を受信して、ｎ（ｎは１以上）個以上のＡＣＫ信号を受信したとき、受信側で正常に受信したと判断することを特徴とする。
【００２６】請求項７及び８記載の発明は、請求項６記載の発明において、移動局又は上位局で前記複数の基地局からＡＣＫ／ＮＡＣＫ信号を受信して、ｎ（ｎは１以上）個以上のＡＣＫ信号を受信したとき、正常に受信したと判断することを規定したものである。
【００２７】請求項９に記載された発明は、移動通信方式における受信パケットに誤りがないことを示すＡＣＫ信号と誤りが含まれていることを示すＮＡＣＫ信号を、受信側から送信側に送信して、自動再送要求を行う通信方法において、移動局から送信された信号を複数の基地局が同時に受信する上りリンクサイトダイバーシチ受信を行う場合、前記複数の基地局の上位局でＡＣＫ／ＮＡＣＫ信号を生成し、複数の基地局は、上位局で生成した同一のＡＣＫ／ＮＡＣＫ信号を、移動局に送信することを特徴とする。
【００２８】請求項９記載の発明によれば、複数の基地局からのパケットが合成されるため、受信パケットの信

頼度が向上される。移動局では、複数基地局から送信される同一のＡＣＫ／ＮＡＣＫ信号を用いて、信頼度の高い再送制御を行うことができる。

【００２９】請求項１０に記載された発明は、移動通信方式における受信パケットに誤りがないことを示すＡＣＫ信号と誤りが含まれていることを示すＮＡＣＫ信号を、受信側から送信側に送信して、自動再送要求を行う通信方法において、複数の基地局から送信された信号を、移動局で受信する下りリンクサイトダイバーシチ受信を行う場合、移動局において、受信パケットを復調してＡＣＫ／ＮＡＣＫ信号を生成して送信し、前記複数の基地局の上位局は、前記ＡＣＫ／ＮＡＣＫ信号を受信して、ｎ（ｎは１以上）個以上のＡＣＫ信号を受信したとき、前記複数の基地局で正常に受信したと判断して、前記複数の基地局での再送制御が行われることを特徴とする。

【００３０】請求項１０記載の発明によれば、下りリンクサイトダイバーシチのために送信を行っている複数の基地局が同一のＡＣＫ／ＮＡＣＫ信号に従って送信を行うため、移動局においてサイトダイバーシチ効果を得ることができる。

【００３１】請求項１１～１３記載の基地局は、請求項１～１０に記載された通信方法に適した基地局を規定したものである。

【００３２】

【発明の実施の形態】以下、図面を用いて本発明の実施の形態を説明する。

【００３３】図１は、３段階以上で示されるＡＣＫ／ＮＡＣＫ信号を生成することを特徴とする自動再送要求における送信側、受信側の制御フローの一実施例を表した図である。

【００３４】送信側では、送信バッファから新規パケット又は再送パケットを送信する（Ｓ１１）。受信側では、そのパケットを受信し（Ｓ２１）、復調を行うとともにその復調パケットの信頼度を表す信頼度を計算し信頼度情報を得る（Ｓ２２）。

【００３５】信頼度を求める方法としては、例えばパケットが畳み込み符号による誤り訂正符号化が行われている場合には、復号の際にビタビ復号を用いていればその復号の過程で計算されるパスメトリックの値を用いることができる。最終のパスメトリック値が小さいほど、その復号信号が、より確からしいことを示すため、この値を受信パケットの信頼度として用いることができる。また、その他の信頼度としては、そのパケットを受信したときの受信信号電力のレベル、又は、そのパケットを受信したときの希望受信信号電力対干渉電力比(ＳＩＲ)を用いることができる。受信電力が大きい、又は、ＳＩＲが大きいときには、信頼度が高いと判断し、その逆であれば信頼度が低いと判断できる。

【００３６】続いて、復調パケットに誤りが含まれるかどうかを、例えば、誤り検出符号を用いて検出する（Ｓ２３）。この誤り検出結果と、パケット信頼度を用いて、３段階以上で示されるＡＣＫ／ＮＡＣＫ信号を生成し（Ｓ２４、Ｓ２５）、送信側へフイードバックする。

【００３７】従来の２段階、つまりパケット内の誤りの有無でＡＣＫ／ＮＡＣＫ信号を生成し送信側へフィードバックする場合には、例えばＡＣＫに０の信号を、ＮＡＣＫに１の信号を割り当てればよい。それに対して、３段階以上でＡＣＫ／ＮＡＣＫ信号を生成する場合には、例えば表１に示されるように、誤りが検出されず信頼度が最も高い場合には、000で示されるＡＣＫ信号を割り当て、以下は信頼度に応じてＮＡＣＫ(０)からＮＡＣＫ(６)までそれぞれ001から111に対応する信号を割り当てることができる。

【００３８】

【表１】

信頼度	ACK/NACK	表し方
高い(誤りなし)	ACK(0)	000
⇕	NACK(0)	001
	NACK(1)	010
	NACK(2)	011
	NACK(3)	100
	NACK(4)	101
	NACK(5)	110
低い	NACK(6)	111

このようにして、受信パケットの信頼度に応じて３段階以上で示されるＡＣＫ／ＮＡＣＫ信号を生成することができる。表１では８段階のＡＣＫ／ＮＡＣＫ信号を生成する例を示しているが、その段階数は自由に設定することが可能である。

【００３９】この後、送信側では、ＡＣＫ／ＮＡＣＫ信号を受信して、ＡＣＫかＮＡＣＫかの識別を行う（Ｓ１２）。ＡＣＫ信号を受信した場合は、送信バッファから

送信したパケットを削除して、送信パケットを新規パケットに設定する（Ｓ１３）。また、ＮＡＣＫ信号を受信した場合は、送信パケットを再送パケットに設定する（Ｓ１４）。従って、ＡＣＫ信号を受信した場合は、新規パケットを送信し、ＮＡＣＫ信号を受信した場合は、再送パケットが送信される。

【００４０】図２は、受信パケットの信頼度に応じて、受信パケットを保存するか、破棄するかを決定することを特徴とする自動再送制御方式の制御フローを示した図の一実施例である。

【００４１】送信側では、図１と同様の方法で、新規パケット又は再送パケットを送信する。送信側では、受信側でそのパケットが新規であるのか再送であるのかを判断できるように、パケット内の制御情報として、新規パケットか再送パケットかの識別信号を含めた信号を送信する（Ｓ３１）。受信側では、パケットを受信し（Ｓ４１）、そのパケットを前述の識別信号から、新規パケットであるか再送パケットであるかを判断する（Ｓ４２）。初めて受信した新規パケットであると判断した場合は、次の処理へ進むが、再送パケットと判断した場合には、受信バッファに保存してある過去に受信された同一のパケットとの合成を行う（Ｓ４３）。

【００４２】このパケットの合成を行うことにより、より信頼度の高い受信パケットを生成することができる。今回受信したパケットと過去に受信した同一のパケットの合成法としては、例えば、上記のパケット合成、符号合成などを用いることができる。さらに、新規パケットであれば受信パケット、再送パケットであれば合成パケットの復調を行うとともに、図１の説明で示したのと同様にそれらのパケットの信頼度を計算し信頼度情報を得る（Ｓ４４）。

【００４３】続いて、復調パケットに誤りが含まれるかどうかを、例えば、誤り検出符号を用いて検出する（Ｓ４５）。誤りがない場合にはＡＣＫ信号を生成し（Ｓ４６）、更に、再送パケットである場合にはバッファに保存しておいたパケットを削除する（Ｓ４７）。

【００４４】誤りが検出された場合には、ＮＡＣＫ信号を生成し（Ｓ４８）、受信パケットの信頼度情報に応じて、誤りの検出されたパケットを受信側のバッファに保存しておくかの判断を行う。これは、受信パケットの信頼度が非常に低い場合、そのパケットを保存し、再送パケットと合成しても、合成の効果は少ない。逆に合成により、誤りを発生させる可能性が高くなる場合もあるため、受信パケットの信頼度に応じて、信頼性が高い場合には保存し、低い場合には破棄する（Ｓ４９）。以下の処理フローは、図１と同じであるので、説明を省略する。

【００４５】このように信頼度があるしきい値以上のパケットのみをバッファに保存することにより、バッファの必要な容量を削減することも可能であり、有効である。

【００４６】図３は、受信側からフィードバックされるＡＣＫ／ＮＡＣＫ信号に応じて、送信側において、送信パラメータを制御することを特徴としたパケット伝送の制御フローの一実施例を示した図である。

【００４７】図３における送信側における新規パケット又は再送パケットの送信（Ｓ６１）及び受信側におけるパケットの受信（Ｓ７１）、パケットの復調（Ｓ７２）、誤りの有無（Ｓ７３）、ＡＣＫ信号生成（Ｓ７４）、ＮＡＣＫ信号生成（Ｓ７５）及びＡＣＫ／ＮＡＣＫ信号の送信側への送信（Ｓ７６）は、一般のＡＲＱ方式と同じであるので、説明を省略する。

【００４８】受信したＡＣＫ／ＮＡＣＫ信号に基づいて、送信側の変調パラメータを変更する（Ｓ６２）点が、この実施例の特徴である。

【００４９】つまり、受信したＡＣＫ／ＮＡＣＫ信号に基づいて、伝送回線の通信状態のレベルを判定し、このレベルに応じて、送信側で送信パラメータを制御するものである。

【００５０】送信パラメータとしては、変調多値数、符号化率、シンボルレート、送信電力値などがあり、例えば表２から６に示されるように、レベル数に対応したパラメータを設定する。

【００５１】表２は、レベル数に対応して変調多値数を設定するものであり、表３は、レベル数に対応して符号化率を設定するものであり、表４は、レベル数に対応してシンボルレートを設定するものであり、表５は、レベル数に対応して送信電力値を設定するものである。

【００５２】

【表２】

レベル	変調方式(多値数)
1	BPSK(1)
2	QPSK(2)
3	16QAM(4)
4	64QAM(6)

【００５３】

【表３】

レベル	符号化率
1	r_0
2	r_1
3	r_2
4	r_3

ただし，$r_0 \leqq r_1 \leqq r_2 \leqq r_3$

【００５４】
【表４】

レベル	シンボルレート
1	M_0 sps
2	M_1 sps
3	M_2 sps
4	M_3 sps

ただし，$M_0 \leqq M_1 \leqq M_2 \leqq M_3$

【００５５】
【表５】

レベル	送信電力値
1	x_0
2	x_1
3	x_2
4	x_3

ただし，$x_0 \geqq x_1 \geqq x_2 \geqq x_3 \geqq x_4$

これらの表において、レベルの数が大きいほど送信側と受信側の通信状態が良い場合であり、それに見合ったパラメータが設定される。送信側でＡＣＫ／ＮＡＣＫ信号に基づいて変調パラメータを操作する方法として、例えばＡＣＫ／ＮＡＣＫ信号の履歴を用いて制御を行うことができる。これは、ＡＣＫ信号が連続するということは送受信間の通信状況が良い場合であり、ＮＡＣＫ信号が連続する場合は通信状況が劣化していることを示している。従って、ＡＣＫ信号がある回数連続して受信された場合には表２から表５に示された各パラメータにおけるレベルを、現状のレベルよりも上げる操作を行い、逆にＮＡＣＫ信号がある回数連続して受信された場合には、逆に現在のレベルよりも下げる操作を行う。また、この制御は受信側で生成されるＡＣＫ／ＮＡＣＫ信号に基づいて行われるため、変調パラメータの変更方法を送信側、受信側で決めておけば、送信側から送信パケットの変調パラメータを通知する必要がなく、有効である。

【００５６】図４は、ＣＤＭＡパケット伝送において、受信側で受信品質が一定となるよう周期的に送信側の送信電力を制御する場合に、ＡＣＫ／ＮＡＣＫ信号と、送信側の送信電力を補正制御する信号(送信電力制御コマンド)の両信号を複合的に用いることを特徴とする送信電力制御フローを表した一実施例である。

【００５７】送信側では、送信バッファから新規パケット又は再送パケットを送信する（Ｓ８１）。受信側では、そのパケットを受信する（Ｓ９１）。

【００５８】例えば、受信レベルから、送信側の送信電力を制御するコマンドを生成する（Ｓ９６）。受信側で受信品質が一定となるように、送信側の送信電力を制御するコマンドを生成する。

【００５９】なお、受信品質とは、受信側で測定される誤り率、信号電力対干渉電力比(ＳＩＲ)値、受信信号電力レベルなどである。これらの測定値に対して、目標値を設定し、測定値が目標品質を満たしていない場合には、送信電力を増加させるため、送信電力制御コマンドＵｐを、品質を満たしている場合には、送信電力を減少させる命令としてＤｏｗｎを設定する。

【００６０】また、同時に、受信側では、受信した信号からパケットの復調を行い（Ｓ９２）、復調パケットに誤りが含まれるかどうかを、例えば、誤り検出符号を用いて検出する（Ｓ９３）。誤りがない場合にはＡＣＫ信号を生成し（Ｓ９４）、再送パケットである場合にはバッファに保存しておいたパケットを削除する。誤りが検出された場合には、ＮＡＣＫ信号を生成する（Ｓ９５）。このＡＣＫ／ＮＡＣＫ信号と上記送信電力制御コマンドを送信側へ送信する（Ｓ９７）。

【００６１】受信側では、送信電力制御コマンド・ＡＣＫ／ＮＡＣＫ信号を受信して、送信電力を変更する（Ｓ８２）。

【００６２】この送信電力制御コマンドと、ＡＣＫ／ＮＡＣＫ信号との複合的に用いる送信電力制御方法としては、次のような方法が考えられる。

【００６３】一実施例として、ＡＣＫ／ＮＡＣＫ信号と送信電力制御コマンド（ＴＰＣ）との組み合わせは、表６に示すように４通りの場合が考えられる。

【００６４】
【表６】

ACK/NACK信号	TPCコマンド	送信電力の増減
ACK	Up	$+x_0$dB
NACK		$+x_1$dB
ACK	Down	$-x_1$dB
NACK		$-x_0$dB

ただし，$x_0 \leqq x_1$

送信電力制御コマンドがＤｏｗｎでかつＡＣＫ信号である場合には、４通りの中で通信品質が最も良いと判断できる状況であり、逆に送信電力制御コマンドがＵｐでかつＮＡＣＫ信号である場合には４通りの中で通信品質が最も悪い状況と判断できる。

【００６５】また、表６において$x_0=0$(dB)に設定すれば送信電力制御コマンドから判断される通信状況とＡＣＫ／ＮＡＣＫ信号から判断される通信状況が一致する場合にのみ、送信電力制御が行われることになる。

【００６６】これにより、送信電力制御コマンドだけでなく、通信状況の判断基準としてＡＣＫ／ＮＡＣＫ信号を用いることで、より確実な通信品質の判断が可能となり、ＣＤＭＡパケット伝送における電力制御に有効である。

【００６７】また、直前のＡＣＫ／ＮＡＣＫ信号だけではなく、過去のＡＣＫ／ＮＡＣＫ信号の履歴も送信電力制御コマンドと併用して判断基準とすることもできる。

【００６８】この後、送信側では、ＡＣＫ／ＮＡＣＫ信号を受信して、ＡＣＫかＮＡＣＫかの識別を行う（Ｓ８３）。ＡＣＫ信号を受信した場合は、送信バッファから送信したパケットを削除して、次に送信する送信パケットを新規パケットに設定する（Ｓ８４）。また、ＮＡＣＫ信号を受信した場合は、送信パケットを再送パケットに設定する（Ｓ８５）。

【００６９】図５、６、７、８は、自動再送要求を用いたパケット伝送において、受信側からフィードバックされるＡＣＫ／ＮＡＣＫ信号に基づく送信パラメータ制御において、情報伝送速度が変更された場合、送信側でパケットを再構築して再送し、既送信パケットと再構築再送パケットを用いて合成することを特徴とするパケット伝送におけるパケット構成例を示した一実施例である。

【００７０】既送信パケットの情報伝送速度をＭ、１パケット当りに含まれる情報量をｍ、１パケットの時間軸上の長さを１パケット周期と定義し、１パケット周期をＬとする。このパケットに誤りが含まれ、再送パケットが送信される場合を考える。まず、図３に示した送信パラメータ制御により、再送時の情報伝送速度がＭ／ｎに減少したとする。このとき、既送信パケットと、再送パケットを受信側で合成するために、再送パケットのパケット構成を以下のように再構築する。

【００７１】図５に示すように、再送パケットの１パケットのパケット周期を既送信パケットと同様にＬとする。この場合、１パケット当りに含まれる情報量がｍ/ｎとなるため、１パケットの再送では、情報量が１／ｎとなり、合成を行うことが難しい。そのため、図５に示すように、ｎパケット用いることにより、既送信パケットと同量の情報を伝送することができる。このようにすることにより、受信側では、１個の既送信パケットとｎ個の再送パケットを合成することが可能となる。この例では、再送パケットを既送信パケットのシンボル１からｍまでを順に並べた構成としているが、インターリーブを掛けることも可能である。

【００７２】ただし、この場合、ｎ個の再送パケットがすべて受信されるまでパケット合成を行うことができない。この遅延時間を減少させるため、ＣＤＭＡパケット伝送においては、拡散率を低下させることにより、遅延時間を削減することができる。

【００７３】また、図６に示すように、ｎ個の再送パケットに別々の拡散符号（符号１～符号ｎ）を割り当て、同時に送信することにより、遅延時間を削減することもできる。

【００７４】続いて、再送時の伝送速度が、ｎ×Ｍに上昇したとする。このとき、既送信パケットと、再送パケットを受信側で合成するために、再送パケットのパケット構成を以下のように再構築する。

【００７５】図７に示すように、再送パケットの１パケットのパケット周期を既送信パケットと同様にＬとする。この場合、１パケット当りに含まれる情報量がｎ×ｍとなるため、既送信パケットの情報量と比較して、ｎ倍の情報伝送が可能となる。そのため、図７に示すように、例えば、同一情報をｎ回繰り返すパケット構成とする。また、この場合もインターリーブを掛けることが可能である。

【００７６】また、再送時の伝送速度が、ｎ×Ｍに上昇する場合の別のパケット構成例を図８に示す。上述の場合とは異なり、この図８に示すように、パケット周期をL/ｎとする。これにより、１パケットに含まれる情報量が、既送信パケットと同様にｍとなるため、受信側で、１個の既送信パケットと、１個の再送パケットを合成することが可能となる。

【００７７】図９は、ＣＤＭＡパケット伝送において、移動局から送信された信号を複数の基地局が同時に受信する上りリンクサイトダイバーシチ受信を行う場合に、各基地局でＡＣＫ／ＮＡＣＫ信号を生成して移動局にフィードバックし、移動局側で複数基地局(基地局数：Ｍ)からのＡＣＫ／ＮＡＣＫ信号を用いて再送制御を行う自動再送要求の制御フローを表した一実施例である。

【００７８】移動局では、送信バッファから新規パケット又は再送パケットを送信する（Ｓ１０１）。基地局側では、そのパケットを受信し（Ｓ１１１、Ｓ１２１）、復調し（Ｓ１１２、Ｓ１２２）、誤りの有無を検出し（Ｓ１１３、Ｓ１２３）、ＡＣＫ信号（Ｓ１１４、Ｓ１２４）又はＮＡＣＫ信号（Ｓ１１５、Ｓ１２５）を生成し、ＡＣＫ／ＮＡＣＫ信号を送信側と上位局へ送信（Ｓ１１６、Ｓ１２６）する。

【００７９】各基地局は、サイトダイバーシチを行わない場合と同様に、ＡＣＫ／ＮＡＣＫ信号を移動局へフィードバックする。さらに上位局へも、ＡＣＫ／ＮＡＣＫ信号及びＡＣＫ信号の場合は、復調パケットを送信する。

【００８０】上位局では、Ｍ個の基地局から送られてくるＡＣＫ／ＮＡＣＫ信号のうち、ｎ個(１≦ｎ≦Ｍ)以上のＡＣＫ信号があるか否かを判断する（Ｓ１３１）。ＡＣＫ信号がｎ個以上受信された場合には（Ｓ１３２）、復調パケットが正しく受信されたと判断して、ＡＣＫ（ＲＮＣ）信号を、ｎ個未満の場合は（Ｓ１３３）、正しく復調されなかったと判断してＮＡＣＫ（ＲＮＣ）信号を、各基地局へフィードバックする（Ｓ１３４）。

【００８１】基地局側では、このＡＣＫ／ＮＡＣＫ信号（ＲＮＣ）信号を受信して（Ｓ１１７、Ｓ１２７）、受信バッファの管理に用いる。これにより、基地局間で同一のＡＣＫ／ＮＡＣＫ信号に従うため、受信バッファ管理が可能となる。

【００８２】一方移動局は、複数の基地局(基地局数Ｍ)からフィードバックされたＡＣＫ／ＮＡＣＫ信号のみを用いて、上位局と同様の判断により再送制御を行う。つまり、ＡＣＫ信号がｎ個(１≦ｎ≦Ｍ)以上受信された場合には、そのパケットは受信側で正しく復調されたと判断し、送信パケットを新規パケットに設定し（Ｓ１０４）、ｎ個未満の場合は、正しく復調されなかったとして、送信パケットを再送パケットに設定して再送を行う（Ｓ１０４）。

【００８３】これにより、上りリンクサイトダイバーシチ受信を行っている場合でも、上位局と移動局がパケット誤りの有無の判断を独立に行うことが可能となる。特に移動局では、上位局からの最終的な判断を待つことなく独立に再送制御を行うことができるため、処理遅延を低減できると共に、送信バッファ量を削減できる。

【００８４】また、伝送路中の誤りの発生により、移動局と基地局間において、送受バッファ管理が異なる可能性がある。このような場合に対応するため、例えば、基地局においてタイマーを設置し、一定期間経過しても受信バッファに蓄えたパケットが受信されない場合、そのパケットを破棄する、又は、移動局側へそのパケットの再送要求を行う制御を加えることもできる。

【００８５】図１０は、ＣＤＭＡパケット伝送において、移動局から送信された信号を複数の基地局(基地局数：Ｍ)が同時に受信する上りリンクサイトダイバーシチ受信を行う場合に、基地局よりも上位にある上位局においてＡＣＫ／ＮＡＣＫ信号を生成し、複数の基地局を通じて、上位局で生成された同一のＡＣＫ／ＮＡＣＫ信号を移動局へ送信することにより、再送制御を行う自動再送要求の制御フローを表した一実施例である。

【００８６】各基地局は、受信パケットを受信すると（Ｓ１５１、Ｓ１６１）、上位局へ受信パケットを送信する（Ｓ１５２、１６２）。上位局において、複数の基地局から送信された受信パケットを受信して（Ｓ１７１）、合成し（Ｓ１７２）、復調し（Ｓ１７３）、ＡＣＫ／ＮＡＣＫ信号を生成する（Ｓ１７４、Ｓ１７５、Ｓ１７６）。基地局では、上位基地局からの同一のＡＣＫ／ＮＡＣＫ信号を受信して（Ｓ１５３、Ｓ１６３）、基地局は、その信号を、移動局に送信する（ＳＳ１５４、Ｓ１６４）。

【００８７】移動局は、複数の基地局からのＡＣＫ／ＮＡＣＫ信号を受信して、合成し（Ｓ１４２）、ＡＣＫ／ＮＡＣＫを判定する（Ｓ１４３）。

【００８８】ここでは、複数の基地局からのパケットが合成されるため、受信パケットの信頼度が向上し有効である。上位局で生成されたＡＣＫ／ＮＡＣＫ信号を、サイトダイバーシチ受信を行っている複数の基地局を通じて、移動局へ送信する。移動局では、複数基地局から送信される同一のＡＣＫ／ＮＡＣＫ信号を用いて再送制御を行う。

【００８９】図１１は、ＣＤＭＡパケット伝送において、複数の基地局から送信された信号を移動局が同時に受信する下りリンクサイトダイバーシチ受信を行う場合に、移動局からフィードバックされたＡＣＫ／ＮＡＣＫ信号を、複数の基地局(基地局数Ｍ)が受信した後、それぞれがＡＣＫ／ＮＡＣＫ信号を上位局へ送信し、複数のＡＣＫ／ＮＡＣＫ信号を合成して、再送制御を行う自動再送要求の制御フローを表した一実施例である。

【００９０】移動局からのＡＣＫ／ＮＡＣＫ信号が受信されると、各基地局は、上位局へＡＣＫ／ＮＡＣＫ信号を転送する（Ｓ１９２、Ｓ２０２）。上位局において、ＡＣＫ信号がｎ個(１≦ｎ≦Ｍ)以上受信された場合には、そのパケットは、移動局側で正しく復調されたとしＡＣＫ／ＮＡＣＫ（ＲＮＣ）信号をＡＣＫ（ＲＮＣ）と設定し（Ｓ２１１、Ｓ２１２）、ｎ個未満の場合は、正しく復調されなかったとして、ＡＣＫ／ＮＡＣＫ（ＲＮＣ）信号をＮＡＣＫと設定する（Ｓ２１１、Ｓ２１

３）。

【００９１】これにより、下りリンクサイトダイバーシチのために送信を行っている複数の基地局が同一のＡＣＫ／ＮＡＣＫ（ＲＮＣ）信号に従って送信を行うため、移動局においてサイトダイバーシチ効果を得ることができる。

【００９２】

【発明の効果】上述の如く本発明によれば、次に述べる種々の効果を奏することができる。請求項１記載の発明によれば、受信側の受信パケットの信頼度に応じて、送信側で、伝送状態に適合した送信制御を行うことができるようになる。

【００９３】請求項２記載の発明によれば、信頼度の低い受信パケットを使用して合成することに伴う、信号の劣化を防止することができる。

【００９４】請求項３記載の発明によれば、受信側の受信パケットの信頼度に応じて、送信側で、伝送状態に適合した送信パラメータの設定を行うことができるようになる。

【００９５】請求項４記載の発明によれば、ＡＣＫ／ＮＡＣＫ信号と送信電力制御信号を用いることにより、精度の高い送信制御を行うことができる。

【００９６】請求項５記載の発明によれば、受信側で既送信パケットと合成できるように、再構築した再送パケットを再送することにより、受信側で既送信パケットと受信パケットを合成することができ、信頼性の高い信号を受信することができる。

【００９７】請求項６記載の発明によれば、上りリンクサイトダイバーシチ受信を行っている場合でも、上位局と移動局がパケット誤りの有無の判断を独立に行うことが可能となる。特に移動局では、上位局からの最終的な判断を待つことなく独立に再送制御を行うことができるため、処理遅延を低減できると共に、送信バッファ量を削減することができる。

【００９８】請求項９記載の発明によれば、複数の基地局からのパケットが合成されるため、受信パケットの信頼度が向上される。移動局では、複数基地局から送信される同一のＡＣＫ／ＮＡＣＫ信号を用いて、信頼度の高い再送制御を行うことができる。

【００９９】請求項１０記載の発明によれば、下りリンクサイトダイバーシチのために送信を行っている複数の基地局が同一のＡＣＫ／ＮＡＣＫ信号に従って送信を行うため、移動局においてサイトダイバーシチ効果を得ることができる。

【０１００】請求項１１～１３記載の発明によれば、請求項１～１０に記載された通信方法に適した基地局を提供することができる。

【図面の簡単な説明】

【図１】受信側で、３段階以上で示されるＡＣＫ／ＮＡＣＫ信号を生成する場合を説明するための図である。

【図２】受信パケットの信頼度に応じて、受信パケットを保存するか、破棄するかを決定する場合を説明するための図である。

【図３】受信側からフィードバックされるＡＣＫ／ＮＡＣＫ信号に応じて、送信側において、送信パラメータを制御する場合を説明するための図である。

【図４】ＡＣＫ／ＮＡＣＫ信号と送信電力制御コマンドの両信号を複合的に用いる場合を説明するための図である。

【図５】情報伝送速度が減少した場合、送信側でパケットを再構築して再送する場合を説明するための図（その１）である。

【図６】情報伝送速度が減少した場合、送信側でパケットを再構築して再送する場合を説明するための図（その２）である。

【図７】情報伝送速度が上昇した場合、送信側でパケットを再構築して再送する場合を説明するための図（その１）である。

【図８】情報伝送速度が上昇した場合、送信側でパケットを再構築して再送する場合を説明するための図（その２）である。

【図９】ＣＤＭＡパケット伝送において、移動局から送信された信号を複数の基地局が同時に受信する上りリンクサイトダイバーシチ受信を行う場合を説明するための図（その１）である。

【図１０】ＣＤＭＡパケット伝送において、移動局から送信された信号を複数の基地局が同時に受信する上りリンクサイトダイバーシチ受信を行う場合を説明するための図（その２）である。

【図１１】複数の基地局から送信された信号を移動局が同時に受信する下りリンクサイトダイバーシチ受信を行う場合を説明するための図である。

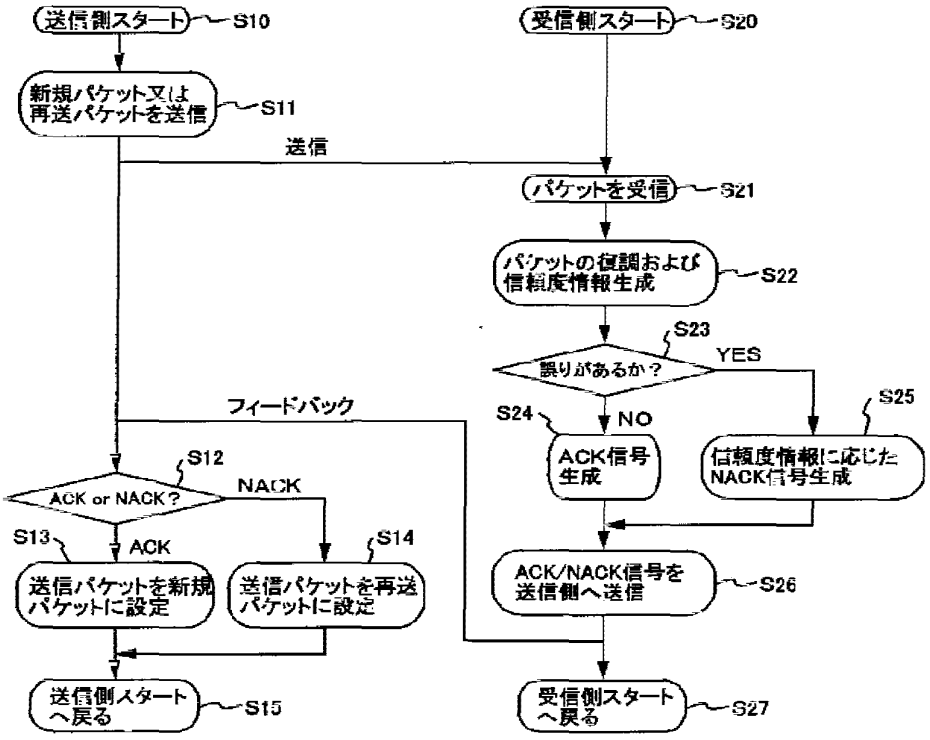
【符号の説明】

ＡＣＫ　　受信パケットに誤りがないことを示すＡＣＫ信号

ＮＡＣＫ　　誤りが含まれていることを示すＮＡＣＫ信号

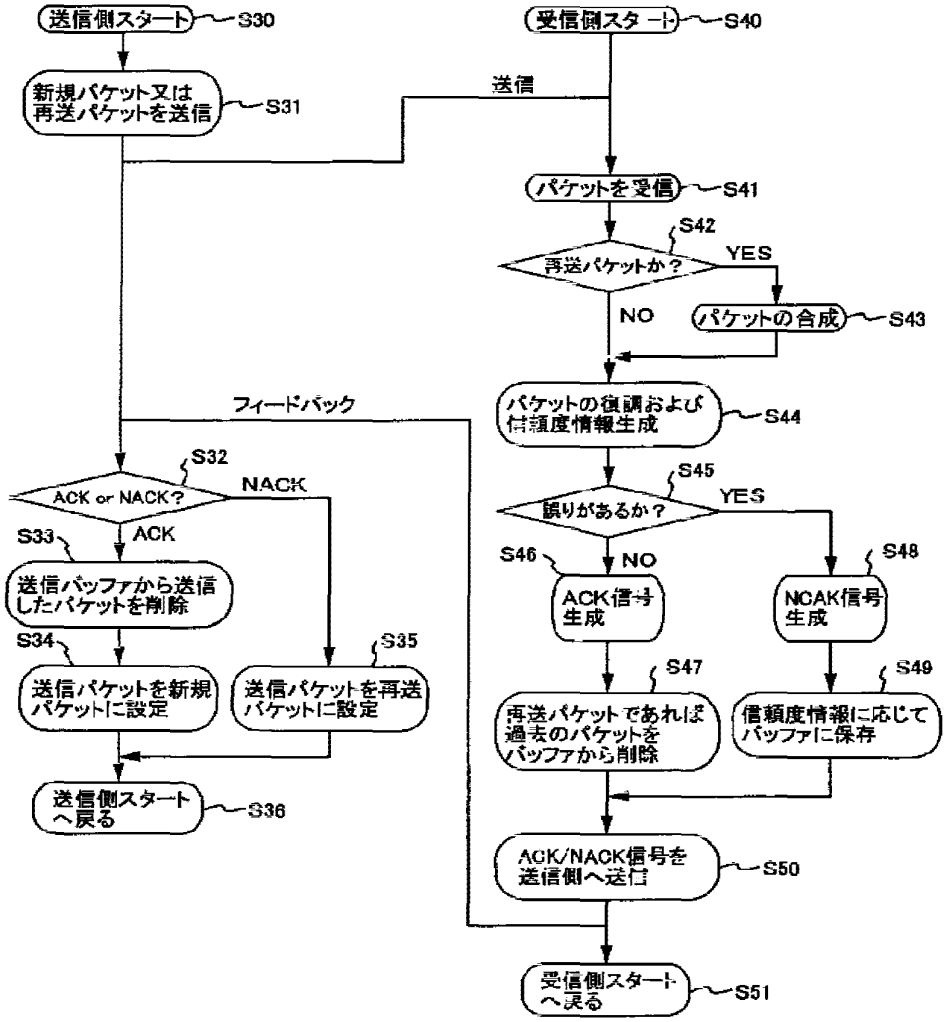
【図１】

受信側で、3段階以上で示されるACK／NACk信号を生成する場合を説明するための図



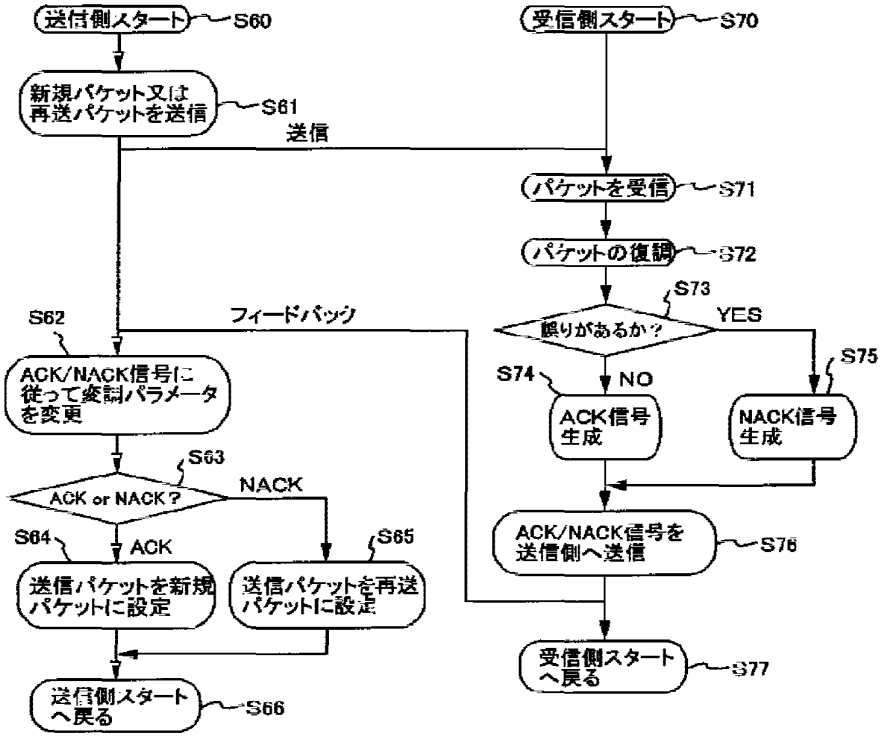
【図２】

受信パケットの信頼度に応じて、受信パケットを保存するか、破棄するかを決定する場合を説明するための図



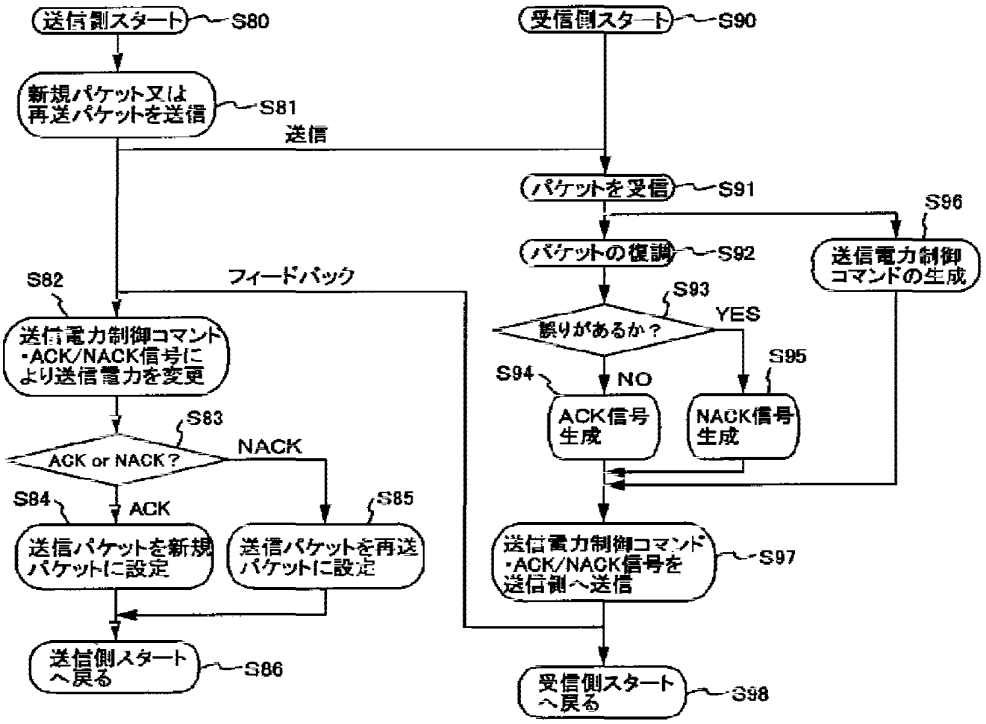
【図３】

受信側からフィードバックされるACK／NACK信号に応じて、送信側において、送信パラメータを制御する場合を説明するための図



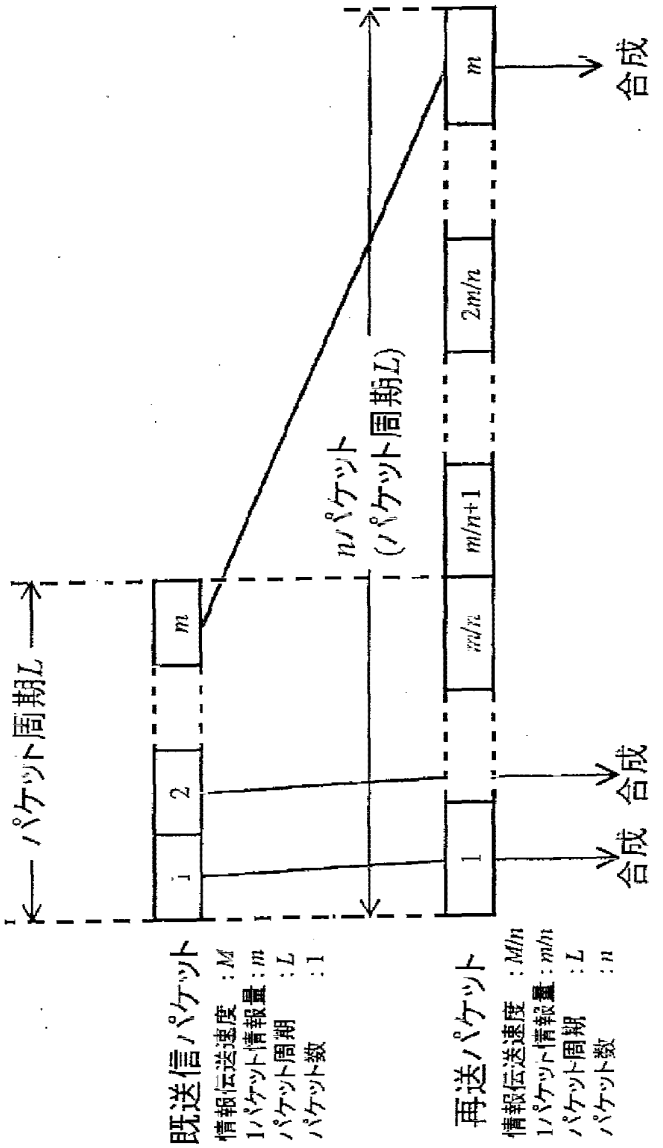
【図４】

ACK／NACK信号と送信電力制御コマンドの両信号を複合的に用いる場合を説明するための図



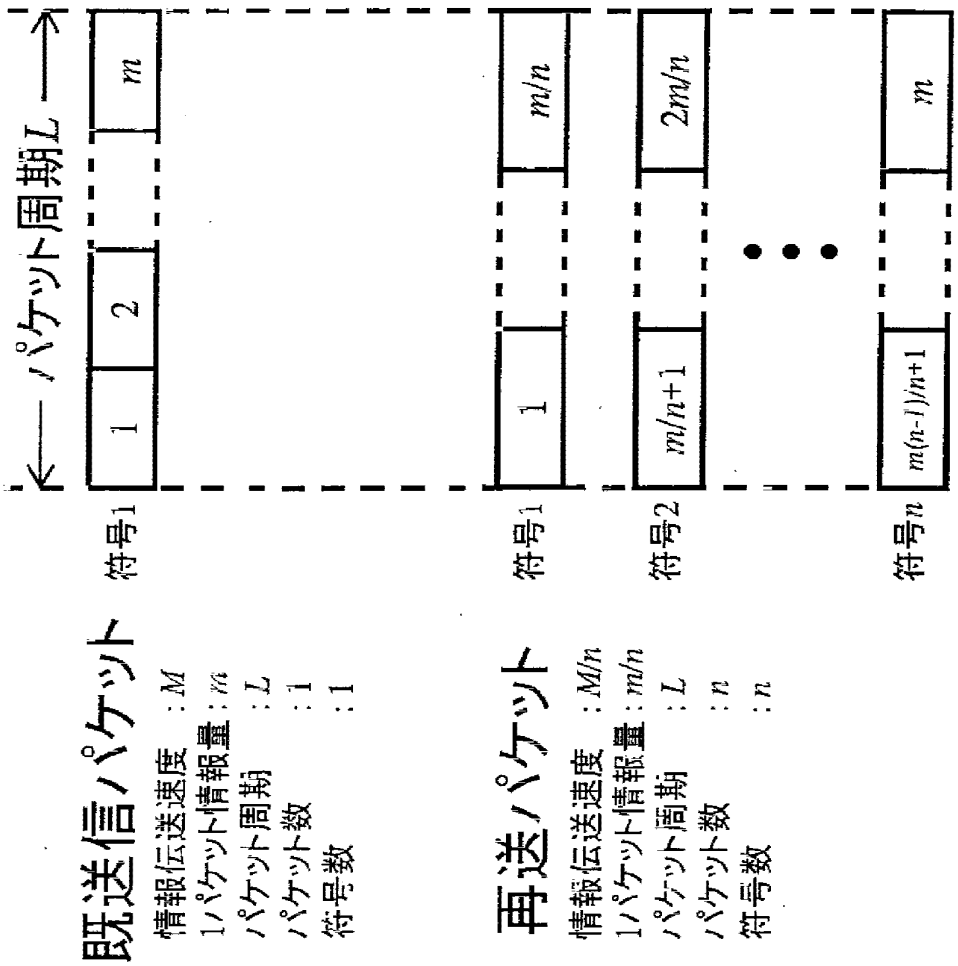
【図5】

情報伝送速度が減少した場合、送信側でパケットを再構築して再送する場合を説明するための図（その1）



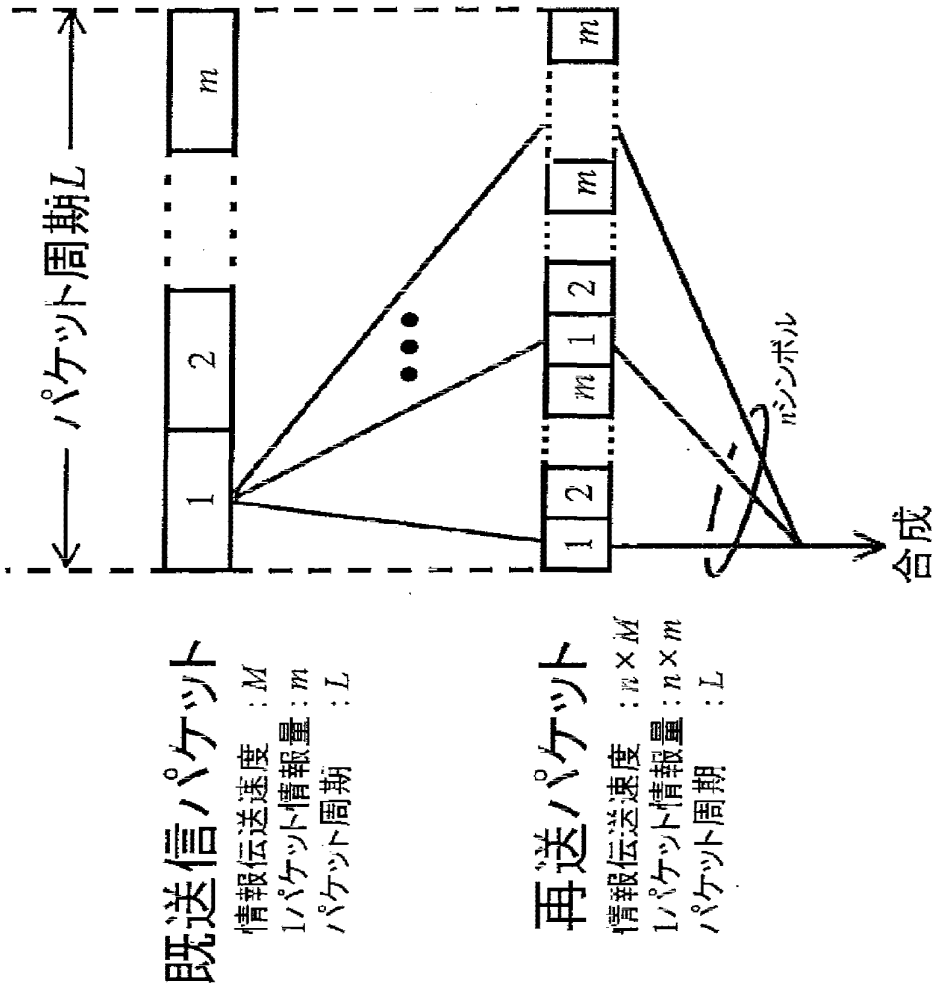
【図6】

情報伝送速度が減少した場合、送信側でパケットを再構築して再送する場合を説明するための図（その2）



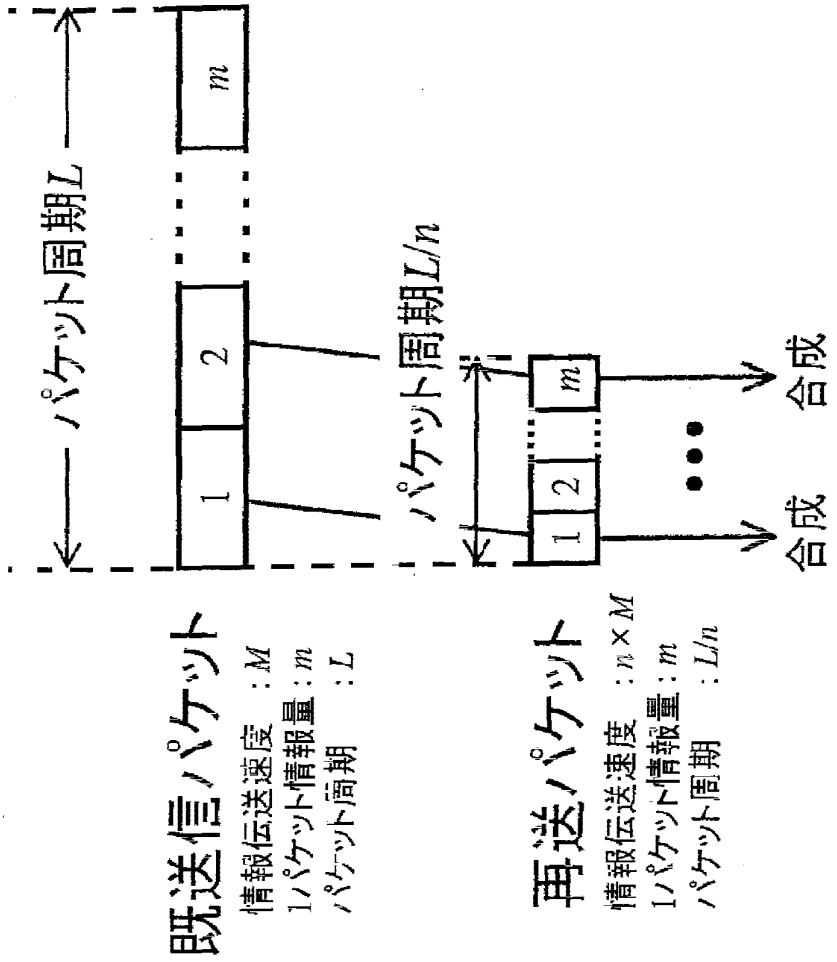
【図7】

情報伝送速度が上昇した場合、送信側でパケットを再構築して再送する場合を説明するための図（その１）



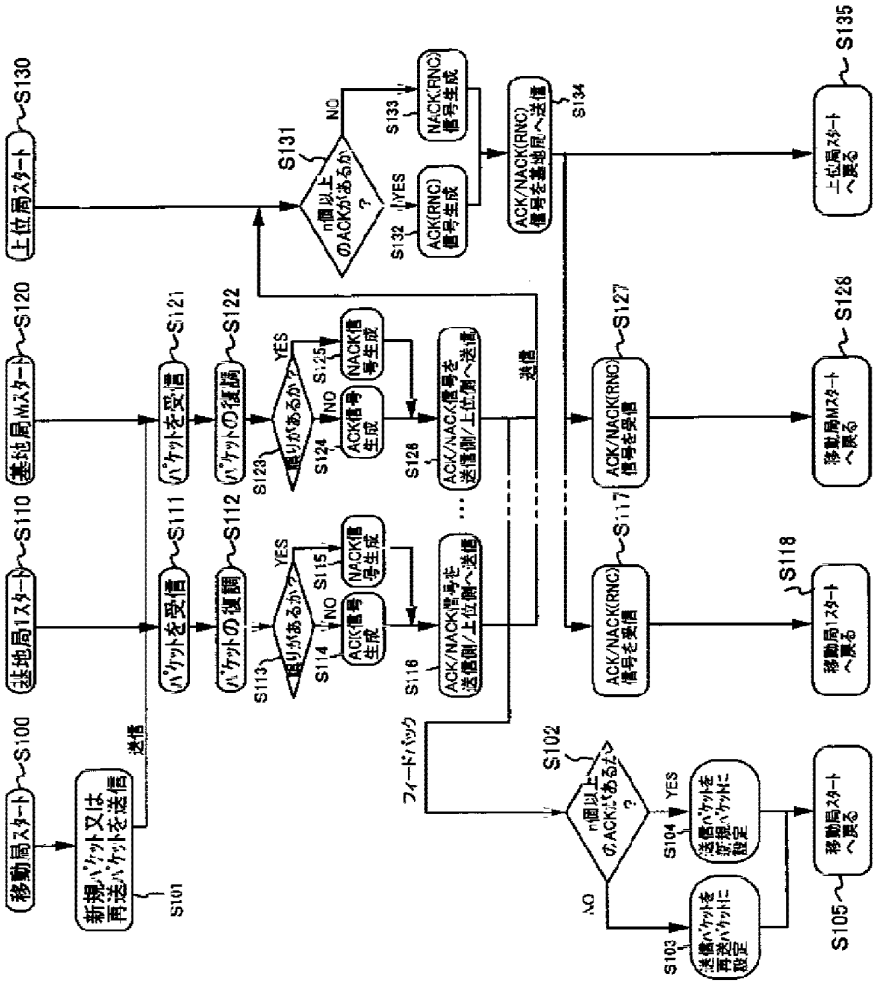
【図8】

情報伝送速度が上昇した場合、送信側でパケットを再構築して再送する場合を説明するための図（その２）



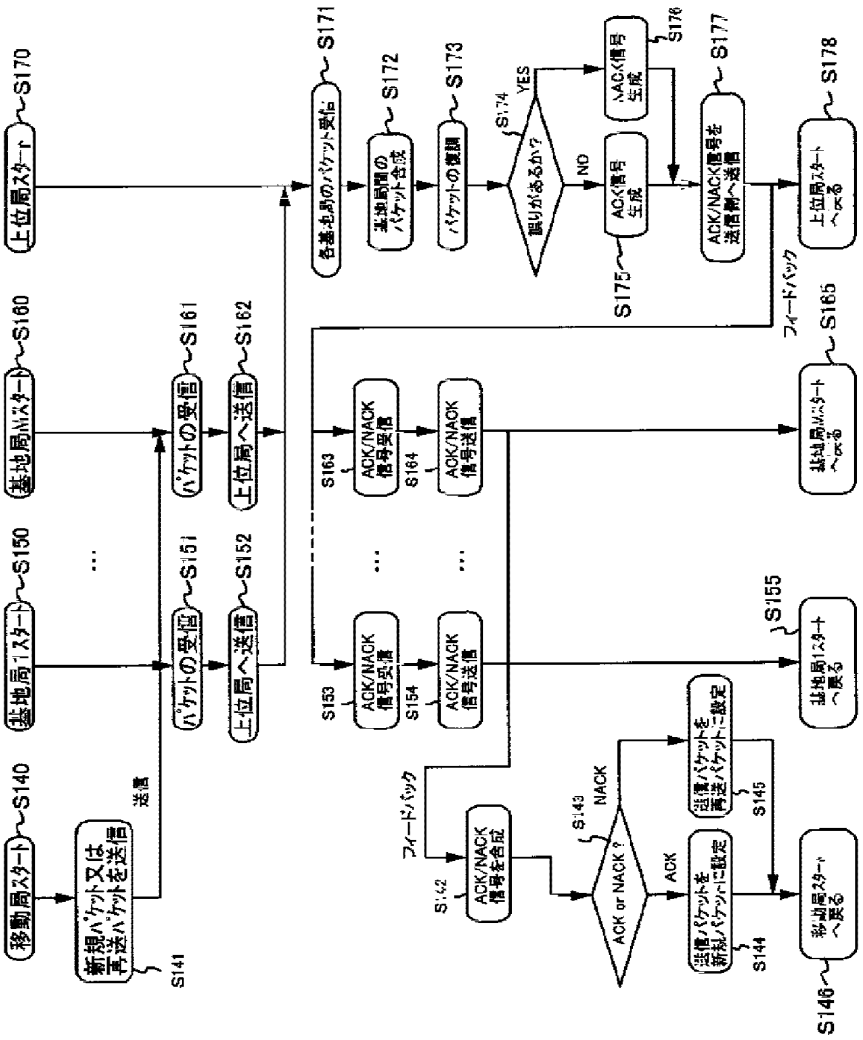
【図9】

CDMAパケット伝送において、移動局から送信された信号を複数の基地局が同時に受信する上りリンクサイトダイバーシチ受信を行う場合を説明するための図（その1）



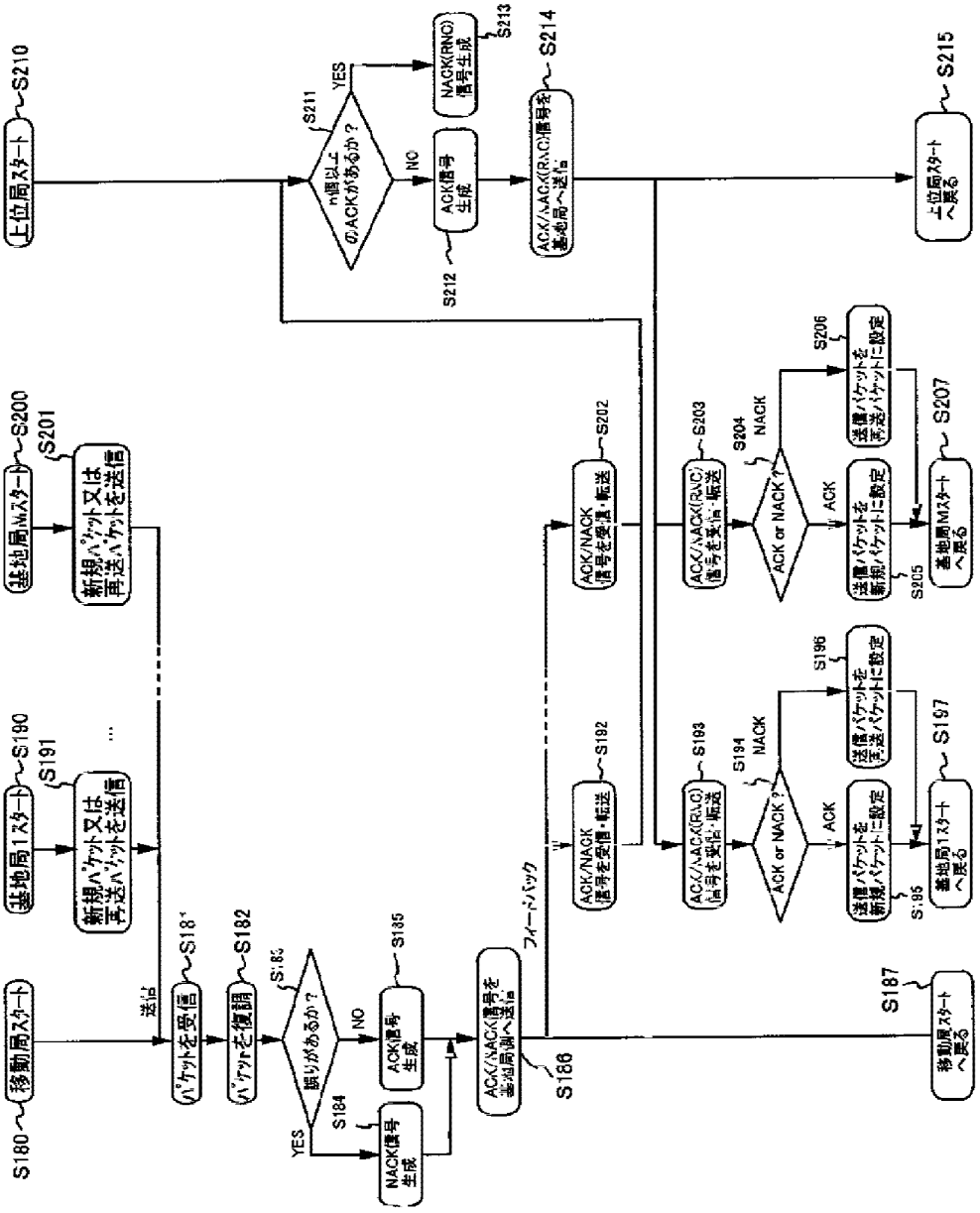
【図１０】

CDMAパケット伝送において、移動局から送信された信号を複数の基地局が同時に受信する上りリンクサイトダイバーシチ受信を行う場合を説明するための図（その2）



【図１１】

複数の基地局から送信された信号を移動局が同時に受信する下りリンクサイトダイバーシチ受信を行う場合を説明するための図



フロントページの続き

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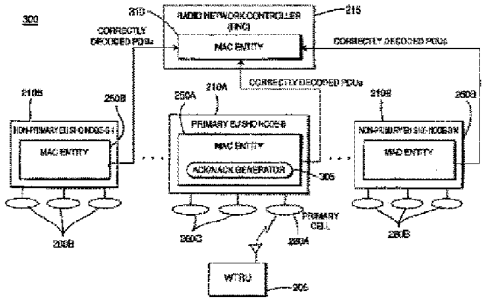
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(54)【発明の名称】ハンドオーバ中にノードＢを調整しかつエンハンストアップリンク（ＥｎｈａｎｃｅｄＵｐｌｉｎｋ）送信をサポートするワイヤレス通信方法および装置

(57)【要約】
エンハンストアップリンク（ＥＵ）送信のハンドオーバ中にノードＢを調整するためのワイヤレス通信方法および装置。一実施形態では、無線ネットワークコントローラ（ＲＮＣ）はノードＢ間ソフトハンドオーバを始動する。ワイヤレス送受信ユニット（ＷＴＲＵ）は複数のノードＢとの通信接続を確立する。ノードＢのうちの特定の１つは主ノードＢと指定され、他のノードＢの各々は非主ノードＢと指定される。ＲＮＣは全てのノードＢに、特定のノードＢが主ノードＢであることを知らせる。主ノードＢはソフトハンドオーバ中にＥＵ送信をスケジューリングし、ＡＣＫ／ＮＡＣＫを実行する。別の実施形態では、ＲＮＣはソースノードＢに接続されたＷＴＲＵのハードハンドオーバを始動する。ＲＮＣは、ハンドオーバの時間を設定するためにソースノードＢに起動タイマを送信する。できるだけ多数の以前に否定応答された（ＮＡＣＫされた）データパケットが、起動タイマのタイムアウト前にソースノードＢで再送の優先順位を決定される。



【特許請求の範囲】
【請求項1】
無線ネットワークコントローラ（ＲＮＣ）と、複数のノードＢと、少なくとも１つのワイヤレス送受信ユニット（ＷＴＲＵ）とを含むワイヤレスマルチセル通信システムにおいて、ハンドオーバ中にノードＢを調整する方法であって、
（ａ）前記ＲＮＣがノードＢ間ソフトハンドオーバを始動するステップと、
（ｂ）前記ＷＴＲＵが前記ノードＢの少なくとも２つとの通信接続を確立するステップと、
（ｃ）前記ノードＢのうちの特定の１つを主ノードＢと指定するステップと、
（ｄ）他の１つまたは複数の前記ノードＢを非主ノードＢと指定するステップと、
（ｅ）前記ＲＮＣが、前記特定のノードＢが主ノードＢであることを前記ノードＢに知らせるステップと、
を含むことを特徴とする方法。
【請求項2】
（ｆ）前記主ノードＢがソフトハンドオーバ中に前記ＷＴＲＵから発信されたアップリンク（ＵＬ）送信を制御するステップ、
をさらに含むことを特徴とする請求項１に記載の方法。
【請求項3】
前記主ノードＢは前記ＵＬ送信をスケジューリングすることを特徴とする請求項２に記載の方法。
【請求項4】
前記主ノードＢは前記非主ノードＢに関する物理測定情報を受信し、前記ＵＬ送信をスケジューリングするときに前記情報を考慮に入れることを特徴とする請求項３に記載の方法。
【請求項5】
前記主ノードＢはスケジューリング情報を前記ＷＴＲＵおよび前記非主ノードＢに送信することを特徴とする請求項４に記載の方法。
【請求項6】
（ｆ）エンハンストアップリンク（ＥＵ）スケジューリングおよびハイブリッド自動再送要求（Ｈ－ＡＲＱ）動作を実行することにより、前記主ノードＢがソフトハンドオーバ中に送信を制御するステップ、
をさらに含むことを特徴とする請求項１に記載の方法。
【請求項7】
肯定応答（ＡＣＫ）または否定応答（ＮＡＣＫ）が前記主ノードＢから前記ＷＴＲＵへ同期的にまたは非同期的に送信されることを特徴とする請求項６に記載の方法。
【請求項8】
前記非主ノードＢは、正確に復号されたデータブロックを前記ＲＮＣに送信することを特徴とする請求項６に記載の方法。
【請求項9】
前記主ノードＢは、前記ノードＢから受信されるダウンリンク品質に基づいて、ＷＴＲＵによって選択されることを特徴とする請求項１に記載の方法。
【請求項10】
前記ダウンリンク品質はダウンリンクパイロット電力であることを特徴とする請求項９に記載の方法。
【請求項11】
前記主ノードＢは、各ノードＢにおけるアップリンク性能統計に基づいて、前記ＲＮＣによって選択されることを特徴とする請求項１に記載の方法。
【請求項12】
前記ＲＮＣは、前記ノードＢからのダウンリンク品質に関して前記ＷＴＲＵによって生

成される報告にさらに基づいて、前記主ノードＢを選択することを特徴とする請求項１１に記載の方法。
【請求項13】
前記ＲＮＣは、アップリンクおよびダウンリンク品質の組合せに関して前記ＷＴＲＵによって生成される報告にさらに基づいて、前記主ノードＢを選択することを特徴とする請求項１１に記載の方法。
【請求項14】
無線ネットワークコントローラ（ＲＮＣ）と、ソースノードＢと、ターゲットノードＢと、少なくとも１つのワイヤレス送受信ユニット（ＷＴＲＵ）とを含むワイヤレスマルチセル通信システムにおいて、ハンドオーバ中にノードＢを調整する方法であって、
（ａ）前記ＲＮＣが前記ソースノードＢに接続されたＷＴＲＵのハードハンドオーバを始動するステップと、
（ｂ）前記ＲＮＣが、前記ＷＴＲＵが前記ソースノードＢに接続されている間にいつ送受信を停止するかを前記ソースノードＢに知らせるステップと、
（ｃ）前記ＲＮＣが起動タイマを前記ソースノードＢに送信して、前記起動タイマがタイムアウトしたときに終了するハンドオーバの時間を設定するステップと、
を含むことを特徴とする方法。
【請求項15】
（ｄ）前記ソースノードＢが、以前に送信されて前記ソースノードＢによって否定応答された（ＮＡＣＫされた）データパケットがあるかどうかを決定するステップと、
（ｅ）前記ソースノードＢが前記ＷＴＲＵによって送信されたデータパケット送信の優先順位を調整して、前記起動タイマがタイムアウトする前に、できるだけ多数の以前にＮＡＣＫされたデータパケットを受信するステップと、
をさらに含むことを特徴とする請求項１４に記載の方法。
【請求項16】
（ｄ）前記ソースノードＢが、以前に送信されて前記ソースノードＢによって否定応答された（ＮＡＣＫされた）データパケットがあるかどうかを決定するステップと、
（ｅ）前記ソースノードＢが前記ＷＴＲＵによって送信されたデータパケット再送に使用される変調および符号化スキーム（ＭＣＳ）を調整して、前記起動タイマがタイムアウトする前に、できるだけ多数の以前にＮＡＣＫされたデータパケットを受信するステップと、
をさらに含むことを特徴とする請求項１４に記載の方法。
【請求項17】
エンハンストアップリンク通信のハンドオーバ中にノードＢを調整するためのワイヤレス通信システムであって、
（ａ）ワイヤレス送受信ユニット（ＷＴＲＵ）と、
（ｂ）各ノードＢがエンハンストアップリンク（ＥＵ）機能のためのエンティティを備え、かつ前記ＷＴＲＵからの送信を独立して処理する複数のノードＢであって、前記ノードＢのうちの特定の１つが主ノードＢと指定され、他のノードＢが非主ノードＢと指定され、ハンドオーバ中に前記主ノードＢが前記ＷＴＲＵからのＥＵ送信を制御するように構成された複数ノードＢと、
を含むことを特徴とするシステム。
【請求項18】
前記主ノードＢはソフトハンドオーバ中にＷＴＲＵから発信されるアップリンク（ＵＬ）送信を制御することを特徴とする請求項１７に記載のシステム。
【請求項19】
前記主ノードＢが前記ＵＬ送信をスケジューリングすることを特徴とする請求項１８に記載のシステム。
【請求項20】
前記主ノードＢは前記非主ノードＢに関する物理測定情報を受信し、前記ＵＬ送信をス

ケジューリングするときに前記物理測定情報を考慮に入れることを特徴とする請求項１９に記載のシステム。
【請求項21】
前記主ノードＢは前記ＷＴＲＵおよび前記非主ノードＢにスケジューリング情報を送信することを特徴とする請求項１９に記載のシステム。
【請求項22】
肯定応答（ＡＣＫ）または否定応答（ＮＡＣＫ）が前記主ノードＢから前記ＷＴＲＵへ同期的にまたは非同期的に送信されることを特徴とする請求項１７に記載のシステム。
【請求項23】
無線ネットワークコントローラ（ＲＮＣ）と、複数のノードＢと、少なくとも１つのワイヤレス送受信ユニット（ＷＴＲＵ）とを含むワイヤレスマルチセル通信システムにおいて、ハンドオーバ中にノードＢを調整するのに使用される集積回路（ＩＣ）であって、
（ａ）前記ノードＢのうちの特定の１つを主ノードＢと指定する手段と、
（ｂ）他の１つまたは複数の前記ノードＢを非主ノードＢと指定する手段と、
（ｃ）前記特定のノードＢが主ノードＢと指定されたことを前記ノードＢに知らせるための手段と、
を含むことを特徴とするＩＣ。
【請求項24】
前記ＩＣが前記ＲＮＣと一体化されることを特徴とする請求項２３に記載のＩＣ。
【請求項25】
無線ネットワークコントローラ（ＲＮＣ）と少なくとも１つのワイヤレス送受信ユニット（ＷＴＲＵ）とを含むワイヤレスマルチセル通信システムにおいて、
（ａ）ノードＢ間のハードハンドオーバの前およびその間に前記ＷＴＲＵと通信する手段と、
（ｂ）以前に送信されて前記ソースノードＢによって否定応答された（ＮＡＣＫされた）データパケットがあるかどうかを決定する手段と、
（ｃ）前記ＷＴＲＵから受信したデータパケット再送の優先順位を調整して、起動タイマがタイムアウトする前に、できるだけ多数の以前にＮＡＣＫされたデータパケットを受信する手段と、
を含むことを特徴とするノードＢ。
【請求項26】
（ｄ）ハンドオーバの時間を設定することに使用される起動タイマをＲＮＣから受信する手段と、
（ｅ）前記ＷＴＲＵから受信したデータパケット再送に使用される変調および符号化スキーム（ＭＣＳ）を調整して、前記起動タイマがタイムアウトする前に、できるだけ多数の以前にＮＡＣＫされたデータパケットを受信する手段と、
をさらに含むことを特徴とする請求項２５に記載のノードＢ。
【請求項27】
複数のノードＢを含むワイヤレスマルチセル通信システムにおいて、
（ａ）前記複数のノードＢを制御する手段と、
（ｂ）ノードＢ間のソフトハンドオーバを始動する手段と、
（ｃ）前記ノードＢのうちの特定の１つを主ノードＢと指定する手段と、
（ｄ）他の１つまたは複数の前記ノードＢを非主ノードＢと指定する手段と、
（ｅ）前記特定のノードＢが主ノードＢと指定されたことを前記ノードＢに知らせるための手段と、
を含むことを特徴とする無線ネットワークコントローラ（ＲＮＣ）。
【請求項28】
複数のノードＢを含むワイヤレスマルチセル通信システムにおいて、
（ａ）前記複数のノードＢを制御する手段と、
（ｂ）ノードＢ間のソフトハンドオーバを始動する手段と、

（ｃ）前記ノードＢのうちの特定の１つを主ノードＢと指定する手段と、
（ｄ）他の１つまたは複数の前記ノードＢを非主ノードＢと指定する手段と、
（ｅ）前記特定のノードＢが主ノードＢと指定されたことを前記ノードＢに知らせるための手段と、
を含むことを特徴とする集積回路（ＩＣ）。
【請求項29】
前記ＩＣが、前記複数のノードＢを制御する無線ネットワークコントローラ（ＲＮＣ）
【発明の詳細な説明】特徴とする請求項２８に記載のＩＣ。
【技術分野】
【0001】
本発明は、ワイヤレス通信システムに関する。さらに詳しくは、本発明は、ハンドオーバ中にノードＢを調整しかつエンハンストアップリンク（ＥＵ）送信をサポートするための方法および装置に関する。
【背景技術】
【0002】
第三世代パートナーシッププロジェクト（３ＧＰＰ）において、ＥＵ送信のカバレージ、スループット、および送信待ち時間（ｔｒａｎｓｍｉｓｓｉｏｎ　ｌａｔｅｎｃｙ）を改善するために、多くのスキームが提案されてきた。発展形態の１つは、アップリンク（ＵＬ）物理チャネル資源のスケジューリングおよび割当ての機能を、無線ネットワークコントローラ（ＲＮＣ）からノードＢへ移すというものである。ノードＢはより効率的な決定を行い、たとえＲＮＣがノードＢに対する全体的な制御を保持していても、ＲＮＣよりよくＵＬ無線資源を短期的に管理することができる。同様の手法はすでに、ユニバーサル移動体通信システム（ＵＭＴＳ）の周波数分割二重（ＦＤＤ）および時分割二重（ＴＤＤ）モードの両方で、高速データパケットアクセス（ＨＳＤＰＡ）のためにダウンリンクで採用されている。
【0003】
媒体アクセス制御（ＭＡＣ）レベルの自動再送要求（ＡＲＱ）およびハイブリッドＡＲＱ（Ｈ－ＡＲＱ）の使用により、性能が大幅に向上することも認識されている。ソフトハンドオーバ中のこれらの技法の適用は、追加の著しい利点を提供する。
【0004】
図１は、ワイヤレス送受信ユニット（ＷＴＲＵ）１０５、ノードＢ１１０、ＲＮＣ１１５、および少なくとも２つのセル１２０Ａ、１２０Ｂを含む、従来のワイヤレスマルチセル通信システム１００を示す。セル１２０Ａ、１２０Ｂの各々は、ノードＢ１１０によってサービスを提供される。ノードＢ１１０はＲＮＣ１１５によって制御される。最良の無線状態を提供するセルの切替えがセル１２０Ａと１２０Ｂとの間で決定されると、ハンドオーバプロセスが始動される。
【0005】
「ノードＢ内ハンドオーバ」は、図１に示すように、ＷＴＲＵが同一ノードＢによって制御される１つのセルから別のセルに切り替わるときに、発生する。「ノードＢ間ハンドオーバ」は、ＷＴＲＵが異なるノードＢによって制御される１つのセルから別のセルに切り替わるときに、発生する。後者の場合、ハンドオーバ前にセルを制御するノードＢはソースノードＢと呼ばれ、ハンドオーバ後にセルを制御するノードＢはターゲットノードＢと呼ばれる。
【0006】
ソフトハンドオーバ中に、ＷＴＲＵは、アクティブセット内の複数のノードＢとの複数の接続を確立する。この状況で、スケジューリングおよびＨ－ＡＲＱ動作に問題が発生することがある。ＷＴＲＵは、２つ以上のノードＢから競合するＥＵ送信スケジューリングを受け取ることがある。また、ＷＴＲＵが複数のノードＢによって生成されるＨ－ＡＲＱ肯定および否定応答（ＡＣＫ／ＮＡＣＫ）を受け取り、復号し、かつ処理することも困難である。ノードＢにおけるＨ－ＡＲＱプロセスのソフトバッファは、ソフトハンドオーバ

中に破壊することがある。
【0007】
ＷＴＲＵがソフトハンドオーバ中であるときに、多数のノードＢの間のＨ－ＡＲＱをサポートする１つの方法は、ＡＣＫ／ＮＡＣＫ生成機能をＲＮＣに配置し、ＲＮＣが多数のノードＢからの結果に基づいて単一のＡＣＫ／ＮＡＣＫを導出するというものである。しかし、この手法はＡＣＫ／ＮＡＣＫプロセスにかなりの遅延をもたらし、それは性能上の理由から非常に望ましくない。
【0008】
ＷＴＲＵがノードＢ間ハードハンドオーバを受けるときに、ハードハンドオーバが終了する前のノードＢであるソースノードＢは、ハードハンドオーバ起動時間の前にＮＡＣＫされた（ＮＡＣＫｅｄ）データパケットのＥＵ送信を正常に受信することができない可能性がある。ＵＬ資源に対して競合する他のＷＴＲＵは、ソースセル内で充分な物理資源を提供されないことがある。ハンドオーバ前にＮＡＣＫされたデータブロックが、ハンドオーバ起動タイマがタイムアウトする前にソースノードＢに再送された場合、これらのデータブロックは、Ｈ－ＡＲＱ復号のために先行するデータブロックと結合することができる。この方法により、復号は、ソースセルにおけるこれらのデータブロックの、以前の失敗した送信を利用する。ハンドオーバ前にＮＡＣＫされたデータブロックが、ハンドオーバ起動タイマがタイムアウトする前にソースノードＢに再送されなかった場合、それらは新しいデータブロックとしてターゲットセルに再び送信しなければならない。この場合、ソースセルにおけるこれらのデータブロックの以前の送信は利用されない。
【発明の開示】
【発明が解決しようとする課題】
【0009】
本発明は、エンハンストアップリンク送信のハンドオーバ中にノードＢを調整するためのワイヤレス通信方法および装置に関する。該装置は、ワイヤレス通信システム、ＲＮＣ、ノードＢ、および／または集積回路（ＩＣ）とすることができる。
【課題を解決するための手段】
【0010】
一実施形態では、ワイヤレスマルチセル通信システムは、ＲＮＣ、複数のノードＢ、および複数のＷＴＲＵを含む。各ノードＢは少なくとも１つのセルにサービスを提供し、ＷＴＲＵからのＥＵ送信をスケジューリングする。ひとたびＲＮＣがソフトハンドオーバの必要性を認識すると、ＷＴＲＵはアクティブセット内のノードＢへの接続を確立する。アクティブセット内のノードＢの１つは主ノードＢと指定され、他の全てのノードＢは非主ノードＢと指定される。ＲＮＣまたはＷＴＲＵは、主ノードＢを選択し、主ノードＢについて他のノードＢに知らせる。ソフトハンドオーバ中に、主ノードＢはＥＵ送信をスケジューリングし、ＡＣＫ／ＮＡＣＫを実行する。
【0011】
別の実施形態では、ＲＮＣは、ソースノードＢに接続されたＷＴＲＵのハードハンドオーバを始動する。ＲＮＣは、ＷＴＲＵがソースノードＢに接続されている間にいつ送受信を停止するかをソースノードＢに知らせる。ＲＮＣは、ハンドオーバの時間を設定するためにソースノードＢに起動タイマを送信する。ハンドオーバは起動タイマがタイムアウトしたときに終了する。
【0012】
ソースノードＢは、以前に送信されてソースノードＢによって否定応答された（ＮＡＣＫされた）データパケットがあるかどうかを決定することができる。起動タイマがタイムアウトする前に、できるだけ多数の以前にＮＡＣＫされたデータパケットを受信するために、ソースノードＢは優先順位を調整し、かつ／またはＷＴＲＵによって送信されたデータパケット再送に使用される変調および符号化スキーム（ＭＣＳ）を調整することができる。
【0013】

本発明のより詳細な理解は、例として提示し添付の図面に関連して理解される、以下の説明から得ることができる。

【発明を実施するための最良の形態】

【0014】

本発明を図面の図を参照しながら説明する。図中、同様の参照番号は全体を通して同様の要素を表わす。

【0015】

以下で、用語「ＷＴＲＵ」は、ユーザ装置（ＵＥ）、移動局、固定もしくは移動加入者ユニット、ページャ、またはワイヤレス環境で動作することのできる任意の他の型の装置を含むが、それらに限らない。

【0016】

以下で言及する場合、用語「ノードＢ」は、基地局、サイトコントローラ、アクセスポイント、またはワイヤレス環境における任意の他の型のインタフェース装置を含むが、それらに限らない。

【0017】

本発明は、ＵＭＴＳ－ＦＤＤ、ＴＤＤ、時分割同期符号分割多元接続（ＴＤＳＣＤＭＡ）、符号分割多元接続２０００（ＣＤＭＡ２０００）（ＥＶ－ＤＯおよびＥＶ－ＤＶ）、または任意の他の型のワイヤレス通信システムのような、任意の型のワイヤレス通信システムで実施することができる。

【0018】

本発明の特徴はＩＣ内に組み込むことができ、あるいは多数の相互接続コンポーネントを含む回路に構成することができる。

【0019】

図２は、本発明に従って主ノードＢに配置されたＵＬスケジューラを使用するワイヤレスマルチセル通信システム２００を示す。ワイヤレスマルチセル通信システム２００はＷＴＲＵ２０５、複数のノードＢ２１０（つまり２１０Ａ、２１０Ｂ）、ＲＮＣ２１５、および複数のセル２６０（つまり２６０Ａ、２６０Ｂ、２６０Ｃ）を含む。セル２６０Ａおよび２６０ＣはノードＢ２１０Ａによってサービスを提供される。セル２６０ＢはノードＢ２１０Ｂによってサービスを提供される。全てのノードＢ２１０はＲＮＣ２１５によって制御される。

【0020】

ソフトハンドオーバ中に、ＷＴＲＵ２０５は、アクティブセットに含まれるノードＢ２１０との多数の接続を確立する。ＷＴＲＵ２０５からの各送信は、各々のノードＢ２１０で独立して処理される。アクティブセット内のノードＢ２１０の１つは主ノードＢ２１０Ａと指定され、他のノードＢは非主ノードＢ２１０Ｂと指定される。

【0021】

図２に示すように、主ノードＢ２１０Ａは、ＵＬスケジューラ２５５を含むＭＡＣエンティティ２５０Ａを含む。非主ノードＢ２１０Ｂの各々も、ＭＡＣエンティティ２５０Ｂをも含む。ＭＡＣエンティティ２５０Ａ、２５０Ｂの各々は、ＥＵ送信を処理する。ＭＡＣエンティティ２５０Ａ内のＵＬスケジューラ２５５は、ＥＵ送信のスケジューリングを担当する。

【0022】

本発明の一実施形態に従って、ＵＬスケジューラ２５５は、ソフトハンドオーバ中に主ノードＢ２１０Ａでだけ実施される。ＷＴＲＵ２０５は、主セル２６０Ａ内の主ノードＢ２１０Ａからだけ ＵＬ送信スケジュールを受信する。しかし、主ノードＢ２１０Ａは、各送信時間間隔（ＴＴＩ）にスケジューリング情報を非主ノードＢ２１０Ｂに送信することはできない。非主ノードＢ２１０Ｂによって制御されるセル内でＷＴＲＵ２０５が送信を行うための資源を主ノードＢ２１０Ａが割り当てることを可能にするために、非主ノードＢ２１０Ｂによって制御される複数のセル２６０Ｂ内で主ノードＢ２５０Ａによってスケジューリングされるこれらの資源は、非主ノードＢ２１０Ｂによって割り当てることがで

きない。したがって、アクティブなＥＵサブセット内の全てのセルで共用される一部の物理資源は、これらの資源が主ノードＢ２１０Ａのみによって使用することができるように、ソフトハンドオーバ中に特定のノードＢによってＷＴＲＵ２０５のために割り当てられ予約されなければならない。

【0023】

主ノードＢ２１０Ａに配置されるＵＬスケジューラ２５５は、ＥＵアクティブサブセット内のいずれかのセル２６０Ａ、２６０Ｂ、２６０ＣでＥＵ送信によって引き起こされる干渉レベルが予め定められた最大許容干渉レベルより低くなるように考慮する。したがって、主ノードＢ２５０Ａは、干渉レベルが他のセル２６０Ｂ、２６０Ｃでも最大許容干渉レベル内となるように、ＷＴＲＵ２０５の送信電力レベルを制限する。これを達成するために、ＲＮＣ２１５は、非主ノードＢ２１０Ｂによって制御されるセル２６０Ｂの送信電力レベルおよび干渉レベルのような必要な情報を主ノードＢ２１０Ａに中継する必要があり、次いで主ノード２１０Ａは該情報をＵＬ送信のスケジューリングに使用する。

【0024】

ＥＵスケジューリング情報は、主ノードＢ２１０Ａのみによって主セル２６０Ａを介してＷＴＲＵ２０５に送信される。ソフトハンドオーバ中に、ＷＴＲＵ２０５は主セル２６０Ａのみでスケジューリング情報を受信するが、ＥＵスケジューリング情報は他の全てのセル２６０Ｂ、２６０Ｃで有効である。

【0025】

一実施形態では、主ノードＢ２５０ＡはＲＮＣ２１５またはＷＴＲＵ２０５のいずれかによって選択される。ＲＮＣ２１５は、予め定められた時間窓中に正確に受信されたデータブロックの最高百分率を持つノードＢを主ノードＢとして選択することができる。

【0026】

別の実施形態では、ＲＮＣ２１５は、予め定められた期間にわたってビット誤り率（ＢＥＲ）またはフレーム誤り率（ＦＥＲ）または類似物のような統計を各ノードＢに対して生成する。次いで、ＲＮＣ２１５は最良の性能を有するノードＢを主ノードＢ２１０Ａに選択する。ＲＮＣ２１５は次いで、それぞれ無線資源コントロール（ＲＲＣ）およびＩｕｂシグナリングを介してＷＴＲＵ２０５および他の全てのノードＢに、主ノードＢ２１０Ａについて通知する。

【0027】

別の実施形態では、ＷＴＲＵ１０２は、最良のダウンリンクパイロット電力（つまり最良のダウンリンク経路損失または最高符号電力）を有するノードＢ２１０を、主ノードＢ２１０Ａとして選択することができる。ＷＴＲＵ２０５は、全てのノードＢ２１０から受信するパイロット信号の電力を測定し、最高パイロット電力を有するノードＢ２１０を主ノードＢ２１０Ａに選択する。ＷＴＲＵ２０５は次いで、高速物理層シグナリングを介して他の全てのノードＢに主ノードＢ２１０Ａについて通知する。

【0028】

ＷＴＲＵ２０５は、全てのセル２６０のダウンリンクパイロット電力をＲＮＣ２１５に報告することができる。ＲＮＣ２１５は次いで、アプリンクおよびダウンリンク複合品質に基づいて、１つのノードＢ２１０を主ノードＢ２１０ａに選択する。セル２６０のアップリンク品質は予め定義された時間窓中に正確に受信されたデータブロックの百分率（またはＢＥＲ、ＦＥＲ、もしくは類似物）に基づき、セル２６０のダウンリンク品質はＷＴＲＵが受信するダウンリンクパイロット電力に基づく。次いでＲＮＣ２１５は、それぞれＲＲＣおよびＩｕｂシグナリングを介してＷＴＲＵ２０５および全てのノードＢ２１０に、主ノードＢ２１０Ａについて通知する。

【0029】

本発明は先行技術のシステムより有利である。本発明を使用して、ＷＴＲＵはソフトハンドオーバ中にノードＢからＥＵ送信の競合するスケジューリングを受信しない。加えて、ＥＵ送信は、非主ノードＢによって制御されるセルの干渉レベルおよび無線資源を考慮してスケジューリングされる。主ノードＢ２１０ＡからＷＴＲＵ２０５へのシグナリング

遅延は、ＲＮＣ２１５からＷＴＲＵ２０５へのシグナリング遅延に比較してずっと低い。

【0030】

別の実施形態では、図３は、図２に示したシステム２００と同様のワイヤレスマルチセル通信システム３００を示す。図３に示すように、主ノードＢ２１０Ａは、ＡＣＫ／ＮＡＣＫ発生器３０５を含むＭＡＣエンティティ２５０Ａを含む。主ノードＢ２１０Ａだけが ＡＣＫ／ＮＡＣＫ発生器３０５を有する。主ノードＢ２１０Ａは増分冗長性を備えたＨ－ＡＲＱを実行するか、あるいは増分冗長性を実現することなくＡＲＱだけを実行することができる。

【0031】

依然として図３を参照して、主ノードＢ２１０Ａは、主セル２６０Ａを介してＷＴＲＵ２０５から少なくとも１つのデータパケットを受信し、データパケットに誤り検査を実行する。巡回冗長検査（ＣＲＣ）のような任意の誤り検査方法を利用することができる。主ノードＢ２１０ＡがＣＲＣに合格するなど、正確にデータパケットを復号すると、主ノードＢ２１０ＡはＡＣＫをＷＴＲＵ２０５に送信し、正確に複合されたデータパケットをＲＮＣ２１５にも送信する。主ノードＢ２１０Ａがデータパケットを正確に復号することに失敗すると、主ノードＢ２１０ＡはＮＡＣＫをＷＴＲＵ２０５に送信する。

【0032】

非主ノードＢ２１０Ｂもまたデータパケットに誤り検査を実行する。しかし、非主ノードＢ２１０ＢはＡＣＫまたはＮＡＣＫをＷＴＲＵ２０５に送信しない。代わりに、非主ノードＢは正常に復号されたデータパケットをＲＮＣ２１５に送信する。ソフトハンドオーバ中は、主ノードＢ２１０ＡだけがＨ－ＡＲＱ（またはＡＲＱ）、ＡＣＫ、およびＮＡＣＫを生成し、再送を制御する。

【0033】

非主ノードＢ２１０Ｂによって受信されたＭＡＣ層ＷＴＲＵアイデンティティは、ユニバーサル地上無線アクセスネットワーク（ＵＴＲＡＮ）で正常に受信された送信を経路指定するために使用することができる。非主ノードＢ２１０Ｂには、どのＷＴＲＵがＥＵ送信のために主ノードＢ２１０Ａによってスケジューリングされたか分からないので、非主ノードＢ２１０Ｂは、ＷＴＲＵ　ＩＤの帯域内ＭＡＣ層シグナリングに頼って、正確に受信された送信を正確なＲＮＣ無線リンクに経路指定する。たとえ主ノードＢ２１０ＡにはどのＷＴＲＵがスケジューリングされているか分からなくても、同じ方法は主ノードＢ２１０Ａによっても実施することができる。

【0034】

好ましくは、主ノードＢ２１０Ａはソフト結合を使用して送信を処理することができる一方、非主ノードＢ２１０Ｂはソフト結合無しに各送信を処理することができる。主ノードＢがＮＡＣＫをＷＴＲＵ２０５に送信すると、ＮＡＣＫされたデータパケットは主ノードＢ２１０Ａのバッファに格納され、ＮＡＣＫされたデータパケットは再送されたデータパケットと結合される。対照的に、非主ノードＢ２１０ＢはＮＡＣＫされたデータパケットを格納しない。これはノードＢ２１０間のソフトバッファの破損の問題、および多数の独立したＡＣＫおよび／またはＮＡＣＫの複雑さを解消する。

【0035】

増分結合プロセスが実施されるときに、ソフトバッファ破損を防止する措置を講じる必要がある。ＷＴＲＵ２０５がもはや特定のＷＴＲＵのＨ－ＡＲＱプロセスのためのデータを再送しておらず、代わりに新しいデータを送信していることを、ノードＢ２１０が検知することを可能にするために、シーケンス情報または新データ標識が必要である。ノードＢ２１０は新しい送信が開始されたことを知る他の方法を持たないので、これは特に必要である。代替的に、非主ノードＢ２１０Ｂは、増分結合プロセスを使用することなく、ＡＲＱを単純に実行することができる。これはソフトバッファ破損の問題を解消する。

【0036】

非主ノードＢ２１０Ｂが増分結合無しに単純ＡＲＱを実行する場合、ＷＴＲＵ２０５は、以前の送信の結果に関係なく全てのノードＢ２１０が送信を復号できることを確実にす

るために、自己復号可能なデータパケットを送信しなければならない。Ｈ－ＡＲＱ機能性はノードＢ２１０で終了することが好ましい。各々のノードＢ２１０は、正常に復号されたデータパケットを送信シーケンス番号（ＴＳＮ）のような明示的な送信の識別付きで、ＲＮＣ２１５に送信する。ＲＮＣ２１５は、非主ノードＢ２１０Ｂから送達されたデータパケットを任意選択的に使用することができる。ＲＮＣ２１５に配置されたＭＡＣエンティティ３１０は、インシーケンス送達（ｉｎ－ｓｅｑｕｅｎｃｅ　ｄｅｌｉｖｅｒｙ）プロセスを実施して、ノードＢ２１０から受信した全てのパケットより高い層にデータを送達するために使用される。ＲＮＣのＭＡＣエンティティ３１０がその再順序付けプロセスを終了した後、それはデータを無線リンクコントロール（ＲＬＣ）（図示せず）に送信する。失われたパケットはＲＮＣ２１５で識別され、ＲＬＣメッセージングを介してＷＴＲＵ２０５に知らされる。

【0037】

代替的に、ＥＵ送信は、非主ノードＢ２１０Ｂにおけるソフト結合が可能になるように、ＷＴＲＵのＩＤ、Ｈ－ＡＲＱプロセス、送信シーケンス、および／または新データ標識（ＮＤＩ）を識別することができる。この方法を使用して非主ノードＢ２１０Ｂにおけるソフト結合を可能にした場合、主ノードＢ２１０Ａは、結合をいつ実行すべきかを決定するのに、スケジューリングおよびＨ－ＡＲＱ　ＡＣＫ／ＮＡＣＫの決定に頼る必要がなくなる。

【0038】

ＡＣＫ／ＮＡＣＫメッセージの送信には２つの選択肢がある。第一の選択肢は同期送信である。ＡＣＫ／ＮＡＣＫメッセージは、対応するアップリンク送信またはＥＵチャネル割当てメッセージに関連する独自の時間遅延後に送信される。第二の選択肢は非同期送信である。ＡＣＫ／ＮＡＣＫメッセージの送信と対応するアップリンク送信またはＥＵチャネル割当てメッセージ間に独自の遅延はない。ＡＣＫ／ＮＡＣＫメッセージ内の明示的情報は対応するアップリンク送信を識別して、ＷＴＲＵ２０５がＡＣＫ／ＮＡＣＫメッセージと送信との間の正しい関連付けができるようにする。この関連付けは、ＷＴＲＵ２０５への各ＡＣＫ／ＮＡＣＫフィードバックメッセージで、Ｈ－ＡＲＱプロセス番号および／または一意のシーケンス番号、例えばＴＳＮの両方またはどちらかを識別することによって行われる。

【0039】

非同期ＡＣＫ／ＮＡＣＫフィードバックの場合に実施することが好ましい別の実施形態では、主ノードＢ２１０Ａによって正確に受信されなかった送信ではなく、非主ノードＢ２１０Ｂによって正確に受信された送信の不必要な再送を回避するために、非主ノードＢ２１０ＢがＨ－ＡＲＱのＡＣＫ／ＮＡＣＫ結果を主ノードＢ２１０Ａに提供することができる。非主ノードＢ２１０ＢはＡＣＫまたはＮＡＣＫメッセージをＷＴＲＵ２０５に直接は送信しない。非主ノードＢ２１０ＢはＡＣＫ／ＮＡＣＫまたはＣＲＣ結果をＲＮＣ２１５に送信する。次いでＲＮＣ２１５はＡＣＫまたはＣＲＣ結果を主ノードＢ２１０Ａに送信する。

【0040】

Ｈ－ＡＲＱ処理を高速化するために、ＲＮＣによって受信されたいずれかの非主ノードＢ２１０Ｂからの最初のＡＣＫメッセージは、即座に主ノードＢ２１０Ａに転送されることが好ましい。主ノードＢ２１０Ａはまた、送信が主ノードＢ２１０Ａで正確に受信された場合、非主ノードＢ２１０Ｂからのフィードバックを待つことなく、即座にＡＣＫメッセージを生成する。主ノードＢ２１０Ａはまた、たとえ他のＡＣＫメッセージが転送されることがある場合でも、ＲＮＣからの転送ＡＣＫメッセージを受信次第、即座にＡＣＫメッセージを生成する。いずれかの経路が正常であれば、ＡＣＫは生成されるので、ＡＣＫは最初の正常な送信が見つかるやいなや、すぐに生成することができる。

【0041】

代替的に、ＡＣＫ／ＮＡＣＫ発生器２０５の設計を簡素化するために、生成ノードのサブセットのみを使用することができる。例えば、ＡＣＫはＲＮＣのみで、あるいはＲＮＣ

および主ノードＢ２１０Ａで生成することができる。
【0042】
ＷＴＲＵ２０５が各Ｈ－ＡＲＱプロセスにアップリンク送信を送出するときに、ＷＴＲＵ２０５は、少なくとも主ノードＢ２１０ＡがＡＣＫ／ＮＡＣＫフィードバックを送出するのに必要な時間だけ待つ。各Ｈ－ＡＲＱプロセスに対し、ＡＣＫがＷＴＲＵ２０５によって受信されると、ＷＴＲＵ２０５は次に利用可能または割り当てられた機会に新しいデータを送信することができる。
【0043】
ＲＮＣ２１５は、ソフトハンドオーバ中にいずれかのノードＢ２１０に正常な受信がなかったことを決定するために必要な全ての情報を持つ唯一のノードであるので、ＮＡＣＫメッセージはＲＮＣ２１５からしか発信することができない。ＲＮＣ２１５が予め定められた時間間隔内にノードＢ２１０からＡＣＫを受信しなければ、ＲＮＣ２１５はＮＡＣＫコマンドを生成する。ＲＮＣ２１５は、主ノードＢ２１０Ａを介して、ＮＡＣＫメッセージをＷＴＲＵ２０５に転送する。
【0044】
この手順を明示的なＮＡＣＫコマンド無しに実施できるようにすることも可能である。この場合、特定の時間内にＡＣＫを受信しないことは、主ノードＢ２１０Ａおよび／またはＷＴＲＵ２０５のいずれかにおける明示的なＮＡＣＫコマンドと同じとみなされる。
【0045】
図４は、本発明の一実施形態に従ってソフトハンドオーバ中にノードＢを調整するための方法ステップを含むプロセス４００のフローチャートである。ステップ４０５で、ＲＮＣ２１５はノードＢ間ソフトハンドオーバを始動する決定を行う。ステップ４１０で、ＷＴＲＵ２０５はアクティブセット内の少なくとも２つのノードＢ２１０との接続を確立する。ステップ４１５で、アクティブセット内のノードＢ２１０の１つが主ノードＢ２１０Ａと指定され、アクティブセット内の残りの１つまたは複数のノードＢ２１０は非主ノードＢ２１０Ｂと指定される。ステップ４２０で、主ノードＢ２１０Ａは、ＥＵスケジューリングおよびＨ－ＡＲＱ動作を実行することにより、ソフトハンドオーバ中にＵＬ送信を制御する。
【0046】
図５は、本発明の別の実施形態に従って、ハードハンドオーバが終了する前にソースノードＢでＮＡＣＫされたデータの送信の優先順位を決定するための方法ステップを含むプロセス５００のフローチャートである。ステップ５０５で、ＲＮＣ２１５は、ソースノードＢ２１０に接続されたＷＴＲＵ２０５のハードハンドオーバを始動することを決定する。ステップ５１０で、ＲＮＣ２１５は、ＷＴＲＵ２０５がソースセル２６０の送受信をいつ停止するかをソースノードＢ２１０に知らせる。ステップ５１５で、ＲＮＣ２１５は、ハンドオーバの時間を設定するために、起動タイマをソースノードＢ２１０に送信する。
【0047】
依然として図５を参照して、以前にＮＡＣＫされたデータパケットがあるとソースノードＢ２１０が決定した場合、できるだけ多数の以前にＮＡＣＫされたデータパケットを、ハンドオーバ起動タイマがタイムアウトする前に再送しなければならない。さもなければ、システムは、以前の送信を再送と増分的に結合する利点を失うことがある。したがって、ソースノードＢスケジューラ２５５は、ＮＡＣＫされたデータパケットをスケジューリングするときに、ハンドオーバ起動時間を考慮に入れる。ソースノードＢ２１０がＮＡＣＫされた全てのデータパケットの送信を時間内にスケジュールするための充分な無線資源がない場合、ソースノードＢ２１０は何とかして、できるだけ多数のＮＡＣＫされたデータパケットの送信をスケジューリングしなければならない。
【0048】
依然として図５を参照して、起動タイマがタイムアウトする前に、できるだけ多数のＮＡＣＫされたデータパケットを送信するために、ソースノードＢ２１０は送信の優先順位を調整し（ステップ５２５）、かつステップ５３０で、ソースノードＢ２１０は送信のＭ

ＣＳを調整する（ステップ５３０）。ＮＡＣＫされたデータパケットに、スケジューリングのより高い優先順位が与えられる。無線資源が充分である場合、より頑健なＭＣＳを使用して、ＷＴＲＵ２０５からソースノードＢ２１０への正常な送信の確立を高めることができる。ステップ５３５で、起動タイマのタイムアウトでハンドオーバは終了する。

【0049】

スケジューリングされたアップリンク送信が、以前に送信を失敗したデータブロック用に意図されていることを、ＷＴＲＵ２０５が理解するために、ソースノードＢ２１０アップリンクスケジューラ２５５は、スケジューリングされたＵＬ送信が、以前にＮＡＣＫされたデータブロック用に意図されていることを指摘することができる。これは、ソースノードＢ２１０からＷＴＲＵ２０５へ送信されるＵＬスケジューリング情報にＨ－ＡＲＱプロセス識別を含めることによって、実施することができる。ソースノードＢ２１０からスケジューリング情報を受信することにより、ＷＴＲＵ２０５は、スケジューリングされた送信が、スケジューリング情報と共に送信されるＨＡＲＱプロセス識別に関連付けられる特定のデータ用であることを知る。

【0050】

本発明を特に好適な実施形態に関連して図示しかつ説明したが、上述した本発明の範囲から逸脱することなく、それらに形態および詳細の様々な変化を施すことができることを、当業者は理解されるであろう。

【図面の簡単な説明】

【0051】

【図1】従来のワイヤレス通信システムを示す図である。

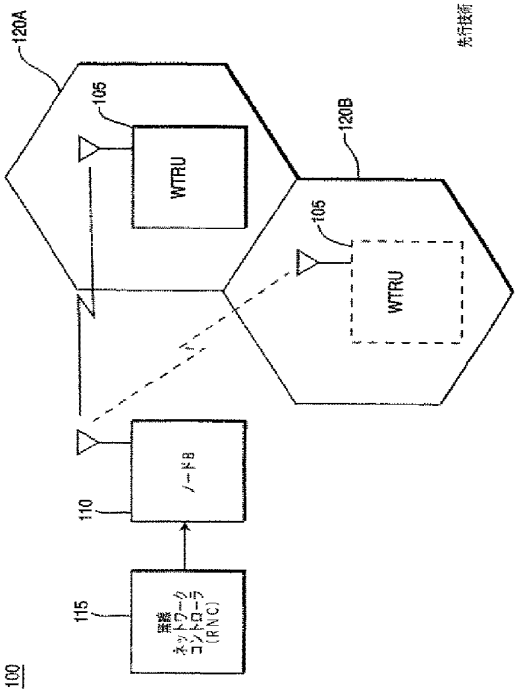
【図2】本発明に従ってＥＵのソフトハンドオーバ中に主ノードＢに配置されたＵＬスケジューラを使用するシステムを示す図である。

【図3】本発明に従ってＥＵのソフトハンドオーバ中に主ノードＢに配置されたＡＣＫ／ＮＡＣＫ生成機能を使用するシステムを示す図である。

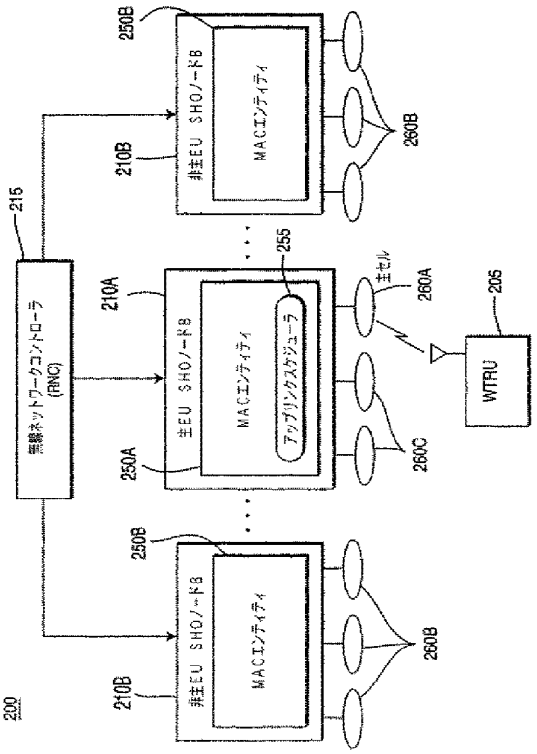
【図4】本発明の一実施形態に従ってソフトハンドオーバ中にノードＢを調整するための方法のステップを含むプロセスのフローチャートである。

【図5】本発明の別の実施形態に従って、ハードハンドオーバが終了する前に、ソースノードＢでＮＡＣＫされたデータの送信の優先順位を決定するための方法ステップを含むプロセスのフローチャートである。

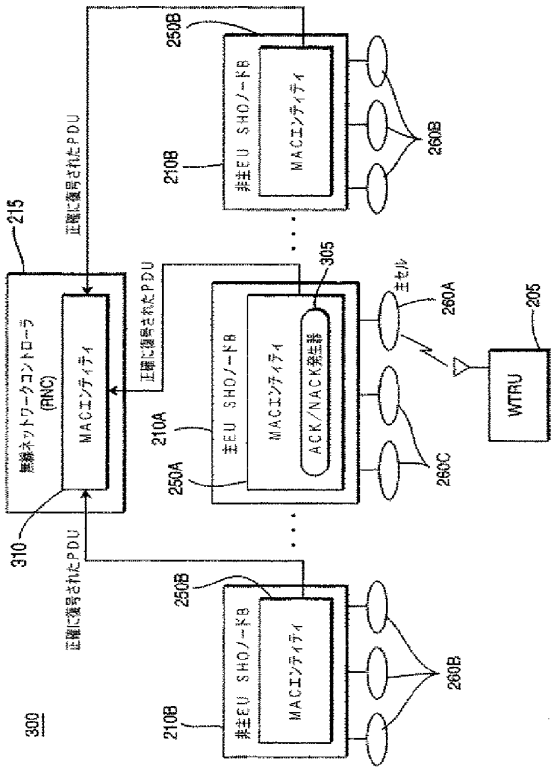
【図1】


先行技術
120A
105
WTRU
120B
105
WTRU
ノードB
110
無線ネットワークコントローラ(RNC)
115
100

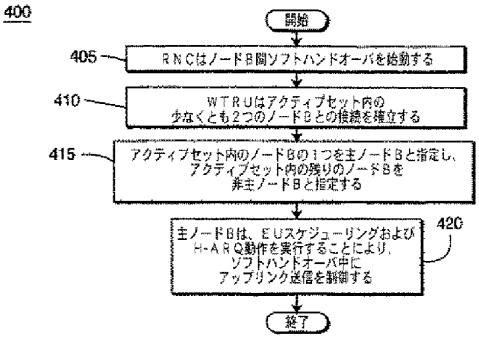
【図2】


250B
210B
非主EU SHOノードB
MACエンティティ
260B
215
255
210A
主EU SHOノードB
MACエンティティ
アップリンクスケジューラ
主セル
260A
205
WTRU
250A
260C
無線ネットワークコントローラ(RNC)
200

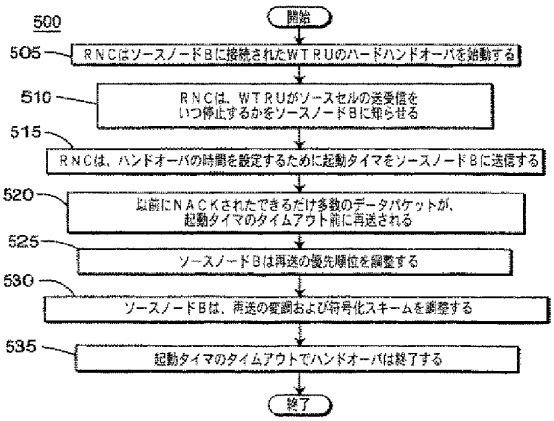
【図3】


250B
210B
非主EU SHOノードB
MACエンティティ
260B
215
正確に復号されたPDU
305
主セル
260A
205
WTRU
210A
主EU SHOノードB
MACエンティティ
ACK/NACK発生器
250A
260C
310
300

【図4】


400
開始
405
RNCはノードB間ソフトハンドオーバを始動する
410
WTRUはアクティブセット内の少なくとも2つのノードBとの接続を確立する
415
アクティブセット内のノードBの1つを主ノードBと指定し、アクティブセット内の残りのノードBを非主ノードBと指定する
主ノードBは、EUスケジューリングおよびH-ARQ動作を実行することにより、ソフトハンドオーバ中にアップリンク送信を制御する
420
終了

【図5】


500
開始
505
RNCはソースノードBに接続されたWTRUのハードハンドオーバを始動する
510
RNCは、WTRUがソースセルの送受信をいつ停止するかをソースノードBに知らせる
515
RNCは、ハンドオーバの時間を設定するために起動タイマをソースノードBに送信する
520
以前にNACKされたできるだけ多数のデータパケットが、起動タイマのタイムアウト前に再送される
525
ソースノードBは再送の優先順位を調整する
530
ソースノードBは、再送の変調および符号化スキームを調整する
535
起動タイマのタイムアウトでハンドオーバは終了する
終了

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/36310

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) : H04Q 7/00
US CL : 370/331
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 370/331, 278, 282, 332, 329, 436, 438, 439, 442, 208

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	US 2004/0202129 A1 (KOLDING et al.) 14 October 2004, para. 0007, 0052, 0053.	14
Y,P		15, 16, 25, 26
Y,E	US 2004/0219917 A1 (LOVE et al.) 04 November 2004, fig. 2, para. 0013, 0016.	1-13,15-26,27-29
Y,E	US 2006/0083888 A1 (SMEE et al.) 21 April 2005, para. 0034-0042	1-13,17-24,27-29
Y,E	US 6,892,071 B2 (PARK et al.) 10 May 2005, col. 2, lines 34-44, col. 7, lines 17-21.	11, 12, 13
Y,E	US 2004/0228313 A1 (CHENG et al.) 18 November 2004, para. 0028.	15-26
Y	US 2003/0081692 A1 (KWAN et al.) 01 May 2003, abstract.	16, 26
A,E	US 2004/0219920 A1 (LOVE et al.) 04 November 2004, see entire document.	1-29

☐ Further documents are listed in the continuation of Box C.　☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 June 2005 (18.06.2005)	22 JUN 2005
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Kenneth Wieder Telephone No. 571-272-2986

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/36310

Continuation of B. FIELDS SEARCHED Item 3:
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node-B and RNC

Form PCT/ISA/210 (extra sheet) (January 2004)

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發明 ~~新型~~ 專利說明書

一、發明 ~~新型~~ 名稱	中文	封包資料傳輸之混合自動重複請求
	英文	HYBRID ARQ FOR PACKET DATA TRANSMISSION
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（由本局填寫）

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五、發明說明（ 1 ）

發明範疇

本發明係有關於資料通訊，而更明確而言，係有關一資料通訊系統的可靠資料傳遞。

發明背景

在數位資料通訊系統中，例如，當通訊是在不良環境時，通常在一通信頻道上傳輸的資料封包會發生錯誤。無線無線通訊時常是在一特別不良環境中進行。無線頻道會受到包括雜訊、快速變化通訊頻道特性、多重路徑衰減、與造成符號間干擾的時間分散、及來自相鄰頻道通訊干擾的破壞因素。

有許多技術可由接收器用來偵測此錯誤。一錯誤偵測技術的範例是眾所週知的循環冗餘檢查(CRC)。在封包資料通訊中所使用的其他技術可採用更先進類型的區塊碼、或捲積碼來完成錯誤偵測與錯誤更正。對於錯誤偵測與錯誤更正而言，通道編碼的應用可將冗餘加入資料。當資訊是在通信頻道接收時，接收的資料可透過使用冗餘解碼，以貞測資料是否受到錯誤的破壞。越多的冗餘在資料單元建立，更多可能錯誤可正確偵測，而且在一些範例中，可使用一前向錯誤更正(FEC)方法更正。在一純粹FEC方法中，資訊流是單向，而且如果一封包解碼錯誤發生，接收器便不會將資訊傳回給傳送器。

在包括無線通訊的許多通訊系統中，想要有一可靠資料傳遞務送，以確保資料單元的傳遞可從一機器傳送給另一機器，而不會造成資料重複或資料損失。大部分此可靠資

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五、發明說明（ 2 ）

料傳遞協定是使用一基本重新傳輸技術，其中資料的接收器可使用確認及否定確認而反應資料的傳送器。此技術普遍已知是自動請求(ARQ)交易處理。編碼資料封包可在一通信頻道上從一傳送器傳送給一接收器。透過使用在編碼資料封包中包括的錯誤偵測位元(冗餘)，每個接收資料封包可透過接收器處理，以決定資料封包是否正確接收或錯誤毀壞。如果封包是正確接收，接收器便可將一確認(ACK)信號傳回給傳送器。如果接收器偵測到封包錯誤，它便亦可將一否定確認(NACK)傳送給傳送器。當NACK接收時，傳送器可將封包重新傳送。在一純粹ARQ系統中，通道碼只可用於錯誤偵測。

在混合ARQ (HARQ)中，一純粹FEC方法及一純粹ARQ方法的特徵可組合。錯誤更正與錯誤偵測功能可連同ACK/NACK回授信號執行。在一混合ARQ方法中的通道碼可用於錯誤更正與錯誤偵測。或者，兩分開的碼可使用：一是用於錯誤偵測，而且一是用於錯誤更正。如果在錯誤更正之後而偵測到錯誤，一NACK信號便可傳回給傳送器。在此第一類型混合ARQ系統中的錯誤接收資料封包可丟棄。

一更有效率的混合ARQ方法可拯救錯誤接收與否定確認資料封包，然後以某些方式將它組合而重新傳送。使用封包組合的混合ARQ方法可視為具組合的混合ARQ。在一混合ARQ組合方法中，“重新傳輸”可以是原始封包的一相同副本。如果重新傳輸是與原始傳輸相同，來自多重封包的

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五、發明說明（ 3 ）

個別符號可組合，以形成由更可靠符號所組成的新封包。或者，重新傳輸可使用增量冗餘(IR)。在IR封包組合中，額外的同位位元可傳送可產生通常比相同封包組合更強的錯誤更正碼。

有組織與非有組織FEC頻道編碼器是存在的。一有組織編碼器可透過有時將稱為同位位元的冗餘位元附加到一區塊的資訊位元而建立碼字。一非有組織編碼器可將一組資訊位元映射到一完全不同組的編碼位元。一類別較強的有組織碼是驅動(Turbo)碼。一驅動編碼器是使用透過一交錯器分開的至少兩循環捲積編碼器。資訊位元可直接傳送給第一編碼器，而且經由交錯器而傳送給第二編碼器。驅動編碼的碼字包括來自第一及第二編碼器的原始資訊位元(亦即，有組織位元)與額外同位位元。因為有組織位元可使用在第一及第二編碼器，所以該等有組織位元對於在接收器上的解碼器是比同位位元更重要。的確，如果有組織位元遺失，即使實質有許多同位位元隨後接收，它不可能使解碼器將資料封包正確解碼。

有組織與非有組織碼可在具組合方法的一混合ARQ中當作FEC碼使用。然而，IR封包組合的使用會比使用一通道碼更不容易，其中不同的碼位元具對編碼器的不同重要性。例如，驅動碼與IR組合的使用會是問題，因為當一新資料封包第一次傳送時，可包括在第一傳輸中的全部有組織位元，以確保驅動解碼器的良好效率。在IR封包組合中，任何重新傳輸可包含同位位元，但是不包含有組織位元。

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五、發明說明（ 4 ）

如果接收器完全錯過原始傳輸、或原始傳輸破壞而無法由解碼器使用，便會發生問題。因為隨後的重新傳輸包含額外同位位元，而沒有有組織位元，資料封包不能正確解碼。如果例如一無線頻道的通道是高度可靠，此遺失的原始封包情況便會時常發生，觸發許多不必要的重新傳輸，及造成降低效率與輸貫量的所造成的延遲。

本發明的一目的是要增加在封包資料通訊系統中的輸貫量及減少延遲。

本發明的一目的是要提供一改善及更彈性的混合ARQ方法。

本發明的一目的是要克服當在一不可靠通信頻道上使用具封包組合方法的一混合ARQ而發生的問題，而且其中某些編碼位元的解碼是比其他編碼位元更重要。

在一傳送器與一接收器之間的資料封包傳輸中，一資料封包包括一第一類型位元及一第二類型位元。在較佳的具體實施例中，該第一類型位元在接收器上將資料封包解碼是比第二類型位元更重要。例如，第一類型位元包括實際的資訊位元，或有組織位元(實際資訊位元+類似結尾位元的其他位元)，而該第二類型位元包括同位位元。在不使用實際的資訊位元，它是相當不容易、或甚至不可能只使用同位位元將資料封包正確解碼。當接收器將一封包否定確認時，傳送器可將稍後在接收器上的一解碼操作中所使用的資訊重新傳送。此一重新傳輸包括第二類型位元。在本發明的一具體實施例中，重新傳輸亦包括第一類型位元。

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五、發明說明（ 5 ）

在另一較佳具體實施例中，第二類型位元可重新傳送，而不是第一類型位元。

如果一資料封包被偵測是不存在或實質毀壞，一LOST信號便會傳送給傳送器，而不是一否定確認。傳送器可反應LOST信號而將第一重新傳輸傳送給接收器，其包括在封包的第一類型資料位元，而且最好亦是第二類型位元。第一重新傳輸可被解碼，而且如果不成功，一否定確認便會傳送給傳送器。在一較佳具體實施例中的傳送器可反應否定確認而傳送一第二重新傳輸，其包括第二類型位元而沒有第一類型位元。在另一具體實施例中，兩類型位元可重新傳送。

一範例接收器包括收發電路，用以接收在一通信頻道上傳送的一編碼資料封包。一原始傳輸的編碼資料封包可包括第一及第二類型位元。如果偵測到一預期封包不存在，封包處理電路便將一LOST信號傳送給傳送器。包括至少第一類型位元與可能第二類型位元的一預期封包的重新傳輸可被解碼。此外，如果一接收的編碼資料封包實質遭破壞，一LOST信號便亦可傳送給傳送器。該封包處理電路包括一緩衝器，用以儲存接收的封包資訊、一組合器，用以將緩衝的資訊與重新傳輸的資訊組合；一解碼器，用以解碼該組合器的一輸出；及一控制器，用以控制該等緩衝器、組合器、與偵測器的操作。在一較佳的具體實施例中，緩衝器與組合器可執行增量冗餘操作。如果第一重新傳輸的解碼不成功，但是接收的資料相信在隨後的解碼嘗試中是

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五、發明說明（ 6 ）

有用，那麼一否定確認便傳送給傳送器。在反應方面，一第二重新傳輸可接收，包括具或不具第一類型位元的一組第二類型位元，其是因實施而定。

一範例傳送器包括一信號處理器，用以處理資料傳輸及產生對應有組織位元與同位位元。一組合器可選擇性從信號處理器接收一或兩有組織與同位位元，並且產生一編碼的資料封包。收發電路可在通信頻道上傳輸編碼的資料封包。一控制器可控制哪些位元是由組合器選取，以便根據來自接收器的回授信號而產生編碼的資料封包。當一否定確認接收時，對應有組織位元的同位位元可在通道上傳新傳送給接收器。當(1)一LOST信號接收、或(2)沒有確認或沒有否定確認於一編碼的資料封包接收時，該等有組織位元與可能相同的同位位元可在通訊頻道上傳送給接收器。在一具體實施例中，該等有組織位元可連同最初與有組織位元傳輸的一組同位位元而重新傳送。或者，該等有組織位元能與不同於最初傳送的一組同位位元而重新傳送。在反應(1)或(2)的第一重新傳輸之後，如果傳送器可反應該第一重新傳輸而接收一否定確認，與該等有組織位元有關的組同位位元能與或(最好)不與該等有組織位元重新傳輸。

圖式之簡單說明

本發明的先前及其他目的、特徵、與優點可從下列連同附圖的描述而更了解。

圖1是顯示在第一嘗試中的一封包成功傳輸的ARQ方法圖

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五、發明說明（ 7 ）

；

圖2是具相同封包組合的一混合ARQ方法圖；

圖3是顯示具整個IR封包組合的一混合ARQ方法；

圖4是顯示具部分IR封包組合一混合ARQ方法；

圖5是顯示原始封包傳輸失去的具整個IR封包組合之一混合ARQ方法；

圖6是顯示回復一遺失原始封包傳輸的具部分IR封包組合之一混合ARQ方法；

圖7是顯示回復一遺失原始封包傳輸的具整個IR封包組合之一混合ARQ方法；

圖8係根據本發明而顯示採用供封包資料傳輸的混合ARQ之一通訊系統圖；

圖9是顯示本發明的一範例實施程序流程圖；

圖10是一範例混合ARQ傳送器的更詳細功能方塊圖；

圖11是一範例混合ARQ接收器的更詳細功能方塊圖；

圖12是描述各種不同混合ARQ方法的效率圖；

圖13哪一本發明可能有利地採用描述無線通訊系統；及

圖14是以方塊格式描述一驅動編碼器。

發明之詳細說明

在下列描述中，為了解釋的目的而非限制，將說明特殊細節，例如特殊具體實施例、程序、技術等，為了要提供對本發明的完全了解。然而，對於技藝中熟諳此技者顯然的是本發明可在其他具體實施例實施，而不致於違背這些特殊細節。例如，本發明可在任何資料傳送器與資料接收

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五、發明說明（ 8 ）

器之間的任何資料通訊系統實施，例如參考圖8。本發明的一特殊非限制應用是在一CDMA無線通訊系統，例如可參考圖13。

在一些範例中，眾所週知的方法、介面、裝置、與發信技術的詳細描述在此省略，而不致於未詳細節描述而造成對本發的模糊。而且，各別功能方塊是在一些圖中顯示。在技藝中熟諳此技者能了解到功能可透過使用個別硬體電路、使用與一程控數位微處理器有關的軟體功能、或使用一應用特殊積體電路(ASIC)的一般目的電腦、及/或使用一或多個數位信號處理器(DSPs)實施。

圖1是顯示在一嘗試的成功資料封包傳輸的範例。在圖1與各種不同隨後圖式(例如，圖2-7)中，在上面列的方塊是表示從傳送器到接收器的資料封包傳輸，而且在下面列的方塊是表示從接收器傳回給傳送器的回授資訊。在下述的通道編碼通訊中，構成第n資料封包的位元包括以S_n和P_n表示的兩群或類型。群S_n的位元於接收器中的解碼處理是比在群P_n的位元更重要。例如，群S_n包括來自一編碼器的群部有組織位元，而且P_n包括來自相同編碼器的所有同位位元。群P_n可進一步分成子群$P_{n,1}$、$P_{n,2}$、$P_{n,3}$、...，用以表示分別在第一、第二、第三等中傳輸的同位位元。在k=1、2、3等的子群$P_{n,k}$可例如透過不同各別組的所有同位位元建立。在圖1中，第一資料封包的第一傳輸包括群S_1和$P_{1,1}$中的位元。在透過前向通道造成一些延遲後，封包可到達接收器，以便將它解碼。如果接收器的錯誤偵測決定資料封包

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五、發明說明（ 9 ）

是正確接收，一ACK信號可傳回給傳送器。在透過反向通道造成一些延遲後，傳送器可接收ACK信號，而且下一資料封包傳輸是由S_2和$P_{2,1}$的資料位元所組成。

圖2係顯示具相同封包組合的混合ARQ原理。每次傳送器從接收器接收一NACK信號時，它便可重新傳送相同位元。因此，如果原始傳輸包括在S_1和$P_{1,1}$的位元，那麼所有重新傳輸亦可包括S_1和$P_{1,1}$。接收器可將原始傳輸與所有重新傳輸組合，為了要形成一更可靠組的接收符號。最後，一封包可正確解碼，而且接收器可將一ACK信號傳回給傳送器。

圖3係顯示具增量冗餘(IR)封包組合的混合ARQ原理。每次傳送器從接收器接收一NACK信號時，傳送器便傳輸表示$P_{1,k}$，(k=2、3、...)的一新組位元。例如，在第二傳輸的位元$P_{1,2}$只由在接收器中的FEC解碼器所使用的額外同位位元所組成。在接收器的FEC解碼器可將在第一嘗試(S_1和$P_{1,1}$)傳輸的有組織與同位位元及在第一重新傳輸($P_{1,2}$)中傳輸的同位位元組成。假設有組織位元接收，解碼器可使用大量的同位位元而更正確將一封包解碼，尤其是在不佳的環境。在此範例中，在$P_{1,2}$的同位位元數量大體上是大於在$P_{1,1}$，因為當$P_{1,2}$傳輸時，來自群S_1的位元是不傳輸。最後，封包可正確解碼，而且接收器可將一ACK信號傳回給傳送器。

圖4係根據本發明的一具體實施例而顯示具部分增量冗餘(IR)封包組合的一混合ARQ。在此，使用在圖2與圖3中描述兩類型組合性質。每次傳送器可從接收器接收一NACK信

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五、發明說明（ 10 ）

號，它可重新傳送來自S_1的相同位元，但是一新組的同位位元$P_{1,k}$(k=2、3、...)苦選取供每個重新傳輸。接收器可組合在S_1的不同傳輸位元，為了要使他們更可靠，而且FEC解碼器可使用在不同同位位元組$P_{1,k}$(k=2、3、...)中的位元，為了要改善FEC解碼器的錯誤更正能力。最後，封包可正確解碼，而且接收器可將一ACK信號傳回給傳送器。

在圖2-4描述的混合ARQ封包組合系統具有不同優點與缺點。例如，具相同封包組合的混合ARQ比兩IR組合方法需要較少的接收器緩衝器記憶體。當在接收器中將一原始傳輸與一相同重新傳輸組合時，組合結果可儲存在與接收器相同的緩衝器區域，該緩衝器區域可用於儲存原始傳輸。在組合後，既然結果是比來自原始傳輸的舊儲存結果更可靠，舊資訊便不再需要。然而，對於IR組合方法而言，重新傳輸包含必須從舊資訊分開儲存的新同位資訊。若與兩其他方法相比較，具在圖2的相同封包組合系統的一混合ARQ主要缺點是一較差效率。在圖3描述的方法從傳輸資料封包的輸貫量與延遲特性觀點具有3個方法的潛在性較佳效率。然而，當原始封包傳輸無法到達接收器時，整個IR方法的一缺點便會發生。此失敗的原始封包傳輸是在圖5描述。或者，原始傳輸的品質可能較差，以致於它對FEC解碼器是無用的。在兩情況中，在群S_1的重要位元(例如，來自一編碼器的有組織位元)是不會重新傳送。在圖3與圖5的重新傳輸包括只來自不重要群P_1的位元，(例如，來自一有組織編碼器的同位位元)。大量重新傳輸是需要，因為未接收在

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五、發明說明（ 11 ）

群S_1中的至少一些重要位元是非常不容易將資料封包解碼。

對照下，在圖4描述的混合ARQ部分IR方法可解決此遺失封包問題。如圖6所示，混合ARQ部分IR方法比混合ARQ整個IR方法更健全，因為它可克服當原始傳輸遺失或實質損壞的情況。在此方法中的重新傳輸係包括在S_1中的位元，而且對於每個重新傳輸而言，及包括一新組的同位位元$P_{1,k}$ (k=2、3、...)。既然解碼器可在重新傳輸中接收例如S_1的重要位元，所以封包可解碼。然而，因為每個重新傳輸包含相當少的冗餘位元，對應的編碼增益若與一整個IR方法相比較是減少，其中重新傳輸只包括唯冗餘位元。因此，性能與效率在用以處理遺失封包重新傳輸的部分IR方法中是折衷的。

另一解決到實質上遺失/使原始封包傳輸問題在圖7顯示的本發明的另一具體實施例描述腐爛。如果接收器不接收資料封包、或接收的資料封包受嚴證損壞，接收器可將一LOST信號，(亦即，不是一NACK或一ACK信號)傳回給傳送器。LOST信號可觸發傳送器，以便在下一重新傳輸的群S_1中包括更多重要位元，而且最號(雖然非必要)來自不重要群P_1的位元，例如$P_{1,1}$。另一方面，如果接收器決定接收的資料封包是有用，但是錯誤仍然可在解碼器輸偵測，接收器可將一NACK信號傳回給傳送器。NACK信號可觸發傳送器，以便傳送包括來自不重要群P_1的位元的重新傳輸，而不必包括例如$P_{1,2}$的更重要位元。如此，每個重新傳輸可使

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五、發明說明（ 12 ）

用比圖4的解決更大的編碼增益。只要資料封包由接收器成功解碼，一ACK信號便可傳回傳送器，以觸發下一資料封包的傳輸。NACK和LOST信號的一解釋是接收器可傳送下列：一NACK，為了要求包含主要額外不重要位元的一重新傳輸；及一LOST信號，為了要求包含主要重要位元的重新傳輸。

在圖7的具體實施例中，包括整個IR封包組合的混合ARQ方法係使用3個回授反應：ACK、NACK、或LOST。如果接收器未偵測到傳送器傳送一資料封包或不能將它解碼，來自接收器的另一反應可完全停止，而不是傳送簡單ARQ方法的一LOST信號，例如停止與等待ARQ。接收器可將未從傳送器反應解釋成一LOST信號，而且此可觸發傳送器，以便將封包重新傳送。如果只採用ACK和NACK反應，此方法可減少從接收器到傳送器的反向連結信號。然而，對於例如返回N (go-back-N)與選擇性重複的更複雜ARQ方法而言，傳送一特殊識別封包的LOST信號會是想要、或必要的。

具圖7的整個IR資料封包的混合ARQ方法是結合相同封包組合與整個IR資料封包組合的優點。透過引用3個位準回授信號(ACK、NACK、或LOST)，該方法可利用相同資料封包組合的健全本質，及從一整個IR資料封包組合系統所提供的較大編碼增益的良好效率。終極利益是增加封包資料通訊系統的輸貫量及減少其延遲。增加的輸貫量與減少的延遲是表示較佳的通訊服務。

在圖4與圖6的具體實施例中，接收器並未始終需要3個回

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五、發明說明（ 13 ）

授反應(ACK/NACK/LOST)。只要接收器考保持追蹤哪些不重要位元是包括在一重新傳輸，它便足以只使用兩回授反應(ACK/NACK)。然而，甚至於部分IR組合方法，使用3個回授仍然是最有效益的情況。例如，如果接收器完全錯失原始傳輸或重新傳輸中的一者，它便不會計算重新傳輸。如此，如果接收器偵測到在重新傳輸的不重要位元組並未對應到接收器所預期的，它便會將一LOST信號傳回給傳送器，以便觸發傳送器開始重新原始傳輸。或者，接收器在組合器緩衝器中沒有組夠的緩衝器記憶體來儲存任何額外不重要位元。透過將一LOST信號傳送給傳送器，下列重新傳輸將只包含先前傳輸的不重要位元，而且不需要任何新的緩衝器記憶體。

根據圖4、6和7的具封包組合方法的混合ARQ可在如圖8的一資料通訊系統1實施。傳輸的資料封包可透過一混合ARQ傳送器2接收及處理。包括對於解碼重要一第一群位元及對於解碼不重要一第二群位元的通道編碼資訊可在一前向通道4上傳送。一混合ARQ接收器6可在前向通道4上接收資訊，而且包括錯誤更正與偵測功能，以處理接收的資料封包、以及偵測是否沒有一資料封包。對於沒有錯誤的滿意解碼封包而言，混合ARQ接收器6可在一回授通道8上將一確認信號(ACK)傳送給混合ARQ傳送器2。確認資料封包亦可透過接收器提供給在接收器中的較高階應用。對於具有偵測錯誤的解碼資料封包而言，一否定確認(NACK)可在回授通道8上傳回給傳送器2。如果採用圖4的方法，傳送器

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2可重新傳送例如S_1的重要位元與例如$P_{1,2}$的一組不重要位元。此處理可持續，直到資料封包成功解碼及確認為止。如果採用圖7的方法，混合ARQ傳送器2可傳送例如$P_{1,2}$的一組不重要位元，而沒有傳送例如S_1的更重要位元。後者方法是較佳，由於它有較佳效率。

然而，如果一資料封包未偵測到、或決定為全損壞，以致於無法由接收器解碼器更正(或實施)時，一LOST信號可藉由回授通道8而由接收器6傳送給混合ARQ傳送器。對於簡單的停止與等待的ARQ方法而言，在傳送後，無法在一特殊時間窗內接收的一ACK或一NACK可透過傳送器解釋成一遺失封包。第一重新傳輸的隨後否定確認會造成相同重要位元及一組不重要位元的第二重新傳輸。此組不重要位元是與例如$P_{1,2}$的第一重新傳輸相同，或它可以是例如$P_{1,3}$的不同組。一不同組較佳。在圖7的解決中，如果第一重新傳輸是否定確認，一第二重新傳輸可傳送給接收器，其包括一組不重要位元而不包括較重要位元。再者，在第二重新傳輸中包括的不重要位元是與在第一重新傳輸中包括的相同，或者他們可不同(較佳)。

在本發明的一範例實施中使用的程序現將根據在圖9所示的流程圖描述。圖9是描述當接收器預期接收一封包(方塊10)的程序。接收器可決定是否沒有一預期的資料封包(方塊11)。如果沒有預期的封包，那麼接收器可將一LOST信號傳送給傳送器(方塊12)。在接收LOST信號的反應方面，傳送器可傳送包括較重要位元及可能不重要位元(方塊13)

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五、發明說明（15）

的重新傳輸。接收器然後可循著旗號C而返回方塊11。只要在方塊11的接收器偵測到有一預期的封包，接收器便可將該封包解碼(方塊14)。一決定可判斷一封包否封成功解碼(方塊15)。如果如此，接收器便可將一確認信號ACK傳送給傳送器(方塊16)。當確認信號接收時，傳送器可傳送下一資料封包(方塊17)。

另一方面，如果封包未在方塊15中成功解碼，接收器便可判斷中間解碼結果是否可接受，及接收器是否可從額外不重要位元(方塊18)獲益。判斷中間解碼結果是否可接受、或在一封包組合錯誤更正方法中是否可用的一方法若與一預定臨界值的中間解碼結果相比較是簡單的。供接收器決定它是否不能從額外不重要位元獲益的一理由是組合器緩衝器(參考圖11的方塊54)是否填滿，而且沒有緩衝器記憶體可儲存任何額外不重要位元。

如果在方塊18的答案是肯定，接收器便可儲存接收的資訊，並且將一NACK信號傳送給傳送器(方塊21)。在反應NACK信號方面，傳送器可在重新傳輸(參考圖7)中傳送不重要位元、或重要與不重要位元(參考圖4和圖6)。接收器然後可持續方塊23。

如果中間解碼結果是在方塊18中決定是不可接受，(例如，資料損壞，以致於不能實質更正)，或如果接收器決定它不能從額外不重要位元(例如組合器緩衝器是填滿)獲益，控制便進行方塊19，而且接收器可將一LOST信號傳送給傳送器。傳送器可反應一LOST信號接收而傳送包括較重要位

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元及一些不重要位元 而傳送一重新傳輸。反應一LOST信號而傳送的不重要位元是與在原始傳輸(較佳)中傳送的相同或不同。接收器然後持續方塊23。

在方塊23中，接收器可決定是否要重新傳輸。如果不重新傳輸，接收器可循著旗號B返回方塊18。如果重新傳輸，接收器可使用重新傳輸位元而重複解碼操作及儲存資訊(方塊24)。在解碼操作後，接收器可循著旗號A返回方塊15。

如上述，在圖8的系統中，當一LOST信號接收時，傳送器能以不同方法反應。在一較佳方法中，每當一LOST信號接收(較佳)時，傳送器可開始及重新傳送原始傳輸的重要與不重要位元，例如S_1和$P_{1,1}$。或者，當一LOST信號接收時，重新傳輸包括重要位元 $S1$與先前未傳送的例如$P_{1,2}$的一新組不重要位元。五外，當一LOST信號接收時，它亦可傳送來自不重要位元P組的新及先前傳送位元的一組合。傳送一新組不重要位元的優點比傳送最初不重要位元更具有較佳效率。將所有重新開始傳送、及重新傳送與第一嘗試中相同位元的優點是此可確保在重新傳輸中接收的資訊可適於在接收器中的組合器緩衝器。

圖10和11係以功能方塊格式而分別顯示可在本發明的一範例實施使用的一混合ARQ傳送器31及一混合ARQ接收器50。在圖10的混合ARQ傳送器31包括可執行通道編碼功能的一通道編碼器32，包括具前向錯誤更正與錯誤偵測位元的編碼原始資料。通道編碼器32 的輸出包括類似有組織位

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元的重要位元、及類似同位位元的不重要位元。有組織位元對於在接收器中的解碼操作是比同位位元更重要。控制器42可控制通道編碼器32、緩衝器34和36、與組合器38的操作。來自緩衝器34 和36中的一或兩個可在組合器38組合，及在通信頻道上提供用以重新傳輸的傳送器前端40，其是因接收器44提供給控制器42的接收回授信號(ACK/NACK/LOST)而定。如上述，有組織位元可或不可在重新傳輸中組合，其是因接收的回授信號與採用的特殊具體實施例而定，而且某些同位位元可在重新傳輸中選取及組合。

在圖11的混合ARQ接收器50包括一接收器前端52，其可接收在通信頻道上傳送的信號。接收的信號資訊可實際儲存在組合器緩衝器54，而且亦可提供給一組合器56。組合器56的輸出可在一前向錯誤更正(FEC)解碼器58中處理。解碼輸出是在錯誤偵測方塊60中處理，以偵測解碼輸出錯誤。如果未偵測到錯誤，資料封包可輸出，而供在接收器中的高階應用程式進一步處理。為了將封包正確解碼，控制器62可藉由傳送器64將一ACK信號傳送給傳送器31。另一方面，如果錯誤在解碼器輸出偵測到，控制器62可經由傳送器64傳送一NACK信號，以請求重新傳輸。此外，控制器62亦可決定一封包何時可在一特殊時間窗內接收。封包視別符典型是包括在資料封包，以指定一特殊封包的序列與識別。透過使用此識別資訊，接收器可偵測一特殊封包是否未接收及是否將一LOST信號傳送給傳送器31。識別序

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列資訊亦可由組合器56使用，以執行有組織與同位位元的增量冗餘組合。而且，如果控制器可從錯誤偵測方塊60接收表示是否由FEC解碼器58輸出許多錯誤的一信號，以進行不容易或未必然發生的錯誤更正，控制器62可傳送來自它傳送器64的一LOST信號。

下列是在S_1和$P_{1,1}$的位元如何與$P_{1,2}$增量組合的一範例。一比率$R=1/5$驅動編碼器是假設用於錯誤更正。(一驅動編碼器是參考圖14描述)。驅動編碼器可計算同位位元的4個位元流，亦即為每個有有組織位元有4個位元。因此，如果傳送的資料封包是由N個位元所組成，我們可從通道編碼器32獲得$4N$個同位位元。在第一傳輸嘗試中，既然始終傳輸此許多位元將增加通訊系統所需的頻寬，所以它不需要傳輸所有$5N$個位元。相反地，只有在同位位元(亦即$P_{1,1}$)的S_1和N中的N個有組織位元是在第一傳輸嘗試中傳送。例如，$P_{1,1}$包括來自第一位元流的奇數同位位元及來自同位位元的第三位元流的偶數位元。因此，在此範例中，來自同位位元的第二或第四位元流的位元不是在第一傳輸嘗試中傳送。

如果接收一NACK信號，$2N$個新同位位元$P_{1,2}$可傳送。對於第二傳輸嘗試而言，$P_{1,2}$包括來自第一位元流的所有偶數位元、來自第二位元流的奇數位元、來自第三位元流的奇數位元、及來自同位位元的第四位元流的偶數同位位元。在接收器中的FEC解碼器58現可分別從第一與第三位元流獲得所有位元、及從第二與第四位元流獲得一半位元。在

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五、發明說明（ 19 ）

S_1、$P_{1,1}$、和$P_{1,2}$中的位元是透過組合器56而以正確順序配置，而且仍然不見的位元可忽略，（亦即，來自同位位元的第二位元流的偶數位元、及來自第四位元流的奇數位元）。在第二傳輸嘗試後，解碼器58具有可解碼的更強通道碼，而且此可明顯改善正確解碼的可能性。

不同的混合ARQ方法可透過使用一範例模擬而與圖12顯示的結果相比較。下列是模擬假設。FEC編碼器是具限制長度3的一標準率1/2驅動編碼器。來自驅動編碼器的位元可透過一QPSK調變器調變，及在一AWGN通道上傳輸。驅動編碼器可使用960個位元的一區塊大小，而且驅動解碼器可使用4個重複。圖12是顯示以分貝為單位而模擬E_s/N_0功能的信道間錯誤率(SLER)，其中E_s是定義為每個調變符號的平均能量，而且N_0是在通道上的白雜訊單端功率頻譜密度。在圖12顯示的信道間錯誤率可解釋成資料封包不是分別在1、2、3、或4個傳輸嘗試後正確通訊。每個資料封包原始傳輸的信道間錯誤率效率是使用沒有記號的一實線顯示。在1、2、和3個重新傳輸之後的信道間錯誤率效率是分別以黑色方塊、白色圓圈、與黑色三角形顯示。具記號的虛線是表示在圖2描述的相同封包組合系統。具記號的虛線是表示在圖4描述的部分IR封包資料組合系統。具記號的實線是表示在圖3描述的整個IR封包資料組合系統。當傳輸嘗試的數量增加時，所有方法的效率便可改善。在相同封包組合與部分IR組合之間的差是大約0.5分貝。整個IR組合方法是比部分IR組合方法好0.5分貝。在此範例模擬中，整個

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五、發明說明（ 20 ）

IR組合方法較優於簡單封包組合方法大約1分貝，此是為什麼在圖7中具IR組合的混合ARQ最好超過在圖4/6中具部分IR組合的混合ARQ。

透過使用本發明，能以相同混合ARQ協定實施一相同、一部分IR、及一整個IR組合方法。如果接收器只可處理相同封包組合，那麼它可傳送LOST信號而取代NACK信號，所以傳送器可重新傳送原始資料，直到接收器可正確將它解碼為止。只要資料封包正確解碼，接收器便可傳送一ACK信號。一更先進的接收器可透過傳送NACK信號以觸發傳送器傳送更多不同冗餘資訊而利用部分或整個IR混合ARQ的改善效率。本發明的另一可能使用是允許接收器使用整個IR組合，直到它用完接收器組合器緩衝器的記憶體為止。只要接收器組合器緩衝器填滿，接收器便回到相同封包組合。此亦允許接收器使用小資料封包的整個IR組合與較大資料封包的相同封包組合。如此，接收器可在組合器緩衝器記憶體的成本與效率之間折衷。

此可能是優點的一系統類型是一細胞式無線通訊系統，其中傳送器是基地台，而且接收器是行動單元、或反之亦然。可部分或整個IR封包資料組合的一更先進行動單元然後可達成比一簡單(而且不昂貴)行動單元更高的輸貫量。圖13係描述一範例CDMA通訊系統100。包括電路交換類型網路、及封包交換類型網路的外部網路102是連接到包括一或多個無線網路控制器(RNCS) 106的一CDMA無線存取網路104。每個RNC 106是連接到複數個無線基地台(BSs)

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五、發明說明（ 21 ）

108及在無線存取網路104中的其他RNCs。在一或多個基地台108與一無線使用者設備110之間的無線通訊是經由一無線介面。一行動無線終端設備是一無線使用者設備110的範例。在此非限制範例中的無線存取是根據個別無線頻道可透過使用散佈碼區別的CDMA。CDMA可提供多媒體服務的較大無線電頻寬，包括具有高資料率/頻寬需求的封包資料應用。高速資料在無線電介面上從無線存取網路104向下連結傳送到一無線使用者設備110的情況是當無線使用者設備110請求來自連接到例如一網站的電腦資訊。

每WUE和BS包括一通道編碼器與解碼器。一通道編碼器可將一區塊(或一連串)的輸入資訊位元映射到一區塊的(或一連串)編碼位元。在本發明的WCDMA非限制應用中，通道編碼器與解碼器最好是一驅動編碼器與解碼器。一驅動編碼器將在下面進一步詳細描述。

圖14係描述速率R=1/3的一範例驅動編碼器，其包括兩循環有組織捲積(RSC)編碼器。RSC編碼器稱為捲積，因為線性移位暫存器結構類似一標準數位線性濾波器，而且線性濾波器可將輸入與濾波器脈衝反應捲積。術語循環是有關在RSC編碼器中提供的一回授迴路。兩RSC編碼器是並聯串級，並且透過一交錯器隔開。交錯器可採用一區塊的輸入位元，並且以類似隨機方式將他們重新排列。輸入位元可直接轉送給第一RSC編碼器，並且經由交錯器而傳送給第二RSC編碼器。一驅動編碼器是在一區塊輸入位元N_{tot}上操作，而且交錯器的大小亦等於N_{tot}。

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五、發明說明（ 22 ）

在圖14的編碼器是不如在接收器的對應解碼器的“驅動”。對應第一RCS編碼器的接收有組織位元與接收同位位元是使用在只考慮RSC-1的一解碼器。從此解碼處理，有關傳輸資訊位元的一些知識可取得。此所謂“軟資訊”可用來解碼有組織位元及來自RSC-2的接收同位位元的一交錯版本。在此解碼操作後，知道有關何種資訊傳輸。解碼處理可重複，但是此次是使用在先前重複的解碼處理期間有關資訊位元的學習。解碼處理可能重複，而且效率可在每個新重複中略微增加。因此，使用術語“驅動”。驅動編碼器的想要品質包括：(1)碼字類似通道的任意碼字，而且(2)構成非常長碼字是簡單的。透過驅動編碼器而在碼字上產生的結構是足以進行實際的解碼處理，但是不如遺失想要的類似隨機性質。

雖然本發明是描述有關特殊具體實施例，但是在技藝中熟諳此技者可確認本發明並未局限於在此描述的特殊具體實施例。除了顯示與描述之外，不同格式、具體實施例、改造、以及許多修改、變化與類似配置亦可用來實施本發明。雖然有組織位元與同位位元是重要與不重要位元，但是其他群與類型的位元可認為重要與不重要。因此，本發明並未違背附錄申請專利的範圍。

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四、中文發明摘要（發明之名稱： 封包資料傳輸之混合自動重複請求 ）

本發明是有關具增量資料封包組合的一混合自動重複請求(ARQ)方法。在一具體實施例中，具增量資料封包組合的該混合ARQ方法可採用3個回授信號命令：ACK、NACK、與LOST。透過使用這些3個回授命令，具增量資料封包組合的該混合ARQ方法可提供健全與良好效率。本發明的特殊優點是可使用在具不可靠通信頻道的通訊系統，例如一衰減無線頻道，其中前向錯誤更正(FEC)編碼可使用，一些碼符號是比其他碼符號更重要。本發明的優點是可增加封包資料通訊的輸貫量及減少延遲。

英文發明摘要（發明之名稱： HYBRID ARQ FOR PACKET DATA TRANSMISSION ）

The invention relates to a hybrid ARQ scheme with incremental data packet combining. In an example embodiment, the hybrid ARQ scheme with incremental data packet combining employs three feedback signaling commands: ACK, NACK, and LOST. Using these three feedback commands, the hybrid ARQ scheme with incremental data packet combining is provides both robustness and good performance. The invention is particularly advantageous in communication systems with unreliable communication channels, e.g., a fading radio channel, where forward error correction (FEC) codes are used, some of the code symbols being more important than other code symbols. The benefits of the invention are increased throughput and decreased delay of the packet data communication.

（請先閱讀背面之注意事項再填寫本頁各欄）
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六、申請專利範圍

1. 一種使用在一傳送器與一接收器之間資料封包傳輸的方法，其中一資料封包可包括一第一類型位元及一第二類型位元，該第一類型位元是比該第二類型位元的解碼更重要，而且一否定確認封包可觸發使用在接收器隨後解碼操作的該第二類型位元重新傳輸，該方法包含：

偵測是否沒有一資料封包；

將一遺失信號傳送給該傳送器，而不是一否定確認；

反應該遺失信號的傳送而從該傳送器接收該資料封包的第一類型位元的一第一重新傳輸；及

解碼該第一重新傳輸。

2. 如申請專利範圍第1項之方法，其中該第一類型位元包括實際構成位元，而且該第二類型位元包括同位位元。

3. 如申請專利範圍第1項之方法，其中該第一重新傳輸亦包括一第一組的該資料封包的第二類型位元。

4. 如申請專利範圍第1項之方法，其進一步包含：

如果該第一重新傳輸的解碼不成功，將一否定確認傳送給該傳送器；

從該傳送器接收一第二重新傳輸，其包括不同於該第一組的一第一組的第二類型位元；

透過使用來自第一及第二重新傳輸的資訊而解碼該資料封包。

5. 如申請專利範圍第4項之方法，其中該第二傳輸不包括該第一類型位元。

6. 如申請專利範圍第4項之方法，其中該第二傳輸包括該

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六、申請專利範圍

第一類型位元及該第二組第二類型位元。

7. 如申請專利範圍第1項之方法，其中該封包可透過決定預期接收一特殊識別符的封包未在一預期時間週期中接收而偵測是否存在。

8. 如申請專利範圍第1項之方法，其中該封包可透過將該封包的一解碼結果與一臨界值相比較而偵測是否存在。

9. 一種用以處理接收編碼資料封包之方法，每個編碼資料封包包括第一群位元及第二群位元，其中該第一群位元是比第二群位元的資料封包解碼更重要，其包含：

解碼一接收的封包，以產生一中間的解碼結果；

決定該中間的解碼結果是否超過一臨界值；

如果該中間的解碼結果未超過臨界值，傳送一遺失信號；

接收該資料封包的該等第一群位元的一第一重新傳輸；及

解碼該第一重新傳輸。

10. 如申請專利範圍第9項之方法，其中該第一重新傳輸亦包括一第一組的該資料封包的該等第二群位元。

11. 如申請專利範圍第9項之方法，其進一步包含：

如果該第一重新傳輸的解碼不成功，將一否定確認傳送給該傳送器；

從該傳送器接收一第二重新傳輸，其包括不同於該第一組的一第二組的該等第二群位元；

透過使用來自該等第一及第二重新傳輸的資訊而解碼該

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六、申請專利範圍

該資料封包。

12.如申請專利範圍第11項之方法，其中該第二傳輸只包括該第二組的該等第二群位元。

13.如申請專利範圍第11項之方法，其中該第二傳輸包括該等第一群位元及該第二組的該等第二群位元。

14.一種在通訊頻道上傳輸資料的一傳送器中所使用之裝置，其包含：

一信號處理器，其配置可處理資料及產生對應有組織位元與同位位元；

一組合器，其配置可選擇性接收有組織與同位位元，並且產生一編碼資料封包；

收發電樂，其配置可在通信頻道上傳送編碼資料封包；

一控制器，其配置可控制哪些位元是由組合器選取，以便根據來自一接收器的回授而產生編碼資料封包，

其中當一否定確認接收時，同位位元可在通信頻道上重新傳送給接收器，而且當一遺失信號接收、或沒有確認或否定確認接收時，該等有組織位元便可在通信頻道上重新傳送給該接收器。

15.如申請專利範圍第14項之裝置，其中該信號處理器與組合器可使用一驅動編碼器實施。

16.如申請專利範圍第15項之裝置，其中該通信頻道是一無線頻道。

17.如申請專利範圍第14項之裝置，其中當一遺失信號接收、或沒有確認、或否定確認接收時，該等有組織位元可

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六、申請專利範圍

在通信頻道上連同原始與有組織位元傳送的同位位元而重新傳送給該接收器。

18.如申請專利範圍第14項之裝置，其中當一遺失信號接收、或沒有確認、或否定確認接收時，該等有組織位元可在通信頻道上連同不同於原始與有組織位元傳輸的同位位元而重新傳送給該接收器。

19.如申請專利範圍第14項之裝置，其中當該等有組織位元重新傳送、及一否定確認信號反應該重新傳輸而接收時，與該等有組織位元有關的同位位元可在通信頻道上重新傳送給該接收器，而沒有該等有組織位元。

20.如申請專利範圍第14項之裝置，其中當一否定確認信號接收時，該等有組織位元可在該通信頻道上連同同位位元而重新傳送給該接收器。

21.如申請專利範圍第14項之裝置，其中當一否定確認信號接收時，該等同位位元可在通訊頻道上傳送給該接收器，而沒有該等有組織位元。

22.一種使用在接收器而可於一通信頻道上接收資料之裝置，其包含：

收發電路，其配置可透過一傳送器而接收在通信頻道上傳送的一編碼資料封包，其中一原始傳輸編碼資料封包包括一第一類型位元及一第二類型位元，該第一類型位元是比該第二類型位元的解碼重要；

封包處理電路，其配置可偵測是否有一預期封包，並且將一遺失信號傳送給該傳送器，而且隨後將包括該第一

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六、申請專利範圍

類型位元的該預期封包的一第一重新傳輸解碼。

23.如申請專利範圍第22項之裝置，其中該封包處理電路包括：

一解碼器，用以解碼一接收的資料封包，及

其中如果該資料封包不能正確解碼，一遺失信號便傳送給該傳送器。

24.如申請專利範圍第22項之裝置，其中該封包處理電路包括：

一緩衝器，用以儲存接收的資料封包資訊；

一組合器，用以將緩衝器資訊與重新傳輸的資訊組合；

一解碼器，用以解碼該組合器的一輸出；及

一控制器，其是耦合到該等緩衝器、組合器、與解碼器。

25.如申請專利範圍第24項之裝置，其中該解碼器是一驅動解碼器。

26.如申請專利範圍第24項之裝置，其中該緩衝器與該組合器可執行一增量冗餘操作。

27.如申請專利範圍第24項之裝置，其中該解碼器可執行錯誤更正，而且該封包處理電路可進一步偵測該解碼器的輸出錯誤。

28.如申請專利範圍第24項之裝置，其中如果該解碼器輸出是不可接受，該控制器可將一否定確認信號傳送給該傳送器。

29.如申請專利範圍第28項之裝置，其中該接收器可反應該

本紙張尺度適用中國國家標準(CNS) A4規格(210×297公釐)

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六、申請專利範圍

否定確認而接收包括一組第二類型位元的一重新傳輸，而沒有該第一類型位元。

30.如申請專利範圍第28項之裝置，其中其中該接收器可反應該否定確認而接收包括一組第二類型位元及該第一類型位元的一重新傳輸。

31.如申請專利範圍第22項之裝置，其中該第一類型位元包括實際資訊位元，而且該第二類型位元包括同位位元。

32.如申請專利範圍第22項之裝置，其中該第一重新傳輸亦包括一第一組的該第二類型位元。

33.如申請專利範圍第22項之裝置，其中如果該第一重新傳輸的解碼不成功，一否定確認便會傳送給該傳送器，而且在反應上，一第二重新傳輸可接收，其包括一組該第二類型位元，而沒有該第一類型位元。

34.如申請專利範圍第 33項之裝置，其中該第二傳輸可接收，其包括該第一類型位元與該第二類型位元。

本紙張尺度適用中國國家標準(CNS) A4規格(210×297公釐)

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圖 1

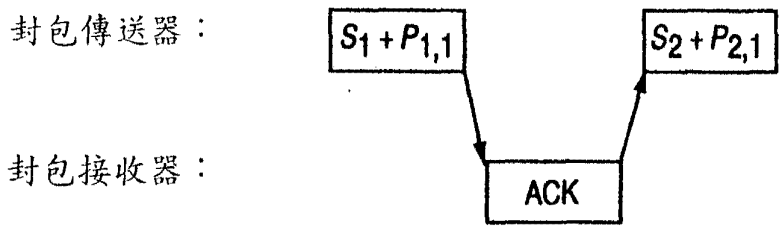


圖 2

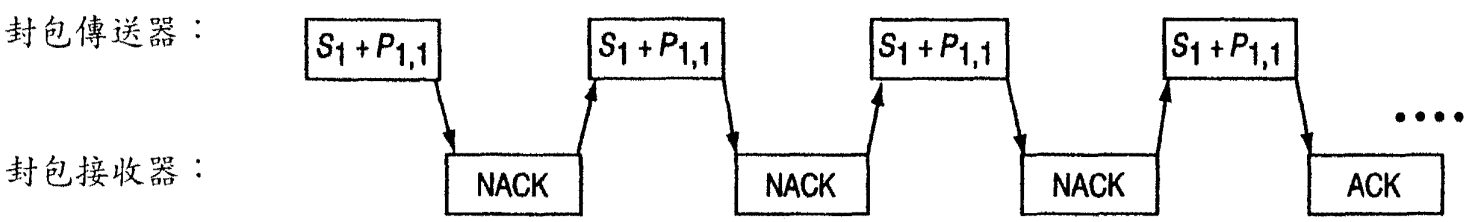
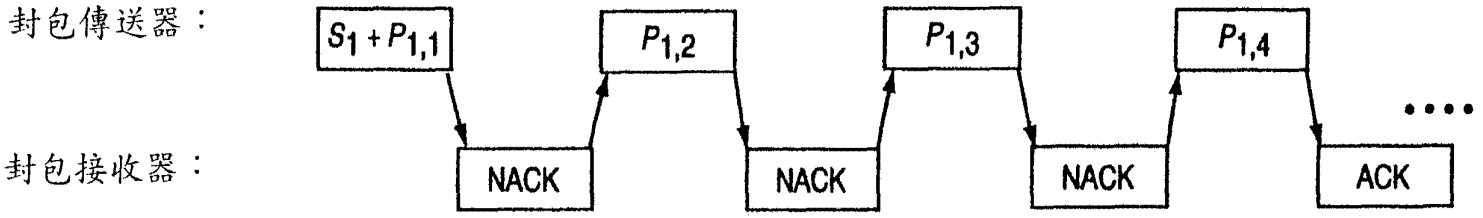


圖 3



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圖 4

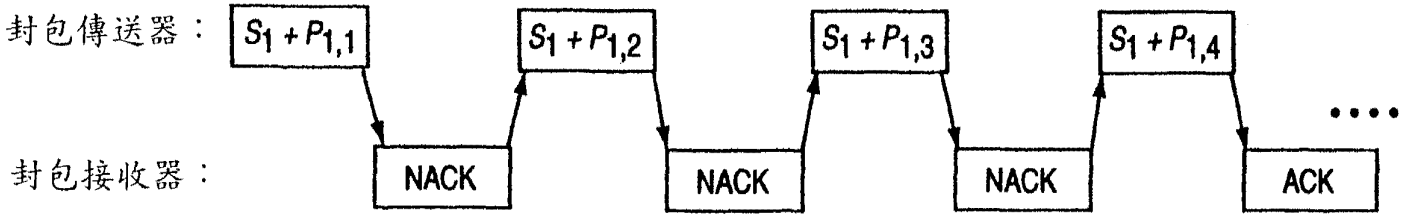

封包傳送器：
封包接收器：
$S_1 + P_{1,1}$
$S_1 + P_{1,2}$
$S_1 + P_{1,3}$
$S_1 + P_{1,4}$
NACK
NACK
NACK
ACK
....

圖 5

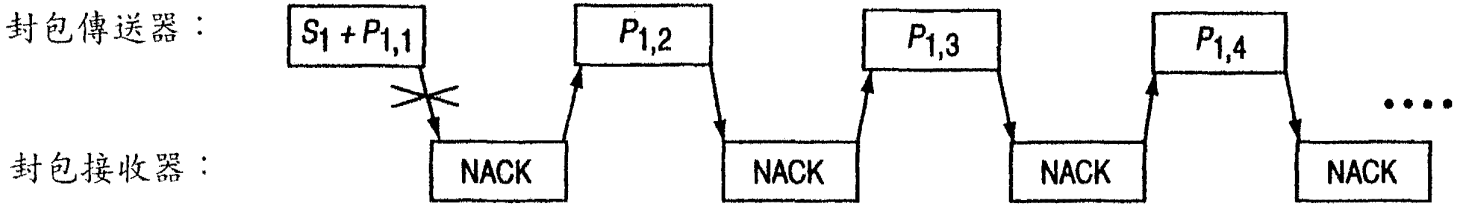

封包傳送器：
封包接收器：
$S_1 + P_{1,1}$
$P_{1,2}$
$P_{1,3}$
$P_{1,4}$
NACK
NACK
NACK
NACK
....

圖 6

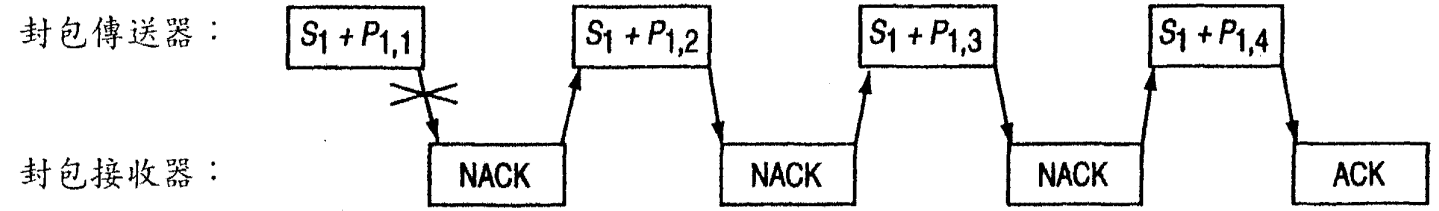

封包傳送器：
封包接收器：
$S_1 + P_{1,1}$
$S_1 + P_{1,2}$
$S_1 + P_{1,3}$
$S_1 + P_{1,4}$
NACK
NACK
NACK
ACK

圖 7

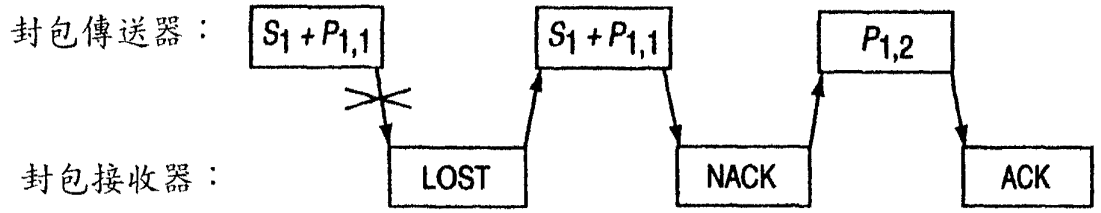
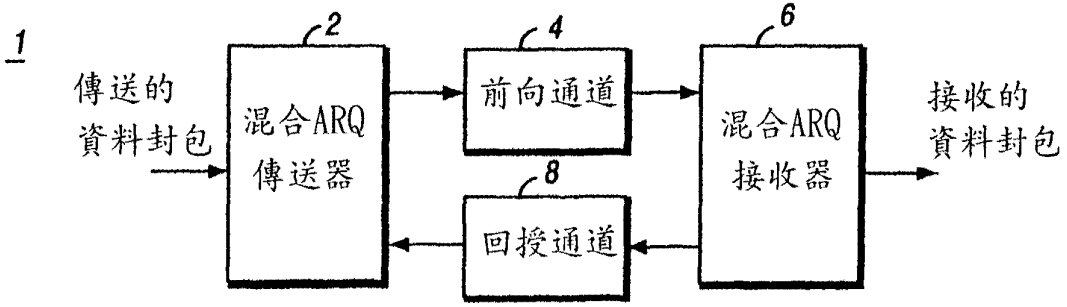


圖 8



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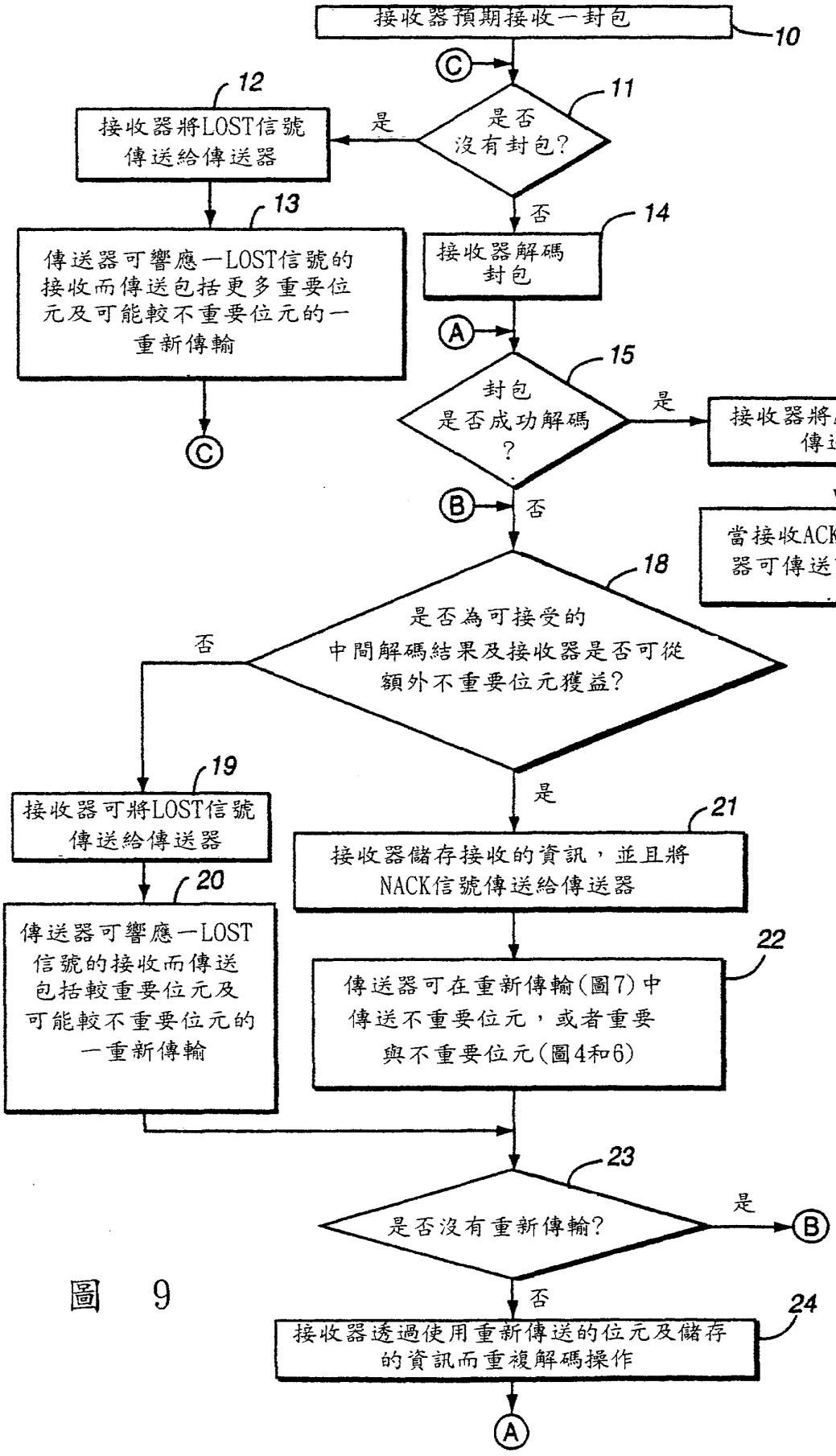

接收器預期接收一封包
10
C
是否沒有封包?
11
是
接收器將LOST信號傳送給傳送器
12
否
接收器解碼封包
14
傳送器可響應一LOST信號的接收而傳送包括更多重要位元及可能較不重要位元的一重新傳輸
13
C
A
封包是否成功解碼?
15
是
接收器將ACK傳送給傳送器
16
當接收ACK時，傳送器可傳送下一封包
17
B
否
是否為可接受的中間解碼結果及接收器是否可從額外不重要位元獲益?
18
否
是
接收器可將LOST信號傳送給傳送器
19
傳送器可響應一LOST信號的接收而傳送包括較重要位元及可能較不重要位元的一重新傳輸
20
接收器儲存接收的資訊，並且將NACK信號傳送給傳送器
21
傳送器可在重新傳輸(圖7)中傳送不重要位元，或者重要與不重要位元(圖4和6)
22
是否沒有重新傳輸?
23
是
B
否
接收器透過使用重新傳送的位元及儲存的資訊而重複解碼操作
24
A

圖 9

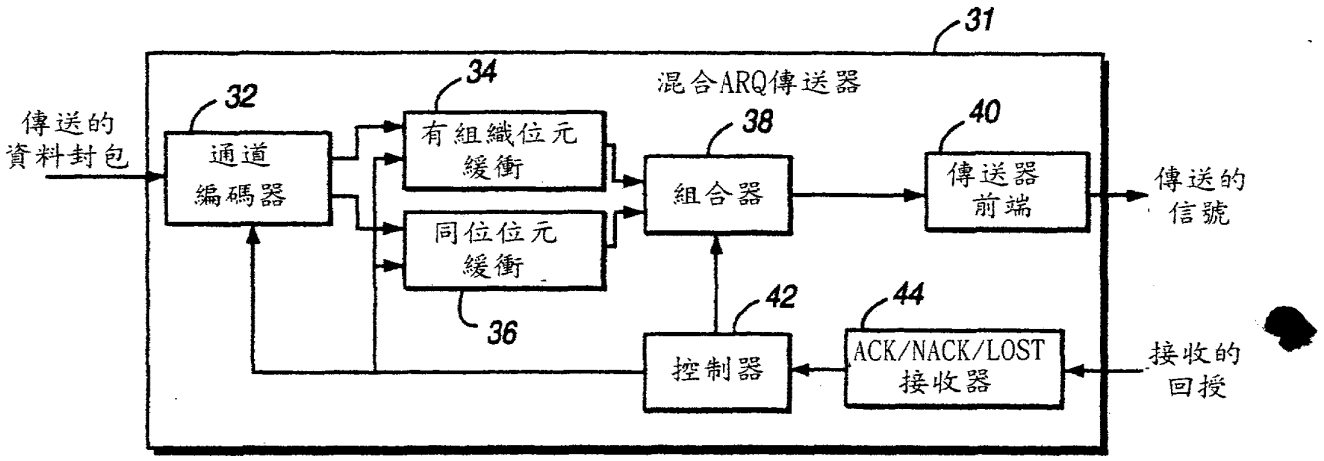

31
混合ARQ傳送器
傳送的
資料封包
32
通道
編碼器
34
有組織位元
緩衝
同位位元
緩衝
36
38
組合器
40
傳送器
前端
傳送的
信號
42
控制器
44
ACK/NACK/LOST
接收器
接收的
回授

圖 10

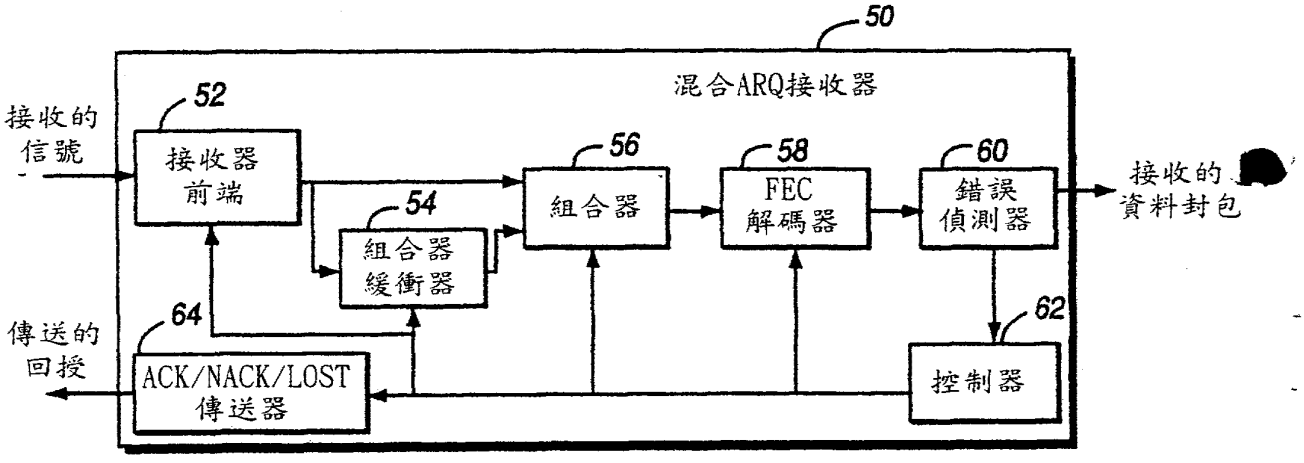

50
混合ARQ接收器
接收的
信號
52
接收器
前端
54
組合器
緩衝器
56
組合器
58
FEC
解碼器
60
錯誤
偵測器
接收的
資料封包
傳送的
回授
64
ACK/NACK/LOST
傳送器
62
控制器

圖 11

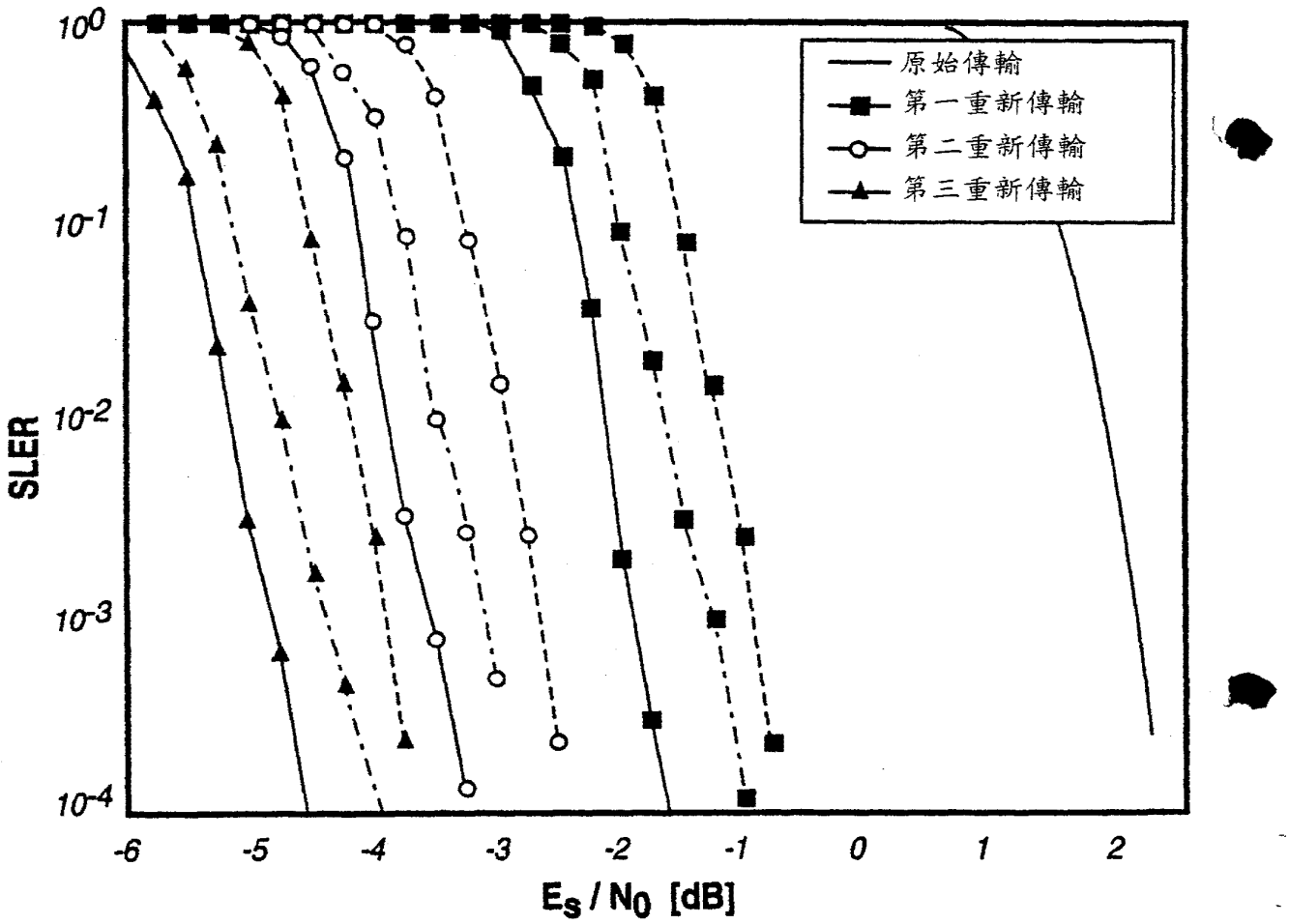

SLER
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
-6
-5
-4
-3
-2
-1
0
1
2
E_S / N_0 [dB]
原始傳輸
第一重新傳輸
第二重新傳輸
第三重新傳輸

圖 12

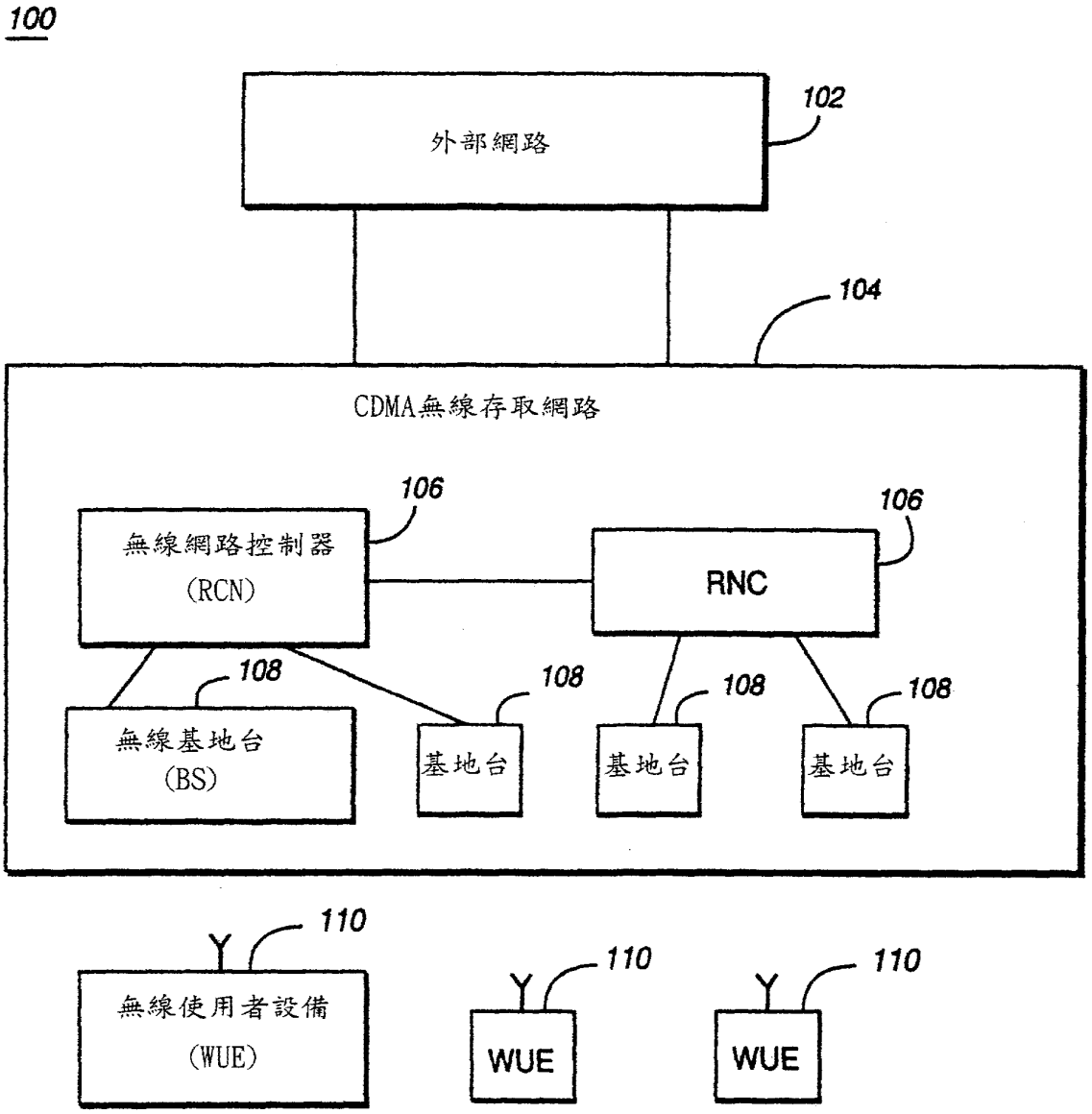

100
外部網路
102
104
CDMA無線存取網路
106
無線網路控制器
(RCN)
106
RNC
108
無線基地台
(BS)
108
基地台
108
基地台
108
基地台
110
無線使用者設備
(WUE)
110
WUE
110
WUE

圖 13

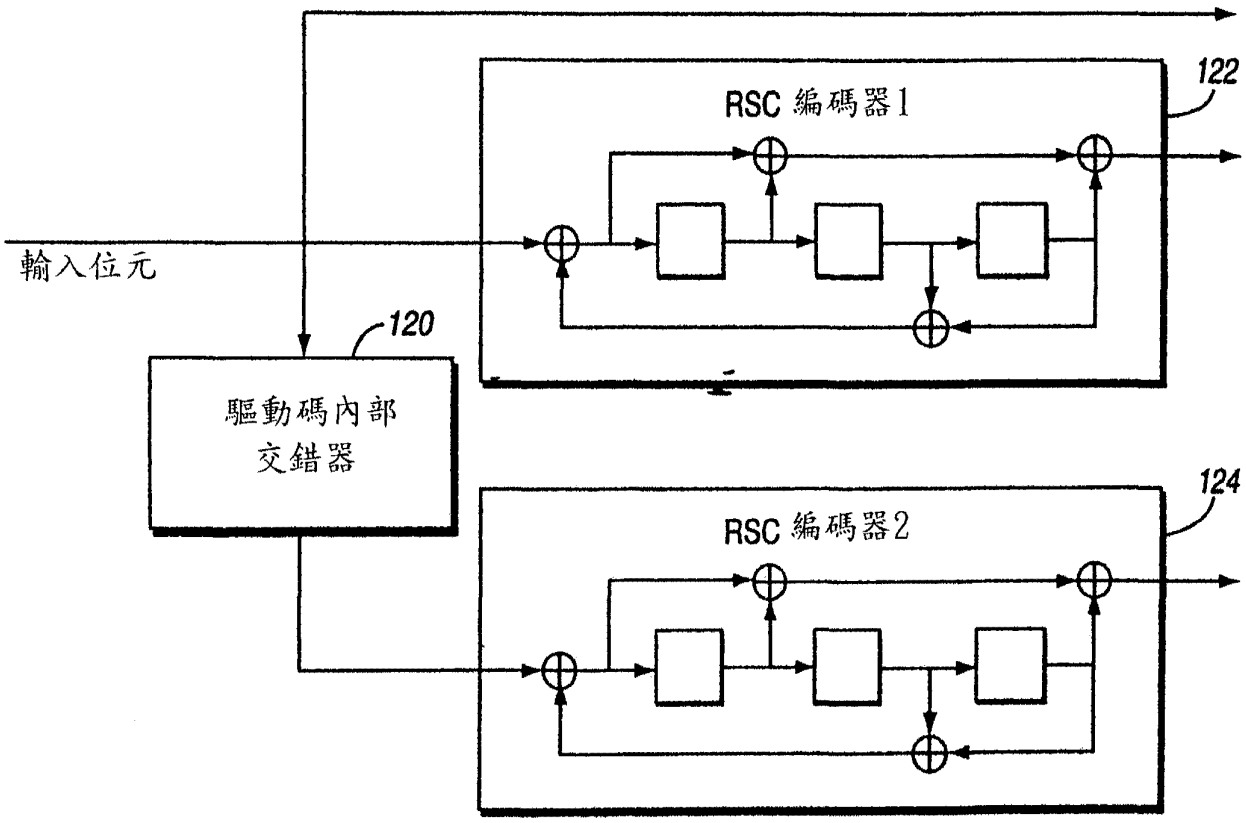


圖 14

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200303689

發明專利說明書

（填寫本書件時請先行詳閱申請書後之申請須知，作※記號部分請勿填寫）

※ 申請案號：92102968 ※IPC分類：H04Q 7/16

※ 申請日期：92. 2. 13

壹、發明名稱

（中文）有效偵測經接收之信號之識別之系統及方法

（英文）SYSTEM AND METHOD FOR EFFICIENTLY DETECTING THE IDENTIFICATION OF A RECEIVED SIGNAL

貳、發明人（共 3 人）

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捌、聲明事項

☐ 本案係符合專利法第二十條第一項☐第一款但書或☐第二款但書規定之期間，其日期為：＿＿＿＿＿＿＿＿＿＿

☑ 本案已向下列國家（地區）申請專利，申請日期及案號資料如下：

【格式請依：申請國家（地區）；申請日期；申請案號　順序註記】

1. 美國；2002年02月13日；60/357,189
2. 美國；2002年02月13日；60/357,199
3. 美國；2002年02月19日；60/357,943

☑ 主張專利法第二十四條第一項優先權：

【格式請依：受理國家（地區）；日期；案號　順序註記】

1. 美國；2002年02月13日；60/357,189
2. 美國；2002年02月13日；60/357,199
3. 美國；2002年02月19日；60/357,943
4.
5.
6.
7.
8.
9.
10.

☐ 主張專利法第二十五條之一第一項優先權：

【格式請依：申請日；申請案號　順序註記】

1.
2.
3.

☐ 主張專利法第二十六條微生物：

☐國內微生物　【格式請依：寄存機構；日期；號碼　順序註記】

1.
2.
3.

☐國外微生物　【格式請依：寄存國名；機構；日期；號碼　順序註記】

1.
2.
3.

☐熟習該項技術者易於獲得，不須寄存。

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(1)

玖、發明說明

(發明說明應敘明：發明所屬之技術領域、先前技術、內容、實施方式及圖式簡單說明)

技術領域

本發明相關於無線通信領域。更特定的是，本發明應用於有效地從多個控制通道中辨識一個特殊控制通道之資訊的系統及方法。

先前技術

無線行動單元之設計的目標之一是最大化電池壽命。大體上，一個較長電池壽命將大大地提高使用者的便利性。限制電池壽命的主要因素為行動單元所需的處理。如果最小化該處理所需，電池壽命將更長;反之，該處理所需增加，將降低電池壽命。這是設計無線系統時的取捨之一：即表現較佳，但具有低電池壽命的系統，之於，表現不這麼好，但具有延長電池壽命的系統。

在無線系統內，耗費絕大部分處理資源的處理之一為偵測過程。因此，刺激設計高效率偵測過程，其可使在預備偵測時期，最小化處理資源，尤其在具有共享通道的系統內。初步偵測階段佔據該偵測過程的主體，因為這是當該接收器連續或間歇監視一或多個通道，以決定是否有資料預定給該行動單元的階段。如果有資料預定給該行動單元，通道之一將會有某種形式的顯示或訊息，告知接獲資料。然後，傳送預定給該行動單元的資料於那個通道，或者該顯示可能包括某另一個通道之位址，而該行動單元應該調頻到該某另一個通道，接收該資料。

維持資料通信的一個解決方案為對每一個無線行動單元

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之專用通道的配置。然而，因為這樣的通道通常於長時期內持續閒置，將導致該頻寬之極無效率的使用。

使用對於每一個無線行動單元之專用通道的替代方案為使用共享資料通道與資料封包。在這個方法中，多個行動單元之間共享多個通道。動態配置一個該共享資料通道給那些具有資料欲傳送或接收的行動單元。這將導致該頻譜的更為有效使用。

具有共享通道的系統通常共享大數目行動單元(例如，多達100個行動單元)之間的小數目通道，(例如4-6個通道)。因此，雖然該行動單元於初步偵測階段內連續或間歇監視一或多個通道，實際上，在浪費時間於無特定給那個特定行動單元之資料的期間內，對於那個特定行動單元與所需過程之大量主體，該顯示或訊息是相當難得的。當一個行動單元監視多個通道，只有一個通道可以具有預定給該特定行動單元的資料。然而，大多數時間，沒有通道具有預定給該特定行動單元的資料。希望該行動單元僅於有興趣的通道內，執行詳細的資料搜尋，並且在執行此時，減低消耗功率與計算資源。

使用共享通道計畫的這樣一個通信系統的一個特定範例為第三代合資企劃(3GPP)通信系統。在使用高速封包資料架構(HSDPA)應用的3GPP系統內，行動單元預先考慮到資料將會傳遞給它，但卻沒有十分精確地知曉何時或於何個通道。這個過程顯示於圖1A-1C。參考圖1A，從一個基地台(或端點B)傳送相關下鏈專用實體通道(DPCH)到每個行動單

元。該行動單元監視DPCH與共享控制通道(HS-SCCH)。當沒有資料從該基地台傳送到該行動單元，該行動單元進入等待模式，藉以週期喚醒而企圖監視DPCH與共享控制通道(HS-SCCH)。這個等待模式允許該行動單元儲存處理和電池資源。

如果基地台的資料已經準備好傳送到該行動單元，將傳送高速下載共享通道(HS-DSCH)旗幟於DPCH內。該旗幟具有n位元長度，其表示於圖1B所示的2^n個HS-SCCHs之一。例如，2位元旗幟可以表示4個SCCH-HSs，(即，00，01，10或11)。

以圖1A所示的範例而言，該旗幟為(1, 0)，表示圖1B所示的第三通道。當該行動單元接取由該旗幟所辨別的控制通道時，那個特定HS-SCCH引導該行動單元到適合的HS-DSCH。為了該資料重覆，已經配置該適合的HS-DSCH給該行動單元。例如，如圖1C所示，該行動單元調頻到由HS-SCCH (1, 0)所辨別的HS-DSCH (001)。然後，該行動單元接收到HS-DSCH (001)上欲給其的資料。應注意到圖1A-1C之圖像表示已經展示說明配置HS-DSCHs的過程，而通道的設定與使用也許些許有別於HSDPA標準的實際執行。

雖然參考圖1A-1C所描述的過程提供一個有效方法，以為資料傳輸配置共有資料通道，其需使用一個分離專用控制通道來傳輸不期望的該旗幟。

也可以一般化前面提及的範例，並且將其應用到其他通信系統，該通信系統內使用多個通道來提供多個接收器個

別所需的資料。

因為給特定行動單元的資訊一般包含於多個控制通道的一個特定控制通道內，其有利於如果行動單元可以快速決定特定控制通道來接取目標為其的資料。

發明內容

本發明是有效決定何時訊息給予特定無線傳送/接收單元(WTRU)的一個系統與方法。根據本發明，設定每個WTRU以接收多個通信通道上的通信。可以從至少一個多數通信通道上，獲取來自一個基地台的資訊。WTRU接收且處理實體層上多數通信通道的輸入信號，以顯示是否有任何多數通信通道是WTRU所想要。如果該顯示一致於那個行動單元所期望的顯示，該行動單元則接取該特定通信通道，並且處理傳送那裡的資訊。

在一個特定設定內，可以提供該通信通道如同控制通道，信號分析足夠以獲取可以提供特定行動單元一個控制資訊顯示的樣式。

實施方式

這裡將參考附圖圖示，說明本發明，其中處理相似數字代表相似元素。應注意到雖然參考3GPP系統來描述本發明，應用這裡所教導的原則到具有多數通信通道的任何通信系統，其中接收器必須偵測於任一通信通道上之傳送給其的資訊。

參考圖2，本發明所使用的通用行動電訊系統(UMTS)網路架構包括核心網路(CN)，UMTS陸地無線電接取網路

(UTRAN)，以及無線傳送/接收單元(WTRU)。兩個一般介面為Iu介面與無線電介面Uu；Iu介面乃介於UTRAN和核心網路之間，Uu介面乃介於UTRAN與WTRU之間。UTRAN包括幾個無線電網路子系統(RNSs)。可以藉著Iur介面將它們相互連接。這個相互連接允許不同RNSs之間的核心網路獨立程序。RNS進一步分成無線電網路控制器(RNC)與幾個基地台(端點B)。端點B可以服務一或多個細胞，一般亦可以服務多數WTRUs。UTRAN在無線電介面上同時支援FDD模式與TDD模式。這兩個模式使用了相同網路架構跟相同協定。只有分別明確說明實體層與空氣介面Uu。

參考圖3，展示了根據本發明所製作的傳送器10。該傳送器10包括前導產生器12，控制訊息產生器14，結合器16，RF上轉換器與傳送器18跟天線20。控制訊息產生器14產生X位元控制訊息22。同樣地，前導產生器12產生前導24。結合器16結合該前導24與控制訊息22，以形成傳送訊息26，該傳送訊息26具有在該控制訊息22之前的前導24。然後上轉換該傳送訊息26，並且透過RF上轉換器跟傳送器18來傳送，藉由天線20傳播。

參考圖4，更詳盡地顯示前導產生器12。前導產生器12可以處理多數並行通道C1, C2, C3, ..., CN。前導產生器12接取N個並行控制通道CC1, CC2, CC3,..., CCN，每個控制通道CC1-CCN包括具有M個位元的WTRU識別碼(WTRUID)。前導產生器12透過至少一個編碼器13，藉由對應M位元WTRUID到K位元前導，來執行編碼。如同熟於本技藝者所認同，可

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以為本發明使用編碼計畫的任何龐大列舉。例如，可以使用 Reed-Muller, Reed-Solomon, Hamming, Bose-Chaudhura-Hocquenghem (DCH)跟Golay等的編碼計畫。當然，可以使用其它碼，其表示前述各碼的較佳品質。這些品質為較易實現，在任兩個碼字之間有較大距離。例如，對於一個方塊碼，兩個字之間的Hamming距離為字不同的位置數目。一個好碼其最小Hamming距離有一個大值。

由於編碼過程，從至少一個編碼器13產生多個前導P1, P2, P3, ..., PN。如同參考圖3的前述，結合每個前導P1-PN與一個相對應的控制訊息22，以製造傳送之傳送訊息26。

參考圖5，展示了根據本發明的一個接收器40。該接收器40包括天線42，RF下轉換器44，前導處理器46和控制訊息處理器48。一旦，天線42處接收到該傳送訊息26，以RF下轉換器44做下轉換，並且進而送到前導處理器46。如同下述更為詳盡的說明，該前導處理器46接受特定WTRU之WTRUID，並且處理多數前導P1-PN，以決定是否有任何前導相對應於那個特定WTRU之WTRUID。將只有具有匹配WTRUID之前導P1-PN的一個傳送訊息26，遞送到該控制訊息處理器48，以更進一步處理該控制訊息22。

參考圖6，更詳盡地展示該前導處理器46。該前導處理器46包括一個前導解碼單元50與一個比較器52。該前導解碼單元50接收該傳送訊息26；該傳送訊息26包含前導24與控制訊息26。該前導解碼單元50也將前導24解碼為M位元辨別(ID)。本質上，該前導解碼單元50對於該前導產生器12所執

行者執行相反處理，如圖4所示。然後，在比較器52比較M位元ID和WTRUID。如果沒有匹配，將進一步處理該前導24和該控制訊息26。如果匹配，則接受該前導24，並且遞送該控制訊息26到該控制訊息處理器48，以做進一步處理。應該注意雖然圖6為簡化起見，僅顯示一個單一通道，實際上該前導處理器46可以處理多數通道C1-CN，如同參考圖4的前導產生器12所顯示與描述。

雖然，可以應用本發明於使用許多不同形式編碼過程的任一形式通信系統，圖7和8展示參考3GPP系統的一個特定範例。

參考圖7，在前導產生器12的每個編碼器13內執行碼對應。在本具體實施例中，以10位元WTRUIDs完成此，其中以Reed-Muller編碼將10位元WTRUIDs編碼成32位元樣式。Reed-Muller編碼是一個著名技術，可以是一個有效率與高可信度的方法，來傳送高達10位元控制資訊。然後，將這個樣式當成該控制訊息22的前導，接著傳輸該傳送訊息26。在本範例中，分配WTRU四個控制通道來監視，可能於它們之任一上傳送該預期訊息。

參考圖8，在接收端，該前導處理器46包括一個Reed-Muller前導解碼單元51，其本質上對圖7所示的編碼器13執行相反操作。接著同樣方式處理Reed-Muller前導解碼單元51的輸出，如同參考圖6所展示與描述的一般應用。

如熟悉本技藝者所熟知，有解碼過程的許多執行可能，本發明不應侷限於這裡描述的幾個範例。然而，M位元辨

別(ID)的本範例代表2^MID可能假設(即，本範例中，10位元ID導致2^{10}=1024個假設)。

在本發明的第一個具體實施例中，前導解碼單元51內的解碼程序使得所接收到的未加工位元與1024個假設之每個所期待的32位元樣式兩者相關聯。並且，前導解碼單元51內的解碼程序為四個通道的每個選取最強相關的假設。這四個假設為依序，相關於具有相關該WTRUID之32位元樣式的比較器52。然後，該比較器52接受最匹配的通道。

參考圖9，顯示了根據本發明所製作之前導處理器70的替代具體實施例，其中偵側乃基於在比較器76內特定WTRUID的最匹配。這時，使用對應於該特定WTRUID(即，該WTRU's自己的ID)的信號樣式72來做比較。當在實體層接收到N個通道74，則於比較器76處執行比較。基本上，該比較包括一個匹配濾波操作或一個相關。最為相關該特定WTRUID之信號樣式72的該輸入信號樣式被判定為最匹配。這個替代提供更高機率的成功選取，同時也僅需要更少的處理。在四個通道的範例內，這需要四個相關，取代4*1024相關。這個替代提供一個顯示，顯示四個通道之一上所接收到的資訊乃為傳送給該WTRU。

在一個隨意的具體實施例中，該最匹配必須進一步符合預定門限，其中只有超出門限的最匹配被視為匹配該WTRUID。

透過一般識別標誌該實體信號，本發明可以進一步地加強。取代處理每個傳送控制訊息前導，來決定是否它們之

一確切匹配其ID，該WTRU可決定哪一個多數傳輸最匹配其ID。然後，該WTRU執行那個傳輸的完全處理。藉由決定哪一個傳輸最為匹配其ID，和總是執行那個傳輸的完全處理，可以完成此。在僅處理完全控制訊息之一個的代價下，將大大地降低偵測其ID的失敗機率。這表示在完整地處理所有控制訊息上的顯著節省。

圖式簡單說明

圖1A是一個方塊圖，顯示配置共享下鏈資料通道的使用。

圖1B是一個方塊圖，說明多數控制通道。

圖1C是一個方塊圖，說明多數資料通道。

圖2是根據本發明所使用的通用行動電訊系統(UMTS)網路架構。

圖3是一個方塊圖，其傳送器乃是根據本發明所製作。

圖4是前導產生器的方塊圖。

圖5是一個方塊圖，其接收器乃是根據本發明所製作。

圖6是前導處理器的方塊圖。

圖7是使用Reed-Muller編碼之前導產生器的替代具體實施例。

圖8是使用Reed-Muller解碼之前導處理器的替代具體實施例。

圖9是根據本發明所製作之前導處理器的替代具體實施例。

圖式代表符號說明

10　　傳送器

12	前導產生器
14	控制訊息產生器
16	結合器
18	RF上轉換器和傳送器
20，42	天線
22	X位元控制訊息
24	前導
26	傳送訊息
13	編碼器
40	接收器
44	RF下轉換器
50	前導解碼單元
52，76	比較器
51	Reed-Muller前導解碼單元
72	信號樣式
74	N個通道
46，70	前導處理器
48	控制訊息處理器

肆、中文發明摘要

在無線通信網路中，可以有效決定何時一個訊息意欲於特殊無線傳送/接收單元(WTRU)的一個系統及方法。依據本發明，設定每一個WTRU，以在多個通信通道上接收通信。WTRU接收並且處理在實體層之多個通信通道上的輸入信號，以顯示何者或任何該多個通信通道意欲於該WTRU。如果該顯示一致於對於那個行動單元的期望顯示，該行動單元將接取該特殊通信通道，並且處理所傳送來的該資訊。

伍、英文發明摘要

A system and method in a wireless communication network that efficiently determine when a message is intended for a particular wireless transmit/receive unit (WTRU). In accordance with the present invention, each WTRU is configured to receive communications on multiple communication channels. The WTRU receives and processes incoming signals on the multiple communication channels at the physical layer for an indication of which, if any, of the multiple communication channels is intended for the WTRU. If the indication is consistent with an expected indication for that mobile unit, the mobile unit accesses the particular communication channel and processes the information being sent therein.

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拾、申請專利範圍

1. 一種從至少一個多數通信通道上的基地台獲取資訊之方法，該基地台在多數通信通道上與具有多數無線傳送/接收單元(WTRUs)的一個系統通信，該方法包括：

接收一個RF信號；及

在實體層分析該RF信號，以決定是否該RF信號內的樣式相似於一個特定WTRU的期望樣式，如果是，則對該多數通信通道至少之一進一步處理以該RF信號所傳送的資訊。

2. 如申請專利範圍第1項之方法，更包括：

使用該分析，以獲取特定一個通信通道的顯示，而該通信通道為運載欲給該WTRU之通信資料的該多數通信通道之特定之一；及

選取該特定通信通道。

3. 如申請專利範圍第2項之方法，更包括使用該RF信號的標誌，以獲取該顯示。

4. 一種操作一個無線傳送/接收單元(WTRUs)之方法，其中為了獲取一個控制信號，使該WTRU監視一個RF信號，該RF信號包括多個通道，具有在至少一個該多數通道內所提供的控制訊息，該方法包括：

在實體層監視該RF信號，而沒有完全剖析該多數通道；及

根據該實體層的該RF信號之一般特性，獲取欲給該特定WTRU之該控制訊息之一的一個顯示。

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5. 一種透過多數通信通道與基地台溝通的無線傳送/接收單元(WTRUs)，該基地台傳送多數訊息，每個訊息具有一個編碼前導；該WTRU包括：

一個前導處理器，其處理該實體層處的該前導，以決定是否該前導相匹配於該WTRU的該識別(ID)；及

一個控制訊息處理器，其只有該決定為是的時候，處理該控制訊息。

6. 如申請專利範圍第5項之WTRU，其中該前導處理器更包括一個前導解碼單元，該前導解碼單元可解碼實體層處的該前導。

7. 如申請專利範圍第6項之WTRU，其中該前導處理器更包括一個比較器，其可以比較該解碼前導與該ID。

8. 如申請專利範圍第5項之WTRU，其中該前導處理器使每個該前導跟該ID相互關聯。

9. 如申請專利範圍第8項之WTRU，其中該前導處理器更決定哪一個該前導為最高相關。

10. 如申請專利範圍第9項之WTRU，其中最高相關的該前導更比做為一個門限，其中決定如果超出該門限，將偵測到該WTRU的ID。

11. 如申請專利範圍第5項之WTRU，其中該前導處理器將該WTRU之ID相關聯於每個前導，並且決定與該ID最高相關的前導。

12. 一種基地台，在具有多個無線傳送/接收單元(WTRUs)的系統內，該多個無線傳送/接收單元(WTRUs)透過多數通

信通道與基地台溝通，該基地台傳送多數訊息，每個訊息具有一個編碼前導；該基地台包括：

一個前導產生器，以在實體層產生一個具有單一識別的前導；

一個控制訊息產生器，以產生一個控制訊息；

一個結合器，結合該前導與該控制訊息；及

一個RF上轉換器與傳送器，以傳送該結合訊息。

13. 如申請專利範圍第12項之基地台，其中該前導產生器更包括一個編碼單元，其可編碼於實體層內具有單一識別的前導。

14. 如申請專利範圍第13項之基地台，其中該編碼包含Reed-Muller編碼。

拾壹、圖式

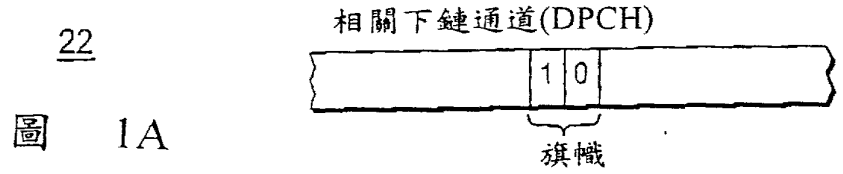


圖 1A

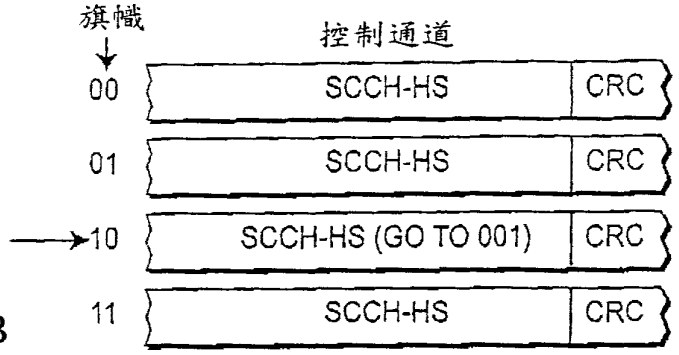


圖 1B

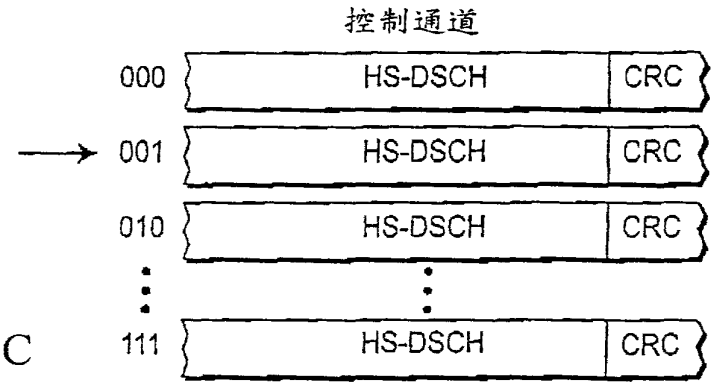


圖 1C

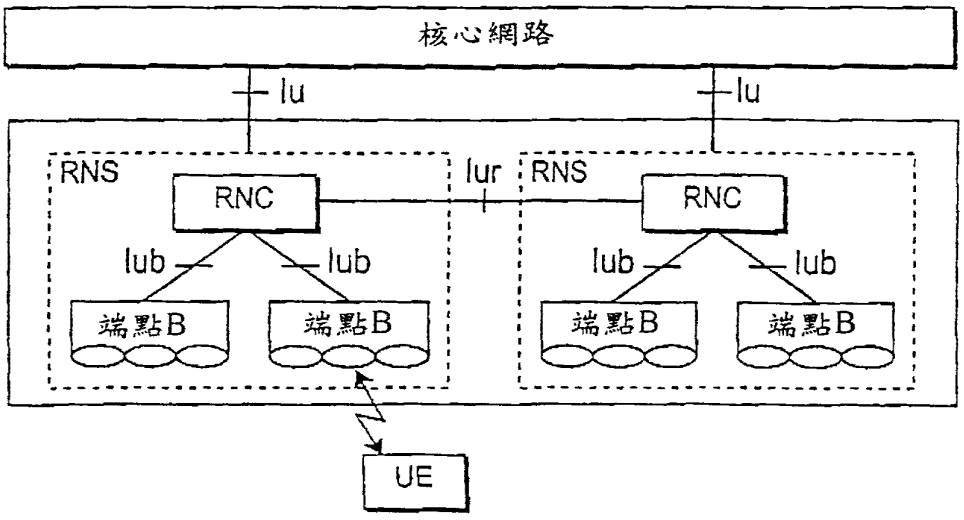


圖 2

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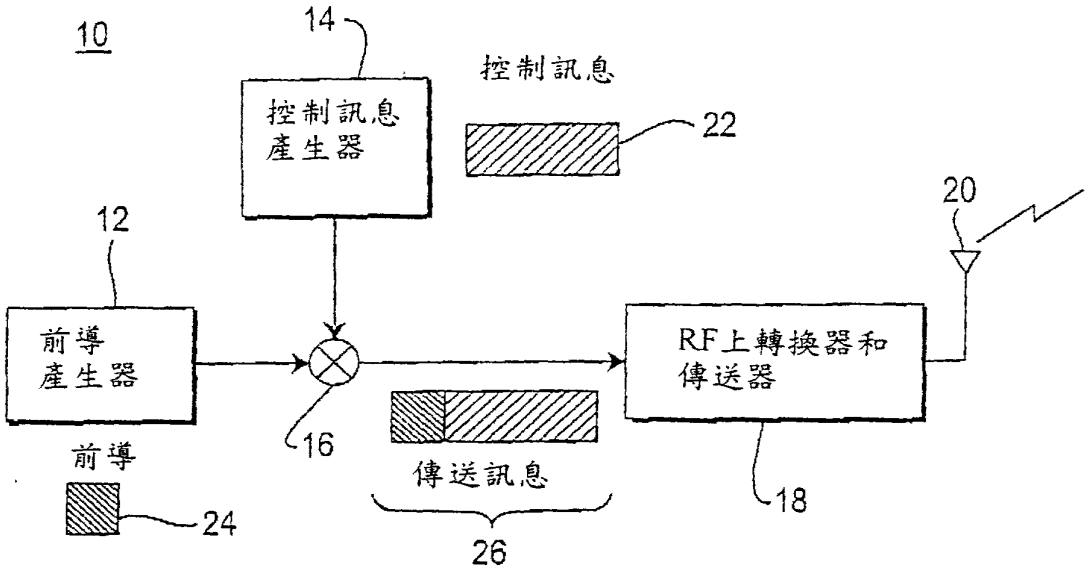

10
14
控制訊息
控制訊息
產生器
22
20
12
前導
產生器
RF上轉換器和
傳送器
16
傳送訊息
前導
24
18
26

圖 3

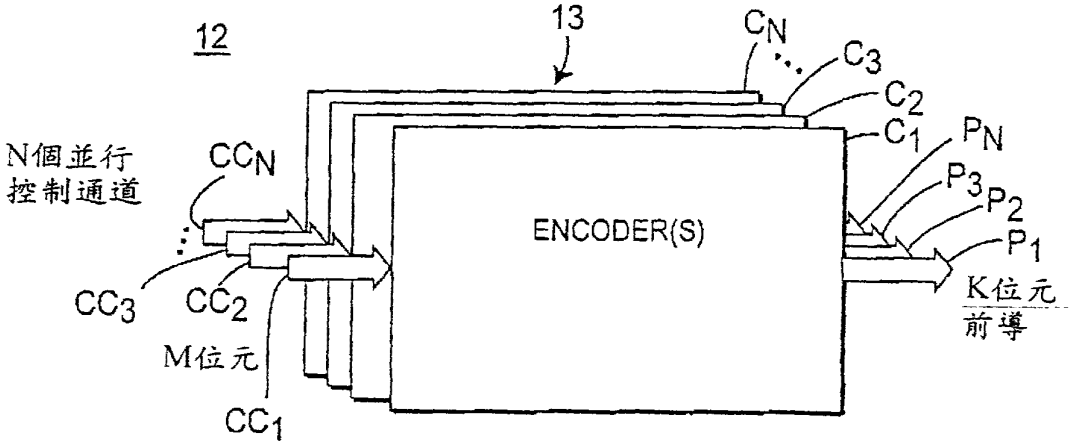

12
13
C_N
C_3
C_2
C_1
P_N
P_3
P_2
P_1
N個並行
控制通道
CC_N
ENCODER(S)
CC_3
CC_2
M位元
CC_1
K位元
前導

圖 4

圖式續頁

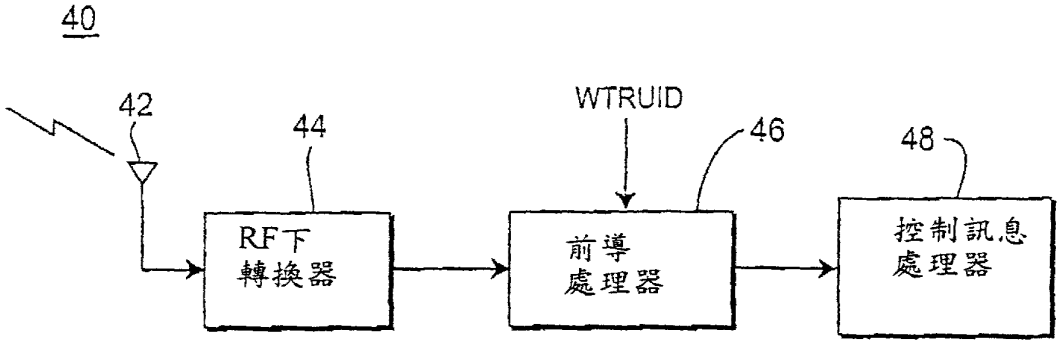

40
42
44
WTRUID
46
48
RF下
轉換器
前導
處理器
控制訊息
處理器

圖 5

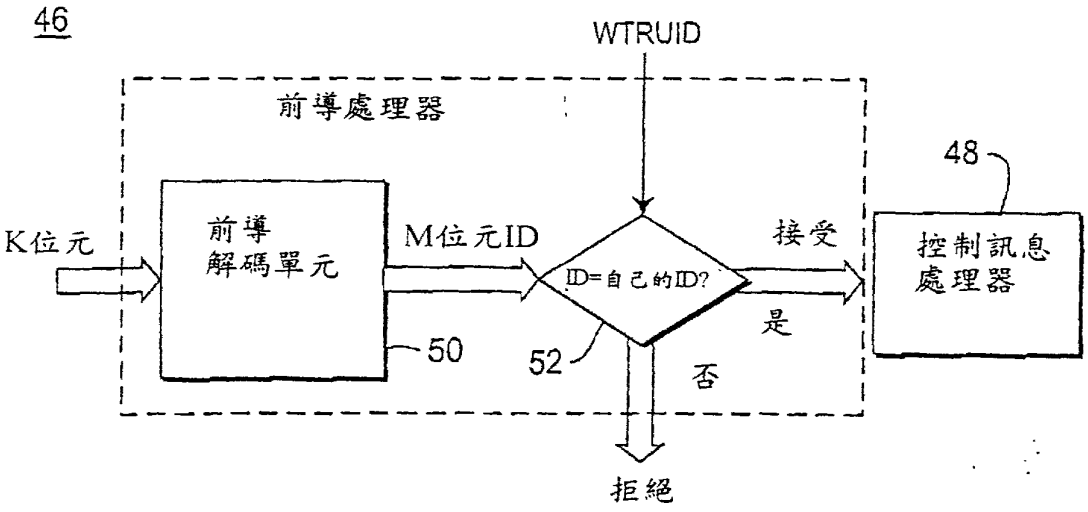

46
WTRUID
前導處理器
48
K位元
前導
解碼單元
M位元ID
ID=自己的ID?
接受
是
否
50
52
控制訊息
處理器
拒絕

圖 6

圖式續頁

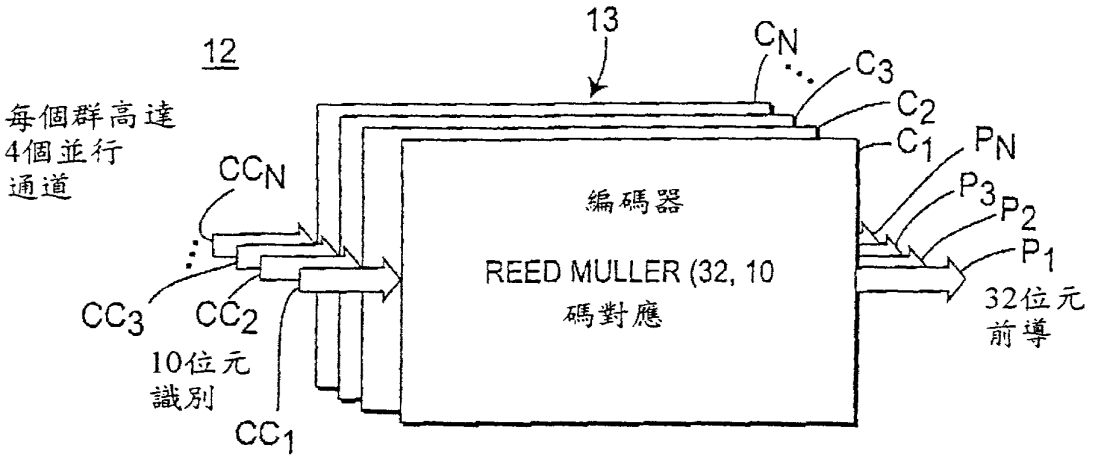

12
13
每個群高達
4個並行
通道
CCN
CC3
CC2
CC1
10位元
識別
編碼器
REED MULLER (32, 10
碼對應
CN
C3
C2
C1
PN
P3
P2
P1
32位元
前導

圖 7

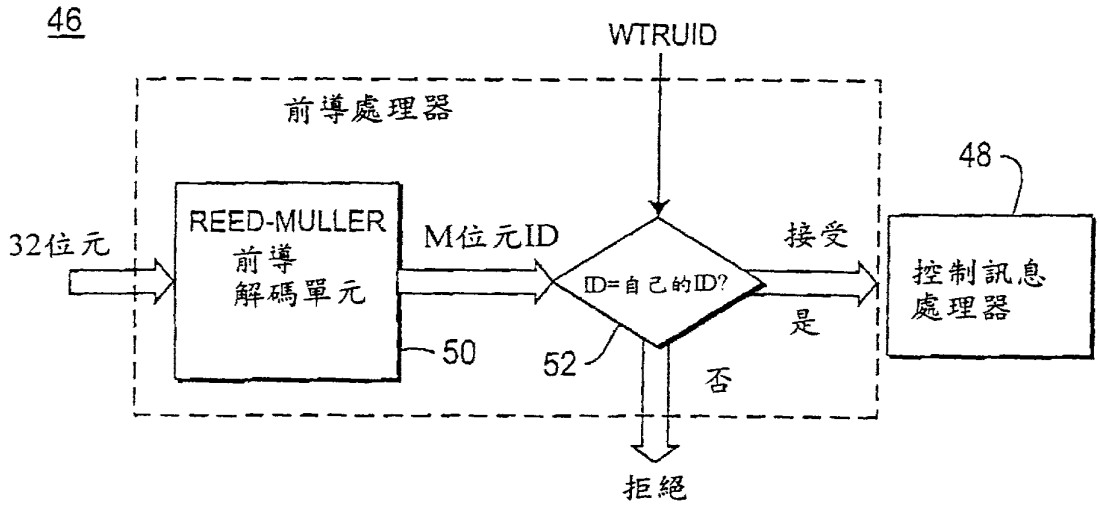

46
WTRUID
前導處理器
32位元
REED-MULLER
前導
解碼單元
M位元ID
ID=自己的ID?
接受
是
否
50
52
48
控制訊息
處理器
拒絕

圖 8

圖式頁

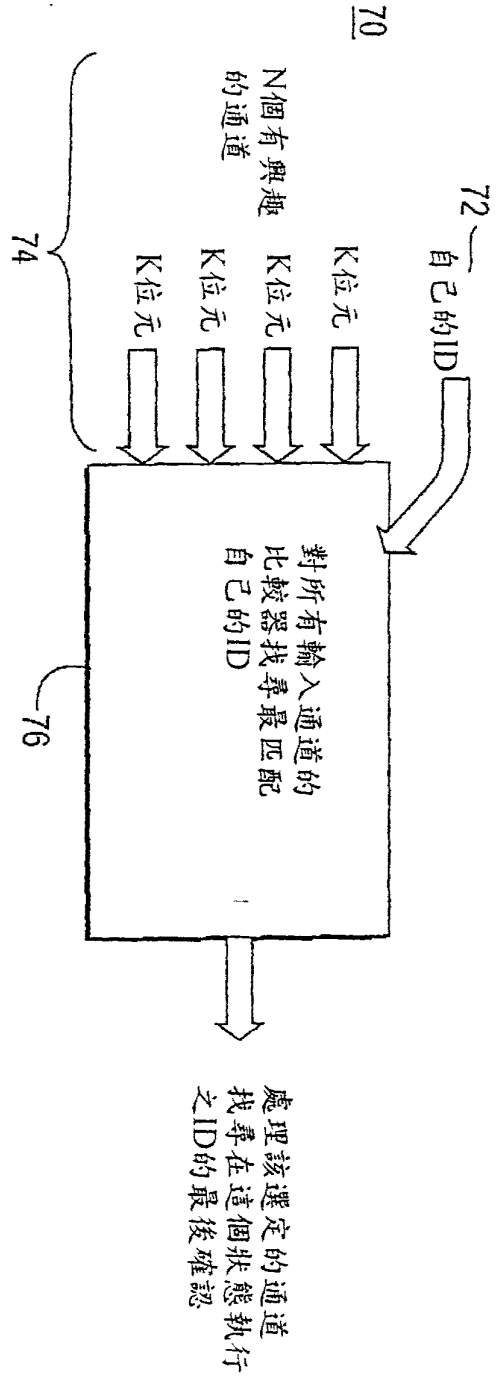


圖 9

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陸、(一)、本案指定代表圖為：第___6___圖

(二)、本代表圖之元件代表符號簡單說明：

46	前導處理器
48	控制訊息處理器
50	前導解碼單元
52	比較器

柒、本案若有化學式時，請揭示最能顯示發明特徵的化學式：

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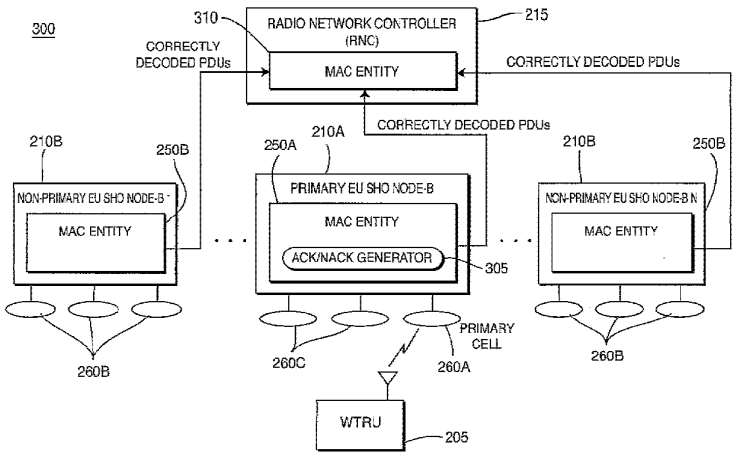
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(54) Title: WIRELESS COMMUNICATION METHOD AND APPARATUS COORDINATING NODE-B'S AND SUPPORTING ENHANCED UPLINK TRANSMISSIONS DURING HANDOVER



(57) Abstract: A wireless communication method and apparatus for coordinating Node-Bs during handover for enhanced uplink (EU) transmission. In one embodiment, a radio network controller (RNC) initiates an inter-Node-B soft handover. A wireless transmit/receive unit (WTRU) establishes communication connections with a plurality of Node-Bs. A particular one of the Node-Bs is designated as being a primary Node-B, and each of other Node-Bs are designated as being a non-primary Node-B. The RNC informs all of the Node-Bs that the particular Node-B is a primary Node-B. The primary Node-B schedules EU transmission and performs ACK/NACK during soft handover. In another embodiment, the RNC initiates a hard handover for a WTRU connected to a source Node-B. The RNC sends an activation timer to the source Node-B to set the time for handover. As many previously negatively acknowledged (NACKed) data packets as possible are prioritized for retransmission in the source Node-B before the activation timer expires.

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[0001] WIRELESS COMMUNICATION METHOD AND APPARATUS COORDINATING NODE-B'S AND SUPPORTING ENHANCED UPLINK TRANSMISSIONS DURING HANDOVER

[0002] FIELD OF INVENTION

[0003] 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.

[0004] BACKGROUND

[0005] 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.

[0006] 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.

[0007] 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.

[0008] 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

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"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.

[0009] 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.

[0010] 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.

[0011] 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.

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[0012] SUMMARY

[0013] The present invention is related to a wireless communication method and apparatus for coordinating Node-Bs during handover for enhanced uplink transmission. The apparatus may be a wireless communication system, an RNC, a Node-B and/or an integrated circuit (IC).

[0014] In one embodiment, a wireless multi-cell communication system includes an RNC, a plurality of Node-Bs, and a plurality of WTRUs. Each Node-B serves at least one cell and schedules EU transmissions from the WTRUs. Once an RNC recognizes a need for soft handover, a WTRU establishes connections to Node-Bs in an active set. One of the Node-Bs in the active set is designated as a primary Node-B and all other Node-Bs are designated as a non-primary Node-B. An RNC or a WTRU selects a primary Node-B and informs the other Node-Bs about the primary Node-B. During soft handover, the primary Node-B schedules EU transmission and performs ACK/NACK.

[0015] In a separate embodiment, an RNC initiates a hard handover for a WTRU connected to the source Node-B. The RNC informs the source Node-B when the WTRU will stop transmission and reception while being connected to the source Node-B. The RNC sends an activation timer to the source Node-B to set the time for handover. The handover is completed when the activation timer expires.

[0016] The source Node-B may determine whether there are any previously transmitted data packets that were negatively acknowledged (NACKed) by the source Node-B. In order to receive as many previously NACKed data packets as possible before the activation timer expires, the source Node-B may adjust the priority and/or adjust a modulation and coding scheme (MCS) used for data packet retransmissions sent by the WTRU.

[0017] BRIEF DESCRIPTION OF THE DRAWINGS

[0018] 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:

[0019] Figure 1 shows a conventional wireless communication system;

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[0020] 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;

[0021] 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;

[0022] 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

[0023] 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.

[0024] DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0025] The present invention will be described with reference to the drawing figures wherein like numerals represent like elements throughout.

[0026] 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.

[0027] 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.

[0028] 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.

[0029] The features of the present invention may be incorporated into an IC or be configured in a circuit comprising a multitude of interconnecting components.

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[0030] 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.

[0031] 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.

[0032] 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.

[0033] 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.

[0034] 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,

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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.

[0035] 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.

[0036] 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.

[0037] 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.

[0038] 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.

[0039] 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

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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 260is 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.

[0040] 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.

[0041] 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.

[0042] 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.

[0043] 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

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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.

[0044] 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.

[0045] 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.

[0046] 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.

[0047] In the case where non-primary Node-Bs 210B perform simple ARQ without incremental combining, the WTRU 205 must transmit self-decodable

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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.

[0048] 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.

[0049] 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.

[0050] In a separate embodiment, preferably implemented for the asynchronous ACK/NACK feedback case, the non-primary Node-Bs 210B may

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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.

[0051] 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.

[0052] 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.

[0053] 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.

[0054] 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.

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[0055] 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.

[0056] 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.

[0057] 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.

[0058] 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

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should manage to schedule transmission of as many NACKed data packets as possible.

[0059] 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.

[0060] 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.

[0061] 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.

* * *

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CLAIMS

What is claimed is:

1. In a wireless multi-cell communication system including a radio network controller (RNC), a plurality of Node-Bs, and at least one wireless transmit/receive unit (WTRU), a method of coordinating Node-Bs during handover, the method comprising:

(a) the RNC initiating an inter-Node-B soft handover;

(b) the WTRU establishing communication connections with at least two of the Node-Bs;

(c) designating a particular one of the Node-Bs as a primary Node-B;

(d) designating the other one(s) of the Node-Bs as a non-primary Node-B; and

(e) the RNC informing the Node-Bs that the particular Node-B is a primary Node-B.

2. The method of claim 1 further comprising:

(f) the primary Node-B controlling an uplink (UL) transmission originating from the WTRU during soft handover.

3. The method of claim 2 wherein the primary Node-B schedules the UL transmission.

4. The method of claim 3 wherein the primary Node-B receives physical measurement information regarding the non-primary Node-B(s), and considers the information when scheduling the UL transmission.

5. The method of claim 4 wherein the primary Node-B transmits scheduling information to the WTRU and the non-primary Node-B(s).

6. The method of claim 1 further comprising:

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(f) the primary Node-B controlling transmissions during soft handover by performing enhanced uplink (EU) scheduling and hybrid automatic repeat request (H-ARQ) operations.

7. The method of claim 6 wherein a positive acknowledgement (ACK) or negative acknowledgement (NACK) is transmitted either synchronously or non-synchronously from the primary Node-B to the WTRU.

8. The method of claim 6 wherein the non-primary Node-B transmits correctly decoded data blocks to the RNC.

9. The method of claim 1 wherein the primary Node-B is selected by the WTRU based on a downlink quality received from the Node-Bs.

10. The method of claim 9 wherein the downlink quality is downlink pilot power.

11. The method of claim 1 wherein the primary Node-B is selected by the RNC based on uplink performance statistics at each Node-B.

12. The method of claim 11 wherein the RNC selects the primary Node-B further based on a report generated by the WTRU regarding a downlink quality from the Node-Bs.

13. The method of claim 11 wherein the RNC selects the primary Node-B further based on a report generated by the WTRU regarding a combination of uplink and downlink quality.

14. In a wireless multi-cell communication system including a radio network controller (RNC), a source Node-B, a target Node-B and at least one wireless transmit/receive unit (WTRU), a method of coordinating Node-Bs during handover, the method comprising:

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(a) the RNC initiating a hard handover for a WTRU connected to the source Node-B;

(b) the RNC informing the source Node-B when the WTRU will stop transmission and reception while being connected to the source Node-B; and

(c) the RNC sending an activation timer to the source Node-B to set the time for handover, wherein the handover is completed when the activation timer expires.

15. The method of claim 14 further comprising:

(d) the source Node-B determining whether there are any previously transmitted data packets that were negatively acknowledged (NACKed) by the source Node-B; and

(e) the source Node-B adjusting the priority of data packet transmissions sent by the WTRU in order to receive as many previously NACKed data packets as possible before the activation timer expires.

16. The method of claim 14 further comprising:

(d) the source Node-B determining whether there are any previously transmitted data packets that were negatively acknowledged (NACKed) by the source Node-B; and

(e) the source Node-B adjusting a modulation and coding scheme (MCS) used for data packet retransmissions sent by the WTRU in order to receive as many previously NACKed data packets as possible before the activation timer expires.

17. A wireless communication system for coordinating Node-Bs during handover for enhanced uplink communication, the system comprising:

(a) a wireless transmit/receive unit (WTRU); and

(b) a plurality of Node-Bs, each Node-B comprising an entity for enhanced uplink (EU) functionalities and processing a transmission from the WTRU independently, wherein a particular one of the Node-Bs is designated as being a primary Node-B, the other Node-B(s) being designated as a non-primary Node-B,

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and the primary Node-B controlling EU transmissions from the WTRU during handover.

18. The system of claim 17 wherein the primary Node-B controls an uplink (UL) transmission originating from the WTRU during soft handover.

19. The system of claim 18 wherein the primary Node-B schedules the UL transmission.

20. The system of claim 19 wherein the primary Node-B receives physical measurement information regarding the non-primary Node-B(s), and considers the physical measurement information when scheduling the UL transmission.

21. The system of claim 19 wherein the primary Node-B transmits scheduling information to the WTRU and the non-primary Node-B(s).

22. The system of claim 17 wherein a positive acknowledgement (ACK) or negative acknowledgement (NACK) is transmitted either synchronously or non-synchronously from the primary Node-B to the WTRU.

23. In a wireless multi-cell communication system including a radio network controller (RNC), a plurality of Node-Bs, and at least one wireless transmit/receive unit (WTRU), an integrated circuit (IC) used to coordinate Node-Bs during handover, the IC comprising:

(a) means for designating a particular one of the Node-Bs as a primary Node-B;

(b) means for designating one or more other ones of the Node-Bs as a non-primary Node-B; and

(c) means for informing the Node-Bs that the particular Node-B has been designated as a primary Node-B.

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24. The IC of claim 23 wherein the IC is integrated with the RNC.

25. In a wireless multi-cell communication system including a radio network controller (RNC) and at least one wireless transmit/receive unit (WTRU), a Node-B comprising:

(a) means for communicating with the WTRU before and during inter-Node-B hard handover;

(b) means for determining whether there are any previously transmitted data packets that were negatively acknowledged (NACKed) by the source Node-B; and

(c) means for adjusting the priority of data packet retransmissions received from the WTRU in order to receive as many previously NACKed data packets as possible before the activation timer expires.

26. The Node-B of claim 25 further comprising:

(d) means for receiving an activation timer from the RNC, wherein the timer is used to set the time for handover; and

(e) means for adjusting a modulation and coding scheme (MCS) used for data packet retransmissions received from the WTRU in order to receive as many previously NACKed data packets as possible before the activation timer expires.

27. In a wireless multi-cell communication system including a plurality of Node-Bs, a radio network controller (RNC) comprising:

(a) means for controlling the plurality of Node-Bs;

(b) means for initiating an inter-node-B soft handover;

(c) means for designating a particular one of the Node-Bs as a primary Node-B;

(d) means for designating one or more other ones of the Node-Bs as a non-primary Node-B; and

(e) means for informing the Node-Bs that the particular Node-B has been designated as a primary Node-B.

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28. In a wireless multi-cell communication system including a plurality of Node-Bs, an integrated circuit (IC) comprising:

(a) means for controlling the plurality of Node-Bs;

(b) means for initiating an inter-Node-B soft handover;

(c) means for designating a particular one of the Node-Bs as a primary Node-B;

(d) means for designating one or more other ones of the Node-Bs as a non-primary Node-B; and

(e) means for informing the Node-Bs that the particular Node-B has been designated as a primary Node-B.

29. The IC of claim 28 wherein the IC is integrated with a radio network controller (RNC) that controls the plurality of Node-Bs.

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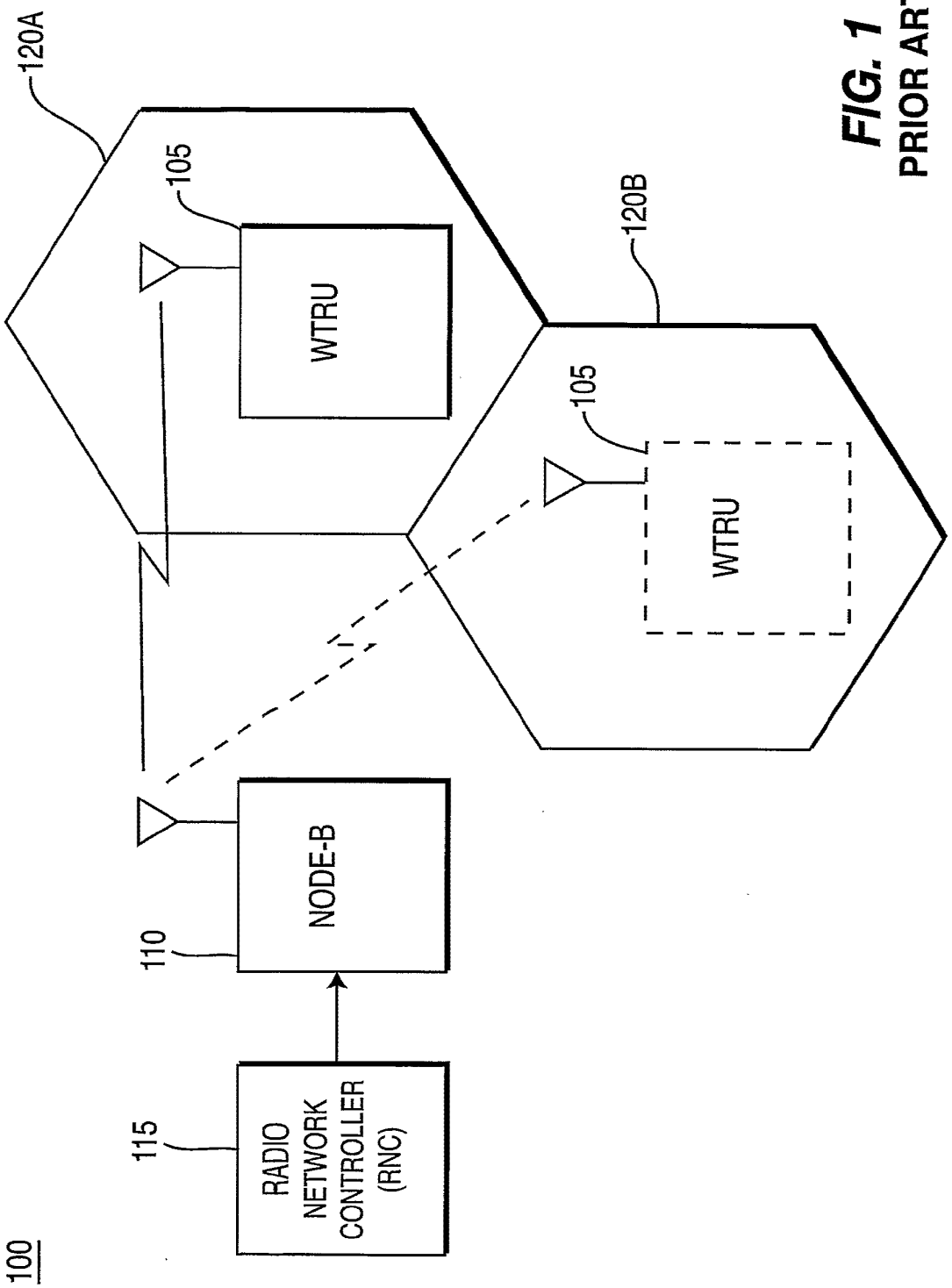


FIG. 1
PRIOR ART

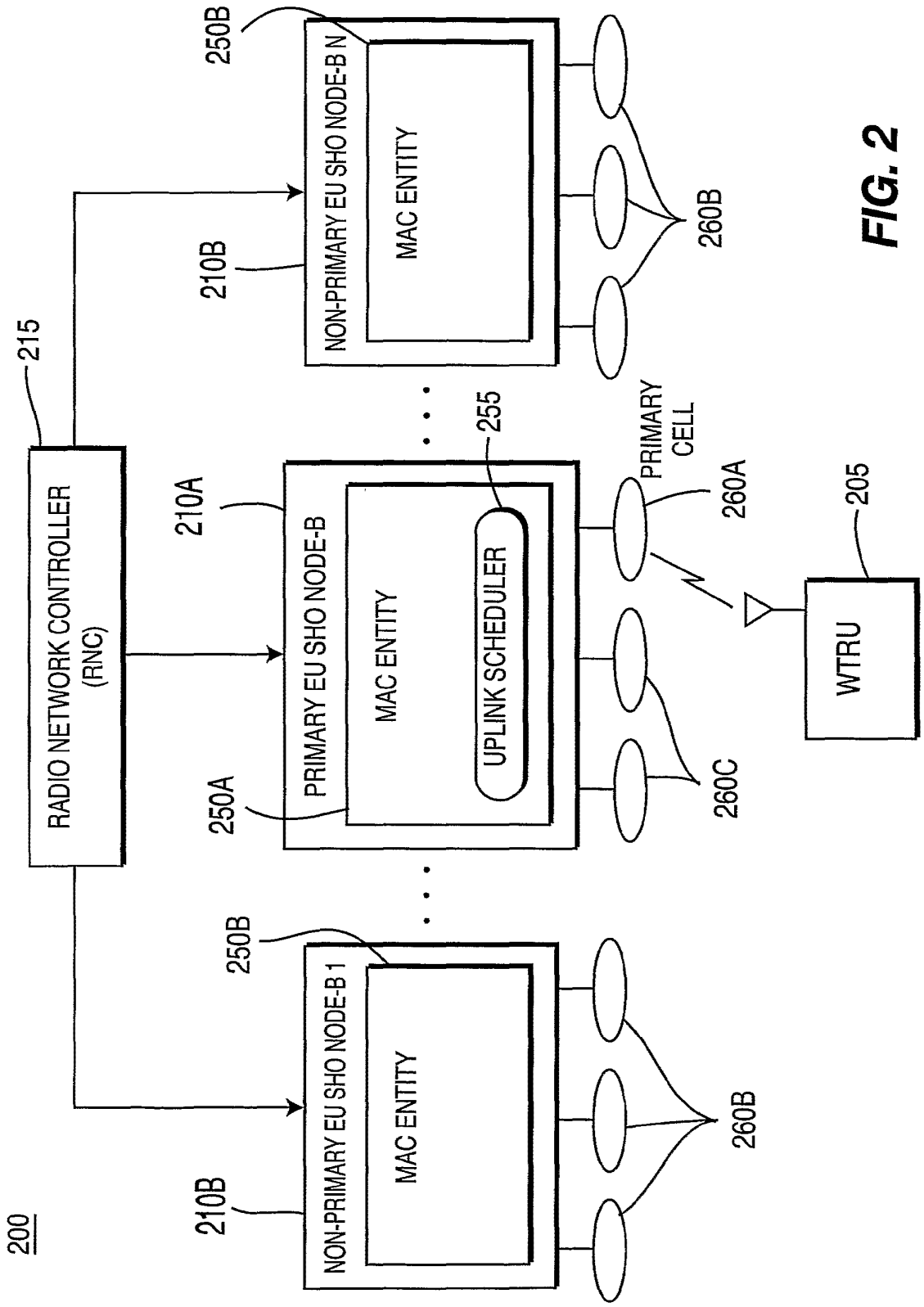

200
RADIO NETWORK CONTROLLER (RNC)
215
PRIMARY EU SHO NODE-B
MAC ENTITY
UPLINK SCHEDULER
255
210A
250A
NON-PRIMARY EU SHO NODE-B 1
MAC ENTITY
210B
250B
NON-PRIMARY EU SHO NODE-B N
MAC ENTITY
210B
250B
PRIMARY CELL
260A
260B
260C
260B
WTRU
205

FIG. 2

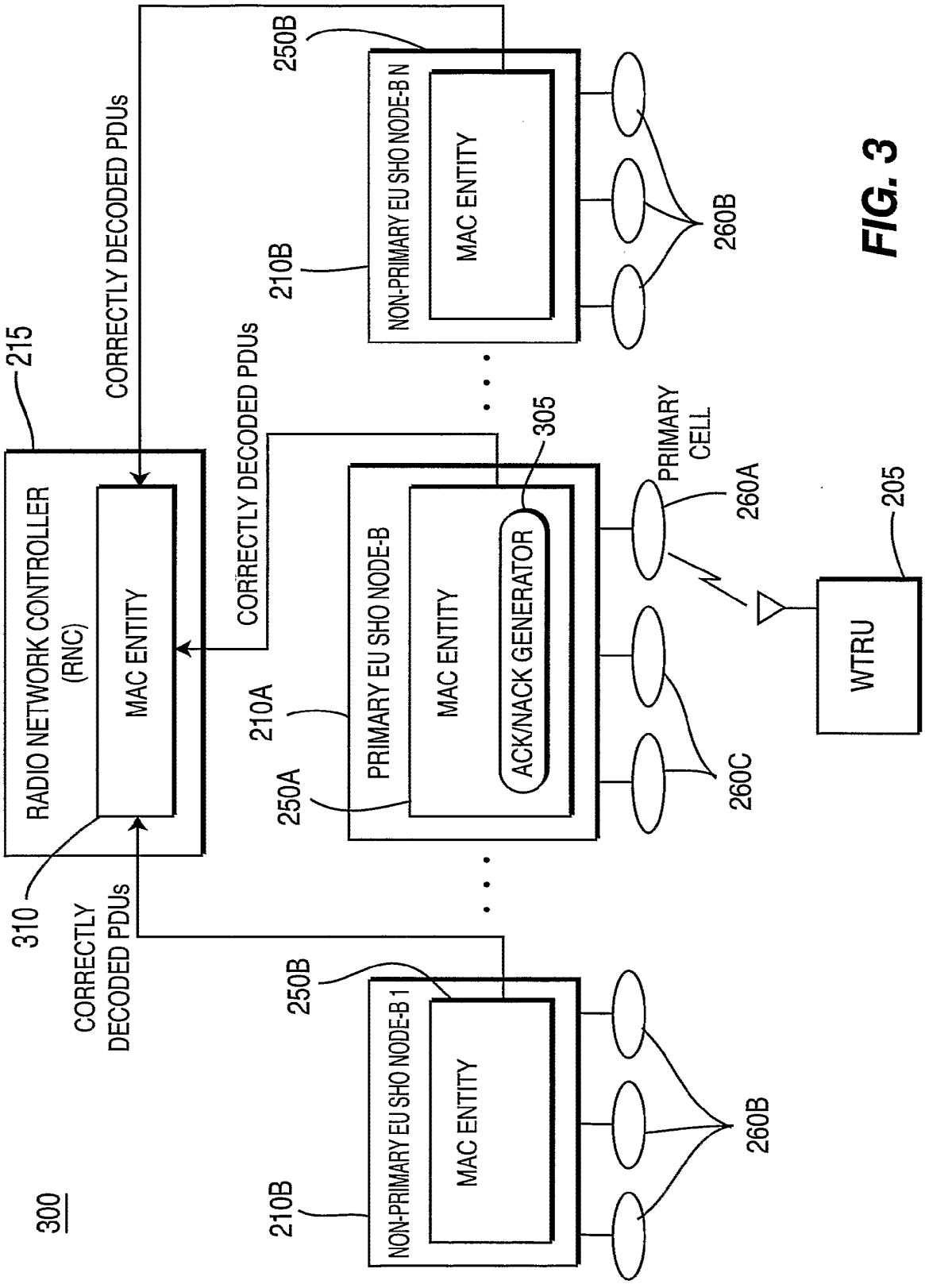

300
RADIO NETWORK CONTROLLER (RNC)
MAC ENTITY
215
310
CORRECTLY DECODED PDUs
CORRECTLY DECODED PDUs
CORRECTLY DECODED PDUs
PRIMARY EU SHO NODE-B
MAC ENTITY
ACK/NACK GENERATOR
305
210A
250A
NON-PRIMARY EU SHO NODE-B 1
MAC ENTITY
210B
250B
NON-PRIMARY EU SHO NODE-B N
MAC ENTITY
210B
250B
PRIMARY CELL
260A
260C
260B
260B
WTRU
205

FIG. 3

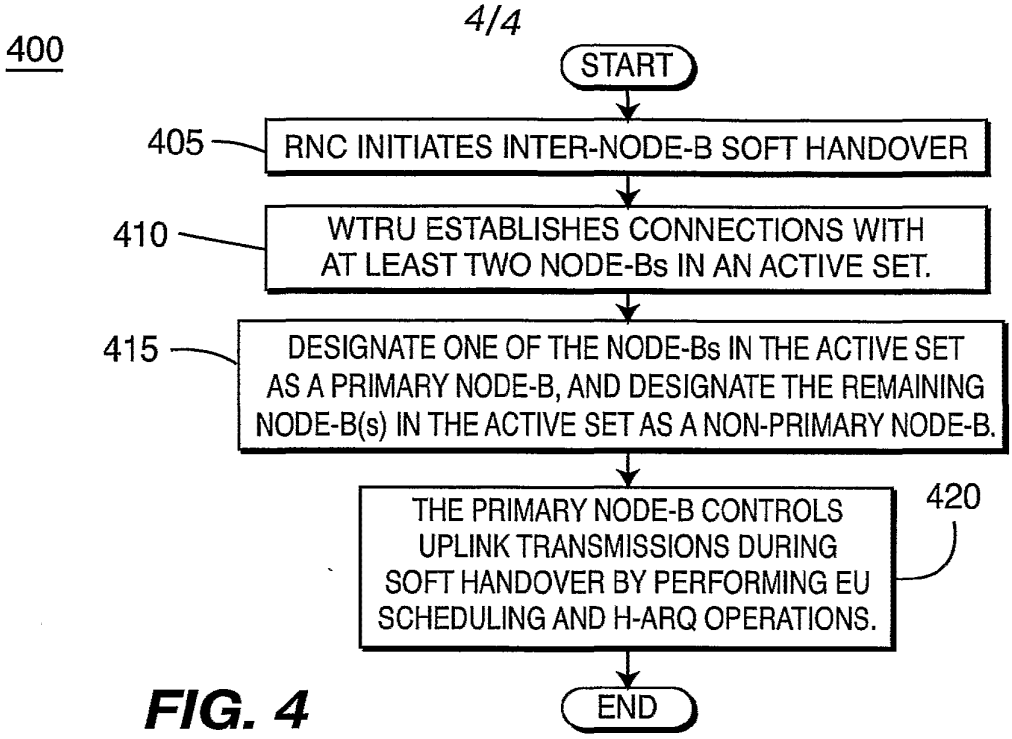

400
START
405
RNC INITIATES INTER-NODE-B SOFT HANDOVER
410
WTRU ESTABLISHES CONNECTIONS WITH AT LEAST TWO NODE-Bs IN AN ACTIVE SET.
415
DESIGNATE ONE OF THE NODE-Bs IN THE ACTIVE SET AS A PRIMARY NODE-B, AND DESIGNATE THE REMAINING NODE-B(s) IN THE ACTIVE SET AS A NON-PRIMARY NODE-B.
420
THE PRIMARY NODE-B CONTROLS UPLINK TRANSMISSIONS DURING SOFT HANDOVER BY PERFORMING EU SCHEDULING AND H-ARQ OPERATIONS.
END

FIG. 4

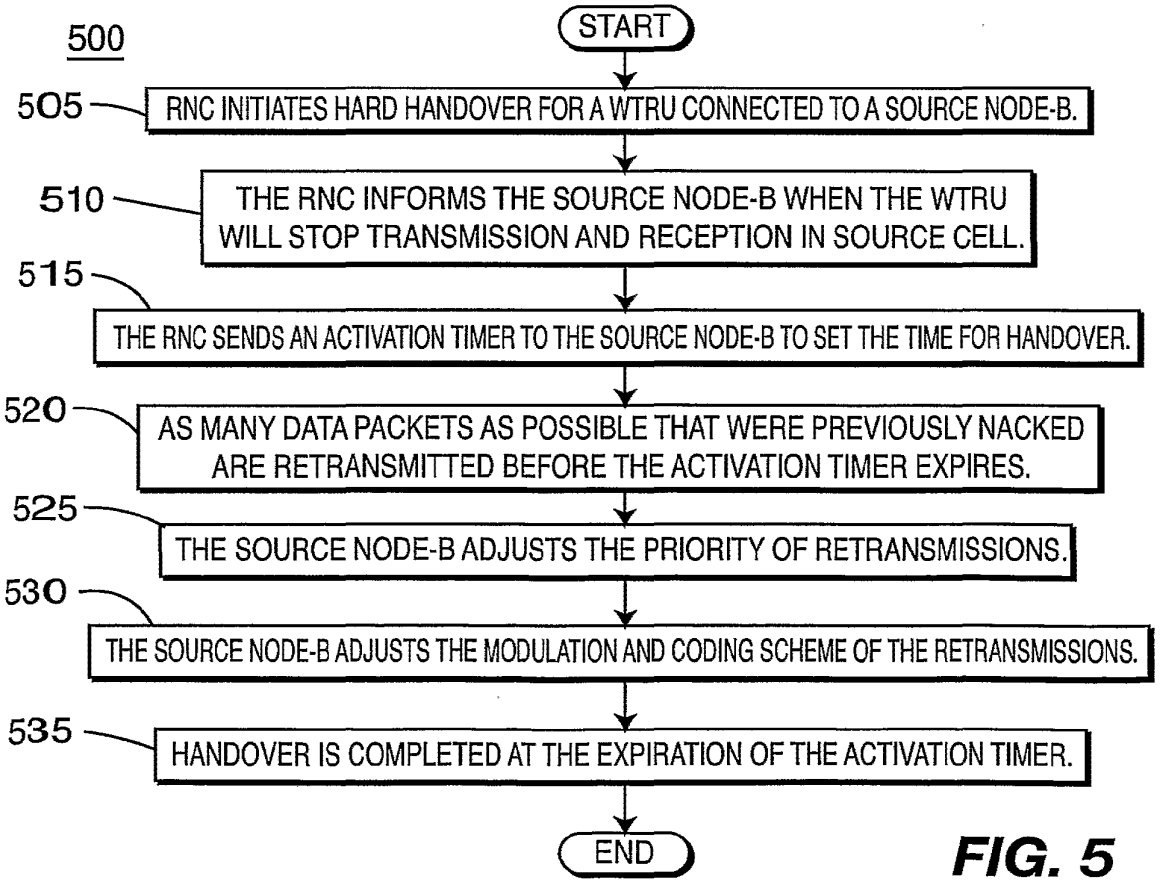

500
START
505
RNC INITIATES HARD HANDOVER FOR A WTRU CONNECTED TO A SOURCE NODE-B.
510
THE RNC INFORMS THE SOURCE NODE-B WHEN THE WTRU WILL STOP TRANSMISSION AND RECEPTION IN SOURCE CELL.
515
THE RNC SENDS AN ACTIVATION TIMER TO THE SOURCE NODE-B TO SET THE TIME FOR HANDOVER.
520
AS MANY DATA PACKETS AS POSSIBLE THAT WERE PREVIOUSLY NACKED ARE RETRANSMITTED BEFORE THE ACTIVATION TIMER EXPIRES.
525
THE SOURCE NODE-B ADJUSTS THE PRIORITY OF RETRANSMISSIONS.
530
THE SOURCE NODE-B ADJUSTS THE MODULATION AND CODING SCHEME OF THE RETRANSMISSIONS.
535
HANDOVER IS COMPLETED AT THE EXPIRATION OF THE ACTIVATION TIMER.
END

FIG. 5

Doc Code: PET.AUTO Document Description: Petition automatically granted by EFS-Web	PTO/SB/140 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)**
Application Number	14869313
Filing Date	29-Sep-2015
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	BRIAN ROBERTS
Attorney Docket Number	SIG-2-0674US06
Title	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER

An application may be withdrawn from issue for further action upon petition by the applicant. To request that the Office withdraw an application from issue, applicant must file a petition under this section including the fee set forth in § 1.17(h) and a showing of good and sufficient reasons why withdrawal of the application from issue is necessary.

APPLICANT HEREBY PETITIONS TO WITHDRAW THIS APPLICATION FROM ISSUE UNDER 37 CFR 1.313(c).

A grantable petition requires the following items:
(1) Petition fee; and
(2) One of the following reasons:
(a) Unpatentability of one or more claims, which must be accompanied by an unequivocal statement that one or more claims are unpatentable, an amendment to such claim or claims, and an explanation as to how the amendment causes such claim or claims to be patentable;
(b) Consideration of a request for continued examination in compliance with § 1.114 (for a utility or plant application only); or
(c) Express abandonment of the application. Such express abandonment may be in favor of a continuing application, but not a CPA under 37 CFR 1.53(d).

Petition Fee

- ◯ Small Entity
- ◯ Micro Entity
- ◉ Regular Undiscounted

Reason for withdrawal from issue

◯ One or more claims are unpatentable ◉ Consideration of a request for continued examination (RCE) (List of Required Documents and Fees) ◯ Applicant hereby expressly abandons the instant application (any attorney/agent signing for this reason must have power of attorney pursuant to 37 CFR 1.32(b)).
RCE request,submission, and fee. ☐ I certify, in accordance with 37 CFR 1.4(d)(4) that : The RCE request ,submission, and fee have already been filed in the above-identified application on ☒ Are attached.
THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES I certify, in accordance with 37 CFR 1.4(d)(4) that I am: ◉ An attorney or agent registered to practice before the Patent and Trademark Office who has been given power of attorney in this application. ◯ An attorney or agent registered to practice before the Patent and Trademark Office, acting in a representative capacity. ◯ A sole inventor ◯ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application ◯ A joint inventor; all of whom are signing this e-petition

Signature	/Abhik A. Huq/
Name	Abhik A. Huq
Registration Number	40656

Electronic Patent Application Fee Transmittal

Application Number:	14869313
Filing Date:	29-Sep-2015
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Filer:	Abhik A. Huq/Gina Ordonez
Attorney Docket Number:	SIG-2-0674US06

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
PETITION FEE- 37 CFR 1.17(H) (GROUP III)	1464	1	140	140
RCE- 1st Request	1801	1	1200	1200
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1340**

Electronic Acknowledgement Receipt

EFS ID:	27028693
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Gina Ordonez
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	26-SEP-2016
Filing Date:	29-SEP-2015
Time Stamp:	17:11:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1340
RAM confirmation Number	
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

Electronic Acknowledgement Receipt

EFS ID:	27028693
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Gina Ordonez
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	26-SEP-2016
Filing Date:	29-SEP-2015
Time Stamp:	17:11:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1340
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Deposit Account	
Authorized User	

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

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Warnings:					
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6	Other Reference-Patent/App/Search documents	TW536896B.pdf	3428460 3426d1db8808a4322811a72ed532ca1eb22e359c	no	39
Warnings:					
Information:					
7	Other Reference-Patent/App/Search documents	TW200303689A.pdf	1904598 52e0f8e6b469932273e0ac72fad5a2107221fe16	no	23
Warnings:					
Information:					
8	Other Reference-Patent/App/Search documents	WO2005048503A2.pdf	1090932 fd78e1a746e9efec410f3140a638ef8ca2b570a1	no	24
Warnings:					
Information:					

9	Petition automatically granted by EFS	petition-request.pdf	31623 1bff4c1425713977be68b291b10174cd0a2 2f81	no	2
Warnings:					
Information:					
10	Fee Worksheet (SB06)	fee-info.pdf	32267 36edaec392805630248a9d182b9f8501a6a 182fa	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	8092195	

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

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

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
Zhang et al.	
Application No.: 14/869,313	Our File: SIG-2-0674US06
Confirmation No.: 1070	Date: October 28, 2016
Filed: September 29, 2015	
For: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER	
Group: 2466	
Examiner: Brian S. Roberts	

PRELIMINARY AMENDMENT

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

Please amend the application without prejudice or disclaimer as follows:

Amendments to the Claims:

This listing of the claims will replace all prior versions of the claims in the application:

1. (Currently Amended) A method for communicating by a wireless transmit/receive unit (WTRU) during a handover, the method comprising:

transmitting, via a primary cell to a Node-B and via at least one non-primary cell to another Node-B, enhanced uplink (EU) data from the WTRU ~~to a Node B~~;

receiving scheduling information from the Node-B via the primary cell only; and

receiving hybrid automatic repeat request (HARQ) acknowledgements (ACKs) from the Node-B via at least the primary cell and negative acknowledgements (NACKs) from the Node-B via the primary cell only.

2. (Previously Presented) The method of claim 1, further comprising:

receiving an identifier indicating the primary cell and the at least one non-primary cell.

3. (Original) The method of claim 1, further comprising:

transmitting downlink power measurements of transmissions received by the WTRU.

4. (Previously Presented) The method of claim 1, wherein the EU data includes identification information of the WTRU.

5. (Previously Presented) The method of claim 1, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the WTRU.

6. (Original) The method of claim 1, further comprising:

transmitting the EU data using synchronous HARQ.

7. (Previously Presented) The method of claim 1, wherein the EU data is transmitted in accordance with the received scheduling information.

8. Canceled

9. (Currently Amended) A wireless transmit/receive unit (WTRU), comprising:

a transmitter; and

a receiver,

wherein when the WTRU is in a handover;

~~wherein~~ the transmitter transmits, via a primary cell to a Node-B and via at least one non-primary cell to another Node-B, enhanced uplink (EU) data ~~to a Node-B~~;

~~wherein~~ the receiver receives scheduling information from the Node-B via the primary cell only; and

~~wherein~~ the receiver receives hybrid automatic repeat request (HARQ) acknowledgements (ACKs) from the Node-B via at least the primary cell and negative acknowledgements (NACKs) from the Node-B via the primary cell only.

10. (Previously Presented) The WTRU of claim 9, wherein the receiver receives an identifier indicating the primary cell and the at least one non-primary cell.

11. (Previously Presented) The WTRU of claim 9, wherein the transmitter transmits downlink power measurements of transmissions received by the receiver.

12. (Previously Presented) The WTRU of claim 9, wherein the EU data includes identification information of the WTRU.

13. (Previously Presented) The WTRU of claim 9, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the transmitter.

14. (Previously Presented) The WTRU of claim 9, wherein the transmitter transmits the EU data using synchronous HARQ.

15. (Previously Presented) The WTRU of claim 9, wherein the transmitter transmits the EU data in accordance with the received scheduling information.

16. Canceled

17. (Currently Amended) A wireless transmit/receive unit (WTRU), comprising:

a transmitter; and

a receiver,

wherein when the WTRU is in a handover[[;]]:

~~wherein~~ the transmitter transmits, via a primary cell to a Node-B and via at least one non-primary cell to another Node-B, enhanced uplink (EU) data ~~to a Node-B~~; and

~~wherein~~ the receiver receives scheduling information from the Node-B, and the transmitter transmits the EU data transmission in accordance with the scheduling information received from the Node B via the primary cell only;

~~wherein~~ the receiver receives hybrid automatic repeat request (HARQ) acknowledgements (ACKs) from the Node-B via at least the primary cell and negative acknowledgements (NACKs) from the Node-B via the primary cell only.

18. (Previously Presented) The WTRU of claim 17, wherein the receiver receives an identifier indicating the primary cell and the at least one non-primary cell.

19. (Previously Presented) The WTRU of claim 17, wherein the transmitter transmits downlink power measurements of transmissions received by the receiver.

20. (Previously Presented) The WTRU of claim 17, wherein the EU data includes identification information of the WTRU.

21. (Previously Presented) The WTRU of claim 17, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the transmitter.

22. (Previously Presented) The WTRU of claim 17, wherein the transmitter transmits the EU data using synchronous HARQ.

23. Cancelled

24. Cancelled

25. Canceled

26. (Currently Amended) A method for communicating by a wireless transmit/receive unit (WTRU) during a handover, the method comprising:

receiving scheduling information from a Node-B;

transmitting, via a primary cell controlled by the Node-B and via at least one non-primary cell controlled by ~~the~~ another Node-B, enhanced uplink (EU) data to the Node-B and the another Node-B in accordance with the scheduling information received from the Node-B via the primary cell only; and

receiving hybrid automatic repeat request (HARQ) acknowledgements (ACKs) from the Node-B via at least the primary cell and negative acknowledgements (NACKs) from the Node-B via the primary cell only.

27. (Previously Presented) The method of claim 26, further comprising:

receiving an identifier indicating the primary cell and the at least one non-primary cell.

28. (Original) The method of claim 26, further comprising:

transmitting downlink power measurements of transmissions received by the WTRU.

29. (Previously Presented) The method of claim 26, wherein the EU data includes identification information of the WTRU.

30. (Previously Presented) The method of claim 26, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the WTRU.

31. (Original) The method of claim 26, further comprising:

transmitting the EU data using synchronous HARQ.

32. Canceled

33. Canceled

34. Canceled

35. (Currently Amended) A method for communicating by a wireless transmit/receive unit (WTRU) during a handover, the method comprising:

transmitting, via a first cell to a Node-B and via at least one second cell to another Node-B, enhanced uplink (EU) data from the WTRU ~~to a Node-B~~;

receiving scheduling information from the Node-B via the first cell only; and

receiving hybrid automatic repeat request (HARQ) acknowledgements (ACKs) from the Node-B via at least the first cell and negative acknowledgements (NACKs) from the Node-B via the first cell only.

36. (Previously Presented) The method of claim 35, further comprising:

receiving an identifier indicating the first cell and the at least one second cell.

37. (Original) The method of claim 35, further comprising:

transmitting downlink power measurements of transmissions received by the WTRU.

38. (Previously Presented) The method of claim 35, wherein the EU data includes identification information of the WTRU.

39. (Previously Presented) The method of claim 35, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the WTRU.

40. (Original) The method of claim 35, further comprising:

transmitting the EU data using synchronous HARQ.

41. (Previously Presented) The method of claim 35, wherein the EU data is transmitted in accordance with the received scheduling information.

42. Canceled

43. (Currently Amended) A wireless transmit/receive unit (WTRU), comprising:

a receiver; and

a transmitter,

wherein when the WTRU is in a handover,

the receiver receives scheduling information from [[the]] a Node-B via a primary cell only,

the transmitter transmits, via the primary cell to the Node-B and via at least one non-primary cell to another Node-B, enhanced uplink (EU) data ~~to a Node-B~~,

the receiver receives hybrid automatic repeat request (HARQ) acknowledgements (ACKs) from the Node-B via at least the primary cell, and

the receiver receives negative acknowledgements (NACKs) from the Node-B via the primary cell only.

44. (Currently Amended) The WTRU of claim 43, wherein the EU data is retransmitted from the WTRU to the Node-B and the another Node-B upon receipt of a NACK.

45. (Previously Presented) The WTRU of claim 43, wherein the receiver receives an identifier indicating the primary cell and the at least one non-primary cell.

46. (Previously Presented) The WTRU of claim 43, wherein the transmitter transmits downlink power measurements of transmissions received by the receiver.

47. (Previously Presented) The WTRU of claim 43, wherein the EU data includes identification information of the WTRU.

48. (Previously Presented) The WTRU of claim 43, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the transmitter.

49. (Previously Presented) The WTRU of claim 43, wherein the transmitter transmits the EU data using synchronous HARQ.

50. (Previously Presented) The WTRU of claim 43, wherein the transmitter transmits in accordance with the received scheduling information.

51. Canceled

52. (Currently Amended) A method of operating in a wireless network during a handover, the method comprising:

receiving scheduling information at a wireless/transmit receive unit (WTRU) from a Node-B via the primary cell only;

transmitting, via the primary cell to the Node-B and via at least one non-primary cell to another Node-B, enhanced uplink (EU) data from the WTRU ~~to the Node-B~~; and

receiving hybrid automatic repeat request (HARQ) acknowledgements (ACKs) from the Node-B via at least the primary cell and negative acknowledgements (NACKs) from the Node-B via the primary cell only.

53. (Currently Amended) The method of claim 52, further comprising:

retransmitting the EU data from the WTRU to the Node-B and the another Node-B upon receipt of a NACK from the Node-B via the primary cell only.

54. (Previously Presented) The method of claim 52, further comprising:

receiving an identifier indicating the primary cell and the at least one non-primary cell.

55. (Previously Presented) The method of claim 52, further comprising:

transmitting downlink power measurements of transmissions received by the WTRU.

56. (Previously Presented) The method of claim 52, wherein the EU data includes identification information of the WTRU.

57. (Previously Presented) The method of claim 52, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the WTRU.

58. (Previously Presented) The method of claim 52, further comprising:

transmitting the EU data using synchronous HARQ.

59. (Previously Presented) The method of claim 52, further comprising:

transmitting in accordance with the received scheduling information.

60. Canceled

61. (Currently Amended) The method of claim 1, further comprising:

retransmitting the EU data from the WTRU to the Node-B and the another Node-B upon receipt of a NACK from the Node-B via the primary cell only.

62. (Currently Amended) The WTRU of claim 9, wherein the EU data is retransmitted from the WTRU to the Node-B and the another Node-B upon receipt of a NACK.

63. (Previously Presented) The WTRU of claim 17, wherein the EU data is retransmitted from the WTRU.

64. (Currently Amended) The method of claim 26, further comprising:

retransmitting the EU data from the WTRU to the Node-B and the another Node-B upon receipt of a NACK.

65. (Currently Amended) The method of claim 35, further comprising:

retransmitting the EU data from the WTRU to the Node-B and the another Node-B upon receipt of a NACK.

REMARKS/ARGUMENTS

After the foregoing Amendment, claims 1-7, 9-15, 17-22, 26-31, 35-41, 43-50, 52-59 and 61-65 are currently pending. Claims 1, 9, 17, 26, 35, 43, 44, 52, 53, 61, 62, 64 and 65 are amended. Claims 8, 16, 23-25, 32-34, 42, 51 and 60 are canceled. No new matter is added.

Conclusion

If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephonic interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone.

In view of the foregoing, Applicant respectfully submits that the present application, including claims 1-7, 9-15, 17-22, 26-31, 35-41, 43-50, 52-59 and 61-65, is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

SIGNAL TRUST FOR WIRELESS INNOVATION

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Electronic Acknowledgement Receipt

EFS ID:	27360150
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Gina Ordonez
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	28-OCT-2016
Filing Date:	29-SEP-2015
Time Stamp:	17:58:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		SIG_2_0674US06_Preliminary_Amendment.pdf	85641 95e2f37119a37f563b51cd33d50df9f4a82cab09	yes	13

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Claims	2	12
	Applicant Arguments/Remarks Made in an Amendment	13	13
Warnings:			
Information:			
	Total Files Size (in bytes):	85641	

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

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

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
Zhang et al.	
Application No.: 14/869,313	Our File: SIG-2-0674US06
Confirmation No.: 1070	Date: November 2, 2016
Filed: September 29, 2015	
For: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER	
Group: 2466	
Examiner: Brian S. Roberts	

SECOND PRELIMINARY AMENDMENT

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

Please amend the application without prejudice or disclaimer as follows:

Amendments to the Claims:

This listing of the claims will replace all prior versions of the claims in the application:

1. (Currently Amended) A method for communicating by a wireless transmit/receive unit (WTRU) during a handover from a primary cell to a non-primary cell, the method comprising:

receiving scheduling information via the primary cell and not via the non-primary cell;

transmitting, via [[a]] the primary cell ~~to a Node-B~~ and ~~via at least one~~ the non-primary cell ~~to another Node-B~~, enhanced uplink (EU) data ~~from the WTRU~~;

~~receiving scheduling information from the Node-B via the primary cell only; and~~

receiving hybrid automatic repeat request (HARQ) acknowledgements (ACKs) ~~from the Node-B~~ via ~~at least~~ the primary cell; and

receiving negative acknowledgements (NACKs) ~~from the Node-B~~ via the primary cell and not via the non-primary cell ~~only~~.

2. (Currently Amended) The method of claim 1, further comprising:

receiving an identifier indicating the primary cell and the ~~at least one~~ non-primary cell.

3. (Original) The method of claim 1, further comprising:

transmitting downlink power measurements of transmissions received by the WTRU.

4. (Previously Presented) The method of claim 1, wherein the EU data includes identification information of the WTRU.

5. (Previously Presented) The method of claim 1, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the WTRU.

6. (Original) The method of claim 1, further comprising:

transmitting the EU data using synchronous HARQ.

7. (Previously Presented) The method of claim 1, wherein the EU data is transmitted in accordance with the received scheduling information.

8. Canceled

9. (Currently Amended) A wireless transmit/receive unit (WTRU), comprising:

a transmitter; and

a receiver,

wherein when the WTRU is in a handover from a primary cell to a non-primary cell,[[;]]

the receiver receives scheduling information via the primary cell and not via the non-primary cell,

the transmitter transmits, via [[a]] the primary cell ~~to a Node B~~ and ~~via~~ the ~~at least one~~ non-primary cell ~~to another Node B~~, enhanced uplink (EU) data[[;]].

~~the receiver receives scheduling information from the Node-B via the primary cell only; and~~

the receiver receives hybrid automatic repeat request (HARQ) acknowledgements (ACKs) ~~from the Node-B~~ via ~~at least~~ the primary cell, and

the receiver receives negative acknowledgements (NACKs) ~~from the Node-B~~ via the primary cell and not via the non-primary cell ~~only~~.

10. (Currently Amended) The WTRU of claim 9, wherein the receiver ~~receives~~ is configured to process an identifier indicating the primary cell and the ~~at least one~~ non-primary cell.

11. (Currently Amended) The WTRU of claim 9, wherein the transmitter ~~transmits~~ is configured to transmit downlink power measurements of transmissions received by the receiver.

12. (Previously Presented) The WTRU of claim 9, wherein the EU data includes identification information of the WTRU.

13. (Previously Presented) The WTRU of claim 9, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the transmitter.

14. (Previously Presented) The WTRU of claim 9, wherein the transmitter transmits the EU data using synchronous HARQ.

15. (Previously Presented) The WTRU of claim 9, wherein the transmitter transmits the EU data in accordance with the received scheduling information.

16. Canceled

17. (Currently Amended) A wireless transmit/receive unit (WTRU), comprising:

a transmitter; and

a receiver,

wherein when the WTRU is in a soft handover,[[:]]

the receiver receives scheduling information from a first Node-B,

the transmitter transmits, ~~via a primary cell~~ in accordance with the received scheduling information, enhanced uplink (EU) data to the first Node-B ~~to a Node-B~~ and to a second Node-B, ~~via at least one non-primary cell to another Node-B, enhanced uplink (EU) data; and~~

~~the receiver receives scheduling information from the Node-B, and the transmitter transmits the EU data transmission in accordance with the scheduling information received from the Node-B via the primary cell only;~~

the receiver receives hybrid automatic repeat request (HARQ) acknowledgements (ACKs) from the first Node-B, ~~via at least the primary cell~~ and

the receiver receives negative acknowledgements (NACKs) from the first Node-B and not from the second Node-B ~~via the primary cell only~~.

18. (Currently Amended) The WTRU of claim 17, wherein the receiver ~~receives~~ is configured to process an identifier indicating [[the]] a primary cell

controlled by the first Node-B and ~~the at least one~~ a non-primary cell controlled by the second Node-B.

19. (Currently Amended) The WTRU of claim 17, wherein the transmitter is configured to transmit ~~transmits~~ downlink power measurements of transmissions received by the receiver.

20. (Previously Presented) The WTRU of claim 17, wherein the EU data includes identification information of the WTRU.

21. (Previously Presented) The WTRU of claim 17, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the transmitter.

22. (Previously Presented) The WTRU of claim 17, wherein the transmitter transmits the EU data using synchronous HARQ.

23. Cancelled

24. Cancelled

25. Canceled

26. (Currently Amended) A ~~method for communicating by a~~ wireless transmit/receive unit (WTRU) ~~during a handover, the method~~ comprising:

a transmitter; and

a receiver,

wherein when the WTRU is in a soft handover from a primary cell to a non-primary cell,

the receiver receives ~~receiving~~ scheduling information via the primary cell ~~from a Node B~~;

the transmitter transmits enhanced uplink (EU) data ~~transmitting,~~ via [[a]] the primary cell ~~controlled by the Node B~~ and ~~via at least one~~ the non-primary cell ~~controlled by another Node B, enhanced uplink (EU) data to the Node B and the another Node B~~ in accordance with the received scheduling information, ~~received from the Node B via the primary cell only; and~~

the receiver receives ~~receiving~~ hybrid automatic repeat request (HARQ) acknowledgements (ACKs) ~~from the Node B~~ via ~~at least~~ the primary cell, and

the receiver receives negative acknowledgements (NACKs) ~~from the Node B~~ via the primary cell and not via the non-primary cell ~~only~~.

27. (Currently Amended) The ~~method~~ WTRU of claim 26, wherein the receiver further ~~comprising:~~

~~receiving~~ receives an identifier indicating the primary cell and the ~~at least one~~ non-primary cell.

28. (Currently Amended) The ~~method~~ WTRU of claim 26, wherein the transmitter further ~~comprising:~~

~~transmitting~~ transmits downlink power measurements of transmissions received by the WTRU.

29. (Currently Amended) The ~~method~~ WTRU of claim 26, wherein the EU data includes identification information of the WTRU.

30. (Currently Amended) The ~~method~~ WTRU of claim 26, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the WTRU.

31. (Currently Amended) The ~~method~~ WTRU of claim 26, wherein the transmitter further ~~comprising:~~

~~transmitting~~ transmits the EU data using synchronous HARQ.

32. Canceled

33. Canceled

34. Canceled

35. (Currently Amended) A method for communicating [[by]] with a wireless transmit/receive unit (WTRU) during a soft handover from a primary cell to a non-primary cell, the method comprising:

transmitting scheduling information to the WTRU via the primary cell and not via the non-primary cell;

~~transmitting,~~ receiving enhanced uplink (EU) data from the WTRU via [[a]] the primary cell and the non-primary cell ~~first~~ cell ~~to a Node-B and via at least one second cell to another Node-B, enhanced uplink (EU) data from the WTRU~~;

~~receiving scheduling information from the Node-B via the first cell only; and~~

transmitting ~~receiving~~ hybrid automatic repeat request (HARQ) acknowledgements (ACKs) ~~from the Node-B~~ to the WTRU via ~~at least~~ the ~~first~~ primary cell; and

transmitting negative acknowledgements (NACKs) ~~from the Node-B~~ to the WTRU via the ~~first~~ primary cell and not via the non-primary cell ~~only~~.

36. (Currently Amended) The method of claim 35, further comprising:

~~receiving~~ transmitting, to the WTRU, an identifier indicating the ~~first~~ primary cell and the ~~at least one~~ non-primary ~~second~~ cell.

37. (Currently Amended) The method of claim 35, further comprising:

~~transmitting~~ receiving, from the WTRU, downlink power measurements of transmissions received by the WTRU.

38. (Previously Presented) The method of claim 35, wherein the EU data includes identification information of the WTRU.

39. (Previously Presented) The method of claim 35, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the WTRU.

40. (Currently Amended) The method of claim 35, further comprising:

~~transmitting the EU data using synchronous HARQ~~ designating, by a radio network controller (RNC), the primary cell and the non-primary cell.

41. (Currently Amended) The method of claim [[35]] 40, ~~wherein the EU data is transmitted in accordance with the received scheduling information~~ further comprising:

controlling the primary cell and the non-primary cell with respective Node-Bs, and wherein a Node-B controlling the primary cell and a Node-B controlling the non-primary cell are controlled by the RNC.

42. Canceled

43. (Currently Amended) A wireless transmit/receive unit (WTRU), comprising:

a receiver; and

a transmitter,

wherein when the WTRU is in a soft handover from a primary cell to a non-primary cell,

the receiver receives scheduling information ~~from a Node-B~~ via [[a]] the primary cell and not via the non-primary cell ~~only~~,

the transmitter transmits[[,]] enhanced uplink (EU) data via the primary cell ~~to the Node-B~~ and ~~via at least one~~ the non-primary cell ~~to another Node-B, enhanced uplink (EU) data,~~

~~the receiver receives hybrid automatic repeat request (HARQ) acknowledgements (ACKs) from the Node-B via at least the primary cell~~, and

the receiver receives negative acknowledgements (NACKs) ~~from the Node-B~~ via the primary cell and not via the non-primary cell ~~only~~.

44. (Currently Amended) The WTRU of claim 43, wherein, when the WTRU is in the soft handover, the transmitter further retransmits the EU data ~~is retransmitted from the WTRU to~~ via the ~~Node-B and the another Node-B~~ primary cell and the non-primary cell upon receipt of a NACK via the primary cell.

45. (Currently Amended) The WTRU of claim 43, wherein the receiver ~~receives~~ is configured to process an identifier indicating the primary cell and the ~~at least one~~ non-primary cell.

46. (Currently Amended) The WTRU of claim 43, wherein the transmitter ~~transmits~~ is configured to transmit downlink power measurements of transmissions received by the receiver.

47. (Previously Presented) The WTRU of claim 43, wherein the EU data includes identification information of the WTRU.

48. (Previously Presented) The WTRU of claim 43, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the transmitter.

49. (Previously Presented) The WTRU of claim 43, wherein the transmitter transmits the EU data using synchronous HARQ.

50. (Currently Amended) The WTRU of claim 43, wherein the transmitter transmits the EU data in accordance with the received scheduling information.

51. Canceled

52. (Currently Amended) A ~~method of operating in a~~ wireless network ~~during a handover, the method~~ comprising a plurality of Node-Bs configured to communicate with a wireless transmit/receiver unit (WTRU) during a handover from a first Node-B of the plurality of Node-Bs to a second Node-B of the plurality of Node-Bs by:

~~receiving~~ transmitting scheduling information ~~at a wireless/transmit receive unit (WTRU) from a Node-B~~ to the WTRU via the first Node-B ~~primary cell only~~;

~~transmitting,~~ receiving enhanced uplink (EU) data from the WTRU via the first Node-B ~~primary cell to the Node-B~~ and the second Node-B ~~via at least one non-primary cell to another Node-B, enhanced uplink (EU) data from the WTRU; and~~

~~receiving~~ transmitting hybrid automatic repeat request (HARQ) acknowledgements (ACKs) ~~from the Node-B~~ to the WTRU via ~~at least~~ the first Node-B; ~~primary cell~~ and

transmitting negative acknowledgements (NACKs) to the WTRU ~~from the Node-B~~ via the first Node-B and not via the second Node-B ~~primary cell only~~.

53. (Currently Amended) The ~~method~~ wireless network of claim 52, ~~further comprising:~~

~~retransmitting the EU data from the WTRU to the Node-B and the another Node-B upon receipt of a NACK from the Node-B via the primary cell only~~ wherein the first Node-B controls a primary cell and the second Node-B controls a non-primary cell.

54. (Currently Amended) The ~~method~~ wireless network of claim 52, further comprising:

~~receiving an identifier indicating the primary cell and the at least one non-primary cell~~ a radio network controller (RNC) to transmit to the plurality of Node-Bs an identifier indicating the first Node-B and the second Node-B.

55. (Currently Amended) The ~~method~~ wireless network of claim 52, wherein the plurality of Node-Bs is further ~~comprising:~~

~~transmitting~~ configured to receive, from the WTRU, downlink power measurements of transmissions received by the WTRU.

56. (Currently Amended) The ~~method~~ wireless network of claim 52, wherein the EU data includes identification information of the WTRU.

57. (Currently Amended) The ~~method~~ wireless network of claim 52, wherein the scheduling information includes at least one of a HARQ process identification and a transmit power level of the WTRU.

58. (Currently Amended) The ~~method~~ wireless network of claim 52, wherein the first and second Node-Bs are further ~~comprising:~~

~~transmitting~~ configured to receive the EU data using synchronous HARQ.

59. (Currently Amended) The ~~method~~ wireless network of claim 52, ~~further comprising:~~

~~transmitting in accordance with the received scheduling information~~ wherein the handover is a soft handover.

60. Canceled

61. (Currently Amended) The method of claim 1, further comprising:

retransmitting the EU data from the WTRU ~~to the Node-B~~ via the primary cell and the non-primary cell ~~the another Node-B~~ upon receipt of a NACK ~~from the Node-B via the primary cell only~~.

62. (Currently Amended) The WTRU of claim 9, wherein the transmitter further retransmits the EU data via ~~is retransmitted from the WTRU~~

~~to~~ the ~~Node-B and the another Node-B~~ primary cell and the non-primary cell upon receipt of a NACK.

63. (Currently Amended) The WTRU of claim 17, wherein the transmitter further retransmits the EU data via the primary cell and the non-primary cell upon receipt of a NACK ~~is retransmitted from the WTRU~~.

64. (Currently Amended) The ~~method~~ WTRU of claim 26, wherein the transmitter further ~~comprising:~~

~~retransmitting~~ retransmits the EU data ~~from the WTRU to the Node-B and the another Node-B~~ upon receipt of a NACK.

65. Cancelled

66. (New) The method of claim 1, wherein the handover is a soft handover.

67. (New) The WTRU of claim 9, wherein the handover is a soft handover.

68. (New) The method of claim 35, further comprising receiving the EU data using synchronous HARQ.

REMARKS/ARGUMENTS

After the foregoing Amendment, claims 1-7, 9-15, 17-22, 26-31, 35-41, 43-50, 52-59 and 61-64, and 66-68 are currently pending. Claims 1, 2, 9-11, 17-19, 26-31, 35-37, 40, 41, 43-46, 50, 52-59, and 61-64 are amended. Claims 8, 16, 25, 42, 51, 60 and 65 are canceled. Claims 66-68 are added. No new matter is added.

Conclusion

If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephonic interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone.

In view of the foregoing, Applicant respectfully submits that the present application, including claims 1-7, 9-15, 17-22, 26-31, 35-41, 43-50, 52-59 and 61-64, and 66-68, is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

SIGNAL TRUST FOR WIRELESS INNOVATION

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AAH/gvo

Electronic Acknowledgement Receipt

EFS ID:	27401825
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Gina Ordonez
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	02-NOV-2016
Filing Date:	29-SEP-2015
Time Stamp:	17:38:24
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		SIG_2_0674US06_Preliminary_Amendment.pdf	93141 e32c288ea941edbce092bd693e61cbdd71bf33ed	yes	16

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Claims	2	14
	Applicant Arguments/Remarks Made in an Amendment	15	16
Warnings:			
Information:			
	Total Files Size (in bytes):	93141	

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

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/869,313	Filing Date 09/29/2015	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

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

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)		
AMENDMENT	11/02/2016	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 56	Minus	** 60	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 7	Minus	***7	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
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LIE
STEFANIE BRYCE

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

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	7026911	B2	2006-04-11	Aono et al.	Corresponds to WO/0237572 A1

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	1	0237572	WO	A1	2002-05-10	Japan Science and Technology Corp.	Corresponds to USP 7,026,911	

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14869313
	Filing Date	2015-09-29
	First Named Inventor	Guodong Zhang
	Art Unit	2466
	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

	1	PANASONIC, HARQ OPERATION DURING SOFT HANDOVER, 3GPP TSG-RAN WG1 MEETING #33 R1-030802, AUGUST 25-29, 2003

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2016-11-23
Name/Print	Abhik A. Huq	Registration Number	40656

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

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

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

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

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

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

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

(12)特許協力条約に基づいて公開された国際出願

(19) 世界知的所有権機関
国際事務局

(43) 国際公開日
2002 年5 月10 日 (10.05.2002)

PCT

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(81) 指定国 (国内): KR, US.

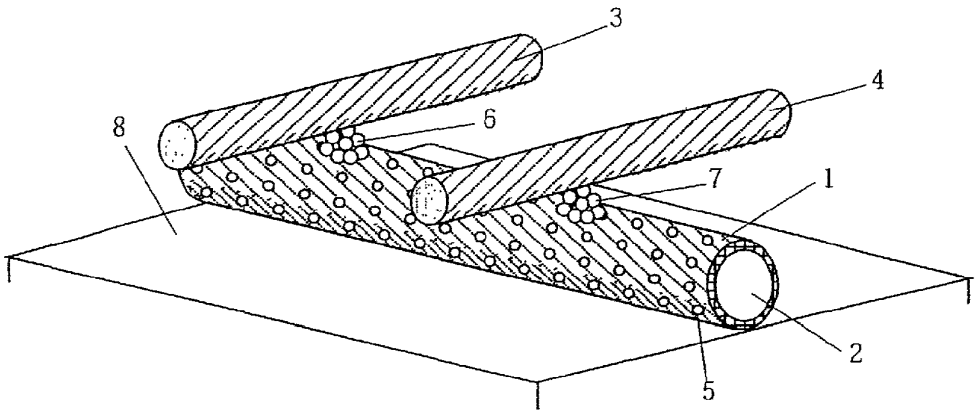
(84) 指定国 (広域): ヨーロッパ特許 (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR).

添付公開書類:
— 国際調査報告書

２文字コード及び他の略語については、定期発行される各*PCT*ガゼットの巻頭に掲載されている「コードと略語のガイダンスノート」を参照。

(54) Title: POINT CONTACT ARRAY, NOT CIRCUIT, AND ELECTRONIC CIRCUIT COMPRISING THE SAME

(54) 発明の名称: ポイントコンタクト・アレー、NOT回路及びそれを用いた電子回路



(57) Abstract: A point contact array applicable to an arithmetic circuit, a logic circuit, and memory device, in which the conductances between electrodes are electrically and reversibly controlled and point contacts are arranged. A circuit comprising point contacts each composed of a first electrode made of a mixture of conductive materials having ion-conductivity and electron-conductivity and a second electrode made of a conductive material is fabricated while controlling the conductances of the point contacts. The conductive material mixture is preferably Ag_2S, Ag_2Se, Cu_2S, or Cu_2Se. A semiconductor and an insulating material when they are interposed between electrodes are preferably crystals or amorphous bodies of GeS_x, $GeSe_x$, $GeTe_x$, or WO_x ($0 < x < 100$). A NOT circuit is composed of a device , which is an atomic switch composed of a two-terminal element, and comprises a first electrode made of a mixture of conductive materials having ion-conductivity and electron conductivity and a second electrode made of a conductive material and in which the conductance between electrodes can be controlled.

[続葉有]

WO 02/37572 A1

(57) 要約:

電極間のコンダクタンスの制御を、電気的にかつ可逆的に行うとともに、演算回路、論理回路、メモリ素子などへ応用可能なポイントコンタクトを複数個並べたポイントコンタクト・アレー、ＮＯＴ回路及びそれを用いた電子回路を提供する。

イオン導電性及び電子導電性を有する混合導電体材料から成る第１電極及び導電性材料から成る第２電極により構成されるポイントコンタクトを複数個用い、これらのポイントコンタクトのコンダクタンスを制御して回路を構成するものである。混合導電体材料としてはAg_2S、Ag_2Se、Cu_2S又はCu_2Seが好ましい。また、電極間に半導体ないし絶縁体材料を挿入する場合の半導体ないし絶縁体材料としては、GeS_x、$GeSe_x$、$GeTe_x$、ないしWO_x（$0<x<100$）の結晶体ないし非晶質体が好ましい。

また、２端子素子からなるアトミックスイッチであるイオン伝導性および電子伝導性を有する混合導電体材料から成る第１電極及び導電性材料から成る第２電極により構成され、前記電極間のコンダクタンスが制御可能な素子を用いてＮＯＴ回路を構成する。

明 細 書

ポイントコンタクト・アレー、ＮＯＴ回路及びそれを用いた電子回路

技術分野

本発明は、対向する電極間においてポイントコンタクトを形成し、又は切断してコンダクタンスを制御する素子を複数個用いるポイントコンタクト・アレー、ＮＯＴ回路及びそれを用いた電子回路、特に、対向する電極間においてポイントコンタクトを形成し、又は切断してコンダクタンスを制御する電子素子（以下に後述するアトミックスイッチ）を用いたＮＯＴ回路及びそれを用いた電子回路に関するものである。

背景技術

ポイントコンタクトを構成することによりコンダクタンスを制御する方法が、例えば、先行技術〔1〕として、Ｊ．Ｋ．Ｇｉｍｚｅｗｓｋｉ ａｎｄ Ｒ．Ｍｏｌｌｅｒ：Ｐｈｙ．Ｒｅｖ．Ｂ３６（１９８７）１２８４，Ｊ．Ｌ，Ｃｏｓｔａ－Ｋｒａｍｅｒ，Ｎ．Ｇａｒｃｉａ，Ｐ．Ｇａｒｃｉａ－Ｍｏｃｈａｌｅｓ，Ｐ．Ａ．Ｓｅｒｅｎａ，Ｍ．Ｉ．Ｍａｒｑｕｅｓ ａｎｄ Ａ．Ｃｏｒｒｃｉａ：Ｐｈｙｓ．Ｒｅｖ．Ｂ５５（１９９７）５４１６，Ｈ．Ｏｈｎｉｓｈｉ，Ｙ．Ｋｏｎｄｏ ａｎｄ Ｋ．Ｔａｋａｙａｎａｇｉ：Ｎａｔｕｒｅ ３９５（１９９８）７８０などに記載されている。

これらは、ポイントコンタクトの構築および制御にピエゾ素子を必要とする。すなわち、ピエゾ素子を駆動することにより、ピエゾ素子に付けられた金属探針を対向電極に対して高精度で位置決めして、探針・対向電極間にポイントコンタクトを構築、その状態を制御する。

これらとは別に、先行技術〔2〕として、ポイントコンタクトのコンダクタンスを制御する方法であって、有機分子を用いる方法が、Ｃ．Ｐ．Ｃｏｌｌｉｅｒ ｅｔ ａｌ，：Ｓｃｉｅｎｃｅ２８５（１９９９）３９１に記載されている。

この方法では、対向電極間に一分子厚さで挟んだロタクサン分子の導電性を、

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電極間に高電圧を印加することで変化させる。すなわち、電極間に挟んだロタクサン分子は初め導電性を示すが、ある極性の一定以上の電圧を印加すると、分子が酸化されて導電性が減り、電極間が絶縁される。

〔3〕また、従来、2端子素子であるダイオードを用いてＡＮＤ回路およびＯＲ回路を構成できることが知られている。

一方、ダイオードだけでは、ＮＯＴ回路を構成できないことも広く知られている。すなわち、従来の2端子素子を用いるだけでは、ＮＯＴ回路を構成することができなかった。このため、ＮＯＴ回路を構成するためには、3端子素子であるトランジスタなどを用いる必要があった。

全ての論理回路は、ＡＮＤ回路、ＯＲ回路及びＮＯＴ回路の組み合わせで構成することができる。すなわち、任意の論理回路を構成するためには、3端子回路が不可欠であった。これらは、例えば、（Ｉ）入門エレクトロニクス講座（日刊工業新聞社）、ディジタル回路編、第2巻、第1頁から第7頁に詳しく記載されている。

また、シリコンデバイスの集積化が限界に近づきつつある現在、分子デバイスなど、ｎｍ（ナノメートル）サイズの新しいデバイスの開発が進められている。例えば、（Ⅱ）ネーチャー第３９３巻第４９頁から第５０頁（１９９８年）〔Ｎａｔｕｒｅ，３９３（１９９８）ｐｐ４９－５０〕に、カーボンナノチューブを用いたトランジスタの実験結果が報告されている。

発明の開示

しかしながら、上記した先行技術〔1〕の方法では、一つのポイントコンタクトに対して少なくとも一つのピエゾ素子と、それを駆動する複雑な制御回路が必要となり、これらを集積化することは極めて困難である。

また、上記した先行技術〔2〕の方法では、一旦酸化された分子は還元して導電性を復活させることができないので、その用途が極めて限られてしまう。

更に、〔3〕に関しては、上記した3端子回路は、小型化の阻害要因となっていた。

例えば、上記文献（Ⅱ）の方法でも、カーボンナノチューブ以外のゲートなど

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の構造体は既存の半導体デバイスの製造プロセスを応用して作られており、結果として、トランジスタ全体のサイズは従来のものと大差ない。すなわち、ｎｍサイズの素子の開発は、未だ基本原理実証の域を出ていないのが実状であった。

本発明の第１の目的は、上記状況を鑑みて、電極間のコンダクタンスの制御を、電気的にかつ可逆的に行うとともに、演算回路、論理回路、メモリ素子などへ応用可能なポイントコンタクトを複数個並べたポイントコンタクト・アレーを提供することを目的とする。

本発明の第２の目的は、ｎｍサイズの電子素子を用いたＮＯＴ回路及びそれを用いた電子回路を提供することを目的とする。

本発明は、上記目的を達成するために、

〔１〕ポイントコンタクト・アレーにおいて、イオン伝導性及び電子伝導性を有する混合導電体材料から成る第１電極及び導電性物質から成る第２電極により構成される電極間のコンダクタンスが制御可能な電子素子を複数個用いることを特徴とする。

〔２〕上記〔１〕記載のポイントコンタクト・アレーにおいて、可動イオン（Ｍイオン：Ｍは金属電子）を有する前記混合導電体材料が前記可動イオン供給源（Ｍ）上に形成されていることを特徴とする。

〔３〕上記〔１〕又は〔２〕記載のポイントコンタクト・アレーにおいて、前記混合導電体材料がAg_2S、Ag_2Se、Cu_2S又はCu_2Seであることを特徴とする。

〔４〕上記〔１〕、〔２〕又は〔３〕記載のポイントコンタクト・アレーにおいて、前記混合導電体材料中に含まれる可動イオンにより、前記第１電極と第２電極間に架橋が形成され、前記電極間のコンダクタンスが変化することを利用することを特徴とする。

〔５〕上記〔１〕、〔２〕又は〔３〕記載のポイントコンタクト・アレーにおいて、前記第１電極と前記第２電極間に、イオンを固溶させることが可能で、かつイオンを固溶することにより電子とイオン伝導性が現れる半導体あるいは絶縁体材料を有し、この半導体あるいは絶縁体材料に前記混合導電体材料中に含まれる可動イオンが流入することにより、前記半導体ないし絶縁体のコンダクタンス

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が変化することを利用ことを特徴とする

〔6〕上記〔5〕記載のポイントコンタクト・アレーにおいて、前記半導体あるいは絶縁体材料が、GeS_x、$GeSe_x$、$GeTe_x$、ないしWO_x（$0<x<100$）の結晶体ないし非晶質体であることを特徴とする。

〔7〕上記〔1〕、〔2〕、〔3〕、〔4〕、〔5〕又は〔6〕記載のポイントコンタクト・アレーにおいて、少なくとも一部が混合導電体材料で被覆された第1電極を構成する金属線と、第2電極を構成する金属線であって、少なくとも一方の電極を構成する金属線が複数本あり、この金属線間の各交点にポイントコンタクトを設けるようにしたことを特徴とする。

〔8〕上記〔1〕、〔2〕、〔3〕、〔4〕、〔5〕、〔6〕又は〔7〕記載のポイントコンタクト・アレーにおいて、前記ポイントコンタクトのコンダクタンスが量子化されていることを特徴とする。

〔9〕上記〔8〕記載のポイントコンタクト・アレーにおいて、前記ポイントコンタクトの量子化されたコンダクタンスを記録状態として用いる多重記録メモリ型素子を構成することを特徴とする。

〔10〕上記〔8〕記載のポイントコンタクト・アレーにおいて、前記ポイントコンタクトの量子化されたコンダクタンスを入力信号とし、前記各電極の電位を制御することにより、この入力信号間の加算ないし減算を行うことを特徴とする。

〔11〕上記〔1〕、〔2〕、〔3〕、〔4〕、〔5〕、〔6〕又は〔7〕記載のポイントコンタクト・アレーにおいて、前記ポイントコンタクトの一端の電位を入力信号とする論理回路を構成することを特徴とする。

〔12〕NOT回路において、2端子素子のみで構成されたことを特徴とする。

〔13〕NOT回路において、2端子素子からなるアトミックスイッチを用いて構成されることを特徴とする。

〔14〕上記〔13〕記載のNOT回路において、前記アトミックスイッチは、イオン伝導性および電子伝導性を有する混合導電体材料から成る第1電極及び導電性材料から成る第2電極により構成され、前記第1電極と第2電極間のコンダクタンスが制御可能な素子からなることを特徴とする。

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〔１５〕上記〔１４〕記載のＮＯＴ回路において、前記混合導電体材料がAg_2S，Ag_2Se，Cu_2S又はCu_2Seであることを特徴とする。

〔１６〕上記〔１４〕又は〔１５〕記載のＮＯＴ回路において、前記アトミックスイッチに加え、いずれも２端子素子である、抵抗体、コンデンサーを用いて構成することを特徴とする。

〔１７〕上記〔１６〕記載のＮＯＴ回路において、前記抵抗体、コンデンサーに加え、ダイオードを用いて構成することを特徴とする。

〔１８〕上記〔１６〕記載のＮＯＴ回路において、前記コンデンサーを介して前記アトミックスイッチに印加する電圧を制御することにより、前記アトミックスイッチのコンダクタンスを制御することを特徴とする。

〔１９〕電子回路であって、上記〔１３〕から〔１８〕のいずれか１項記載のＮＯＴ回路と、前記アトミックスイッチを用いたＡＮＤ回路およびＯＲ回路を組み合わせて構成することを特徴とする。

図面の簡単な説明

第１図は、本発明にかかる複数個のポイントコンタクトを配置したポイントコンタクト・アレーを示す斜視模式図である。

第２図は、本発明にかかる多重記憶メモリを構成するポイントコンタクト・アレーを示す模式図である。

第３図は、本発明の第１実施例を示す多重記憶されたメモリの読み出し結果を示す図である。

第４図は、本発明の第２実施例を示すポイントコンタクト・アレーで構成した加算回路の演算結果を示す図である。

第５図は、本発明の第３実施例を示すポイントコンタクト・アレーで構成した減算回路の演算結果を示す図である。

第６図は、本発明の第４実施例を示すポイントコンタクト・アレーで構成したＯＲゲートの模式図である。

第７図は、本発明の第４実施例を示すポイントコンタクト・アレーで構成したＯＲゲートの動作結果を示す図である。

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第８図は、本発明の第４実施例を示すポイントコンタクト・アレー論理回路の等価回路図である。

第９図は、本発明の第５実施例を示すポイントコンタクト・アレーで構成したＡＮＤゲートの模式図である。

第１０図は、本発明の第５実施例を示すポイントコンタクト・アレーで構成したＡＮＤゲートの演算結果を示す図である。

第１１図は、本発明の第６実施例を示すポイントコンタクト・アレーの製造方法を示す図である。

第１２図は、本発明の第７実施例を示す半導体の導電性を制御するポイントコンタクト・アレーの模式図である。

第１３図は、本発明の第８実施例を示す一部が混合導電体で被覆された電極を有するポイントコンタクト・アレーの模式図である。

第１４図は、本発明の第９実施例を示すＮＯＴ回路の模式図である。

第１５図は、本発明の第９実施例を示すＮＯＴ回路の動作原理を示す図である。

第１６図は、本発明の第１０実施例を示すＮＯＴ回路の模式図である。

第１７図は、本発明の第１０実施例を示すＮＯＴ回路の動作原理を示す図である。

第１８図は、本発明の第１１実施例を示すＮＯＴ回路の模式図である。

第１９図は、本発明の第１１実施例を示すＮＯＴ回路の動作原理を示す図である。

第２０図は、本発明の第１２実施例を示すＮＯＴ回路の模式図である。

第２１図は、本発明の第１３実施例を示す２進１桁加算器の模式図である。

第２２図は、本発明の第１３実施例を示す２進１桁加算器の論理記号表示を示す図である。

第２３図は、本発明の第１３実施例を示す２進１桁加算器の真理値表を示す図である。

発明を実施するための最良の形態

以下、本発明の実施の形態について図を参照しながら詳細に説明する。

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第１図は本発明にかかる複数個のポイントコンタクトを配置したポイントコンタクト・アレーを示す斜視模式図である。

第１図に示すように、混合導電体１で被覆された金属線（第１電極）２と、金属線３，４（第２電極）との交点に可動イオン（原子）５で構成されたポイントコンタクト（架橋）６，７を形成する。これらは、絶縁性の基板８上に設置され、絶縁性の材料（図では省略）により固定される。

第１及び第２の二つの電極間に半導体ないし絶縁体材料を挿入する場合は、この半導体ないし絶縁体中に可動イオンが固溶することにより、その半導体のコンダクタンスが変化する。

その結果、電極間のコンダクタンスが変化する。なお、その変化量は半導体ないし絶縁体材料中に固溶する可動イオンの量に依存する。

簡略化するため、第１図においては、混合導電体１で被覆された金属線（第１電極）２が一本、金属線（第２電極）３，４が２本から成るポイントコンタクト・アレーが示されている。ポイントコンタクトの数は、電極を構成する金属線の本数の乗算であり、ここでは、２×１の２個のポイントコンタクトが形成されることになる。第１電極、第２電極を構成する金属線の本数を増やせばｎ個×ｎ個のポイントコンタクト・アレーを構成することができる。

本発明では、第１電極２と第２電極３，４間に電圧を印加して、イオン原子からなる架橋６，７を形成したり消滅させたりして、電極間に形成されたポイントコンタクトのコンダクタンスを制御する。具体的に説明すれば、第１電極２に対して第２電極３，４に適当な負電圧を印加すると、電圧と電流との効果により、混合導電体材料中の可動イオン（原子）が析出し、電極間に架橋６，７が形成される。この結果、電極間のコンダクタンスが増大する。逆に第２電極３，４に適当な正電圧を印加すると、可動イオン（原子）が混合導電体材料中に戻り、架橋６，７が消滅する。すなわち、コンダクタンスが減少する。

このように、各金属線に印加する電圧を独立に制御することによって、第１電極２と第２電極３，４の各交点に形成されたポイントコンタクトに印加する電圧を独立に制御することができる。すなわち、各交点のポイントコンタクトのコンダクタンスを独立に制御できる。

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これにより、ポイントコンタクト・アレーからなるメモリー素子、演算素子などの電子素子とそれらからなる電気回路を構成することができる。

以下では、混合導電体材料Ag_2S、可動イオン供給源Agから成る第1電極と、Ptからなる第2電極を用いた実施例を述べるが、他の材料を用いても同様の結果が得られることは言うまでもない。

架橋の形成はAg原子が10個程度あれば十分可能である。測定結果から、電圧100mV、初期電極間抵抗100kΩの場合に、Ag原子10個を混合導電体Ag_2Sから引き出すのに必要な時間、すなわち架橋を形成するのに必要な時間は、高々数十ナノ秒と見積もられた。また、架橋を形成するのに必要な電力はナノワット程度と小さい。このため、本発明を用いれば、高速でかつ低消費電力型の素子を構築することができる。

まず、本発明の第1実施例について説明する。

第2図は本発明にかかる多重メモリ素子に応用したポイントコンタクト・アレーの模式図である。

簡略化のため、第1図と同様に、2つのポイントコンタクトから成る試料を用いた。ここでは、第1電極を構成する混合導電体材料11としてAg_2Sを、金属線10としてAg線を用いた。また、第2電極を構成する金属線13，14としてPt線を用いた。第1電極を接地し、第2電極13，14にそれぞれ電圧V1，V2を独立に印加する。V1，V2として負の電圧を選ぶと、混合導電体材料11中のAg原子12が析出し、架橋15，16が形成される。V1，V2を正の電圧にすると、架橋15，16中のAg原子12が混合導電体材料11中に戻り、架橋15，16が消滅する。この詳しい機構については、本願発明者によって特願2000－265344として提案されている。

本発明では、ポイントコンタクトを複数用いることにより、以下に述べる新たな機能を実現している。

本実施例では、ポイントコンタクトのコンダクタンスの制御をパルス電圧を印加することにより行った。すなわち、コンダクタンスを増大させるためには、50mVの電圧を5ミリ秒印加した。コンダクタンスを減少させる場合には、－50mVの電圧を5ミリ秒印加した。これにより、各ポイントコンタクトにおいて、

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量子化されたコンダクタンス間の遷移を実現した。すなわち、これがメモリとしての書き込み動作にあたる。

そこで、記録状態を読み出すためには、Ｖ１，Ｖ２を１０ｍＶに設定し、読み出し動作によって記録したコンダクタンス値が変化しないようにした。その状態で、各ポイントコンタクトの第２電極を構成する金属線１３，１４に流れる電流I_1，I_2を測定した。その結果を第３図に示す。

第３図において、I_1を細い実線で、I_2を太い実線で示してある。ポイントコンタクト１５ないし１６に、１秒ごとに書き込み動作を行い、その都度記録状態を読み出した。左側の縦軸は実際に測定した電流値を、右側の縦軸は対応する量子化コンダクタンスを示している。コンダクタンスは、測定電流を印加電圧（１０ｍＶ）除算して得られる。

この図によれば、各ポイントコンタクトのコンダクタンスが量子化されていることが分かる。すなわち、架橋１５による第１のポイントコンタクトの量子化コンダクタンスの量子数をN_1、架橋１６による第２のポイントコンタクトの量子化コンダクタンスの量子数をN_2とすると、それぞれN_1＝０～３、N_2＝０～３の合計１６通りの記録状態が実現されている。

本実施例では、Ｎ＝０～３の４つの量子化状態しか用いなかったが、さらに大きな量子数をもつ状態を用いることにより、記録密度を増やすことができる。また、ポイントコンタクトの数を増やすことによって記録密度が上げられることも言うまでもない。

次に、本発明の第２実施例について説明する。

まず、第１実施例に示す構成を用いて、加算回路を実現した実施例を説明する。

本発明による加算回路では、入力は、架橋１５，１６によるポイントコンタクトの量子化コンダクタンスの量子数N_1，N_2である。入力の動作は、電圧Ｖ１，Ｖ２を制御してN_1，N_2を所望の値に設定することで行われる。演算結果は、Ｖ１，Ｖ２を読み出し電圧、例えば１０ｍＶに設定して、第１電極１０から接地電位に流出する電流I_{out}を測定することにより得られる。

第４図は本発明の第２実施例の演算結果を示す図である。グラフ下に、入力したN_1，N_2と測定されたN_{out}をグラフ横軸に対応させて示した。得られた電

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流値I_{out}がN_1+N_2に対応する量子化コンダクタンスを有していることが分かる。すなわち、加算が正確に行われている。本実施例でも、第1実施例と同様、$N_1=0\sim3$，$N_2=0\sim3$に対応する16通りの加算結果を示したが、より大きな量子数を用いても良い。また、用いるポイントコンタクトの数、すなわち、入力数を3個以上にしても同様のことが行える。

次に、本発明の第3実施例について説明する。

第1実施例に示す構成は、減算回路にも応用できる。入力の制御は第2実施例で述べたのと同じ方法で行う。減算の演算を行う際には、V1，V2として絶対値が等しく極性が逆の電圧を選べばよい。例えば、V1として10mV、V2として−10mVを設定すれば、N_1-N_2に相当する量子化コンダクタンスに対応する電流I_{out}が第1電極から接地電位に流出する。このとき、電流の向きが第1電極から接地電位を向いていれば演算結果は正の値を持ち、接地電位から第1電極を向いていれば演算結果は負の値を持つことになる。

第3実施例の演算結果を第5図に示す。

N_1-N_2の演算が正確に行われている。更に、3つ以上のポイントコンタクトを用いれば、$N_1+N_2-N_3$のような演算を一度に行うことが可能になる。例えば、この場合、V1とV2を10mV、V3を−10mVに設定して演算を行えばよい。

次に、本発明の第4実施例について説明する。

これは、本発明のポイントコンタクトを用いて論理回路を構成した実施例である。論理回路を構成する場合は、第1実施例〜第3実施例の場合と異なり、ポイントコンタクトにおける量子化コンダクタンス状態間の遷移は使わない。すなわち、オン・オフのスイッチング素子としてポイントコンタクトを用いる。典型的には、オンの状態の抵抗値が1kΩ以下、オフの状態の抵抗値が100kΩ以上である。

第6図は本発明のポイントコンタクトを用いて構成したORゲートの模式図である。

Ag線21，22がAg_2S 23，24で被覆されており第1電極を構成している。これらのAg_2S 23，24から析出したAg架橋25，26が、第

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２電極であるＰｔ電極２０に対向して、ポイントコンタクトを形成している。Ｐｔ電極２０の一端は、抵抗２７（本実施例では１０ｋΩ）を介して参照電圧V_sに接続されており、もう一端は出力端子で、出力電圧V_{out}が出力される。Ａｇ線２１，２２に対して、入力電圧Ｖ１，Ｖ２が印加されると、これにより、架橋２５，２６が形成されたり消滅したりして、ポイントコンタクトがオン・オフのスイッチング素子として働く。

第７図にその動作結果を示す。本実施例では、１秒毎に入力、すなわちＶ１，Ｖ２を変更して出力V_{out}を測定した。

２入力ＯＲゲートでは、ＬｏｗレベルとＨｉｇｈレベルの２値化されたそれぞれの入力に対し、いずれか一方でもＨｉｇｈレベルならば、出力がＨｉｇｈレベルとならなければならない。

そこで、まず、Ｌｏｗレベルとして０Ｖ（参照電位Ｖｓも同じ）を、Ｈｉｇｈレベルとして２００ｍＶを用いて動作させた場合の結果を第７（ａ）図に示す。

この図によると、２つの入力Ｖ１，Ｖ２の内、いずれか一方が２００ｍＶのとき、出力V_{out}は略２００ｍＶとなっており、正常に動作していることが分かる。Ｈｉｇｈレベルの電圧を５００ｍＶに上昇させても同様の結果〔第７（ｂ）図〕が得られた。

第８図は本論理回路の等価回路を示す図である。

参照電圧Ｖｓと入力電圧Ｖ１，Ｖ２によって、架橋２５，２６（第６図）の生成・消滅が起こり、抵抗Ｒ１，Ｒ２（架橋によって形成されるポイントコンタクト部の抵抗）の抵抗値が変化する。電極２０（第６図）上の２つのポイントコンタクト間にも僅かな抵抗Ｒ１２（数Ωから数十Ω程度）があるが、Ｒ０（１０ｋΩ）、Ｒ１，Ｒ２（１ｋΩ～１ＭΩ）に比べれば無視できる大きさである。

まず、Ｖ１，Ｖ２ともに０Ｖの場合、系に接続された３つの電圧が全て０Ｖなので、出力V_{out}は必然的に０Ｖになる。次に、Ｖ１が０Ｖ、Ｖ２が２００ｍＶ（５００ｍＶ）の場合、架橋２５（第６図）が成長し、抵抗Ｒ２の抵抗値が小さくなる。典型的には１ｋΩ以下である。

この結果、Ｒ０よりも Ｒ２の方が抵抗値が１桁以上小さくなるので、Ｖ２′は約２００ｍＶ（５００ｍＶ）となる。このときＶ１′もほぼ２００ｍＶ（５００

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ｍＶ）となるので、架橋２４（第６図）に対しては架橋が消滅する電圧が印加されたことになり、Ｒ１は１ＭΩ以上の大きい値となる。この結果、Ｖ１が０Ｖであっても、Ｒ０，Ｒ１≫Ｒ２であるので、Ｖ１′はＶ２′と同じ約２００ｍＶ（５００ｍＶ）となる。その結果、出力は２００ｍＶ（５００ｍＶ）となるのである。正確には、架橋２５の成長と架橋２４の切断は平行して起こり、上述の結果をもたらす。

Ｖ１が２００ｍＶ（５００ｍＶ）、Ｖ２が０Ｖの場合も同様に説明できる。また、Ｖ１，Ｖ２ともに２００ｍＶ（５００ｍＶ）の場合は、架橋２５，２６がともに成長するので、Ｖ１，Ｖ２の電圧、すなわち、２００ｍＶ（５００ｍＶ）が出力されることになる。

次に、本発明の第５実施例について説明する。

第９図を用いて、ＡＮＤゲートを構成した実施例を説明する。

本実施例では、Ag_2S薄膜３１で被覆されたＡｇ線３０の一端が、抵抗体３７を介して、参照電圧Ｖｓと接続されている。もう一端は出力端子である。また、２本のＰｔ電極３５，３６に向かって、可動イオンであるＡｇ原子が析出してできた架橋３３，３４が形成されている。入力電圧Ｖ１，Ｖ２は、この２本のＰｔ電極３５，３６に対して印加される。なお、第９図において、３２はAg_2S薄膜３１中のＡｇイオンである。

第１０図に、ＡＮＤゲートの演算結果を示す。２入力ＡＮＤゲートでは、２つの入力がともにＨｉｇｈレベルの時のみ、出力V_{out}がＨｉｇｈレベルとなる。

第１０（ａ）図は、Ｈｉｇｈレベルを２００ｍＶに設定して動作させた場合の結果である。なお、このとき、参照電圧も２００ｍＶに設定した。

第１０（ｂ）図には、Ｈｉｇｈレベルを５００ｍＶに設定して動作させた場合の結果を示す。このときの参照電圧は５００ｍＶである。

第１０図によると、Ｈｉｇｈレベルが２００ｍＶで、Ｖ１が０Ｖ、Ｖ２が２００ｍＶの場合に、出力V_{out}が中途半端な値（約５０ｍＶ）を示している。しかし、これ以外はＬｏｗレベルである０Ｖか、Ｈｉｇｈレベルである２００ｍＶを出力している。また、Ｈｉｇｈレベルとして５００ｍＶを設定した場合は、全ての入力パターンに対して正常に動作している。なお、２００ｍＶ動作の場合もＬ

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ｏｗ－Ｈｉｇｈを決める臨界電圧を１００ｍＶに設定すれば全く問題は起きない。なお、この原因については後述する。

再び、第８図を用いてこのＡＮＤゲートの動作原理を説明する。本実施例では、参照電圧ＶｓはＨｉｇｈレベル（２００ないし５００ｍＶ）である。まず、Ｖ１，Ｖ２ともに０Ｖの場合、架橋３３，３４（第９図）がともに成長するので、抵抗Ｒ１，Ｒ２の抵抗値は典型的には１ｋΩ以下となる。すなわち、抵抗Ｒ０（１０ｋΩ）よりも一桁以上小さな抵抗値で出力端がＬｏｗレベルにある入力電圧に接続されるので、出力V_{out}は０Ｖとなる。次に、Ｖ１が０Ｖ、Ｖ２が２００ｍＶ（５００ｍＶ）の場合、架橋３３（第９図）のみが成長する。

一方、架橋３４は電圧Ｖ２′が電圧Ｖ１のために２００ｍＶ（５００ｍＶ）よりも小さくなる。すなわち、架橋が消滅する極性の電圧が印加されたことになり、架橋３４は消滅しＲ２の抵抗値は１ＭΩ程度に大きくなる。このときのＶ２′とＶ２の電位差が小さいと、架橋の消滅が十分でなく、従ってＲ２の抵抗値が十分大きくならないので、先に述べた中途半端な出力がでてしまうことがある。しかし、Ｈｉｇｈレベルの電圧を５００ｍＶにすればＶ２′とＶ２の電位差が十分大きくなるので、完全に正常に動作する。

Ｖ１が２００ｍＶ（５００ｍＶ）、Ｖ２が０Ｖの場合も同様である。ただし、ポイントコンタクトを構成する架橋３３，３４の特性が若干異なるため、この場合は、動作電圧２００ｍＶにおいても正常な出力が得られている。最後に、Ｖ１，Ｖ２がともに２００ｍＶ（５００ｍＶ）の場合、この場合は、架橋３３，３４の生成消滅は起こらない。全ての電圧が２００ｍＶ（５００ｍＶ）なので、出力電圧も２００ｍＶ（５００ｍＶ）となる。

以上、ポイントコンタクトを用いた論理回路について説明してきた。以上の実施例では２入力の論理回路について述べたが、本発明によるポイントコンタクトを３つ以上使えば、上述した動作原理により３入力以上の論理回路を構成することができる。

次に、本発明の第６実施例について説明する。

ここでは、ポイントコンタクト・アレーの製造方法について述べる。

第１１図は本発明の第６実施例を示すポイントコンタクト・アレーの製造方法

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を示す図である。

第１１図に示すように、絶縁性の基板４０上にＡｇ線４１，４２を形成し、その表面をイオウ化してＡｇ$_2$Ｓ膜４３，４４を形成する。その上にＰｔ線４５，４６を載せることで、このポイントコンタクト・アレーの主要部が完成する。ここで重要なことは、Ａｇ$_2$Ｓ膜４３，４４で覆われたＡｇ線４１，４２とＰｔ線４５，４６との各交点に、Ａｇ原子による架橋４７，４８が形成されていることである。

このために本発明ではＰｔ線４５，４６を載せる際に、Ｐｔ線４５，４６・Ａｇ線４１，４２間に電圧を印加して、Ａｇ$_2$Ｓ膜４３，４４からＡｇが析出して架橋４７，４８を形成するようにした。これにより、例えば、配線装置等によりＰｔ線４５，４６を載せるだけで本発明を実現することができる。

また、マスクを用いた蒸着等により、交点に予めＡｇを蒸着しておいても良いし、Ａｇ$_2$Ｓ膜で覆われたＡｇ線に電子線を照射してＡｇ原子を析出させても良い。重要なことは、第１電極を構成するＡｇ$_2$Ｓと第２電極を構成するＰｔ間にＡｇが存在することである。

さらに、Ｐｔ線を別の基板上に予め形成しておき、Ａｇ$_2$Ｓ膜で覆われたＡｇ線が形成された基板と貼り合わせても良い。

次に、本発明の第７実施例について説明する。

ここでは、別のポイントコンタクト・アレーの製造方法と構造について述べる。

第１２図は本発明の第７実施例を示す半導体の導電性を制御するポイントコンタクト・アレーの模式図である。

第１２図では、絶縁性の基板５０上に、やはりＡｇ$_2$Ｓ膜５３，５４で被覆されたＡｇ線５１，５２が形成されている。その上に、Ａｇ原子を固溶することができる半導体ないし絶縁体５７，５８，５９，６０がＡｇ線５１，５２とＰｔ線５５，５６との交点にあたる部分にのみ形成されている。なお、第１２図ではこれらを覆う絶縁材料は示していないが、図に示した部分は全て素子内部に埋め込まれている。

この場合、これまでに述べてきたのと同じ原理でＡｇイオンが、Ａｇ$_2$Ｓ膜５３，５４から流出する。この流出したＡｇイオンが半導体ないし絶縁体５７，５

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８，５９，６０内に固溶して半導体ないし絶縁体の導電率を変化させ、上述した実施例と同様のことを実現することができる。この場合、架橋の生成・消滅のための空間が素子中に不要となるので、絶縁性部材中への埋め込みが容易になる。

また、半導体ないし絶縁体の代わりに、Ａｇ薄膜を予め形成しておけば、第６実施例で述べたのと同じ構造となる。この場合、この薄膜Ａｇ中のＡｇ原子が$Ａｇ_{2}$Ｓ膜中に入り込むことによって薄膜が消失する。

なお、本発明では、Ａｇイオンを固溶することができる半導体ないし絶縁体として、$ＧｅＳ_{x}$、$ＧｅＳｅ_{x}$、$ＧｅＴｅ_{x}$、ないし$ＷＯ_{x}$（$０＜ｘ＜１００$）の結晶体ないし非晶質体を用いるようにした。

次に、本発明の第８実施例について説明する。

第１３図に第１電極である金属配線の一部が混合導電体で被覆された実施例を示す。本実施例においては、第１電極を構成する金属線と第２電極を構成する金属線との交点において、「第１電極を構成する金属／混合導電体／架橋ないし半導体／第２電極を構成する金属」で構成されるポイントコンタクトが形成されていればよい。

従って、第１３図に示すように、第１電極を構成する金属線７０と第２電極を構成する金属線７１，７２の交点付近のみに混合導電体７３，７４が形成されていても、混合導電体７３，７４と金属線７１，７２間にポイントコンタクト（架橋）７５，７６を形成できる。

さらに、第１電極を構成する金属も、混合導電体に接する部分と、ポイントコンタクト間の配線材が異なっていても良い。例えば、本実施例では、混合導電体（$Ａｇ_{2}$Ｓ）７７，７８に接する部分にＡｇ線７９，８０を、その他の部分８１～８３にタングステン線を用いた。なお、混合導電体と接する部分の部材は、混合導電体中の可動イオン原子と同じ元素で構成されている必要がある。従って、本実施例では、混合導電体として$Ａｇ_{2}$Ｓを用いたので、これと接する部分の部材にＡｇを用いたのである。

次に、本発明の他の実施例のＮＯＴ回路及びそれを用いた電子回路について詳細に説明する。

第１４図は本発明の第９実施例を示すＮＯＴ回路の模式図である。

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この図に示すように、導電性部材１０１上に混合導電体である第１電極１０２が形成されている。この第１電極１０２と第２電極１０３間の電位差を操作することで、混合導電体中の可動イオン（原子）１０４の第１電極１０２表面上への金属原子としての析出、又は析出した金属原子の第１電極１０２内への可動イオン（原子）としての固溶を制御できる。すなわち、第１電極１０２に対して第２電極１０３に適当な負電圧を印加すると、電圧と電流の効果により、混合導電体材料中の可動イオン（原子）１０４が析出し、電極１０２，１０３間に架橋１０５が形成される。この結果、電極１０２，１０３間の抵抗が減少する。

逆に、第２電極１０３に適当な正電圧を印加する場合には、可動イオン（原子）１０４が混合導電体材料中に固溶し、架橋１０５が消滅する。つまり、抵抗が増大する。以後、この２端子素子を「アトミックスイッチ」と呼ぶ。なお、この詳しい動作原理に関しては、本願発明者によって、特願２０００－２６５３４４として提案されている。

アトミックスイッチの第２電極１０３には、抵抗体１０６（抵抗値Ｒ１）を介して出力のハイレベルに対応する電圧ＶＨ／２が印加されるとともに、コンデンサー１０８（容量Ｃ１）を介して、入力端V_{in}が接続されている。一方、アトミックスイッチの第１電極１０２を構成する導電性部材１０１には抵抗体１０７（抵抗値Ｒ２）を介して出力のローレベルに対応する電圧ＶＬが印加されるとともに、出力端V_{out}が接続されている。

ここで、アトミックスイッチのオン状態の抵抗値をＲ（ＯＮ）、オフ状態の抵抗値をＲ（ＯＦＦ）とすると、本発明では、

Ｒ（ＯＦＦ）≫Ｒ２≫Ｒ（ＯＮ）～Ｒ１

の関係を満たす抵抗体およびアトミックスイッチを用いる。

そして、入力V_{in}のハイレベルとしてＶＨをローレベルとしてＶＬを用いると、入力V_{in}がＶＬのとき出力V_{out}がＶＨ／２となり、入力V_{in}がＶＨのとき出力V_{out}がＶＬとなる。すなわち入力がハイレベルの時に出力がローレベルとなり、入力がローレベルの時に出力がハイレベルとなり、ＮＯＴ回路として動作する。

以下、第１電極１０２としてＡｇ上に形成されたAg_2Sを、第２電極１０３としてはＰｔを用いたアトミックスイッチを用いた場合の実施例を説明するが、

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Ag_2Se、Cu_2S又はCu_2Seなど他の混合導電体およびＰｔ以外の金属を用いたアトミックスイッチを用いてもＮＯＴ回路を構成できることは言うまでもない。

上記したように、本発明では、混合導電体材料からなる第１電極１０２と導電性材料から成る第２電極１０３で構成される２端子素子であるアトミックスイッチを用いることにより２端子素子のみによるＮＯＴ回路を実現する。

ここで、入力V_{in}のハイレベルとしてＶＨを、ローレベルとしてＶＬ（０Ｖ）を用いる場合を例に取り、第１４図に示すＮＯＴ回路の動作原理を第１５図を用いて詳細に説明する。

時刻ｔ１において、入力V_{in}がローレベル（ＶＬ）からハイレベル（ＶＨ）に変化すると〔第１５（ａ）図参照〕、コンデンサー１０８に電荷Ｑ＝Ｃ１×ＶＨ（Ｃ１はコンデンサーの容量）が蓄積される。このとき、一時的に流れる電流のために、アトミックスイッチの第２電極３側の電位V_{in}'は、第１５（ｂ）図に示すように変化する。すなわち、アトミックスイッチの第２電極１０３側の電位が、第１電極１０２側の電位よりも一時的に高くなり、アトミックスイッチがオフ状態（抵抗の高い状態）へと変化する〔第１５（ｃ）図参照〕。その結果、Ｒ（ＯＦＦ）≫Ｒ２となり、出力V_{out}がＶＬとなる〔図１５（ｄ）参照〕。

アトミックスイッチの抵抗が高くなったことで、アトミックスイッチの電極１０２，１０３間の電位は、第１５（ｅ）図に示すように高くなる。スイッチング時間ｔｓは、コンデンサー１０８の容量Ｃ１と抵抗体１０６の抵抗値Ｒ１によってほぼ決まる。例えば、コンデンサーの容量Ｃ１を１ｐＦ、抵抗値Ｒ１を１０Ωとすれば、ＧＨｚオーダーのスイッチングが可能になる。

一方、時刻ｔ２において、入力V_{in}がハイレベル（ＶＨ）からローレベル（ＶＬ）に変化すると〔第１５（ａ）図参照〕、コンデンサー１０８に蓄積されていた電荷が放出される。このとき一時的に流れる電流によって、アトミックスイッチの第２電極３側の電位V_{in}'は、第１５（ｂ）図に示すように変化する。すなわち、アトミックスイッチの第２電極１０３側の電位が、第１電極１０２側の電位よりも一時的に極端に低くなり、アトミックスイッチがオン状態（抵抗の低い状態）へと変化する〔第１５（ｃ）図参照〕。その結果、Ｒ２≫Ｒ（ＯＮ）とな

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り、出力V_{out}がＶＨ／２となる〔第１５（ｄ）図参照〕。

第１５（ｅ）図は、アトミックスイッチの電極１０２，１０３間の電位差を示したものである。入力V_{in}がローレベル（ＶＬ）のときのアトミックスイッチの電極１０２，１０３間の電位差はほぼゼロであり、アトミックスイッチのオン状態は安定に保たれる。一方、入力V_{in}がハイレベル（ＶＨ）のときのアトミックスイッチの電極１０２，１０３間の電位差はＶＨ／２であり、これは、アトミックスイッチがオフ状態になるべき電位差であるので、オフ状態が安定に保たれる。すなわち、本実施例によるＮＯＴ回路は確実かつ安定に動作する。

なお、ここでは、入力として、ＶＨないしＶＬを、出力として、ＶＨ／２ないしＶＬを用いる実施例を示した。第１４図に示すＮＯＴ回路では、アトミックスイッチの動作原理上、入力の電位差（本実施例では、ＶＨ－ＶＬ）が必ず出力の電位差（本実施例では、ＶＨ／２－ＶＬ）よりも大きくならなければならないという制約があるが、その範囲で、入出力の電位差を自由に設定することができる。

また、入出力の電位差が等しくなる実施例については、第３，４実施例で詳しく述べる。すなわち、本発明に基づけば、入出力のレベルが等しいＮＯＴ回路を構成することもできる。

第１６図は本発明の第１０実施例を示すＮＯＴ回路の模式図である。

ここでは、２端子素子を第１４図とは異なる配置で用いたＮＯＴ回路の別の実施例を説明する。

用いた部材は、第１４図に示す第９実施例と全く同じである。すなわち、導電性部材であるＡｇ１１１上に混合導電体（Ag_2S）である第１電極１１２が形成されており、この混合導電体中の可動イオン（Ａｇイオン）１１４が析出して、第２電極（Ｐｔ）１１３との間にＡｇ原子による架橋１１５を形成するアトミックスイッチが用いられている。

アトミックスイッチの第２電極（Ｐｔ）１１３には、抵抗体１１６（抵抗値Ｒ３）を介して出力のハイレベルに対応する電圧ＶＨ／２が印加されるとともに、出力端V_{out}が接続されている。

一方、アトミックスイッチの第１電極１１２を構成する導電性部材（Ａｇ）１１１には、抵抗体１１７（抵抗値Ｒ４）を介して出力のローレベルに対応する電

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圧ＶＬが印加されるとともに、コンデンサー１１８（容量Ｃ２）を介して、入力端V_{in}が接続されている。

ここで、アトミックスイッチのオン状態の抵抗値をＲ（ＯＮ）、オフ状態の抵抗値をＲ（ＯＦＦ）とすると、この実施例では、

Ｒ（ＯＦＦ）≫Ｒ３≫Ｒ（ＯＮ）～Ｒ４

の関係を満たす抵抗体およびアトミックスイッチを用いる。

第１７図を用いて、第１６図に示すＮＯＴ回路の動作原理を詳しく説明する。

時刻ｔ１において、入力V_{in}がローレベル（ＶＬ）からハイレベル（ＶＨ）に変化すると〔第１７（ａ）図参照〕、コンデンサー１１８に電荷Ｑ＝Ｃ２×ＶＨ（Ｃ２は、コンデンサーの容量）が蓄積される。このとき、一時的に流れる電流のために、アトミックスイッチの第１電極１１２側の電位V_{in}'は、第１７（ｂ）図に示すように変化する。すなわち、アトミックスイッチの第１電極１１２側の電位が、第２電極１１３側の電位よりも、一時的に極端に高くなり、アトミックスイッチがオン状態（抵抗の低い状態）へと変化する〔第１７（ｃ）図参照〕。

その結果、Ｒ３≫Ｒ（ＯＮ）となり、出力V_{out}がＶＬとなる〔第１７（ｄ）図参照〕。スイッチング時間ｔｓは、コンデンサー１１８の容量Ｃ２と抵抗１１７の抵抗値Ｒ４によってほぼ決まる。例えば、コンデンサーの容量Ｃ２を１ｐＦ、抵抗値Ｒ４を１０Ωとすれば、ＧＨｚオーダーのスイッチングが可能になる。

一方、時刻ｔ２において、入力V_{in}がハイレベル（ＶＨ）からローレベル（ＶＬ）に変化すると〔第１７（ａ）図参照〕、コンデンサー１１８に蓄積されていた電荷が放出される。このとき一時的に流れる電流によって、アトミックスイッチの第１電極１１２側の電位V_{in}'は、第１７（ｂ）図に示すように変化する。すなわち、アトミックスイッチの第１電極１１２側の電位が第２電極１１３側の電位よりも一時的に極端に低くなり、アトミックスイッチがオフ状態（抵抗の高い状態）へと変化する〔第１７（ｃ）図参照〕。その結果、Ｒ（ＯＦＦ）≫Ｒ３となり、出力V_{out}がＶＨ／２となる〔第１７（ｄ）図参照〕。

第１７（ｅ）図は、アトミックスイッチの電極１１２，１１３間の電位差を示したものである。入力V_{in}がローレベル（ＶＬ）のときのアトミックスイッチの

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電極１１２，１１３間の電位差はＶＨ／２であり、これは、アトミックスイッチがオフ状態になるべき電位差であるので、オフ状態が安定に保たれる。

一方、入力V_{in}がハイレベル（ＶＨ）のときのアトミックスイッチの２電極１１２，１１３間の電位差はほぼゼロであり、アトミックスイッチのオン状態は安定に保たれる。すなわち、本実施例によるＮＯＴ回路は確実かつ安定に動作する。

なお、ここでも、入力としてＶＨ、ＶＬを、出力としてＶＨ／２、ＶＬを用いる実施例を示したが、第９実施例（第１４図）に示すＮＯＴ回路同様、入力の電位差が必ず出力の電位差よりも大きくならなければならないという制約があるが、その範囲で、入出力の電位差を自由に設定することができる。

また、アトミックスイッチと抵抗、コンデンサーの配置および数は、上述した実施例以外にも可能であり、本発明の主たる特徴は、それらを部品として用いることにある。

第１８図は本発明の第１１実施例を示すＮＯＴ回路の模式図、第１９図は第１８図に示すＮＯＴ回路の動作原理を示す図である。

ここでは、入出力の電位差が等しいＮＯＴ回路について説明する。第９実施例（第１４図）に示すＮＯＴ回路の出力に当たる部分（第１８図では、V_{out}'）に、ダイオード１０９が接続され、このダイオード１０９のもう一端には抵抗１１０（抵抗値Ｒ５）を介してＶＨが印加されるとともに、出力端V_{out}が接続されている。さらに、抵抗１０７（抵抗値Ｒ２）を介して印加される電圧がＶＬではなく、ＶＳとなっていることが、第９実施例（第１４図）に示したＮＯＴ回路と異なっている。

ここで、V_{out}'の電位は、ローレベルがＶＬではなくＶＳとなることを除いて、第９実施例で説明した通りである〔第１９（ｂ）図参照〕。本実施例では、ＶＨ／２＜ＶＦ（ＶＨ－ＶＳ）（ＶＦは、ダイオード１０９の閾値電圧）とすることで、ＮＯＴ回路の入出力の電位差を同じにしている。すなわち、V_{out}'がＶＨ／２となれば、ダイオード１０９には閾値電圧以下の電圧が印加されることになり、このときのダイオード１０９の抵抗値をＲＢ、閾値以上の電圧が印加された時の抵抗値をＲＦとすると、ＲＢ≫Ｒ５≫ＲＦとなるような抵抗１１０を用いる。第１９（ｃ）図にダイオードに印加される電圧を示す。また、

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Ｒ５／Ｒ２＝（ＶＨ－ＶＬ）／（ＶＬ－ＶＦ－ＶＳ）

ＶＬ＞ＶＦ＋ＶＳ

を満足するような抵抗値、印加する電圧を設定することにより、出力V_{out}は、第１９（ｄ）図のようになる。すなわち、入出力の電位差が等しいＮＯＴ回路を実現することができる。

第２０図は本発明の第１２実施例を示すＮＯＴ回路の模式図である。

第１６図に示した第１０実施例のＮＯＴ回路を基にしても、入出力の電位差が等しいＮＯＴ回路を構成することができる。第１０実施例（第１６図）に示したＮＯＴ回路の出力に当たる部分（V_{out}′）に、ダイオード１１９が接続され、このダイオード１１９のもう一端には、抵抗１２０（抵抗値Ｒ６）を介してＶＨが印加されるとともに、出力端V_{out}が接続されている。さらに、抵抗１１７（抵抗値Ｒ４）を介して印加される電圧がＶＬではなく、ＶＳとなっていることが、第１０実施例のＮＯＴ回路と異なっている。

動作原理は、第１１実施例で説明したＮＯＴ回路とほぼ同じであり、ＲＢ≫Ｒ６≫ＲＦとなるような抵抗１２０を用いること、

Ｒ６／２Ｒ４＝（ＶＨ－ＶＬ）／（ＶＬ－ＶＦ－ＶＳ）

ＶＬ＞ＶＦ＋ＶＳ

を満足するような抵抗値、印加する電圧を設定することにより、入出力の電位差が等しいＮＯＴ回路を実現することができる。なお、上記は、アトミックスイッチのオン状態の抵抗がほぼＲ４に等しい場合で、そうでない場合は、ＶＳを多少操作する必要がある。

アトミックスイッチと抵抗、コンデンサが様々に配置されたＮＯＴ回路に対して、ダイオードと抵抗を付加するだけで、上述のように入出力の電位差が等しいＮＯＴ回路を構成することができる。すなわち、アトミックスイッチと抵抗、コンデンサ、ダイオードの配置は、上記実施例に示したものに限られるわけではなく、それらを部品として用いることが本発明の特徴である。

第２１図は本発明の第１３実施例を示す２進１桁加算器の模式図である。

ここでは、本発明によるＮＯＴ回路と、アトミックスイッチを用いたＡＮＤ回路、ＯＲ回路を用いて２進１桁加算器を構成した実施例について述べる。

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ＮＯＴ回路は、第１８図に示す第１１実施例のものを用いた。また、ＡＮＤ回路とＯＲ回路は、本願発明者によって特願２０００－３３４６８６として提案したものを用いた。図中、個々のＮＯＴ回路、ＡＮＤ回路、ＯＲ回路を構成する部分が点線で囲まれている。すなわち、本２進１桁加算器は、２つのＮＯＴ回路１２１，１２２と、３つのＡＮＤ回路１２３，１２４，１２５および一つのＯＲ回路１２６で構成されている。

この回路を論理記号表示すると第２２図のようになる。なお、第２２図において、１２１′，１２２′はＮＯＴ回路、１２３′，１２４′，１２５′はＡＮＤ回路、１２６′はＯＲ回路である。

ここで、入力Ｘ，Ｙのハイレベルを１で、ローレベルを０で表すと、出力ＳとＣは、第２３図に示すようになり、本発明により、コンピューターに用いられる２進１桁加算器が構成できることが分かる。これは、一例であるが、このように本発明によれば、２端子素子を用いてＮＯＴ回路、ＡＮＤ回路、ＯＲ回路を構成できるので、すべての論理回路を２端子素子のみで構成することが可能になる。

なお、本発明は上記実施例に限定されるものではなく、本発明の趣旨に基づいて種々の変形が可能であり、これらを本発明の範囲から排除するものではない。

以上、詳細に説明したように、本発明によれば、以下のような効果を奏することができる。

（Ａ）高速、かつ低消費電力で動作するポイントコンタクト・アレーを構築することができ、多重記録型メモリー素子、論理回路、演算回路等を実現することができる。

（Ｂ）２端子素子でＮＯＴ回路を構成することができるため、２端子素子のみですべての論理回路を実現することができる。アトミックスイッチは、ｎｍサイズ化が容易であり、従って、本発明によれば、ｎｍスケールのデバイスを現実することができる。

産業上の利用可能性

本発明のポイントコンタクト・アレー、ＮＯＴ回路及びそれを用いた電子回路は、ナノスケールの論理回路、演算回路、メモリ素子への利用が可能である。

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請 求 の 範 囲

1．イオン伝導性及び電子伝導性を有する混合導電体材料から成る第１電極及び導電性物質から成る第２電極により構成される電極間のコンダクタンスが制御可能な電子素子を複数個用いることを特徴とするポイントコンタクト・アレー。

2．可動イオン（Mイオン：Mは金属電子）を有する前記混合導電体材料が前記可動イオン供給源（M）上に形成されていることを特徴とする請求項１記載のポイントコンタクト・アレー。

3．前記混合導電体材料がAg_2S、Ag_2Se、Cu_2S又はCu_2Seであることを特徴とする請求項１又は２記載のポイントコンタクト・アレー。

4．前記混合導電体材料中に含まれる可動イオンにより、前記第１電極と第２電極間に架橋が形成され、前記電極間のコンダクタンスが変化することを利用することを特徴とする請求項１、２又は３記載のポイントコンタクト・アレー。

5．前記第１電極と前記第２電極間に、イオンを固溶させることが可能で、かつイオンを固溶することにより電子とイオン伝導性が現れる半導体あるいは絶縁体材料を有し、該半導体あるいは絶縁体材料に前記混合導電体材料中に含まれる可動イオンが流入することにより、該半導体ないし絶縁体のコンダクタンスが変化することを利用することを特徴とする請求項１、２又は３記載のポイントコンタクト・アレー。

6．前記半導体あるいは絶縁体材料が、GeS_x、$GeSe_x$、$GeTe_x$、ないしWO_x（$0<x<100$）の結晶体ないし非晶質体であることを特徴とする請求項５記載のポイントコンタクト・アレー。

7．少なくとも一部が混合導電体材料で被覆された第１電極を構成する金属線と、第２電極を構成する金属線であって、少なくとも一方の電極を構成する金属線が複数本あり、該金属線間の各交点にポイントコンタクトを設けることを特徴とする請求項１、２、３、４、５又は６記載のポイントコンタクト・アレー。

8．前記ポイントコンタクトのコンダクタンスが量子化されていることを特徴とする請求項１、２、３、４、５、６又は７記載のポイントコンタクト・アレー。

9．前記ポイントコンタクトの量子化されたコンダクタンスを記録状態として用

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いる多重記録メモリ型素子を構成することを特徴とする請求項8記載のポイントコンタクト・アレー。

１０．前記ポイントコンタクトの量子化されたコンダクタンスを入力信号とし、前記各電極の電位を制御することにより、該入力信号間の加算ないし減算を行うことを特徴とする請求項8記載のポイントコンタクト・アレー。

１１．前記ポイントコンタクトの一端の電位を入力信号とする論理回路を構成することを特徴とする請求項１、２、３、４、５、６又は７記載のポイントコンタクト・アレー。

１２．２端子素子のみで構成されたことを特徴とするＮＯＴ回路。

１３．２端子素子からなるアトミックスイッチを用いて構成されることを特徴とするＮＯＴ回路。

１４．請求項１３記載のＮＯＴ回路において、前記アトミックスイッチは、イオン伝導性および電子伝導性を有する混合導電体材料から成る第１電極及び導電性材料から成る第２電極により構成され、前記第１電極と第２電極間のコンダクタンスが制御可能な素子からなることを特徴とするＮＯＴ回路。

１５．請求項１４記載のＮＯＴ回路において、前記混合導電体材料がAg_2S，Ag_2Se，Cu_2S又はCu_2Seであることを特徴とするＮＯＴ回路。

１６．請求項１４又は１５記載のＮＯＴ回路において、前記アトミックスイッチに加え、いずれも２端子素子である、抵抗体、コンデンサーを用いて構成することを特徴とするＮＯＴ回路。

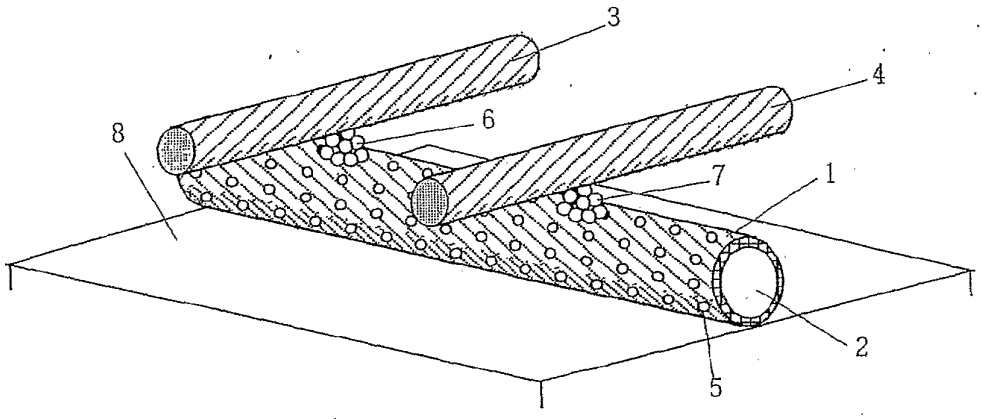
１７．請求項１６記載のＮＯＴ回路において、前記抵抗体、コンデンサーに加え、ダイオードを用いて構成することを特徴とするＮＯＴ回路。

１８．請求項１６記載のＮＯＴ回路において、前記コンデンサーを介して前記アトミックスイッチに印加する電圧を制御することにより、前記アトミックスイッチのコンダクタンスを制御することを特徴とするＮＯＴ回路。

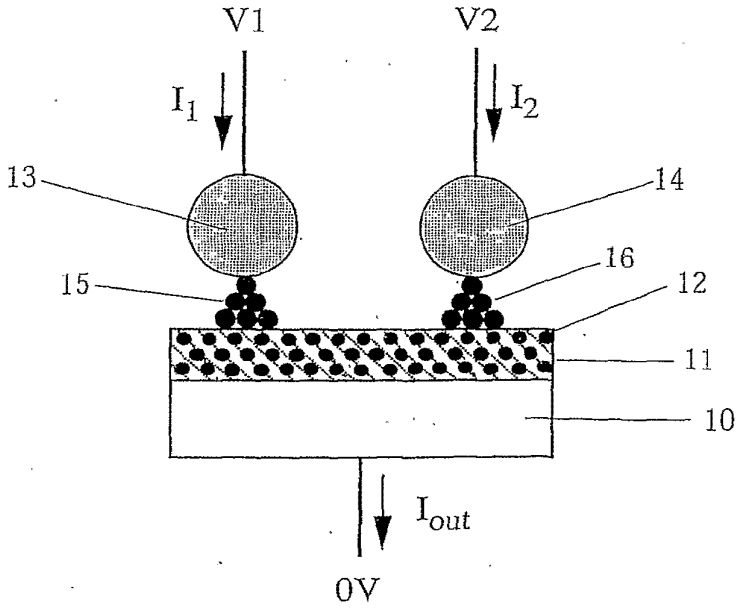
１９．請求項１３から１８のいずれか１項記載のＮＯＴ回路と、前記アトミックスイッチを用いたＡＮＤ回路およびＯＲ回路を組み合わせて構成することを特徴とする電子回路。

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第 1 図

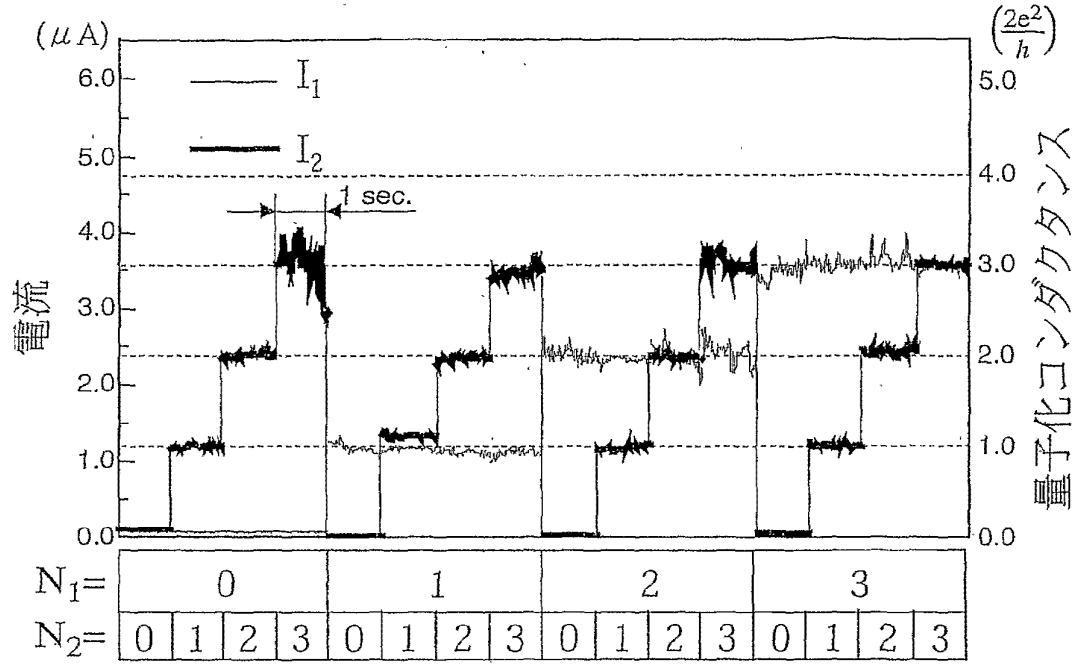


第 2 図

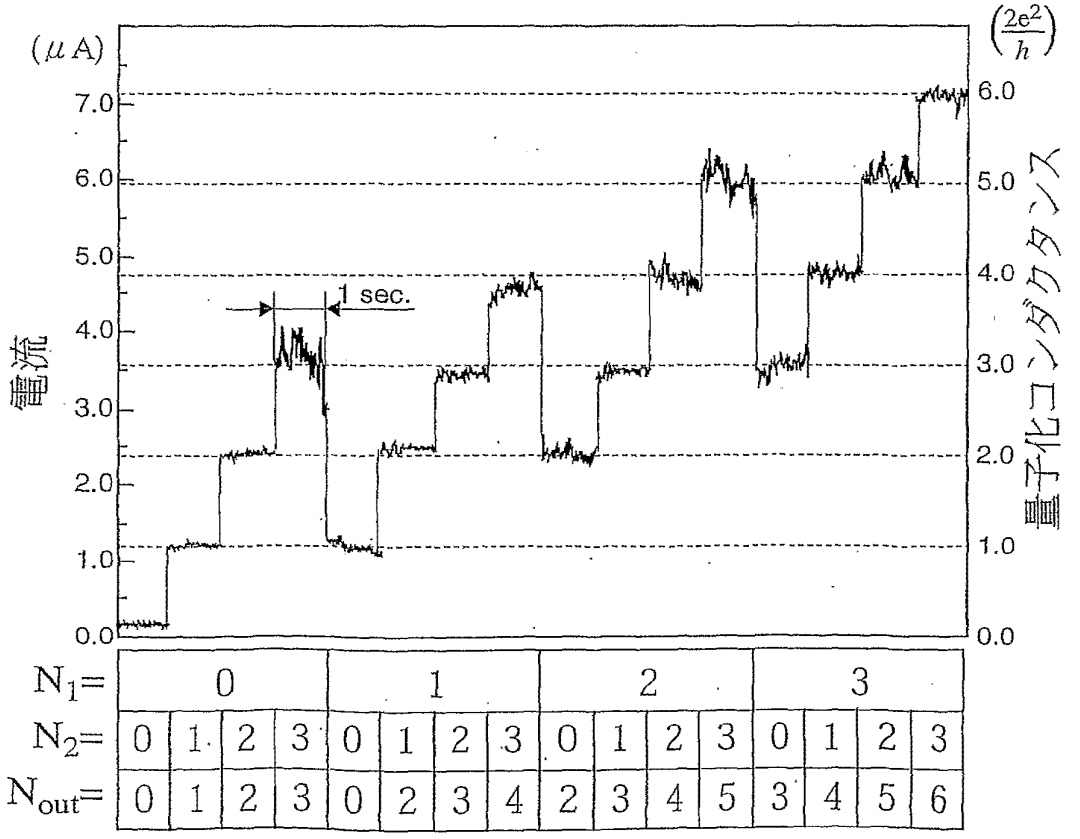


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第 3 図

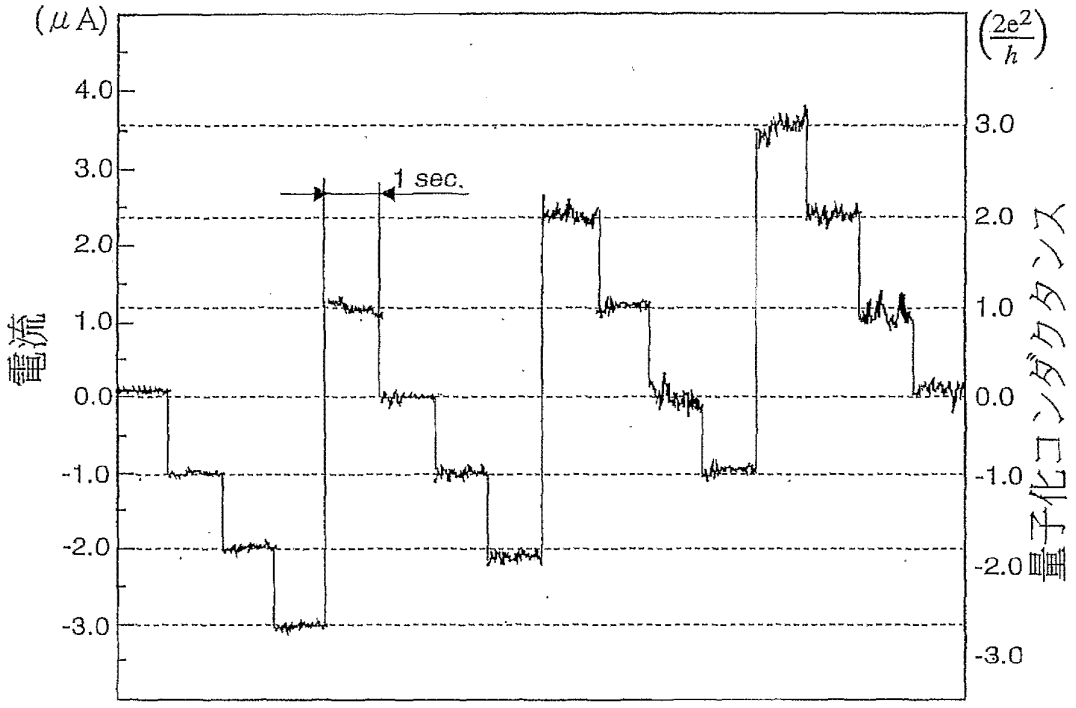


第 4 図



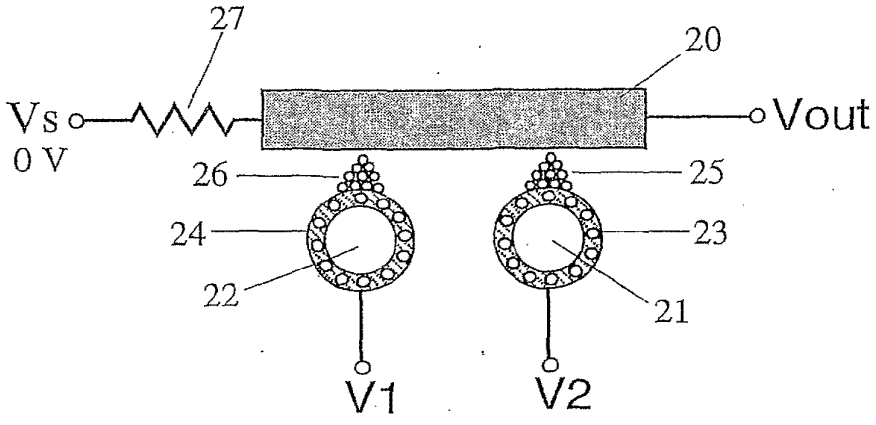
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第 5 図



N_1=	0				1				2				3			
N_2=	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3
N_{out}=	0	-1	-2	-3	1	0	-1	-2	2	1	0	-1	3	2	1	0

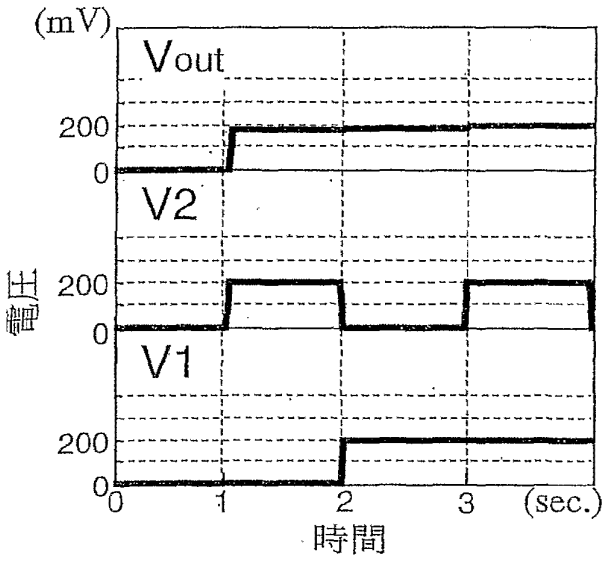
第 6 図



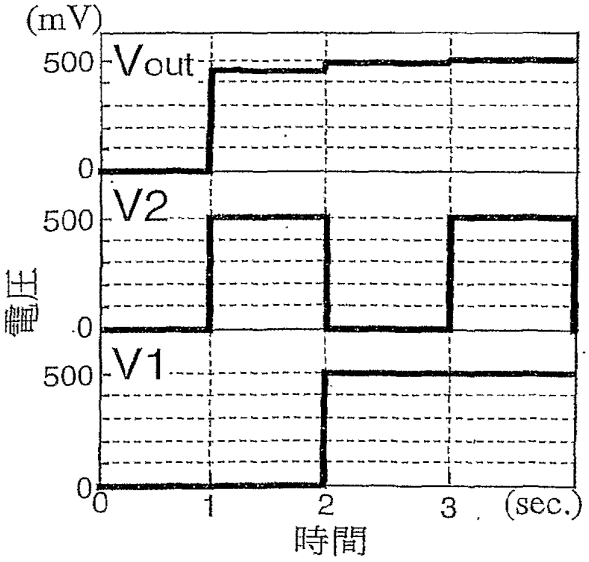
IPR2023-01270 Page 666

第 7 図

(a)

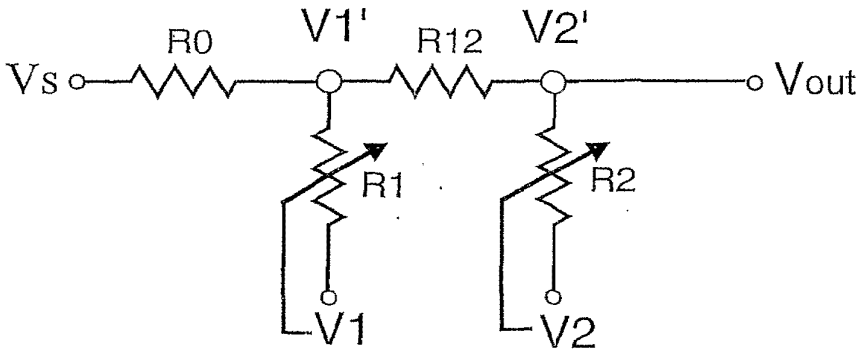


(b)

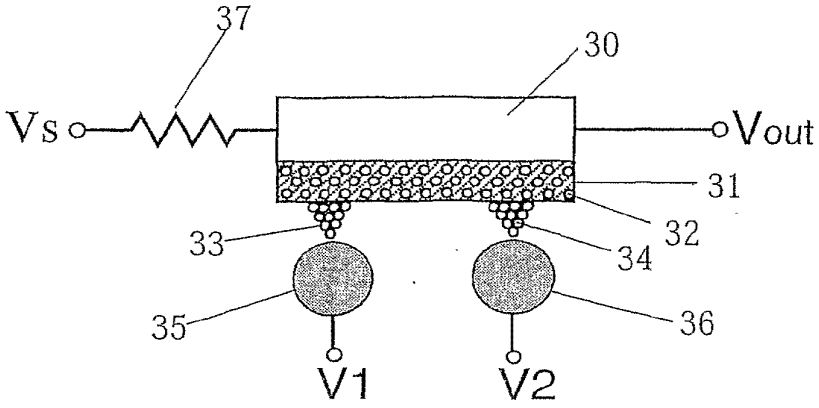


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第 8 図



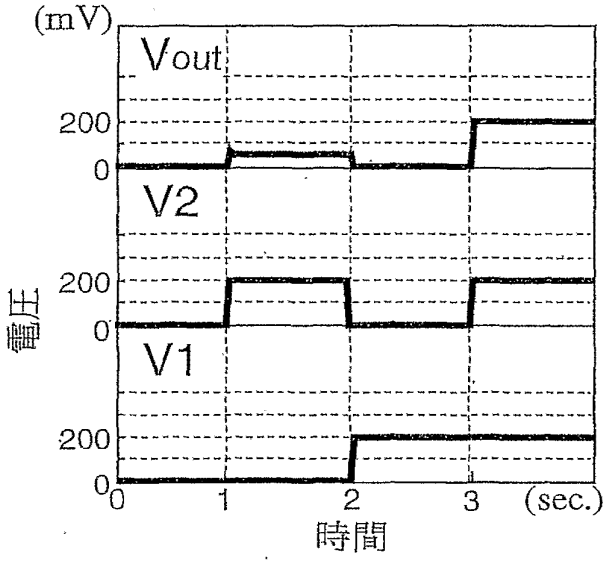
第 9 図



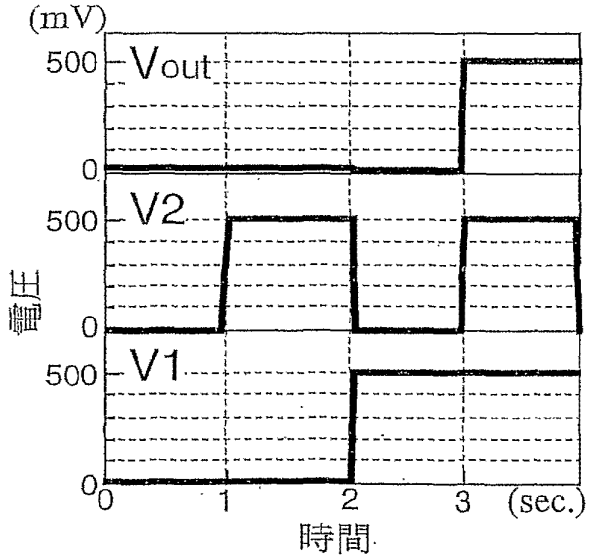
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第 10 図

(a)

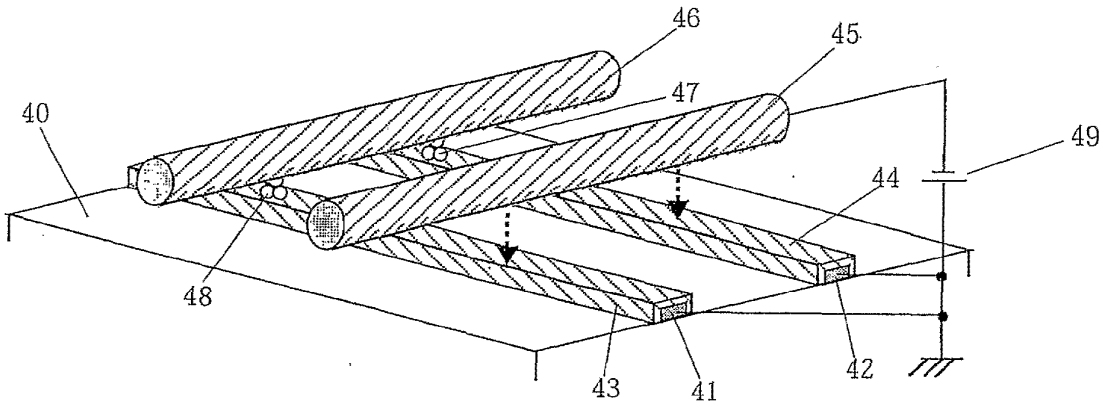


(b)

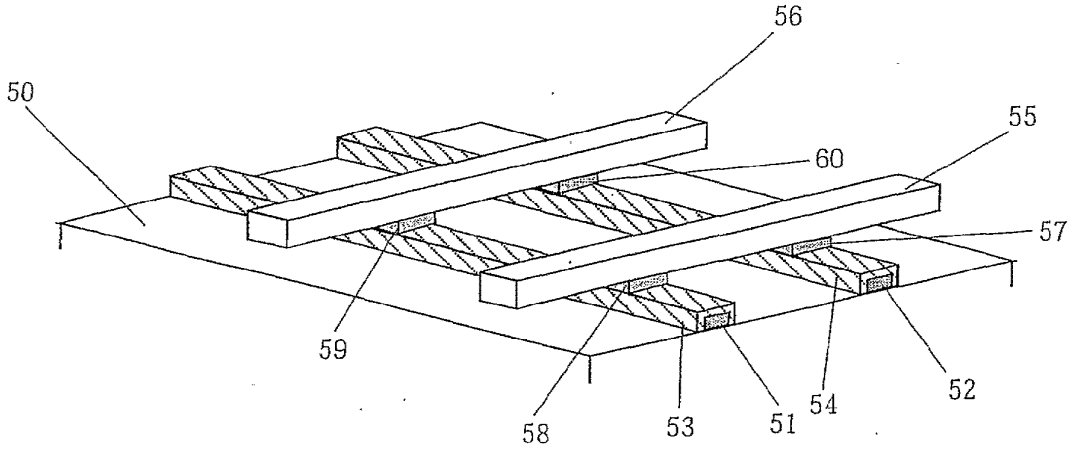


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第 11 図

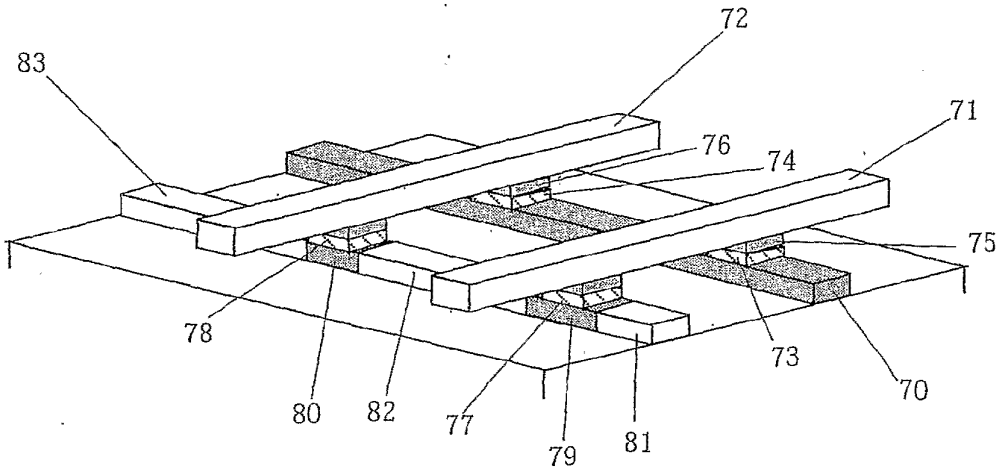


第 12 図

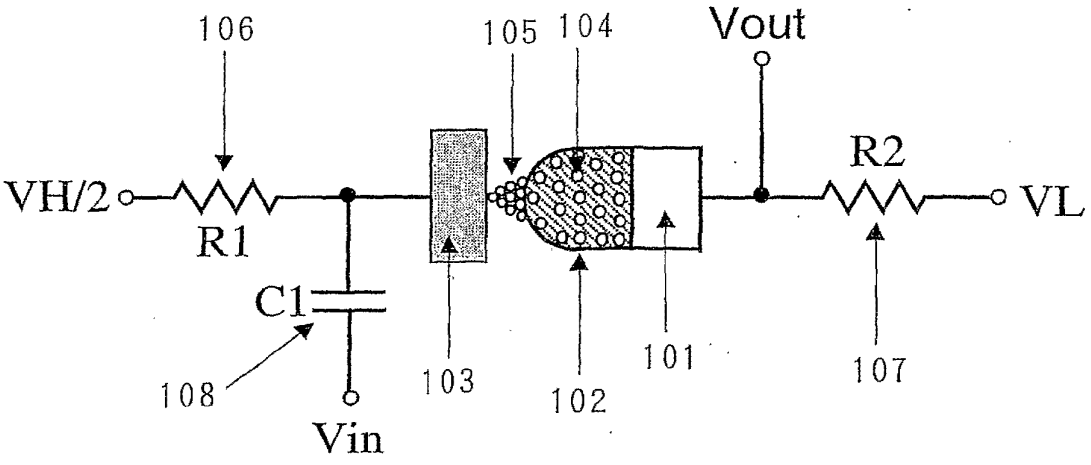


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第 13 図

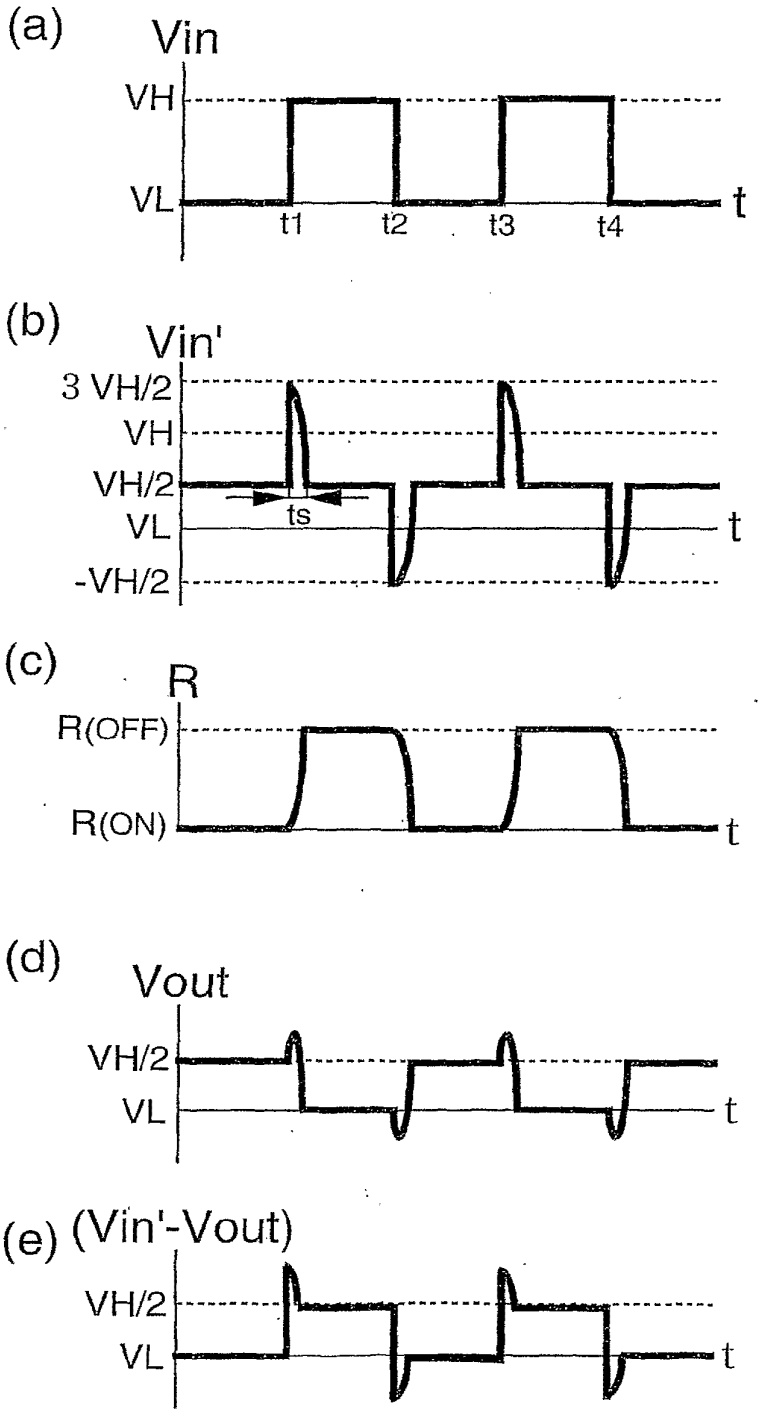


第 14 図



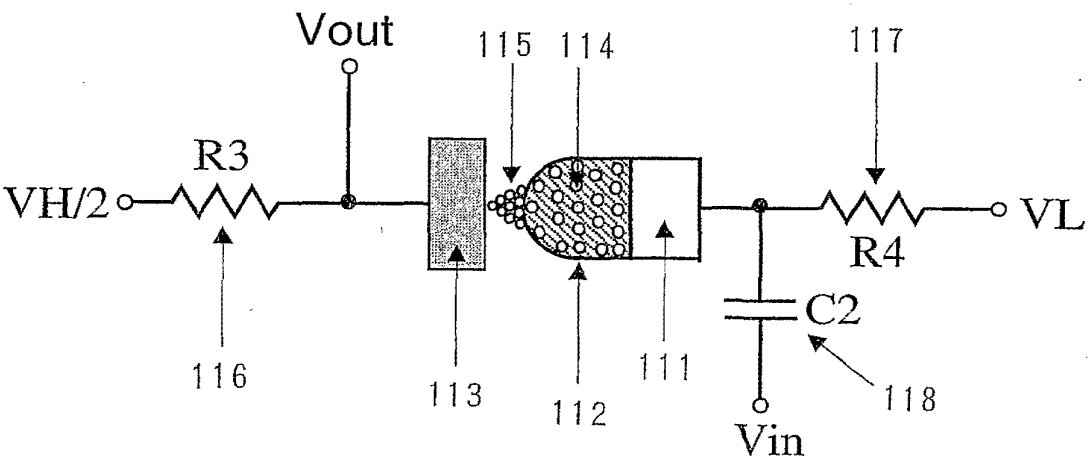
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第 15 図



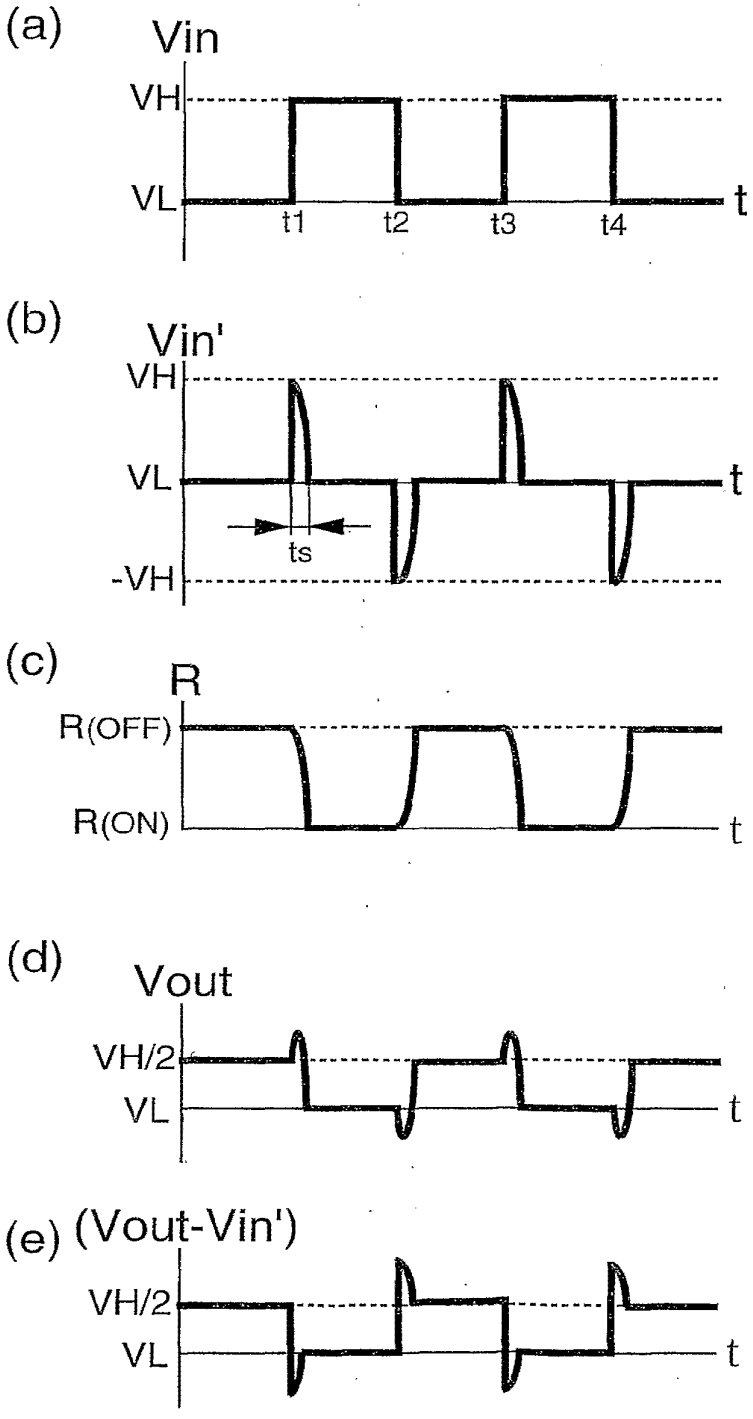
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第 16 図



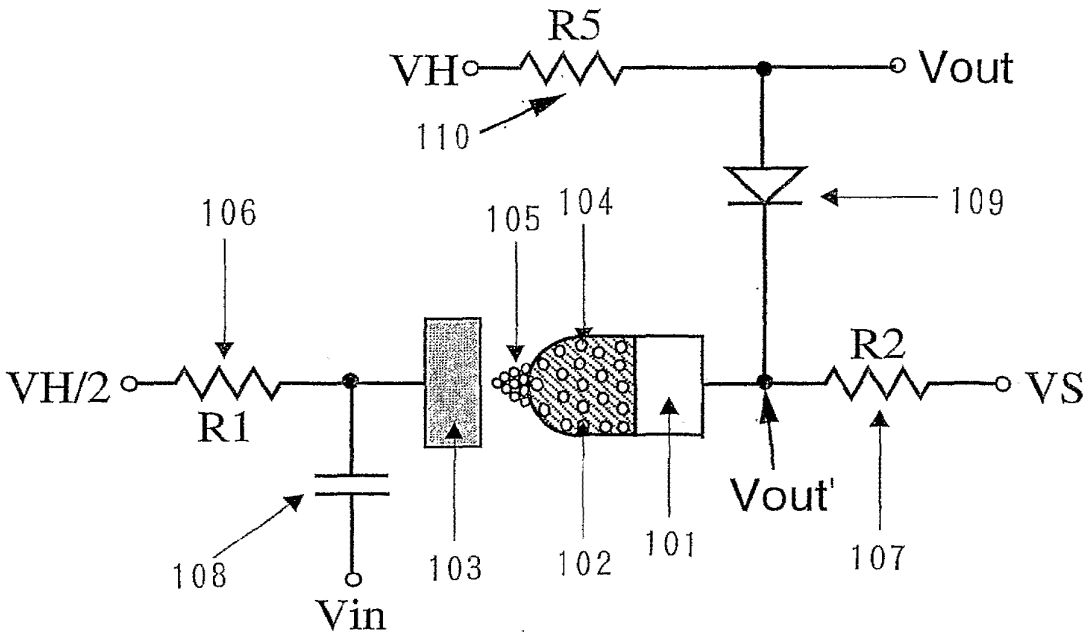
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第 17 図



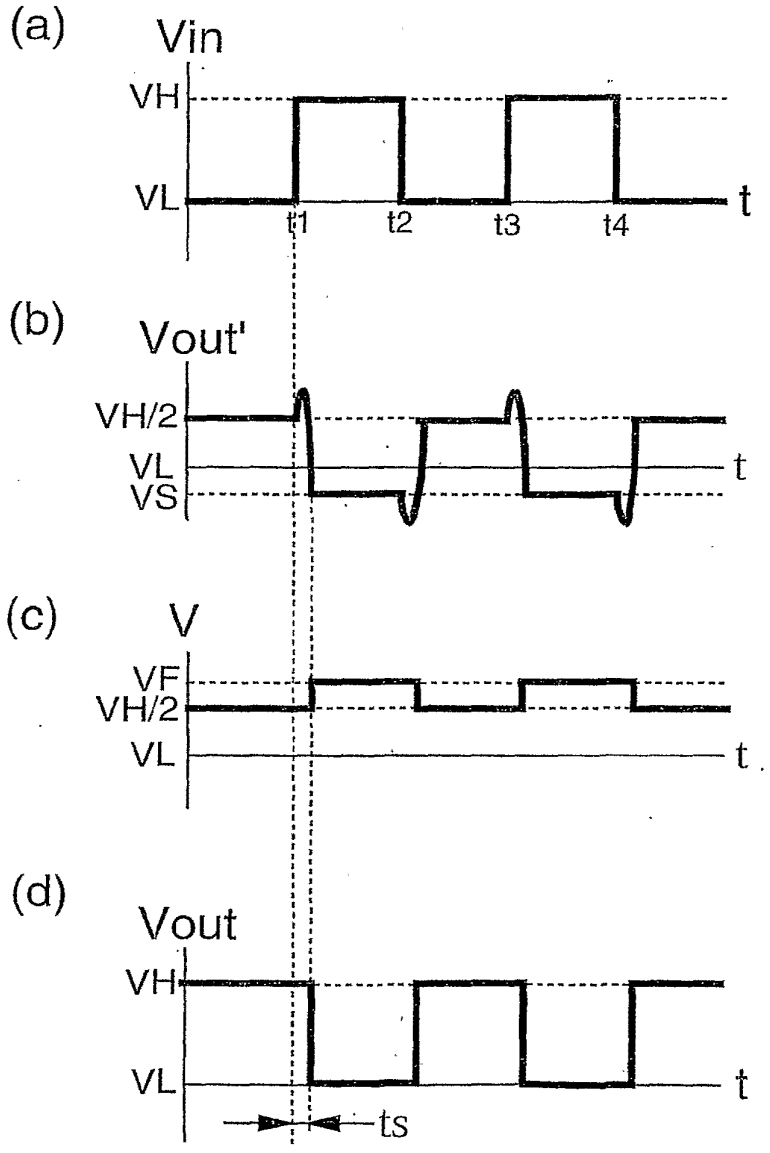
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第 18 図



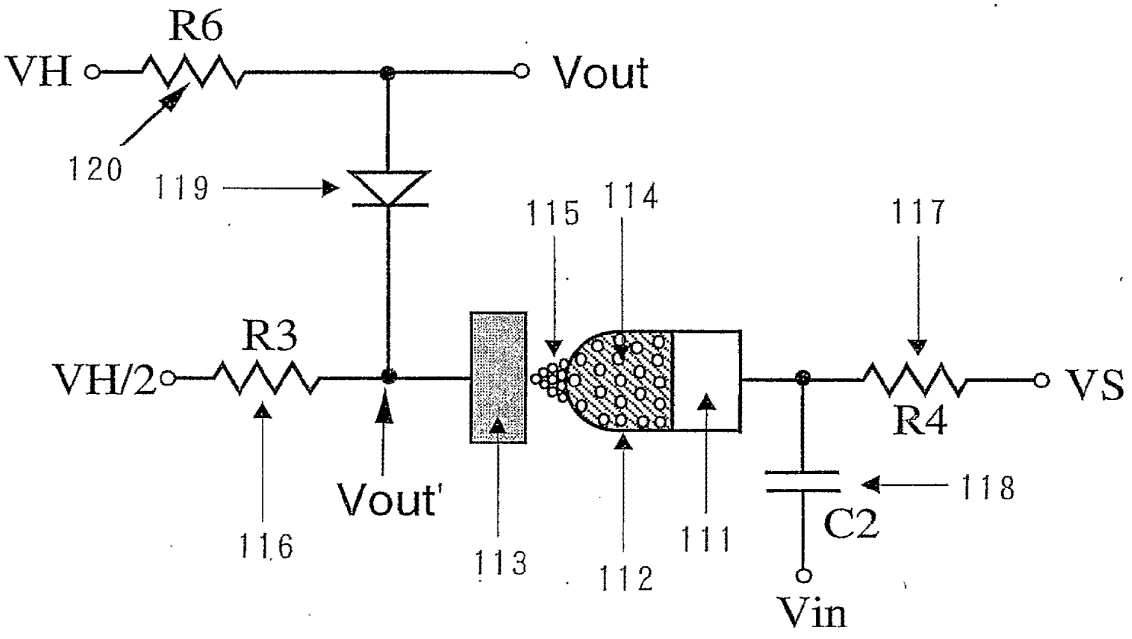
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第 19 図



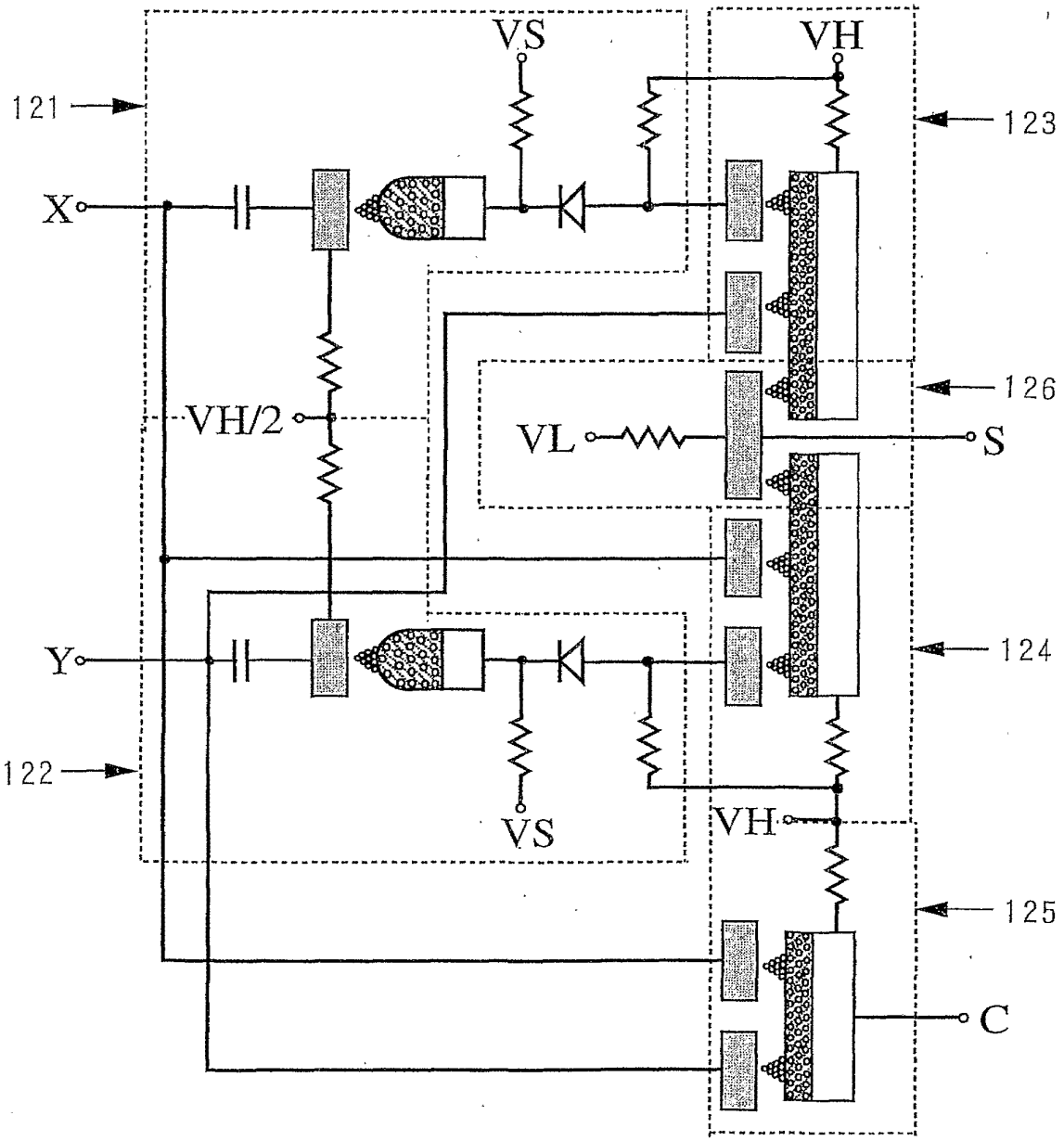
IPR2023-01270 Page 676

第 20 図



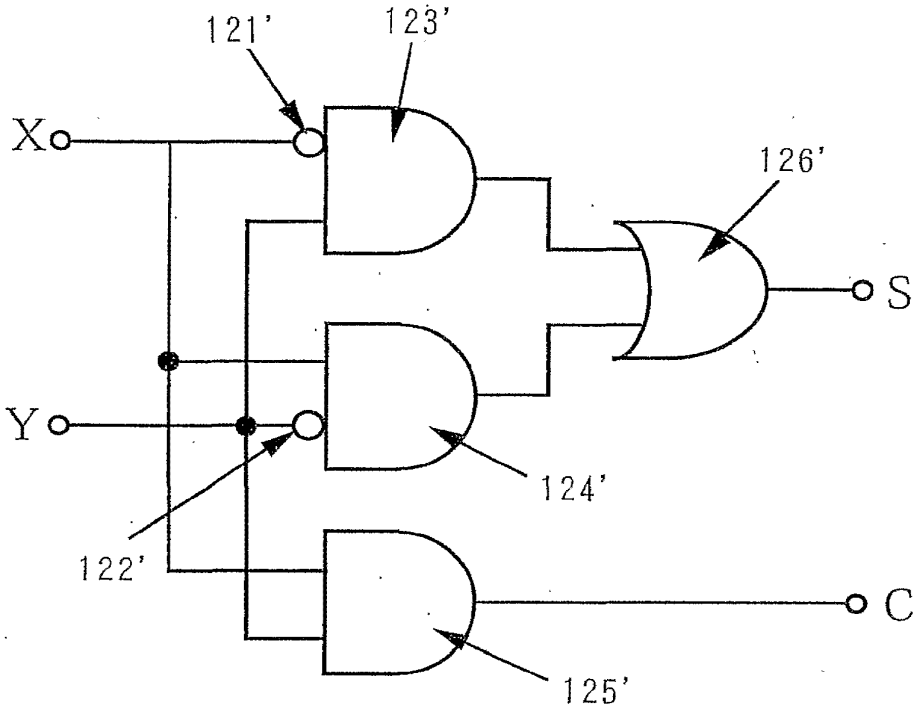
IPR2023-01270 Page 677

第 21 図



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第 22 図



第 23 図

X	Y	S	C
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0	1	1	0
1	0	1	0
1	1	0	1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP01/09464

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] H01L 29/06 H01L29/66

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] H01L 29/06 H01L29/66 H01L 39/22

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Toroku Jitsuyo Shinan Koho 1994-2002
Kokai Jitsuyo Shinan Koho 1971-2002 Jitsuyo Shinan Toroku Koho 1996-2002

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
ISI Web of Science

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 9-326514 A (Fujitsu Limited), 16 December, 1997 (16.12.1997), Par. Nos. [0028]-[0034]; Fig. 1 (Family: none)	12
X	JP 61-230426 A (Agency of Ind. Science & Technogy), 14 October, 1986 (14.10.1986), page 4, lower left column, line 6 to page 5, upper right column, line 11; Fig. 1 (Family: none)	12
A	Costa-Kramer, J.L. et al., Conductance quantization in nanowires formed between micro and macroscopic metallic electrodes. Physical Review B, 15 February, 1997, Vol. 55, No. 8, pages 5416-5424	1-19
A	OHNISHI, H et al., Quantized conductance through individual rows of suspended gold atoms. Nature, 22 October, 1998, Vol. 395, pages 789-783	1-19

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search
21 January, 2002 (21.01.02)

Date of mailing of the international search report
29 January, 2002 (29.01.02)

Name and mailing address of the ISA/
Japanese Patent Office

Facsimile No.

Authorized officer

Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

国際調査報告

国際出願番号　ＰＣＴ／ＪＰ０１／０９４６４

Ａ．　発明の属する分野の分類（国際特許分類（ＩＰＣ））
Int Cl⁷　Ｈ０１Ｌ　２９／０６　Ｈ０１Ｌ２９／６６

Ｂ．　調査を行った分野
調査を行った最小限資料（国際特許分類（ＩＰＣ））
Int Cl⁷　Ｈ０１Ｌ２９／０６　Ｈ０１Ｌ２９／６６　Ｈ０１Ｌ　３９／２２

最小限資料以外の資料で調査を行った分野に含まれるもの
日本国実用新案公報　１９２２－１９９６年
日本国公開実用新案公報　１９７１－２００２年
日本国登録実用新案公報　１９９４－２００２年
日本国実用新案登録公報　１９９６－２００２年

国際調査で使用した電子データベース（データベースの名称、調査に使用した用語）
ＩＳＩ　Ｗｅｂ　ｏｆ　Ｓｃｉｅｎｃｅ

Ｃ．　関連すると認められる文献

引用文献のカテゴリー＊	引用文献名　及び一部の箇所が関連するときは、その関連する箇所の表示	関連する請求の範囲の番号
Ｘ	ＪＰ　９－３２６５１４　Ａ，（富士通株式会社） １９９７．１２．１６， 【００２８】－【００３４】段落，第１図（ファミリーなし）	１２
Ｘ	ＪＰ　６１－２３０４２６　Ａ，（工業技術院長） １９８６．１０．１４， 第４頁左下欄第６行－第５頁右上欄第１１行，第１図 （ファミリーなし）	１２

☒ Ｃ欄の続きにも文献が列挙されている。　☐ パテントファミリーに関する別紙を参照。

＊　引用文献のカテゴリー
「Ａ」特に関連のある文献ではなく、一般的技術水準を示すもの
「Ｅ」国際出願日前の出願または特許であるが、国際出願日以後に公表されたもの
「Ｌ」優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献（理由を付す）
「Ｏ」口頭による開示、使用、展示等に言及する文献
「Ｐ」国際出願日前で、かつ優先権の主張の基礎となる出願の日の後に公表された文献
「Ｔ」国際出願日又は優先日後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの
「Ｘ」特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの
「Ｙ」特に関連のある文献であって、当該文献と他の１以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの
「＆」同一パテントファミリー文献

国際調査を完了した日　２１．０１．０２

国際調査報告の発送日　29.01.02

国際調査機関の名称及びあて先
日本国特許庁（ＩＳＡ／ＪＰ）
郵便番号１００－８９１５
東京都千代田区霞が関三丁目４番３号

特許庁審査官（権限のある職員）　4M　9634
小川　将之

電話番号　０３－３５８１－１１０１　内線　３４６１

様式ＰＣＴ／ＩＳＡ／２１０（第２ページ）（１９９８年７月）

Ｃ（続き）．　関連すると認められる文献

引用文献のカテゴリー＊	引用文献名　及び一部の箇所が関連するときは、その関連する箇所の表示	関連する請求の範囲の番号
A	Costa-Kramer, J. L. et. al. Conductance quantization in nanowires formed between micro and macroscopic metallic electrodes. Physical Review B, 15 February 1997, vol. 55, no. 8, p. 5416-5424	１－１９
A	Ohnishi, H et. al. Quantized conductance through individual rows of suspended gold atoms. Nature, 22 October 1998, vol. 395, p. 789-783	１－１９

IPR2023-01270 Page 682

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Zhang et al.
Application No.:	14/869,313
Confirmation No.:	1070
Filed:	September 29, 2015
For:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
Group:	2466
Examiner:	Brian S. Roberts

Our File:	SIG-2-0674US06
Date:	November 23, 2016

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB/08a. Copies of the newly cited documents are enclosed.

Pursuant to 37 C.F.R. §1.98(a)(2)(ii), copies of the cited U.S. publications and/or patent documents have not been included.

This Application is a continuation of U.S. Patent Application No. 13/908,242, which was filed June 3, 2013, which issued December 15, 2015 as U.S. Patent No. 9,215,636, which is a continuation of U.S. Patent Application No. 13/308,950, filed December 1, 2011, which issued June 4, 2013 as U.S. Patent No. 8,457,072, which is a continuation of U.S. Patent Application No. 11/434,330, filed May 15, 2006, which

issued March 6, 2012 as U.S. Patent No. 8,130,720, which is a continuation of U.S. Patent Application No. 10/962,720, filed October 12, 2004, which issued May 16, 2006 as U.S. Patent No. 7,046,648, which claims priority from Provisional Application No. 60/578,674, filed June 10, 2004, Provisional Application No. 60/520,692, filed November 17, 2003, Provisional Application No. 60/519,990, filed November 14, 2003, and Provisional Application No. 60/517,656, filed November 5, 2003.

Applicants would like to bring the following Applications to the Examiner's attention: U.S. Patent Application No. 13/236,133, filed September 19, 2011, which issued on September 6, 2016 as U.S. Patent No. 9,438,381; U.S. Patent Application No. 10/925,426, filed August 25, 2004, which issued September 20, 2011 as U.S. Patent No. 8,023,463; Provisional Application No. 60/585,174, filed July 2, 2004; Provisional Application No. 60/520,207, filed November 14, 2003; Provisional Application No. 60/508,797, filed October 3, 2003; Provisional Application No. 60/507,554, filed October 1, 2003; and Provisional Application No. 60/497,747, filed August 25, 2003.

This Supplemental Information Disclosure Statement is being filed after the filing of a Request for Continued Examination (RCE) submitted on September 26, 2016, therefore no fee is believed due. If any additional fees are required, the Commissioner is authorized to charge any fees due or credit any overpayment to Volpe and Koenig's Deposit Account No. 22-0493.

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the PTO Form SB/08a indicating consideration of the cited materials.

Respectfully submitted,

SIGNAL TRUST FOR WIRELESS INNOVATION

By /Abhik A. Huq/
Abhik A. Huq
Registration No. 40,656

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United Plaza
30 South 17th Street
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Telephone: (215) 568-6400
Facsimile: (215) 568-6499

AAH/srp

Enclosures (3)

Electronic Acknowledgement Receipt

EFS ID:	27604244
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Sheila de Padilla
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	23-NOV-2016
Filing Date:	29-SEP-2015
Time Stamp:	14:48:59
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SIG_2_0674US06_IDS_SB08a_20161123_EFS.PDF	1035369 7e419a785c31c74e813b26566dd96b5d478d8ffc	no	4

Warnings:

Information:					
2	Foreign Reference	WO0237572A1_corresponds_to_US7026911.PDF	1952612 69990a9253558e9d859d0b24bc450b961d12afdd	no	45
Warnings:					
Information:					
3	Non Patent Literature	NPL_PANASONIC_HARQ_Operation_R1_030802_2003.PDF	296970 8587ca20c6a5f9f581085ca0ebc293cf962291 3c	no	4
Warnings:					
Information:					
4	Transmittal Letter	SIG_2_0674US06_IDS_Letter_20161123_EFS.PDF	61033 b27c05c968fee1b5b01ff75bcc94e93176ee894f	no	3
Warnings:					
Information:					
		Total Files Size (in bytes):	3345984		

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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6850771	B2	2005-02-01	Malladi et al.	
	2	7428424	B2	2008-09-23	Hwang et al.	
	3	9348381	B2	2016-09-06	Dick et al.	

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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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If you wish to add additional U.S. Published Application citation information please click the Add button. Add

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14869313
	Filing Date	2015-09-29
	First Named Inventor	Guodong Zhang
	Art Unit	2466
	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	ETSI, UMTS XX.15 V0.3.0 1999-01 UTRA Handover, 21 pp.	

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2017-01-10
Name/Print	Abhik A. Huq	Registration Number	40656

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

Electronic Acknowledgement Receipt

EFS ID:	28027792
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Sheila de Padilla
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	10-JAN-2017
Filing Date:	29-SEP-2015
Time Stamp:	19:19:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	SIG_2_0674US06_SIDS_Transmittal_20170110_EFS.PDF	740176 4d33e7295ecc768b0f0b1d40c1bad4226cc5c0a2	no	3

Warnings:

Information:					
2	Non Patent Literature	NPL_ETSI_UMTS_XX_15_V0_3_0_1999_UTRA_Handover_EFS.PDF	277806 cecdda596ae1c2b3d1961f0ba8067e4642c98e3a	no	21
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	SIG_2_0674US06_IDS_SB08a_20170110_EFS.PDF	1035253 d1065d9bf664f84b2b12f19161ee2941b2740a26	no	4
Warnings:					
Information:					
			Total Files Size (in bytes):	2053235	

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New Applications Under 35 U.S.C. 111

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New International Application Filed with the USPTO as a Receiving Office

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Zhang et al.
Application No.:	14/869,313
Confirmation No.:	1070
Filed:	September 29, 2015
For:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
Group:	2466
Examiner:	Brian S. Roberts

Our File: SIG-2-0674US06

Date: January 10, 2017

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

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This Application is a continuation of U.S. Patent Application No. 13/908,242, which was filed June 3, 2013, which issued December 15, 2015 as U.S. Patent No. 9,215,636, which is a continuation of U.S. Patent Application No. 13/308,950, filed December 1, 2011, which issued June 4, 2013 as U.S. Patent No. 8,457,072, which is a continuation of U.S. Patent Application No. 11/434,330, filed May 15, 2006, which

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Applicants would like to bring the following Applications to the Examiner's attention: U.S. Patent Application No. 15/212,402 filed July 18, 2016 and U.S. Patent Application No. 15/212,403, filed July 18, 2016, both of which are continuations of U.S. Patent Application No. 13/236,133, filed September 19, 2011, which issued on September 6, 2016 as U.S. Patent No. 9,438,381; U.S. Patent Application No. 10/925,426, filed August 25, 2004, which issued September 20, 2011 as U.S. Patent No. 8,023,463; Provisional Application No. 60/585,174, filed July 2, 2004; Provisional Application No. 60/520,207, filed November 14, 2003; Provisional Application No. 60/508,797, filed October 3, 2003; Provisional Application No. 60/507,554, filed October 1, 2003; and Provisional Application No. 60/497,747, filed August 25, 2003.

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It is respectfully requested that the Examiner consider these documents and return an initialed copy of the PTO Form SB/08a indicating consideration of the cited materials.

Respectfully submitted,

SIGNAL TRUST FOR WIRELESS INNOVATION

By /Abhik A. Huq/
Abhik A. Huq
Registration No. 40,656

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
Philadelphia, PA 19103
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

AAH/srp
Enclosures (2)

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020115460	A1	2002-08-22	Rune et al.	
	2	20020172208	A1	2002-11-21	Malkamaki, Esa	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

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First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

CERTIFICATION STATEMENT

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OR

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

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2017-01-12
Name/Print	Abhik A. Huq	Registration Number	40656

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Zhang et al.
Application No.:	14/869,313
Confirmation No.:	1070
Filed:	September 29, 2015
For:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
Group:	2466
Examiner:	Brian S. Roberts

Our File:	SIG-2-0674US06
Date:	January 12, 2017

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB/08a. Pursuant to 37 C.F.R. §1.98(a)(2)(ii), copies of the cited U.S. publications and/or patent documents have not been included.

This Application is a continuation of U.S. Patent Application No. 13/908,242, which was filed June 3, 2013, which issued December 15, 2015 as U.S. Patent No. 9,215,636, which is a continuation of U.S. Patent Application No. 13/308,950, filed December 1, 2011, which issued June 4, 2013 as U.S. Patent No. 8,457,072, which is a continuation of U.S. Patent Application No. 11/434,330, filed May 15, 2006, which issued March 6, 2012 as U.S. Patent No. 8,130,720, which is a continuation of U.S.

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

Applicants would like to bring the following Applications to the Examiner's attention: U.S. Patent Application No. 15/212,402 filed July 18, 2016 and U.S. Patent Application No. 15/212,403, filed July 18, 2016, both of which are continuations of U.S. Patent Application No. 13/236,133, filed September 19, 2011, which issued on September 6, 2016 as U.S. Patent No. 9,438,381; U.S. Patent Application No. 10/925,426, filed August 25, 2004, which issued September 20, 2011 as U.S. Patent No. 8,023,463; Provisional Application No. 60/585,174, filed July 2, 2004; Provisional Application No. 60/520,207, filed November 14, 2003; Provisional Application No. 60/508,797, filed October 3, 2003; Provisional Application No. 60/507,554, filed October 1, 2003; and Provisional Application No. 60/497,747, filed August 25, 2003.

This Supplemental Information Disclosure Statement is being filed after the filing of a Request for Continued Examination (RCE) submitted on September 26, 2016, therefore no fee is believed due. If any additional fees are required, the Commissioner is authorized to charge any fees due or credit any overpayment to Volpe and Koenig's Deposit Account No. 22-0493.

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the PTO Form SB/08a indicating consideration of the cited materials.

Respectfully submitted,

SIGNAL TRUST FOR WIRELESS INNOVATION

By /Abhik A. Huq/
Abhik A. Huq
Registration No. 40,656

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
Philadelphia, PA 19103
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

AAH/srp
Enclosure:

Electronic Acknowledgement Receipt

EFS ID:	28049154
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Sheila sheila
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	12-JAN-2017
Filing Date:	29-SEP-2015
Time Stamp:	17:06:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SIG_2_0674US06_IDS_SB08a_20170112_EFS.PDF	1035199 6a5d935b130a4689392c1100ec186ec54e70668b	no	4

Warnings:

Information:					
2	Transmittal Letter	SIG_2_0674US06_IDS_Letter_20170112_EFS.PDF	67519 83c3d96649d9a86b4804e523a875dddc0cf94861	no	3
Warnings:					
Information:					
			Total Files Size (in bytes):	1102718	

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Zhang et al.
Application No.:	14/869,313
Confirmation No.:	1070
Filed:	September 29, 2015
For:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
Group:	2466
Examiner:	Brian S. Roberts

Our File: SIG-2-0674US06

Date: February 10, 2017

COMMUNICATION TO OFFICE OF PETITIONS
REGARDING FAILURE TO CORRECTLY PROCESS
e-PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c) ("THE PETITION")
and
REQUEST TO GRANT THE PETITION FILED ON SEPTEMBER 26, 2016 AND WITHDRAW THE APPLICATION FROM ISSUE

Mail Stop – OFFICE OF PETITIONS
Attention: Jacob Betit, Deputy Director Office of Petitions
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant submits this Communication to the Office of Petitions because an electronic Petition to Withdraw An Application From Issue After Payment of the Issue Fee Under 37 CFR 1.313(c) ("the Petition) which was filed on September 26, 2016 along with an Request for Continued Examination (RCE) and Supplemental Information Disclosure Statement (SIDS), was not processed correctly, and therefore did not automatically generate a Decision on Petition, Petition Granted letter, and therefore this application was not withdrawn from issue as requested, and therefore the, Preliminary Amendments and Supplemental Information

Disclosure Statements filed were not considered and entered, and the Application erroneously proceeded to issue on October 4, 2016.

It appears the failure to properly process the Petition and timely withdraw the application from issue was due to U.S. Patent & Trademark, EFS electronic technical errors or technical difficulties. The facts of the events are as follows:

1. On **September 26, 2016** the following documents were electronically filed via EFS-Web:
    1. Electronic Petition to Withdraw an Application From Issue After Payment of the Issue Fee Under 37 CFR 1.313(c) for consideration of a request for continued examination (RCE);
    2. Request for Continued Examination (RCE);
    3. Information Disclosure Statement Form SB08a;
    4. Transmittal Letter for Information Disclosure Statement;
    5. Foreign References (5); and
    6. Fees for Petition and RCE were paid.

2. After submission of the documents in EFS-Web and the payment was completed on September 26, 2016, my assistant, Gina Ordonez, tried to save the Electronic Acknowledgement Receipt, but instead got an "ACROBAT" error message, indicating that due to an ACROBAT technical issue, a "pdf" could not be generated. She was unable to obtain the Electronic Acknowledgement Receipt which would have automatically included the Decision on Petition letter.

3. On September 26, 2016, my assistant Gina Ordonez called the U.S. Patent and Trademark office and spoke to a representative ("Rep."). Ms. Ordonez informed the Rep. that she did not get the Electronic Acknowledgement Receipt because of the Acrobat error, and needed a receipt for the Petition

and documents just filed. Ms. Ordonez had to find the EFS Identification number of the submission in the "View last 40 eFiling Acknowledgement Receipts" which the Rep. needed to locate the filing in the PTO system. After the EFS ID number was provided, the Rep confirmed that the file Wrapper included the entry "Petition automatically granted by EFS" on September 26, 2016. The Rep. informed Ms. Ordonez that an Efiling Acknowledgement Receipt would be generated and should show up in the FileWrapper sometime in the next few days. Upon checking the FileWrapper a few days later, it was still missing. Ms. Ordonez called the Patent office again and was told to wait for it.

4. Based on what Ms. Ordonez was told by the representatives at the Patent Office in two (2) separate phone calls in September 2016, and the fact that the entry "*Petition automatically granted by EFS*" was listed in the FileWrapper on September 26, 2016, and because an RCE had also been filed, we believed that the Petition to Withdraw from issue had been processed, and we were awaiting an Action from the PTO based on the RCE and Supplemental Information Disclosure Statements which were filed.

5. On **September 26, 2016** "*Workflow – Request for RCE – Begin*" was listed in the Transaction history.

6. On **September 26, 2016** "*Information Disclosure Statement (IDS) Filed*" was listed in the transaction history.

7. On **October 4, 2016** – "*Recordation of Patent Grant Mailed*" was listed in the Transaction history.

8. On October 28, 2016 Applicant filed a Preliminary Amendment.

9. On November 2, 2016 Applicant filed a Second Preliminary Amendment.

10. On November 23, 2016 Applicant filed a Supplemental Information Disclosure Statement.

11. On January 10, 2017, Applicant filed a Supplemental Information Disclosure Statement.

12. On January 12, 2017, Applicant filed a Supplemental Information Disclosure Statement.

13. On February 3, 2017, my assistant Sheila De Padilla called the Patent Office to find out the status of the application. She was referred to the Office of Petitions. She called the Office of Petitions and spoke to a representative, who informed her that she could not find that a Petition to Withdraw Application from Issue had been filed on September 26, 2016 and did not know why it was not processed or completed on their end. Ms. De Padilla pointed out the fact that the FileWrapper lists "Petition automatically granted by EFS" on September 26, 2016. She referred Ms. Padilla to speak with Ms. Gibson in the Office of Petitions, and informed her that Ms. Gibson was not in the office that day but she would leave a message for Ms. Gibson to contact Ms. Padilla.

14. On February 6, 2017, Ms. Padilla called Miss Cheryl Gibson in the Office of Petitions and left a detailed voicemail. Ms. De Padilla also called and left a voicemail for Jacob Betit, Deputy Director Office of Petitions, and requested information and rectification of the error that caused the application to proceed to issue instead of withdrawing it from issue.

15. On February 6, 2017, Ms. Cheryl Gibson called Ms. De Padilla and told her she did not see a Decision on Petition in the PTO records and did not know why the Decision on Petition was not auto generated which would have

initiated the withdrawal from issue procedure on their end. She told Ms. DePadilla to call the Electronic Business Center (EBC) to see if there were any system wide technical difficulty on September 26, 2016 because she did not know why the Petition to Withdraw from issue was not processed or why the letter "Decision on Petition" was not generated. She said it was an electronic function that is supposed to be auto generated and auto granted, therefore there must have been some type of technical problem.

16. On February 6, 2017, Ms. De Padilla called the EBC and spoke to a representative (Rep.) (Ticket no. for the call 1-465733374). The Rep. confirmed that that the PTO records indicated someone had called the EBC on September 26, 2016 to get the Efiling Acknowledgement Receipt/Decision on Petition for the 9/26/2016 filing that included the Petition to Withdraw from Issue. Because the Efiling Acknowledgement Receipt failed to generate, the Decision on Petition Granted also failed to automatically generate. She said someone at the EBC tried to generate the Decision on Petition to grant the petition (withdrawal) but instead it just generated another Efilng Acknowledgement Receipt without the Decision on Petition attached, and that is why there are two (2) Efiling Acknowledgement Receipts on September 26, 2016. The Rep. could not tell Ms. De Padilla why there was no more follow up with getting the Decision auto granted and correctly processed. She said there were not any system wide technical failures that day, so she could not find out what caused the technical error in this application to cause the failure to properly process the Petition to Withdraw from Issue. She only confirmed that it was not auto processed completely on their end. She told Ms. De Padilla to call the Application Assistance Unit (AAU) to find out what happened. Ms. De Padilla called the AAU but they told her they could not help because the Petition was filed after the issue notification was mailed, and therefore the application was no longer in their

hands, and they couldn't give her any information about Ms. Ordonez's original phone calls in September, because they did not take the call.

17. On February 9, 2017, Mr. Jacob Betit, Deputy Director of Office of Petitions, called Ms. De Padilla and left a voicemail message informing her that they were investigating the problem, and confirmed that the Petition to Withdraw from Issue had not been processed correctly. Mr. Betit requested that we file a letter in the file with the facts so they can respond to the letter in order to withdraw the application from issue.

Accordingly, Applicant requests that the electronic Petition to Withdraw An Application From Issue After Payment of the Issue Fee Under 37 CFR 1.313(c) filed on September 26, 2016 be granted, and that the application be withdrawn from issue, and that the RCE, two (2) Preliminary Amendments and four (4) Supplemental Information Disclosure Statements be entered and considered.

A copy of the documents as filed on September 26, 2016 are attached hereto as downloaded from PAIR, which includes the PTO/SB/140 form that was automatically generated from the Electronic Petition Request. In Addition, the Electronic Acknowledgement Receipt shows that item #9 is the *Petition automatically granted by EFS".*

Respectfully submitted,

SIGNAL TRUST FOR WIRELESS INNOVATION

By /Abhik A. Huq/
Abhik A. Huq
Registration No. 40,656

Volpe and Koenig, P.C.
30 South 17th Street, Suite 1800
Philadelphia, PA 19103
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

AAH/srp
Enclosure : COPY of September 26, 2016 as-filed Documents
(w/out Foreign References) and Electronic Acknowledgement Receipt

COPY

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	14869313	Filing Date	2016-09-29	Docket Number (if applicable)	SIG-2-0674US06	Art Unit	2466
First Named Inventor	Guodong Zhang			Examiner Name	Brian S. Roberts		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, to any international application that does not comply with the requirements of 35 U.S.C. 371, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV.

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☐ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☒ Other
Petition to Withdraw An Application from Issue After Payment of the Issue Fee

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 220493

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

Signature of Registered U.S. Patent Practitioner			
Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2016-09-26
Name	Abhik A. Huq	Registration Number	40656

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of: Zhang et al.	Our File: SIG-2-0674US06
Application No.: 14/869,313	Date: September 26, 2016
Confirmation No.:1070	
Filed: September 29, 2015	
For: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER	
Group: 2466	
Examiner: Brian S. Roberts	

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB/08a. Copies of the newly cited documents are enclosed.

Pursuant to 37 C.F.R. §1.98(a)(2)(ii), copies of the cited U.S. publications and/or patent documents have not been included.

This Application is a continuation of U.S. Patent Application No. 13/908,242, which was filed June 3, 2013, which is a continuation of U.S. Patent Application No. 13/308,950, filed December 1, 2011, which issued June 4, 2013 as U.S. Patent No. 8,457,072, which is a continuation of U.S. Patent Application No. 11/434,330, filed May 15, 2006, which issued March 6, 2012 as U.S. Patent No. 8,130,720, which is a

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

Applicants would like to bring the following Applications to the Examiner's attention: U.S. Patent Application No. 13/236,133, filed September 19, 2011; U.S. Patent Application No. 10/925,426, filed August 25, 2004, which issued September 20, 2011 as U.S. Patent No. 8,023,463; Provisional Application No. 60/585,174, filed July 2, 2004; Provisional Application No. 60/520,207, filed November 14, 2003; Provisional Application No. 60/508,797, filed October 3, 2003; Provisional Application No. 60/507,554, filed October 1, 2003; and Provisional Application No. 60/497,747, filed August 25, 2003.

Pursuant to 37 C.F.R. § 1.704(d), the undersigned certifies that each new item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application, and that this communication was not received by any individual designated in § 1.56(c) more than thirty (30) days prior to the filing of this Information Disclosure Statement.

Copies of the communications, i.e. an Office Action in corresponding Taiwan Patent Application No.: 104139614 mailed August 25, 2016, and corresponding U.S.

Patent Application No. 15/212,402 mailed September 20, 2016, are submitted herewith.

This Supplemental Information Disclosure Statement is being filed after issue of patent along with Request for Continued Examination Transmittal and Petition to Withdraw an Application from Issue after Payment of the Issue Fee.

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the PTO Form SB/08a indicating consideration of the cited materials.

Respectfully submitted,

Signal Trust for Wireless Innovation

By /Abhik A. Huq/
Abhik A. Huq
Registration No. 40,656

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
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Telephone: (215) 568-6400
Facsimile: (215) 568-6499

AAH/gvo
Enclosure

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6650905	B1	2003-11-18	Toskala et al.	
	2	6754496	B2	2004-06-22	Mohebbi et al.	
	3	6977888	B1	2005-12-20	Frenger et al.	Corresponds to TW536896B
	4	7065359	B2	2006-06-20	Chuah et al.	
	5	7185256	B2	2007-02-27	Miki et al.	Corresponds to JP2002-009741A
	6	7848290	B2	2010-12-07	Cheng et al.	

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U.S.PATENT APPLICATION PUBLICATIONS

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

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	Attorney Docket Number	SIG-2-0674US06

	1	20030176195	A1	2003-09-18	Dick et al.	Corresponds to TW200303689A
	2	20060274712	A1	2006-12-07	Malladi et al.	

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FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2002-009741	JP	A	2002-01-11	NTT DOCOMO, INC.	Corresponds to US7,185,256B2	☐
	2	2007-511135	JP	A	2007-04-26	INTERDIGITAL TECHNOLOGY CORPORATION	Corresponds to WO2005/048503A2	☐
	3	536896	TW	B	2003-06-11	TELEFONAKTIEBOLAG ET L M ERICSSON	Corresponds to US6,977,888B1	☐
	4	200303689	TW	A	2003-09-01	INTERDIGITAL TECHNOLOGY CORPORATION	Corresponds to US2003/0176195A1	☐
	5	2005/048503	WO	A2	2005-05-26	INTERDIGITAL TECHNOLOGY CORPORATION	Corresponds to JP2007-511135A	☐

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

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	Application Number	14869313
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	Attorney Docket Number	SIG-2-0674US06

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

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CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2016-09-26
Name/Print	Abhik A. Huq	Registration Number	40,656

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

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

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

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

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

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

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

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

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

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

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

Doc Code: PET.AUTO Document Description: Petition automatically granted by EFS-Web	PTO/SB/140 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)**
Application Number	14869313
Filing Date	29-Sep-2015
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	BRIAN ROBERTS
Attorney Docket Number	SIG-2-0674US06
Title	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER

An application may be withdrawn from issue for further action upon petition by the applicant. To request that the Office withdraw an application from issue, applicant must file a petition under this section including the fee set forth in § 1.17(h) and a showing of good and sufficient reasons why withdrawal of the application from issue is necessary.

APPLICANT HEREBY PETITIONS TO WITHDRAW THIS APPLICATION FROM ISSUE UNDER 37 CFR 1.313(c).

A grantable petition requires the following items:
(1) Petition fee; and
(2) One of the following reasons:
(a) Unpatentability of one or more claims, which must be accompanied by an unequivocal statement that one or more claims are unpatentable, an amendment to such claim or claims, and an explanation as to how the amendment causes such claim or claims to be patentable;
(b) Consideration of a request for continued examination in compliance with § 1.114 (for a utility or plant application only); or
(c) Express abandonment of the application. Such express abandonment may be in favor of a continuing application, but not a CPA under 37 CFR 1.53(d).

Petition Fee

○	Small Entity
○	Micro Entity
◉	Regular Undiscounted

Reason for withdrawal from issue

○ One or more claims are unpatentable ◉ Consideration of a request for continued examination (RCE) (List of Required Documents and Fees) ○ Applicant hereby expressly abandons the instant application (any attorney/agent signing for this reason must have power of attorney pursuant to 37 CFR 1.32(b)).	
RCE request,submission, and fee. ☐ I certify, in accordance with 37 CFR 1.4(d)(4) that : The RCE request ,submission, and fee have already been filed in the above-identified application on ☒ Are attached.	
THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES I certify, in accordance with 37 CFR 1.4(d)(4) that I am: ◉ An attorney or agent registered to practice before the Patent and Trademark Office who has been given power of attorney in this application. ○ An attorney or agent registered to practice before the Patent and Trademark Office, acting in a representative capacity. ○ A sole inventor ○ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application ○ A joint inventor; all of whom are signing this e-petition	
Signature	/Abhik A. Huq/
Name	Abhik A. Huq
Registration Number	40656

Electronic Patent Application Fee Transmittal

Application Number:	14869313
Filing Date:	29-Sep-2015
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Filer:	Abhik A. Huq/Gina Ordonez
Attorney Docket Number:	SIG-2-0674US06

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
PETITION FEE- 37 CFR 1.17(H) (GROUP III)	1464	1	140	140
RCE- 1st Request	1801	1	1200	1200
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1340**

Electronic Acknowledgement Receipt

EFS ID:	27028693
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Gina Ordonez
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	26-SEP-2016
Filing Date:	29-SEP-2015
Time Stamp:	17:11:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1340
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Deposit Account	
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The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	SIG_2_0674US06_RCE_20160926.pdf	88244 0bc7094132e0aa5182f515bd4483c162699e09aa	no	3
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
2	Transmittal Letter	SIG_2_0674US06_IDS_Transmittal_Ltr_20160926.pdf	56366 9ccd5cd07286c6065dc0fbee55bd889b3ee5de61	no	3
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	SIG_2_0674US06_IDS_20160926.pdf	74529 4ccbf921db8e937b5c3e133e40dba80c53e3ca7e	no	5
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Other Reference-Patent/App/Search documents	JP2002009741A.pdf	776857 e45264530a1ec6fe3d7179c6df681e0e85cb57b4	no	22
Warnings:					
Information:					
5	Other Reference-Patent/App/Search documents	JP2007511135A.pdf	608319 e17bbba3044e184f7c43bece2371f839b3f3874c	no	16
Warnings:					
Information:					
6	Other Reference-Patent/App/Search documents	TW536896B.pdf	3428460 3426d1db8808a4322811a72ed532ca1eb22e359c	no	39

Warnings:					
Information:					
7	Other Reference-Patent/App/Search documents	TW200303689A.pdf	1904598 52e0f8e6b469932273e0ac72fad5a2107221fe16	no	23
Warnings:					
Information:					
8	Other Reference-Patent/App/Search documents	WO2005048503A2.pdf	1090932 fd78e1a746e9efec410f3140a638ef8ca2b570a1	no	24
Warnings:					
Information:					
9	Petition automatically granted by EFS	petition-request.pdf	31623 1bff4c1425713977be68b291b10174cd0a2f2f81	no	2
Warnings:					
Information:					
10	Fee Worksheet (SB06)	fee-info.pdf	32267 36edaec392805630248a9d182b9f8501a6a182fa	no	2
Warnings:					
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			Total Files Size (in bytes):	8092195	

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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.

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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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Electronic Acknowledgement Receipt

EFS ID:	28327777
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Sheila de Padilla
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	10-FEB-2017
Filing Date:	29-SEP-2015
Time Stamp:	16:54:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	SIG_2_0674US06_Letter_to_Office_of_Petitions_20170210_EFS.PDF	2176820 3b8976db577a0c599d7488269ea61be57e6e1dce	no	25

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PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
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Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	7283782		2007-10-16	Sinnarajah et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

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Examiner Signature		Date Considered	

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

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Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2017-02-15
Name/Print	Abhik A. Huq	Registration Number	40,656

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

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

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

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

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

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

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

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Zhang et al.
Application No.:	14/869,313
Confirmation No.:	1070
Filed:	September 29, 2015
For:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
Group:	2466
Examiner:	Brian S. Roberts

Our File:	SIG-2-0674US06
Date:	February 15, 2017

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB/08a. Pursuant to 37 C.F.R. §1.98(a)(2)(ii), copies of the cited U.S. publications and/or patent documents have not been included.

This Application is a continuation of U.S. Patent Application No. 13/908,242, which was filed June 3, 2013, which issued December 15, 2015 as U.S. Patent No. 9,215,636, which is a continuation of U.S. Patent Application No. 13/308,950, filed December 1, 2011, which issued June 4, 2013 as U.S. Patent No. 8,457,072, which is a continuation of U.S. Patent Application No. 11/434,330, filed May 15, 2006, which issued March 6, 2012 as U.S. Patent No. 8,130,720, which is a continuation of U.S.

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

Applicants would like to bring the following Applications to the Examiner's attention: U.S. Patent Application No. 15/212,402 filed July 18, 2016 and U.S. Patent Application No. 15/212,403, filed July 18, 2016, both of which are continuations of U.S. Patent Application No. 13/236,133, filed September 19, 2011, which issued on September 6, 2016 as U.S. Patent No. 9,438,381; U.S. Patent Application No. 10/925,426, filed August 25, 2004, which issued September 20, 2011 as U.S. Patent No. 8,023,463; Provisional Application No. 60/585,174, filed July 2, 2004; Provisional Application No. 60/520,207, filed November 14, 2003; Provisional Application No. 60/508,797, filed October 3, 2003; Provisional Application No. 60/507,554, filed October 1, 2003; and Provisional Application No. 60/497,747, filed August 25, 2003.

This Supplemental Information Disclosure Statement is being filed after the filing of a Request for Continued Examination (RCE) submitted on September 26, 2016, therefore no fee is believed due. If any additional fees are required, the Commissioner is authorized to charge any fees due or credit any overpayment to Volpe and Koenig's Deposit Account No. 22-0493.

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the PTO Form SB/08a indicating consideration of the cited materials.

Respectfully submitted,

SIGNAL TRUST FOR WIRELESS INNOVATION

By /Abhik A. Huq/
Abhik A. Huq
Registration No. 40,656

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
Philadelphia, PA 19103
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

AAH/srp
Enclosure

Electronic Acknowledgement Receipt

EFS ID:	28363137
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/sheila de Padilla
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	15-FEB-2017
Filing Date:	29-SEP-2015
Time Stamp:	14:45:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SIG_2_0674US06_IDS_SB08a_20170215_EFS.PDF	1035159 c2be078c1ea77fbdad8d02f800524aee020c31ae	no	4

Warnings:

Information:					
2	Transmittal Letter	SIG_2_0674US06_IDS_Letter_20170215_EFS.PDF	60849 c3a026e4e7371cee3538d581e215994698b4dfd5	no	3
Warnings:					
Information:					
			Total Files Size (in bytes):	1096008	

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

MAILED
APR 13 2017
OFFICE OF PETITIONS

VOLPE AND KOENIG, P.C.
UNITED PLAZA
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA PA 19103

In re Application of	:	
Guodong Zhang et al.	:	
Application No. 14/869,313	:	On Request
Filed: September 29, 2015	:	
Attorney Docket No. SIG-2-0674US06	:	

This is a decision on the request filed February 10, 2017 that is being treated as a request for the Office to correct its records to reflect that a petition to withdraw the above-identified application from issue was granted by the Office on September 26, 2016, to process the Request for Continued Examination filed September 26, 2016 and to vacate PATENT NO. 9,462,526.

The request is **GRANTED** to the extent indicated below.

Office records verify that applicant filed an ePetition to withdraw the application from issue and that the ePetition was granted by the Office on September 26, 2016. Accordingly, the application was withdrawn from issue on September 26, 2016 as the petition was received and granted prior to the date of issue. See 37 CFR 1.313(d). The subsequent administrative mishandling of the decision by the Office is regretted.

The Office of Data Management is being informed to facilitate the publication of an erratum in the Official Gazette (OG) that **ALL REFERENCE TO PATENT NO. 9,462,526 TO Guodong Zhang et al. OF U.S.A. FOR SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER APPEARING IN THE OFFICIAL GAZETTE SHOULD BE DELETED SINCE NO PATENT WAS GRANTED.**

In view of the above, the request is granted to the extent that acceptance by the Office of the petition to withdraw the above-identified application from issue on September 26, 2016 is recognized.

Accordingly, the application is being referred to Technology Center AU 2466 for consideration of the Request for Continued Examination and the Information Disclosure Statement filed therewith on September 26, 2016.

Telephone inquiries should be directed to the undersigned at (571) 272-7421.

Charles Kim
Director
Office of Petitions

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS Remove

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

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14869313
	Filing Date	2015-09-29
	First Named Inventor	Guodong Zhang
	Art Unit	2466
	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

	1	3GPP TSG RAN WG1 #31, Tdoc R1-03-0273 QUALCOMM, "Channel Structure for Consideration in Enhanced Uplink" Tokyo, Japan, 18th – 21st February 2003

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2017-05-10
Name/Print	Abhik A. Huq	Registration Number	40,656

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

Privacy Act Statement

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

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

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

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

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

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

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Zhang et al.
Application No.:	14/869,313
Confirmation No.:	1070
Filed:	September 29, 2015
For:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
Group:	2466
Examiner:	Brian S. Roberts

Our File:	SIG-2-0674US06
Date:	May 10, 2017

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB/08a. A copy of the newly cited document is enclosed.

This Application is a continuation of U.S. Patent Application No. 13/908,242, which was filed June 3, 2013, which issued December 15, 2015 as U.S. Patent No. 9,215,636, which is a continuation of U.S. Patent Application No. 13/308,950, filed December 1, 2011, which issued June 4, 2013 as U.S. Patent No. 8,457,072, which is a continuation of U.S. Patent Application No. 11/434,330, filed May 15, 2006, which issued March 6, 2012 as U.S. Patent No. 8,130,720, which is a continuation of U.S. Patent Application No. 10/962,720, filed October 12, 2004, which issued May 16,

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

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It is respectfully requested that the Examiner consider these documents and return an initialed copy of the PTO Form SB/08a indicating consideration of the cited materials.

Respectfully submitted,

SIGNAL TRUST FOR WIRELESS INNOVATION

By /Abhik A. Huq/
Abhik A. Huq
Registration No. 40,656

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
Philadelphia, PA 19103
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

AAH/srp
Enclosures (2)

Electronic Acknowledgement Receipt

EFS ID:	29168896
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Sheila de Padilla
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	10-MAY-2017
Filing Date:	29-SEP-2015
Time Stamp:	15:31:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SIG_2_0674US06_IDS_SB08a_20170510_EFS.PDF	1035264 157e6fede905e88e669c1ca63120fedc17a8eb99	no	4

Warnings:

Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
2	Transmittal Letter	SIG_2_0674US06_IDS_Letter_20170510_efs.PDF	61305 c32ac00efc5cfabb32004e8fe0e51b3906db6487	no	3
Warnings:					
Information:					
3	Non Patent Literature	R1_03_0273_Qualcomm_Channel_Structure_for_Consideration_in_Enhanced_Uplink.PDF	138972 b45de05913d682074f2d7d9c19d182633a19e399	no	6
Warnings:					
Information:					
			Total Files Size (in bytes):	1235541	

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

New Applications Under 35 U.S.C. 111

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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.

New International Application Filed with the USPTO as a Receiving Office

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

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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NOTICE OF ALLOWANCE AND FEE(S) DUE

3624 7590 05/24/2017

VOLPE AND KOENIG, P.C.
UNITED PLAZA
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103

EXAMINER
ROBERTS, BRIAN S

ART UNIT	PAPER NUMBER
2466	

DATE MAILED: 05/24/2017

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/869,313	09/29/2015	Guodong Zhang	SIG-2-0674US06	1070

TITLE OF INVENTION: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$960	$960	08/24/2017

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

3624 7590 05/24/2017
VOLPE AND KOENIG, P.C.
UNITED PLAZA
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103

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

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/869,313	09/29/2015	Guodong Zhang	SIG-2-0674US06	1070

TITLE OF INVENTION: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$960	$960	08/24/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
ROBERTS, BRIAN S	2466	370-331000

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

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

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

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

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

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

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

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

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

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

IPR2023-01270 Page 754

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/869,313	09/29/2015	Guodong Zhang	SIG-2-0674US06	1070

3624 7590 05/24/2017

VOLPE AND KOENIG, P.C.
UNITED PLAZA
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103

EXAMINER	
ROBERTS, BRIAN S	

ART UNIT	PAPER NUMBER
2466	

DATE MAILED: 05/24/2017

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

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

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

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 14/869,313	Applicant(s) ZHANG ET AL.	
	Examiner BRIAN ROBERTS	Art Unit 2466	AIA (First Inventor to File) Status No

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

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

1. ☒ This communication is responsive to *the RCE filed on 09/26/2016*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-7,9-15,17-22,26-31,35-41,43-50,52-59,61-64 and 66-68*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

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

   * Certified copies not received: _____.

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

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

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

Attachment(s)

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

/BRIAN ROBERTS/
Primary Examiner, Art Unit 2466

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

Examiner's Statement of Reasons for Allowance

Claims 1-7, 9-15, 17-22, 26-31, 35-41, 43-50, 52-59, 61-64 and 66-68 are allowed.

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

The primary reason independent claim 1, and similarly independent claim 9 is allowable is because the closest prior art of record, US 7013143 by Love et al., fails to teach or fairly suggest either alone or in combination with the prior art of record a method for communicating by a wireless transmit/receive unit (WTRU) during a handover from a primary cell to a non-primary cell that includes receiving scheduling information via the primary cell and not via the non-primary cell: transmitting, via the primary cell and the non-primary cell enhanced uplink (EU) data from the WTRU; receiving hybrid automatic repeat request (HARQ) acknowledgements (ACKs) via the primary cell; and receiving negative acknowledgements (NACKs) via the primary cell and not via the non-primary cell.

The primary reason independent claim 17 is allowable is because the closest prior art of record, US 7013143 by Love et al., fails to teach or fairly suggest either

alone or in combination with the prior art of record a wireless transmit/receive unit (WTRU) that includes a transmitter; and a receiver, wherein when the WTRU is in a soft handover; the receiver receives scheduling information from a first Node-B, the transmitter transmits, in accordance with the received scheduling information, enhanced unlink (EU) data to the first Node-B and to a second Node-B; the receiver receives hybrid automatic repeat request (HARQ) acknowledgements (ACKs) from the first Node-B and the receiver receives negative acknowledgements (NACKs) from the first Node-B and not from the second Node-B.

The primary reason independent claim 26 is allowable is because the closest prior art of record, US 7013143 by Love et al., fails to teach or fairly suggest either alone or in combination with the prior art of record a wireless transmit/receive unit (WTRU) that includes a transmitter; and a receiver, wherein when the WTRU is in a soft handover from a primary cell to a non-primary cell, the receiver receives scheduling information via the primary cell; the transmitter transmits enhanced uplink (EU) data via the primary cell in accordance with the received scheduling information, the receiver receives hybrid automatic repeat request (HARQ) acknowledgements (ACKs) via the primary cell, and the receiver receives negative acknowledgements (NACKs) via the primary cell and not via the non-primary cell.

The primary reason independent claim 35 is allowable is because the closest prior art of record, US 7013143 by Love et al., fails to teach or fairly suggest either

alone or in combination with the prior art of record a method for communicating with a wireless transmit/receive unit (WTRU) during a soft handover from a primary cell to a non-primary cell that includes transmitting scheduling information to the WTRU via the primary cell and not via the non-primary cell; receiving enhanced uplink (EU) data from the WTRU via the primary cell and the non-primary cell; transmitting hybrid automatic repeat request (HARQ) acknowledgements (ACKs) to the WTRU via the primary cell; and transmitting negative acknowledgements (NACKs) to the WTRU via the primary cell and not via the non-primary cell.

The primary reason independent claim 43 is allowable is because the closest prior art of record, US 7013143 by Love et al., fails to teach or fairly suggest either alone or in combination with the prior art of record a wireless transmit/receive unit (WTRU) that includes a transmitter; and a receiver, wherein when the WTRU is in a soft handover from a primary cell to a non-primary cell, the receiver receives scheduling information via the primary cell and not via the non-primary cell, the transmitter transmits enhanced uplink (EU) data via the primary cell and the non-primary cell, and the receiver receives negative acknowledgements (NACKs) via the primary cell and not via the non-primary cell.

The primary reason independent claim 52 is allowable is because the closest prior art of record, US 7013143 by Love et al., fails to teach or fairly suggest either alone or in combination with the prior art of record a wireless network comprising a

plurality of Node-Bs configured to communicate with a wireless transmit/receiver unit (WTRU) during a handover from a first Node-B of the plurality of Node-Bs to a second Node-B of the plurality of Node-Bs bv: transmitting scheduling information to the WTRU via the first Node-B; receiving enhanced unlink (EU) data from the WTRU via the first Node-B and the second Node-B; transmitting hybrid automatic repeat request (HARQ) acknowledgements (ACKs) to the WTRU via the first Node-B; and transmitting negative acknowledgements (NACKs) to the WTRU via the first Node-B and not via the second Node-B.

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

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIAN ROBERTS whose telephone number is (571)272-3095. The examiner can normally be reached on M-F 10:00-6:30.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, FARUK HAMZA can be reached on (571) 272-7969. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

/BRIAN ROBERTS/
Primary Examiner, Art Unit 2466
05/18/2017

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

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	7026911	B2	2006-04-11	Aono et al.	Corresponds to WO/0237572 A1

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	1	0237572	WO	A1	2002-05-10	Japan Science and Technology Corp.	Corresponds to USP 7,026,911	

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.S.R./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14869313
	Filing Date	2015-09-29
	First Named Inventor	Guodong Zhang
	Art Unit	2466
	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

	1	PANASONIC, HARQ OPERATION DURING SOFT HANDOVER, 3GPP TSG-RAN WG1 MEETING #33 R1-030802, AUGUST 25-29, 2003

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

EXAMINER SIGNATURE

Examiner Signature	/BRIAN S ROBERTS/	Date Considered	05/17/2017

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2016-11-23
Name/Print	Abhik A. Huq	Registration Number	40656

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

Privacy Act Statement

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IPR2023-01270 Page 766

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

PTO/SB/08a (03-15)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6850771	B2	2005-02-01	Malladi et al.	
	2	7428424	B2	2008-09-23	Hwang et al.	
	3	9348381	B2	2016-09-06	Dick et al.	

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	ETSI, UMTS XX.15 V0.3.0 1999-01 UTRA Handover, 21 pp.	

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EXAMINER SIGNATURE

Examiner Signature	/BRIAN S ROBERTS/	Date Considered	05/17/2017

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Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2017-01-10
Name/Print	Abhik A. Huq	Registration Number	40656

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Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020115460	A1	2002-08-22	Rune et al.	
	2	20020172208	A1	2002-11-21	Malkamaki, Esa	

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Examiner Signature	/BRIAN S ROBERTS/	Date Considered	05/17/2017

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Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2017-01-12
Name/Print	Abhik A. Huq	Registration Number	40656

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	1	7283782		2007-10-16	Sinnarajah et al.	

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

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

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

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

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. IPR2023-01270 Page 779

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14869313
	Filing Date	2015-09-29
	First Named Inventor	Guodong Zhang
	Art Unit	2466
	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

	1	3GPP TSG RAN WG1 #31, Tdoc R1-03-0273 QUALCOMM, "Channel Structure for Consideration in Enhanced Uplink" Tokyo, Japan, 18th – 21st February 2003

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EXAMINER SIGNATURE

Examiner Signature	/BRIAN S ROBERTS/	Date Considered	05/17/2017

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2017-05-10
Name/Print	Abhik A. Huq	Registration Number	40,656

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

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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).

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14869313	ZHANG ET AL.
	Examiner	Art Unit
	BRIAN ROBERTS	2466

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
PALM inventor search	5/18/2017	BSR
Search focused on: H04W36/18 H04L1/1887,1893,12,18,1812,1816,1819,1867,189,1896,22 H04B7/022 H04W36/30,00,02,16,18,24,26,28,34,38 H04W88/08	5/18/2017	BSR
EAST text search: see search history printout	5/18/2017	BSR
Google; IEEE Xplore search "enhanced uplink"	5/18/2017	BSR

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
Interference search	See search history printout	5/18/2017	BSR

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14869313	ZHANG ET AL.
	Examiner	**Art Unit**
	BRIAN ROBERTS	2466

CPC								
Symbol							**Type**	**Version**
H04W		36	/	18			F	2013-01-01
H04B		7	/	022			A	2013-01-01
H04L		1	/	1887			I	2013-01-01
H04L		1	/	1893			I	2013-01-01
H04W		36	/	30			A	2013-01-01
H04W		88	/	08			A	2013-01-01
H04L		1	/	1812			I	2013-01-01
H04W		74	/	004			I	2013-01-01
H04W		74	/	04			I	2013-01-01
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CPC Combination Sets								
Symbol							**Type**	**Set**	**Ranking**	**Version**
			/							
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NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	40	
/BRIAN ROBERTS/ Primary Examiner.Art Unit 2466	05/18/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14869313	ZHANG ET AL.
	Examiner	**Art Unit**
	BRIAN ROBERTS	2466

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
		H	0	4	W	36 / 18 (2009.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	40	
/BRIAN ROBERTS/ Primary Examiner.Art Unit 2466	05/18/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14869313	ZHANG ET AL.
	Examiner	**Art Unit**
	BRIAN ROBERTS	2466

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

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
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	8		24	38	40	53	56								
10	9		25	39	41	54	57								
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13	12	28	28	42	44		60								
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15	14	30	30	44	46	17	62								
16	15	31	31	45	47	25	63								
	16		32	46	48	32	64								

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 40	
/BRIAN ROBERTS/ Primary Examiner.Art Unit 2466 (Primary Examiner)	05/18/2017 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 2

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	8991	(enhanc$3 near2 uplink or ("e-dch"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 15:21
S2	589	(enhanc$3 near2 uplink or ("e-dch")) and HARQ and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 15:22
S3	637	(enhanc$3 near2 uplink or ("e-dch")) and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)) and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 15:23
S4	637	((enhanc$3 near2 uplink) or ("e-dch")) and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)) and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 15:23
S5	459	H04L1/1887.cpc. and (enhanc$3 near2 uplink or ("e-dch"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 15:58
S6	459	H04L1/1887.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 16:04
S7	350	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 16:21
S8	6	"20030002470".pn.	US-PGPUB;	OR	ON	2015/02/19

		"20030031119".pn.	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			16:30
S9	71	"5794149".pn. "5946320".pn. "6434396".pn. "6643813".pn. "6678523".pn. "6907245".pn. "6915465".pn. "6977888".pn. "7046648".pn. "7054633".pn. "7103729".pn. "7124350".pn. "7158504".pn. "7185256".pn. "7269420".pn. "7283508".pn. "7315741".pn. "7317700".pn. "7403513".pn. "8023463".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 16:47
S10	70	H04L1/1893.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 16:53
S11	16	"20020093937".pn. "20030081692".pn. "20030202500".pn. "20060045010".pn. "20060105796".pn. "20070079207".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 16:54
S12	3	"20030003943".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 16:55
S13	66	"6678249".pn. "6778830".pn. "6892071".pn. "7013143".pn. "7346035".pn. "7414989".pn. "20020095635".pn. "20020191544".pn. "20030007480".pn. "20030043786".pn. "20030054824".pn. "20030081692".pn. "20030161284".pn. "20030210668".pn. "20040004954".pn. "20040072567".pn. "20040085934".pn. "20040120306".pn. "20040160925".pn. "20040202129".pn. "20040203991".pn. "20040219917".pn. "20040219919".pn. "20040219920".pn. "20040228313".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 17:13
S14	15	"20050041694".pn. "20050047354".pn. "20050048920".pn.	US-PGPUB; USPAT; USOCR;	OR	ON	2015/02/19 17:19

		"20050083888".pn. "20070047501".pn.	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S15	0	H04L1/12.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 20:33
S16	314	H04L1/12.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/19 20:34
S17	637	((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)) and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 10:58
S18	77	H04L1/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 12:38
S19	884	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 12:52
S20	107	H04L1/1816.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 14:11
S21	178	H04L1/1819.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 14:27
S22	201	H04L1/1867.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 14:44
S23	49	H04L1/189.cpc. and ((enhanc$3 near2	US-PGPUB;	OR	ON	2015/02/20

		uplink) or ("e-dch") or ("EU-DCH"))	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			15:01
S24	105	H04L1/1896.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 15:16
S25	2	H04L1/22.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 15:30
S26	101	H04B7/022.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 15:34
S27	154	H04W36/30.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 16:03
S28	30	H04W36/00.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 16:20
S29	71	H04W36/02.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 16:37
S30	10	H04W36/16.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 16:44
S31	350	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2015/02/20 16:45

			IBM_TDB			
S32	10	"8457072".pn. "8130720".pn. "7046648".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 17:12
S33	2	"20040219917".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 17:13
S34	2273255	"73"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 17:14
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S36	6	"8130720".pn. "8457072".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 17:32
S37	19	H04W36/24.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 17:44
S38	4	H04W36/26.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 17:46
S39	7	H04W36/28.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 17:46
S40	4	H04W36/34.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS;	OR	ON	2015/02/20 17:47

			EPO; JPO; DERWENT; IBM_TDB			
S41	3	H04W36/38.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 17:48
S42	261	H04W88/08.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/20 18:03
S46	0	"6754496".pn. and "7206598".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 15:19
S48	9	"6754496".pn. "7206598".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 15:27
S49	9371	(enhanc$3 near2 uplink or ("e-dch"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 15:37
S50	614	(enhanc$3 near2 uplink or ("e-dch")) and HARQ and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 15:38
S51	665	((enhanc$3 near2 uplink) or ("e-dch")) and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)) and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 15:38
S52	496	H04L1/1887.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 15:38
S53	362	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-	US-PGPUB; USPAT;	OR	ON	2015/06/22 16:11

		DCH"))	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S54	73	H04L1/1893.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 16:52
S55	305	H04L1/12.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 17:09
S56	909	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 17:53
S57	909	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 19:40
S58	110	H04L1/1816.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 20:39
S59	188	H04L1/1819.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 20:44
S60	111	H04L1/1896.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 21:05
S61	2	H04L1/22.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 21:13

S62	104	H04B7/022.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 21:13
S63	161	H04W36/30.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 21:23
S64	72	H04W36/02.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 21:36
S65	10	H04W36/16.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 21:44
S66	362	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 21:53
S67	20	H04W36/24.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 22:27
S68	4	H04W36/26.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 22:28
S69	4	H04W36/26.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 22:28
S70	7	H04W36/28.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2015/06/22 22:28

			DERWENT; IBM_TDB			
S71	4	H04W36/34.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 22:29
S72	289	H04W88/08.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/22 22:30
S73	614	(enhanc$3 near2 uplink or ("e-dch")) and HARQ and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/23 11:55
S74	1148	(enhanc$3 near2 uplink or ("e-dch")) and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/06/23 11:55
S78	936	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/14 14:54
S79	380	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/14 17:26
S80	680	((enhanc$3 near2 uplink) or ("e-dch")) and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)) and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/14 18:05
S81	47	H04L1/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/14 19:49
S82	114	H04L1/1816.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR;	OR	ON	2015/08/14 20:03

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S83	195	H04L1/1819.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/14 20:12
S84	206	H04L1/1867.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/14 20:28
S85	51	H04L1/189.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/14 20:47
S86	115	H04L1/1896.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/14 20:57
S87	103	H04B7/022.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/14 21:08
S88	164	H04W36/30.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/14 21:23
S89	307	H04W88/08.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/14 21:39
S90	629	(enhanc$3 near2 uplink or ("e-dch")) and HARQ and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/17 10:22
S91	5	"20120155304".pn.	US-PGPUB;	OR	ON	2015/08/17

		"20120039271".pn.	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			13:30
S92	2	"20120322492".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/17 13:55
S93	2	"20140254516".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/17 14:01
S94	0	"20090247206,pn."	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/17 14:11
S95	0	"20090247206.pn."	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/17 14:11
S96	2	"20090247206".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/17 14:11
S97	5	"6507567".pn. "20030131124".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/08/17 15:39
S101	639	(enhanc$3 near2 uplink or ("e-dch")) and HARQ and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/05 19:26
S102	970	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2015/10/05 20:59

			IBM_TDB			
S103	311	H04W88/08.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/06 07:31
S104	393	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/06 08:26
S105	527	H04L1/1887.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 19:03
S106	79	H04L1/1893.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 19:41
S107	0	H04L1/12.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 19:53
S108	170	H04W36/30.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 19:54
S109	30	H04W36/00.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 20:08
S110	76	H04W36/02.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 20:15
S111	11	H04W36/16.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS;	OR	ON	2015/10/20 20:24

			EPO; JPO; DERWENT; IBM_TDB			
S112	401	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 20:26
S113	19	H04W36/24.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 21:03
S114	4	H04W36/26.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 21:12
S115	7	H04W36/28.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 21:15
S116	4	H04W36/34.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 21:17
S117	4	H04W36/38.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 21:22
S118	0	H04W88/00.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 21:26
S119	12891	H04W36/18.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/20 21:39
S120	401	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-	US-PGPUB; USPAT;	OR	ON	2015/10/21 11:28

		DCH"))	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S121	1005	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/21 12:05
S122	400	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/27 18:44
S123	527	H04L1/1887.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/27 19:04
S124	79	H04L1/1893.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/27 20:35
S125	0	H04L1/12.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/27 20:43
S126	50	H04L1/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/27 20:44
S127	1005	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/27 20:50
S128	119	H04L1/1816.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/27 21:49

S129	7623	H04L1/1819.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/27 21:56
S130	242	H04L1/1819.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 12:56
S131	209	H04L1/1867.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 13:15
S132	54	H04L1/189.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 13:44
S133	122	H04L1/1896.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:41
S134	2	H04L1/22.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 17:04
S135	4126	H04L1/22.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 19:16
S136	107	H04B7/022.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/29 15:06
S137	169	H04W36/30.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2015/10/29 15:35

			DERWENT; IBM_TDB			
S138	31	H04W36/00.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/29 16:20
S139	76	H04W36/02.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/29 16:45
S140	11	H04W36/16.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/29 16:49
S141	400	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/29 16:55
S142	19	H04W36/24.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/29 17:14
S143	4	H04W36/26.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/29 17:15
S144	10	H04W36/28.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/29 17:15
S145	4	H04W36/34.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/29 17:16
S146	4	H04W36/38.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR;	OR	ON	2015/10/29 17:16

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S147	329	H04W88/08.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/29 17:16
S148	3580	(enhanc$3 near2 uplink or ("e-dch")) and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/29 17:27
S149	3580	(enhanc$3 near2 uplink or ("e-dch")) and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/29 19:44
S150	3580	(enhanc$3 near2 uplink or ("e-dch")) and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/31 18:36
S154	689	(enhanc$3 near2 uplink or ("e-dch")) and HARQ and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 13:24
S155	17	"7046648".pn. "8130720".pn. "8457072".pn. "9215636".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 13:36
S156	8	"7283509".pn. "7366538".pn. "20010020285".pn. "20020115467".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 13:56
S157	1176	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 14:18
S158	504	H04W88/08.cpc. and ((enhanc$3	US-PGPUB;	OR	ON	2016/05/26

		near2 uplink) or ("e-dch") or ("EU-DCH"))	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			14:23
S159	436	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:06
S160	570	H04L1/1887.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:07
S161	93	H04L1/1893.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:15
S162	0	H04L1/12.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:16
S163	198	H04W36/30.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:16
S164	36	H04W36/00.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:18
S165	79	H04W36/02.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:20
S166	13	H04W36/16.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2016/05/26 15:22

			IBM_TDB			
S167	436	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:22
S168	21	H04W36/24.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:25
S169	7	H04W36/26.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:25
S170	10	H04W36/28.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:25
S171	4	H04W36/34.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:25
S172	6	H04W36/38.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:26
S173	436	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:26
S174	1176	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:27
S175	125	H04L1/1816.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS;	OR	ON	2016/05/26 15:31

			EPO; JPO; DERWENT; IBM_TDB			
S176	256	H04L1/1819.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:31
S177	214	H04L1/1867.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:44
S178	1553	(enhanc$3 near2 uplink or ("e-dch")) and HARQ and ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:47
S179	1645	(enhanc$3 near2 uplink or ("e-dch")) and (HARQ or (hybrid near2 automatic near2 repeat near2 request$4)) and ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/05/26 15:48
S180	702	(enhanc$3 near2 uplink or ("e-dch")) and HARQ and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/05 15:41
S181	1227	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/05 16:05
S182	516	H04W88/08.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/05 17:12
S183	442	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/05 18:28
S184	578	H04L1/1887.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-	US-PGPUB; USPAT;	OR	ON	2016/07/05 19:16

		DCH"))	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S185	1227	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/05 20:28
S186	94	H04L1/1893.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 09:59
S187	0	H04L1/12.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 12:07
S188	203	H04W36/30.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 12:07
S189	35	H04W36/00.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 12:11
S190	80	H04W36/02.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 12:13
S191	14	H04W36/16.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 12:17
S192	442	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 12:20

S193	22	H04W36/24.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 12:35
S194	9	H04W36/26.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 12:38
S195	11	H04W36/28.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 12:38
S196	4	H04W36/34.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 12:41
S197	6	H04W36/38.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 12:45
S198	1674	(enhanc$3 near2 uplink or ("e-dch")) and (HARQ or (hybrid near2 automatic near2 repeat near2 request$4)) and ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 12:45
S199	702	(enhanc$3 near2 uplink or ("e-dch")) and HARQ and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/06 13:18
S203	10	"716167".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/07/07 12:22
S204	2	"7169167".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2016/07/07 12:23

			DERWENT; IBM_TDB			
S205	1889	(enhanc$3 near2 uplink or ("e-dch")) and (HARQ or (hybrid near2 automatic near2 repeat near2 request$4)) and ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/08 17:07
S206	4	"20140294884".pn. "20140349647".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/08 17:25
S207	827	((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)) and soft near2 ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/08 18:26
S208	57	H04L1/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/09 08:06
S209	1479	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/09 08:06
S210	4	"5530841".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/10 10:35
S211	3	"5680318".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/10 10:36
S212	546	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 16:01
S213	116	H04L1/1893.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR;	OR	ON	2017/05/17 16:05

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S214	1490	H04L1/1812.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 16:09
S215	150	H04L1/1816.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 16:35
S216	1	("7283782").PN.	US-PGPUB; USPAT	OR	ON	2017/05/17 16:53
S217	2	("20020115460" | "20020172208").PN.	US-PGPUB; USPAT	OR	ON	2017/05/17 16:54
S218	3	("6850771" | "7428424" | "9348381").PN.	US-PGPUB; USPAT	OR	ON	2017/05/17 16:54
S219	1	("7026911").PN.	US-PGPUB; USPAT	OR	ON	2017/05/17 16:54
S220	5	("6650905" | "6754496" | "6977888" | "7065359" | "7185256" | "B2").PN.	US-PGPUB; USPAT	OR	ON	2017/05/17 16:54
S221	305	H04L1/1819.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 16:59
S222	234	H04L1/1867.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 17:04
S223	69	H04L1/189.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 17:12
S224	159	H04L1/1896.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 17:16
S225	2	H04L1/22.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS;	OR	ON	2017/05/17 17:33

			EPO; JPO; DERWENT; IBM_TDB			
S226	546	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 17:34
S227	137	H04B7/022.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 17:34
S228	272	H04W36/30.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 17:46
S229	29	H04W36/00.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 18:19
S230	91	H04W36/02.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 18:21
S231	14	H04W36/16.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 19:02
S232	1897	((enhanc$3 near2 uplink) or ("e-dch")) and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)) and ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/17 19:02
S233	1794	(enhanc$3 near2 uplink or ("e-dch")) and HARQ and ((handover) or (handoff) or (hand$3 near over) or (hand$3 near2 off))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/18 10:50
S234	546	H04W36/18.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-	US-PGPUB; USPAT;	OR	ON	2017/05/18 11:38

		DCH"))	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S235	14	H04W36/24.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/18 14:58
S236	10	H04W36/26.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/18 14:58
S237	14	H04W36/28.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/18 14:59
S238	4	H04W36/34.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/18 15:00
S239	13	H04W36/38.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/18 15:00
S240	679	H04W88/08.cpc. and ((enhanc$3 near2 uplink) or ("e-dch") or ("EU-DCH"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/05/18 15:01

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S43	12	enhanced near2 uplink.clm. and soft near2 handover.clm.	USPAT	OR	ON	2015/02/20 18:25
S44	4	enhanced near2 uplink.clm. and soft near2 handover.clm. and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)).clm.	USPAT	OR	ON	2015/02/20 18:26
S45	7	enhanced near2 uplink.clm. and soft near2 handover.clm. and schedul$.clm.	USPAT	OR	ON	2015/02/20 18:27

S75	12	enhanced near2 uplink.clm. and soft near2 handover.clm.	USPAT	OR	ON	2015/06/23 15:38
S76	4	enhanced near2 uplink.clm. and soft near2 handover.clm. and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)).clm.	USPAT	OR	ON	2015/06/23 15:40
S77	7	enhanced near2 uplink.clm. and soft near2 handover.clm. and schedul$.clm.	USPAT	OR	ON	2015/06/23 15:42
S98	4	enhanced near2 uplink.clm. and soft near2 handover.clm. and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)).clm.	USPAT	OR	ON	2015/08/17 15:47
S99	7	enhanced near2 uplink.clm. and soft near2 handover.clm. and schedul$.clm.	USPAT	OR	ON	2015/08/17 15:48
S100	1	enhanced near2 uplink.clm. and soft near2 handover.clm. and primary near2 cell.clm.	USPAT	OR	ON	2015/08/17 15:48
S151	4	enhanced near2 uplink.clm. and primary near2 cell.clm.	USPAT	OR	ON	2015/11/01 17:50
S152	51	enhanced near2 uplink.clm. and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)).clm.	USPAT	OR	ON	2015/11/01 17:52
S153	33	enhanced near2 uplink.clm. and schedul$4 near2 information.clm.	USPAT	OR	ON	2015/11/01 17:57
S200	37	enhanced near2 uplink.clm. and schedul$4 near2 information.clm.	USPAT	OR	ON	2016/07/06 13:28
S201	94	enhanced near2 uplink.clm. and schedul$4 near2 information.clm.	US-PGPUB; USPAT	OR	ON	2016/07/06 13:28
S202	134	enhanced near2 uplink.clm. and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)).clm.	US-PGPUB; USPAT	OR	ON	2016/07/06 13:29
S241	99	enhanced near2 uplink.clm. and schedul$4 near2 information.clm.	US-PGPUB; USPAT	OR	ON	2017/05/18 15:21
S242	99	enhanced near2 uplink.clm. and schedul$4 near2 information.clm.	US-PGPUB; USPAT	OR	ON	2017/05/18 15:21
S243	147	enhanced near2 uplink.clm. and ((HARQ) or (hybrid near2 automatic near2 repeat$3 near2 request$3)).clm.	US-PGPUB; USPAT	OR	ON	2017/05/18 15:26

5/ 18/ 2017 3:56:19 PM
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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6650905	B1	2003-11-18	Toskala et al.	
	2	6754496	B2	2004-06-22	Mohebbi et al.	
	3	6977888	B1	2005-12-20	Frenger et al.	Corresponds to TW536896B
	4	7065359	B2	2006-06-20	Chuah et al.	
	5	7185256	B2	2007-02-27	Miki et al.	Corresponds to JP2002-009741A
	6	7848290	B2	2010-12-07	Cheng et al.	

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U.S.PATENT APPLICATION PUBLICATIONS

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	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

	1	20030176195	A1	2003-09-18	Dick et al.	Corresponds to TW200303689A
	2	20060274712	A1	2006-12-07	Malladi et al.	

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FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2002-009741	JP	A	2002-01-11	NTT DOCOMO, INC.	Corresponds to US7,185,256B2	☐
	2	2007-511135	JP	A	2007-04-26	INTERDIGITAL TECHNOLOGY CORPORATION	Corresponds to WO2005/048503A2	☐
	3	536896	TW	B	2003-06-11	TELEFONAKTIEBOLAG ET L M ERICSSON	Corresponds to US6,977,888B1	☐
	4	200303689	TW	A	2003-09-01	INTERDIGITAL TECHNOLOGY CORPORATION	Corresponds to US2003/0176195A1	☐
	5	2005/048503	WO	A2	2005-05-26	INTERDIGITAL TECHNOLOGY CORPORATION	Corresponds to JP2007-511135A	☐

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

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	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

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Examiner Signature	/BRIAN S ROBERTS/	Date Considered	05/17/2017

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

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☐ See attached certification statement.

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

☒ A certification statement is not submitted herewith.

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2016-09-26
Name/Print	Abhik A. Huq	Registration Number	40,656

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

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

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Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

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	1	20030040972	KR	A	2003-05-23	LG Electronics Inc.	English Translation of Abstract included	×

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See attached certification statement.

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Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2017-06-08
Name/Print	Abhik A. Huq	Registration Number	40,656

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Espacenet

Bibliographic data: KR20030040972 (A) — 2003-05-23

METHOD OF TRANSMITTING CONTROL INFORMATION FOR HIGH SPEED DOWNLINK SHARED CHANNEL IN MOBILE COMMUNICATION SYSTEM

Inventor(s): KIM EUN JEONG [KR]; PARK JIN YEONG [KR] ± (KIM, EUN JEONG, ; PARK, JIN YEONG)

Applicant(s): LG ELECTRONICS INC [KR] ± (LG ELECTRONICS INC)

Classification: **- international:** ***H04B7/005; H04B7/26;*** (IPC1-7): H04B7/26
- cooperative: **H04W52/286**

Application number: KR20010071651 20011117 Global Dossier

Priority number(s): KR20010071651 20011117

Also published as: KR100782211 (B1)

Abstract of KR20030040972 (A)

PURPOSE: A method of transmitting control information for an HS-DSCH(High-Speed Downlink Shared Channel) in a mobile communication system is provided to define messages of a control plane or a user plane, a frame format, and each procedure for transmitting information on power control, thereby performing power control for an HS-DSCH indicator field for the HS-DSCH. CONSTITUTION: A radio interface parameter update control frame comprises as follows. A 2-byte radio interface parameter update flag field shows whether or not parameters exist. A 1-byte connection frame number field is selectively configured. An HI(HS-DSCH Indicator) PO(Power Offset) field configures a TPC(Transmit Power Control) PO and an information field of a DPC(Downlink Power Control) mode with 1 byte, and includes an HS-DSCH indicator field PO value for power control for an HI field.; An HI PO-primary field has a PO value for the HI field applied to a DPCCH(Dedicated Physical Control Channel) during soft handover. A spare expansion field is configured. An entire payload is configured more than 6 bytes.

(19)대한민국특허청(KR)
(12) 공개특허공보(A)

(51) 。Int. Cl. [7]
H04B 7/26

(11) 공개번호 특2003-0040972
(43) 공개일자 2003년05월23일

(21) 출원번호 10-2001-0071651
(22) 출원일자 2001년11월17일

(71) 출원인 엘지전자 주식회사
서울특별시 영등포구 여의도동 20번지 LG트윈타워

(72) 발명자 박진영
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김은정
서울특별시서초구방배2동942-2남성빌라2-102

(74) 대리인 허용록

심사청구 : 없음

(54) 이동통신 시스템에서 고속 다운링크 공유채널에 대한제어정보전송방법

요약

본 발명은 이동통신 시스템에서 고속 패킷 데이터 서비스를 위한 고속 다운링크 공유채널 지시자 필드의 전력 정보 갱신을 위한 제어 프레임 또는 메시지를 제시하고자 한 것이다. 본 발명은 이동 통신 시스템에서 전용 물리적 제어 채널(DPCCH)이 소프트 핸드오버 상태이고, 하나의 기지국에서만 고속 다운링크 공유 채널(HS-DSCH)이 전송될 때 고속 다운링크 공유 채널을 위한 제어 정보를 전송하는 방법에 있어서, 고속 다운링크 공유 채널(HS-DSCH)에 연계된 전용 물리적 전용 채널의 HS-DSCH 지시자 필드에 대한 전력 제어를 위해서, 제어 평면에서 보내지는 HS-DSCH 지시자 파워 오프셋 값에 대한 정보를 넣은 필드를 추가한 제어 프레임을 사용하는 것을 특징으로 한다.

이 같은 본 발명에 의하면, HS-DSCH와 연관된 전용 물리적 제어채널의 소프트 핸드오버시에 HS-DSCH 지시자 필드에 대한 전력 제어를 위한 정보를 전달하기 위한 제어 평면 또는 사용자 평면에서의 메시지 또는 프레임 포맷과 각각에 따른 프로시저를 정의함으로써 3GPP 비동기 시스템과 단말기에서 HS-DSCH를 위한 HS-DSCH 지시자 필드에 대한 전력 제어를 수행할 수 있게 해준다.

대표도

도 10

명세서

도면의 간단한 설명

도 1은 서로 다른 기지국 제어기간 소프트 핸드오프 시에 무선 접속 망의 구조.

도 2는 전용 채널(DCH)의 구성을 나타내는 도면.

도 3은 다운링크 공유 채널(DSCH)의 구성을 나타내는 도면.

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도 4는 다운링크 공유 제어 채널에 구성된 물리채널 프레임 구조.

도 5는 다운링크 공유 제어 채널의 공유할 수 있는 사용자의 예를 나타낸 도면.

도 6은 다운링크 공유 제어 채널과 HS-DSCH의 타이밍을 나타낸 도면.

도 7은 종래의 무선 인터페이스 파라미터 업데이트 제어 프레임 포맷 구성도.

도 8은 UMTS Radio Network 제어 평면 프로토콜을 나타낸 도면.

도 9는 UMTS Radio Network 사용자 평면 프로토콜을 나타낸 도면.

도 10은 본 발명의 제 1실시 예로서, HS-DSCH 지시자 필드의 전력 제어를 위한 무선 인터페이스 파라미터 업 데이트 제어 프레임의 포맷 구성도.

도 11은 본 발명의 도 2실시 예로서, HS-DSCH 지시자 필드의 전력 제어를 위한 무선 인터페이스 파라미터 업 데이트 제어 프레임의 포맷 구성도.

도 12는 본 발명의 제 3실시 예로서, HS-DSCH 지시자 필드의 전력 제어를 위한 무선 인터페이스 파라미터 업 데이트 제어 프레임의 포맷 구성도.

도 13은 본 발명의 4실시 예로서, HS-DSCH 지시자 필드의 전력 제어를 위한무선 인터페이스 파라미터 업 데이트 제어 프레임의 포맷 구성도.

도 14는 본 발명의 제 5실시 예로서, HS-DSCH 지시자 필드의 전력 제어를 위한 무선 인터페이스 파라미터 업 데이트 제어 프레임의 포맷 구성도.

도 15는 본 발명 도 6 실시 예로서, HS-DSCH 지시자 필드의 전력 제어를 위한 무선 인터페이스 파라미터 업 데이트 제어 프레임의 포맷 구성도.

발명의 상세한 설명

발명의 목적

발명이 속하는 기술 및 그 분야의 종래기술

본 발명은 이동통신 시스템에서 고속 다운링크 공유채널(High-Speed Downlink Shared Channel, 이하 HS-DSCH로 약칭함)을 위한 제어 프레임에 관한 것으로, 특히 HS-DSCH를 위한 HS-DSCH 지시자(HI: HS-DSCH Indicator) 필드의 전력 정보 업데이트를 위한 새로운 제어 메시지나 프레임을 제시한 이동통신 시스템에서 고속 다운링크 공유 채널에 대한 제어정보 전송방법에 관한 것이다.

또한 HS-DSCH 지시자 필드의 전력 정보 갱신을 위한 제어 메시지 또는 프레 임에 실리는 HS-DSCH 지시자 필드의 전력 제어 정보는 HS-DSCH에 연관된 DPCCH의 소프트 핸드오버가 발생한 경우와 같은 때에 사용 될 수 있으며, 이러한 정보는 기지국과 기지국 제어국간, 기지국 제어국과 기지국 제어국 간에 새로운 제어 메시지 또는 프레임을 통해서 전달된다.

또한 본 발명에서는 이러한 제어 메시지를 전송함에 있어서 사용자 평면(User Plane)으로 보내는 방법과 제어 평면(Control Plane)으로 보내는 방법의 두 가지 경우에 대해 각각 고려하도록 한다.

3GPP 의 표준 시스템에서는 높은 속도의 패킷 데이터(packet data) 서비스를 고속 다운링크에서 지원하기 위해서 새로이 HS-DSCH(High Speed Downlink Packet Access Downlink Shared CHannel)이 제안되었다. HS-DSCH는 3GPP의 표준 가운데 고속 다운링크 패킷 액세스(High Speed Downlink Packet Access)를 규정하는 Release 5에 따르는 시스템에서 사용되며, 기존의 3GPP의 표준 Release 99/Release 4에 따르는 시스템인 W-CDMA 시스템과는 달리 짧은 전송시간간격(TTI: Transmission Time Interval)(3 slot, 2 ms)을 사용하며, 높은 데이터 전송 속도(data rate)를 지원하기 위해서 다양한 변조 코드 셋(MCS: Modulation Code Set)을 지원한다. 채널 상황에 가장 적합한 M

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CS를 선정함으로써 최적의 성능을 올릴 수 있다. 이를 위해서 자동 재 전송 요청(automatic repeat request, ARQ) 기술과 채널 코딩(channel coding) 기술을 결합한 하이브리드(hybrid ARQ, HARQ) 기술을 채택하여 신뢰성 있는 전송이 이루어지게 한다. 그리고 CDM(코드 분할 다중)을 통해 4명의 사용자까지 동시에 지원할 수 있도록 제안되었다.

도 1은 종래 서로 다른 제어국(116,118)간 소프트 핸드오버시에 무선 접속 네트워크의 구조를 나타낸 도면으로서, UMTS 무선 접속 망(112)에는 서빙 제어국(SRNC, 116)과 목적지 제어국(DRNC, 118)이 각각 다수개의 기지국(313,317)을 제어하는 무선 환경 하에서, 이동국(124)이 소프트 핸드 오버시 두 개의 제어국(116,118)에 존재하는 각각의 기지국(Node B, 120,122)과 동시에 통화채널을 유지하고 있는 상태가 된다.

여기에서, 서빙 제어국(116)은 각 이동국에 할당된 전용무선자원을 관리하고, 목적지 제어국(DRNC: Drift RNC)(118)은 상기 이동국(124)이 서빙 제어국(116)을 벗어나 자신의 영역으로 이동하는 경우에 상기 이동국(124)에 무선 자원을 제공하는 목적지의 제어국이고, 목적지 무선망 서브 시스템(DRNS: Drift RNS) 내에 존재한다. 이러한 제어국(116,118)의 하위에는 여러 개의 기지국이 존재하며, 소프트 핸드오버시의 이동국은 이러한 두 개의 제어국에 속한 각각의 기지국과 동시에 전송을 유지하고 있는 상태가 된다. 각 경우에 있어서, 비록 때때로 기지국 중 하나로부터 새로운 기지국으로 핸드오버 될 지라도, 상기 이동국은 두개의 다른 기지국의 적어도 2개의 기지국과 항상 통신을 수행하게 된다. 상기에 설명된 바와 같이, 상기 이동국이 핸드오버되는 경우, 다운링크에서의 전력을 제어하는 것은 매우 중요함을 알 수 있다.

그리고, 3GPP 시스템에서는 버스트(burst) 데이터 타입(data type)의 전송을 위한 채널로서 다운링크 공유 채널(DSCH : Downlink Shared Channel)을 가지고 있다. 도 2는 다운링크 공유 채널(DSCH)의 구성을 나타내는 도면이다. 도 2에서 다운 링크 공유 채널(DSCH)은 10ms의 무선 프레임(radio frame)으로 구성되어 있는데, 매 프레임 마다 서로 다른 사용자들이 공유하여 사용할 수 있다. 이는 여러 사용자가 다운링크 공유 채널(DSCH)을 위한 채널 코드(channelization code)로부터 프레임마다 하나의 노드(node)를 할당받음으로써 가능할 것이다.

도 3은 전용 채널(DCH)의 구성을 나타내는 도면이다.

도 3을 참조하면, 전용 채널(DCH)은 프레임 주기(T_f)가 10ms인 무선 프레임으로 구성되고, 하나의 무선 프레임마다 15개의 슬롯(Slot#0~ Slot#14)이 포함된다. 여기서, 하나의 슬롯 길이(T_{slot})는 2560 칩(chips)이다. 또한, 상기 전용 채널(DCH)은 물리적 데이터 채널(DPDCH : Dedicated Physical Data CHannel)과 물리적 제어 채널(DPCCH : Dedicated Physical Control CHannel) 들이 교대로 개입되어 있다. 상기 전용 채널(DCH)은 왼쪽부터 차례로 제1 물리적 데이터 채널에 N_{data1} 비트의 데이터(Data1)가 실리고, 제1 물리적 제어 채널에는 TPC(N_{TPC} 비트)와 TFCI(N_{TFCI} 비트)가 실릴 수 있다. 또한, 그 다음에 오는 제2 물리적 데이터 채널에는 N_{data2} 비트의 데이터(Data2)가 실리고, 제2 물리적 제어 채널에는 N_{pilot} 비트의 파일럿(Pilot) 신호가 실릴 수 있다. 여기서, TFCI 필드는 현재 전송중인 채널에 대한 정보가 들어 있다. 예를 들어, TFCI 필드에는 현재 무선 프레임으로 전송되는 데이터의 양과 코딩 방법 등에 대한 정보가 전송될 수 있다.

다운링크 공유 제어 채널(Downlink shared control channel)에 담겨지는 물 리채널 프레임 구조는 도 4와 같다. HS-DSCH를 지원하기 위해 필요한 다운링크 제어 정보(downlink control information)의 전송을 위해 공유 제어 채널(shared control channel)이 새로이 정의 되었다. 이 공유 제어 채널(Shared control channel)에는 전송 포맷과 자원 관련된 정보(TFRI: transport format and resource related information)와 HARQ 관련 정보가 담겨져서 보내진다.

상기 TFRI에는 HS-DSCH 전송채널 셋 사이즈(transport channel set size), 변조 방법, 코딩 레이트(coding rate), 멀티코드(multicode) 수에 관한 정보가 포함되며, HARQ 관련 정보에는 블록 넘버(block number), 덧붙임 버전(redundancy version) 같은 정보가 포함된다. 이외에도 어떤 사용자의 정보인지를 알려주기 위한 이동국 식별자(UE ID: UE IDentification)에 관한 정보가 전송된다.

HS-DSCH 지시자(HI: HS-DSCH Indicator)는 이동국(UE)에게 HS-DSCH를 통하여 데이터가 전송될 지 여부와 어떤 다운링크 공유 제어채널(downlink shared control channel)을 읽어야 할지를 알려주는 지시자(Indicator)이다. HS-DSCH를 사용하는 이동국들은 HS-DSCH 지시자(HI) 필드를 전송하는 연계된 전용 다운링크 전용 물리적 채널(DPCH)를 갖고 있으며 도 5에서 보듯이 최대 4개까지의 다운링크 공유제어채널을 여러 사용자와 동시에 공유해서 사용할 수 있다.

도 5는 다운링크 제어정보(Downlink control information)을 전송하기 위한 다운링크 공유 제어채널(downlink shared control channel)의 시그널링(signalling)을 나타낸 것이다. 도면에 나타난 바와 같이, 여러 사용자를 동시에 지원할 수 있고, 이를 위한 제어정보(control information)은 사용자마다 할당된 공유 제어채널(shared control channel)을 이용한다. 최대 지원할 수 있는 사용자 M = 4이다.

도 6은 다운링크 공유 제어채널과 HS-DSCH의 타이밍을 나타낸 도면이다. 도면에 나타난 바와 같이, HS-DSCH 지

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시자(HI)는 HS-DSCH에 관련(associate)되어 있는 것으로, DPCH(Dedicated Physical Channel)로 전송되는데, 이는 어떤 이동국에게 HS-DSCH를 통하여 data가 전송될 것임을 미리 알려주는 지시자(indicator) 역할을 하게 된다. 즉, HS-DSCH 지시자 비트가 정해지면 이동국은 공유 제어 채널(shared control channel)을 통하여 전송되는 제어 정보(control information)를 읽고, HS-DSCH 데이터 복구를 할 수 있게 된다.

HS-DSCH 지시자(HI)의 전송 타이밍은 한 슬롯 구간 (0.67 ms)만큼 가변성을 가질 수 있으며, HS-DSCH와 공유 제어 채널은 중복구간을 가지도록 할 수 있으며, 공유 제어 채널이 먼저 전송되고, 이후에 HS-DSCH가 전송된다. 이때 전송지연을 줄이려는 목적으로 이 두 채널의 중복 구간을 가능한 한 많게 하여 전송 할 수 있다.

상기 제어 프레임들 중에서 무선 인터페이스 파라미터 업데이트시의 제어 프레임 포맷은 도 7에 도시된 바와 같다. 도 7를 참조하면, 파라미터의 존재 유무를 나타내는 2 바이트의 플래그 필드와, 8바이트의 CFN(Connection Frame Number), 5비트의 TPC(Transmit Power Control) 파워 오프셋(PO: Power Offset), 그리고 1비트의 DPC(Downlink Power Control) 모드 정보의 업데이트(Update)시에 사용되고 있다. 전체 4 바이트 이상의 페이로드로 구성된다.

현재 고속 패킷 서비스를 위한 HS-DSCH(High Speed Downlink Shared Channel)를 위한 물리 계층에서의 채널 형태나 물리 채널에 담겨지는 정보들에 대해서는 정의가 되어지고 있으나, 아직 HS-DSCH를 위해 기지국과 기지국 제어국, 기지국 제어국과 다른 기지국 제어국 사이에서의 상위 계층 제어 메시지나 프레임에 대해서는 정해진 바가 없다.

따라서 기존의 다운링크 공유채널(DSCH: Downlink Shared Channel)에서 사용하던 제어 메시지나 프레임만으로는 HS-DSCH에 새로이 생긴 물리 채널들에 담겨지는 정보들을 다 지원할 수 없으므로 HS-DSCH의 높은 성능을 보장하기 힘들게 된다.

따라서 HS-DSCH를 올바로 작동시키기 위해서는 HS-DSCH에 맞도록 새로이 제어 메시지와 프레임이 제안되어져야 한다. 예를 들어 HS-DSCH의 작동을 위해서는 연관된 DPCCH로 HS-DSCH 지시자 비트가 전송되어지는데, 이 연관된 DPCCH의 소프트 핸드오버가 발생한 경우에 HS-DSCH 지시자(HI) 필드에 대한 전력 제어를 수행해 주자는 제안이 나오고, 또한 연관된 DPCCH의 소프트 핸드오버가 발생한 경우에 HI(HS-DSCH Indicator) 필드에 대한 전력 제어를 수행하는데 있어서 프라이머리 셀(primary cell)인 경우와 프라이머리 셀이 아닌(non-primary cell) 경우를 구분하여 전력 제어를 해 주는 방법도 제안되고 있으나 현재의 3GPP Release 99/Release 4용 제어 메시지나 프레임으로는 이를 지원해 주지 못한다.

발명이 이루고자 하는 기술적 과제

본 발명은 상기한 종래의 문제점을 해결하기 위해 안출된 것으로서, 고속 다운링크 제어채널에 새로이 생긴 물리 채널들에 담겨지는 정보를 지원할 수 있도록 제어 메시지 또는 제어 프레임을 제시할 수 있도록 한 이동통신 시스템에서 고속 다운링크 공유채널을 위한 제어정보 전송방법을 제공함에 그 목적이 있다.

본 발명의 다른 특징은 고속 다운링크 제어채널의 전력 제어를 위한 제어 메시지 또는 제어 프레임이 기지국과 기지국 제어국간, 기지국 제어국과 기지국 제어국간에 사용되어 지는 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유채널을 위한 제어정보 전송방법을 제공함에 그 목적이 있다.

본 발명의 또 다른 특징은 고속 다운링크 공유채널에 대한 제어 정보를 사용자 평면을 통해 제어 프레임 형태로 전달하거나, 제어 평면으로 NABP나 RNSAP 메시지의 형태로 전달할 수 있도록 한 이동통신 시스템에서 고속 다운링크 공유채널을 위한 제어정보 전송방법을 제공함에 그 목적이 있다.

본 발명의 또 다른 특징은 고속 다운링크 공유 제어채널에 연관된 전용 물리적 제어채널의 소프트 핸드오버가 발생한 경우에 대해서 실시 예 별로, HS-DSCH 지시자(HS-DSCH Indicator) 필드에 대한 전력 제어를 수행할 수 있도록 한 이동통신 시스템에서 고속 다운링크 공유채널을 위한 제어정보 전송방법을 제공함에 그 목적이 있다.

발명의 구성 및 작용

상기한 목적 달성을 위한, 본 발명에 따른 이동통신 시스템에서 고속 다운링크 공유채널을 위한 제어정보 전송방법은,

이동 통신 시스템에서 전용 물리적 제어 채널(DPCCH)이 소프트 핸드오버 상태이고, 하나의 기지국에서만 고속 다운링크 공유 채널(HS-DSCH)이 전송될 때 고속 다운링크 공유 채널을 위한 제어 정보를 전송하는 방법에 있어서,

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고속 다운링크 공유 채널(HS-DSCH)에 연계된 전용 물리적 전용 채널의 HS-DSCH 지시자 필드에 대한 전력 제어를 위해서, 제어 평면에서 보내지는 HS-DSCH 지시자 파워 오프셋 값에 대한 정보를 넣은 필드를 추가한 제어 프레임을 사용하는 것을 특징으로 한다.

바람직하게, 상기 제어 프레임 내에는 적어도 7비트 이상으로 연관된 HS-DSCH 지시자 파워 오프셋 필드를 포함하는 것을 특징으로 한다.

본 발명의 다른 특징은 이동 통신 시스템에서 전용 물리적 제어 채널(DPCCH)이 소프트 핸드오버 상태이고, 하나의 기지국에서만 고속 다운링크 공유 채널(HS-DSCH)이 전송될 때 고속 다운링크 공유 채널을 위한 제어 정보를 전송하는 방법에 있어서, HS-DSCH에 연계된 전용 물리적 제어 채널의 HS-DSCH 지시자 필드에 대한 전력 제어를 위해서, 제어 평면에서 HS-DSCH 지시자 파워 오프셋 값에 대한 정보를 위한 새로운 파라미터를 추가한 형태의 제어 메시지를 사용하는 것을 특징으로 한다.

바람직하게, 상기 제어 메시지는 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 파워 제어를 위해 NBAP나 RNSAP 메시지 안에 HS-DSCH 지시자 파워 오프셋 값을 넣는 것을 특징으로 한다.

본 발명의 다른 특징은 이동 통신 시스템에서 전용 물리적 제어 채널(DPCCH)이 소프트 핸드오버 상태이고, 하나의 기지국에서만 고속 다운링크 공유 채널(HS-DSCH)이 전송될 때 고속 다운링크 공유 채널을 위한 제어 정보를 전송하는 방법에 있어서, HS-DSCH에 연계된 전용 물리적 제어 채널의 HS-DSCH 지시자 필드에 대한 전력 제어를 위해서 사용자 평면에서 프라이머리 셀과 프라이머리 아닌 셀에 대한 HS-DSCH 지시자 파워 오프셋 값에 대한 정보를 넣는 새로운 필드를 추가한 형태의 제어 프레임을 사용하는 것을 특징으로 한다.

바람직하게, 상기 HS-DSCH를 보내는 셀이 프라이머리가 아닌 셀인 경우에는 다른 셀에서 사용하는 HS-DSCH 지시자 파워 오프셋과 동일한 파워 오프셋을 사용하는 것을 특징으로 한다.

상기와 같이 구성되는 본 발명에 따른 이동통신 시스템에서 고속 다운링크 공유채널을 위한 제어정보 전송방법에 대하여 첨부된 도면을 참조하여 설명하면 다음과 같다.

일반적인 통신 프로토콜들은 도 8과 같은 제어 평면과 도 9와 같은 사용자 평면 프로토콜로 나뉜다. 도 8은 UMTS Radio Network 제어 평면 프로토콜을 나타낸 도면이고, 도 9는 UMTS Radio Network 사용자 평면 프로토콜을 나타낸 도면이다. 이는 시스템 전체에서 제어를 위한 목적의 제어 시그널링과 실제적인 end-user data를 구별하여 보내는 것이 일반적이기 때문이다.

UMTS(Universal Mobile Telecommunications System) 프로토콜들 중에서 무선 망에서 사용되는 제어 평면 프로토콜들로는 도 8에 도시된 바와 같이 무선 자원 제어국(RRC: Radio Resource Control), RANAP(Radio Access Network Application Part), RNSAP(Radio Network Subsystem Application Part), NBAP(Node B Application Part) 등이 있다.

각각의 프로토콜들이 사용되는 인터페이스는 도 8 및 도 9와 같다.

도 8 및 도 9를 참조하면, 이동국(UE)과 기지국 제어국(RNC) 간에 사용되는 프로토콜은 RRC 프로토콜이며 기지국(Node B)과 기지국 제어국(RNC) 간 Iub 인터페이스에 사용되는 프로토콜은 NBAP, 기지국 제어국과 기지국 제어국 간 Iur 인터페이스에 사용되는 프로토콜은 RNSAP, 기지국 제어국과 핵심망(Core Network; CN)의 MSC(Mobile Services Switching Center)/VLR(Visitor Location Register) 또는 SGSN(Serving GPRS Support Node)간 Iu 인터페이스에 사용되는 프로토콜은 RANAP이다. 이러한 Radio Network 제어 평면 Protocol들은 클라이언트-서버 원칙 환경하에 존재한다. 즉, Iu 인터페이스에서는 UTRAN이 무선 액세스 서버 역할을 하고 핵심망(CN)이 UTRAN에 액세스 서비스를 요청하는 클라이언트(client)의 역할을 한다.

마찬가지로 Iub 인터페이스에서는 기지국이 서버 역할을 하고 제어국(RNC)이 클라이언트 역할을 하며, Iur 인터페이스에서는 목적지 제어국(DRNC: Drift RNC)가 서버 역할을 하고 서빙 제어국(SRNC)가 원격(remote) 기지국들에 대한 제어서비스를 요청하는 클라이언트 역할을 한다.

이러한 NBAP, RNSAP, RANAP 메시지들에는 기지국과 기지국 제어국, 기지국 제어국과 기지국 제어국간, 그리고 핵심망과 기지국 제어국간의 모든 구간에 걸쳐 있는 무선 액세스 베어러(Radio Access Bearer)에 대한 자원들에 대한 다양한 제어 메시지들이 포함된다.

여기서, 사용자 평면으로 보내게 되는 경우에는 제어 프레임(Control Frame)의 형태로 전달되며, 제어 평면으로 보내게 되는 경우에는 NBAP(기지국과 기지국 제어국간의 인터페이스에 쓰이는 3GPP의 제어평면 프로토콜)이나 RNS

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AP(기지국 제어국과 기지국 제어국간의 인터페이스에 쓰는 제어평면 프로토콜) 메시지의 형태로 전달된다.

이러한 사용자 평면이나 제어 평면에서 보내어지는 무선 인터페이스 파라미터 업 데이트 제어 프레임에, HS-DSCH에 연관된 전용 물리적 제어 채널(DPCCH)의 소프트 핸드오버가 발생한 경우에 HS-DSCH 지시자(HI) 필드에 대한 전력 제어를 수행해 주기 위해 새로운 제어 프레임으로 하기의 실시 예와 같은 방법을 제시하고자 한다.

제 1실시 예;

사용자 평면에서 HS-DSCH 지시자(HI) 필드에 대한 전력 제어를 위해 종래 도 7과 같은 무선 인터페이스 파라미터 업 데이트(RADIO INTERFACE PARAMTER UPDATE) 제어 프레임에, 연관된 전용 물리적 제어 채널(associated DPCCH)의 소프트 핸드오버(soft handover)시에 도 10과 같은 HS-DSCH 지시자 파워 오프셋(HI PO) 값에 대한 필드를 추가해 준다. 즉, 도 7과 같은 무선 인터페이스 파라미터 업 데이트 제어 프레임에 HS-DSCH 지시자의 파워 제어를 위한 HS-DSCH 파워 오프셋 값에 대한 필드를 추가한 제어 프레임을 사용하게 된다.

그 실시 예로서, 도 10을 참조하면, 무선 인터페이스 파라미터 업데이트 제어 프레임은 파라미터의 존재 유무를 지시하는 무선 인터페이스 파라미터 업데이트 플래그 필드를 2 바이트로 구성하고, 그 다음에 연결 제어 프레임 필드를 1 바이트로 구성하며, 그 다음에 TPC 파워 오프셋(TPC TO)와 DPC 모드를 삽입하고 그 나머 지에 스페어 비트 정보 필드 삽입하여 1 바이트로 구성하고, 1 바이트 중 적어도 7비트 이상으로 연관된 HS-DSCH 지시자 파워 오프셋 필드로 구성한다. 이러한 연관된 HS-DSCH 지시자 파워 오프셋 필드는 가변적이며, 만약 연관된 HS-DSCH 지시자 파워 오프셋 필드가 7비트일 경우 1비트의 스페어 비트를 포함하는 포맷으로 구성된다. 전체 페이로드는 5 바이트 이상으로 구성한다.

이와 같은 제 1 실시예에 적용되는 무선 인터페이스 파라미터 업 데이터 제어 프레임은 사용자 평면에서 HS-DSCH 지시자 필드에 대한 전력 제어를 위해, 연관된 전용 물리적 제어 채널의 소프트 핸드오버시에 HS-DSCH 지시자 파워 제어를 위한 오프셋 값(HI PO)을 넣는 필드를 추가하여 이를 통해 고속 다운링크 공유 채널의 전력 제어를 수행하고자 한다.

제 2실시 예;

사용자 평면에서 HS-DSCH 지시자(HI) 필드에 대한 전력 제어를 위해 도 11과 같은 제어 프레임을 사용하고자 한다. 도 11과 같은 제어 프레임은 내부에 연관된 전용 물리적 제어채널(DPCCH)의 소프트 핸드오버시에 HS-DSCH 지시자 전력 제어를 위한 HS-DSCH 파워 오프셋 값(HI-PO)넣은 필드를 사용하여, 이를 통해 고속 다운링크 공유 채널의 전력 제어를 수행하고자 한다.

그 실시 예로서, 도 11을 참조하면, 연결 프레임 넘버 필드를 1 바이트로 구성하는데, 이러한 연결 프레임 넘버 필드는 포함할 수도 있고 포함 하지 않을 수도 있다. 그 다음으로 적어도 7비트 이상으로 구성된 HS-DSCH 지시자 필드에 대한 파워 오프셋 값을 넣는 필드(HI PO)를 삽입하고 그 이외의 1비트는 스페어 비트로 하 여 1바이트로 구성하고, 제어 프레임의 마지막에는 스페어 확장 필드를 삽입해 준다. 이때, 상기 HS-DSCH 지시자 필드에 대한 파워 오프셋 값을 넣는 필드의 길이는 가변적이다.

도 11에 제시된 제어 프레임에는 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 지시자 파워 제어를 위한 HS-DSCH 지시자 파워 오프셋 값을 삽입함으로써, 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 지시자를 위한 전력 제어 정보를 전송해 준다.

제 3실시 예;

제어 평면에서 HS-DSCH 지시자 전력 제어를 위해 기지국과 기지국 제어국간의 인터페이스 프로토콜인 NBAP 메시지 또는 기지국 제어국과 기지국 제어국간의 인터페이스 프로토콜인 RNSAP 메시지 내에 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 지시자 필드(HI)에 대한 파워 오프셋(HI-PO) 값을 넣는다.

즉, HS-DSCH에 연계된 DPCCH의 소프트 핸드오버가 발생한 경우에 HS-DSCH 지시자 필드에 대한 전력 제어를 위해서 제어 평면에서 HS-DSCH 파워 오프셋 값에 대한 정보를 새로운 파라미터 형태로 추가한 형태의 제어 메시지를 사용하여 기지국과 기지국 제어국 또는 기지국 제어국 간의 인터페이스시에 알려주게 된다.

제 4실시 예;

사용자 평면에서 HS-DSCH 지시자 필드에 대한 전력 제어를 위해 무선 인터페이스 파라미터 업 데이트 제어 프레임에 연관된 DPCCH의 소프트 핸드오버시에 SSDT의 Uplink 시그널링이 사용되는 경우, 프라이머리 셀(primary cell)

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에서의 HS-DSCH 지시자 필드(HI)에 대한 파워 오프셋 값과 프라이머리가 아닌 셀(non-primary cell)에서의 HS-DSCH 지시자 필드(HI)에 대한 파워 오프셋 값의 필드를 추가한 형태의 제어 프레임을 사용한다. 이러한 실시 예로서, 무선 인터페이스 파라미터 업데이트 제어 프레임의 포맷은 도 12 또는 도 13과 같다.

도 12를 참조하면, 무선 인터페이스 파라미터 업데이트 제어 프레임의 포맷은 상기 제어 프레임은 파라미터의 존재 유무를 나타내는 2 바이트의 무선 인터페이스 파라미터 업데이트 플래그 필드와, 선택적으로 구성할 수 있는 1 바이트의 연결 프레임 넘버 필드와, TPC 파워 오프셋(TPC PO) 및 DPC 모드의 정보 필드를 1바이트로 구성하고, 1바이트 중 적어도 7비트 이상의 연관된 DPCCH의 HS-DSCH 지시자 필드에 대한 전력 제어를 위한 HS-DSCH 지시자 필드 파워 오프셋 값을 포함하는 필드(HI PO)와, 적어도 7 비트 이상의 연관된 DPCCH의 소프트 핸드오버시에 프라이머리 셀에 속하는 전용 물리적 제어 채널(DPCCH)에 적용되는 HI 필드에 대한 파워 오프셋 값의 정보필드(HI PO_primary)와, 그 이외에 스페어 확장 필드로 구성된다. 전체 페이로드는 6 바이트 이상으로 구성한다. 여기서는, 연결 프레임 넘버(CFN) 필드는 포함할 수도 있고 포함 안될 수 도 있다. 여기서, 프라이머리 셀에서 사용하는 HS-DSCH 지시자 필드(HI)에 대한 파워 오프셋 값을 넣는 필드의 길이는 가변적이다. 그리고 제어 프레임은 상기와 같은 헤더 정보를 포함하고 있기 때문에 전체 페이로드는 6바이트 이상이 된다.

도 12와 같은 제어 프레임은 HS-DSCH 지시자를 보내는 셀이 프라이머리 셀일 때에는 다른 셀에서 사용하는 HS-DSCH 지시자(HI) 파워 오프셋과 다른 파워 오프셋(HI-PO_primary)을 사용하게 된다.

도 13을 참조하면, 상기 무선 인터페이스 파라미터 업데이트 제어 프레임은 2바이트의 무선 인터페이스 파라미터 업데이트 플래그 필드, 1바이트의 연결 프레임 넘버(CFN: Connection Frame Number) 필드, 1바이트의 TPC 파워 오프셋(TPC PO) 및 DPC 모드로 구성된 필드, 1바이트 중 적어도 7비트 이상의 연관된 전용 물리적 제어 채널(DPCCH)의 소프트 핸드오버시에 HS-DSCH 지시자를 전송하는 DPCCH들에 적용되는 HS-DSCH 지시자 파워 오프셋 값을 실은 필드(HI PO)와, 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 지시자 값을 전송하는 DPCCH들 중 프라이머리 셀에 속하는 DPCCH에 적용되는 HS-DSCH 지시자 파워 오프셋 값(HI PO_primary)의 필드, 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 시지자를 전송하는 DPCCH들 중 프라이머리가 아닌 셀에 속하는 DPCCH에 적용되는 HS-DSCH 지시자 파워 오프셋 값(HI PO_non_primary) 필드와, 그리고 나머지 스페어 확장 필드를 포함하는 포맷으로 구성된다. 여기서, 프라이머리 셀에서 사용하는 HS-DSCH 지시자 필드에 대한 파워 오프셋 값 필드와 프라이머리가 아닌 셀에서 사용하는 HS-DSCH 지시자 필드의 파워 오프셋 값 필드는 가변적이며, 연결 프레임 넘버는 포함될 수도 있고 안 될 수 도 있다. 그리고 상술한 헤더 정보를 포함하기 때문에 전체 페이로드는 7바이트 이상이 된다.

도 13과 같은 제어 프레임은 HS-DSCH를 보내는 셀이 프라이머리가 아닌 셀일 때에도 다른 기지국에서 사용하는 HS-DSCH 파워 오프셋과 다른 파워 오프셋(HI PO_non_primary)을 사용하는 경우이다.

도 12 및 도 13에서는 프라이머리 셀에서 사용하는 HS-DSCH 지시자 파워 오프셋 값은 HSD-DSCH를 보내는 셀이 프라이머리 셀인 경우에 적용시킬 파워 오프셋이다.

제 5 실시 예;

사용자 평면에서 HS-DSCH 필드에 대한 전력 제어를 위해 새로이 만든 제어 프레임을 사용하게 되는데, 이 새로운 제어 프레임 내에 연관된 전용 물리적 제어채널(DPCCH)의 소프트 핸드오버시에 프라이머리 셀에서의 HS-DSCH 지시자(HI) 파워 오프셋 값과 프라이머리가 아닌 셀에서의 HS-DSCH 지시자(HI) 파워 오프셋 값을 넣는다.

이러한 제어 프레임의 형태는 도 14 또는 도 15와 같다.

도 14는 HS-DSCH를 보내는 셀이 프라이머리 셀이 아닐 때 다른 셀에서 사용하는 HS-DSCH 지시자 파워 오프셋과 동일한 파워 오프셋(HI PO)을 사용하는 경우이다.

도 14의 제어 프레임은, 1 바이트의 연결 프레임 넘버 필드(CFN)와, 적어도 7비트 이상의 HS-DSCH 지시자 필드에 대한 파워 오프셋을 넣는 필드(HI PO), 프라이머리 셀에서 사용하는 HS-DSCH 지시자 필드에 대한 파워 오프셋 필드(HI PO_primary), 스페어 확장 필드로 구성되며, 전체 페이로드는 3바이트 이상으로 구성된다. 여기서는 연결 프레임 넘버 필드는 포함될 수도 있고 안될 수도 있으며, 파라미터 존재 유무를 가리키는 플래그 필드는 첨가할 수도 있다.

도 15는 HS-DSCH를 보내는 셀이 프라이머리가 아닌 셀일 때에도 다른 셀에서 사용하는 HS-DSCH 지시자 파워 오프셋과 다른 파워 오프셋(HI PO_non_primary)을 사용하는 경우이다.

도 15의 제어 프레임은 1바이트의 연결 프레임 넘버와, 적어도 7비트 이상의 HS-DSCH 지시자 필드에 파워 오프셋 값(HI PO)을 넣은 필드, 적어도 7비트 이상으로 구성된 프라이머리 셀에서 사용하는 HS-DSCH 지시자 필드에 대한

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파워 오프셋 값을 넣는 필드(HI PO_primary), 적어도 7비트 이상으로 구성된 프라이머리가 아닌 셀에서 사용하는 HS-DSCH 지시자 필드에 대한 파워 오프셋 값을 넣은 필드(HI PO_non_primary), 스페어 확장 필드로 구성되며, 전체 페이로드는 4바이트 이상으로 구성된다. 여기서, 연결 프레임 넘버는 포함 될 수도 있고 안될 수도 있으며, 파라미터의 존재 유무를 가리키는 플래그 필드를 첨가할 수도 있다.

제 6실시 예;

제어 평면에서 HS-DSCH 지시자 파워 제어를 위해 기지국과 기지국 제어국간의 인터페이스 프로토콜인 NBAP 또는 기지국 제어국과 기지국 제어국간의 인터페이스 프로토콜인 RNSAP 메시지 내에 연관된 전용 물리적 제어 채널(DPCCH)의 소프트 핸드오버시에 프라이머리 셀에서의 HS-DSCH 지시자 파워 오프셋 값과 주가 아닌 기지국에서의 HS-DSCH 파워 오프셋 값을 넣어서 알려 준다.

이러한 실시 예들에서 정의된 제어 프레임 또는 제어 메시지는 HS-DSCH에 연계된 전용 물리적 제어 채널의 소프트 핸드오버가 발생한 경우에 HS-DSCH 지시자 필드의 전력 제어를 수행하기 위해서, 기지국과 기지국 제어국간, 기지국 제어국과 기지국 제어국 간에 사용되어 지며, HS-DSCH 제어 정보를 사용자 평면에서 제어 프 레임 형태로 전달하거나, 제어 평면에서 NBAP 메시지나 RNSAP 메시지의 형태로 전달되도록 한다.

발명의 효과

이상에서 설명한 바와 같이, 본 발명에 따른 이동통신 시스템에서 고속 다운링크 공유채널에 대한 제어정보 전송방법에 의하면, UMTS 무선 인터페이스 프로토콜에서는 HS-DSCH와 연관된 전용 물리적 제어채널의 소프트 핸드오버가 발생한 경우에 HS-DSCH 지시자(HS-DSCH Indicator) 필드에 대한 전력 제어를 위해 필요한 정보를 기지국(Node B)과 기지국 제어국(RNC)간, 그리고 기지국 제어국과 기지국 제어국 간에 알려주는 메시지나 프로시저를 정의하여, 기존의 DSCH에서 사용하던 제어 메시지나 프레임 만으로는 HS-DSCH에 새로이 생긴 물리 채널들에 담겨지는 정보들을 모두 지원할 수 없었던 것을 지원 가능하게 함으로써, HS-DSCH의 높은 성능을 보장할 수 있는 효과가 있다.

또한, HS-DSCH와 연관된 전용 물리적 제어채널의 소프트 핸드오버시에 HS-DSCH 지시자 필드에 대한 전력 제어를 위한 정보를 전달하기 위한 제어 평면 또는 사용자 평면에서의 메시지 또는 프레임 포맷과 각각에 따른 프로시저를 정의함으로써 3GPP 비동기 시스템과 단말기에서 HS-DSCH를 위한 HS-DSCH 지시자 필드에 대한 전력 제어를 수행할 수 있게 해준다.

그리고, 본 발명에서 제시한 제어 메시지나 프레임 형태와 프로시저를 사용하면 무선 링크가 처음 셋업 될 때 뿐 아니라 이동국의 이동이나 HS-DSCH 지시자를 전송하는 무선 링크들의 수의 변화에 따라 또는 HS-DSCH 지시자를 전송하는 셀이 프라이머리 셀인지 아니면 프라이머리가 아닌 셀인지에 따라 적절하게 HS-DSCH 지시자 파워 오프셋 값을 설정하여 이 정보를 알려 줄 수 있는 효과가 있다.

(57) 청구의 범위

청구항 1.
이동 통신 시스템에서 전용 물리적 제어 채널(DPCCH)이 소프트 핸드오버 상태이고, 하나의 기지국에서만 고속 다운링크 공유 채널(HS-DSCH)이 전송될 때 고속 다운링크 공유 채널을 위한 제어 정보를 전송하는 방법에 있어서,

고속 다운링크 공유 채널(HS-DSCH)에 연계된 전용 물리적 전용 채널의 HS-DSCH 지시자 필드에 대한 전력 제어를 위해서, 사용자 평면에서 보내지는 HS-DSCH 지시자 파워 오프셋 값에 대한 정보를 넣은 필드를 추가한 제어 프레임을 사용하는 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유채널에 대한 제어정보 전송방법.

청구항 2.
제 1항에 있어서,

상기 제어 프레임은 파라미터의 존재 유무를 나타내는 무선 인터페이스 파라미터 업 데이트 플래그 필드, 연결 프레임 넘버(CFN) 필드, TPC 파워 오프셋와 DPC 모드 및 스페어 비트 정보필드, 적어도 7비트 이상으로 연관된 HS-DSCH 지시자 파워 오프셋 필드를 포함하는 포맷으로 하는 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유채널에 대한 제어정보 전송방법.

청구항 3.
제 1항에 있어서,

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상기 제어 프레임은 선택적으로 포함되는 연결 프레임 넘버 필드와, 일정 비트 이상의 연관된 HS-DSCH 지시자 필드에 대한 파워 오프셋을 넣는 필드로 구성되는 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유채널에 대한 제어정보 전송방법.

청구항 4.
제 1항에 있어서,

상기 제어 프레임은 연계된 전용 물리적 제어채널의 소프트 핸드오버가 발생한 경우에 HS-DSCH 지시자 파워 오프셋 값에 대한 정보를 새로운 필드를 추가한 구성을 갖는 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유채널에 대한 제어정보 전송방법.

청구항 5.
이동 통신 시스템에서 전용 물리적 제어 채널(DPCCH)이 소프트 핸드오버 상태이고, 하나의 기지국에서만 고속 다운링크 공유 채널(HS-DSCH)이 전송될 때 고속 다운링크 공유 채널을 위한 제어 정보를 전송하는 방법에 있어서,

HS-DSCH에 연계된 전용 물리적 제어 채널의 HS-DSCH 지시자 필드에 대한 전력 제어를 위해서, 제어 평면에서 HS-DSCH 지시자 파워 오프셋 값에 대한 정보를 위한 새로운 파라미터를 추가한 형태의 제어 메시지를 사용하는 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유채널에 대한 제어정보 전송방법.

청구항 6.
제 5항에 있어서,

상기 제어 메시지는 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 파워 제어 를 위해 NBAP나 RNSAP 메시지 안에 HS-DSCH 지시자 파워 오프셋 값을 넣는 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유채널에 대한 제어정보 전송방법.

청구항 7.
이동 통신 시스템에서 전용 물리적 제어 채널(DPCCH)이 소프트 핸드오버 상태이고, 하나의 기지국에서만 고속 다운링크 공유 채널(HS-DSCH)이 전송될 때 고속 다운링크 공유 채널을 위한 제어 정보를 전송하는 방법에 있어서,

HS-DSCH에 연계된 전용 물리적 제어 채널의 HS-DSCH 지시자 필드에 대한 전력 제어를 위해서 사용자 평면에서 프라이머리 셀에 속하는 기지국과 프라이머리 셀이 아닌 셀에 속하는 기지국에 대한 HS-DSCH 지시자 파워 오프셋 값에 대한 정보를 넣는 새로운 필드를 추가한 형태의 제어 프레임을 사용하는 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유채널에 대한 제어정보 전송방법.

청구항 8.
제 7항에 있어서,

상기 HS-DSCH를 보내는 셀이 프라이머리가 아닌 셀에 속한 기지국인 경우에 다른 기지국에서 사용하는 HS-DSCH 지시자 파워 오프셋과 동일한 파워 오프셋을 사용하는 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유채널에 대한 제어정보 전송방법.

청구항 9.
제 7항에 있어서,

상기 제어 프레임은 파라미터의 존재 유무를 나타내는 무선 인터페이스 파라미터 업 데이트 플래그 필드와, 선택적으로 구성할 수 있는 연결 프레임 넘버 필드와, TPC 파워 오프셋 및 DPC 모드의 정보 필드, 적어도 7비트 이상의 연관된 DPCCH의 HS-DSCH 지시자 필드에 대한 전력 제어를 위한 HS-DSCH 지시자 필드 파워 오프셋 값을 포함하는 필드, 연관된 DPCCH의 소프트 핸드오버시에 프라이머리 셀에 속하는 DPCCH에 적용되는 HS-DSCH 파워 오프셋 값의 정보필드를 포함하는 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유채널에 대한 제어정보 전송방법.

청구항 10.
제 7항에 있어서,

상기 제어 프레임은 무선 인터페이스 파라미터 업데이트 플래그 필드, 연결 프레임 필드, TPC 파워 오프셋 및 DPC 모드의 정보 필드, 적어도 7비트 이상의 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 지시자를 전송하는 DPC

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CH들에 적용되는 HS-DSCH 지시자 파워 오프셋 값을 실은 필드와, 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 시시자 값을 전송하는 DPCCH들 중 프라이머리 셀에 속하는 DPCCH에 적용되는 HS-DSCH 지시자 파워 오프셋 값의 정보필드, 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 지지자를 전송하는 DPCCH들 중 프라이머리가 아닌 셀에 속하는 DPCCH에 적용되는 HS-DSCH 지시자 파워 오프셋 값의 정보필드를 포맷으로 하는 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유채널에 대한 제어정보 전송방법.

청구항 11.
제 7항에 있어서,

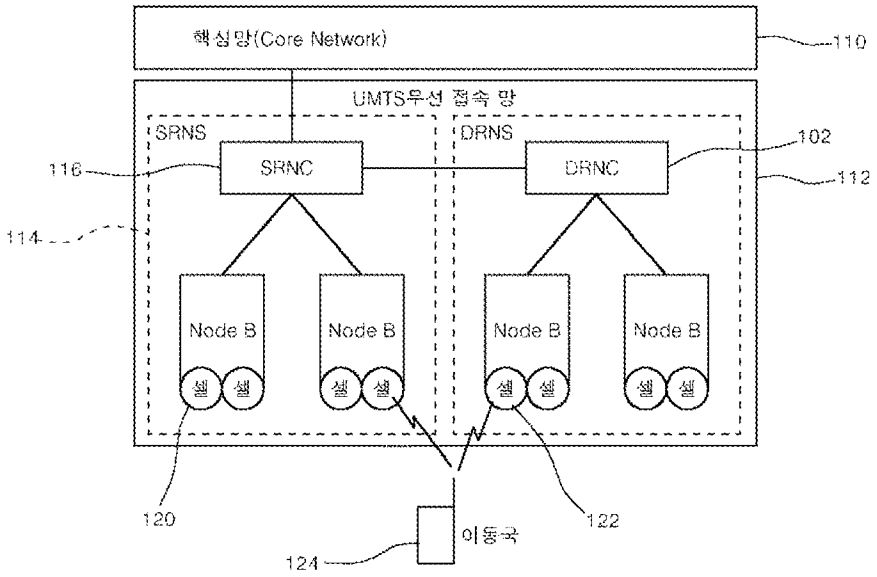
상기 제어 프레임은 선택적으로 구성된 연결 프레임 넘버 필드, 적어도 7비트 이상의 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 지시자를 전송하는 DPCCH들에 적용되는 HS-DSCH 지시자 파워 오프셋 값을 실은 필드, 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 지시자 값을 전송하는 DPCCH들 중 프라이머리 셀에 속하는 DPCCH에 적용되는 HS-DSCH 지시자 파워 오프셋 값의 정보필드 포맷으로 구성된 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유 채널에 대한 제어정보 전송방법.

청구항 12.
제 7항에 있어서,

상기 제어 프레임은 선택적으로 포함되는 연결 프레임 넘버 필드와, 적어도 7비트 이상의 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 지시자를 전송하는 DPCCH들에 적용되는 HS-DSCH 지시자 파워 오프셋 값을 실은 필드와, 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 지시자 값을 전송하는 DPCCH들 중 프라이머리 셀에 속하는 DPCCH에 적용되는 HS-DSCH 지시자 파워 오프셋 값의 정보필드, 연관된 DPCCH의 소프트 핸드오버시에 HS-DSCH 지시자를 전송하는 DPCCH들 중 프라이머리가 아닌 셀에 속한 기지국에 속하는 DPCCH에 적용되는 HS-DSCH 지시자 파워 오프셋 값의 정보필드를 포맷으로 하는 것을 특징으로 하는 이동통신 시스템에서 고속 다운링크 공유채널에 대한 제어정보 전송방법.

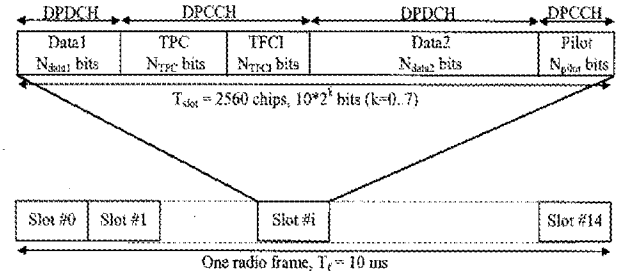
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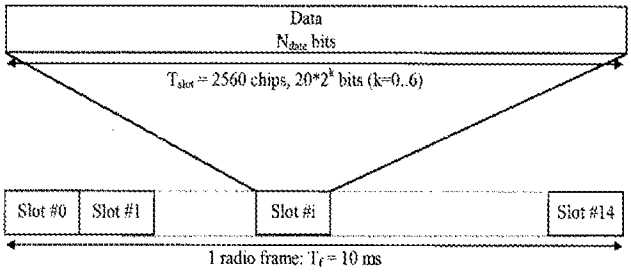


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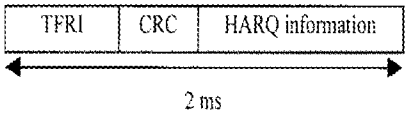
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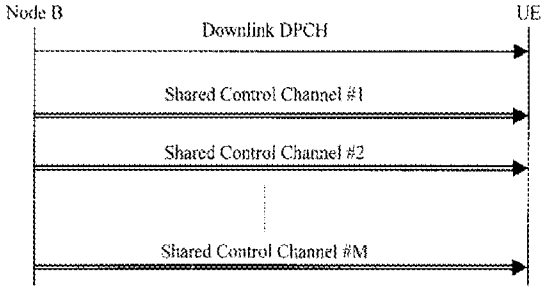
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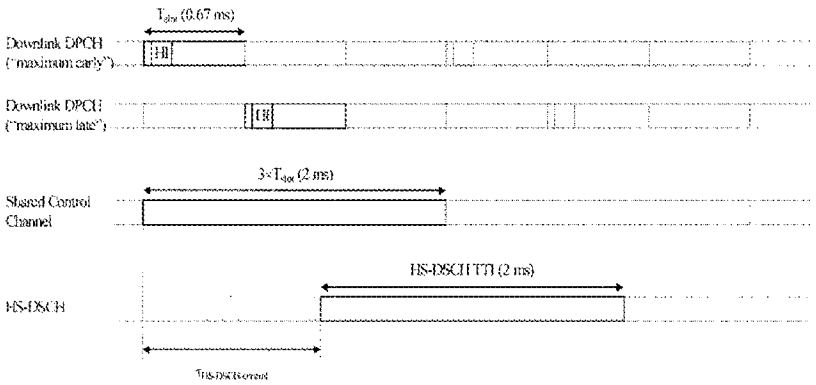
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도면5

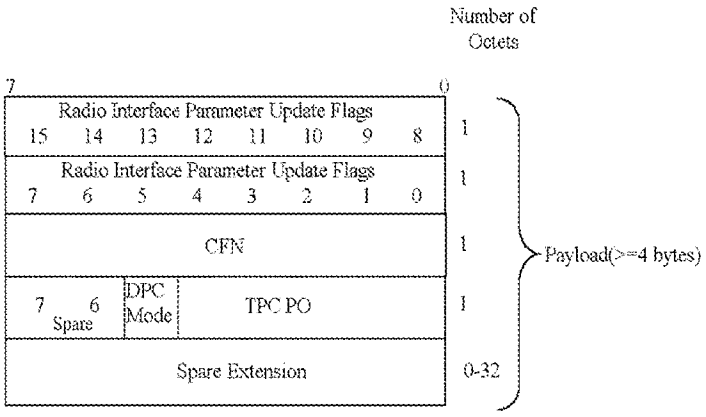


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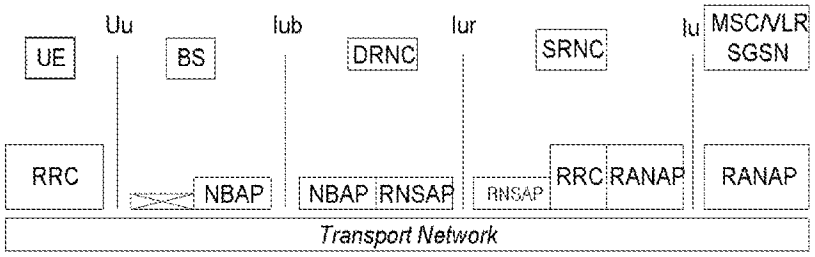


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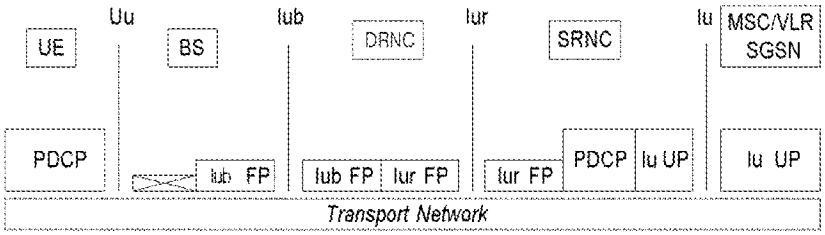
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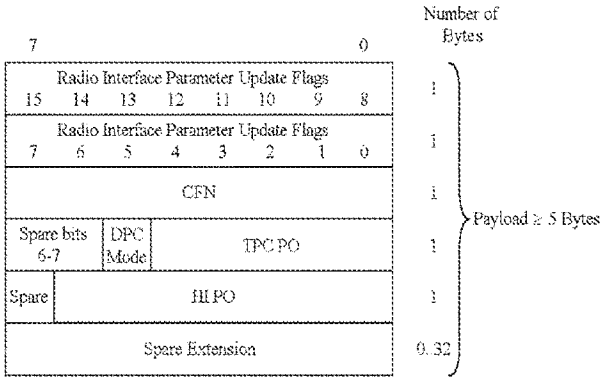
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도면9

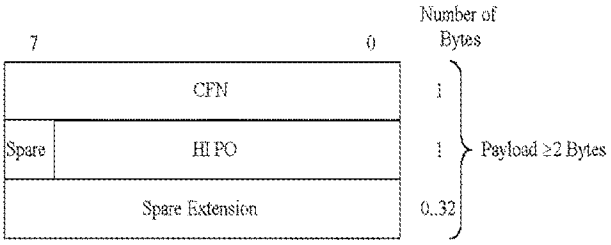


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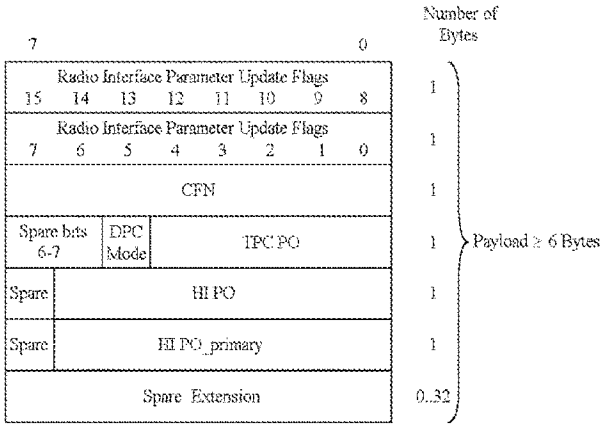


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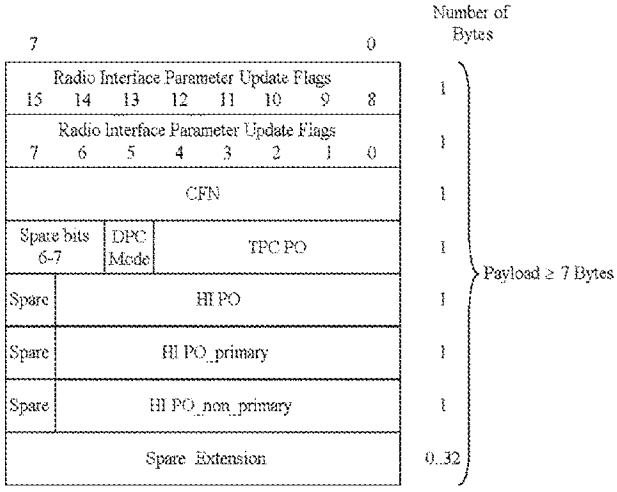
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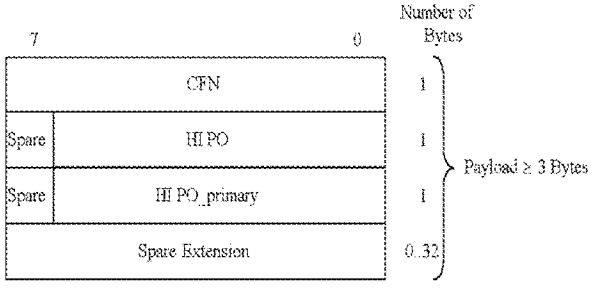
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도면13

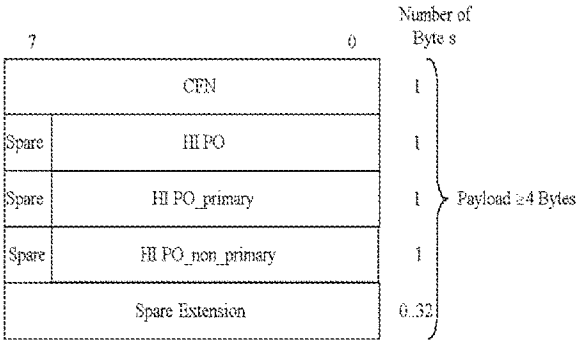


도면14



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도면15



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Electronic Patent Application Fee Transmittal

Application Number:	14869313
Filing Date:	29-Sep-2015
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Filer:	Abhik A. Huq/Sheila de Padilla
Attorney Docket Number:	SIG-2-0674US06

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	29438414
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Sheila de Padilla
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	08-JUN-2017
Filing Date:	29-SEP-2015
Time Stamp:	15:58:23
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$180
RAM confirmation Number	060917INTEFSW15592800
Deposit Account	220493
Authorized User	Sheila De Padilla

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

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.20 (Post Issuance fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	SIG_2_0674US06_SIDS_Letter_KoreanRef_20170608_EFS.PDF	61538 09bd22429bfe3612b6ad3b1e831694999eae7e99	no	3
Warnings:					
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Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
3	Foreign Reference	KR20030040972_and_English_Abstract_EFS.PDF	6310507 2887d4fed4fc3f1d3bb59fe421f8b170e3b4e204	no	15
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Information:					
		Total Files Size (in bytes):	7438155		

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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Zhang et al.
Application No.:	14/869,313
Confirmation No.:	1070
Filed:	September 29, 2015
For:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
Group:	2466
Examiner:	Brian S. Roberts

Our File:	SIG-2-0674US06
Date:	June 8, 2017

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB/08a. A copy of the cited document is enclosed.

Korean document KR 2003-0040972 (A) is submitted herewith in the Korean language with an English language Abstract.

This Application is a continuation of U.S. Patent Application No. 13/908,242, which was filed June 3, 2013, which issued December 15, 2015 as U.S. Patent No. 9,215,636, which is a continuation of U.S. Patent Application No. 13/308,950, filed December 1, 2011, which issued June 4, 2013 as U.S. Patent No. 8,457,072, which is a continuation of U.S. Patent Application No. 11/434,330, filed May 15, 2006, which

issued March 6, 2012 as U.S. Patent No. 8,130,720, which is a continuation of U.S. Patent Application No. 10/962,720, filed October 12, 2004, which issued May 16, 2006 as U.S. Patent No. 7,046,648, which claims priority from Provisional Application No. 60/578,674, filed June 10, 2004, Provisional Application No. 60/520,692, filed November 17, 2003, Provisional Application No. 60/519,990, filed November 14, 2003, and Provisional Application No. 60/517,656, filed November 5, 2003.

Applicants would like to bring the following Applications to the Examiner's attention: U.S. Patent Application No. 15/212,402 filed July 18, 2016 and U.S. Patent Application No. 15/212,403, filed July 18, 2016, both of which are continuations of U.S. Patent Application No. 13/236,133, filed September 19, 2011, which issued on September 6, 2016 as U.S. Patent No. 9,438,381; U.S. Patent Application No. 10/925,426, filed August 25, 2004, which issued September 20, 2011 as U.S. Patent No. 8,023,463; Provisional Application No. 60/585,174, filed July 2, 2004; Provisional Application No. 60/520,207, filed November 14, 2003; Provisional Application No. 60/508,797, filed October 3, 2003; Provisional Application No. 60/507,554, filed October 1, 2003; and Provisional Application No. 60/497,747, filed August 25, 2003.

This Supplemental Information Disclosure Statement is being filed after the mailing of a Notice of Allowance on May 24, 2017. The required fee under 37 CFR 1.17(p) of $180.00 is enclosed herewith. If any additional fees are required, the

Commissioner is authorized to charge any fees due or credit any overpayment to Volpe and Koenig's Deposit Account No. 22-0493.

It is respectfully requested that the Examiner consider the document and return an initialed copy of the PTO Form SB/08a indicating consideration of the cited material.

Respectfully submitted,

SIGNAL TRUST FOR WIRELESS INNOVATION

By /Abhik A. Huq/
Abhik A. Huq
Registration No. 40,656

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
Philadelphia, PA 19103
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

AAH/srp
Enclosures (2)

1. Form PTO/SB/08a with Certification
2. Korean reference KR2003-0040972(A) and English Abstract

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

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20030147370	A1	2003-08-07	Wu, Chih-Hsiang	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14869313
	Filing Date	2015-09-29
	First Named Inventor	Guodong Zhang
	Art Unit	2466
	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

	1	

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2017-06-08
Name/Print	Abhik A. Huq	Registration Number	40,656

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

Electronic Patent Application Fee Transmittal

Application Number:	14869313
Filing Date:	29-Sep-2015
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Filer:	Abhik A. Huq/Sheila de Padilla
Attorney Docket Number:	SIG-2-0674US06

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	29438740
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Sheila de Padilla
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	08-JUN-2017
Filing Date:	29-SEP-2015
Time Stamp:	16:33:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	SIG_2_0674US06_SIDS_Letter_WU_reference_20170608_EFS.PDF	740821 eb887bfd053de539b42c6b75c9e1bce92ccac283	no	3

Warnings:

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	SIG_2_0674US06_SIDS_SB08a_WU_20030147370_20170608_EFS.PDF	1035166 9821d8b97942826e1616f3abe4b2007f015bbe85	no	4
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30925 a207a1884608e79334aa7edfc77d5a0d1493de8c	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	1806912	

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the **PATENT APPLICATION** of:	
	Zhang et al.
Application No.:	14/869,313
Confirmation No.:	1070
Filed:	September 29, 2015
For:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
Group:	2466
Examiner:	Brian S. Roberts

Our File:	SIG-2-0674US06
Date:	June 8, 2017

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

Further to Applicant's Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicant wishes to bring to the Examiner's attention the material cited on the enclosed PTO Form SB/08a. Pursuant to C.F.R. §1.98(a)(2)(ii), copies of the cited U.S. publications and/or patent documents have not been included.

This Application is a continuation of U.S. Patent Application No. 13/908,242, which was filed June 3, 2013, which issued December 15, 2015 as U.S. Patent No. 9,215,636, which is a continuation of U.S. Patent Application No. 13/308,950, filed December 1, 2011, which issued June 4, 2013 as U.S. Patent No. 8,457,072, which is a continuation of U.S. Patent Application No. 11/434,330, filed May 15, 2006, which issued March 6, 2012 as U.S. Patent No. 8,130,720, which is a continuation of U.S.

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

Applicants would like to bring the following Applications to the Examiner's attention: U.S. Patent Application No. 15/212,402 filed July 18, 2016 and U.S. Patent Application No. 15/212,403, filed July 18, 2016, both of which are continuations of U.S. Patent Application No. 13/236,133, filed September 19, 2011, which issued on September 6, 2016 as U.S. Patent No. 9,438,381; U.S. Patent Application No. 10/925,426, filed August 25, 2004, which issued September 20, 2011 as U.S. Patent No. 8,023,463; Provisional Application No. 60/585,174, filed July 2, 2004; Provisional Application No. 60/520,207, filed November 14, 2003; Provisional Application No. 60/508,797, filed October 3, 2003; Provisional Application No. 60/507,554, filed October 1, 2003; and Provisional Application No. 60/497,747, filed August 25, 2003.

This Supplemental Information Disclosure Statement is being filed after the mailing of a Notice of Allowance on May 24, 2017. The required fee under 37 CFR 1.17(p) of $180.00 is enclosed herewith. If any additional fees are required, the Commissioner is authorized to charge any fees due or credit any overpayment to Volpe and Koenig's Deposit Account No. 22-0493.

It is respectfully requested that the Examiner consider the document and return an initialed copy of the PTO Form SB/08a indicating consideration of the cited material.

Respectfully submitted,

SIGNAL TRUST FOR WIRELESS INNOVATION

By /Abhik A. Huq/
Abhik A. Huq
Registration No. 40,656

Volpe and Koenig, P.C.
United Plaza
30 South 17th Street
Philadelphia, PA 19103
Telephone: (215) 568-6400
Facsimile: (215) 568-6499

AAH/srp
Enclosure: Form PTO/SB/08a with Certification

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

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	20030040972	KR	A	2003-05-23	LG Electronics Inc.	English Translation of Abstract included	X

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

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14869313
	Filing Date	2015-09-29
	First Named Inventor	Guodong Zhang
	Art Unit	2466
	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

	1	

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

EXAMINER SIGNATURE

Examiner Signature	/BRIAN S ROBERTS/	Date Considered	06/11/2017

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2017-06-08
Name/Print	Abhik A. Huq	Registration Number	40,656

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

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.H./

Privacy Act Statement

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

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

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

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

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

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

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

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

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
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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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20030147370	A1	2003-08-07	Wu, Chih-Hsiang	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. IPR2023-01270 Page 861

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14869313
	Filing Date	2015-09-29
	First Named Inventor	Guodong Zhang
	Art Unit	2466
	Examiner Name	Brian S. Roberts
	Attorney Docket Number	SIG-2-0674US06

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EXAMINER SIGNATURE

Examiner Signature	/BRIAN S ROBERTS/	Date Considered	06/11/2017

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Abhik A. Huq/	Date (YYYY-MM-DD)	2017-06-08
Name/Print	Abhik A. Huq	Registration Number	40,656

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

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Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.S./ IPR2023-01270 Page 864

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United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/869,313	09/29/2015	Guodong Zhang	SIG-2-0674US06	1070

3624 7590 06/19/2017

VOLPE AND KOENIG, P.C.
UNITED PLAZA
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103

EXAMINER
ROBERTS, BRIAN S

ART UNIT	PAPER NUMBER
2466	

NOTIFICATION DATE	DELIVERY MODE
06/19/2017	ELECTRONIC

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

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

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

eoffice@volpe-koenig.com

UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
Address : COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
14/869,313	29 September, 2015	ZHANG ET AL.	SIG-2-0674US06

VOLPE AND KOENIG, P.C.
UNITED PLAZA
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103

EXAMINER	
BRIAN ROBERTS	
ART UNIT	PAPER
2466	20170612

DATE MAILED:

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

Commissioner for Patents

The IDSs filed on 06/08/2017 have been considered.

/BRIAN ROBERTS/
Primary Examiner, Art Unit 2466

PTO-90C (Rev.04-03)

PART B - FEE(S) TRANSMITTAL

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

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

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

3624 7590 07/22/2016
VOLPE AND KOENIG, P.C.
UNITED PLAZA
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103

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

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/869,313	09/29/2015	Guodong Zhang	SIG-2-0674US06	1070

TITLE OF INVENTION: SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	10/24/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
ROBERTS, BRIAN S	2466	370-331000

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

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

1 VOLPE AND KOENIG, P.C.
2
3

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

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

(A) NAME OF ASSIGNEE: Signal Trust for Wireless Innovation
(B) RESIDENCE: (CITY and STATE OR COUNTRY): Wilmington, Delaware

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

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

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 220493 (enclose an extra copy of this form).

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

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Abhik A. Huq/ Date July 21, 2017
Typed or printed name Abhik A. Huq Registration No. 40,656

IPR2023-01270 Page 867

Electronic Patent Application Fee Transmittal

Application Number:	14869313
Filing Date:	29-Sep-2015
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Filer:	Abhik A. Huq/Gina Ordonez
Attorney Docket Number:	SIG-2-0674US06

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	960	960

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

Electronic Acknowledgement Receipt

EFS ID:	29852186
Application Number:	14869313
International Application Number:	
Confirmation Number:	1070
Title of Invention:	SUPPORTING ENHANCED UPLINK TRANSMISSION DURING SOFT HANDOVER
First Named Inventor/Applicant Name:	Guodong Zhang
Customer Number:	3624
Filer:	Abhik A. Huq/Gina Ordonez
Filer Authorized By:	Abhik A. Huq
Attorney Docket Number:	SIG-2-0674US06
Receipt Date:	21-JUL-2017
Filing Date:	29-SEP-2015
Time Stamp:	14:09:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$960
RAM confirmation Number	072417INTEFSW14110601
Deposit Account	220493
Authorized User	Gina Ordonez

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

37 CFR 1.20 (Post Issuance fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	SIG_2_0674US06_Issue_Fee_Transmittal.PDF	1627523 4e927af95a64b1a5b9478c4b8b187f8edce6e616	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30904 e76b28dd9ac0ed383ece201ae5d5d0130e947d46	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1658427		

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

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(Not for submission under 37 CFR 1.99)

Application Number	14869313
Filing Date	2015-09-29
First Named Inventor	Guodong Zhang
Art Unit	2466
Examiner Name	Brian S. Roberts
Attorney Docket Number	SIG-2-0674US06

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6850771	B2	2005-02-01	Malladi et al.	
	2	7428424	B2	2008-09-23	Hwang et al.	
Change(s) applied to document, /J.H./ 7/31/2017	3	9438381 ~~9348381~~	B2	2016-09-06	Dick et al.	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/869,313	09/12/2017	9763156	SIG-2-0674US06	1070

3624 7590 08/23/2017

VOLPE AND KOENIG, P.C.
UNITED PLAZA
30 SOUTH 17TH STREET, 18th Floor
PHILADELPHIA, PA 19103

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

The Patent Term Adjustment is 40 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

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

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

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

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

Guodong Zhang, Syosset, NY;
SIGNAL TRUST FOR WIRELESS INNOVATION, Wilmington, DE;
Sung-Hyuk Shin, Northvale, NJ;
Stephen E. Terry, Northport, NY;
James M. Miller, Verona, NJ;
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