AO 120 (Rev. 08/10)

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

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

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

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	10/4/2013	District of Delaware

PLAINTIFF	DEFENDANT
Intellectual Ventures I LLC and Intellectual Ventures II LLC	Nextel Operations, Inc. and Sprint Spectrum L.P.

PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 See Attached Sheet		
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director **Copy 3—Upon termination of action, mail this copy to Director**
Copy 2—Upon filing document adding patent(s), mail this copy to Director **Copy 4—Case file copy**

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	US 6,640,248 B1	10/28/2003	Intellectual Ventures I
2	5,602,831	2/11/1997	Intellectual Ventures I
3	6,023,783	2/8/2000	Intellectual Ventures I
4	US 6,952,408 B2	10/4/2005	Intellectual Ventures I
5	US 6,370,153 B1	4/9/2002	Intellectual Ventures II
6	5,963,557	10/5/1999	Intellectual Ventures II
7	US 8,310,993 B2	11/13/2012	Intellectual Ventures II
8	US 7,269,127 B2	9/11/2007	Intellectual Ventures II
9	US 7,848,353 B2	12/7/2010	Intellectual Ventures II
10	US 8,396,079 B2	3/12/2013	Intellectual Ventures II
11	US 7,787,431 B2	8/31/2010	Intellectual Ventures II

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DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	10/4/2013	District of Delaware

PLAINTIFF	DEFENDANT
Intellectual Ventures I LLC and Intellectual Ventures II LLC	AT&T Mobility LLC, AT&T Mobility II LLC, New Cingular Wireless Services, Inc.

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DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	10/4/2013	District of Delaware

PLAINTIFF	DEFENDANT
Intellectual Ventures I LLC and Intellectual Ventures II LLC	T-Mobile USA, Inc. and T-Mobile US, Inc.

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DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	10/4/2013	District of Delaware

PLAINTIFF	DEFENDANT
Intellectual Ventures I LLC and Intellectual Ventures II LLC	United States Cellular Corporation

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DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	10/4/2013	District of Delaware

PLAINTIFF	DEFENDANT
Intellectual Ventures I LLC and Intellectual Ventures II LLC	Leap Wireless International, Inc. and Cricket Communications, Inc.

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PLAINTIFF	DEFENDANT
Intellectual Ventures I LLC and Intellectual Ventures II LLC	AT&T Mobility LLC, AT&T Mobility II LLC, New Cingular Wireless Services, Inc.

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DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	10/7/2013	District of Delaware

PLAINTIFF	DEFENDANT
Intellectual Ventures I LLC and Intellectual Ventures II LLC	United States Cellular Corporation

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Intellectual Ventures I LLC and Intellectual Ventures II LLC	T-Mobile USA, Inc. and T-Mobile US, Inc.

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PLAINTIFF	DEFENDANT
Intellectual Ventures I LLC and Intellectual Ventures II LLC	Leap Wireless International, Inc. and Cricket Communications, Inc.

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

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
13-1655	10/4/2013	District of Delaware

PLAINTIFF	DEFENDANT
Intellectual Ventures I LLC and Intellectual Ventures II LLC	United States Cellular Corporation

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DECISION/JUDGEMENT
Notice of Dismissal

CLERK	(BY) DEPUTY CLERK	DATE
John A. Cerino		10-11-13

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UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.	: 7,787,431 B2
APPLICATION NO.	: 10/583534
DATED	: August 31, 2010
INVENTOR(S)	: Xiaodong Li

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 12, line 2, "large correlation creak with" should read --large correlation peak with--.

Signed and Sealed this
Eighteenth Day of January, 2011

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s)	:	Xiaodong Li
Application No.	:	10/583,534
Patent No.	:	7,787,431
Issue Date	:	August 31, 2010
For	:	METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

Examiner	:	Maria Lynn Sekul
Art Unit	:	2461
Docket No.	:	122166-175937
Date	:	Dec. 11, 2010

Mail Stop Certificate of Corrections Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CERTIFICATE OF CORRECTION UNDER 37 CFR 1.322

Commissioner for Patents:

Upon review of the above-referenced Letters Patent, error(s) were noted that were the mistake of the U.S. Patent and Trademark Office.

Please correct the following:

At col. 12, line 2, "large correlation creak with" should read --large correlation peak with--.

The correct language from issued claim 8 above can be found in claim 22 of the amendment after final filed on March 3, 2010. However, the above error appears to have been introduced by the U.S. Patent Office in the issued patent.

Since the errors are that of the U.S. Patent and Trademark Office, it is believed that no fee is required for these corrections. It is respectfully requested that a Certificate of Correction be issued.

Respectfully submitted,
Schwabe, Williamson & Wyatt, P.C.

/Davin Chin/

Davin Chin
Registration No. 58,413

1420 Fifth Avenue, Suite 3400
Seattle, Washington 98101
Phone: (206) 622-1711
Fax: (206) 292-0460

PTO/SB/44 (09-07)
Approved for use through 08/31/2013. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,787,431
APPLICATION NO. : 10/583,534
ISSUE DATE : August 31, 2010
INVENTOR(S) : Xiaodong Li

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 12, line 2, “large correlation creak with” should read --large correlation peak with--.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Schwabe, Williamson & Wyatt, P.C.
1420 Fifth Avenue, Suite 3400
Seattle, WA 98101

Electronic Acknowledgement Receipt

EFS ID:	9018214
Application Number:	10583534
International Application Number:	
Confirmation Number:	4954
Title of Invention:	METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	60172
Filer:	Davin Chin/Jessica Rose
Filer Authorized By:	Davin Chin
Attorney Docket Number:	122166-175937
Receipt Date:	13-DEC-2010
Filing Date:	05-JUN-2007
Time Stamp:	16:19:38
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Certificate of Correction	122166-175937_ReqCertofCorr_13DEC2010.pdf	44065 117bd343642ad1587b861ec6c3e25e7c5763483c	no	2

Warnings:	
Information:	

2	Request for Certificate of Correction	122166-175937_CertofCorr_13 DEC2010.pdf	89586 3dddfc27157af79d7ce4744481d1b7ad609 448a0	no	1

Warnings:	
Information:	
Total Files Size (in bytes):	133651

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.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,534	08/31/2010	7787431	122166-175937	4954

60172 7590 08/11/2010

SCHWABE, WILLIAMSON & WYATT, P.C.
1420 FIFTH, SUITE 3400
SEATTLE, WA 98101-4010

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 467 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):

Xiaodong Li, Kirkland, WA;
Titus Lo, Bellevue, WA;
Kemin Li, Bellevue, WA;
Haiming Huang, Bellevue, WA;

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.
10/583,534	06/05/2007	Xiaodong Li	122116-175937	4954

60172 7590 07/30/2010

SCHWABE, WILLIAMSON & WYATT, P.C.
1420 FIFTH, SUITE 3400
SEATTLE, WA 98101-4010

EXAMINER	
SEKUL, MARIA LYNN	
ART UNIT	**PAPER NUMBER**
2461	
MAIL DATE	**DELIVERY MODE**
07/30/2010	PAPER

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.

Response to Rule 312 Communication	Application No.	Applicant(s)
	10/583,534	LI ET AL.
	Examiner	Art Unit
	MARIA SEKUL	2461

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

1. ☒ The amendment filed on *14 July 2010* under 37 CFR 1.312 has been considered, and has been:

a) ☐ entered.

b) ☒ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.
Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☐ entered in part. See explanation below.

/Huy D Vu/
Supervisory Patent Examiner, Art Unit 2461

/M.L.S./
Examiner, Art Unit 2461

OK TO ENTER: /M.L.S./ 07/27/2010

Docket No.: 122166-175937
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Li et al.

Application No.: 10/583,534 Confirmation No.: 4954

Filed: June 5, 2007 Art Unit: 2461

For: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH Examiner: Maria Lynn Sekul

Amendment After Allowance Under 37 C.F.R. 1.312

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

Sir:

INTRODUCTORY COMMENTS

The present communication responds to the Notice of Allowance mailed on Apr. 30, 2010, in the above-identified application. Please amend the application as follows:

Amendments to the Specification begin on page 2 of this paper.

Remarks/Arguments begin on page 3 of this paper.

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)

25096 7590 04/30/2010

~~PERKINS COIE LLP~~
~~PATENT-SEA~~
~~P.O. BOX 1247~~
~~SEATTLE, WA 98111-1247~~

Schwabe, Williamson & Wyatt, P.C.
1420 5th Ave., Suite 3400
Seattle, WA 98101

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.
10/583,534	06/05/2007	Xiaodong Li	320529496US1	4954

TITLE OF INVENTION: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	07/30/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
SEKUL, MARIA LYNN	2461	370-210000

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 Schwabe, Williamson &
2 Wyatt, P.C.
3

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

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

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

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

4a. The following fee(s) are submitted:

☒ Issue Fee

☒ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

☐ A check is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 500393 (enclose an extra copy of this form).

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

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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

Authorized Signature /Davin Chin/ Date July 14, 2010

Typed or printed name Davin Chin Registration No. 58413

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

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

Docket No.: 122166-175937
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Li et al.

Application No.: 10/583,534 | Confirmation No.: 4954

Filed: June 5, 2007 | Art Unit: 2461

For: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH | Examiner: Maria Lynn Sekul

Amendment After Allowance Under 37 C.F.R. 1.312

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

Sir:

INTRODUCTORY COMMENTS

The present communication responds to the Notice of Allowance mailed on Apr. 30, 2010, in the above-identified application. Please amend the application as follows:

Amendments to the Specification begin on page 2 of this paper.

Remarks/Arguments begin on page 3 of this paper.

AMENDMENTS TO THE SPECIFICATION

Please amend paragraph [0001] as follows:

[0001] This application is a National Stage Application and claims the benefit of PCT Application No. PCT/US05/14828, filed on Apr. 29, 2005 (the '828 application). This application, as well as the '828 application, claims the benefit of U.S. Provisional Patent Application No. 60/567,233, filed on May 1, 2004. This application also relates to PCT Application No. PCT/US2005/001939 filed Jan. 20, 2005, which claims the benefit of U.S. Provisional Application No. 60/540,032 filed Jan. 29, 2004; PCT Application No. PCT/US2005/004601 filed Feb. 14, 2005, which claims the benefit of U.S. Provisional Application No. 60/544,521 filed Feb. 13, 2004; PCT Application No. PCT/US2005/003889 filed Feb. 7, 2005, which claims the benefit of U.S. Provisional Application No. 60/542,317 filed Feb. 7, 2004; and PCT Application No. PCT/US2005/008169 filed Mar. 9, 2005, which claims the benefit of U.S. Provisional Application No. 60/551,589 filed Mar. 9, 2004. The above-listed applications are hereby incorporated by reference.

REMARKS

This paper is a response to the Notice of Allowance (NOA) mailed on Apr. 30, 2010. The specification is amended to update the cross-reference to related applications. The incorporation by reference statement is supported by page 13 (numbered paragraph [0051]) of the as-filed specification. No new matter is added.

The undersigned also thanks Examiner Sekul for her time during a telephone call of June 1, 2010. During the telephone call, Examiner Sekul clarified the version of the claims which were allowed by the NOA. Specifically, Examiner Sekul informed the undersigned that the claims attached to the NOA as the "Office Action Appendix" were the claims entered by way of the Examiner's Amendment.

It is requested that this application continue to issuance. If the Examiner has any questions or believes a telephone conference would be useful for any reason, the Examiner is encouraged to contact the undersigned.

Dated: July 14, 2010

Respectfully submitted,

By /Davin Chin/

Davin Chin
Registration No.: 58,413
Schwabe, Williamson & Wyatt, P.C.
Customer No. 60,172
1420 5th Ave., Suite 3400
Seattle, Washington 98101
(206) 622-1711
(206) 292-0460 (Fax)
Attorney for Applicant

Docket No.: 122166-175937
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Li et al.

Application No.: 10/583,534 | Confirmation No.: 4954

Filed: June 5, 2007 | Art Unit: 2461

For: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH | Examiner: Maria Lynn Sekul

Comments on Statement of Reasons for Allowance

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

Applicant acknowledges the Examiner's statements of Reasons for Allowance of the above-referenced patent application and agrees that the claimed subject matter is patentable. However, Applicant takes no position regarding the Reasons for Allowance presented by the Examiner other than the positions Applicant may have previously taken during prosecution. Therefore, the Examiner's Reasons for Allowance should not be attributed to Applicant as an indication of the basis for Applicant's belief that the claims are patentable.

Furthermore, Applicant respectfully asserts that there may also be additional reason for patentability of the claimed subject matter not explicitly stated in this record and Applicant does not waive its rights to such arguments by not further addressing such reasons herein.

Dated: July 14, 2010

Respectfully submitted,

By /Davin Chin/

Davin Chin
Registration No.: 58,413
Schwabe, Williamson & Wyatt, P.C.
Customer No. 60,172
1420 5th Ave., Suite 3400
Seattle, Washington 98101
(206) 622-1711
(206) 292-0460 (Fax)
Attorney for Applicant

Electronic Patent Application Fee Transmittal

Application Number:	10583534
Filing Date:	05-Jun-2007
Title of Invention:	METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH
First Named Inventor/Applicant Name:	Xiaodong Li
Filer:	Davin Chin/Jessica Harvey
Attorney Docket Number:	122116-175937

Filed as Large Entity

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl issue fee	1501	1	1510	1510
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1810**

Electronic Acknowledgement Receipt

EFS ID:	8018093
Application Number:	10583534
International Application Number:	
Confirmation Number:	4954
Title of Invention:	METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	60172
Filer:	Davin Chin/Jessica Harvey
Filer Authorized By:	Davin Chin
Attorney Docket Number:	122116-175937
Receipt Date:	14-JUL-2010
Filing Date:	05-JUN-2007
Time Stamp:	18:42:13
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1810
RAM confirmation Number	6926
Deposit Account	500393
Authorized User	

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)	122166-175937_IssueFeeTrans_14JUL2010.pdf	1751208 d70070f6e24374a8d4fdbc3b21d2fcd947cd1013	no	1
Warnings:					
Information:					
2		122166-175937_312Amendment_14JUL2010.pdf	64991 8f264fa3904d854442b55cfacdccdf2beebbb4a5	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment after Notice of Allowance (Rule 312)	1	1
	Specification	2	2
	Applicant Arguments/Remarks Made in an Amendment	3	3

Warnings:					
Information:					
3	Miscellaneous Incoming Letter	122166-175937_CommentsonReasonsAllowance_14JUL2010.pdf	58797 3a28c330a3fd57bbe2e04a404a7b1155ec2bb975	no	2
Warnings:					
Information:					
4	Fee Worksheet (PTO-875)	fee-info.pdf	32358 517e7d44edcdab7464e3cc539acb52e1721ee46e	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1907354		

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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/583,534	06/05/2007	Xiaodong Li	320529496US1

CONFIRMATION NO. 4954

60172
SCHWABE, WILLIAMSON & WYATT, P.C.
1420 FIFTH, SUITE 3400
SEATTLE, WA 98101-4010

POA ACCEPTANCE LETTER

OC000000042109945

Date Mailed: 06/16/2010

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/08/2010.

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

/nmohammed/

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/583,534	06/05/2007	Xiaodong Li	320529496US1

CONFIRMATION NO. 4954

POWER OF ATTORNEY NOTICE

25096
PERKINS COIE LLP
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

OC000000042109936

Date Mailed: 06/16/2010

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/08/2010.

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

/nmohammed/

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

PTO/SB/80 (11-08)
Approved for use through 11/30/2011. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

☑ Practitioners associated with the Customer Number: 60172

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

☑ The address associated with Customer Number: 60172

OR

☐ Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address:

Ditromossi Remote BV, L.L.C.
2711 Centerville Rd., Suite 400
Wilmington, DE 19808

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

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	Mary Brown	Date	5/10/10
Name	Mary Brown	Telephone	
Title	Authorized Person for Ditromossi Remote BV, L.L.C.		

DECLARATION REGARDING AUTHORITY TO SIGN ON BEHALF OF A LEGAL ENTITY
(37 C.F.R. 3.73(b)(2)(i))

I, Mary Brown (whose title is supplied below), hereby declare that I am authorized to sign on behalf of Ditromossi Remote BV, L.L.C.

Mary Brown

Mary Brown, Authorized Person for Ditromossi Remote BV, L.L.C.

5/10/10

Date

Electronic Acknowledgement Receipt

EFS ID:	7770494
Application Number:	10583534
International Application Number:	
Confirmation Number:	4954
Title of Invention:	METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	25096
Filer:	Davin Chin/Jessica Harvey
Filer Authorized By:	Davin Chin
Attorney Docket Number:	320529496US1
Receipt Date:	08-JUN-2010
Filing Date:	05-JUN-2007
Time Stamp:	17:50:46
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73(b).	122166-175937_373b_08JUN2010.pdf	58334 4c44457f085018f2cec5e7424e81199b3d0ec64d	no	1

Warnings:	
Information:	

2	Power of Attorney	122166-POA_DRATS.pdf	55585 68ffec8ed0b6a67407df1dbb43a46b1437796f1a	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	113919

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.

PTO/SB/96 (01-08)
Approved for use through 06/30/2008. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Xiaodong Li, Titus Lo, Kemin Li, Haiming Huang

Application No./Patent No.: 10/583,534 Filed/Issue Date: June 5, 2007

Entitled: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

Ditromossi Remote BV, L.L.C. , a Limited Liability Company
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. [X] the assignee of the entire right, title, and interest; or

2. [ ] an assignee of less than the entire right, title and interest.
(The extent (by percentage) of its ownership interest is _____ %)

in the patent application/patent identified above by virtue of either:

A. [ ] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____ , Frame _____ , or for which a copy thereof is attached.

OR

B. [X] A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Inventors To: Waltical Solution, Inc.
The document was recorded in the United States Patent and Trademark Office at
Reel 023006 , Frame 0123 , or for which a copy thereof is attached.

2. From: Waltical Solution, Inc. To: Neocific, Inc.
The document was recorded in the United States Patent and Trademark Office at
Reel 017363 , Frame 0370 , or for which a copy thereof is attached.

3. From: Neocific, Inc. To: Ditromossi Remote BV, L.L.C.
The document was recorded in the United States Patent and Trademark Office at
Reel 023130 , Frame 0422 , or for which a copy thereof is attached.

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

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

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

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

/Davin Chin/	June 8, 2010
Signature	Date
Davin Chin, Reg. No. 58,413	(206) 622-1711
Printed or Typed Name	Telephone Number
Attorney for Assignee	
Title	

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

25096 7590 04/30/2010

PERKINS COIE LLP
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

EXAMINER	
SEKUL, MARIA LYNN	
ART UNIT	PAPER NUMBER
2461	

DATE MAILED: 04/30/2010

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,534	06/05/2007	Xiaodong Li	320529496US1	4954

TITLE OF INVENTION: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	07/30/2010

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

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

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

25096 7590 04/30/2010

PERKINS COIE LLP
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

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.
10/583,534	06/05/2007	Xiaodong Li	320529496US1	4954

TITLE OF INVENTION: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	07/30/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
SEKUL, MARIA LYNN	2461	370-210000

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 credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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

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.

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.
10/583,534	06/05/2007	Xiaodong Li	320529496US1	4954

25096 7590 04/30/2010

PERKINS COIE LLP
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

EXAMINER	
SEKUL, MARIA LYNN	
ART UNIT	PAPER NUMBER
2461	

DATE MAILED: 04/30/2010

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

The Patent Term Adjustment to date is 181 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 181 day(s).

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

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

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

Notice of Allowability	Application No.	Applicant(s)	
	10/583,534	LI ET AL.	
	Examiner	Art Unit	
	MARIA L. SEKUL	2461	

-- 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 *Amendement After Final of date 3/3/2010* .

2. ☒ The allowed claim(s) is/are *1,2,6,8,11,13 and 22-42*.

3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

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

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

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. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Christopher Daly-Watson on 04/20/2010.

See attached Examiner's Amendment.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 03/23/2010 was filed after the mailing date of the Amendment After Final on 03/03/2010 and before Notice of Allowability. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Response to Amendment

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

The Amendment After Final filed 03/03/2010 is NOT entered.

Allowable Subject Matter

Claims 1, 2, 6, 8, 11, 13 and 22-42 are allowed.

The following is an examiner's statement of reasons for allowance: **van Nee (US Patent No. 6,175,550**) discloses a variable bandwidth system by adjusting the number of subcarriers. **Vanderaar et al. (US PGPub 2007/0208884)** discloses a primary

channel with a central channel in which dynamic link assignment is constrained in the central channel to maintain synchronization. **Campanella (US Patent No. 5,864,546)** (not previously cited) discloses one or more preambles transmitted across multiple channels, for instance, a central channel transmits a primary preamble and a channel, which is not the central channel, transmitting portions of the auxiliary preamble combinable with a preamble in the central channel to make a full bandwidth preamble.

Claims 1, 2, 6, 8, 11, 13 and 22-42 are allowable over the prior art because the prior art taken individually or in combination fails to particularly disclose, fairly suggest, or render obvious as argued by the Applicant which Examiner considers persuasive:

In a variable bandwidth wireless communication system communicating under multiple different communication schemes that each have a different bandwidth, a process performed by a base station of generating an information bearing signal for wireless transmission, the process comprising:

utilizing by the base station a number of subcarriers to construct a variable bandwidth wireless channel;

utilizing by the base station groups of subcarriers, wherein each group includes a plurality of subcarriers;

maintaining a fixed spacing between adjacent subcarriers;

adding or subtracting, by the base station, groups of subcarriers to scale the variable bandwidth wireless channel and achieve an operating channel bandwidth; and

wherein a core-band, including a plurality of subcarrier groups, substantially centered at an operating center frequency of the different communication schemes, is utilized by the base station as a broadcast channel carrying radio control and operation signalling, where the core-band is substantially

not wider than a smallest possible operating channel bandwidth of the system; and

wherein the information bearing signal has a primary preamble sufficient for basic radio operation, and wherein:

the primary preamble is a direct sequence in the time domain with a frequency content confined within the core-band, or is an orthogonal frequency-divisional multiplexing (OFDM) symbol corresponding to a particular frequency pattern within the core-band; and

wherein properties of the primary preamble comprise:

an autocorrelation having a large correlation peak with respect to sidelobes;

a cross-correlation with other primary preambles having a small cross-correlation coefficient with respect to power of other primary preambles; and

a small peak-to-average ratio; and

wherein a large number of primary preamble sequences exhibit the properties.

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 MARIA L. SEKUL whose telephone number is (571)270-

7636. The examiner can normally be reached on Monday-Friday 9:00 AM to 5:30 PM ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (571) 272-3155. 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.

/M. L. S./
Examiner, Art Unit 2461

/Huy D Vu/
Supervisory Patent Examiner, Art Unit 2461

Notice of References Cited	Application/Control No. 10/583,534	Applicant(s)/Patent Under Reexamination LI ET AL.	
	Examiner MARIA L. SEKUL	Art Unit 2461	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,864,546	01-1999	Campanella, S. Joseph	370/316
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

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

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S4	2	"5864546".pn.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2010/03/25 16:04
S5	263	(preamble midamble mid $1amble) with (auxiliary auxilliary)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2010/03/25 16:09
S6	27	S5 and "370".clas.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2010/03/25 16:09
S7	2229	370/408,485,343,536.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2010/03/25 16:36
S8	2	"6175550".pn.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2010/04/08 11:15
S9	2	"20070242600".pn.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2010/04/08 11:18
S10	2577	preamble with (correlat$3 auto $1correlat$3 cross$1correlat $3)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2010/04/08 11:24
S11	574	preamble with correlat$3 with (auto$1correlat$3 cross $1correlat$3)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2010/04/08 11:25
S12	12	preamble with correlat$3 with (auto$1correlat$3 cross $1correlat$3) with large	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2010/04/08 11:25
S13	33	preamble with correlat$3 with (auto$1correlat$3 cross $1correlat$3) with relat$3	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2010/04/08 11:31
S14	33	S13 not S12	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2010/04/08 11:31

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L5	172	li-xiaodong.in. lo-titus. in. li-kemin.in. huang-haiming.in. neocific$.as. waltical$.as.	US-PGPUB; USPAT; UPAD	OR	ON	2010/04/21 11:47

L7	78163	((variable primary) and (bandwidth subcarrier sub$1carrier preamble pre$1amble range correlat$3)).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2010/04/21 11:48
L8	3	5 and 7	US-PGPUB; USPAT; UPAD	OR	ON	2010/04/21 11:48
L9	2279	((variable primary) and (band bandwidth mode) and (subcarrier sub $1carrier subchannel sub $1channel carrier channel) and (preamble pre$1amble) and (autocorrelat$3 auto $1correlat$3 correlat $3)) and frequency.clm.	US-PGPUB; USPAT; UPAD	OR	ON	2010/04/21 11:50
L10	19	((variable primary) and (band bandwidth mode) and (subcarrier sub $1carrier subchannel sub $1channel carrier channel) and (preamble pre$1amble) and (autocorrelat$3 auto $1correlat$3 correlat$3) and frequency).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2010/04/21 11:50
L11	19	((variable primary) and (band bandwidth mode) and (subcarrier sub $1carrier subchannel sub $1channel carrier channel) and (preamble pre$1amble) and (autocorrelat$3 auto $1correlat$3 correlat$3) and (ofdm frequency)). clm.	US-PGPUB; USPAT; UPAD	OR	ON	2010/04/21 11:52

4/ 21/ 2010 11:54:25 AM
C:\ Documents and Settings\ msekul\ My Documents\ EAST\ Workspaces\ 10583534 - VB - Multi-carrier.wsp

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10583534	LI ET AL.
	Examiner	Art Unit
	MARIA L SEKUL	4124

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

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

CLAIM		DATE								
Final	Original	04/24/2009	01/01/2010	04/21/2010						
1	1	✓	✓	=						
2	2	✓	✓	=						
	3	O	-	-						
	4	O	-	-						
	5	✓	-	-						
4	6	✓	✓	=						
	7	✓	-	-						
5	8	✓	✓	=						
	9	O	-	-						
	10	✓	-	-						
6	11	✓	-	=						
	12	✓	-	-						
7	13	✓	✓	=						
	14	✓	-	-						
	15	✓	-	-						
	16	O	-	-						
	17	✓	-	-						
	18	✓	-	-						
	19	✓	-	-						
	20	✓	-	-						
	21	✓	-	-						
8	22		✓	=						
9	23		✓	=						
10	24		✓	=						
11	25		✓	=						
12	26		✓	=						
13	27		✓	=						
14	28		✓	=						
15	29		✓	=						
16	30		✓	=						
17	31		✓	=						
18	32		✓	=						
19	33		✓	=						
20	34		✓	=						
21	35		✓	=						
22	36		✓	=						

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10583534	LI ET AL.
	Examiner	Art Unit
	MARIA L SEKUL	4124

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

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

CLAIM		DATE								
Final	Original	04/24/2009	01/01/2010	04/21/2010						
23	37		✓	=						
24	38		✓	=						
25	39		✓	=						
26	40		✓	=						
27	41		✓	=						
3	42			=						

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10583534	LI ET AL.
	Examiner	Art Unit
	MARIA L SEKUL	4124

SEARCHED

Class	Subclass	Date	Examiner
370	203, 210 (w/ text search)	4/24/2009	mls
375	(w/ text search)	4/24/2009	mls
370	343,408,485,536	3/25/2010	mls

SEARCH NOTES

Search Notes	Date	Examiner
Discussed search strategy with primary examiner Steven Nguyen	4/20/2009	mls
Inventor/Assignee search	4/24/2009	mls
Updated EAST text search	12/5/09	mls
Discussed search w/ SPE Vu	3/25/2010	mls
Updated Inventor/Assignee search	4/21/2010	mls

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner
(See attached Interference search)		4/21/2010	mls

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
10583534	LI ET AL.
Examiner	**Art Unit**
MARIA L SEKUL	2461

ORIGINAL		INTERNATIONAL CLASSIFICATION	
CLASS	SUBCLASS	CLAIMED	NON-CLAIMED
370	343	H 0 4 J 1 / 00 (2006.01)	

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
370	203	437	468	485	536

☐ 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
1	1		17	19	33										
2	2		18	20	34										
	3		19	21	35										
	4		20	22	36										
	5		21	23	37										
4	6	8	22	24	38										
	7	9	23	25	39										
5	8	10	24	26	40										
	9	11	25	27	41										
	10	12	26	3	42										
6	11	13	27												
	12	14	28												
7	13	15	29												
	14	16	30												
	15	17	31												
	16	18	32												

/M. L. S./ Examiner.Art Unit 2461 (Assistant Examiner)	04/21/2010 (Date)	**Total Claims Allowed:** 27	
/Huy D Vu/ Supervisory Patent Examiner.Art Unit 2461 (Primary Examiner)	04/23/2010 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 8

DO NOT ENTER: /M.S./ (04/20/2010)

Docket No.: 320529496US1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Li et al.

Application No.: 10/583,534 | Confirmation No.: 4954

Filed: June 5, 2007 | Art Unit: 2461

For: **METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH** | Examiner: M. L. Sekul

Response Under 37 C.F.R. § 1.111

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

Sir:

The present communication responds to the Final Office Action dated January 7, 2010, in the above-identified application. Please amend the application as follows:

Amendments to the Claims are reflected in the listing of claims beginning on page 2.

Remarks begin on page 12 of this paper.

PTO/SB/08b (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	10/583,534-Conf. #4954
Filing Date	June 5, 2007
First Named Inventor	Xiaodong Li
Art Unit	2461
Examiner Name	M. L. Sekul
Attorney Docket Number	320529496US1

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. * CITE NO.: Those application(s) which are marked with an single asterisk (*) next to the Cite No. are not supplied (under 37 CFR 1.98(a)(2)(iii)) because that application was filed after June 30, 2003 or is available in the IFW. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
/M.S./		Chinese Office Action for Application No. CN 200580012992.9; Applicant: Neocific, Inc.; Date of Notification: January 29, 2010; 4 pages [translation attached, 4 pages].	

Examiner Signature	/Maria Sekul/ (04/20/2010)	Date Considered	04/20/2010

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

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

Docket No.: 320529496US1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Xiaodong Li

Application No.: 10/583,534 | Confirmation No.: 4954

Filed: June 5, 2007 | Art Unit: 2461

For: **METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH** | Examiner: M. L. Sekul

Amendment Under 37 C.F.R. § 1.111

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

The present communication responds to the Office Action dated January 7, 2010 in the above-identified application. Please amend the application as follows:

Amendments to the Claims are reflected in the listing of claims beginning on page 2.

Amendments to the Claims:

1. (Currently Amended) In a variable bandwidth wireless communication system communicating under multiple different communication schemes that each have a different bandwidth, a process performed by a base station of generating an information bearing signal for wireless transmission, the process comprising:

utilizing by the base station a number of subcarriers to construct a variable bandwidth wireless channel;

utilizing by the base station groups of subcarriers, wherein each group includes a plurality of subcarriers;

maintaining a fixed spacing between adjacent subcarriers;

adding or subtracting, by the base station, groups of subcarriers to scale the variable bandwidth wireless channel and achieve an operating channel bandwidth; and

wherein a core-band, including a plurality of subcarrier groups, substantially centered at an operating center frequency of the different communication schemes, is utilized by the base station as a broadcast channel carrying radio control and operation ~~signaling~~signalling, where the core-band is substantially not wider than a smallest possible operating channel bandwidth of the system; and

wherein the information bearing signal has a primary preamble sufficient for basic radio operation, and wherein:

the primary preamble is a direct sequence in the time domain with a frequency content confined within the core-band, or is an orthogonal frequency-divisional multiplexing (OFDM) symbol corresponding to a particular frequency pattern within the core-band; and

wherein properties of the primary preamble comprise:

an autocorrelation having a large correlation peak with respect to sidelobes;

a cross-correlation with other primary preambles having a small cross-correlation coefficient with respect to power of other primary preambles; and

a small peak-to-average ratio; and

wherein a large number of primary preamble sequences exhibit the properties.

2. (Previously Presented) The process of claim 1, wherein the information bearing signal is:

an orthogonal frequency division multiple access (OFDMA) signal; and is

utilized in a downlink with a duplexing technique that is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

3-5. (Canceled)

6. (Currently Amended) In a variable bandwidth communication network of base stations and mobile stations, wherein a signal comprises groups of subcarriers and each group includes a plurality of subcarriers, a method performed by a mobile station comprising:

maintaining a fixed spacing between adjacent subcarriers;

adjusting a number of groups of subcarriers to scale a channel and attain an operational bandwidth;

utilizing a core-band, substantially centered at an operating center frequency to carry synchronization information, wherein the core-band is narrower than or equal to a smallest possible operating channel bandwidth of the network and the signal includes a primary preamble sufficient to enable radio operations, the primary preamble including a direct sequence in the

time domain with a frequency content confined within the core-band or including an OFDM symbol corresponding to a particular frequency pattern within the core-band;

wherein properties of the primary preamble comprise:

an autocorrelation having a large correlation peak with respect to sidelobes;

a cross-correlation with other primary preambles having a small cross-correlation coefficient with respect to power of other primary preambles; and

a small peak-to-average ratio; and

wherein a large number of primary preamble sequences exhibit the properties; and

scanning spectral bands of different center frequencies and detecting the synchronization information in the core-band of the operating center frequency and decoding a broadcast channel carrying radio control and operation signalling provided by a base station to the mobile station via the core-band.

7. (Canceled)

8. (Previously Presented) The method of claim 6, wherein the signal is an orthogonal frequency division multiple access (OFDMA) signal, and the signal is utilized in a downlink with a duplexing technique that is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

9. (Canceled)

10. (Canceled)

11. (Currently Amended) In a variable bandwidth communication network wherein a communication signal utilizes groups of subcarriers, wherein each group comprises a plurality of subcarriers, and a mobile station has an adaptable bandwidth, the mobile station comprising:

an analog-to-digital converter for signal sampling;

a Fast Fourier Transform and Inverse Fast Fourier Transform processor (FFT/IFFT), wherein a fixed spacing between adjacent subcarriers is maintained;

a scanner for scanning spectral bands of specified center frequencies;

a facility for decoding a broadcast channel including radio control and operation signalling associated with ~~the area in~~ a core-band including a plurality of groups, wherein the core-band is not wider than a smallest possible operating channel bandwidth of the network; and

a facility for adding groups to widen the channel bandwidth for remainder of the communication, wherein the communication signal further utilizes the core-band for communicating a primary preamble sufficient to enable radio operations, the primary preamble being a direct sequence in the time domain with a frequency content confined within the core-band or being an OFDM symbol corresponding to a particular frequency pattern within the core-band,

wherein properties of the primary preamble comprise:

an autocorrelation having a large correlation peak with respect to sidelobes;

a cross-correlation with other primary preambles having a small cross-correlation coefficient with respect to power of other primary preambles; and

a small peak-to-average ratio; and

wherein a large number of primary preamble sequences exhibit the properties.

12. (Canceled)

13. (Previously Presented) The mobile station of claim 11, wherein the communication signal is an orthogonal frequency division multiple access (OFDMA) signal, and the communication signal is utilized in a downlink with a duplexing technique that is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

14-21. (Canceled)

22. (Currently Amended) A cellular base station comprising:

circuitry configured to transmit a broadcast channel in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups, wherein each subcarrier group includes a plurality of subcarriers, wherein the core-band is utilized to communicate a primary preamble sufficient to enable radio operations, the primary preamble being a direct sequence in the time domain with a frequency content confined within the core-band or being an OFDM symbol corresponding to a particular frequency pattern within the core-band,

wherein properties of the primary preamble comprise:

an autocorrelation having a large correlation peak with respect to sidelobes;

a cross-correlation with other primary preambles having a small cross-correlation coefficient with respect to power of other primary preambles; and

a small peak-to-average ratio; and

wherein a large number of primary preamble sequences exhibit the properties; and

circuitry configured to transmit control and data channels using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band.

23. (Previously Presented) The cellular base station of claim 22 wherein the circuitry configured to transmit the broadcast channel is further configured to transmit radio network information in the broadcast channel.

24. (Previously Presented) The cellular base station of claim 22 further comprising circuitry configured to transmit synchronization information in the core-band.

25. (Previously Presented) The cellular base station of claim 22 wherein the circuitry configured to transmit the broadcast channel is further configured to transmit in a time slot format.

26. (Previously Presented) The cellular base station of claim 22 wherein the base station operates in an OFDMA frequency division duplex (FDD) or time division duplex (TDD) mode.

27. (Currently Amended) A cellular mobile station comprising:

circuitry configured to receive synchronization information from a base station in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups where each subcarrier group includes a plurality of subcarriers, wherein the core-band is utilized to communicate a primary preamble sufficient to enable radio operations, the primary preamble being a direct sequence in the time domain with a frequency content confined within the core-band or being an OFDM symbol corresponding to a particular frequency pattern within the core-band,

wherein properties of the primary preamble comprise:

an autocorrelation having a large correlation peak with respect to sidelobes;

a cross-correlation with other primary preambles having a small cross-correlation coefficient with respect to power of other primary preambles; and

a small peak-to-average ratio; and

wherein a large number of primary preamble sequences exhibit the properties;

circuitry configured to synchronize with the base station using the received synchronization information; and

circuitry configured to receive control and data channels using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band.

28. (Currently Amended) The cellular mobile station of claim 27 wherein the circuitry configured to receive the synchronization information from the base station in

the core-band is further configured to receive ~~the~~ cell identification information from the base station in the core-band.

29. (Previously Presented) The cellular mobile station of claim 27 further comprising circuitry configured to receive a broadcast channel in the core-band.

30. (Previously Presented) The cellular mobile station of claim 29 wherein the broadcast channel carries radio network information.

31. (Previously Presented) The cellular mobile station of claim 27 further comprising circuitry configured to transmit a preamble after synchronizing with the base station.

32. (Currently Amended) A variable bandwidth communication method comprising:

transmitting a broadcast channel by a cellular base station in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups, wherein each subcarrier group includes a plurality of subcarriers, wherein the core-band is utilized to communicate a primary preamble sufficient to enable radio operations, the primary preamble being a direct sequence in the time domain with a frequency content confined within the core-band or being an OFDM symbol corresponding to a particular frequency pattern within the core-band

wherein properties of the primary preamble comprise:

an autocorrelation having a large correlation peak with respect to sidelobes;

a cross-correlation with other primary preambles having a small cross-correlation coefficient with respect to power of other primary preambles; and

a small peak-to-average ratio; and

wherein a large number of primary preamble sequences exhibit the properties; and

transmitting control and data channels by the cellular base station using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band.

33. (Previously Presented) The method of claim 32 wherein the broadcast channel carries radio network information.

34. (Previously Presented) The method of claim 32 further comprising transmitting by the base station synchronization information in the core-band.

35. (Previously Presented) The method of claim 32 wherein the transmissions are in a time slot format.

36. (Previously Presented) The method of claim 32 wherein the cellular base station operates in an OFDMA frequency division duplex (FDD) or time division duplex (TDD) mode.

37. (Currently Amended) A variable bandwidth communication method comprising:

receiving synchronization information by a cellular mobile station from a base station in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier

groups where each subcarrier group includes a plurality of subcarriers, wherein the core-band is utilized to communicate a primary preamble sufficient to enable radio operations, the primary preamble being a direct sequence in the time domain with a frequency content confined within the core-band or being an OFDM symbol corresponding to a particular frequency pattern within the core-band

wherein properties of the primary preamble comprise:

an autocorrelation having a large correlation peak with respect to sidelobes;

a cross-correlation with other primary preambles having a small cross-correlation coefficient with respect to power of other primary preambles; and

a small peak-to-average ratio; and

wherein a large number of primary preamble sequences exhibit the properties;

synchronizing the cellular mobile station with the base station using the received synchronization information; and

receiving control and data channels by the cellular mobile station using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band.

38. (Previously Presented) The method of claim 37 wherein the receiving of the synchronization information by the cellular mobile station from the base station in the core-band includes receiving cell identification information from the base station in the core-band.

39. (Previously Presented) The method of claim 37 further comprising receiving by the cellular mobile station a broadcast channel in the core-band.

40. (Previously Presented) The method of claim 39 wherein the broadcast channel carries radio network information.

41. (Previously Presented) The method of claim 37 further comprising transmitting by the cellular mobile station a preamble after synchronizing with the base station.

42. (New) The process of claim 1, wherein an auxiliary preamble, occupying the side-band, is combined with the primary preamble to form a full-bandwidth preamble in either the time domain or the frequency domain, wherein the side-band is the difference between the core-band and an operating bandwidth, and wherein:

the auxiliary preamble is either a direct sequence in the time domain with a frequency response confined within the side-band, or is an OFDM symbol corresponding to a particular frequency pattern within the side-band;

the full-bandwidth preamble allows a base station to broadcast the full-bandwidth preamble and a mobile station to use the primary preamble of the full-bandwidth preamble to access the base station; and

properties of the full-bandwidth preamble sequence comprise:

a large correlation peak with respect to sidelobes, in case of an autocorrelation;

a large ratio between the correlation peak and sidelobes, in case of a correlation with the primary preamble of the full-bandwidth preamble.

a small cross-correlation coefficient with respect to power of other full-bandwidth preamble sequences, in case of cross-correlation with other full-bandwidth preambles

a small cross-correlation coefficient with respect to the power of the full-bandwidth preamble, in case of cross-correlation with a primary

preamble different from the primary preamble of the full-bandwidth preamble;

a small peak-to-average ratio; and

wherein a large number of full-bandwidth preamble sequences exhibit such properties.

PTO/SB/08b (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	10/583,534-Conf. #4954
Filing Date	June 5, 2007
First Named Inventor	Xiaodong Li
Art Unit	2461
Examiner Name	M. L. Sekul
Attorney Docket Number	320529496US1

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. * CITE NO.: Those application(s) which are marked with an single asterisk (*) next to the Cite No. are not supplied (under 37 CFR 1.98(a)(2)(iii)) because that application was filed after June 30, 2003 or is available in the IFW. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Chinese Office Action for Application No. CN 200580012992.9; Applicant: Neocific, Inc.; Date of Notification: January 29, 2010; 4 pages [translation attached, 4 pages].	

Examiner Signature		Date Considered	

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

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

Electronic Patent Application Fee Transmittal

Application Number:	10583534
Filing Date:	05-Jun-2007
Title of Invention:	Methods and Apparatus for Multi-Carrier Communications with Variable Channel Bandwidth
First Named Inventor/Applicant Name:	Xiaodong Li
Filer:	Christopher J. Daley-Watson/Wade Barbus
Attorney Docket Number:	320529496US1

Filed as Large Entity

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

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:	7299158
Application Number:	10583534
International Application Number:	
Confirmation Number:	4954
Title of Invention:	Methods and Apparatus for Multi-Carrier Communications with Variable Channel Bandwidth
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	25096
Filer:	Christopher J. Daley-Watson/Wade Barbus
Filer Authorized By:	Christopher J. Daley-Watson
Attorney Docket Number:	320529496US1
Receipt Date:	26-MAR-2010
Filing Date:	05-JUN-2007
Time Stamp:	19:20:18
Application Type:	U.S. National Stage under 35 USC 371

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Submitted with Payment	yes
Payment Type	Electronic Funds Transfer
Payment was successfully received in RAM	$180
RAM confirmation Number	6509
Deposit Account	
Authorized User	

File Listing:

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

1		2010_03_26_IDS.PDF	132413 ce22aa0a4d82cfb46c339c3f5f1d0f69dbf1d25a	yes	4

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Transmittal Letter	1	3
Information Disclosure Statement (IDS) Filed (SB/08)	4	4

Warnings:

Information:

2	NPL Documents	Chinese_OA.PDF	450741 761c3d2459259d352cb5569b27026ee29b9684ca	no	8

Warnings:

Information:

3	Fee Worksheet (PTO-875)	fee-info.pdf	30486 75749a56840d6f273beb845924609a21bb16df84	no	2

Warnings:

Information:

Total Files Size (in bytes):	613640

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.

Docket No.: 320529496US1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Xiaodong Li

Application No.: 10/583,534 Confirmation No.: 4954

Filed: June 5, 2007 Art Unit: 2461

For: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH Examiner: M. L. Sekul

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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

Sir:

Pursuant to 37 CFR 1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement is filed after the mailing date of a Final Office Action or Notice of Allowance, whichever occurred first, but on or before payment of the Issue Fee (37 CFR 1.97(d)). A statement under 37 CFR 1.97(e)(1) follows:

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement.

An English translation of the non-English language reference is enclosed.

Applicant submits herewith a copy of a non-patent document in accordance with 37 CFR 1.98(a)(2).

This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

It is submitted that the Information Disclosure Statement is in compliance with 37 CFR 1.98 and the Examiner is respectfully requested to consider the listed references.

Please charge the amount of $180.00 to EFT Account SEA1PIRM covering the fee set forth in 37 CFR 1.17(p). The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper

hereafter filed in this application by this firm) to our Deposit Account No. 50-0665, under Order No. 320529496US1.

Dated: 3/26/2010

Respectfully submitted,

By _____

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Docket No.: 320529496US1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Li et al.

Application No.: 10/583,534 | Confirmation No.: 4954

Filed: June 5, 2007 | Art Unit: 2461

For: **METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH** | Examiner: M. L. Sekul

Response Under 37 C.F.R. § 1.111

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

Sir:

The present communication responds to the Final Office Action dated January 7, 2010, in the above-identified application. Please amend the application as follows:

Amendments to the Claims are reflected in the listing of claims beginning on page 2.

Remarks begin on page 12 of this paper.

Amendments to the Claims:

1. (Currently Amended) In a variable bandwidth wireless communication system communicating under multiple different communication schemes that each have a different bandwidth, a process performed by a base station of generating an information bearing signal for wireless transmission, the process comprising:

utilizing by the base station a number of subcarriers to construct a variable bandwidth wireless channel;

utilizing by the base station groups of subcarriers, wherein each group includes a plurality of subcarriers;

maintaining a fixed spacing between adjacent subcarriers;

adding or subtracting, by the base station, groups of subcarriers to scale the variable bandwidth wireless channel and achieve an operating channel bandwidth; and

wherein a core-band, including a plurality of subcarrier groups, substantially centered at an operating center frequency of the different communication schemes, is utilized by the base station as a broadcast channel carrying radio control and operation signaling, where the core-band is substantially not wider than a smallest possible operating channel bandwidth of the system wherein the core-band further includes a primary preamble that is sufficient to enable radio operations, the primary preamble being a direct sequence in the time domain with a frequency content confined within the core-band or being an OFDM symbol corresponding to a particular frequency pattern within the core-band, wherein one or more side-bands are utilized by the base station to communicate an auxiliary preamble that is combinable with the primary preamble to form a full-bandwidth preamble, the auxiliary preamble being either a direct sequence in the time domain with a frequency response combined within the one or more side-bands or being an OFDM symbol corresponding to a particular

frequency pattern within the one or more side-bands, and wherein a bandwidth of the one or more side-bands is the difference between a bandwidth of the core-band and the operating channel bandwidth.

2. (Previously Presented) The process of claim 1, wherein the information bearing signal is:

an orthogonal frequency division multiple access (OFDMA) signal; and is

utilized in a downlinkwith a duplexing technique that is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

3-5. (Canceled)

6. (Currently Amended) In a variable bandwidth communication network of base stations and mobile stations, wherein a signal comprises groups of subcarriers and each group includes a plurality of subcarriers, a method performed by a mobile station comprising:

maintaining a fixed spacing between adjacent subcarriers;

adjusting a number of groups of subcarriers to scale a channel and attain an operational bandwidth;

utilizing a core-band, substantially centered at an operating center frequency to carry synchronization information, wherein the core-band is narrower than or equal to a smallest possible operating channel bandwidth of the network and includes a primary preamble sufficient to enable radio operations, the primary preamble including a direct sequence in the time domain with a frequency content confined within the core-band or including an OFDM symbol corresponding to a particular frequency pattern within the core-band;

utilizing one or more side-bands to carry an auxiliary preamble that is combinable with the primary preamble to form a full-bandwidth preamble, the auxiliary

preamble including either a direct sequence in the time domain with a frequency response combined within the one or more side-bands or including an OFDM symbol corresponding to a particular frequency pattern within the one or more side-bands; and

scanning spectral bands of different center frequencies and detecting the synchronization information in the core-band of the operating center frequency and decoding a broadcast channel carrying radio control and operation signalling provided by a base station to the mobile station via the core-band, wherein a bandwidth of the one or more side-bands is the difference between a bandwidth of the core-band and the operational bandwidth.

7. (Canceled)

8. (Previously Presented) The method of claim 6, wherein the signal is an orthogonal frequency division multiple access (OFDMA) signal, and the signal is utilized in a downlink with a duplexing technique that is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

9. (Canceled)

10. (Canceled)

11. (Currently Amended) In a variable bandwidth communication network wherein a communication signal utilizes groups of subcarriers, wherein each group comprises a plurality of subcarriers, and a mobile station has an adaptable bandwidth, the mobile station comprising:

an analog-to-digital converter for signal sampling;

a Fast Fourier Transform and Inverse Fast Fourier Transform processor (FFT/IFFT), wherein a fixed spacing between adjacent subcarriers is maintained;

a scanner for scanning spectral bands of specified center frequencies;

a facility for decoding a broadcast channel including radio control and operation signalling associated with the area in a core-band including a plurality of groups, wherein the core-band is not wider than a smallest possible operating channel bandwidth of the network; and

a facility for adding groups to widen the channel bandwidth for remainder of the communication, wherein the communication signal further utilizes the core-band for communicating a primary preamble sufficient to enable radio operations, the primary preamble being a direct sequence in the time domain with a frequency content confined within the core-band or being an OFDM symbol corresponding to a particular frequency pattern within the core-band, wherein the communications signal further utilizes one or more sidebands for communicating an auxiliary preamble that is combinable with the primary preamble to form a full-bandwidth preamble, the auxiliary preamble being either a direct sequence in the time domain with a frequency response combined within the one or more side-bands or being an OFDM symbol corresponding to a particular frequency pattern within the one or more side-bands, and wherein a bandwidth of the one or more side-bands is the difference between a bandwidth of the core-band and the adaptable bandwidth.

12. (Canceled)

13. (Previously Presented) The mobile station of claim 11, wherein the communication signal is an orthogonal frequency division multiple access (OFDMA)

signal, and the communication signal is utilized in a downlink with a duplexing technique that is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

14-21. (Canceled)

22. (Currently Amended) A cellular base station comprising:

circuitry configured to transmit a broadcast channel in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups, wherein each subcarrier group includes a plurality of subcarriers, wherein the core-band is utilized to communicate a primary preamble sufficient to enable radio operations, the primary preamble being a direct sequence in the time domain with a frequency content confined within the core-band or being an OFDM symbol corresponding to a particular frequency pattern within the core-band; and

circuitry configured to transmit control and data channels using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band and one or more side-bands, wherein the or more sidebands are utilized to communicate an auxiliary preamble that is combinable with the primary preamble to form a full-bandwidth preamble, the auxiliary preamble being either a direct sequence in the time domain with a frequency response combined within the one or more side-bands or being an OFDM symbol corresponding to a particular frequency pattern within the one or more side-bands, and wherein a bandwidth of the one or more side-bands is the difference between a bandwidth of the core-band and an operating bandwidth.

23. (Previously Presented) The cellular base station of claim 22 wherein the circuitry configured to transmit the broadcast channel is further configured to transmit radio network information in the broadcast channel.

24. (Previously Presented) The cellular base station of claim 22 further comprising circuitry configured to transmit synchronization information in the core-band.

25. (Previously Presented) The cellular base station of claim 22 wherein the circuitry configured to transmit the broadcast channel is further configured to transmit in a time slot format.

26. (Previously Presented) The cellular base station of claim 22 wherein the base station operates in an OFDMA frequency division duplex (FDD) or time division duplex (TDD) mode.

27. (Currently Amended) A cellular mobile station comprising:

circuitry configured to receive synchronization information from a base station in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups where each subcarrier group includes a plurality of subcarriers, wherein the core-band is utilized to communicate a primary preamble sufficient to enable radio operations, the primary preamble being a direct sequence in the time domain with a frequency content confined within the core-band or being an OFDM symbol corresponding to a particular frequency pattern within the core-band;

circuitry configured to synchronize with the base station using the received synchronization information; and

circuitry configured to receive control and data channels using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band and one or more side-bands, wherein the or more sidebands are utilized to communicate an auxiliary preamble that is combinable with the primary preamble to form a full-bandwidth preamble, the auxiliary preamble being either a direct sequence in the time domain with a frequency response combined within the one or more side-bands or being an OFDM symbol corresponding to a particular frequency pattern within the one or more side-bands, and wherein a bandwidth of the one or more side-bands is the difference between a bandwidth of the core-band and an operating bandwidth.

28. (Previously Presented) The cellular mobile station of claim 27 wherein the circuitry configured to receive the synchronization information from the base station in the core-band is further configured to receive the cell identification information from the base station in the core-band.

29. (Previously Presented) The cellular mobile station of claim 27 further comprising circuitry configured to receive a broadcast channel in the core-band.

30. (Previously Presented) The cellular mobile station of claim 29 wherein the broadcast channel carries radio network information.

31. (Previously Presented) The cellular mobile station of claim 27 further comprising circuitry configured to transmit a preamble after synchronizing with the base station.

32. (Currently Amended) A variable bandwidth communication method comprising:

transmitting a broadcast channel by a cellular base station in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups, wherein each subcarrier group includes a plurality of subcarriers, wherein the core-band is utilized to communicate a primary preamble sufficient to enable radio operations, the primary preamble being a direct sequence in the time domain with a frequency content confined within the core-band or being an OFDM symbol corresponding to a particular frequency pattern within the core-band; and

transmitting control and data channels by the cellular base station using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band and one or more side-bands, wherein the or more sidebands are utilized to communicate an auxiliary preamble that is combinable with the primary preamble to form a full-bandwidth preamble, the auxiliary preamble being either a direct sequence in the time domain with a frequency response combined within the one or more side-bands or being an OFDM symbol corresponding to a particular frequency pattern within the one or more side-bands, and wherein a bandwidth of the one or more side-bands is the difference between a bandwidth of the core-band and an operating bandwidth.

33. (Previously Presented) The method of claim 32 wherein the broadcast channel carries radio network information.

34. (Previously Presented) The method of claim 32 further comprising transmitting by the base station synchronization information in the core-band.

35. (Previously Presented) The method of claim 32 wherein the transmissions are in a time slot format.

36. (Previously Presented) The method of claim 32 wherein the cellular base station operates in an OFDMA frequency division duplex (FDD) or time division duplex (TDD) mode.

37. (Currently Amended) A variable bandwidth communication method comprising:

receiving synchronization information by a cellular mobile station from a base station in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups where each subcarrier group includes a plurality of subcarriers, wherein the core-band is utilized to communicate a primary preamble sufficient to enable radio operations, the primary preamble being a direct sequence in the time domain with a frequency content confined within the core-band or being an OFDM symbol corresponding to a particular frequency pattern within the core-band;

synchronizing the cellular mobile station with the base station using the received synchronization information; and

receiving control and data channels by the cellular mobile station using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band and one or more side-bands, wherein the or more sidebands are utilized to communicate an auxiliary preamble that is combinable with the primary preamble to form a full-bandwidth preamble, the auxiliary preamble being either a direct sequence in the time domain with a frequency response combined within the one or more side-bands or being an OFDM symbol corresponding to a

particular frequency pattern within the one or more side-bands, and wherein a bandwidth of the one or more side-bands is the difference between a bandwidth of the core-band and an operating bandwidth.

38. (Previously Presented) The method of claim 37 wherein the receiving of the synchronization information by the cellular mobile station from the base station in the core-band includes receiving cell identification information from the base station in the core-band.

39. (Previously Presented) The method of claim 37 further comprising receiving by the cellular mobile station a broadcast channel in the core-band.

40. (Previously Presented) The method of claim 39 wherein the broadcast channel carries radio network information.

41. (Previously Presented) The method of claim 37 further comprising transmitting by the cellular mobile station a preamble after synchronizing with the base station.

REMARKS

This paper is a response to the Final Office Action of Jan. 7, 2010. Prior to entry of this paper, claims 1, 2, 6, 8, 11, 13, and 22-41 were pending in this application. Claims 1, 6, 11, 22, 27, 32, and 37, are now amended. No claims are added or canceled. The amendments made herein are without prejudice to applicants right to pursue claims in unamended or other form in this or continuing applications and are made merely to expedite prosecution of this application. Upon entry of this paper, claims 1-2, 6, 8, 11, 13, and 22-41 will remain pending. No new matter is added.

In the Office Action mailed January 7, 2010, pending claims 1, 2, 6, 8, 11, 13, 22-41 were rejected. More specifically, the status of the application in light of this Office Action is as follows:

(A) Claims 1, 2, 11, 13, and 22-41 were rejected under 35 U.S.C. § 112, first paragraph.

(B) Claims 1, 2, 6, 8, 11, and 13 were rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over a combination of U.S. Patent No. 6,175,550 to van Nee ("van Nee") and U.S. Patent Publication No. 2007/0208884 to Vanderaar et al. ("Vanderaar"); claims 22-30 and 32-40 were rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over a combination of Vanderrar and U.S. Patent Application No. 2002/0142777 to McGovern et al. ("McGovern"); and claims 31 and 41 were rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over a combination of Vanderrar, McGovern, U.S. Patent No. 7,376,424 to Kim et al. ("Kim").

A. Response to Rejections under 35 U.S.C. § 112, first paragraph

As noted above, claims 1, 2, 11, 13, and 22-41 were rejected under 35 U.S.C. § 112, first paragraph. More specifically, pages 2 and 3 of the Office Action

allege that applicants' specification "does not disclose that the core-band is composed of a plurality of subcarrier groups." Applicants respectfully disagree.

With respect to the rejection of claim 1, applicants respectfully submit that the features alleged to be unsupported by applicants' specification are fully supported by at least paragraph [0022] and paragraph [0033] of applicants' disclosure. As merely one non-limiting example of the how these features are fully supported by applicants' disclosure, applicants respectfully note that paragraph [0022] states that "[t]he data subcarriers can be arranged into groups called subchannels to support scalability and multiple-access." Further, paragraph [0033] states that "[i]n one embodiment, relevant or essential radio control signals such as preambles, ranging signals, bandwidth request, and/or bandwidth allocation are transmitted within the [core-band] CB. In addition to the essential control channels, a **set** of data channels and their related dedicated control channels are placed within the CB to maintain basic radio operation." (Emphasis added.)

Based at least upon paragraph [0033]'s discussion of data channels being within a core-band, and paragraph [0022]'s discussion of data subcarriers being arranged into groups, applicants respectfully submit that their disclosure clearly supports "a core-band, including a plurality of subcarrier groups" as recited by claim 1 and thus request that the 35 U.S.C. § 112 rejection be withdrawn.

Applicants also respectfully submit that the similar rejections of independent claims 11, 22, 27, 32, and 37 should be withdrawn for at least similar reasons. As the remaining claims rejected under 35 U.S.C. § 112 depend from the above-discussed independent claims, applicants also respectfully request that the 35 U.S.C. § 112 rejection of these claims be withdrawn.

B. Response to Rejections under 35 U.S.C. § 103

Claims 1, 2, 6, 8, 11, 13, and 22-41 were rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over combinations of van Nee, Vanderaar, McGovern, and Kim.

Without conceding to or commenting on the substance of the 35 U.S.C. § 103 rejections, applicants have amended each of independent claims 1, 6, 11, 22, 27, 32, and 37 to include subject matter substantially similar to that previously recited by claim 9, which had been indicated as being directed towards allowable subject matter. (See, page 19 of the Office Action of April 28, 2009.) Claim 9 was previously cancelled by the response of Sept. 28, 2009.

For at least the reasons discussed herein, applicants respectfully submit that each of independent claims 1, 6, 11, 22, 27, 32, and 37 are allowable. As the remaining claims each depend from one of the above-discussed independent claims, applicants respectfully submit that these dependent claims are also allowable.

Conclusion

In view of the above amendment, applicants believe the pending application is in condition for allowance. Applicants accordingly request reconsideration of the application and a mailing of a Notice of Allowance. If the Examiner has any questions or believes a telephone conference would expedite prosecution of this application, the Examiner is encouraged to contact Davin Chin at (206) 359-8000.

Please charge any deficiencies or credit any overpayment to our Deposit Account No. 50-0665, under Order No. 320529496US1 from which the undersigned is authorized to draw.

Respectfully submitted,
Perkins Coie LLP

Date: March 3, 2010

Christopher J. Daley-Watson
Registration No. 34,807
Davin Chin
Registration No. 58,413

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Electronic Acknowledgement Receipt

EFS ID:	7134810
Application Number:	10583534
International Application Number:	
Confirmation Number:	4954
Title of Invention:	Methods and Apparatus for Multi-Carrier Communications with Variable Channel Bandwidth
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	25096
Filer:	Christopher J. Daley-Watson/Wade Barbus
Filer Authorized By:	Christopher J. Daley-Watson
Attorney Docket Number:	320529496US1
Receipt Date:	03-MAR-2010
Filing Date:	05-JUN-2007
Time Stamp:	17:07:16
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		2010_03_03_Amendment.PDF	797081 364b16d7f33236d750cd6386d1b56142b7431480	yes	16

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	1
	Amendment After Final	2	2
	Claims	3	12
	Applicant Arguments/Remarks Made in an Amendment	13	16

Warnings:	
Information:	
Total Files Size (in bytes):	797081

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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.

AMENDMENT TRANSMITTAL LETTER

Docket No. 320529496US1			
Application No. 10/583,534-Conf. #4954	Filing Date June 5, 2007	Examiner M. L. Sekul	Art Unit 2461

Applicant(s): Li et al.

Invention: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

TO THE COMMISSIONER FOR PATENTS

Transmitted herewith is an amendment in the above-identified application.

The fee has been calculated and is transmitted as shown below.

CLAIMS AS AMENDED					
	Claims Remaining After Amendment	Highest Number Previously Paid	Number Extra Claims Present	Rate	
Total Claims	26	- 26 =	0	x 52.00	0.00
Independent Claims	7	- 7 =	0	x 220.00	0.00
Multiple Dependent Claims (check if applicable) ☐					
Other fee (please specify):					
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT:					0.00

[x] Large Entity [ ] Small Entity

[x] No additional fee is required for this amendment.

[ ] Please charge Deposit Account No. _____ in the amount of $ _____.

[ ] A check in the amount of $ _____ to cover the filing fee is enclosed.

[ ] Payment by credit card. Form PTO-2038 is attached.

[x] The Director is hereby authorized to charge and credit Deposit Account No. 50-0665 as described below.

[x] Credit any overpayment.

[x] Charge any additional filing or application processing fees required under 37 CFR 1.16 and 1.17.

Dated: March 3, 2010

Christopher J. Daley-Watson
Attorney/Agent Reg. No.: 34,807

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PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
10/583,534	06/05/2007	

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 03/03/2010

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 26	Minus	** 41	= 0	X $ =		OR	X $52=	0
Independent (37 CFR 1.16(h))	* 7	Minus	***6	= 1	X $ =		OR	X $220=	220
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	220

AMENDMENT

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

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

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

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

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

Legal Instrument Examiner:
/Wanda Meredith/

Document code: WFEE

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10/583,534	06/05/2007	Xiaodong Li	320529496US1	4954

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ART UNIT	PAPER NUMBER
2461	

NOTIFICATION DATE	DELIVERY MODE
01/07/2010	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):

patentprocurement@perkinscoie.com
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Office Action Summary	Application No.	Applicant(s)	
	10/583,534	LI ET AL.	
	Examiner	Art Unit	
	MARIA L. SEKUL	2461	

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

Period for Reply

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

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

Status

1)☒ Responsive to communication(s) filed on *28 September 2009*.

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

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

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) *3-5,7,9,10,12 and 14-21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,6,8,11,13,22-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

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

Application Papers

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

10)☒ The drawing(s) filed on *28 September 2009* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

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

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

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

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

a)☒ All b)☐ Some * c)☐ None of:

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

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

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

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

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 1, 2, 6, 8, 11, 13 and 22-41 are pending. Claims 3-5, 7, 9-10, 12 and 14-21 are cancelled. Claims 22-41 are newly added.

Response to Arguments

2. Applicant's arguments with respect to claims 1, 6 and 11 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. **Claims 1-2, 11, 13, 22-41** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

As to **claims 1, 11, 22, 27, 32, and 37**, the claims recite the limitation “a core-band, including a plurality of subcarrier groups”, or similar limitation. Applicant's Specification discloses on p. 5, ¶ 22, "the data subcarriers can be arranged into groups called subchannels to support scalability and multiple access". This grouping refers to supporting the variable bandwidth on the operating portion of the channel. Applicant’s

Specification describes the core-band on p. 7, ¶ 32, but does not disclose that the core-band is composed of a plurality of subcarrier groups.

Claim 2, 13, 23-26, 28-31, 33-36 and 38-41 are rejected as being dependent on a rejected base claim.

Claim Rejections - 35 USC § 103

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

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

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. **Claims 1, 2, 6, 8, 11, 13,** are rejected under 35 U.S.C. 103(a) as being unpatentable over **van Nee (US Patent No. 6,175,550)** in view of **Vanderaar et al. (US PGPub 2007/0208884)** ("Vanderaar").

As to **claim 1**, van Nee discloses a method:

"utilizing, by the base station, a specified number of subcarriers to construct a variable bandwidth wireless channel" (scalable OFDM system that adjusts number of carriers for the desired transmission rate, **col. 3, lines 22-27**);

"utilizing by the base station groups of subcarriers, wherein each group includes a plurality of subcarriers" (this was well known in the art at the time the invention was made that subchannels can comprise one or more subcarriers);

"maintaining a fixed spacing between adjacent subcarriers" (increasing the number of subcarriers for a constant sampling rate will increase the number of carriers while keeping the carrier spacing fixed, **Fig. 3, col. 6, lines 51-54**);

"adding or subtracting, by the base station, groups of subcarriers to scale the variable bandwidth wireless channel and achieve an operating channel bandwidth" (scalable OFDM system with a transmitter and receiver that adjust number of carriers to meet the desired transmission rate, **col. 3, lines 53-58; col. 6, lines 51-57**); and

Van Nee does not explicitly teach "a core-band, including a plurality of subcarrier groups, substantially centered at an operating center frequency of the different communication schemes, is utilized by the base station as a broadcast channel

carrying radio control and operation signaling, where the core-band is substantially not wider than a smallest possible operating channel bandwidth of the system".

Vanderaar teaches carrier and timing synchronization is achieved on a central, data-bearing channel. (¶ 21). A primary channel is subdivided into n sub-channels S; the channel numbering scheme is based around a center frequency fc such that a first sub-channel S_0 ("core band") is centered at a center frequency ("operating center frequency of the different communication schemes") and the remaining sub-channels are distributed about the center frequency (**Fig. 1, 3; ¶ 23, 26**). **Fig. 3** further depicts that the center channel bandwidth is, at most, equal to the smallest operating channel bandwidth, that is, the center channel bandwidth is not wider than the smallest possible operating channel bandwidth of the system. In order to maintain synchronization, the dynamic link assignment (DLA) waveform is constrained to require a special waveform in the central channel 112. The primary band 106 contains sixteen frequency-multiplexed sub-channels 108 that partially overlap in an OFDM fashion ("subcarrier groups") (**Fig. 10; ¶ 39**). The Synchronization frame 300 allows a terminal demodulator to acquire the carrier frequency and phase, as well as the symbol timing ("radio control and operation signaling"), and may be broadcast (**Fig. 5-6, ¶ 25-27**). The RAC frame 700 contains information that allows users to enter the transmission system or receive messages based on a broadcast ID (**Fig. 7, ¶ 32**). Further Vanderaar teaches that this adaptive transmission is applicable to any multi-user digital communication system in which data transmission is to a number of users each operating under different conditions, (**¶ 21**).

Vanderaar and van Nee are analogous art in that they both pertain to dynamically adapting transmission parameters based on transmission capabilities of the transmitter and receiver. It would have been obvious to one skilled in the art at the time the invention was made to use the center frequency to provide carrier and timing information as taught in Vanderaar with the dynamically scalable system in van Nee for the purpose of providing more efficient use of bandwidth by providing adaptive control on a user basis without requiring resynchronization.

As to **claim 2**, van Nee in view of Vanderaar discloses all of claim 1.

van Nee further discloses "the information bearing signal is an orthogonal frequency division multiple access (OFDMA) signal (scalable OFDM system, **Fig. 1, col. 3, line 66** through **col. 4, line 17**).

Vanderaar further discloses the signal is "utilized in a downlink where a duplexing technique that is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD)" (variable modulation and coding formats on a per-user basis through the use of Time Division Multiplexing (TDM) and Orthogonal Frequency Division Multiplexing (OFDM), **¶ 21**).

As to **Claim 6**, van Nee discloses a method comprising:

"maintaining a fixed spacing between adjacent subcarriers " (increasing the number of subcarriers for a constant sampling rate will increase the number of carriers while keeping the carrier spacing fixed, **Fig. 3, col. 6, lines 51-54**);

"adjusting a number of groups of subcarriers to scale a channel and attain an operational bandwidth" (bandwidth can be varied by modifying the number of subcarriers, **col. 3, lines 53-58**); and

"scanning spectral bands of different center frequencies" (the receiver performs measurements on received signals (scans) and provides feedback to the transmitter to dynamically scale the operating characteristics of the channel, **Fig. 4**, col. 7, line 62 through col. 8, line 19).

van Nee does not disclose "utilizing a core-band, substantially centered at an operating center frequency to carry synchronization information, wherein the core-band is narrower or equal to than a smallest possible operating channel bandwidth of the network" and "detecting the synchronization information in the core-band of the operating center frequency and decoding a broadcast channel carrying radio control and operation signaling provided by a base station to the mobile station via the core band".

Vanderaar teaches carrier and timing synchronization is achieved on a central, data-bearing channel. (¶ 21). A primary channel is subdivided into n sub-channels S; the channel numbering scheme is based around a center frequency fc such that a first sub-channel S_0 ("core band") is centered at a center frequency ("operating center frequency of the different communication schemes") and the remaining sub-channels are distributed about the center frequency (**Fig. 1, 3; ¶ 23, 26**). **Fig. 3** further depicts that the center channel bandwidth is, at most, equal to the smallest operating channel bandwidth, that is, the center channel bandwidth is not wider than the smallest possible

operating channel bandwidth of the system. In order to maintain synchronization, the dynamic link assignment (DLA) waveform is constrained to require a special waveform in the central channel 112. The primary band 106 contains sixteen frequency-multiplexed sub-channels 108 that partially overlap in an OFDM fashion ("subcarrier groups") (**Fig. 10; ¶ 39**). The Synchronization frame 300 allows a terminal demodulator to acquire the carrier frequency and phase, as well as the symbol timing ("radio control and operation signaling"), and may be broadcast (**Fig. 5-6, ¶ 25-27**). The RAC frame 700 contains information that allows users to enter the transmission system or receive messages based on a broadcast ID (**Fig. 7, ¶ 32**). Further Vanderaar teaches that this adaptive transmission is applicable to any multi-user digital communication system in which data transmission is to a number of users each operating under different conditions, (**¶ 21**).

Vanderaar and van Nee are analogous art in that they both pertain to dynamically adapting transmission parameters based on transmission capabilities of the transmitter and receiver. It would have been obvious to one skilled in the art at the time the invention was made to use the center frequency to provide carrier and timing information as taught in Vanderaar with the dynamically scalable system in van Nee for the purpose of providing more efficient use of bandwidth by providing adaptive control on a user basis without requiring resynchronization.

As to **claim 8**, van Nee in view of Vanderaar discloses the method of claim 6.

Vanderaar further discloses "the signal is an orthogonal frequency division multiple access (OFDMA), and the signal is utilized in a downlink, with a depleting

technique that is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD)" (variable modulation and coding formats on a per-user basis through the use of Time Division Multiplexing (TDM) and Orthogonal Frequency Division Multiplexing (OFDM) (**¶ 21**)).

As to **claim 11**, van Nee discloses a transceiver comprising:

"an analog-to-digital converter for signal sampling"(**Fig. 4** depicting an OFDM receiver with an A/D component) ;

"a Fast Fourier Transform and Inverse Fast Fourier Transform processor (FFT/IFFT), wherein fixed spacing between carriers is maintained" (increasing the number of subcarriers for a constant sampling rate will increase the number of carriers while keeping the carrier spacing fixed, **Fig. 3, col. 6, lines 51-54**);

"a scanner for scanning spectral bands of specified center frequencies" (the receiver performs measurements on received signals (scans) and provides feedback to the transmitter to dynamically scale the operating characteristics of the channel, **Fig. 4**, col. 7, line 62 through col. 8, line 19); and

"a facility for adding groups to widen the channel bandwidth for remainder of the communication" (scalable OFDM system including an OFDM receiver, **Fig. 4**, for adjusting the number of carriers to meet the desired transmission rate, **col. 3, lines 53-58; col. 6, lines 51-57**).

van Nee does not teach "a facility for decoding a broadcast channel including radio control and operation signaling associated with the area in a core-band including a

plurality of groups, wherein the core-band is not wider than a smallest possible operating channel bandwidth of the network".

Vanderaar teaches carrier and timing synchronization is achieved on a central, data-bearing channel. (¶ 21). A primary channel is subdivided into n sub-channels S; the channel numbering scheme is based around a center frequency fc such that a first sub-channel S_0 ("core band") is centered at a center frequency ("operating center frequency of the different communication schemes") and the remaining sub-channels are distributed about the center frequency (**Fig. 1, 3; ¶ 23, 26**). **Fig. 3** further depicts that the center channel bandwidth is, at most, equal to the smallest operating channel bandwidth, that is, the center channel bandwidth is not wider than the smallest possible operating channel bandwidth of the system. In order to maintain synchronization, the dynamic link assignment (DLA) waveform is constrained to require a special waveform in the central channel 112. The primary band 106 contains sixteen frequency-multiplexed sub-channels 108 that partially overlap in an OFDM fashion ("subcarrier groups") (**Fig. 10; ¶ 39**). The Synchronization frame 300 allows a terminal demodulator to acquire the carrier frequency and phase, as well as the symbol timing ("radio control and operation signaling"), and may be broadcast (**Fig. 5-6, ¶ 25-27**). The RAC frame 700 contains information that allows users to enter the transmission system or receive messages based on a broadcast ID (**Fig. 7, ¶ 32**). Further Vanderaar teaches that this adaptive transmission is applicable to any multi-user digital communication system in which data transmission is to a number of users each operating under different conditions, (**¶ 21**).

Vanderaar and van Nee are analogous art in that they both pertain to dynamically adapting transmission parameters based on transmission capabilities of the transmitter and receiver. It would have been obvious to one skilled in the art at the time the invention was made to use the center frequency to provide carrier and timing information as taught in Vanderaar with the dynamically scalable system in van Nee for the purpose of providing more efficient use of bandwidth by providing adaptive control on a user basis without requiring resynchronization.

As to **claim 13**, van Nee in view of Vanderaar disclose all of claim 11.

Van Nee further discloses "the communication signal is an orthogonal frequency division multiple access (OFDMA) signal, and the communication signal is utilized in a downlink, with a duplexing technique that is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD)" (in a scalable OFDM system it was well known in the art at the time the invention was made that either TDD or FDD could be used on the uplink and/or downlink).

7. **Claims 22-30 and 32-40** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Vanderaar et al. (US PGPub 2007/0208884)** ("Vanderaar") in view of **McGovern et al. (US PGPub 2002/0142777)** ("McGovern").

As to **claims 22 and 32**, Vanderaar discloses a cellular base station comprising:

"circuitry configured to transmit a broadcast channel in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups, wherein each subcarrier group includes a plurality of subcarriers"

(Vanderaar discloses carrier and timing synchronization is achieved on a central, data-bearing channel (core-band) (**¶ 21**). The Receive Access Channel (RAC) slot supports broadcast information for users not registered with the system (**Fig. 7; ¶ 29)**. A primary channel is subdivided into n sub-channels S; the channel numbering scheme is based around a center frequency fc such that a first sub-channel S_0 ("core band") is centered at a center frequency ("operating center frequency of the different communication schemes") and the remaining sub-channels are distributed about the center frequency, **Fig. 1, 3; ¶ 23, 26**; it is further implicit that in an OFDM system (**¶ 21**), the center channel (core band) will be comprised of a group of subcarriers; Vanderaar allows variable modulation and coding formats on a per-user basis through the use of Time Division Multiplexing (TDM) and Orthogonal Frequency Division Multiplexing (OFDM) (**¶ 21**), in which it is implicit that when applying OFDM variable modulation and coding formats (**¶ 21**), the group of subcarriers will be adapted to the various coding and formats, and further teaches the system may be a point (base station) to multi-point (cell phones) configuration, **¶ 42**).

Vanderaar does not explicitly disclose "circuitry configured to transmit control and data channels using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band".

Vanderaar teaches dynamic link assignment (DLA) allows communication system to dynamically customize the forward link on a per-user basis (**¶ 20-21**). Vanderaar allows variable modulation and coding formats on a per-user basis through the use of Time Division Multiplexing (TDM) and Orthogonal Frequency Division

Multiplexing (OFDM) (**¶ 21**), in which it is implicit that when applying OFDM variable modulation and coding formats (**¶ 21**), the group of subcarriers will be adapted to the various coding and formats. Vanderaar further teaches the system may be a point (base station) to multi-point (cell phones) configuration, **¶ 42**).

McGovern teaches dynamic channel bandwidth allowing variable bandwidth channels, i.e. narrowband, wideband, or a combination of both (**¶ 13**). The mobile station receives a list of available channels from a broadcast control channel, e.g. then scans for the center frequencies to find one with acceptable signal quality (¶ 27). The mobile station tunes to the center frequency of the channel selected and therefore, the variable band includes the center frequency (**¶ 22**).

It would have been obvious to one skilled in the art at the time the invention was made to combine the central, data-bearing channel of Vanderaar with the dynamic bandwidth allocation of McGovern for the purpose of providing more efficient use of bandwidth by providing adaptive control on a user basis without requiring resynchronization.

As to **claims 23 and 33**, Vanderaar in view of McGovern discloses the cellular base station of claim 22.

Vanderaar further discloses wherein the circuitry "is further configured to transmit radio network information in the broadcast channel" (carrier and timing synchronization ("radio network information") is achieved on a central, data-bearing channel ("core-band") (**¶ 21**); the central channel supports individual, multicast and broadcast users.

As to **claims 24 and 34**, Vanderaar in view of McGovern discloses the cellular base station of claim 22.

Vanderaar further discloses circuitry configured to transmit synchronization information in the core-band (carrier and timing synchronization ("radio network information") is achieved on a central, data-bearing channel ("core-band") (**¶ 21**).

As to **claims 25 and 35**, Vanderaar in view of McGovern discloses the cellular base station of claim 22.

Vanderaar further discloses the circuitry is further configured to transmit in a time slot format (variable modulation and coding formats on a per-user basis through the use of Time Division Multiplexing (TDM) and Orthogonal Frequency Division Multiplexing (OFDM), **¶ 21**), both of which have a time slot element).

As to **claims 26 and 36**, Vanderaar in view of McGovern discloses the cellular base station of claim 22.

Vanderaar further discloses the base station operates in an OFDMA frequency division duplex (FDD) or time division duplex (TDD) mode (variable modulation and coding formats on a per-user basis through the use of Time Division Multiplexing (TDM) and Orthogonal Frequency Division Multiplexing (OFDM), **¶ 21**).

As to **claims 27 and 37**, Vanderaar discloses a cellular mobile station (the system may be a point (base station) to multi-point (cell phones) configuration, **¶ 42**) comprising:

"circuitry configured to receive synchronization information from a base station in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the

core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups where each subcarrier group includes a plurality of subcarriers" Vanderaar teaches dynamic link assignment (DLA) allows communication system to dynamically customize the forward link on a per-user basis (**¶ 20-21**). Vanderaar allows variable modulation and coding formats on a per-user basis through the use of Time Division Multiplexing (TDM) and Orthogonal Frequency Division Multiplexing (OFDM) (**¶ 21**), in which it is implicit that when applying OFDM variable modulation and coding formats (**¶ 21**), the group of subcarriers will be adapted to the various coding and formats. Vanderaar further teaches the system may be a point (base station) to multi-point (cell phones) configuration, **¶ 42**); and

circuitry configured to synchronize with the base station using the received synchronization information (it is anticipated that the synchronization sent by the transmitter will be used for synchronization by the receiver).

Vanderaar in view of McGovern does not explicitly disclose "circuitry configured to receive control and data channels using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band".

Vanderaar teaches dynamic link assignment (DLA) allows communication system to dynamically customize the forward link on a per-user basis (**¶ 20-21**). Vanderaar allows variable modulation and coding formats on a per-user basis through the use of Time Division Multiplexing (TDM) and Orthogonal Frequency Division Multiplexing (OFDM) (**¶ 21**), in which it is implicit that when applying OFDM variable modulation and coding formats (**¶ 21**), the group of subcarriers will be adapted to the

various coding and formats. Vanderaar further teaches the system may be a point (base station) to multi-point (cell phones) configuration, **¶ 42**).

McGovern teaches dynamic channel bandwidth in which channel assignment is via inband control instead of dedicated control channel to allow variable bandwidth channels, i.e. narrowband, wideband, or a combination of both (**¶ 13**). The mobile station receives a list of available channels from a broadcast control channel, e.g. then scans for the center frequencies to find one with acceptable signal quality (¶ 27). The mobile station tunes to the center frequency of the channel selected and therefore, the variable band includes the center frequency (¶ 22).

It would have been obvious to one skilled in the art at the time the invention was made to combine the central control channel of Vanderaar in view of McGovern with the dynamic bandwidth allocation of McGovern for the purpose of providing more efficient use of bandwidth by providing adaptive control on a user basis without requiring resynchronization.

As to **claims 28 and 38**, Vanderaar in view of McGovern discloses the cellular mobile station of claim 27.

Vanderaar further discloses the circuitry configured to receive the synchronization information from the base station in the core-band is further configured to receive the cell identification information from the base station in the core-band (carrier and timing synchronization is achieved on a central, data-bearing channel (core-band) (**¶ 21**); it is anticipated that the carrier and timing synchronization contains cell identification information).

As to **claims 29 and 39**, Vanderaar in view of McGovern discloses the cellular mobile station of claim 27.

Vanderaar further discloses circuitry configured to receive a broadcast channel in the core-band (In order to maintain accurate synchronization, the DLA waveform is constrained to require a special waveform in the central channel; the central channel 112 is received at the baseband, and uses a special waveform in order to maintain synchronization; information must be present in all channel-zero 112 slots, **Fig. 3; ¶ 26**).

As to **claims 30 and 40**, Vanderaar in view of McGovern discloses the cellular mobile station of claim 29.

Vanderaar further discloses the broadcast channel carries radio network information (carrier and timing synchronization (radio network information) is achieved on a central, data-bearing channel (core-band), **¶ 21**).

8. **Claims 31 and 41** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Vanderaar et al. (US PGPub 2007/0208884)** ("Vanderaar") in view of in view of **McGovern et al. (US PGPub 2002/0142777)** ("McGovern") and further in view of **Kim et al. (US Patent No. 7,376,424)** ("Kim").

As to **claims 31 and 41**, Vanderaar in view of McGovern discloses the cellular mobile station of claim 27.

Vanderaar in view of McGovern does not explicitly disclose "circuitry configured to transmit a preamble after synchronizing with the base station".

Kim teaches that if a mobile station is performing an inter-frequency hard handover, the mobile station target base station acquires synchronization of signals

transmitted from the mobile station by using the preamble of the transmitted by the mobile station through the new frequency, **col. 7, lines 10-24**; therefore, after a mobile station has synchronized with a currently serving base station, the mobile station will send an uplink preamble to a target base station before handover).

It would have been obvious to one skilled in the art at the time the invention was made that a mobile station of Vanderaar in view of McGovern could perform a handover as taught in Kim in which the mobile sends a preamble.

Conclusion

1. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARIA L. SEKUL whose telephone number is (571)270-7636. The examiner can normally be reached on Monday - Friday 9:00-5:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (571) 272-3155. 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.

MARIA L. SEKUL
Examiner
Art Unit 2461

/Dmitry H. Levitan/
Primary Examiner, Art Unit 2461

Notice of References Cited	Application/Control No. 10/583,534	Applicant(s)/Patent Under Reexamination LI ET AL.	
	Examiner MARIA L. SEKUL	Art Unit 2461	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2002/0018527	02-2002	Vanderaar et al.	375/259
*	B	US-7,376,424	05-2008	Kim et al.	455/436
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

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

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10583534	LI ET AL.
	Examiner	Art Unit
	MARIA L SEKUL	4124

SEARCHED

Class	Subclass	Date	Examiner
370	203, 210 (w/ text search)	4/24/2009	mls
375	(w/ text search)	4/24/2009	

SEARCH NOTES

Search Notes	Date	Examiner
Discussed search strategy with primary examiner Steven Nguyen	4/20/2009	mls
Inventor/Assignee search	4/24/2009	mls
Updated EAST text search	12/5/09	mls

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10583534	LI ET AL.
	Examiner	Art Unit
	MARIA L SEKUL	4124

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

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

CLAIM		DATE								
Final	Original	04/24/2009	01/01/2010							
	1	✓	✓							
	2	✓	✓							
	3	O	-							
	4	O	-							
	5	✓	-							
	6	✓	✓							
	7	✓	-							
	8	✓	✓							
	9	O	-							
	10	✓	-							
	11	✓	-							
	12	✓	-							
	13	✓	✓							
	14	✓	-							
	15	✓	-							
	16	O	-							
	17	✓	-							
	18	✓	-							
	19	✓	-							
	20	✓	-							
	21	✓	-							
	22		✓							
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	31		✓							
	32		✓							
	33		✓							
	34		✓							
	35		✓							
	36		✓							

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10583534	LI ET AL.
	Examiner	Art Unit
	MARIA L SEKUL	4124

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

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

CLAIM		DATE								
Final	Original	04/24/2009	01/01/2010							
	37		✓							
	38		✓							
	39		✓							
	40		✓							
	41		✓							

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3039	variable adj2 bandwidth	US-PGPUB; USPAT; DERWENT	OR	ON	2010/01/01 13:09
L2	786	variable adj2 bandwidth same (control core)	US-PGPUB; USPAT; DERWENT	OR	ON	2010/01/01 13:09
L3	407	variable adj2 bandwidth same (control core) and (wireless ofdm$1 cell$4)	US-PGPUB; USPAT; DERWENT	OR	ON	2010/01/01 13:10
L4	457	variable adj2 bandwidth with (control core)	US-PGPUB; USPAT; DERWENT	OR	ON	2010/01/01 13:10
L5	219	variable adj2 bandwidth with (control core) and (wireless ofdm$1 cell$4)	US-PGPUB; USPAT; DERWENT	OR	ON	2010/01/01 13:10
L6	67	variable adj2 bandwidth same (control core) with band	US-PGPUB; USPAT; DERWENT	OR	ON	2010/01/01 13:18
L7	67	variable adj2 bandwidth same (control core central) with band	US-PGPUB; USPAT; DERWENT	OR	ON	2010/01/01 13:18
L8	1	variable adj2 bandwidth same (control core central) with band and (wide$1 narrow$2) with (bandwidth channel) and preamble	US-PGPUB; USPAT; DERWENT	OR	ON	2010/01/01 13:23
L9	1	variable adj2 bandwidth same (control core central) with band and (wide$1 narrow$2) and preamble	US-PGPUB; USPAT; DERWENT	OR	ON	2010/01/01 13:23
L10	1	variable adj2 bandwidth same (control core central) with band and preamble	US-PGPUB; USPAT; DERWENT	OR	ON	2010/01/01 13:24
L11	5	variable adj2 channel same (control core central) with band and preamble	US-PGPUB; USPAT; DERWENT	OR	ON	2010/01/01 13:25
S135	1440	(control$1channel) mid $1amble	US-PGPUB; USPAT	OR	ON	2009/12/05 15:38
S136	133073	channel with (wide width)	US-PGPUB; USPAT	OR	ON	2009/12/05 15:41
S137	2425	S136 and lobe	US-PGPUB; USPAT	OR	ON	2009/12/05 15:41

S138	3	S135 and S137	US-PGPUB; USPAT	OR	ON	2009/12/05 15:41
S139	48501	S136 and frequency	US-PGPUB; USPAT	OR	ON	2009/12/05 15:46
S140	99	S135 and S139	US-PGPUB; USPAT	OR	ON	2009/12/05 15:46
S141	1447	(control$1channel) mid $1amble core$1band	US-PGPUB; USPAT	OR	ON	2009/12/05 15:54
S142	304139	(control$1channel) mid $1amble core$1band correlation	US-PGPUB; USPAT	OR	ON	2009/12/05 15:54
S143	19420	(control$1channel) mid $1amble core$1band auto $1correlation	US-PGPUB; USPAT	OR	ON	2009/12/05 15:54
S144	1389	S143 and S136	US-PGPUB; USPAT	OR	ON	2009/12/05 15:55
S145	1310	S144 and frequency	US-PGPUB; USPAT	OR	ON	2009/12/05 15:56
S146	14	S143 same S136 same frequency	US-PGPUB; USPAT	OR	ON	2009/12/05 15:56
S147	25221	chang$3 with (mode frequency) same communication	US-PGPUB; USPAT	OR	ON	2009/12/05 16:12
S148	49943	(chang$3 detect$3) with (mode frequency) same communication	US-PGPUB; USPAT	OR	ON	2009/12/05 16:12
S149	27088	(chang$3 detect$3) with (mode frequency) with communication	US-PGPUB; USPAT	OR	ON	2009/12/05 16:12
S150	31872	(chang$3 detect$3 shift$3) with (mode frequency) with communication	US-PGPUB; USPAT	OR	ON	2009/12/05 16:13
S151	675	(chang$3 detect$3 shift$3) with (mode frequency) with communication with available	US-PGPUB; USPAT	OR	ON	2009/12/05 16:13
S152	12	(chang$3 detect$3 shift$3) with (mode frequency) with communication with available with broadcast	US-PGPUB; USPAT	OR	ON	2009/12/05 16:13
S153	837	(chang$3 detect$3 shift$3 broadcast) with (mode frequency) with communication with available	US-PGPUB; USPAT	OR	ON	2009/12/05 16:16
S154	595	(chang$3 detect$3 shift$3 broadcast) with (mode frequency) with communication with available and (mobile WLAN cellular "802"$3)	US-PGPUB; USPAT	OR	ON	2009/12/05 16:17

S155	9	(chang$3 detect$3 shift$3 broadcast) with (mode frequency) with communication with available and (mobile WLAN cellular "802"$3) and lobe	US-PGPUB; USPAT	OR	ON	2009/12/05 16:17
S157	3098	(chang$3 detect$3 shift$3 broadcast switch$3 control) with (mode frequency channel) with communication with available and (mobile WLAN cellular "802"$3)	US-PGPUB; USPAT	OR	ON	2009/12/05 16:28
S158	598233	correlat$3 side$1lobe main $1lobe lobe	US-PGPUB; USPAT	OR	ON	2009/12/05 16:29
S159	810	S157 and S158	US-PGPUB; USPAT	OR	ON	2009/12/05 16:29
S160	469	S159 and (ht high $1throughput variable)	US-PGPUB; USPAT	OR	ON	2009/12/05 16:30
S161	19	S159 and (ht high $1throughput)	US-PGPUB; USPAT	OR	ON	2009/12/05 16:30
S162	510	S157 and S158 and (carrier sub$1carrier)	US-PGPUB; USPAT	OR	ON	2009/12/05 16:35
S163	170	(chang$3 detect$3 shift$3 broadcast switch$3 control) with (mode frequency channel) with communication with available same (carrier sub $1carier) and (mobile WLAN cellular "802"$3)	US-PGPUB; USPAT	OR	ON	2009/12/05 16:36
S164	489	multiple with (carrier sub $1carrier) with control with channel	US-PGPUB; USPAT	OR	ON	2009/12/05 16:48
S165	2626	variable adj2 bandwidth	US-PGPUB; USPAT	OR	ON	2009/12/05 16:48
S166	9	S164 and S165	US-PGPUB; USPAT	OR	ON	2009/12/05 16:48
S167	2	09/906171.app.	US-PGPUB; USPAT	OR	OFF	2009/12/07 15:00
S168	4472	wide$1band with (center control)	US-PGPUB; USPAT	OR	OFF	2009/12/07 16:39
S169	22	wide$1band with (center control) with pre$1amble	US-PGPUB; USPAT	OR	OFF	2009/12/07 16:39
S170	12483	center with (frequency band) same mhz	US-PGPUB; USPAT	OR	OFF	2009/12/07 16:44
S171	5167	center with (frequency band) same mhz and (multi $1user multi$1carrier multi)	US-PGPUB; USPAT	OR	OFF	2009/12/07 16:45

S172	196	center with (frequency band) same mhz same (multi$1user multi$1carrier multi) same ofdm	US-PGPUB; USPAT	OR	OFF	2009/12/07 16:45
S173	17	center with (frequency band) same mhz same (multi$1user multi$1carrier multi) same broadcast	US-PGPUB; USPAT	OR	OFF	2009/12/07 18:06
S174	1	10/583534.app.	US-PGPUB; USPAT	OR	OFF	2009/12/07 19:23
S175	45	fundamental adj range	US-PGPUB; USPAT	OR	OFF	2009/12/08 09:39
S176	42	fundamental adj range and (mhz cellular radio mobile frequency)	US-PGPUB; USPAT	OR	OFF	2009/12/08 09:39
S177	1	"20020018527".pn.	US-PGPUB; USPAT	OR	ON	2009/12/31 12:38
S178	1	"20020142777".pn.	US-PGPUB; USPAT	OR	OFF	2009/12/31 12:55
S179	6	("2002/0142777").URPN.	USPAT	OR	OFF	2009/12/31 12:56
S180	0	10/583534.app.	USPAT	OR	OFF	2009/12/31 12:57
S181	3	"2002042777".pn.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/12/31 15:09
S182	2	"20020142777".pn.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/12/31 15:09
S183	1702	scan$4 with center with frequenc$3	US-PGPUB; USPAT; DERWENT	OR	ON	2009/12/31 15:28
S184	75	scan$4 with center with frequenc$3 same (broadcast synchroniz$3)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/12/31 15:28
S185	759	scan$4 with center adj2 frequenc$3	US-PGPUB; USPAT; DERWENT	OR	ON	2009/12/31 15:36
S186	68	scan$4 with center adj2 frequenc$3 with (mobile receiver)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/12/31 15:36
S187	383	uplink near3 pre$1amble	US-PGPUB; USPAT; DERWENT	OR	ON	2009/12/31 17:11
S188	52	uplink near3 pre$1amble with synchroniz$5	US-PGPUB; USPAT; DERWENT	OR	ON	2009/12/31 17:11
S189	3	uplink near3 pre$1amble with after adj2 synchroniz $5	US-PGPUB; USPAT; DERWENT	OR	ON	2009/12/31 17:14

S190	52	uplink near3 pre$1amble with synchroniz$5	US-PGPUB; USPAT; DERWENT	OR	ON	2009/12/31 17:15
S191	2	"6175550".pn.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/12/31 17:43
S192	6	US-20050201476-$.DID. OR US-20050180314-$.DID. OR US-5793757-$.DID. OR US-20040224691-$.DID. OR US-2720056-$.DID.	US-PGPUB; USPAT; USOCR	OR	OFF	2010/01/01 11:53

EAST Search History (Interference)

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1/1/2010 2:41:17 PM
C:\Documents and Settings\msekul\My Documents\EAST\Workspaces\10583534 - Variable Channel BW.wsp

PTO/SB/08b (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	10/583,534-Conf. #4954
Filing Date	June 5, 2007
First Named Inventor	Xiaodong Li
Art Unit	2416
Examiner Name	M. L. Sekul
Attorney Docket Number	320529496US1

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
/M.S./		US-20050201476	09-15-2005	Kim et al.	
/M.S./		US-20050180314	08-18-2005	Webster et al.	
/M.S./		US-5,991,308	11-23-1999	Fuhrmann et al.	
/M.S./		US-5,793,757	08-11-1998	Uddenfeldt	
/M.S./		US-20040224691	11-11-2004	Hadad	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. * CITE NO.: Those application(s) which are marked with an single asterisk (*) next to the Cite No. are not supplied (under 37 CFR 1.98(a)(2)(iii)) because that application was filed after June 30, 2003 or is available in the IFW. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

NON PATENT LITERATURE DOCUMENTS

Examiner Initials	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
/M.S./		Yi et al., "Orthogonal multicarrier bandwidth modulation scheme for wireless communications," The 13th IEEE International Symposium on Personal Indoor and Mobile Radio communications, Sept. 2002, Volume 5, pgs. 2054-2058.	
/M.S./		International Search Report and Written Opinion; PCT Application No.: PCT/US2005/014828; Applicant: Waltical Solutions, Inc.; Date of Mailing: December 27, 2005, 6 pages.	

Examiner Signature	/Maria Sekul/	Date Considered	01/01/2010

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

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

PTO/SB/08b (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	10/583,534-Conf. #4954
Filing Date	June 5, 2007
First Named Inventor	Xiaodong Li
Art Unit	2416
Examiner Name	M. L. Sekul
Attorney Docket Number	320529496US1

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20050201476	09-15-2005	Kim et al.	
		US-20050180314	08-18-2005	Webster et al.	
		US-5,991,308	11-23-1999	Fuhrmann et al.	
		US-5,793,757	08-11-1998	Uddenfeldt	
		US-20040224691	11-11-2004	Hadad	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

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NON PATENT LITERATURE DOCUMENTS

Examiner Initials	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Yi et al., "Orthogonal multicarrier bandwidth modulation scheme for wireless communications," The 13th IEEE International Symposium on Personal Indoor and Mobile Radio communications, Sept. 2002, Volume 5, pgs. 2054-2058.	
		International Search Report and Written Opinion; PCT Application No.: PCT/US2005/014828; Applicant: Waltical Solutions, Inc.; Date of Mailing: December 27, 2005, 6 pages.	

Examiner Signature		Date Considered	

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[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

Electronic Patent Application Fee Transmittal

Application Number:	10583534
Filing Date:	05-Jun-2007
Title of Invention:	Methods and Apparatus for Multi-Carrier Communications with Variable Channel Bandwidth
First Named Inventor/Applicant Name:	Xiaodong Li
Filer:	Christopher J. Daley-Watson/Wade Barbus
Attorney Docket Number:	320529496US1

Filed as Large Entity

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

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:	6176112
Application Number:	10583534
International Application Number:	
Confirmation Number:	4954
Title of Invention:	Methods and Apparatus for Multi-Carrier Communications with Variable Channel Bandwidth
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	25096
Filer:	Christopher J. Daley-Watson/Wade Barbus
Filer Authorized By:	Christopher J. Daley-Watson
Attorney Docket Number:	320529496US1
Receipt Date:	30-SEP-2009
Filing Date:	05-JUN-2007
Time Stamp:	14:43:12
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Electronic Funds Transfer
Payment was successfully received in RAM	$180
RAM confirmation Number	3520
Deposit Account	
Authorized User	

File Listing:

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

1		2009_09_30_IDS_as_filed.PDF	829541 0277c385d7815b9a6a9ec4916cf784626fddb5e7	yes	14

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Transmittal Letter	1	2
Information Disclosure Statement (IDS) Filed (SB/08)	3	3
NPL Documents	4	8
NPL Documents	9	14

Warnings:

Information:

2	Fee Worksheet (PTO-875)	fee-info.pdf	30487 f49d792a3e693917d29bb1b9b78c070678234d24	no	2

Warnings:

Information:

Total Files Size (in bytes):	860028

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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.

Docket No.: 320529496US1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Xiaodong Li

Application No.: 10/583,534 Confirmation No.: 4954

Filed: June 5, 2007 Art Unit: 2416

For: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH Examiner: M. L. Sekul

INFORMATION DISCLOSURE STATEMENT (IDS)

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

Sir:

Pursuant to 37 CFR 1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement is filed more than three months after the U.S. filing date, OR more than three months after the date of entry of the national stage of a PCT application, AND after the mailing date of the first Office Action on the merits, whichever occurs first, but before the mailing date of a Final Office Action or Notice of Allowance (37 CFR 1.97(c)).

In accordance with 37 CFR 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of non-patent documents in accordance with 37 CFR 1.98(a)(2).

This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

It is submitted that the Information Disclosure Statement is in compliance with 37 CFR 1.98 and the Examiner is respectfully requested to consider the listed references.

Please charge the amount of $180.00 to EFT Account SEA1PIRM covering the fee set forth in 37 CFR 1.17(p). The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 50-0665, under Order No. 320529496US1.

Dated: 9/28/2009

Respectfully submitted,

By ______

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,534	06/05/2007	Xiaodong Li	320529496US1	4954

25096 7590 09/30/2009

PERKINS COIE LLP
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SEATTLE, WA 98111-1247

EXAMINER	
SEKUL, MARIA LYNN	
ART UNIT	**PAPER NUMBER**
2416	

MAIL DATE	DELIVERY MODE
09/30/2009	PAPER

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.

Interview Summary	Application No.	Applicant(s)	
	10/583,534	LI ET AL.	
	Examiner	Art Unit	
	MARIA L. SEKUL	2416	

All participants (applicant, applicant's representative, PTO personnel):

(1) *MARIA L. SEKUL*.

(2) *JASON MATTIS*.

(3)*DAVIN CHEN*.

(4)*CHRISTOPHER DALEY-WATSON*.

Date of Interview: *28 September 2009*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: *1*.

Identification of prior art discussed: *Miyoshi and McGovern et al*.

Agreement with respect to the claims f)☐ was reached. g)☒ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *See Continuation Sheet*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

/Jason E Mattis/ Primary Examiner, Art Unit 2416	/MARIA L. SEKUL/ Examiner, Art Unit 2416

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

———

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Applicant's attorneys provided an overview of the invention and the problem it is intended to solve, then discussed the Miyoshi and McGovern references as applied to the claims. Their position stated was that Miyoshi is geared toward an MCS scheme for a point-to-point connection between a receiver and transmitter whereas the claimed invention is directed toward a multi-carrier broadcast transmission; and the McGovern reference is not an analogous reference as it pertains to a land-mobile radio communication system and not a multi-carrier system. An amendment to the claims, specifically claim 1, was proposed by Applicant's attorneys to incorporate the limitations of a "multi-carrier system", currently stated in the preamble, and to add a limitation that the core-band is used as a "broadcast channel" into the body of the claim, and will be submitted with arguments in response to the First Office Action. Additionally, Examiner noted that the term "substantially" is used throughout the claims and may result in a 112,2nd para. rejection if the term has not been more specifically described in the specification as to what "substantially" means.

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Docket No.: 320529496US1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Li et al.

Application No.: 10/583,534 | Confirmation No.: 4954

Filed: June 5, 2007 | Art Unit: 4124

For: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH | Examiner: M. L. Sekul

RESPONSE TO NON-FINAL OFFICE ACTION

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

Sir:

INTRODUCTORY COMMENTS

In response to the Office Action dated April 28, 2009, please amend the above-identified U.S. patent application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Amendments to the Drawings begin on page 10 of this paper.

Remarks/Arguments begin on page 11 of this paper.

An **Appendix** including replacement drawing sheets is attached following the Remarks section of this paper.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) In a variable bandwidth wireless communication system ~~capable of~~ communicating under multiple different communication schemes that each have a different bandwidth, a process performed by a base station of generating an information bearing signal for wireless transmission, the process comprising:

utilizing by the base station a ~~specified~~ number of subcarriers to construct a variable bandwidth wireless channel ~~with a particular bandwidth~~;

utilizing by the base station groups of subcarriers, wherein each group includes a plurality ~~subchannels that include groups~~ of subcarriers;

~~providing a fixed time-domain signal structure, including symbol length;~~

maintaining a ~~substantially constant ratio between a sampling frequency and a size of FFT (Fast Fourier Transform) and IFFT (Inverse Fast Fourier Transform) or a~~ fixed spacing between adjacent subcarriers;

adding or subtracting, by the base station, groups of ~~some of the~~ subcarriers ~~or subchannels~~ to scale the variable bandwidth wireless channel and achieve ~~a required~~ an operating channel bandwidth; and

wherein a core-band, including a plurality of subcarrier groups, substantially centered at an operating center frequency of the different communication schemes, is ~~utilized for~~ utilized by the base station as a broadcast channel carrying radio control and operation signaling, where the core-band is substantially not wider than a smallest possible operating channel bandwidth of the system.

2. (Currently Amended) The process of claim 1, wherein the ~~wireless~~ information bearing signal is:

~~transmitted by a mobile station in a multi-cell, multi-base station environment;~~

~~a multi-carrier code division multiple access (MC-CDMA) or~~ an orthogonal frequency division multiple access (OFDMA) signal; and is

utilized ~~with~~ in a downlink~~, uplink, or both, where~~ with a duplexing technique that is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

3-5. (Canceled)

6. (Currently Amended) In a variable bandwidth communication network of base stations and mobile stations, wherein a signal ~~utilizes subchannels that include groups~~ comprises groups of subcarriers and each group includes a plurality of subcarriers, a ~~method of adjusting a mobile station bandwidth to an operating bandwidth of a base station, the~~ method performed by a mobile station comprising:

~~maintaining a fixed time-domain signal structure;~~

maintaining a ~~substantially constant ratio between a sampling frequency and a size of FFT (Fast Fourier Transform)~~ fixed spacing between adjacent subcarriers;

adjusting a number of groups of subcarriers ~~or subchannels~~ to scale a channel and attain ~~a desired~~ an operational bandwidth;

utilizing a core-band, substantially centered at an operating center frequency to carry synchronization information~~, for radio control and operation signaling~~, wherein the core-band is ~~not wider~~ narrower than or equal to a smallest possible operating channel bandwidth of the network; and

~~a configuration wherein the mobile station, upon entering an area, scans~~ scanning spectral bands of different center frequencies and detecting the synchronization information in the core-band of the operating center frequency and ~~upon detecting a signal in a spectral band of a center frequency:~~

~~determines the operating channel bandwidth by a centerfrequency-to-bandwidth mapping; or~~

~~decodes the bandwidth information~~ decoding a broadcast channel carrying radio control and operation signalling provided by a base station to the mobile station via ~~downlink signaling~~ the core-band.

7. (Canceled)

8. (Currently Amended) The method of claim 6, wherein the signal is ~~a multi-carrier code division multiple access (MC-CDMA) or~~ an orthogonal frequency division multiple access (OFDMA) signal, and the signal is utilized ~~with~~ in a downlink~~, uplink, or both, where~~ with a duplexing technique that is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

9. (Canceled)

10. (Canceled)

11. (Currently Amended) In a variable bandwidth communication network wherein a communication signal utilizes ~~subchannels that are composed of~~ groups of subcarriers, wherein each group comprises a plurality of subcarriers, and a mobile ~~transceiver with~~ station has an adaptable bandwidth, the ~~transceiver~~ mobile station comprising:

an analog-to-digital converter for signal sampling;

a Fast Fourier Transform and Inverse Fast Fourier Transform processor (FFT/IFFT), wherein a ~~substantially constant ratio is maintained between a sampling frequency and a size of the FFT/IFFT~~ fixed spacing between adjacent subcarriers is maintained;

a scanner for scanning spectral bands of specified center frequencies~~, upon entering an area, to find a signal and to determine an operating channel bandwidth~~;

a facility for ~~sustaining~~ decoding a broadcast channel including radio control and operation signalling associated with the area in a core-band ~~for pertinent communications~~ including a plurality of groups, wherein the core-band is not wider than a smallest possible operating channel bandwidth of the network; and

a facility for adding ~~to the subcarriers~~ groups to widen the channel bandwidth for remainder of the communication.

12. (Canceled)

13. (Currently Amended) The ~~transceiver~~ mobile station of claim 11, wherein the communication signal is ~~a multi-carrier code division multiple access (MC-CDMA) or~~ an orthogonal frequency division multiple access (OFDMA) signal, and the communication signal is utilized ~~with~~ in a downlink~~, uplink, or both, where~~ with a duplexing technique that is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

14-21. (Canceled)

22. (New) A cellular base station comprising:

circuitry configured to transmit a broadcast channel in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups, wherein each subcarrier group includes a plurality of subcarriers; and

circuitry configured to transmit control and data channels using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band.

23. (New) The cellular base station of claim 22 wherein the circuitry configured to transmit the broadcast channel is further configured to transmit radio network information in the broadcast channel.

24. (New) The cellular base station of claim 22 further comprising circuitry configured to transmit synchronization information in the core-band.

25. (New) The cellular base station of claim 22 wherein the circuitry configured to transmit the broadcast channel is further configured to transmit in a time slot format.

26. (New) The cellular base station of claim 22 wherein the base station operates in an OFDMA frequency division duplex (FDD) or time division duplex (TDD) mode.

27. (New) A cellular mobile station comprising:

circuitry configured to receive synchronization information from a base station in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups where each subcarrier group includes a plurality of subcarriers;

circuitry configured to synchronize with the base station using the received synchronization information; and

circuitry configured to receive control and data channels using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band.

28. (New) The cellular mobile station of claim 27 wherein the circuitry configured to receive the synchronization information from the base station in the core-

band is further configured to receive the cell identification information from the base station in the core-band.

29. (New) The cellular mobile station of claim 27 further comprising circuitry configured to receive a broadcast channel in the core-band.

30. (New) The cellular mobile station of claim 29 wherein the broadcast channel carries radio network information.

31. (New) The cellular mobile station of claim 27 further comprising circuitry configured to transmit a preamble after synchronizing with the base station.

32. (New) A variable bandwidth communication method comprising:

transmitting a broadcast channel by a cellular base station in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups, wherein each subcarrier group includes a plurality of subcarriers; and

transmitting control and data channels by the cellular base station using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band.

33. (New) The method of claim 32 wherein the broadcast channel carries radio network information.

34. (New) The method of claim 32 further comprising transmitting by the base station synchronization information in the core-band.

35. (New) The method of claim 32 wherein the transmissions are in a time slot format.

36. (New) The method of claim 32 wherein the cellular base station operates in an OFDMA frequency division duplex (FDD) or time division duplex (TDD) mode.

37. (New) A variable bandwidth communication method comprising:

receiving synchronization information by a cellular mobile station from a base station in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups where each subcarrier group includes a plurality of subcarriers;

synchronizing the cellular mobile station with the base station using the received synchronization information; and

receiving control and data channels by the cellular mobile station using a variable band including a second plurality of subcarrier groups, wherein the variable band includes at least the core-band.

38. (New) The method of claim 37 wherein the receiving of the synchronization information by the cellular mobile station from the base station in the core-band includes receiving cell identification information from the base station in the core-band.

39. (New) The method of claim 37 further comprising receiving by the cellular mobile station a broadcast channel in the core-band.

40. (New) The method of claim 39 wherein the broadcast channel carries radio network information.

41. (New) The method of claim 37 further comprising transmitting by the cellular mobile station a preamble after synchronizing with the base station.

AMENDMENTS TO THE DRAWINGS

Please replace original drawing sheets 1-10 with the attached replacement drawing sheets 1-10.

"Prior Art" labels are added to Figures 1-5, gray-scale shading in the various figures is changed to black and white patterns, and the labels to Figure 8 clarified.

REMARKS

This paper is a response to the non-final Office Action of April 28, 2009. Prior to entry of this paper, claims 1-21 were pending in this application. Claims 1-2, 6, 8, 11, and 13 are now amended; claims 22-41 are newly added; and claims 3-5, 7, 9-10, 12, and 14-21 are canceled. In addition, ten replacement drawing sheets are submitted. The cancellation and amendments herein are made without prejudice to applicants right to pursue claims in unamended or other form in this or continuing applications. Upon entry of this paper, claims 1-2, 6, 8, 11, 13, and 22-41 will be pending. New claims 22-41 are supported by applicants' disclosure, e.g., at least by paragraphs [0015], [0025]-[0029], [0031]-[0033], [0035]-[0036], and [0052]-[0053] of applicants' specification, as published. No new matter is added.

In the Office Action, pending claims 1-2, 5-8, 10-15, and 17-21 were rejected and 3-4, 9, and 16, were objected to. More specifically, the status of the application in light of this Office Action is as follows:

(A) Claims 3-4, 9, and 16 were indicated as directed to allowable subject matter but objected to as depending from rejected base claims.

(B) Figures 1-5 were objected as not being labeled as –prior art–.

(C) Claim 21 was rejected under 35 U.S.C. § 101 as allegedly directed to non-statutory subject matter.

(D) Claims 1-2, 5, 11, 13-15, 17-18, and 20-21 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over a combination of U.S. Patent No. 6,175,550 to van Nee ("van Nee") and U.S. Patent No. 7,372,909 to Miyoshi ("Miyoshi") and claims 6-8, 10, 12, and 19 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over a

combination of van Nee, Miyoshi, and U.S. Patent Application No. 2002/0142777 to McGovern et al. ("McGovern").

Applicants respectfully disagree with at least the 35 U.S.C. § 103(a) rejections for at least the reasons discussed below.

As an introductory matter, the undersigned attorney and his colleague, Christopher Daley-Watson, appreciate the time Examiners Sekul and Mattis provided during the Examiner Interview of Sept. 28, 2009. During the interview, the parties discussed applicants' technology, the applied references, and the applicants' proposed claim amendments. Specifically, the parties discussed the failure of the applied references, in any reasoned combination, to disclose or suggest the features: "wherein a core-band, including a plurality of subcarrier groups, substantially centered at an operating center frequency of the different communication schemes, is utilized for utilized by the base station as a broadcast channel carrying radio control and operation signaling, where the core-band is substantially not wider than a smallest possible operating channel bandwidth of the system." Examiner Sekul indicated that applicants' proposed amendment appeared to overcome the 35 U.S.C. § 103 rejections, but stated that she would further consider the applied references upon receiving applicants' written response.

In addition, Examiner Mattis mentioned that the word "substantially" in applicants' various claims may be indefinite under 35 U.S.C. § 112, second paragraph. None of applicants' claims are currently rejected under § 112, second paragraph. With respect to this issue, applicants respectfully submit that the use of "substantially" in applicants' claims are definite under § 112, second paragraph as they define the subject matter with "a reasonable degree of particularity and distinctness." (MPEP § 2173.02.) Applicants also note that "[s]ome latitude in the manner of expression and the aptness of terms should be permitted even though the claim language is not as precise as the examiner might desire. (MPEP § 2173.02.)

Applicants also submit that applicants' use of "substantially" is definite under § 112, second paragraph due at least to limitations of the English language as well as real-world technological limitations. For instance, applicants' phrase "a core band ... substantially centered at an operating center frequency[,]" and similar, balance clarity with the fact that real-world systems have process and operational tolerances whereby a core-band may not be *exactly* centered at an operating center frequency despite efforts to center the core band at the operating center frequency. Accordingly, one of ordinary skill in the relevant art would understand applicants' use of "substantially" in the above claims. Further, in at least two cases, the Federal Circuit determined "substantially" to be definite. (See, e.g., Playtex Products Inc. v. Procter & Gamble Co., 73 USPQ.2d 2010 and Dana Corp. v. American Axle & Manufacturing Inc., 61 USPQ.2d 1609.)

If Examiners Sekul or Mattis believes that additional discussions would be beneficial, they are encouraged to contact the undersigned at (206) 359-8000.

A. Allowable Subject Matter

Applicants appreciate the Examiner's recognition of allowable subject matter with respect to original claims 3-4, 9, and 16. However, claims 3-4, 9, and 16 are canceled and applicants respectfully submit that each of the now pending claims is allowable for at least the reasons discussed below.

B. Response to Objections to the Drawings

In the Office Action, Figures 1-5 were objected to as not being labeled as –prior art–. Ten replacement sheets are provided by which "Prior Art" labels are added to Figures 1-5, gray-scale shading in the various figures is changed to black and white patterns, and the labeling of Figure 8 is clarified. Although "Prior Art" labels are added to Figures 1-5, applicants do not concede that the text corresponding to figures 1-5 are prior art. Rather, applicants respectfully submit that at least some aspects of the text corresponding to Figures 1-5 are not prior art.

C. Response to Rejection under 35 U.S.C. § 101

In the Office Action, claim 21 was rejected under 35 U.S.C. § 101. Claim 21 has been deleted and thus this rejection is now moot.

D. Response to Rejections under 35 U.S.C. § 103

Claims 1-2, 5-8, 10-15, and 17-21 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over combinations of van Nee, Miyoshi, and McGovern.

Applicants respectfully submit that independent claim 1, as amended, is allowable over the applied references at least because the applied references fail to disclose or suggest "wherein a core-band, including a plurality of subcarrier groups, substantially centered at an operating center frequency of the different communication schemes, is utilized by the base station as a broadcast channel carrying radio control and operation signaling, where the core-band is substantially not wider than a smallest possible operating channel bandwidth of the system[,]" as claim 1 now recites.

Applicants respectfully submit that independent claim 6, as amended, is allowable over the applied references at least because the applied references fail to disclose or suggest "utilizing a core-band, substantially centered at an operating center frequency to carry synchronization information, wherein the core-band is narrower than or equal to a smallest possible operating channel bandwidth of the network" in combination with "decoding a broadcast channel carrying radio control and operation signalling provided by a base station to the mobile station via the core-band[,]" as claim 6 now recites.

Applicants respectfully submit that independent claim 11, as amended, is allowable over the applied references at least because the applied references fail to disclose or suggest "a facility for decoding a broadcast channel including radio control and operation signalling associated with the area in a core-band including a plurality of

groups, wherein the core-band is not wider than a smallest possible operating channel bandwidth of the network[,]" as claim 11 now recites.

Dependent claims 2, 8, and 13 respectively depend from claims 1, 6, and 11 and are respectfully submitted to be allowable for at least that reason.

In addition, the 35 U.S.C. § 103 rejections of claims 5, 7, 10, 12, 14-15, and 17-21 are moot as these claims have been cancelled.

New Claims 22-41

Claims 22-26 and 32-36 are respectfully submitted to be allowable over the applied references for at least reasons substantially similar to those discussed above with respect to amended claims 1-2, 6, 8, 11, and 13.

With respect to independent claim 27, applicants note that none of the applied references disclose, in combination with the other recited features, "circuitry configured to receive synchronization information from a base station in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups where each subcarrier group includes a plurality of subcarriers" as recited by claim 27.

With respect to independent claim 37, applicants note that none of the applied references disclose, in combination with the other recited features, "receiving synchronization information by a cellular mobile station from a base station in an orthogonal frequency division multiple access (OFDMA) core-band, wherein the core-band is substantially centered at an operating center frequency and the core-band includes a first plurality of subcarrier groups where each subcarrier group includes a plurality of subcarriers" as recited by claim 37.

Claims 28-31 depend from claim 27 and claims 38-41 depend from claims 37. Applicants respectfully submit that claims 27-31 and 37-41 are allowable over the applied references for at least the above discussed reasons.

Conclusion

In view of the above amendment, applicants believe the pending application is in condition for allowance. Applicants accordingly request reconsideration of the application and a mailing of a Notice of Allowance. If the Examiner has any questions or believes a telephone conference would expedite prosecution of this application, the Examiner is encouraged to contact Davin Chin at (206) 359-8000.

Please charge any deficiencies or credit any overpayment to our Deposit Account No. 50-0665, under Order No. 320529496US1 from which the undersigned is authorized to draw.

Dated: September 28, 2009

Respectfully submitted,

By

Davin Chin
Registration No.: 58,413
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000
(206) 359-7198 (Fax)
Attorney for Applicant

Appendix

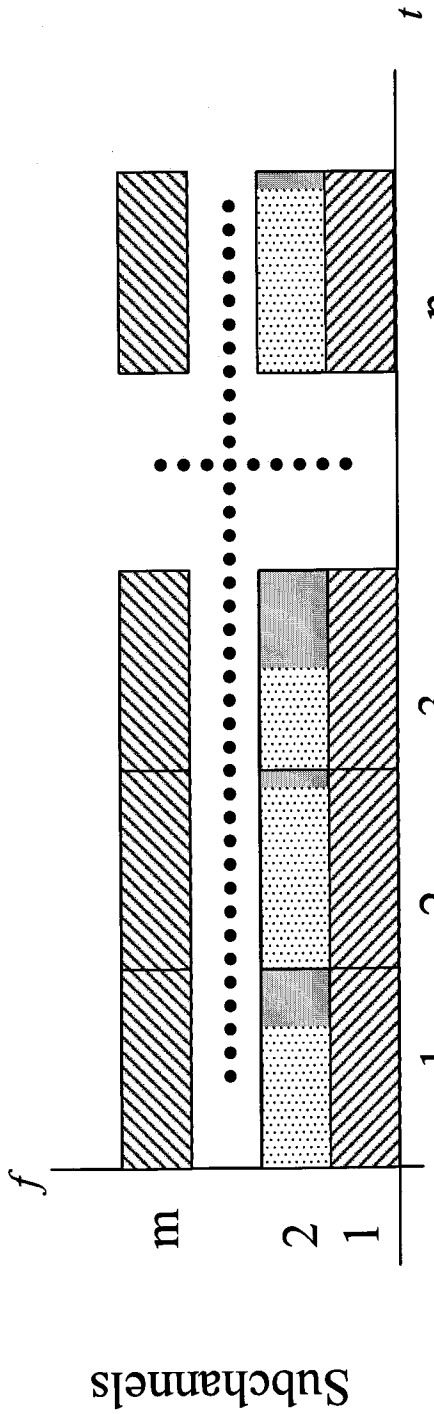

FIG. 1
Prior Art

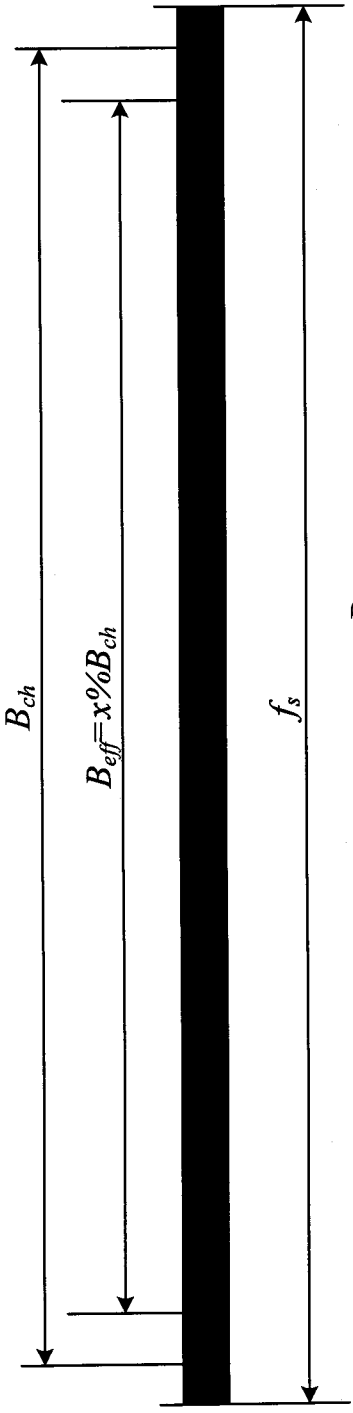

FIG. 2
Prior Art

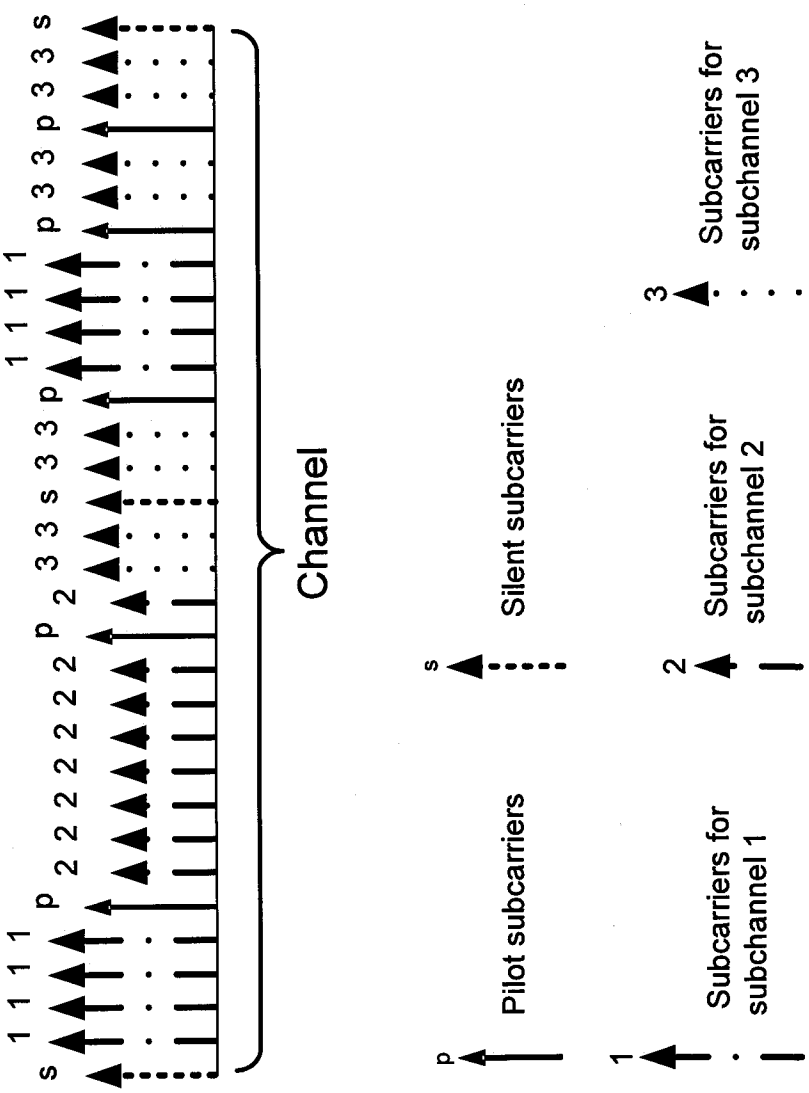

FIG. 3
Prior Art

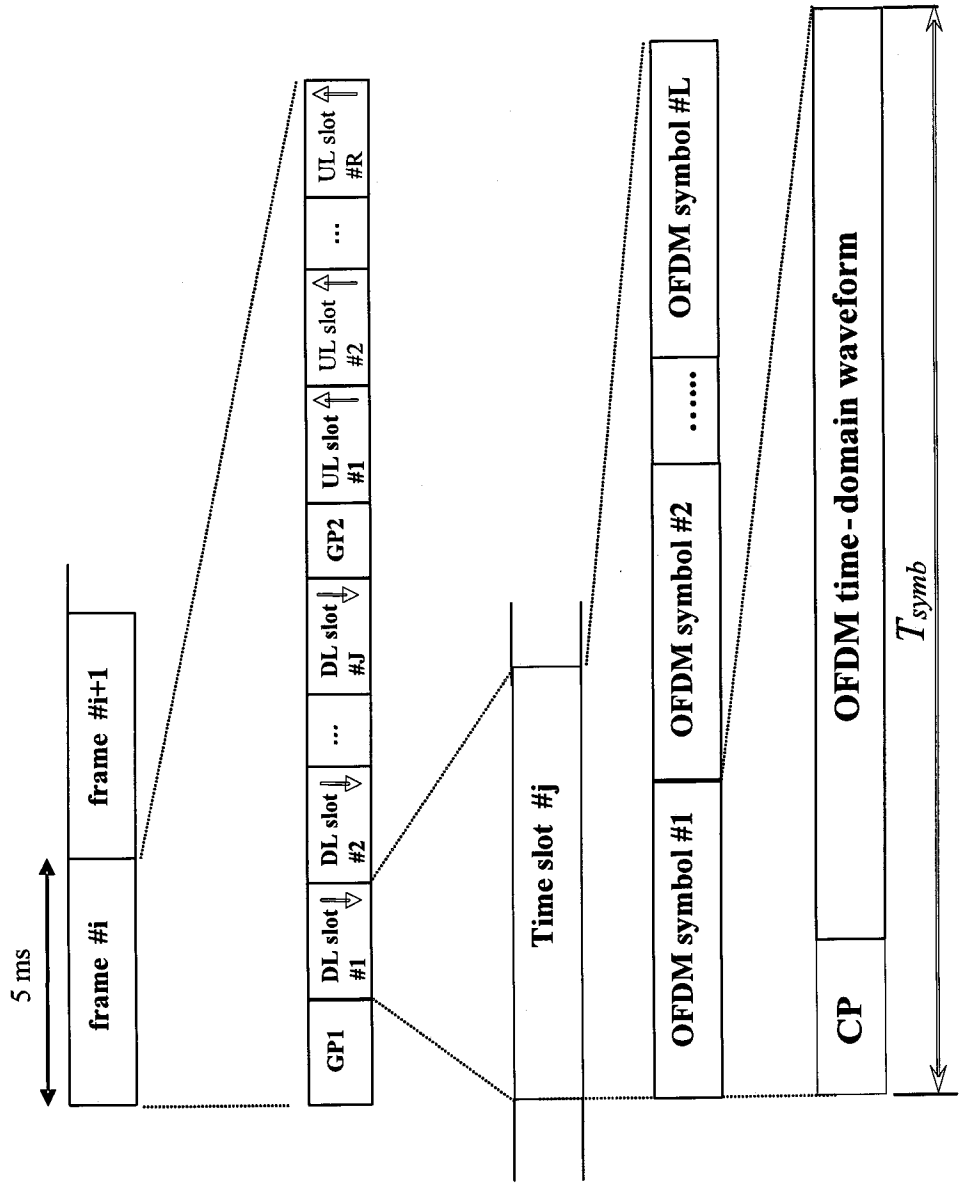

FIG. 4
Prior Art

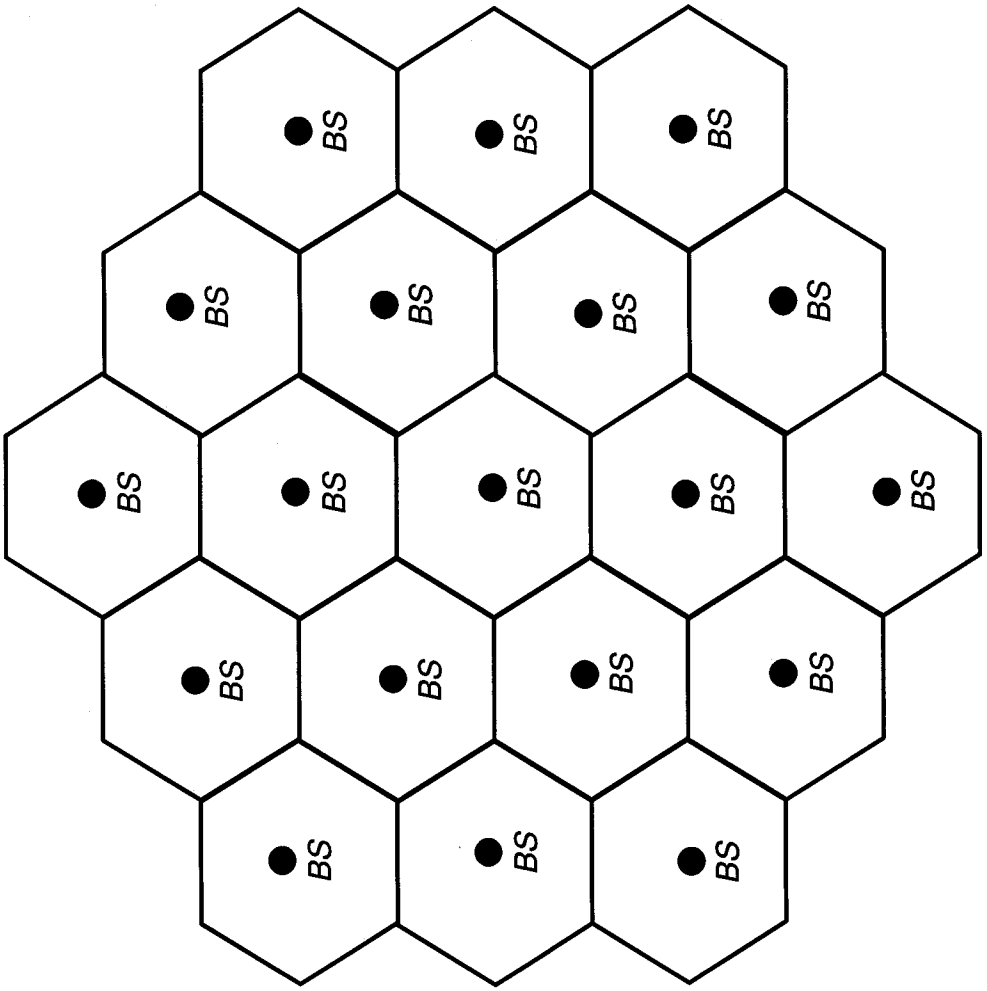

FIG. 5
Prior Art

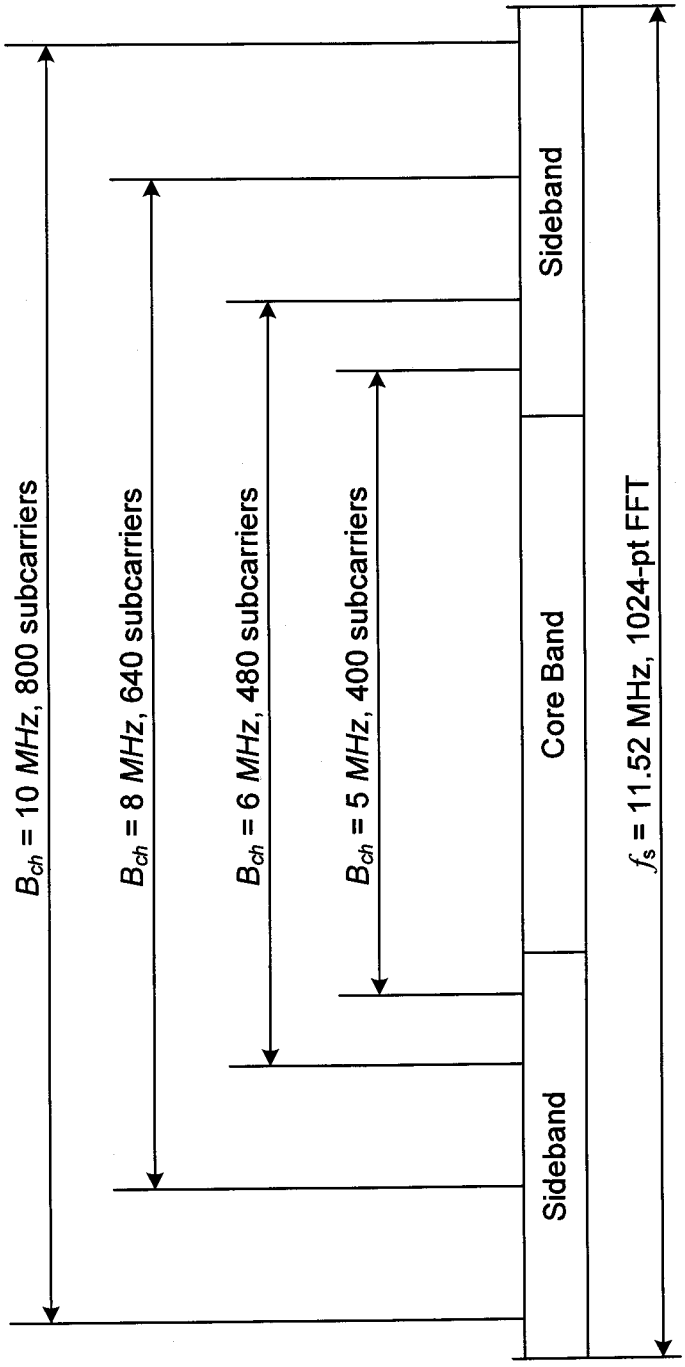
B_{ch} = 10 MHz, 800 subcarriers
B_{ch} = 8 MHz, 640 subcarriers
B_{ch} = 6 MHz, 480 subcarriers
B_{ch} = 5 MHz, 400 subcarriers
Sideband
Core Band
Sideband
f_s = 11.52 MHz, 1024-pt FFT
B_{eff} = 90% B_{ch}

FIG. 6

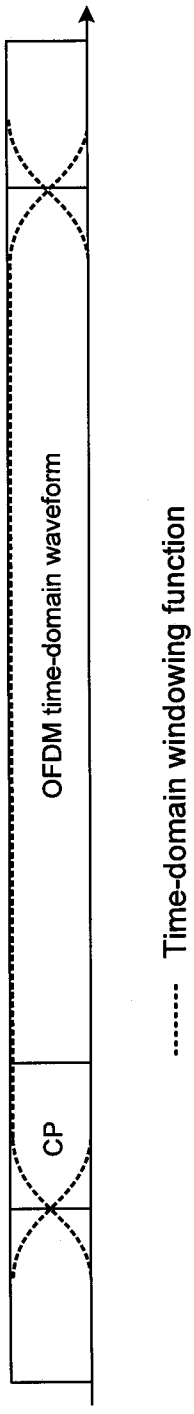
OFDM time-domain waveform
CP
Time-domain windowing function

FIG. 7

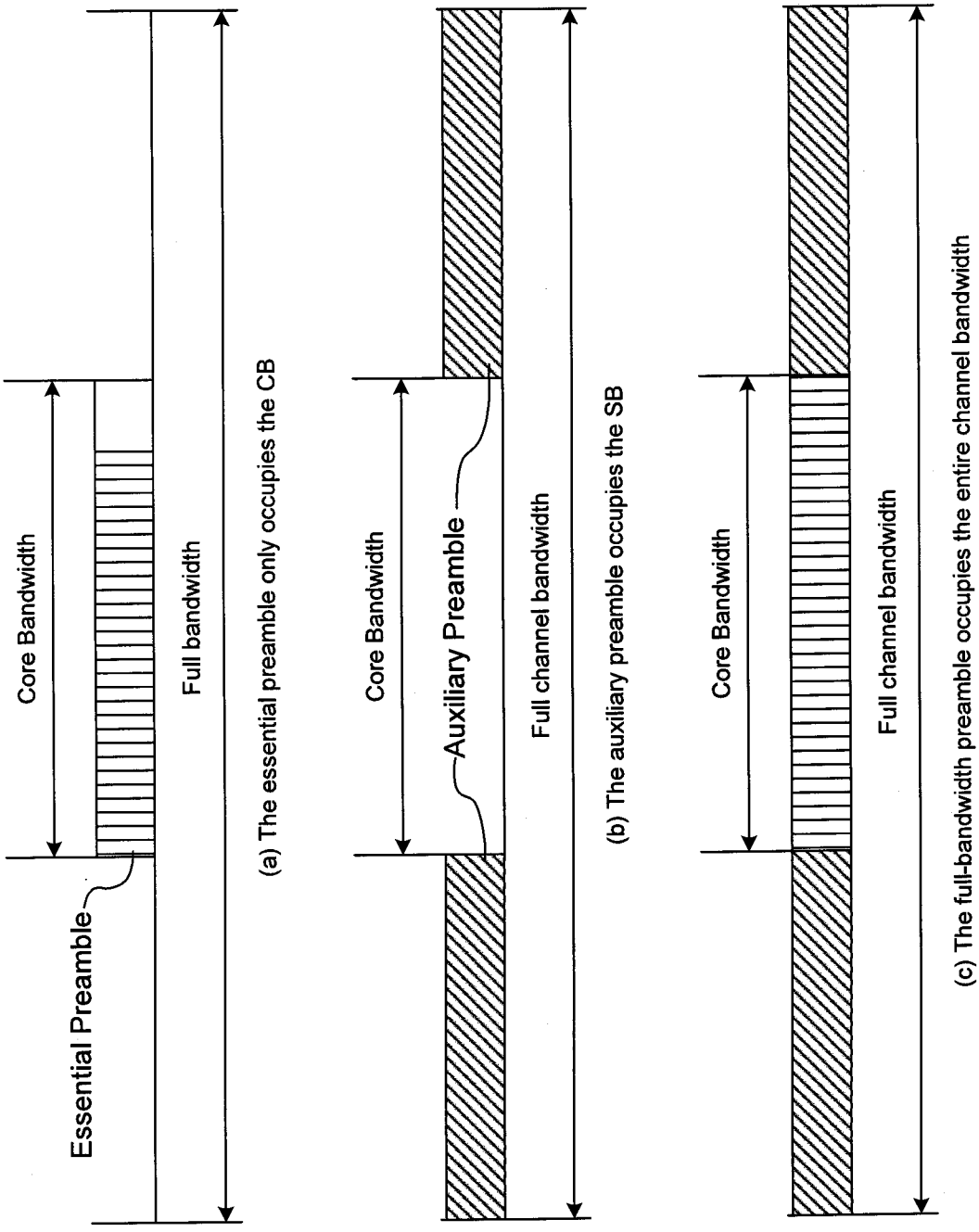
Core Bandwidth
Full bandwidth
Essential Preamble
(a) The essential preamble only occupies the CB
Core Bandwidth
Auxiliary Preamble
Full channel bandwidth
(b) The auxiliary preamble occupies the SB
Core Bandwidth
Full channel bandwidth
(c) The full-bandwidth preamble occupies the entire channel bandwidth

FIG. 8

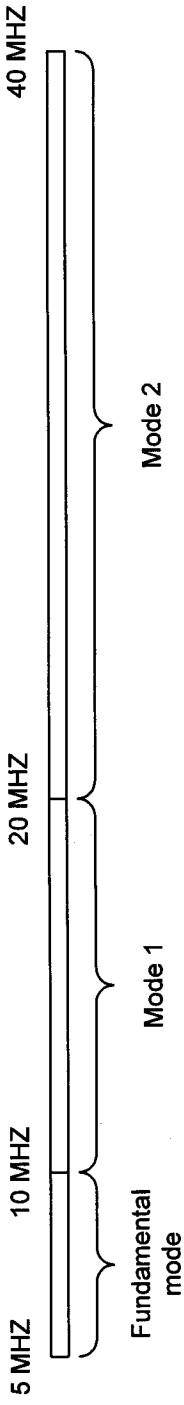

FIG. 9

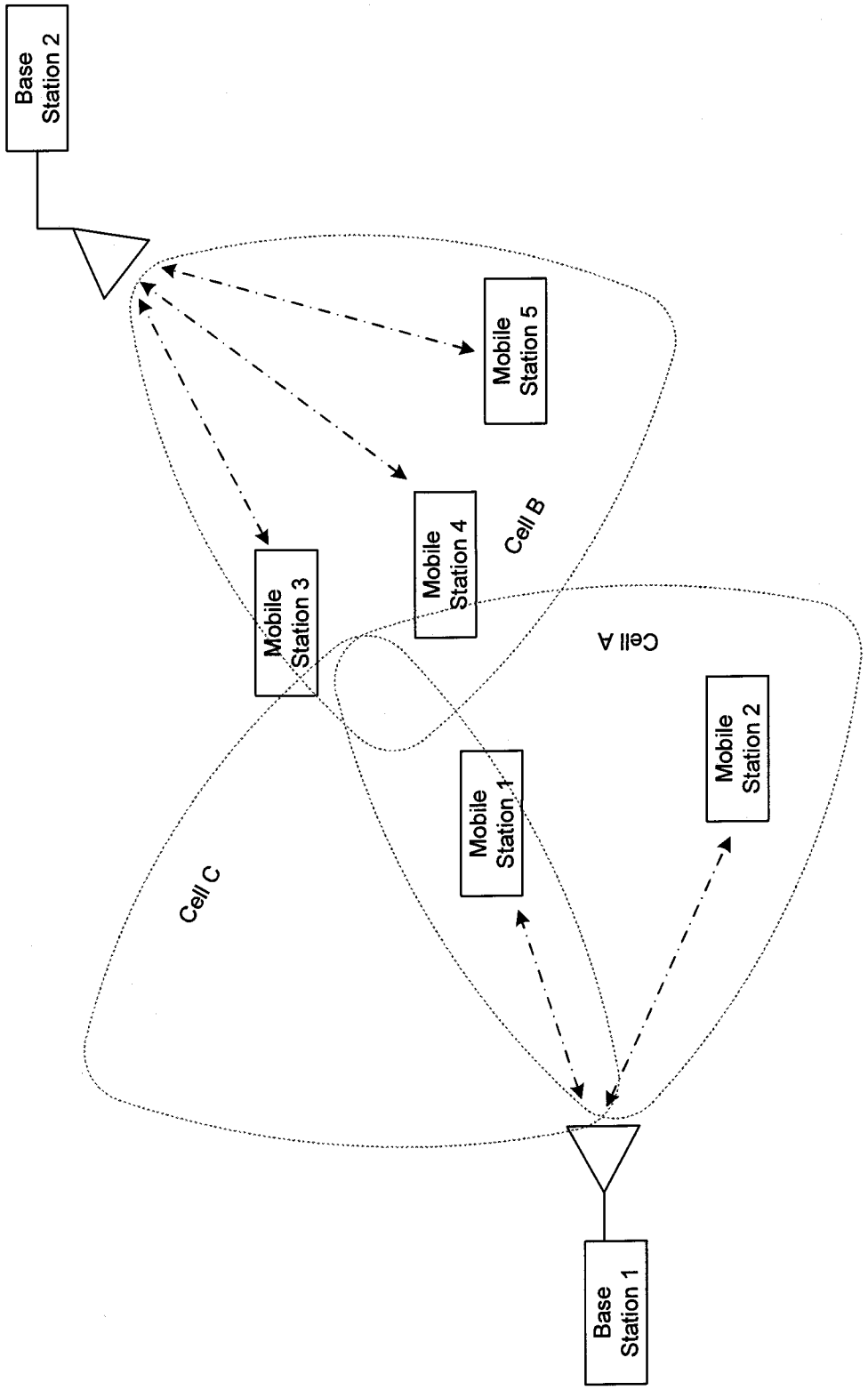
Base Station 2
Mobile Station 5
Mobile Station 4
Mobile Station 3
Cell B
Cell A
Mobile Station 1
Mobile Station 2
Cell C
Base Station 1

FIG. 10

Electronic Patent Application Fee Transmittal

Application Number:	10583534
Filing Date:	05-Jun-2007
Title of Invention:	Methods and Apparatus for Multi-Carrier Communications with Variable Channel Bandwidth
First Named Inventor/Applicant Name:	Xiaodong Li
Filer:	Christopher J. Daley-Watson/Wade Barbus
Attorney Docket Number:	320529496US1

Filed as Large Entity

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Claims in excess of 20	1615	5	52	260
Independent claims in excess of 3	1614	1	220	220
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Extension - 2 months with $0 paid	1252	1	490	490
Miscellaneous:				
			Total in USD ($)	**970**

Electronic Acknowledgement Receipt

EFS ID:	6161770
Application Number:	10583534
International Application Number:	
Confirmation Number:	4954
Title of Invention:	Methods and Apparatus for Multi-Carrier Communications with Variable Channel Bandwidth
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	25096
Filer:	Christopher J. Daley-Watson/Wade Barbus
Filer Authorized By:	Christopher J. Daley-Watson
Attorney Docket Number:	320529496US1
Receipt Date:	28-SEP-2009
Filing Date:	05-JUN-2007
Time Stamp:	20:56:34
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Electronic Funds Transfer
Payment was successfully received in RAM	$970
RAM confirmation Number	5778
Deposit Account	
Authorized User	

File Listing:

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

1		2009_09_28_Amendment_as_filed.PDF	841536 714e81a35a52a488efc0da55920c6ecd87f34d52	yes	29

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Miscellaneous Incoming Letter	1	1
Extension of Time	2	2
Amendment/Req. Reconsideration-After Non-Final Reject	3	3
Claims	4	11
Drawings-only black and white line drawings	12	12
Applicant Arguments/Remarks Made in an Amendment	13	18
Drawings-only black and white line drawings	19	29

Warnings:

Information:

2	Fee Worksheet (PTO-875)	fee-info.pdf	33733 e02de7e9583dd8955e8e99025d8fe096b8269f62	no	2

Warnings:

Information:

Total Files Size (in bytes):	875269

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.

AMENDMENT TRANSMITTAL LETTER

Docket No. 320529496US1			
Application No. 10/583,534-Conf. #4954	Filing Date June 5, 2007	Examiner M. L. Sekul	Art Unit 4124

Applicant(s): Xiaodong Li

Invention: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

TO THE COMMISSIONER FOR PATENTS

Transmitted herewith is an amendment in the above-identified application.

The fee has been calculated and is transmitted as shown below.

CLAIMS AS AMENDED

	Claims Remaining After Amendment	Highest Number Previously Paid	Number Extra Claims Present	Rate	
Total Claims	26	- 21 =	5	x 52.00	260.00
Independent Claims	7	- 6 =	1	x 220.00	220.00
Multiple Dependent Claims (check if applicable)	☐				
Other fee (please specify):	Extension for response within second month				490.00
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT:					970.00

☒ Large Entity ☐ Small Entity

☐ No additional fee is required for this amendment.

☒ Please charge EFT Account No. SEA1PIRM in the amount of $ 970.00 .

☐ A check in the amount of $ _____ to cover the filing fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☒ The Director is hereby authorized to charge and credit Deposit Account No. 50-0665 as described below.

☒ Credit any overpayment.

☒ Charge any additional filing or application processing fees required under 37 CFR 1.16 and 1.17.

Dated: September 28, 2009

Davin Chin
Attorney/Agent Reg. No.: 58,413

PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000

PTO/SB/22 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) FY 2009 *(Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)*	Docket Number (Optional) 320529496US1
Application Number 10/583,534-Conf. #4954	Filed June 5, 2007
For METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH	
Art Unit 4124	Examiner M. L. Sekul

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	
[ ]	One month (37 CFR 1.17(a)(1))	$130	$65	$
[X]	Two months (37 CFR 1.17(a)(2))	$490	$245	$ 490.00
[ ]	Three months (37 CFR 1.17(a)(3))	$1110	$555	$
[ ]	Four months (37 CFR 1.17(a)(4))	$1730	$865	$
[ ]	Five months (37 CFR 1.17(a)(5))	$2350	$1175	$

[ ] Applicant claims small entity status. See 37 CFR 1.27.

[ ] A check in the amount of the fee is enclosed.

[ ] Payment by credit card. Form PTO-2038 is attached.

[ ] The Director has already been authorized to charge fees in this application to a Deposit Account.

[X] The Director is hereby authorized to charge any fees which may be required to EFT Account Number SEA1PIRM .

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

[ ] applicant/inventor.

[ ] assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

[X] attorney or agent of record. Registration Number 58,413

[ ] attorney or agent under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____

Signature — September 28, 2009 (Date)

Davin Chin (Typed or printed name) — (206) 359-8000 (Telephone Number)

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

[X] Total of 1 forms are submitted.

PTOL-413A (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Applicant Initiated Interview Request Form

Application No.: 10/583,534-Conf. #4954 First Named Applicant: Xiaodong Li
Examiner: M. L. Sekul Art Unit: 4124 Status of Application: Published

Tentative Participants:

(1) Exr. Sekul (2) SPE West
(3) Atty. Davin Chin (4) Atty. Christopher Daley-Watson

Proposed Date of Interview: Sept. 28, 2009 **Proposed Time:** 1:00 **PM Eastern**

Type of Interview Requested:

(1) [X] **Telephonic** (2) [ ] **Personal** (3) [ ] **Video Conference**

Exhibit To Be Shown or Demonstrated: [ ] **YES** [X] **NO**

If yes, provide brief description:

Issues To Be Discussed

Issues (Rej., Obj., etc)	Claims/ Fig. #s	Prior Art	Discussed	Agreed	Not Agreed
(1) Rej.	Various	van Nee, Miyoshi, McGovern	[ ]	[ ]	[ ]
(2)			[ ]	[ ]	[ ]
(3)			[ ]	[ ]	[ ]
(4)			[ ]	[ ]	[ ]

[ ] Continuation Sheet Attached

Brief Description of Arguments to be Presented:

Discussion of applicants' technology and differences between applied references, e.g., Miyoshi, and applicants' technology.

An interview was conducted on the above-identified application on _____.

NOTE:
This form should be completed by applicant and submitted to the examiner in advance of the interview (see MPEP §713.01).
This application will not be delayed from issue because of applicant's failure to submit a written record of this interview. Therefore, applicant is advised to file a statement of the substance of this interview (37 CFR 1.133(b)) as soon as possible.

Applicant/Applicant's Representative Signature

Examiner/SPE Signature

Davin Chin
Typed/Printed Name of Applicant or Representative

58,413
Registration Number, if applicable

Perkins Coie

FACSIMILE COVER SHEET

CONFIDENTIAL AND PRIVILEGED

If there are any problems with this transmission, please call:

☐ Central Fax Room: 206.359.8575 ☐ *Sender's name and phone number

☐ Individual Floor: ☐ 48th Floor Reception: 206.264.6300

1201 Third Avenue, Suite 4800
Seattle, WA 98101-3099
PHONE: 206.359.8000
FAX: 206.359.9000
www.perkinscoie.com

DATE: *September 25, 2009* COVER SHEET & *1* PAGES

CLIENT NUMBER: *32052.9496.US01*

RETURN TO: (Name) *Beth A. Wayne-Hyman* (EXT.) *3326* (ROOM NO.) *4258*

PLEASE SEE ATTACHED APPLICANT INTERVIEW REQUEST FROM.

SENDER:	TELEPHONE:	FACSIMILE:
Davin K. Chin	*(206) 359-6196*	*(206) 359-7196*

RECIPIENT:	COMPANY:	TELEPHONE:	FACSIMILE:
Exr. Maria Lynn Sekul	*USPTO*	*571-270-7636*	*571-271-7636*

Please see attached Applicant Initiated Interview Request Form.

PTO/SB/80 (01-08)
Approved for use through 12/31/2008. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

[X] Practitioners associated with the Customer Number: 25096

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

[X] The address associated with Customer Number: 25096

OR

[ ] Firm or Individual Name

Address					
City		State		Zip	
Country		Telephone		Email	

Assignee Name and Address:

Ditromossi Remote BV, L.L.C.
2711 Centerville Rd, Suite 400
Wilmington, DE 19808

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

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	Mary Brown	Date	8/14/09
Name	Mary Brown	Telephone	
Title	Authorized Person for Ditromossi Remote BV, L.L.C.		

DECLARATION REGARDING AUTHORITY TO SIGN ON BEHALF OF A LEGAL ENTITY
(37 C.F.R. 3.73(b)(2)(ii))

I, Mary Brown (whose title is supplied below), hereby declare that I am authorized to sign on behalf of Ditromossi Remote BV, L.L.C.

Mary Brown
Authorized Person for Ditromossi Remote BV, L.L.C.

8/14/09
Date

Electronic Acknowledgement Receipt

EFS ID:	6103503
Application Number:	10583534
International Application Number:	
Confirmation Number:	4954
Title of Invention:	Methods and Apparatus for Multi-Carrier Communications with Variable Channel Bandwidth
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	25096
Filer:	Christopher J. Daley-Watson/Wade Barbus
Filer Authorized By:	Christopher J. Daley-Watson
Attorney Docket Number:	612408010US1
Receipt Date:	18-SEP-2009
Filing Date:	05-JUN-2007
Time Stamp:	17:01:55
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		2009_09_18_POA_as_filed.PDF	273873 29dbfb9faedb629eed0662598a25531a43f846a5	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Assignee showing of ownership per 37 CFR 3.73(b).	1	1
	Power of Attorney	2	2
	Miscellaneous Incoming Letter	3	3

Warnings:	
Information:	
Total Files Size (in bytes):	273873

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.

PTO/SB/96 (01-08)
Approved for use through 06/30/2008. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Xiaodong Li, Titus Lo, Kemin Li, Haiming Huang

Application No./Patent No.: 10/583,534 Filed/Issue Date: June 5, 2007

Entitled: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

Ditromossi Remote BV, L.L.C. (Name of Assignee), a Limited Liability Company (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. [X] the assignee of the entire right, title, and interest; or
2. [ ] an assignee of less than the entire right, title and interest.
   (The extent (by percentage) of its ownership interest is _____ %)

in the patent application/patent identified above by virtue of either:

A. [ ] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

OR

B. [X] A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Inventors To: Waltical Solution, Inc.
   The document was recorded in the United States Patent and Trademark Office at Reel 023006, Frame 0123, or for which a copy thereof is attached.
2. From: Waltical Solution, Inc. To: Neocific, Inc.
   The document was recorded in the United States Patent and Trademark Office at Reel 017363, Frame 0370, or for which a copy thereof is attached.
3. From: Neocific, Inc. To: Ditromossi Remote BV, L.L.C.
   The document was recorded in the United States Patent and Trademark Office at Reel 023130, Frame 0422, or for which a copy thereof is attached.

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

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

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

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

Signature	September 18, 2009 Date
Davin Chin, Reg. No. 58,413 Printed or Typed Name	(206) 359-8000 Telephone Number
Attorney for Assignee Title	

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.
10/583,534	06/05/2007	Xiaodong Li	612408010US1	4954

25096 7590 04/28/2009

PERKINS COIE LLP
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

EXAMINER	
SEKUL, MARIA LYNN	
ART UNIT	**PAPER NUMBER**
4124	
MAIL DATE	**DELIVERY MODE**
04/28/2009	PAPER

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.

Office Action Summary	Application No.	Applicant(s)	
	10/583,534	LI ET AL.	
	Examiner	Art Unit	
	MARIA L. SEKUL	4124	

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

Period for Reply

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

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

Status

1)☒ Responsive to communication(s) filed on *05 June 2007*.

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

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

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-8,10-15 and 17-21* is/are rejected.

7)☒ Claim(s) *3,4,9,16* is/are objected to.

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

Application Papers

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

10)☒ The drawing(s) filed on *16 June 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

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

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

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

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

a)☐ All b)☐ Some * c)☐ None of:

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

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

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

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

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. **Figures 1-5** should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 21 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claimed is directed to a signal for wireless transmission which is considered a transitory signal. Transitory signals are not considered a process, machine, manufacture, or composition of matter, and therefore, is not patentable subject matter.

Claim Rejections - 35 USC § 103

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

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

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. **Claims 1, 2, 5, 11, 13, 14, 15, 17, 18, 20 and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over **van Nee (US Patent No. 6,175,550)** in view of **Miyoshi (US Patent No. 7,372,909)**.

As to **claim 1**, van Nee discloses a method:

"utilizing a specified number of subcarriers to construct a channel with a particular bandwidth" (scalable OFDM system that adjusts number of carriers for the desired transmission rate, **col. 3, lines 22-27**);

"utilizing subchannels that include groups of subcarriers" (this was well known in the art at the time the invention was made that subchannels can comprise one or more subcarriers);

"providing a fixed time-domain signal structure, including symbol length" (transmission has a time structure, **Fig. 2, col. 6, lines 41-47**);

"maintaining a substantially constant ratio between a sampling frequency and a size of FFT (Fast Fourier Transform) and IFFT (Inverse Fast Fourier Transform) or a fixed spacing between adjacent subcarriers" (increasing the number of subcarriers for a constant sampling rate will increase the number of carriers while keeping the carrier spacing fixed, **Fig. 3, col. 6, lines 51-54**);

"adding or subtracting some of the subcarriers or subchannels to scale the channel and achieve a required bandwidth" (scalable OFDM system with a transmitter and receiver that adjust number of carriers to meet the desired transmission rate, **col. 3, lines 53-58; col. 6, lines 51-57**); and

Van Nee does not explicitly teach "a core-band, substantially centered at an operating center frequency of the different communication schemes, is utilized for radio control and operation signaling, where the core-band is substantially not wider than a smallest possible operating channel bandwidth of the system".

Miyoshi teaches a control channel (core band) composed of one subcarrier with the remaining subcarriers making up the data channel. Because the control channel can consist of just one subcarrier, the size of the control channel would not be wider than the smallest possible operating channel bandwidth of the system. Additionally, the control channel is located at the center frequency of the transmit band of the data channel (**Fig. 4, col. 2, line 64** through **col. 3, line 11**).

Miyoshi and van Nee are analogous art in that they both pertain to multi-carrier transmission. It would have been obvious to one skilled in the art at the time the invention was made to use the control channel as taught in Miyoshi with the process in van Nee being that it speeds up switching between the control channel and the data channel as stated in Miyoshi, col. 1, lines 61-65.

As to **claim 2**, van Nee in view of Miyoshi discloses all of claim 1.

van Nee further discloses the signal is:

"transmitted by a mobile station in a multi-cell, multi-base-station environment; a multi-carrier code division multiple access (MC-CDMA) or an orthogonal frequency division multiple access (OFDMA)" (scalable OFDM system, **Fig. 1, col. 3, line 66** through **col. 4, line 17**); and

"utilized with downlink, uplink, or both, where a duplexing technique is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD)" (it was well known in the art at the time the invention was made that either TDD or FDD could be used on the uplink and/or downlink).

As to **claim 5**, van Nee discloses all of claim 1 and further discloses:

"the sampling frequency is a multiple of the sampling frequency of the fundamental range and the corresponding FFT length is multiplied by a substantially same factor as the sampling frequency is multiplied by, to maintain time duration of the OFDM symbol structure; the FFT length is maintained and the OFDM symbol duration is shortened accordingly; or the FFT length is increased and the OFDM symbol duration is shortened accordingly" (the symbol duration is modified to double the signal bandwidth while not modifying the FFT length, **col. 3, lines 48-52**); and

"wherein the width of the core-band is less than or equal to a smallest bandwidth in the fundamental range" (the control channel is composed of one carrier and the data channel uses the remaining subcarriers for data, **Fig. 4, line 28-383**, the fundamental range being a designated range after division of the entire range).

As to **claim 11**, van Nee discloses a transceiver comprising:

"an analog-to-digital converter for signal sampling"(**Fig. 4** depicting an OFDM receiver with an A/D component) ;

"a Fast Fourier Transform and Inverse Fast Fourier Transform processor (FFT/IFFT), wherein a substantially constant ratio is maintained between a sampling frequency and a size of the FFT/IFFT" (**Fig 3,4** depict the IFFT and FFT components of an OFDM transmitter and receiver, and the bandwidth can be varied in the scalable OFDM system by changing various parameters other than the sampling frequency or the size of the FFT (such as, the number of subcarriers) and therefore, the ratio between sampling frequency and size of FFT remains constant, (**col. 3, lines 38-58**);

"a scanner for scanning spectral bands of specified center frequencies, upon entering an area, to find a signal and to determine an operating channel bandwidth" (the receiver performs measurements on received signals and provides feedback to the transmitter to dynamically scale the operating characteristics of the channel, **Fig. 4**, col. 7, line 62 through col. 8, line 19); and

"a facility for adding to the subcarriers to widen the channel bandwidth for remainder of the communication" (scalable OFDM system including an OFDM receiver, **Fig. 4**, for adjusting the number of carriers to meet the desired transmission rate, **col. 3, lines 53-58; col. 6, lines 51-57**).

van Nee does not teach "a facility for sustaining a core-band for pertinent communications, wherein the core-band is not wider than smallest possible operating channel bandwidth of the network".

Miyoshi teaches a receiver with a channel selecting section which allows only the control channel to pass (**Fig. 5, col. 3, lines 39-56**), and because the control channel can consist of just one subcarrier, the size of the control channel would not be wider than the smallest possible operating channel bandwidth of the system (**Fig. 4, col. 2, line 64** through **col. 3, line 11**).

Miyoshi and van Nee are analogous art in that the both pertain to to adjusting variable bandwidth. It would have been obvious to one skilled in the art at the time the invention was made to use the control channel as taught in Miyoshi with the mobile station in van Nee in order to adapt to the variable bandwidth between the transmitter and receiver.

As to **claim 13**, van Nee in view of Miyoshi disclose all of claim 11.

Van Nee further discloses "the signal is a multi-carrier code division multiple access (MC-CDMA) or an orthogonal frequency division multiple access (OFDMA), and the signal is utilized with downlink, uplink, or both, where a duplexing technique is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD)" (in a scalable OFDM system it was well known in the art at the time the invention was made that either TDD or FDD could be used on the uplink and/or downlink).

As to **claim 14**, van Nee in view of Miyoshi discloses all of claim 11.

Van Nee further discloses:

"the sampling frequency is a multiple of the sampling frequency of the fundamental range and the corresponding FFT/IFFT size is multiplied by a substantially same factor as the sampling frequency is multiplied by, to maintain time duration of the OFDM symbol structure; the FFT/IFFT size is maintained and the OFDM symbol duration is shortened accordingly; or the FFT/IFFT size is increased and the OFDM symbol duration is shortened accordingly" (the symbol duration is modified to double the signal bandwidth while not modifying the FFT length, **col. 3, lines 48-52**).

van Nee does not explicitly teach "the width of the core-band is less than or equal to a smallest bandwidth in the fundamental range".

Miyoshi further teaches a receiver with a control channel consisting of just one subcarrier, and therefore, the size of the control channel would not be wider than the smallest possible operating channel bandwidth of the system (**Fig. 4, col. 2, line 64** through **col. 3, line 11**).

It would have been obvious to one skilled in the art at the time the invention was made to use the control channel as taught in Miyoshi with the mobile station in van Nee in order to detect and adapt to the variable bandwidth between the transmitter and receiver.

As to **claim 15**, van Nee in view of Miyoshi discloses all of claim 11.

Van Nee further discloses "the transceiver is a mobile station and the communication network is a wireless network of base stations and mobile stations" (the scalable OFDM system consists of mobile units and base stations, **Fig. 5; col. 2, lines 11-24**).

As to **claim 17**, van Nee in view of Miyoshi discloses all of claim 11.

Miyoshi further teaches "the transceiver uses the core-band during an initial communication stage and the operating bandwidth during normal operation, and wherein upon entering into an area, the mobile transceiver starts with the core-band and switches to the operating bandwidth for additional data and radio control subchannels" (mobile station's detects information on the control channel then the channel selecting component adjusts to the operating bandwidth specified by the base station, **Fig. 4-5; col. 3, lines 28-64**).

It would have been obvious to one skilled in the art at the time the invention was made to use the control channel in Miyoshi with the mobile station in van Nee in order to detect and adapt to the variable bandwidth between the transmitter and receiver.

As to **claim 18**, Miyoshi discloses a mobile station with an FFT (Fast Fourier Transform) facility (**Fig. 5** discloses an OFDM receiver with FFT component) configured to:

"divide a wide range of operating bandwidths into smaller bandwidth ranges, wherein a width of a predetermined band for basic system information communication is less than or substantially equal to the smallest operating bandwidth of any of the bandwidth range" (core band) composed of one subcarrier and the remaining subcarriers making up the data channel. Because the control channel can consist of just one subcarrier, the size of the control channel would not be wider than the smallest possible operating channel bandwidth of the system (**Fig. 4, col. 2, line 64** through **col. 3, line 11; col. 3, lines**).

Miyoshi does not teach any of the remaining limitations of the claim.

van Nee teaches "a sampling frequency is a multiple of a sampling frequency of the lowest bandwidth range and the FFT is sized corresponding to the sampling frequency, to maintain time duration of an OFDM symbol structure; the FFT size is maintained and the OFDM symbol duration is shortened accordingly; or the FFT size is increased and the OFDM symbol duration is shortened accordingly" (the bandwidth can be adjusted by modifying the symbol duration while not modifying any other parameters, such as, FFT length; **col. 3, lines 48-52**).

"scan spectral bands, when entering an area, to determine the operating bandwidth upon detecting a signal in a spectral band (the receiver performs measurements on received signals and provides feedback to the transmitter to

dynamically scale the operating characteristics of the channel, **Fig. 4**, col. 7, line 62 through col. 8, line 19); and

"switch to the operating bandwidth by adding subcarriers to transmitting signals, wherein a specified number of subcarriers form a channel with a particular bandwidth" (scalable OFDM system with a transmitter and receiver that adjust number of carriers to meet the desired transmission rate, **Fig. 4; col. 3, lines 53-58; col. 6, lines 51-57; (col. 7, lines 9-25**).

Miyoshi and van Nee are analogous art in that they both pertain to adjusting variable bandwidth. It would have been obvious to one skilled in the art at the time the invention was made to use the receiver functions in van Nee with the mobile station in Miyoshi in order to adapt to the variable bandwidth in order to communicate with the transmitter.

As to **claim 20**, van Nee discloses a means for adjusting a mobile station bandwidth comprising:

"means for maintaining a fixed time-domain signal structure" ((transmission has a time structure, **Fig. 2, col. 6, lines 41-47**);

"means for maintaining a substantially constant ratio between a sampling frequency and a size of FFT (Fast Fourier Transform)" (the bandwidth can be varied in a scalable OFDM system by changing various parameters other than the sampling frequency or the size of the FFT and therefore, the ratio between sampling frequency and size of FFT remains constant, (**col. 3, lines 38-58**);

"means for adjusting the number of subcarriers or subchannels to scale the channel and attain a desired bandwidth' (bandwidth can be varied by modifying the number of subcarriers, **col. 3, lines 53-58**); and

"means for scanning spectral bands of different center frequencies, detecting a signal in a spectral band of a center frequency, and determining the operating channel bandwidth of an area". (the receiver performs measurements on received signals and provides feedback to the transmitter to dynamically scale the operating characteristics of the channel, **Fig. 4**, **col. 7, line 62 through col. 8, line 19**).

Van Nee does not teach "means for utilizing a core-band, substantially centered at an operating center frequency, for essential communications, wherein the core-band is not wider than smallest possible operating channel bandwidth of the network:

Miyoshi teaches a control channel (core band) composed of one subcarrier with the remaining subcarriers making up the data channel. Because the control channel can consist of just one subcarrier, the size of the control channel would not be wider than the smallest possible operating channel bandwidth of the system. Additionally, the control channel is located at the center frequency of the transmit band of the data channel (**Fig. 4, col. 2, line 64** through **col. 3, line 11**).

Miyoshi and van Nee are analogous art in that they both pertain to multi-carrier transmission. It would have been obvious to use the control channel as taught in Miyoshi with the process in van Nee being that it speeds up switching between the control channel and the data channel as stated in Miyoshi, col. 1, lines 61-65.

As to **claim 21**, van Nee discloses a signal for wireless transmission comprising:

"subcarriers, wherein a specified number of subcarriers constitute a channel with a particular bandwidth" (scalable OFDM system that adjusts number of carriers for the desired transmission rate, **col. 3, lines 22-27**);

"a fixed time-domain signal structure" ((transmission signal has a time structure, **Fig. 2, col. 6, lines 41-47**); and a configuration wherein:

"a substantially constant ratio between a sampling frequency and a size of FFT (Fast Fourier Transform) and IFFT (Inverse Fast Fourier Transform) of the signal or a fixed spacing between adjacent subcarriers is maintained" (increasing the number of subcarriers for a constant sampling rate will increase the number of carriers while keeping the carrier spacing fixed, **Fig. 3, col. 6, lines 51-54**); and

"at least some of the subcarriers are added or subtracted to scale the channel and achieve a required bandwidth" (scalable OFDM system with a transmitter and receiver that adjust number of carriers to meet the desired transmission rate, **col. 3, lines 53-58; col. 6, lines 51-57**);

van Nee does not teach "a core-band utilized for radio control and operation signaling, where the core-band is substantially not wider than a smallest possible operating channel bandwidth of the system".

Miyoshi teaches a control channel (core band) composed of one subcarrier with the remaining subcarriers making up the data channel. Because the control channel can consist of just one subcarrier, the size of the control channel would not be wider than the smallest possible operating channel bandwidth of the system. Additionally, the

control channel is located at the center frequency of the transmit band of the data channel (**Fig. 4, col. 2, line 64** through **col. 3, line 11**).

Miyoshi and van Nee are analogous art in that they both pertain to multi-carrier transmission. It would have been obvious to use the control channel as taught in Miyoshi with the process in van Nee being that it speeds up switching between the control channel and the data channel as stated in Miyoshi, col. 1, lines 61-65.

5. **Claims 6, 7, 8, 10 12 and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over **van Nee (US Patent No. 6,175,550)** in view of **Miyoshi (US Patent No. 7,372,909)** in view of **McGovern et al. (US PGPub 2002/0142777)** (hereinafter McGovern).

As to **Claim 6**, van Nee discloses a method comprising:

"maintaining a fixed time-domain signal structure" **Fig. 2, col. 6, lines 41-47**);

"maintaining a substantially constant ratio between a sampling frequency and a size of FFT (Fast Fourier Transform)" (the bandwidth can be varied in a scalable OFDM system by changing various parameters other than the sampling frequency or the size of the FFT and therefore, the ratio between sampling frequency and size of FFT remains constant, (**col. 3, lines 38-58**);

"adjusting a number of subcarriers or subchannels to scale a channel and attain a desired bandwidth" (bandwidth can be varied by modifying the number of subcarriers, **col. 3, lines 53-58**);

van Nee does not disclose "utilizing a core-band, substantially centered at an operating center frequency, for radio control and operation signaling, wherein the core-band is not wider than a smallest possible operating channel bandwidth of the network".

Miyoshi teaches a control channel ("core band") composed of a number of subcarriers which is less than the number of subcarriers composing the data channel and the control channel is located at the center frequency of the transmit band of the data channel (**Fig. 4**).

Miyoshi and van Nee are analogous art in that they both pertain to multi-carrier transmission. It would have been obvious to use the control channel as taught in Miyoshi with the process in van Nee being that it speeds up switching between the control channel and the data channel as stated in Miyoshi, col. 1, lines 61-65.

van Nee in view of Miyoshi also does not explicitly teach a configuration in which a mobile station "determines the operating channel bandwidth by a center-frequency-to-bandwidth-mapping; or decodes the bandwidth information provided to the mobile station via downlink signaling".

McGovern teaches that a resource controller controls transmit and receive frequencies and generates a resource mapping message to the mobile station which specifies the width and center frequency of the channel to be used by the mobile station, **Fig. 4, ¶ 16-18, ¶ 27**).

McGovern and van Nee in view of Miyoshi are analogous art in that they pertain to dynamic channel bandwidth. It would have been obvious to one skilled in the art at the time the invention was made to use the mapping message as taught in McGovern

with the method in van Nee in view of Miyoshi being that it allows the transmitter to notify the mobile of the operating channel bandwidth and center frequency.

As to **claim 7**, van Nee in view of Miyoshi in view of McGovern discloses all of claim 6.

McGovern further discloses "the center-frequency-to-bandwidth-mapping employs a table look-up and the information provided to the mobile station via downlink signaling is in a broadcasting channel or preamble and is transmitted within the core-band" (in the case the information is provided in a downlink signal as in claim 6, the mobile discovers scans the broadcast channel, broadcast by the transmitter, for the channel list and selects a channel; the network equipment then sends the mapping message to the mobile station with inband signaling containing the operating parameters in the downlink signal, **¶ 16, 27**).

As to **claim 8**, van Nee in view of Miyoshi in view of McGovern discloses:

"the signal is a multi-carrier code division multiple access (MC-CDMA) or an orthogonal frequency division multiple access (OFDMA), and the signal is utilized with downlink, uplink, or both, where a duplexing technique is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD)" (it was well known in the art at the time the invention was made that either TDD or FDD could be used on the uplink and/or downlink).

As to **claim 10**, van Nee in view of Miyoshi in view of McGovern discloses all of claim 6.

van Nee further discloses:

"the sampling frequency is a multiple of the sampling frequency of the fundamental range and the corresponding FFT size is multiplied by a substantially same factor as the sampling frequency has been multiplied by, to maintain time duration of the OFDM symbol structure; the FFT size is maintained and the OFDM symbol duration is shortened accordingly; or the FFT size is increased and the OFDM symbol duration is shortened accordingly" ((the symbol duration is modified to double the signal bandwidth while not modifying the FFT length, **col. 3, lines 48-52**); and

Miyoshi further discloses "the width of the core-band is less than or equal to a smallest bandwidth in the fundamental range" (Miyoshi teaches a control channel (core band) composed of one subcarrier and the remaining subcarriers making up the data channel. Because the control channel can consist of just one subcarrier, the size of the control channel would not be wider than the smallest possible operating channel bandwidth of the system (**Fig. 4, col. 2, line 64** through **col. 3, line 11; col. 3, lines 28-38**), and the fundamental range being simply a designated range from the division of the entire range).

As to **claim 12,** van Nee in view of Miyoshi disclose all of claim 11.

van Nee in view of Miyoshi do not disclose "the center-frequency-to-bandwidth-mapping employs a table look-up and the information provided to the mobile transceiver as downlink information is in a broadcasting channel or preamble".

McGovern discloses "the center-frequency-to-bandwidth-mapping employs a table look-up and the information provided to the mobile station via downlink signaling is in a broadcasting channel or preamble and is transmitted within the core-band" (the

transmitter transmits the available channel list on the broadcast channel which the receiver detects and uses to selects a channel for the transmission; the network equipment then sends the mapping message to the mobile station with in-band signaling, **¶ 16, 27**; it is implicit that the mapping information is sent in the preamble of the transmission).

McGovern and van Nee in view of Miyoshi are analogous art in that they pertain to dynamic channel bandwidth. It would have been obvious to one skilled in the art at the time the invention was made to broadcast the channel information as taught in McGovern with the method in van Nee in view of Miyoshi being that it allows the transmitter to notify the mobile of the operating channel bandwidth and center frequency associated with the transmission.

As to **claim 19**, Miyoshi in view of van Nee disclose all of claim 18.

Miyoshi in view of van Nee does not disclose "the operating bandwidth is by table look-up or down-link signaling".

McGovern teaches the mobile scans the broadcast channel, broadcast by the transmitter, for the channel list and selects a channel; the network equipment then sends the mapping message to the mobile station with inband signaling containing the operating parameters in the downlink signal (**¶ 16, 27**).

McGovern and van Nee in view of Miyoshi are analogous art in that they pertain to dynamic channel bandwidth. It would have been obvious to one skilled in the art at the time the invention was made to broadcast the channel information as taught in McGovern with the method in van Nee in view of Miyoshi being that it allows the

transmitter to notify the mobile of the operating channel bandwidth and center frequency associated with the transmission.

Allowable Subject Matter

Claims 3, 4, 9 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARIA L. SEKUL whose telephone number is (571)270-7636. The examiner can normally be reached on Monday - Friday 8:00-5:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis West can be reached on (571) 272-7859. 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.

MARIA L. SEKUL
Examiner
Art Unit 4124

/M. L. S./
Examiner, Art Unit 4124

/Lewis G. West/
Supervisory Patent Examiner, Art Unit 4124

Notice of References Cited	Application/Control No. 10/583,534	Applicant(s)/Patent Under Reexamination LI ET AL.	
	Examiner MARIA L. SEKUL	Art Unit 4124	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,175,550	01-2001	van Nee, Richard D. J.	370/206
*	B	US-7,372,909	05-2008	Miyoshi, Kenichi	375/260
*	C	US-2002/0142777	10-2002	McGovern et al.	455/450
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

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

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10583534	LI ET AL.
	Examiner	Art Unit
	MARIA L SEKUL	4124

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

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

CLAIM		DATE								
Final	Original	04/24/2009								
	1	✓								
	2	✓								
	3	O								
	4	O								
	5	✓								
	6	✓								
	7	✓								
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10583534	LI ET AL.
	Examiner	Art Unit
	MARIA L SEKUL	4124

SEARCHED

Class	Subclass	Date	Examiner
370	203, 210 (w/ text search)	4/24/2009	mls
375	(w/ text search)	4/24/2009	

SEARCH NOTES

Search Notes	Date	Examiner
Discussed search strategy with primary examiner Steven Nguyen	4/20/2009	mls
Inventor/Assignee search	4/24/2009	mls

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

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CONFIRMATION NO. 4954

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
10/583,534	06/05/2007	001	4124	612408010US1

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Kemin Li, Bellevue, WA;
Haiming Huang, Bellevue, WA;

**** CONTINUING DATA ***************************
This application is a 371 of PCT/US05/14828 04/29/2005
which claims benefit of 60/567,233 05/01/2004

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

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
07/07/2007

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /MARIA LYNN SEKUL/ Examiner's Signature	☐ Met after Allowance mls Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		WA	10	21	6

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SEATTLE, WA 98111-1247
UNITED STATES

TITLE

Methods and Apparatus for Multi-Carrier Communications with Variable Channel Bandwidth

FILING FEE RECEIVED		
1380	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	4229	((primary first) and (second$3 auxillary)) with preamble	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:12
L2	3624	((primary first) with preamble) same ((second$3 auxillary) with preamble)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:13
L3	1835	((primary first) with preamble) same (sequence time frequency symbol) same ((second$3 auxillary) with preamble)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:14
L4	1835	(((primary first) with preamble) same (sequence time frequency symbol)) same ((second$3 auxillary) with preamble)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:15
L5	1376	(((primary first) with preamble) with (sequence time frequency symbol)) same ((second$3 auxillary) with preamble)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:15
L6	0	(((primary first) with preamble) with (sequence time frequency symbol) with core) same (((second$3 auxillary) with preamble) with side$band)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:17
L7	1	(((primary first) with preamble) with (sequence time frequency symbol) with core) same ((second$3 auxillary) with preamble)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:17

L8	404	(((primary first) with preamble) with (sequence time frequency symbol) with (core$band control channel)) same ((second$3 auxillary) with preamble)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:18
L9	187696	"370".clas. "375".clas.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:19
L10	292	L9 and 8	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:19
L11	193	10 and @ay<"2005"	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:19
L12	842	(primary first second$3 auxillary) adj preamble	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:37
L13	88136	"center frequency" "core band" core$band "control channel"	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:38
L14	3	12 with 13	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:38
L15	167533	"center frequency" "core band" core$band "control channel" lobe side$1lobe$1	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:40
L16	3	12 with 15	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:41
L17	13937	("center frequency" "core band" core$band "control channel" lobe side$1lobe$1) with shap$3	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:41
L18	2	12 and 17	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:41
L19	88136	("center frequency" "core band" core$band "control channel")	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:43
L20	532	19 with preamble	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:43
L21	353	9 and 20	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:43

L22	217	21 and @ay<"2005"	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:43
L23	86	19 with (preamble with center)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:44
L24	61	23 and @ay<"2005"	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:45
L25	0	auxillary adj preamble	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:57
L26	505	(second secondary) adj preamble	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:58
L27	312	9 and 26	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:58
L28	148	26 and ofdm	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:58
L29	124	9 and 28	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:58
L30	64	29 and @ay<"2005"	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 15:58
L31	2	"4621365".pn.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 16:13
L32	3	"7106814".pn.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 16:16
L33	1	11/322369.app.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 17:36
L34	0	neocific.in.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:03
L35	21	neocific.as.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:03
L36	12	neocific.as. and (variable bandwidth band subcarrier preamble range)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:04
L37	1198	neocific.as. and (variable bandwidth band subcarrier preamble range)".clm"	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:04

L38	6	neocific.as. and (variable bandwidth band subcarrier preamble range).clm.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:04
L39	139	li-xiaodong.in. lo-titus. in. li-kemin.in. huang-haiming.in. and (variable bandwidth band subcarrier preamble range).clm.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:06
L40	139	li-xiaodong.in. lo-titus. in. li-kemin.in. huang-haiming.in. and (variable bandwidth band subcarrier preamble range correlation).clm.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:06
L41	139	li-xiaodong.in. lo-titus. in. li-kemin.in. huang-haiming.in. and (variable adj bandwidth band subcarrier preamble range correlation).clm.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:06
L42	139	li-xiaodong.in. lo-titus. in. li-kemin.in. huang-haiming.in. and (variable adj bandwidth subcarrier primary adj preamble range correlation).clm.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:07
L43	36	(li-xiaodong.in. lo-titus. in. li-kemin.in. huang-haiming.in.) and (variable adj bandwidth subcarrier primary adj preamble range correlation).clm.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:07
L44	1518	370/203,210.ccls.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:13
L45	0	44 and (variable adj bandwith) and sid adj aband and ofdm and FM	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:14
L46	0	44 and sid adj aband and ofdm and FM	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:14
L47	0	44 and side adj aband and ofdm and FM	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:14

L48	0	side adj aband and ofdm and FM	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:14
L49	77	side adj band and ofdm and FM	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:14
L50	0	44 and 49	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:14
L51	10	44 and (variable adj bandwith)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:14
L52	1	51 and $lobe	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 18:15
S1	865311	core band same frequenc$3	US-PGPUB; USPAT	OR	ON	2009/04/20 13:02
S2	45	core adj band same frequenc$3	US-PGPUB; USPAT	OR	ON	2009/04/20 13:02
S3	275	core near2 band same frequenc$3	US-PGPUB; USPAT	OR	ON	2009/04/20 13:02
S4	24	core near2 band same frequenc$3 same bandwi$th	US-PGPUB; USPAT	OR	ON	2009/04/20 14:35
S5	1971532	core near2 band same frequenc$3 same bandwi$th same operat $3 center	US-PGPUB; USPAT	OR	ON	2009/04/20 14:44
S6	1	core near2 band same frequenc$3 same bandwi$th same operat $3 same center	US-PGPUB; USPAT	OR	ON	2009/04/20 14:44
S7	4	core near2 band same frequenc$3 with center	US-PGPUB; USPAT	OR	ON	2009/04/20 14:44
S8	2047	core near2 band	US-PGPUB; USPAT	OR	ON	2009/04/20 14:45
S9	42	core near2 band same (time same frequenc $3)	US-PGPUB; USPAT	OR	ON	2009/04/20 14:45
S10	49	core near2 band same control same frequency	US-PGPUB; USPAT	OR	ON	2009/04/20 14:54
S11	41	S10 not S9	US-PGPUB; USPAT	OR	ON	2009/04/20 14:55
S12	255	variable near2 bandwi $th same (time and frequency)	US-PGPUB; USPAT	OR	ON	2009/04/20 15:00

S13	5	variable near2 bandwi $th same (time and frequency) same (sub $carrier sub$channel)	US-PGPUB; USPAT	OR	ON	2009/04/20 15:00
S14	1	"6175550".pn.	US-PGPUB; USPAT	OR	ON	2009/04/23 10:20
S15	4399	ofdm same fft	US-PGPUB; USPAT	OR	ON	2009/04/23 10:21
S16	28	ofdm same (fft ifft) same ("same" near2 (bandwith rate))	US-PGPUB; USPAT	OR	ON	2009/04/23 10:22
S17	25	ofdm same (fft ifft) same (("same" near1 (bandwith rate)) (rate near2 control))	US-PGPUB; USPAT	OR	ON	2009/04/23 10:59
S18	21836	(core$band wide$band center$band) same frequency	US-PGPUB; USPAT	OR	ON	2009/04/23 14:26
S19	3117	S18 and ofdm	US-PGPUB; USPAT	OR	ON	2009/04/23 14:26
S20	23667	(core$band wide$band center$band) same ((sampl$3 center) frequency)	US-PGPUB; USPAT	OR	ON	2009/04/23 14:27
S21	476	(core$band wide$band center$band) same ((sampl$3 center) frequency) same fft	US-PGPUB; USPAT	OR	ON	2009/04/23 14:27
S22	60482	(core$band wide$band center$band) same ((sampl$3 center) frequency) same fft same2 (sub$carrier sub $channel) (time with symbol)	US-PGPUB; USPAT	OR	ON	2009/04/23 14:27
S23	20	(core$band wide$band center$band) same ((sampl$3 center) frequency) same fft same2 (sub$carrier sub $channel) same2 (time with symbol)	US-PGPUB; USPAT	OR	ON	2009/04/23 14:28
S24	1	"5914933".pn.	US-PGPUB; USPAT	OR	ON	2009/04/23 14:42
S25	70	(core$band wide$band center$band) same ((sampl$3 center) frequency) same (control with signal$4) same2 fft	US-PGPUB; USPAT	OR	ON	2009/04/23 14:44

S26	0	size with core$band	US-PGPUB; USPAT	OR	ON	2009/04/23 14:59
S27	1	(wide width) with core $band	US-PGPUB; USPAT	OR	ON	2009/04/23 14:59
S28	2	((control operation) with signal$4) and core $band	US-PGPUB; USPAT	OR	ON	2009/04/23 15:00
S29	1289569	((control operation) with signal$4)	US-PGPUB; USPAT	OR	ON	2009/04/23 15:01
S30	254160	((control operation) with signal$4) same (frequency ofdm)	US-PGPUB; USPAT	OR	ON	2009/04/23 15:01
S31	205	((control operation) with signal$4)same (center near2 frequency) same2 ofdm	US-PGPUB; USPAT	OR	ON	2009/04/23 15:02
S32	6	((control operation) with signal$4)same (center near2 frequency) same (core $band wide$band) same2 ofdm	US-PGPUB; USPAT	OR	ON	2009/04/23 15:19
S33	8	((control operation) with signal$4)same (center near2 frequency) same (core $band wide$band "control channel") same2 ofdm	US-PGPUB; USPAT	OR	ON	2009/04/23 15:36
S34	1	"wo 03088539"	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 15:55
S35	80	small$3 with ((operat $3 data) adj channel) with bandwith	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:28
S36	15	small$3 with ((operat $3 data) adj channel) with bandwith with control$4	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:30
S37	4	"6175550".pn. "7372909".pn.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:45
S38	0	S37 and pre$amble	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:45
S39	8148	pre$amble with (correlat$3 near2 peak) with2 side$lobe$	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:46

S40	298	pre$amble with (correlat$3 near2 peak) with2 side$lobe$ with co$efficient	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:47
S41	128	(primary adj pre $amble) with (correlat $3 near2 peak) with2 side$lobe$ with co $efficient	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:48
S42	171102	"370".clas. "379".clas.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:48
S43	67	S42 and S40	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:49
S44	5	pre$amble with (correlat$3 near2 peak) with side$lobe$	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:51
S45	0	(primary adj pre $amble) with (correlat $3 near2 peak) with side$lobe$ with co $efficient	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:55
S46	38988	pre$amble with (correlat$3 near2 peak) with side$lobe$ with cross-correlat$3 co $efficient with ratio	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:56
S47	187696	"370".clas. "375".clas.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:56
S48	1335	S46 and S47	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:56
S49	25	S48 and (small near ratio)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:57
S50	0	pre$amble with (correlat$3 near2 peak) with side$lobe$ with cross-correlat$3 with co$efficient with ratio	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:58
S51	0	pre$amble with (correlat$3 near2 peak) with side$lobe$ with cross-correlat$3 with co$efficient	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:58

S52	0	pre$amble with (correlat$3 near2 peak) with side$lobe$ with cross$correlat$3 with co$efficient	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:58
S53	4	pre$amble with (correlat$3 near2 peak) with side$lobe$ with cross$correlat$3	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:58
S54	18	primary adj pre$amble	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 16:59
S55	3	((primary first) adj pre $amble) with (pn pseudo$noise)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 17:04
S56	1530	(control adj (channel frequenc$3)) with bandwidth	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 17:53
S57	18	(control adj (channel frequenc$3)) with bandwidth with ofdm	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 17:54
S58	8	(control adj (channel frequenc$3)) with bandwidth with fundamental	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 17:56
S59	5	(control adj (channel)) with bandwidth with fundamental	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 17:58
S60	9	(control adj (channel)) same bandwidth with fundamental	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 17:58
S61	1	10/583534.app.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:00
S62	3771072	fundamental (range bandwith)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:06
S63	120303	S47 and (fundamental (range bandwith))	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:06
S64	17954	(sampl$3 with frequency) with (fundamental (range bandwith))	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:07
S65	6	(sampl$3 with frequency) with (fundamental adj (range bandwith))	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:07

S66	130	fundamental adj (range bandwith)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:07
S67	89	fundamental adj (range bandwith) and @ay<"2005"	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:09
S68	1	(fundamental adj range) with (sampl$3 adj frequenc$3)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:13
S69	1	(fundamental adj range) same (sampl$3 adj frequenc$3)	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:13
S70	2	(fundamental adj range) with band$wi $th	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:13
S71	11	(fundamental adj range) same band$wi $th	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:14
S72	35	(fundamental adj range) same frequency	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:17
S73	3	S47 and S72	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:17
S74	0	2005/0201476.pn.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:23
S75	2	"20050201476".pn.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:23
S76	4	"2005010314".pn.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/23 18:26
S77	490	operat$3 near2 channel near2 band $1wi$1th	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 11:08
S78	1	(operat$3 near2 channel near2 band $1wi$1th) same (center near2 frequency) same map $4	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 11:09
S79	4	(operat$3 near2 channel near2 band $1wi$1th) and(center near2 frequency) same map$4	US-PGPUB; USPAT; DERWENT	OR	ON	2009/04/24 11:09

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6226337 59
6757344 59
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UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING OR 371(c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/583,534	06/05/2007	Xiaodong Li	612408010US1

CONFIRMATION NO. 4954

25096
PERKINS COIE LLP
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA98111-1247

Title: Methods and Apparatus for Multi-Carrier Communications with Variable Channel Bandwidth

Publication No. US-2007-0242600-A1
Publication Date: 10/18/2007

NOTICE OF PUBLICATION OF APPLICATION

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

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

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

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

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

Pre-Grant Publication Division, 703-605-4283

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO
10/583,534	06/05/2007	3902	1380	612408010US1

CONFIRMATION NO. 4954

25096
PERKINS COIE LLP
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA98111-1247

FILING RECEIPT

Date Mailed: 07/12/2007

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

Applicant(s)

Xiaodong Li, Kirkland, WA;
Titus Lo, Bellevue, WA;
Kemin Li, Bellevue, WA;
Haiming Huang, Bellevue, WA;

Assignment For Published Patent Application

Neocific, Inc., Bellevue, WA

Power of Attorney: The patent practitioners associated with Customer Number 25096

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/US05/14828 04/29/2005
which claims benefit of 60/567,233 05/01/2004

Foreign Applications

If Required, Foreign Filing License Granted: 07/07/2007

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US10/583,534**

Projected Publication Date: 10/18/2007

Non-Publication Request: No

Early Publication Request: No

Title

Methods and Apparatus for Multi-Carrier Communications with Variable Channel Bandwidth

Preliminary Class

001

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

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

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date

thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

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

NOT GRANTED

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

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APPLICATION NUMBER	FILING OR 371(c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/583,534	06/05/2007	Xiaodong Li	612408010US1

CONFIRMATION NO. 4954

25096
PERKINS COIE LLP
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA98111-1247

Date Mailed. 07/12/2007

NOTICE OF NEW OR REVISED PROJECTED PUBLICATION DATE

The above-identified application has a new or revised projected publication date. The current projected publication date for this application is 10/18/2007. If this is a new projected publication date (there was no previous projected publication date), the application has been cleared by Licensing & Review or a secrecy order has been rescinded and the application is now in the publication queue.

If this is a revised projected publication date (one that is different from a previously communicated projected publication date), the publication date has been revised due to processing delays in the USPTO or the abandonment and subsequent revival of an application. The application is anticipated to be published on a date that is more than six weeks different from the originally-projected publication date.

More detailed publication information is available through the private side of Patent Application Information Retrieval (PAIR) System. The direct link to access PAIR is currently http://pair.uspto.gov. Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Questions relating to this Notice should be directed to the Office of Patent Publication at 1-888-786-0101.

PART 1 - ATTORNEY/APPLICANT COPY

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APPLICATION NUMBER	FILING OR 371(c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/583,534	06/05/2007	Xiaodong Li	612408010US1

CONFIRMATION NO. 4954

25096
PERKINS COIE LLP
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA98111-1247

Date Mailed. 07/12/2007

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The above-identified application has a new or revised projected publication date. The current projected publication date for this application is 10/18/2007. If this is a new projected publication date (there was no previous projected publication date), the application has been cleared by Licensing & Review or a secrecy order has been rescinded and the application is now in the publication queue.

If this is a revised projected publication date (one that is different from a previously communicated projected publication date), the publication date has been revised due to processing delays in the USPTO or the abandonment and subsequent revival of an application. The application is anticipated to be published on a date that is more than six weeks different from the originally-projected publication date.

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U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
10/583,534	Xiaodong Li	612408010US1

INTERNATIONAL APPLICATION NO.	
PCT/US05/14828	
I.A. FILING DATE	PRIORITY DATE
04/29/2005	05/01/2004

25096
PERKINS COIE LLP
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

CONFIRMATION NO. 4954

371 ACCEPTANCE LETTER

OC000000024716612

Date Mailed: 07/12/2007

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

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

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

06/05/2007	06/05/2007
DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS	DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS

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

The following items have been received:

- Copy of the International Application filed on 06/16/2006
- Copy of the International Search Report filed on 06/16/2006
- Oath or Declaration filed on 06/05/2007
- U.S. Basic National Fees filed on 06/16/2006
- Assignee Statement for PGPUB filed on 06/05/2007
- Priority Documents filed on 06/16/2006
- Power of Attorney filed on 06/05/2007

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

ULYSSES G WALKER
Telephone: (703) 308-9290 EXT 130

PART 3 - OFFICE COPY

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

UNITED STATES NATIONAL STAGE SHEET (DO/EO)
Karen Williams, Paralegal

PUBLICATION NO. WO 05/112566

PUBLICATION DATE 01 DEC 05

U. S. APPL. NO. 10/583534

INTERNATIONAL APPL. US05/14828

Application Filed By: 30 MOS

International Application ✓ Translation ___ Defective ___ Reason ___

WIPO Designated US Elected ___ IA Language ENGLISH

Copy of Search Report (ISR) ✓ Article 33 ___ Article 19 ___

371 Filing fees ✓ paid ___ insufficient ___ partial ___ Pages ___

Total Claims 21 Chargeable 21 Independent 6 Multiple N

Total Drawing Sheets 10 Defective ___ Reason ___

Oath/Declaration needed ✓ signed ✓ defective ___ Reason ___

Small entity ___ Large entity ✓ Small entity statement/request ___

Biochemical Seq. Diskette ___ needed ___ damaged ___ entered ___ not entered ___

Biochemical Sequence listing ___ needed ___ statement ___ no statement ___

Copy of References Cited in ISR ___ Statement 37 CFR 3.73(b) ___

Copy of IPER ___ Annexes ___ entered ___ not entered ___ Reason ___

Preliminary Amendments ___ entered ___ not entered Reason ___

Information Disclosure Statement ___ Request for Immediate Examination ___

Substitute Specification ___ Assignment ✓ Priority document ✓

Power of Attorney ✓ Data Sheet ___ RO/101 ___ PCT Easy ___

Other papers ___

---

35 USC Receipt of Request 16 JUN 06
Date completion USC 371 Requirements ___
Notice of Missing Requirements 03 APR 07
Notice of Defective ___ Response ___ Translation ___ Declaration ___ Disk ___
Notice of Acceptance ___
Notice of Abandonment ___
Notice of Missing Sequence ___

Docket No.: 612408010US1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Li et al.

Application No.: 10/583,534

Filed: June 16, 2006

For: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

Confirmation No.: 4954

Art Unit: N/A

Examiner: Not Yet Assigned

RESPONSE TO NOTICE TO FILE MISSING PARTS OF APPLICATION

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

Sir:

In response to the Notice to File Missing Parts of Application – Filing Date Granted mailed April 5, 2007, Applicant respectfully submits a Declaration and a Power of Attorney.

Payment by EFT Account No. SEA1PIRM in the amount of $65.00 covering the fee set forth in 37 CFR 1.16(f) is enclosed. The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith

(or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 50-0665, under Order No. 612408010US1.

Dated: June 5, 2007

Respectfully submitted,

By _____

Stephen Bishop
Registration No.: 38,829
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000
(206) 359-7198 (Fax)
Attorney for Applicant

PTO/SB/80 (01-06)
Approved for use through 12/31/2008. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

[X] Practitioners associated with the Customer Number: 25096

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number		Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

[X] The address associated with Customer Number: 25096

OR

[ ] Firm or Individual Name

Address					
City		State		Zip	
Country		Telephone		Email	

Assignee Name and Address:

Neocific, Inc.
13312 SE 43rd Street
Bellevue, Washington 98006

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

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	[signature]	Date	1/3/2007
Name	XIAODONG LI	Telephone	425-445-2270
Title	PRESIDENT		

PTO/SB/96 (04-07)
Approved for use through 09/30/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Xiaodong Li, Titus Lo, Kemin Li, and Haiming Huang

Application No./Patent No.: 10/583,534 Filed/Issue Date: June 16, 2006

Entitled: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

Neocific, Inc. (Name of Assignee) , a corporation (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. [X] the assignee of the entire right, title, and interest; or

2. [ ] an assignee of less than the entire right, title and interest.
(The extent (by percentage) of its ownership interest is _____ %)

in the patent application/patent identified above by virtue of either:

A. [ ] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

OR

B. [X] A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Inventors To: Waltical Solutions, Inc. (copy attached)
The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: Waltical Solutions, Inc. To: Neocific, Inc.
The document was recorded in the United States Patent and Trademark Office at
Reel 017363, Frame 0370, or for which a copy thereof is attached.

3. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

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

[X] As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.
[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

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

_____ 5 June 2007
Signature Date

Stephen C. Bishop _____
Printed or Typed Name Telephone Number

Authorized Signer for Assignee
Title

ASSIGNMENT BY INVENTORS

This Assignment is by Xiaodong Li; Titus Lo; Haiming Huang; and Kemin Li (the "Assignors"), residing at 9919 129th PL NE, Kirkland, Washington 98033; 13312 SE 43rd ST, Bellevue, Washington 98006; 605 141st CT SE #D203, Bellevue, Washington 98007; and 4228 144th LN SE, Bellevue, 98006, respectively. The Assignors have invented one or more certain inventions (the "Invention(s)") described in a Patent application for Letters Patent of the United States entitled METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH (the "Application"), executed concurrently herewith and naming the Assignors as inventors. The Assignors authorize the Assignee, identified below, or its representatives to insert the application number of the Application US05/14828 when known.

Waltical Solution, Inc. (formerly Walbell Technologies, Inc.), a corporation of Washington having its principal place of business at Suite D159, 1750 112th Ave. NE, Bellevue, Washington 98004 ("Assignee"), desires to acquire the entire right, title and interest in and to the Invention(s) and the Application, and in and to any patents (collectively, "Patents") that may be granted for the Invention(s) in the United States or in any foreign countries.

For valuable consideration, the receipt and sufficiency of which Assignors acknowledge, Assignors hereby sell, assign, and transfer to Assignee, its successors, legal representatives and assigns, the entire right, title and interest in and to: the Invention(s), the Application, and any Patents; any divisions, continuations, and continuations-in-part of the Application and any other application claiming priority rights from the Application; any reissues, reexaminations, or extensions of any and all Patents; the right to file foreign applications directly in the name of Assignee; and the right to claim priority rights deriving from the Application (collectively, the "Rights"). Assignors warrant that Assignors own the Rights, and that the Rights are unencumbered. Assignors also agree to not sign any writing or do any act conflicting

with this assignment, and, without further compensation, sign all documents and do such additional acts as Assignee deems necessary or desirable to: perfect Assignee's enjoyment of the Rights; conduct proceedings regarding the Rights, including any litigation or interference proceedings; or perfect or defend title to the Rights. Assignors request the Commissioner of Patents to issue any Patent of the United States that may be issued on the Invention(s) to Assignee. This Assignment may be executed in counterparts.

Xiaodong Li

Date: 10/6/2005

United States of America)
State of ~~to~~ WA) ss.:
County of King)

On this 6th day of October, 2005, before me personally came Xiaodong Li, to me known to be the individual described in and who executed the foregoing instrument, and acknowledged execution of the same.

BOBBY H. RATTY NOTARY PUBLIC STATE OF WASHINGTON COMM. EXP. JUNE 30, 2009

Notary Public

Titus Lo

Date: 10/6/05

United States of America)
State of WA) ss.:
County of King)

On this 6th day of October, 2005, before me personally came Titus Lo, to me known to be the individual described in and who executed the foregoing instrument, and acknowledged execution of the same.

BOBBY H. PATTY NOTARY PUBLIC STATE OF WASHINGTON COMM EXP JUNE 30, 2009

Notary Public

Kemin Li

Date: 10/06/2005

United States of America)
State of WA) ss.:
County of King)

On this 6th day of October, 2005, before me personally came Kemin Li, to me known to be the individual described in and who executed the foregoing instrument, and acknowledged execution of the same.

BOBBY H. RATTY
COMM EXP
NOTARY
PUBLIC
JUNE 30, 2009
STATE OF WASHINGTON

Notary Public

Haiming Huang

Date: 10/6/2005

United States of America)
State of WA) ss.:
County of King)

On this 6th day of October, 2005, before me personally came Haiming Huang, to me known to be the individual described in and who executed the foregoing instrument, and acknowledged execution of the same.

BOBBY H. RATTY
COMM EXP
NOTARY
PUBLIC
JUNE 30, 2009
STATE OF WASHINGTON

Notary Public

Declaration for Patent Application English Language Declaration		
	Attorney Docket No.	612408010US1
	First Named Inventor	Xiaodong Li
	COMPLETE IF KNOWN:	
☐ Submitted with initial filing ☒ Submitted after initial filing (surcharge required 37 CFR 1.16(e))	Application No.	10/583,534
	Filing Date	
	Art Unit	N/A
	Examiner	Not Yet Assigned

As a below named inventor, I hereby declare that:

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

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

METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

the specification of which

☐ is attached hereto

OR

☒ was filed on 04/29/2005

as United States Application No. or PCT International Application No. PCT/US05/14828

and was amended on _____ (if applicable).

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

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the National or PCT International filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign applications(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's right certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

(Number)	(Country)	(Filing Date)	Priority Not Claimed ☐	Certified Copy Attached YES ☐	Certified Copy Attached NO ☐

☐ Additional prior foreign applications are listed on a supplemental data sheet attached hereto.

IN LIEU OF PTO SB/01 (03-01))

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

Full name of sole or first inventor Xiaodong Li	
Sole or first inventor's signature	Date 1/3/2007
Residence Kirkland, Washington	
Citizenship US	
Mailing Address 9919 129th PL NE Kirkland, Washington 98033	

Full name of second inventor Titus Lo	
Second inventor's signature	Date 01/03/2007
Residence Bellevue, Washington	
Citizenship Canada	
Mailing Address 13312 SE 43rd ST Bellevue, Washington 98006	

Full name of third inventor Kemin Li	
Third inventor's signature	Date 01/03/2007
Residence Bellevue, Washington	
Citizenship People's Republic of China	
Mailing Address 4228 144th Lane SE Bellevue, Washington 98006	

Full name of fourth inventor, if any Haiming Huang	
Fourth inventor's signature	Date 1/3/2007
Residence Bellevue, Washington	
Citizenship People's Republic of China	
Mailing Address 605 141st CT SE #D203 Bellevue, Washington 98007	

Electronic Patent Application Fee Transmittal

Application Number:	10583534
Filing Date:	
Title of Invention:	Methods and apparatus for multi-carrier communications with variable channel bandwidth
First Named Inventor/Applicant Name:	Xiaodong Li
Filer:	Maurice J. Pirio/CHRISTINE HURDLE
Attorney Docket Number:	612408010US1

Filed as Small Entity

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Late filing fee for oath or declaration	2051	1	65	65
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**65**

Electronic Acknowledgement Receipt

EFS ID:	1842676
Application Number:	10583534
International Application Number:	
Confirmation Number:	4954
Title of Invention:	Methods and apparatus for multi-carrier communications with variable channel bandwidth
First Named Inventor/Applicant Name:	Xiaodong Li
Customer Number:	25096
Filer:	Maurice J. Pirio/CHRISTINE HURDLE
Filer Authorized By:	Maurice J. Pirio
Attorney Docket Number:	612408010US1
Receipt Date:	05-JUN-2007
Filing Date:	
Time Stamp:	20:59:52
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	$65
RAM confirmation Number	3606
Deposit Account	

File Listing:

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

1		Response.pdf	386993	yes	13

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Applicant Response to Pre-Exam Formalities Notice	1	2
Power of Attorney	3	10
Oath or Declaration filed	11	13

Warnings:

Information:

2	Fee Worksheet (PTO-06)	fee-info.pdf	8216	no	2

Warnings:

Information:

Total Files Size (in bytes):	395209

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

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

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

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

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U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
10/583,534	Xiaodong Li	612408010US1

INTERNATIONAL APPLICATION NO.	
PCT/US05/14828	
I.A. FILING DATE	PRIORITY DATE
04/29/2005	05/01/2004

25096
PERKINS COIE LLP
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

CONFIRMATION NO. 4954

371 FORMALITIES LETTER

OC000000023253819

Date Mailed: 04/05/2007

NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as a Designated / Elected Office (37 CFR 1.495).

- Copy of the International Application filed on 06/16/2006
- Copy of the International Search Report filed on 06/16/2006
- U.S. Basic National Fees filed on 06/16/2006
- Priority Documents filed on 06/16/2006

The applicant needs to satisfy supplemental fees problems indicated below.

The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:

- Oath or declaration of the inventors, in compliance with 37 CFR 1.497(a) and (b), identifying the application by the International application number and international filing date.
- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.492(h) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fees required for this application is **$130** for a Large Entity:

- **$130** Surcharge.

ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE OR BY 32 MONTHS FROM THE PRIORITY DATE FOR THE APPLICATION, WHICHEVER IS LATER. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

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

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

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

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

KAREN M WILLIAMS

Telephone: (703) 308-9140 EXT 213

PART 2 - OFFICE COPY

U.S. APPLICATION NUMBER NO.	INTERNATIONAL APPLICATION NO.	ATTY. DOCKET NO.
10/583,534	PCT/US05/14828	612408010US1

FORM PCT/DO/EO/905 (371 Formalities Notice)

Express Mail No. EV904399058US
PTO-1390 (Rev. 07-2005)
Approved for use through 03/31/2007. OMB 0651-0021
U. S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	
612408010US1	
U.S. APPLICATION NO. (If known, see 37 CFR 1.5)	
10/583534	

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/US2005/014828	29 April 2005	1 May 2004

TITLE OF INVENTION
METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

APPLICANT(S) FOR DO/EO/US
Xiaodong Li et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [x] This is a **FIRST** submission of items concerning a submission under 35 U.S.C. 371.
2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a submission under 35 U.S.C. 371.
3. [ ] This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. [ ] The US has been elected (Article 31).
5. [x] A copy of the International Application as filed (35 U.S.C. 371 (c)(2))
   a. [ ] is attached hereto (required only if not communicated by the International Bureau).
   b. [ ] has been communicated by the International Bureau.
   c. [x] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [ ] An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. [ ] is attached hereto.
   b. [ ] has been previously submitted under 35 U.S.C. 154(d)(4).
7. [x] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [ ] are attached hereto (required only if not communicated by the International Bureau).
   b. [ ] have been communicated by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [x] have not been made and will not be made.
8. [ ] An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. [ ] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [ ] A preliminary amendment.
14. [ ] An Application Data Sheet under 37 CFR 1.76.
15. [ ] A substitute specification.
16. [ ] A power of attorney and/or change of address letter.
17. [ ] A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.2 and 37 CFR 1.821 – 1.825.
18. [ ] A second copy of the published International Application under 35 U.S.C. 154(d)(4).
19. [ ] A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).

Express Mail No. EV904399058US
PTO-1390 (Rev. 07-2005)
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U.S. APPLICATION NO. (if known, see 37 CFR 1.5) 10/583534	INTERNATIONAL APPLICATION NO. PCT/US2005/014828	ATTORNEY'S DOCKET NUMBER 612408010US1

20. [x] Other items or information: Return Receipt Postcard

The following fees have been submitted	CALCULATIONS	PTO USEONLY
21. [x] Basic national fee (37 CFR 1.492(a)) $300	$ 300.00	
22. [x] Examination fee (37 CFR 1.492(c)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... $0 All other situations $200	$ 200.00	
23. [x] Search fee (37 CFR 1.492(b)) If the written opinion of the ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... $0 Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority ..... $100 International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB ..... $400 All other situations $500	$ 100.00	
TOTAL OF 21, 22 and 23 =	$ 600.00	

[ ] Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing in compliance with 37 CFR 1.821(c) or (e) or computer program listing in an electronic medium) (37 CFR 1.492(j)).
The fee is $250 for each additional 50 sheets of paper or fraction thereof.

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof (round up to a whole number)	RATE	
35 - 100 =	/50 =		x $250.00	$

Surcharge of $130 for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1.492(h)).	$	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	21 - 20 =	1	x	50.00	50.00
Independent claims	6 - 3 =	3	x	200.00	600.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+		
TOTAL OF ABOVE CALCULATIONS =					$ 1,250.00

[ ] Applicant claims small entity status. See 37 CFR 1.27. Fees above are reduced by ½.

SUBTOTAL =	$ 1,250.00	
Processing fee of $130.00 for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i)).	$	
TOTAL NATIONAL FEE =	$ 1,250.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40.00 per property +	$	
	$	
TOTAL FEES ENCLOSED =	$ 1,250.00	
Amount to be refunded:	$	
Amount to be charged	$	

10/583534

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a. [ ] A check in the amount of $ _____ to cover the above fees is enclosed.

b. [x] Please charge my Deposit Account No. 50-0665 in the amount of $ 1,250.00 to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [x] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 50-0665 . A duplicate copy of this sheet is enclosed.

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NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed an granted to restore the International Application to pending status.

SEND ALL CORRESPONDENCE TO:

M. Macartney
SIGNATURE

Michelle C. Macartney
NAME

CUSTOMER NUMBER: 25096

55,828
REGISTRATION NUMBER

Express Mail No. EV904399058US
PTO-1390 (Rev. 07-2005)
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U. S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	
612408010US1	
U.S. APPLICATION NO. (If known, see 37 CFR 1.5)	10/583534

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/US2005/014828	29 April 2005	1 May 2004

TITLE OF INVENTION
METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

APPLICANT(S) FOR DO/EO/US
Xiaodong Li et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

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U.S. APPLICATION NO. (if known, see 37 CFR 1.5) 10/583534	INTERNATIONAL APPLICATION NO. PCT/US2005/014828	ATTORNEY'S DOCKET NUMBER 612408010US1

20. [x] Other items or information: Return Receipt Postcard

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Surcharge of $130 for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1.492(h)). $

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
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MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+		

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[ ] Applicant claims small entity status. See 37 CFR 1.27. Fees above are reduced by ½.	
SUBTOTAL =	$ 1,250.00
Processing fee of $130.00 for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i)). +	$
TOTAL NATIONAL FEE =	$ 1,250.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40.00 per property +	$
	$
TOTAL FEES ENCLOSED =	$ 1,250.00
Amount to be refunded:	$
Amount to be charged	$

10/583534

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a. [ ] A check in the amount of $ _____ to cover the above fees is enclosed.

b. [x] Please charge my Deposit Account No. 50-0665 in the amount of $ 1,250.00 to cover the above fees. A duplicate copy of this sheet is enclosed.

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NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed an granted to restore the International Application to pending status.

SEND ALL CORRESPONDENCE TO:

M. Macartney
SIGNATURE

Michelle C. Macartney
NAME

CUSTOMER NUMBER: 25096

55,828
REGISTRATION NUMBER

RAM/PCT

Date: 07-03-06

Serial Number: 10/583534

- ☐ No check received
- ☐ Insufficient Fee by check
- ☐ No credit card received
- ☐ Credit card declined
- ☐ Credit card invalid
- ☐ Credit card expired
- ☐ No calculation sheet
- ☐ No authorization
- ☒ Insufficient funds in deposit account
- ☐ Deposit Account is not found
- ☐ User not listed
- ☐ No signature
- ☐ Different Serial Number

Operated by: AMY

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
1 December 2005 (01.12.2005)

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(10) International Publication Number
WO 2005/112566 A2

(51) International Patent Classification: Not classified

(21) International Application Number:
PCT/US2005/014828

(22) International Filing Date: 29 April 2005 (29.04.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/567,233 1 May 2004 (01.05.2004) US

(71) Applicant *(for all designated States except US)*: **WALTICAL SOLUTIONS, INC. (FORMERLY WALBELL TECHNOLOGIES, INC.)** [US/US]; Suite D159, 1750 112th Ave. NE, Bellevue, WA 98004 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **LI, Xiaodong** [US/US]; 9919 129th PL NE, Kirkland, WA 98033 (US). **LO, Titus** [CA/US]; 10501 181st Ave. NE, Redmond, WA 98052 (US). **LI, Kemin** [—/US]; 4228 144th LN SE, Bellevue, WA 98006 (US). **HUANG, Haiming** [—/US]; 605 141st CT SE #D203, Bellevue, WA 98007 (US).

(74) Agent: **DALEY-WATSON, Christopher**; P.O. Box 1247, Seattle, Washington 98111-1247 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

(57) Abstract: Methods and apparatus for multi-carrier communication with variable channel bandwidth are disclosed, where the time frame structure and the OFDM symbol structure are invariant and the frequency-domain signal structure is flexible. In one embodiment, a mobile station, upon entering a geographic area, uses a core-band to initiate communication and obtain essential information and subsequently switches to full operating bandwidth of the area for the remainder of the communication. If the mobile station operates in a wide range of bandwidths, the mobile station divides the full range into sub-ranges and adjusts its sampling frequency and its FFT size in each sub-range.

WO 2005/112566 A2

METHODS AND APPARATUS FOR MULTI-CARRIER COMMUNICATIONS WITH VARIABLE CHANNEL BANDWIDTH

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 60/567,233, filed on May 1, 2004. This application also relates to PCT Application No. PCT/US2005/001939 filed January 20, 2005, which claims the benefit of U.S. Provisional Application No. 60/540,032 filed January 29, 2004; PCT Application No. PCT/US2005/004601 filed February 14, 2005, which claims the benefit of U.S. Provisional Application No. 60/544,521 filed February 13, 2004; PCT Application No. PCT/US2005/003889 filed February 7, 2005, which claims the benefit of U.S. Provisional Application No. 60/542,317 filed February 7, 2004; and PCT Application No. PCT/US2005/008169 filed March 9, 2005, which claims the benefit of U.S. Provisional Application No. 60/551,589 filed March 9, 2004.

BACKGROUND

[0002] While it is ideal for a broadband wireless communication device to be able to roam from one part of the world to another, wireless communication spectra are heavily regulated and controlled by individual countries or regional authorities. It also seems inevitable that each country or region will have its own different spectral band for broadband wireless communications. Furthermore, even within a country or region, a wireless operator may own and operate on a broadband spectrum that is different in frequency and bandwidth from other operators. The existing and future bandwidth variety presents a unique challenge in designing a broadband wireless communication system and demands flexibility and adaptability.

[0003] Multi-carrier communication systems are designed with a certain degree of flexibility. In a multi-carrier communication system such as multi-carrier code division multiple access (MC-CDMA) and orthogonal frequency division multiple access (OFDMA), information is multiplexed on subcarriers that are mutually

orthogonal in the frequency domain. Design flexibility is a result of the ability to manipulate parameters such as the number of subcarriers and the sampling frequency. For example, by using a different sampling frequency, a DVB-T (Digital Video Broadcasting-Terrestrial) device is capable of receiving signals broadcasted from a DVB-T station that is operating on a 6-, 7-, or 8-MHz bandwidth.

[0004] However, the change in the time-domain structure brings about a series of system problems. A varying sampling rate alters the symbol length, frame structure, guard time, prefix, and other time-domain properties, which adversely affects the system behavior and performance. For example, the MAC layer and even the layers above have to keep track of all the time-domain parameters in order to perform other network functions such as handoff, and thereby the complexity of the system will exponentially increase. In addition, the change in symbol length causes control and signaling problems and the change in the frame structure may cause unacceptable jitters in some applications such as voice over IP. A practical and feasible solution for multi-carrier communication with variable channel bandwidth is desirable.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Figure 1 is a schematic presentation of a radio resource divided into small units in both the frequency and time domains: subchannels and time slots.

[0006] Figure 2 illustrates a relationship between sampling frequency, channel bandwidth, and usable subcarriers.

[0007] Figure 3 shows a basic structure of a multi-carrier signal in the frequency domain, made up of subcarriers.

[0008] Figure 4 shows a basic structure of a multi-carrier signal in the time domain, generally made up of time frames, time slots, and OFDM symbols.

[0009] Figure 5 shows a cellular wireless network comprised of a plurality of cells, wherein in each of the cells coverage is provided by a base station (BS).

[0010] Figure 6 illustrates a variable channel bandwidth being realized by adjusting a number of usable subcarriers, whose spacing is set constant.

[0011] Figure 7 depicts a time-domain windowing function applied to OFDM symbols to shape the OFDM spectrum to conform to a given spectral mask.

[0012] Figure 8 depicts a preamble designed to occupy either an entire operating bandwidth or a core-band.

[0013] Figure 9 shows an entire range (e.g., from 5 Mhz to 40 MHz) of bandwidth variation being divided into smaller groups or trunks (e.g., 5-10 MHz, 10-20 MHz, 20-40 MHz, in sizes), wherein each trunk is handled in one particular range.

[0014] Figure 10 illustrates a multi-cell, multi-user cellular system comprising multiple base stations and mobile stations.

DETAILED DESCRIPTION

[0015] The multi-carrier system mentioned here can be of any format such as OFDM, or Multi-Carrier Code Division Multiple Access (MC-CDMA). The presented methods can also be applied to downlink, uplink, or both, where the duplexing technique is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

[0016] The following description provides specific details for a thorough understanding of the various embodiments and for the enablement of one skilled in the art. However, one skilled in the art will understand that the invention may be practiced without such details. In some instances, well-known structures and functions have not been shown or described in detail to avoid unnecessarily obscuring the description of the embodiments.

[0017] The terminology used in the description presented below is intended to be interpreted in its broadest reasonable manner, even though it is being used in conjunction with a detailed description of certain specific embodiments of the invention. Certain terms may even be emphasized below; however, any terminology intended to be interpreted in any restricted manner will be overtly and specifically defined as such in this Detailed Description section.

[0018] Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise," "comprising," and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to." Words using the singular or plural

number in this Detailed Description section also include the plural or singular number respectively. Additionally, the words "herein," "above," "below" and words of similar import, when used in this application, shall refer to this application as a whole and not to any particular portions of this application. When the claims use the word "or" in reference to a list of two or more items, that word covers all of the following interpretations of the word: any of the items in the list, all of the items in the list and any combination of the items in the list.

MULTI-CARRIER COMMUNICATION SYSTEM

[0019] The physical media resource (e.g., radio or cable) in a multi-carrier communication system can be divided in both the frequency and time domains. This canonical division provides a high flexibility and fine granularity for resource sharing. Figure 1 presents a radio resource divided into small units in both the frequency and time domains – subchannels and time slots. The subchannels are formed by subcarriers.

[0020] The basic structure of a multi-carrier signal in the frequency domain is made up of subcarriers. For a given bandwidth of a spectral band or channel (B_{ch}) the number of usable subcarriers is finite and limited, whose value depends on a size of an FFT (Fast Fourier Transform) employed, a sampling frequency (f_s), and an effective bandwidth (B_{eff}). Figure 2 illustrates a schematic relationship between the sampling frequency, the channel bandwidth, and the usable subcarriers. As shown, the B_{eff} is a percentage of B_{ch}.

[0021] A basic structure of a multi-carrier signal in the frequency domain is made up of subcarriers and, illustrated in Figure 3, which shows three types of subcarriers as follow:

1. Data subcarriers, which carry information data;
2. Pilot subcarriers, whose phases and amplitudes are predetermined and made known to all receivers, and which are used for assisting system functions such as estimation of system parameters; and
3. Silent subcarriers, which have no energy and are used as guard bands and DC carriers.

[0022] The data subcarriers can be arranged into groups called subchannels to support scalability and multiple-access. Each subchannel may be set at a different power level. The subcarriers forming one subchannel may or may not be adjacent to each other. Each user may use some or all of the subchannels. A subchannel formed by the contiguous subcarriers is called a congregated or clustered subchannel. A congregated subchannel may have a different power level from others.

[0023] Figure 4 illustrates the basic structure of a multi-carrier signal in the time domain which is generally made up of time frames, time slots, and OFDM symbols. A frame consists of a number of time slots, whereas each time slot is comprised of one or more OFDM symbols. The OFDM time domain waveform is generated by applying the inverse-fast-Fourier-transform (IFFT) to the OFDM signals in the frequency domain. A copy of the last portion of the time waveform, known as the cyclic prefix (CP), is inserted at the beginning of the waveform itself to form an OFDM symbol.

[0024] The downlink transmission in each frame begins with a downlink preamble, which can be the first or more of the OFDM symbols in the first downlink (DL) slot. The DL preamble is used at a base station to broadcast radio network information such as synchronization and cell identification.

[0025] Similarly, uplink transmission can begin with an uplink preamble, which can be the first or more of the OFDM symbols in the first uplink (UL) slot. The UL preamble is used by mobile stations to carry out the functions such as initial ranging during power up and handoff, periodic ranging and bandwidth request, channel sounding to assist downlink scheduling or advanced antenna technologies, and other radio functions.

CELLULAR WIRELESS NETWORKS

[0026] In a cellular wireless network, the geographical region to be serviced by the network is normally divided into smaller areas called cells. In each cell the coverage is provided by a base station. This type of structure is normally referred to as the cellular structure. Figure 5 depicts a cellular wireless network comprised of a

plurality of cells. In each of these cells the coverage is provided by a base station (BS).

[0027] A base station is connected to the backbone of the network via a dedicated link and also provides radio links to the mobile stations within its coverage. Within each coverage area, there are located mobile stations to be used as an interface between the users and the network. A base station also serves as a focal point to distribute information to and collect information from its mobile stations by radio signals. If a cell is divided into sectors, from system engineering point of view each sector can be considered as a cell. In this context, the terms "cell" and "sector" are interchangeable.

VARIABLE BANDWIDTH OFDMA

[0028] In accordance with aspects of certain embodiments of the invention, a variable bandwidth system is provided, while the time-domain signal structure (such as the OFDM symbol length and frame duration) is fixed regardless of the bandwidths. This is achieved by keeping the ratio constant between the sampling frequency and the length of FFT/IFFT. Equivalently, the spacing between adjacent subcarriers is fixed.

[0029] In some embodiments, the variable channel bandwidth is realized by adjusting the number of usable subcarriers. In the frequency domain, the entire channel is aggregated by subchannels. (The structure of a subchannel is designed in a certain way to meet the requirements of FEC (Forward Error Correction) coding and, therefore, should be maintained unchanged.) However, the number of subchannels can be adjusted to scale the channel in accordance with the given bandwidth. In such realization, a specific number of subchannels, and hence the number of usable subcarriers, constitute a channel of certain bandwidth.

[0030] For example, Figure 6 illustrates the signal structure in the frequency domain for a communication system with parameters specified in Table 1 below. The numbers of usable subcarriers are determined based on the assumption that the effective bandwidth B_{eff} is 90% of the channel bandwidth B_{ch}. The variable channel bandwidth is realized by adjusting the number of usable subcarriers, whose

spacing is set constant. The width of a core-band is less than the smallest channel bandwidth in which the system is to operate.

Table 1: Sample System Parameters

Sampling freq.	11.52 MHz			
FFT size	1024 points			
Subcarrier spacing	11.25 kHz			
Channel bandwidth	10 MHz	8 MHz	6 MHz	5 MHz
# of usable subcarriers	800	640	480	400

[0031] In this realization, using the invariant OFDM symbol structure allows the use of same design parameters for signal manipulation in the time-domain for a variable bandwidth. For example, in an embodiment depicted in Figure 7, a particular windowing design shapes the spectrum to conform to a given spectral mask and is independent of the operating bandwidth.

RADIO OPERATION VIA CORE-BAND

[0032] To facilitate the user terminals to operate in a variable bandwidth (VB) environment, specific signaling and control methods are required. Radio control and operation signaling is realized through the use of a core-band (CB). A core-band, substantially centered at the operating center frequency, is defined as a frequency segment that is not greater than the smallest operating channel bandwidth among all the possible spectral bands that the receiver is designed to operate with. For example, for a system that is intended to work at 5-, 6-, 8-, and 10-Mhz, the width of the CB can be 4 MHz, as shown in Figure 6. The rest of the bandwidth is called sideband (SB).

[0033] In one embodiment relevant or essential radio control signals such as preambles, ranging signals, bandwidth request, and/or bandwidth allocation are transmitted within the CB. In addition to the essential control channels, a set of data channels and their related dedicated control channels are placed within the CB to maintain basic radio operation. Such a basic operation, for example, constitutes the primary state of operation. When entering into the network, a mobile station starts

with the primary state and transits to the normal full-bandwidth operation to include the sidebands for additional data and radio control channels.

[0034] In another embodiment, a preamble, called an essential, or primary preamble (EP), is designed to only occupy the CB, as depicted in Figure 8. The EP alone is sufficient for the basic radio operation. The EP can be either a direct sequence in the time domain with its frequency response confined within the CB, or an OFDM symbol corresponding to a particular pattern in the frequency domain within the CB. In either case, an EP sequence may possess some or all of the following properties:

1. Its autocorrelation exhibits a relatively large ratio between the correlation peak and sidelobe levels.
2. Its cross-correlation coefficient with another EP sequence is significantly small with respect to the power of the EP sequences.
3. Its peak-to-average ratio is relatively small.
4. The number of EP sequences that exhibit the above three properties is relatively large.

[0035] In yet another embodiment, a preamble, called an auxiliary preamble (AP), which occupies the SB, is combined with the EP to form a full-bandwidth preamble (FP) (e.g., appended in the frequency domain or superimposed in the time domain). An FP sequence may possess some or all of the following properties:

1. Its autocorrelation exhibits a relatively large ratio between the correlation peak and sidelobe levels.
2. Its cross-correlation coefficient with another FP sequences is significantly small with respect to the power of the FP sequences.
3. Its peak-to-average ratio is relatively small.
4. The number of FP sequences that exhibits the above three properties is relatively large.

[0036] In still another embodiment, the formation of an FP by adding an AP allows a base station to broadcast the FP, and a mobile station to use its

corresponding EP, to access this base station. An FP sequence may also possess some or all of the following properties:

1. Its correlation with its own EP exhibits a relatively large ratio between the correlation peak and sidelobe levels.
2. Its cross-correlation coefficient with any EP sequence other than its own is significantly small with respect to its power.
3. The number of FP sequences that exhibit the above two properties is relatively large.

AUTOMATIC BANDWIDTH RECOGNITION

[0037] The VB-OFDMA receiver is capable of automatically recognizing the operating bandwidth when it enters in an operating environment or service area of a particular frequency and channel bandwidth. The bandwidth information can be disseminated in a variety of forms to enable Automatic Bandwidth Recognition (ABR).

[0038] In one embodiment, a mobile station, when entering in an environment or an area that supports the VB operation or services, will scan the spectral bands of different center frequencies. If it detects the presence of a signal in a spectral band of a particular center frequency by using envelope detection, received signal strength indicator (RSSI), or by other detection methods, it can determine the operating channel bandwidth by bandwidth-center frequency association such as table lookup. For example, a table such as Table 2 is stored in the receiver. Based on the center frequency that it has detected, the mobile station looks up the value of the channel bandwidth from the table.

Table 2: Sample Center Frequency and Corresponding Bandwidth

Center frequency	Channel Bandwidth
2.31 GHz	10 MHz
2.56 GHz	6 MHz
2.9 G	8 MHz

[0039] In another embodiment, the system provides the bandwidth information via downlink signaling, such as using a broadcasting channel or a preamble. When entering into a VB network, the mobile stations will scan the spectral bands of different center frequencies in which the receiver is designed to operate and decode the bandwidth information contained in the broadcasting channel or preamble.

MULTI-MODE (MULTI-RANGE) VB-OFDMA

[0040] In accordance with the principles of this invention, multi-modes are devised for a VB-OFDMA system to handle an exceptionally wide range of variation in channel bandwidth. The entire range of bandwidth variation is divided into smaller parts – not necessarily in equal size – each of which will be dealt with as a separate mode or range.

[0041] Figure 9 illustrates the entire range (e.g., from 5 MHz to 40 MHz) of bandwidth variation being divided into smaller parts (e.g., 5-10 MHz, 10-20 MHz, 20-40 MHz, in sizes). Each part is handled in one particular mode. The mode for the lowest range of bandwidth is labeled as "fundamental mode" and other modes are called "higher modes" (Mode 1, Mode 2, etc.).

[0042] The sampling frequency of a higher mode is higher than the sampling frequency of the fundamental mode. In one embodiment the sampling frequency of a higher mode is a multiple of the sampling frequency of the fundamental mode. In this embodiment, in the higher modes, the FFT size can be multiplied in accordance with the sampling frequency, thereby maintaining the time duration of the OFDM symbol structure. For example, the parameters for the case of a multi-mode design are given in Table 3. Alternatively, a higher mode can be realized by maintaining the FFT size and shortening the OFDM symbol duration accordingly. For example, for Mode 1 in Table 3, the FFT size can be maintained at 1024, whereas the sampling frequency is doubled and the symbol length is a half of that for the fundamental range. Yet another higher-mode realization is to both increase the FFT size and shorten the symbol duration accordingly. For example, for Mode 2 (20 MHz to 40 MHz in bandwidth), both the FFT size and the sampling frequency can be doubled as those of the fundamental range, whereas the symbol length is halved as that of the fundamental range. The width of the CB in a multi-mode VB-OFDMA system may not be greater than the smallest bandwidth in the fundamental mode.

Table 3: Sample System Parameters

	Mode 1				Fundamental-Mode			
Sampling freq.	23.04 MHz				11.52 MHz			
FFT size	2048 points				1024 points			
Subcarrier spacing	11.25 kHz							
Channel bandwidth (MHz)	20	18	15	12	10	8	6	5
# of usable subcarriers	1600	1440	1200	960	800	680	480	400

[0043] Figure 10 illustrates a multi-cell, multi-user cellular system comprising multiple base stations and mobile stations. The system of Figure 10 is an example of an environment in which the attributes of the invention can be utilized.

[0044] While specific circuitry may be employed to implement the above embodiments, aspects of the invention can be implemented in a suitable computing environment. Although not required, aspects of the invention may be implemented as computer-executable instructions, such as routines executed by a general-purpose computer, e.g., a server computer, wireless device or personal computer. Those skilled in the relevant art will appreciate that aspects of the invention can be practiced with other communications, data processing, or computer system configurations, including: Internet appliances, hand-held devices (including personal digital assistants (PDAs)), wearable computers, all manner of cellular or mobile phones, multi-processor systems, microprocessor-based or programmable consumer electronics, set-top boxes, network PCs, mini-computers, mainframe computers, and the like. Indeed, the term "computer" refers to any of the above devices and systems, as well as any data processor.

[0045] Aspects of the invention can be embodied in a special purpose computer or data processor that is specifically programmed, configured, or constructed to perform one or more of the processes explained in detail herein. Aspects of the invention can also be practiced in distributed computing environments where tasks or modules are performed by remote processing devices, which are linked through a communications network, such as a Local Area Network (LAN), Wide Area Network (WAN), or the Internet. In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

[0046] Aspects of the invention may be stored or distributed on computer-readable media, including magnetically or optically readable computer discs, hard-wired or preprogrammed chips (e.g., EEPROM semiconductor chips), nanotechnology memory, biological memory, or other data storage media. Indeed, computer implemented instructions, data structures, screen displays, and other data under aspects of the invention may be distributed over the Internet or over other networks (including wireless networks), on a propagated signal on a propagation medium (e.g., an electromagnetic wave(s), a sound wave, etc.) over a period of time, or they may be provided on any analog or digital network (packet switched, circuit switched, or other scheme). Those skilled in the relevant art will recognize that portions of the invention reside on a server computer, while corresponding portions reside on a client computer such as a mobile or portable device, and thus, while certain hardware platforms are described herein, aspects of the invention are equally applicable to nodes on a network.

[0047] The above detailed description of the embodiments of the invention is not intended to be exhaustive or to limit the invention to the precise form disclosed above. While specific embodiments of, and examples for, the invention are described above for illustrative purposes, various equivalent modifications are possible within the scope of the invention, as those skilled in the relevant art will recognize. For example, while processes are presented in a given order, alternative embodiments may perform routines having steps in a different order, and some processes may be deleted, moved, added, subdivided, combined, and/or modified. Each of these processes may be implemented in a variety of different ways.

[0048] The teachings provided herein can be applied to other systems, not necessarily the system described herein. The elements and acts of the various embodiments described above can be combined to provide further embodiments. All of the above patents and applications and other references, including any that may be listed in accompanying filing papers, are incorporated herein by reference. Aspects of the invention can be modified, if necessary, to employ the systems, functions, and concepts of the various references described above to provide yet further embodiments of the invention.

[0049] Particular terminology used when describing certain features or aspects of the invention should not be taken to imply that the terminology is being redefined

herein to be restricted to any specific characteristics, features, or aspects of the invention with which that terminology is associated. In general, the terms used in the following claims should not be construed to limit the invention to the specific embodiments disclosed in the specification, unless the above Detailed Description section explicitly defines such terms. Accordingly, the actual scope of the invention encompasses not only the disclosed embodiments, but also all equivalent ways of practicing or implementing the invention.

[0050] The above detailed description of the embodiments of the invention is not intended to be exhaustive or to limit the invention to the precise form disclosed above or to the particular field of usage mentioned in this disclosure. While specific embodiments of, and examples for, the invention are described above for illustrative purposes, various equivalent modifications are possible within the scope of the invention, as those skilled in the relevant art will recognize. Also, the teachings of the invention provided herein can be applied to other systems, not necessarily the system described above. The elements and acts of the various embodiments described above can be combined to provide further embodiments.

[0051] All of the above patents and applications and other references, including any that may be listed in accompanying filing papers, and the PCT Application entitled "Methods and Apparatus for Communication with Time-Division Duplexing," filed April 29, 2005, assigned to Waltical Solutions, (Attorney Docket No. 42938-8011) are incorporated herein by reference. Aspects of the invention can be modified, if necessary, to employ the systems, functions, and concepts of the various references described above to provide yet further embodiments of the invention.

[0052] Changes can be made to the invention in light of the above "Detailed Description." While the above description details certain embodiments of the invention and describes the best mode contemplated, no matter how detailed the above appears in text, the invention can be practiced in many ways. Therefore, implementation details may vary considerably while still being encompassed by the invention disclosed herein. As noted above, particular terminology used when describing certain features or aspects of the invention should not be taken to imply that the terminology is being redefined herein to be restricted to any specific

characteristics, features, or aspects of the invention with which that terminology is associated.

[0053] In general, the terms used in the following claims should not be construed to limit the invention to the specific embodiments disclosed in the specification, unless the above Detailed Description section explicitly defines such terms. Accordingly, the actual scope of the invention encompasses not only the disclosed embodiments, but also all equivalent ways of practicing or implementing the invention under the claims.

[0054] While certain aspects of the invention are presented below in certain claim forms, the inventors contemplate the various aspects of the invention in any number of claim forms. Accordingly, the inventors reserve the right to add additional claims after filing the application to pursue such additional claim forms for other aspects of the invention.

CLAIMS

We claim:

1. In a variable bandwidth wireless communication system capable of communicating under multiple different communication schemes that each have a different bandwidth, a process of generating an information bearing signal for wireless transmission, the process comprising:

utilizing a specified number of subcarriers to construct a channel with a particular bandwidth;

utilizing subchannels that include groups of subcarriers;

providing a fixed time-domain signal structure, including symbol length;

maintaining a substantially constant ratio between a sampling frequency and a size of FFT (Fast Fourier Transform) and IFFT (Inverse Fast Fourier Transform) or a fixed spacing between adjacent subcarriers;

adding or subtracting some of the subcarriers or subchannels to scale the channel and achieve a required bandwidth; and

wherein a core-band, substantially centered at an operating center frequency of the different communication schemes, is utilized for radio control and operation signaling, where the core-band is substantially not wider than a smallest possible operating channel bandwidth of the system.

2. The process of claim 1, wherein the wireless signal is:

transmitted by a mobile station in a multi-cell, multi-base-station environment;

a multi-carrier code division multiple access (MC-CDMA) or an orthogonal frequency division multiple access (OFDMA); and

utilized with downlink, uplink, or both, where a duplexing technique is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

3. The process of claim 1, wherein the wireless signal has a primary preamble sufficient for basic radio operation, and wherein:

the primary preamble is a direct sequence in the time domain with a frequency content confined within the core-band or is an OFDM symbol corresponding to a particular frequency pattern within the core-band; and

properties of the primary preamble comprise:

a large correlation peak with respect to sidelobes, in case of an autocorrelation;

a small cross-correlation coefficient with respect to power of other primary preambles, in case of a cross-correlation with other primary preambles; and

a small peak-to-average ratio; and

wherein a large number of primary preamble sequences exhibit such properties.

4. The process of claim 3, wherein an auxiliary preamble, occupying the side-band, is combined with the primary preamble to form a full-bandwidth preamble in either the time domain or the frequency domain, wherein the side-band is the difference between the core-band and an operating bandwidth, and wherein:

the auxiliary preamble is either a direct sequence in the time domain with a frequency response confined within the side-band, or is an OFDM symbol corresponding to a particular frequency pattern within the side-band;

the full-bandwidth preamble allows a base station to broadcast the full-bandwidth preamble and a mobile station to use the primary preamble of the full-bandwidth preamble to access the base station; and

properties of the full-bandwidth preamble sequence comprise:

a large correlation peak with respect to sidelobes, in case of an autocorrelation;

a large ratio between the correlation peak and sidelobes, in case of a correlation with the primary preamble of the full-bandwidth preamble.

a small cross-correlation coefficient with respect to power of other full-bandwidth preamble sequences, in case of cross-correlation with other full-bandwidth preambles

a small cross-correlation coefficient with respect to the power of the full-bandwidth preamble, in case of cross-correlation with a primary preamble different from the primary preamble of the full-bandwidth preamble;

a small peak-to-average ratio; and

wherein a large number of full-bandwidth preamble sequences exhibit such properties.

5. The process of claim 1, wherein for a wide range of system bandwidths the bandwidth range is divided into smaller ranges, where the lowest range of bandwidth is a fundamental range and other ranges are higher ranges, and wherein in a higher range:

the sampling frequency is a multiple of the sampling frequency of the fundamental range and the corresponding FFT length is multiplied by a substantially same factor as the sampling frequency is multiplied by, to maintain time duration of the OFDM symbol structure;

the FFT length is maintained and the OFDM symbol duration is shortened accordingly; or

the FFT length is increased and the OFDM symbol duration is shortened accordingly; and

wherein the width of the core-band is less than or equal to a smallest bandwidth in the fundamental range.

6. In a variable bandwidth communication network of base stations and mobile stations, wherein a signal utilizes subchannels that include groups of

subcarriers, a method of adjusting a mobile station bandwidth to an operating bandwidth of a base station, the method comprising:

maintaining a fixed time-domain signal structure;

maintaining a substantially constant ratio between a sampling frequency and a size of FFT (Fast Fourier Transform);

adjusting a number of subcarriers or subchannels to scale a channel and attain a desired bandwidth;

utilizing a core-band, substantially centered at an operating center frequency, for radio control and operation signaling, wherein the core-band is not wider than a smallest possible operating channel bandwidth of the network; and

a configuration wherein the mobile station, upon entering an area, scans spectral bands of different center frequencies and upon detecting a signal in a spectral band of a center frequency:

determines the operating channel bandwidth by a center-frequency-to-bandwidth-mapping; or

decodes the bandwidth information provided to the mobile station via downlink signaling.

7. The method of claim 6, wherein the center-frequency-to-bandwidth-mapping employs a table look-up and the information provided to the mobile station via downlink signaling is in a broadcasting channel or preamble and is transmitted within the core-band.

8. The method of claim 6, wherein the signal is a multi-carrier code division multiple access (MC-CDMA) or an orthogonal frequency division multiple access (OFDMA), and the signal is utilized with downlink, uplink, or both, where a duplexing technique is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

9. The method of claim 6, wherein the signal has:

a primary preamble, sufficient for basic radio operation, which is a direct sequence in the time domain with a frequency content confined

within the core-band or is an OFDM symbol corresponding to a particular frequency pattern within the core-band; and

an auxiliary preamble which occupies side-bands and is combined with the primary preamble to form a full-bandwidth preamble, and wherein the auxiliary preamble is either a direct sequence in the time domain with a frequency response confined within side-bands or is an OFDM symbol corresponding to a particular frequency pattern within side-bands, where the side-bands are the difference between the core-band and the operating bandwidth.

10. The method of claim 6, wherein for a wide range of operating bandwidths the bandwidth range is divided into smaller ranges, where the lowest range of bandwidth is a fundamental range and other ranges are higher ranges, and wherein in a higher range:

the sampling frequency is a multiple of the sampling frequency of the fundamental range and the corresponding FFT size is multiplied by a substantially same factor as the sampling frequency has been multiplied by, to maintain time duration of the OFDM symbol structure;

the FFT size is maintained and the OFDM symbol duration is shortened accordingly; or

the FFT size is increased and the OFDM symbol duration is shortened accordingly; and

wherein the width of the core-band is less than or equal to a smallest bandwidth in the fundamental range.

11. In a variable bandwidth communication network wherein a communication signal utilizes subchannels that are composed of groups of subcarriers, a mobile transceiver with an adaptable bandwidth, the transceiver comprising:

an analog-to-digital converter for signal sampling;

a Fast Fourier Transform and Inverse Fast Fourier Transform processor (FFT/IFFT), wherein a substantially constant ratio is maintained between a sampling frequency and a size of the FFT/IFFT;

a scanner for scanning spectral bands of specified center frequencies, upon entering an area, to find a signal and to determine an operating channel bandwidth;

a facility for sustaining a core-band for pertinent communications, wherein the core-band is not wider than smallest possible operating channel bandwidth of the network; and

a facility for adding to the subcarriers to widen the channel bandwidth for remainder of the communication.

12. The transceiver of claim 11, wherein the center-frequency-to-bandwidth-mapping employs a table look-up and the information provided to the mobile transceiver as downlink information is in a broadcasting channel or preamble.

13. The transceiver of claim 11, wherein the signal is a multi-carrier code division multiple access (MC-CDMA) or an orthogonal frequency division multiple access (OFDMA), and the signal is utilized with downlink, uplink, or both, where a duplexing technique is either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD).

14. The transceiver of claim 11, wherein for a wide range of operating bandwidths the bandwidth range is divided into smaller ranges, where the lowest range of bandwidth is a fundamental range and other ranges are higher ranges, and wherein in a higher range:

the sampling frequency is a multiple of the sampling frequency of the fundamental range and the corresponding FFT/IFFT size is multiplied by a substantially same factor as the sampling frequency is multiplied by, to maintain time duration of the OFDM symbol structure;

the FFT/IFFT size is maintained and the OFDM symbol duration is shortened accordingly; or

the FFT/IFFT size is increased and the OFDM symbol duration is shortened accordingly; and

wherein the width of the core-band is less than or equal to a smallest bandwidth in the fundamental range.

15. The transceiver of claim 11, wherein the transceiver is a mobile station and the communication network is a wireless network of base stations and mobile stations.

16. The transceiver of claim 11, wherein the signal has:

an essential preamble, sufficient for basic radio operation, which is a direct sequence in the time domain with a frequency content confined within the core-band or is an OFDM symbol corresponding to a particular frequency pattern within the core-band; and

an auxiliary preamble which occupies side-bands and is combined with the essential preamble to form a full-bandwidth preamble, and wherein the auxiliary preamble is either a direct sequence in the time domain with a frequency response confined within side-bands or is an OFDM symbol corresponding to a particular frequency pattern within side-bands, where the side-bands are the difference between the core-band and the operating bandwidth.

17. The transceiver of claim 11, wherein the transceiver uses the core-band during an initial communication stage and the operating bandwidth during normal operation, and wherein upon entering into an area, the mobile transceiver starts with the core-band and switches to the operating bandwidth for additional data and radio control subchannels.

18. An apparatus for use in a communication system, the apparatus comprising:

a mobile station with an FFT (Fast Fourier Transform) facility configured to:

divide a wide range of operating bandwidths into smaller bandwidth ranges, wherein a width of a predetermined band for basic system information communication is less than or substantially equal to the smallest operating bandwidth of any of the bandwidth range, and wherein in a bandwidth range:

a sampling frequency is a multiple of a sampling frequency of the lowest bandwidth range and the FFT is sized corresponding to the sampling frequency, to maintain time duration of an OFDM symbol structure;

the FFT size is maintained and the OFDM symbol duration is shortened accordingly; or

the FFT size is increased and the OFDM symbol duration is shortened accordingly;

scan spectral bands, when entering an area, to determine the operating bandwidth upon detecting a signal in a spectral band; and

switch to the operating bandwidth by adding subcarriers to transmitting signals, wherein a specified number of subcarriers form a channel with a particular bandwidth.

19. The system of claim 18, wherein determining the operating bandwidth is by table look-up or down-link signaling.

20. In a variable bandwidth communication network of base stations and mobile stations, wherein a signal utilizes subchannels that include groups of subcarriers, a means for adjusting a mobile station bandwidth to an operating bandwidth of a base station, the means comprising:

means for maintaining a fixed time-domain signal structure;

means for maintaining a substantially constant ratio between a sampling frequency and a size of FFT (Fast Fourier Transform);

means for adjusting the number of subcarriers or subchannels to scale the channel and attain a desired bandwidth;

means for utilizing a core-band, substantially centered at an operating center frequency, for essential communications, wherein the core-band is not wider than smallest possible operating channel bandwidth of the network; and

means for scanning spectral bands of different center frequencies, detecting a signal in a spectral band of a center frequency, and determining the operating channel bandwidth of an area.

21. In an adaptive variable bandwidth wireless communication system capable of communicating under multiple different communication schemes that each have a different bandwidth, a signal for wireless transmission, the signal comprising:

subcarriers, wherein a specified number of subcarriers constitute a channel with a particular bandwidth;

a fixed time-domain signal structure;

a core-band utilized for radio control and operation signaling, where the core-band is substantially not wider than a smallest possible operating channel bandwidth of the system; and

a configuration wherein:

a substantially constant ratio between a sampling frequency and a size of FFT (Fast Fourier Transform) and IFFT (Inverse Fast Fourier Transform) of the signal or a fixed spacing between adjacent subcarriers is maintained; and

at least some of the subcarriers are added or subtracted to scale the channel and achieve a required bandwidth.

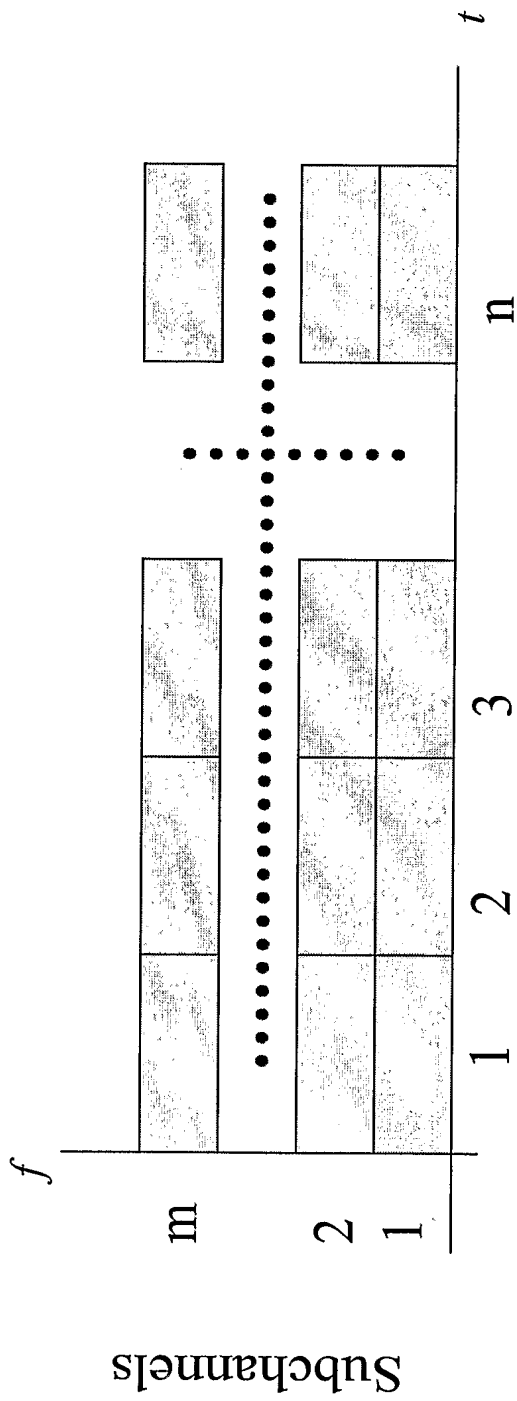
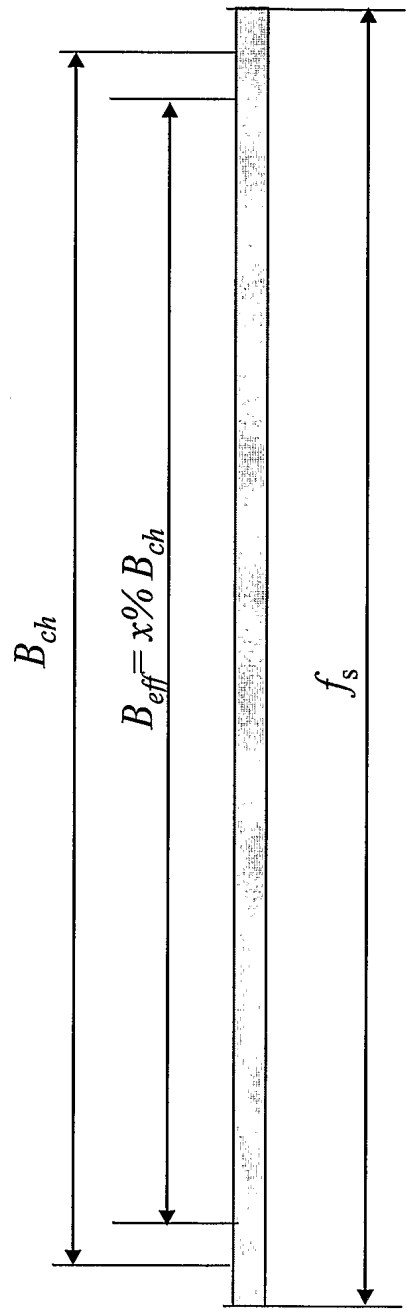


FIG. 1



$$\#\text{ of usable subcarriers} = \frac{B_{eff}}{f_s} \times N_{fft}$$

FIG. 2

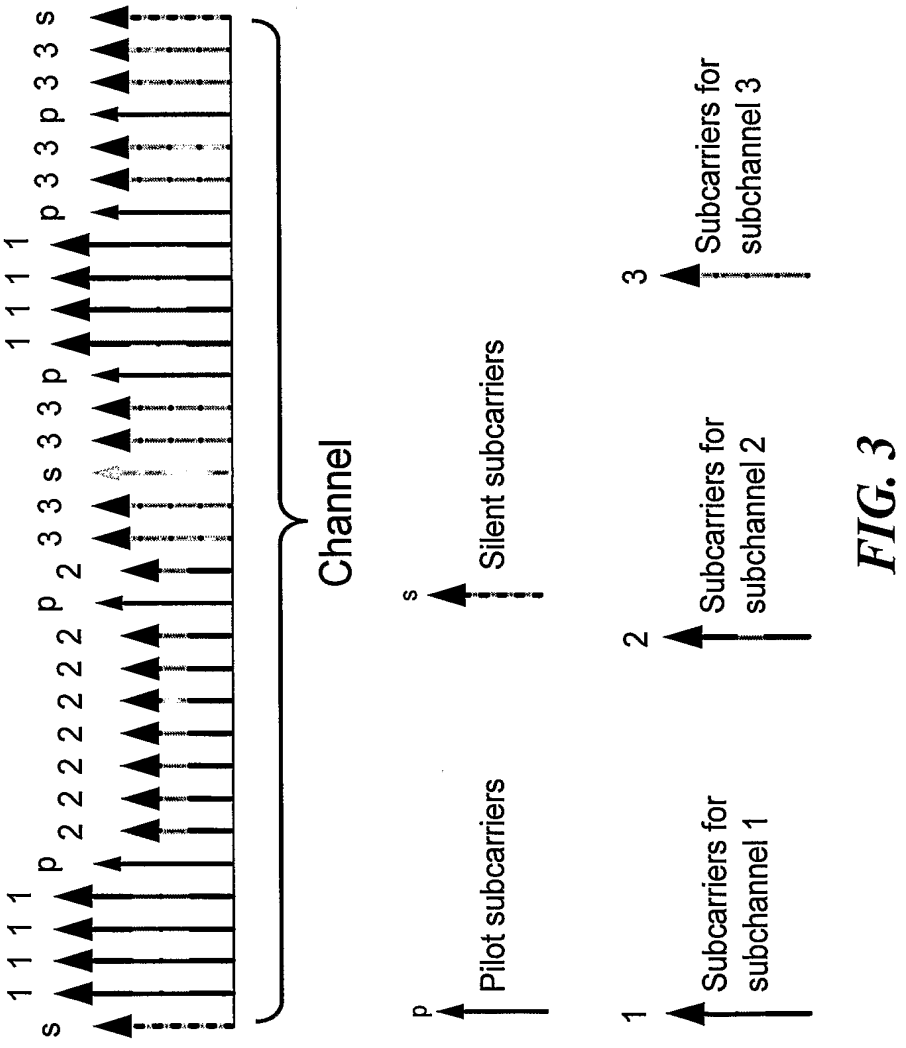

s 1 1 1 1 p 2 2 2 2 2 2 2 2 p 3 3 s 3 3 p 1 1 1 1 p 3 3 p 3 3 s
Channel
p
Pilot subcarriers
s
Silent subcarriers
1
Subcarriers for subchannel 1
2
Subcarriers for subchannel 2
3
Subcarriers for subchannel 3

FIG. 3

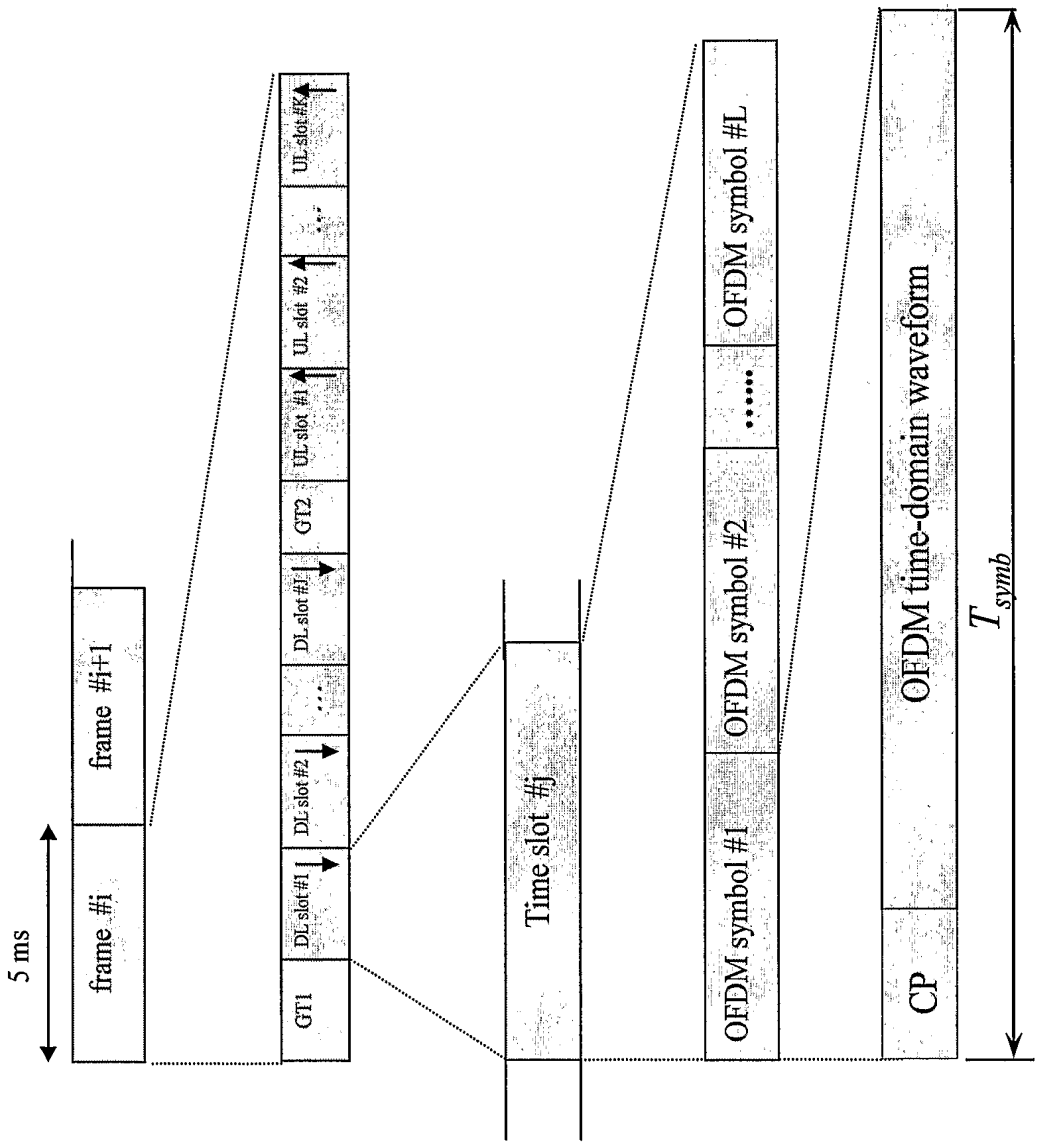

5 ms
frame #i
frame #i+1
GT1
DL slot #1
DL slot #2
DL slot #J
GT2
UL slot #1
UL slot #2
UL slot #K
Time slot #j
OFDM symbol #1
OFDM symbol #2
OFDM symbol #L
CP
OFDM time-domain waveform
T_{symb}

FIG. 4

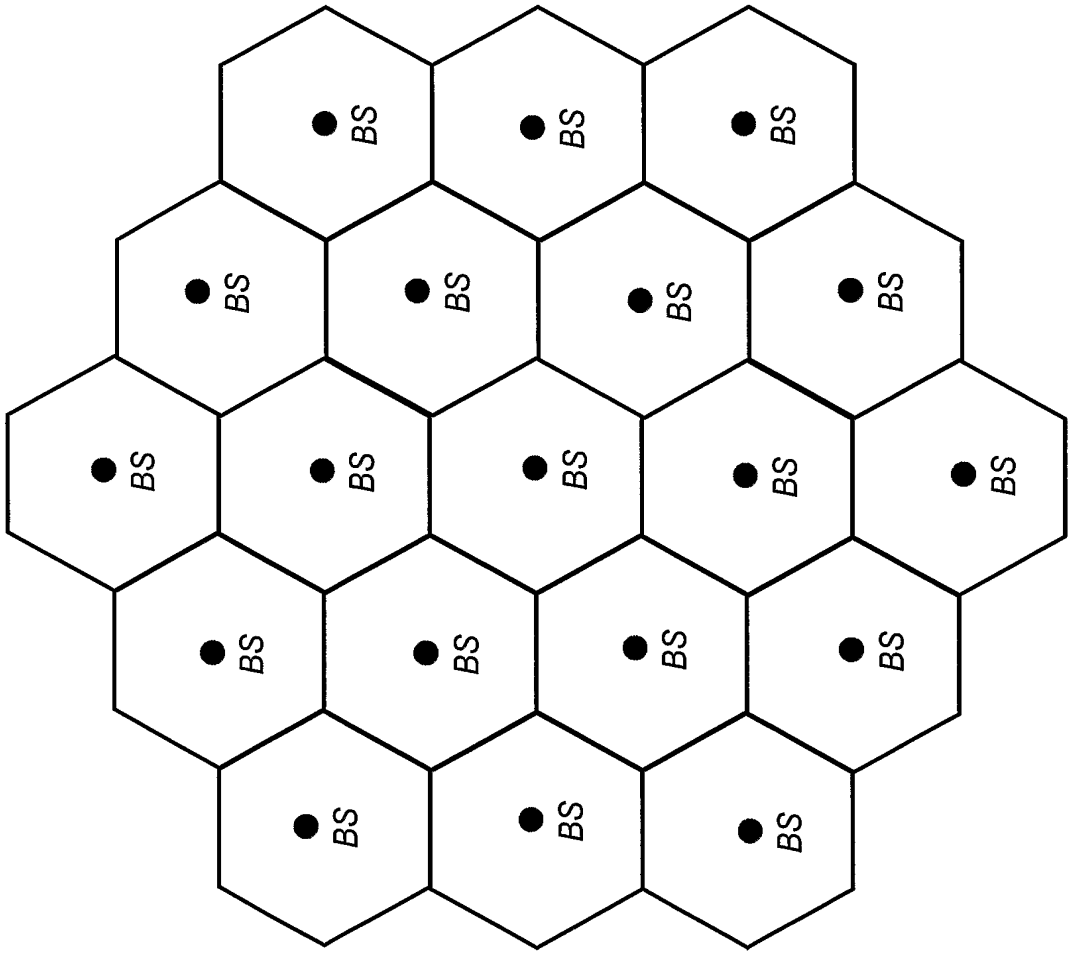


FIG. 5

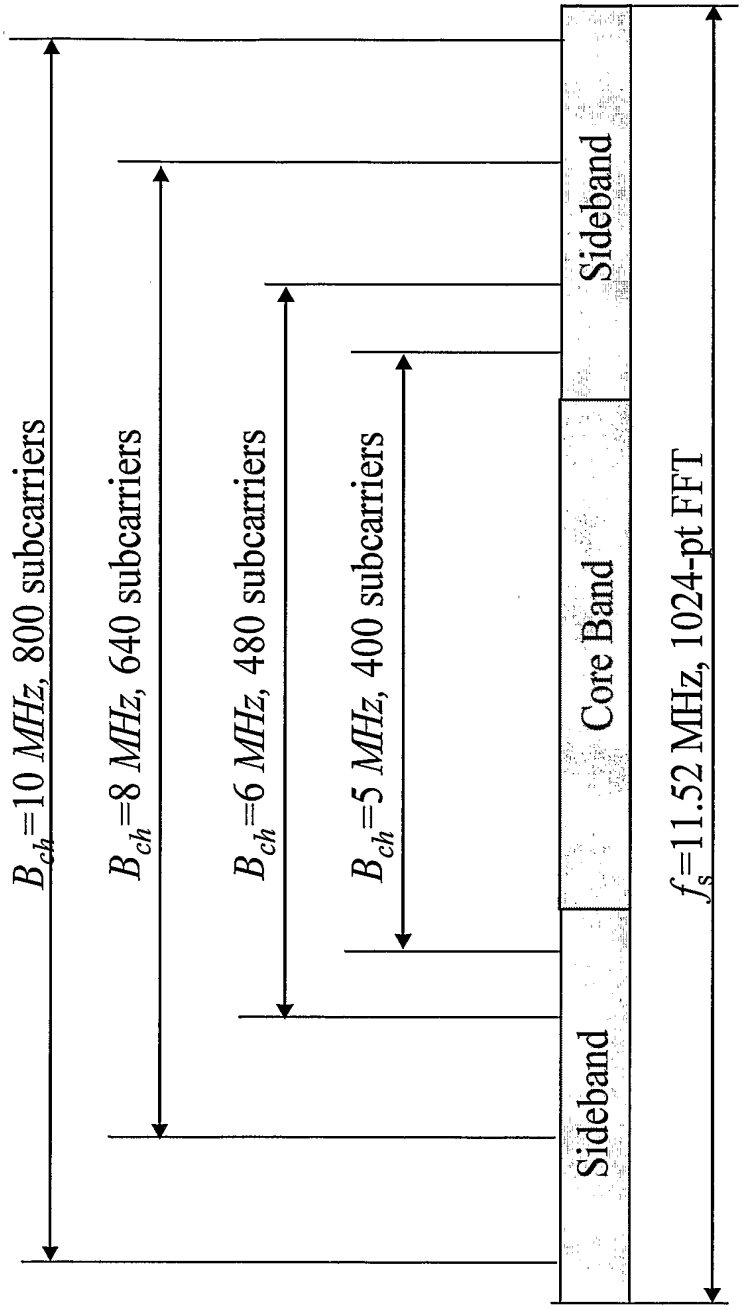

B_{ch}=10 MHz, 800 subcarriers
B_{ch}=8 MHz, 640 subcarriers
B_{ch}=6 MHz, 480 subcarriers
B_{ch}=5 MHz, 400 subcarriers
Sideband
Core Band
Sideband
f_s=11.52 MHz, 1024-pt FFT
B_{eff}= 90% B_{ch}

FIG. 6


CP
OFDM time-domain waveform
---- Time-domain windowing function

FIG. 7

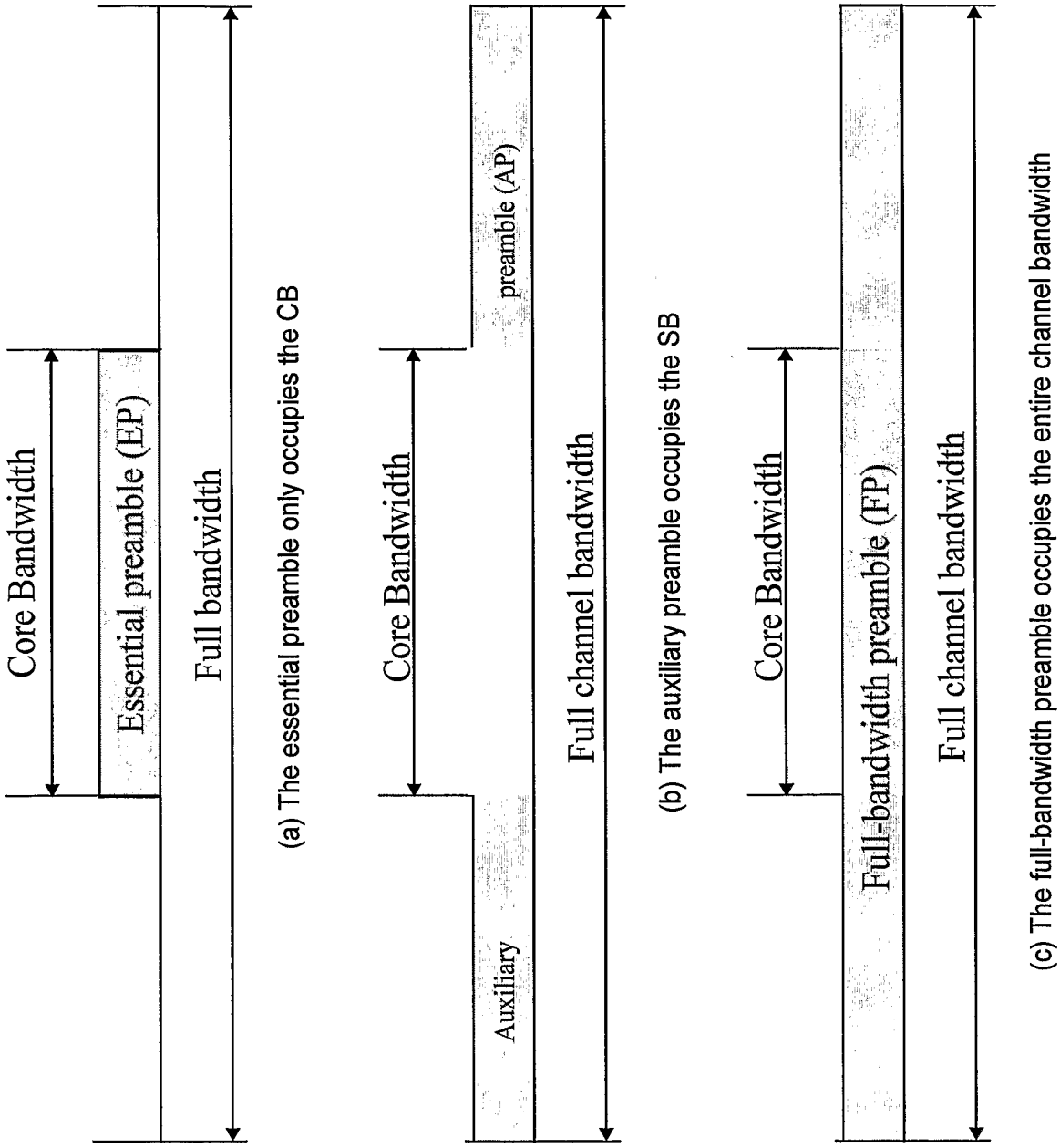

Core Bandwidth
Essential preamble (EP)
Full bandwidth
(a) The essential preamble only occupies the CB
Core Bandwidth
Auxiliary
preamble (AP)
Full channel bandwidth
(b) The auxiliary preamble occupies the SB
Core Bandwidth
Full-bandwidth preamble (FP)
Full channel bandwidth
(c) The full-bandwidth preamble occupies the entire channel bandwidth

FIG. 8

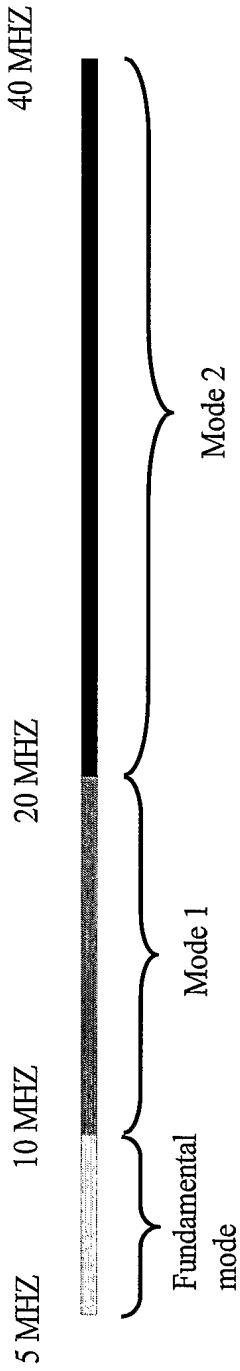


FIG. 9

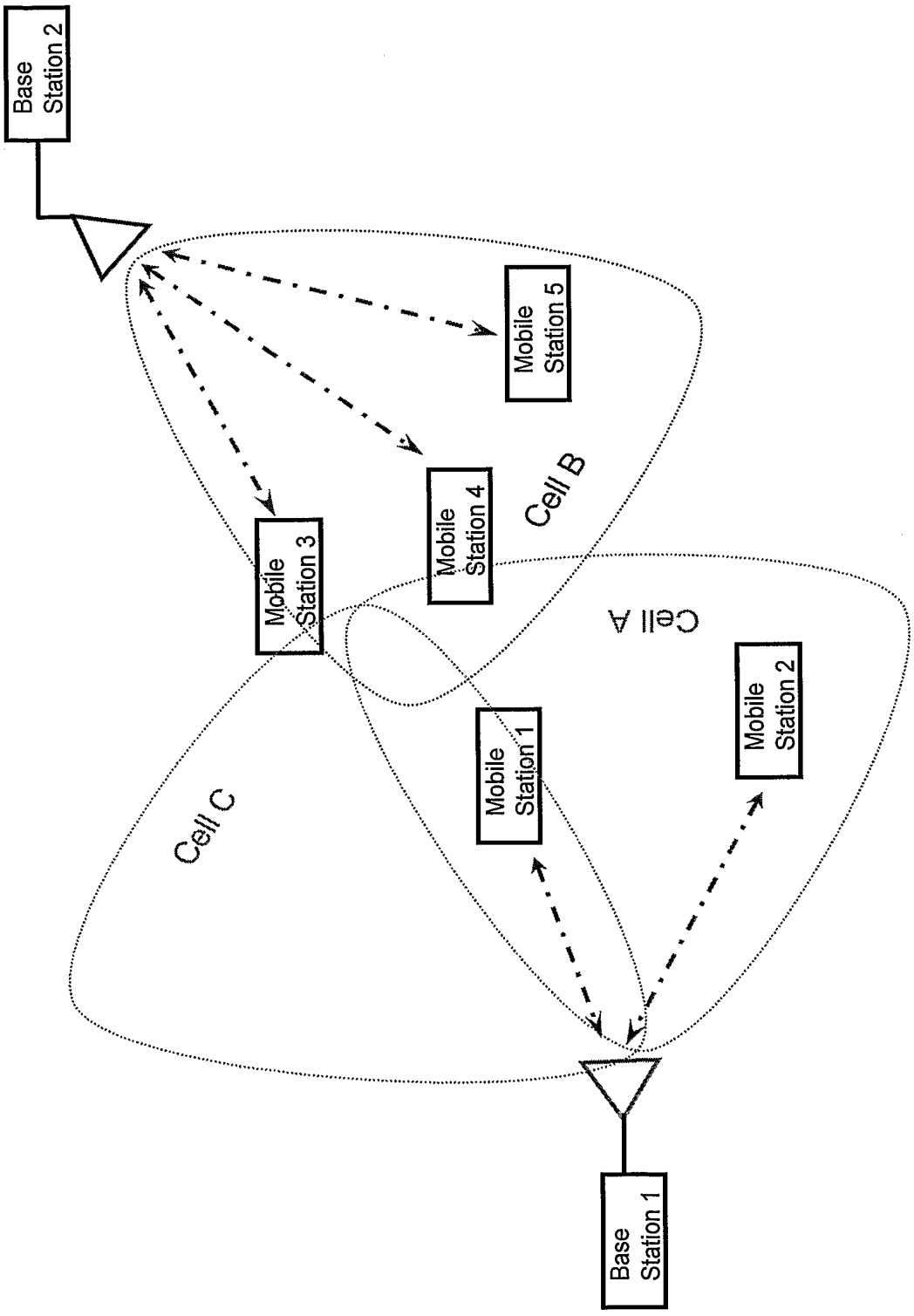

Base Station 2
Mobile Station 5
Mobile Station 4
Mobile Station 3
Cell B
Cell A
Cell C
Mobile Station 1
Mobile Station 2
Base Station 1

FIG. 10

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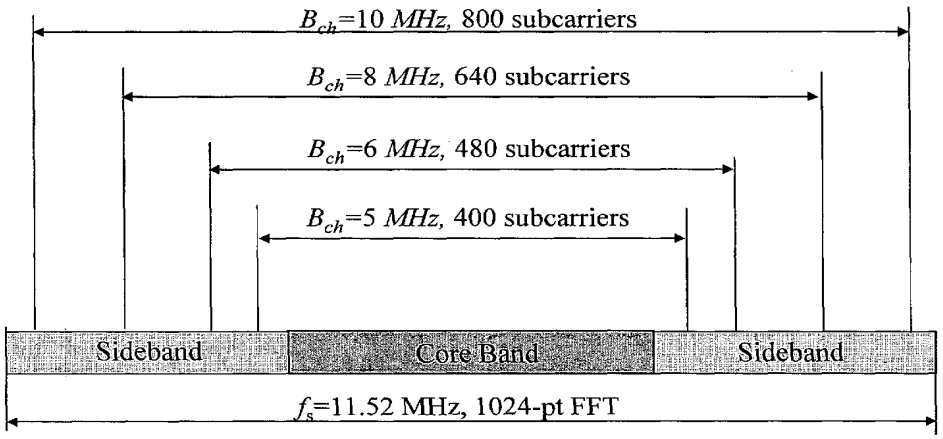

$$B_{eff} = 90\% B_{ch}$$

(57) Abstract: Methods and apparatus for multi-carrier communication with variable channel bandwidth are disclosed, where the time frame structure and the OFDM symbol structure are invariant and the frequency-domain signal structure is flexible. In one embodiment, a mobile station, upon entering a geographic area, uses a core-band to initiate communication and obtain essential information and subsequently switches to full operating bandwidth of the area for the remainder of the communication. If the mobile station operates in a wide range of bandwidths, the mobile station divides the full range into sub-ranges and adjusts its sampling frequency and its FFT size in each sub-range.

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Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Xiaodong	Li	Kirkland, WA

Additional inventors are being named on the 2nd page *separately numbered sheets attached hereto*

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Methods and Apparatus for Multi-carrier Communications with Variable Channel Bandwidth

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☑ Specification *Number of Pages* 8 ☐ CD(s), Number _____

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☐ Application Data Sheet. See 37 CFR 1.76

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[Page 1 of 2]

Respectfully submitted,

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Date 4/30/2004

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Kemin	Li	Bellevue, WA
Haiming	Huang	Bellevue, WA

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Methods and Apparatus for Multi-Carrier Communications with Variable Channel Bandwidth

Xiaodong Li, Titus Lo, Kemin Li, and Haiming Huang

1 Background of the Invention

A broadband wireless communication device should be able to roam from one geographic region to another over the world. However, wireless communication spectra are heavily regulated and controlled by individual countries or regional authorities. It is inevitable that each country or region will have its own spectral band for broadband wireless communications that is different in frequency and bandwidth from others. Furthermore, even within a country or region, a wireless operator may own and operate on a broadband spectrum that is different in frequency and bandwidth from other operators. The difference in bandwidth presents a unique challenge in designing a broadband wireless communication system with flexibility that works for different bandwidths.

One of the advantages of a multi-carrier communication system is that it can be designed with a certain degree of flexibility. In a multi-carrier communication system such as multi-carrier code division multiple access (MC-CDMA) and orthogonal frequency division multiple access (OFDMA), information data are multiplexed on subcarriers that are mutually orthogonal in the frequency domain. The design flexibility lies in the manipulablility of the parameters, such as the number of subcarriers and the sampling frequency. For example, by using a different sampling frequency a DVB-T device is capable of receiving signals broadcasted from a DVB-T station that is operating on a 6-, 7-, or 8-MHz bandwidth.

The present invention is intended to provide a practical and feasible solution for multi-carrier communication with variable channel bandwidth.

2 Summary of the Invention

This invention describes the methods and apparatus for multi-carrier communication with variable channel bandwidth. The multi-carrier system mentioned in this invention can be of any special formats such as Orthogonal Frequency Division Multiplexing (OFDM), Orthogonal Frequency Division Multiple Access (OFDMA), or Multi-Carrier Code Division Multiple Access (MC-CDMA). The invention can be applied to either Time Division Duplexing (TDD) or Frequency Division Duplexing (FDD). Without lost of generality, OFDMA is taken as an example to illustrate the present invention.

In accordance with aspects of certain embodiments of the variable bandwidth OFDMA (VB-OFDMA) system, the time frame structure and the OFDM symbol structure of the communication interface is maintained the same for different channel bandwidth. The variable channel bandwidth is realized by adjusting the number of usable subcarriers.

In accordance with yet other embodiments of the VB-OFDMA system, a core band (CB) is defined and reserved for the primary state of radio operation, where critical, essential, and important radio control signals, along with some data, are transmitted within the CB. The full-bandwidth is used for normal radio operation.

In accordance with aspects of the VB-OFDM system, automatic bandwidth recognition (ABR) enables a receiver to automatically recognize the operating bandwidth when it enters in to an operating environment or service area of a particular frequency and channel bandwidth.

In accordance with other embodiments of the VB-OFDMA system, preambles are constructed either using a direct sequence in the time domain or using an OFDM symbol which corresponds to a particular pattern in the frequency domain. The preambles occupy either the entire band or only the core band.

In accordance with yet other embodiments of the VB-OFDMA system, multi-modes are devised to handle an exceptionally wide range of variation in bandwidth.

3 Brief Description of the Drawings

The present invention will be thoroughly understood from the detailed description given below and from the accompanying drawings of various embodiments of the invention, which, however, should not be taken to limit the invention to the specific embodiments, but are for explanation and understanding only.

Figure 1: The radio resource is divided into small units in both the frequency and time domains: subchannels and time slots. Subchannels are formed by subcarriers. The basic structure of a multi-carrier signal in the time domain is made up of time slots.

Figure 2: The relationship is shown between the sampling frequency, the channel bandwidth, and the usable subcarriers. For a given bandwidth of a spectral band or channel (B_{ch}), the number of usable subcarriers is finite and limited, whose value depends on the size of the FFT and the sampling frequency (f_s).

Figure 3: The basic structure of a multi-carrier signal in the frequency domain is made up of subcarriers. Data subcarriers can be grouped into subchannels in a particular way. Each subchannel may be set at a different power level.

Figure 4: The basic structure of a multi-carrier signal in the time domain is generally made up of time frames, time slots, and OFDM symbols. A frame consists of a number of time slots, whereas each time slot is comprised of one or more OFDM symbols. The OFDM

time domain waveform is generated by applying the inverse-fast-Fourier-transform (IFFT) to the OFDM signals in the frequency domain. A copy of the last portion of the time waveform, known as the cyclic prefix (CP), is inserted at the beginning of the waveform itself to form the OFDM symbol.

Figure 5: A cellular wireless network is comprised of a plurality of cells, in each of which the coverage is provided by a base station (BS). Within each coverage area, there are distributed mobile stations. A base station is connected to the backbone of the network via a dedicated link and also provides radio links to the mobile stations within its coverage.

Figure 6: The variable channel bandwidth is realized by adjusting the number of usable subcarriers, whose spacing is set constant. In this realization, a particular number of usable subcarriers constitute a channel with a certain bandwidth. The width of the core band is less than the smallest channel bandwidth.

Figure 7: A time-domain windowing function can be applied to the OFDM symbols to shape the spectrum to conform to a given spectral mask. This process is independent of the operating bandwidth.

Figure 8: A preamble is designed to occupy either the entire operating bandwidth or only the core band.

Figure 9: The entire range (e.g., from 5 Mhz to 40 MHz) of bandwidth variation is divided into smaller trunks (e.g., 5-10 MHz, 10-20 MHz, 20-40 MHz, in sizes). Each trunk is handled in one particular mode. The mode for the lowest range of bandwidth is labeled as the fundamental mode and other modes are called higher modes (Mode 1, Mode 2, etc.).

4 Detailed Description

4.1 Multi-Carrier Signal Format

The physical media resource (e.g., radio or cable) in a multi-carrier communication system can be divided in both the frequency and time domains, as depicted in Figure 1. This canonical division provides a high flexibility and fine granularity for resource sharing.

The basic structure of a multi-carrier signal in the frequency domain is made up of subcarriers. For a given bandwidth of a spectral band or channel (B_{ch}), the number of usable subcarriers is finite and limited, whose value depends on the size of the FFT and the sampling frequency (f_s) and the effective bandwidth (B_{eff}), as depicted in Figure 2. There are three types of subcarriers, as illustrated in Figure 3.

1. Data subcarriers, which carries information data;

2. Pilot subcarriers, whose phases and amplitudes are predetermined and made known to all receivers and which are used for assisting system functions such as estimation of system parameters; and

3. Silent subcarriers, which have no energy and are used for guard bands and DC carrier.

The data subcarriers can be arranged into groups called subchannels to support scalability and multiple-access. The subcarriers forming one subchannel may or may not be adjacent to each other. Each user may use some or all of the subchannels. A subchannel formed by the contiguous subcarriers is called a congregated (or clustered) subchannel. A congregated subchannel may have a different power level from others.

The basic structure of a multi-carrier signal in the time domain is generally made up of time frames, time slots, and OFDM symbols, as depicted in Figure 4. A frame consists of a number of time slots, whereas each time slot is comprised of one or more OFDM symbols. The OFDM time domain waveform is generated by applying the inverse-fast-Fourier-transform (IFFT) to the OFDM signals in the frequency domain. A copy of the last portion of the time waveform, known as the cyclic prefix (CP), is inserted in the beginning of the waveform itself to form the OFDM symbol.

The downlink transmission in each frame begins with a downlink preamble, which can be the first one or more OFDM symbols in the first DL slot. The DL preamble is used a base station to broadcast signals for radio network information such as synchronization and cell identification.

Similarly, uplink transmission can begin with a uplink preamble, which can be the first one or more OFDM symbols in the first UL slot. The UL preamble is used by mobile stations to carry out the functions such as initial ranging during power up and handoff, periodic ranging, and bandwidth request, channel sounding to assist downlink scheduling or advanced antenna technologies, and other radio functions.

4.2 Cellular Wireless Networks

In a cellular wireless network, the geographical region to be serviced by the network is normally divided into smaller areas called cells. In each cell the coverage is provided by a base station. Thus, this type of structure is normally referred to as the cellular structure (Figure 5). Within each coverage area, there are located mobile stations to be used as an interface between the users and the network. A base station is connected to the backbone of the network, usually by a dedicated link. A base station also serves as a focal point to distribute information to and collect information from its mobile stations by radio signals.

In a wireless network, there are a number of base stations, each of which provides coverage to its designated area, normally called a cell. If a cell is divided in to sectors, from system engineering point of view each sector can be considered as a cell. In this context, the terms "cell" and "sector" are interchangeable.

4.3 Variable Bandwidth OFDMA

In accordance with aspects of certain embodiments of VB-OFDMA, the spacing between adjacent subcarriers is set constant and the variable channel bandwidth is realized by adjusting the number of usable subcarriers. In other words, the same OFDM symbol structure is used and the ratio between the sampling frequency and the number of FFT/IFFT is kept constant. In such a realization, a specific number of usable subcarriers constitute a channel of a certain bandwidth. For example, in Figure 6 is illustrated the signal structure in the frequency domain for a communication system with parameters specified in Table 1. The numbers of usable subcarriers are determined based on the assumption that effective bandwidth is 90% of the channel bandwidth.

Table 1 System parameters

Sampling freq.	11.52 MHz			
FFT size	1024 points			
Subcarrier spacing	11.25 kHz			
Channel bandwidth	10 MHz	8 MHz	6 MHz	5 MHz
# of usable subcarriers	800	640	480	400

In this realization, using the invariant OFDM symbol structure allows the use of the same design parameters for signal manipulation in the time-domain for a variable bandwidth. For example, in an embodiment depicted in Figure 7, a particular windowing design is employed to shape the spectrum to conform to a given spectral mask.

4.4 Radio Operation via Core Band

Radio control and operation signaling is realized through the use of a core band (CB). A core band, centered at the operating center frequency, is defined as the frequency segment that must be less than or equal to the smallest operating channel bandwidth among all the possible spectral bands that the receiver is designed to operate. For example, for a system that is intended to work at 5-, 6-, 8-, and 10-Mhz, the width of its CB can be set to be 4 MHz, as shown in Figure 6. The rest of the bandwidth is called sideband (SB).

In one embodiment, critical, essential, and important radio control signals such as preambles, ranging signals, bandwidth request, bandwidth allocation, etc. are transmitted within the CB. In addition to the essential control channels, a set of data channels and their related dedicated control channels are placed within the CB. This ensures the basic radio operation to be maintained with the use of the CB. Such a basic operation constitutes the primary state of operation. When entering into the network, a mobile station starts with the primary state and

transits to the normal full-bandwidth operation to include the sidebands for additional data and radio control channels.

In accordance with the embodiments of this invention, a preamble occupies only the CB, called the essential preamble (EP), as depicted in Figure 8. The EP alone will be necessary and sufficient for the basic radio operation. The EP can either be a direct sequence in the time domain with its frequency response confined within the CB, or be an OFDM symbol corresponding to a particular pattern in the frequency domain within the CB. In either case, the EP sequences must possess the following desired properties:

1. The autocorrelation of an EP sequence must exhibit a relatively large ratio between its correlation peak and sidelobe level.

2. The cross-correlation coefficient between two different EP sequences must be significantly small with respect to the power of the EP sequences.

3. The peak-to-average ratio of an EP sequence must be relatively small.

4. The number of EP sequences that exhibit the above three properties must be relatively large.

In an embodiment, the auxiliary preamble (AP), which occupies the SB, can be added (appended in the frequency domain or superimposed in the time domain) to the EP to form a full-bandwidth preamble (FP). The FP sequences must possess the following desired properties.

1. The autocorrelation of an FP sequence must exhibit a relatively large ratio between its correlation peak and sidelobe level.

2. The cross-correlation coefficient between two different FP sequences must be significantly small with respect to the power of the FP sequences.

3. The peak-to-average ratio of an FP sequence must be relatively small.

4. The number of FP sequences that exhibit the above three properties must be relatively large.

In yet another embodiment, the formation of an FP by adding an AP must allow the operation where a base station broadcasts the FP and a mobile station use its corresponding EP to access this base station. Consequently, The FP sequences must possess the following desired properties:

1. The correlation of an FP sequence and its corresponding EP must exhibit a relatively large ratio between its correlation peak and sidelobe level.

2. The cross-correlation coefficient between an FP sequence and any EP sequence other than its corresponding one must be significantly small with respect to its power.

3. The peak-to-average ratio of an FP sequence must be relatively small.

4. The number of FP sequences that exhibit the above three properties must be relatively large.

4.5 Automatic Bandwidth Recognition (ABR)

The VB-OFDMA receiver is capable of automatically recognizing the operating bandwidth when it enters in an operating environment or service area of a particular frequency and channel bandwidth. The bandwidth information can be disseminated in a variety of forms to enable ABR. A number of embodiments in accordance with the principles of the present invention are provided below.

4.5.1 Based on Center Frequency

In one embodiment, a mobile station, when entering in an environment or area that supports the VB operation or services, will scan the spectral bands of different center frequencies. If it detects the presence of a signal, by using envelope detection, received signal strength indicator (RSSI), or other detection methods, in a spectral band of a particular center frequency, it can determine the operating channel bandwidth by bandwidth-center frequency association such as table lookup. A table such as Table 2 is stored in the receiver. Based on the center frequency that it has detected, it looks up the value of the channel bandwidth from the table.

Table 2 Center frequency and its corresponding bandwidth

Center frequency	Channel Bandwidth
2.31 GHz	10 MHz
2.56 GHz	6 MHz
2.9 G	8 MHz

4.5.2 Based on Downlink Signaling

In another embodiment, the system provides the bandwidth information via the means of downlink signaling, such as using a broadcasting channel or a preamble. When entering into a VB network, the mobile stations will scan the spectral bands of different center frequencies, in which the receiver is designed to operate. It will decode the bandwidth information contained in the broadcasting channel or preamble.

4.6 Multi-Mode VB-OFDMA

In accordance with the principles of this invention, multi-modes are devised for a VB-OFDMA system to handle an exceptionally wide range of variation in channel bandwidth. The entire

range of variation in bandwidth is divided into smaller trunks (not necessarily in equal size), each of which will be dealt with in one particular mode, as depicted in Figure 9. The mode for the lowest range of bandwidth is labeled as the fundamental mode and other modes are called higher modes (Mode 1, Mode 2, ...). The sampling frequency of the higher modes is the multiples of that of the fundamental mode. In the higher modes, the FFT size can be multiplied in accordance with the sampling frequency, thereby maintaining the time duration of the OFDM symbol structure. For example, the parameters for a case of multi-mode design are given in Table 3, Alternatively, a higher mode can also be realized by maintaining the FFT size and shortening the OFDM symbol duration accordingly. Yet another higher-mode realization is to both increase the FFT size and shorten the symbol duration accordingly. The width of the CB in a multi-mode VB-OFDMA system must be less than or equal to the smallest bandwidth in the fundamental mode.

Table 3 System parameters

	Mode 1				Fundamental-Mode			
Sampling freq.	23.04 MHz				11.52 MHz			
FFT size	2048 points				1024 points			
Subcarrier spacing	11.25 kHz							
Channel bandwidth (MHz)	20	18	15	12	10	8	6	5
# of usable subcarriers	1600	1440	1200	960	800	680	480	400

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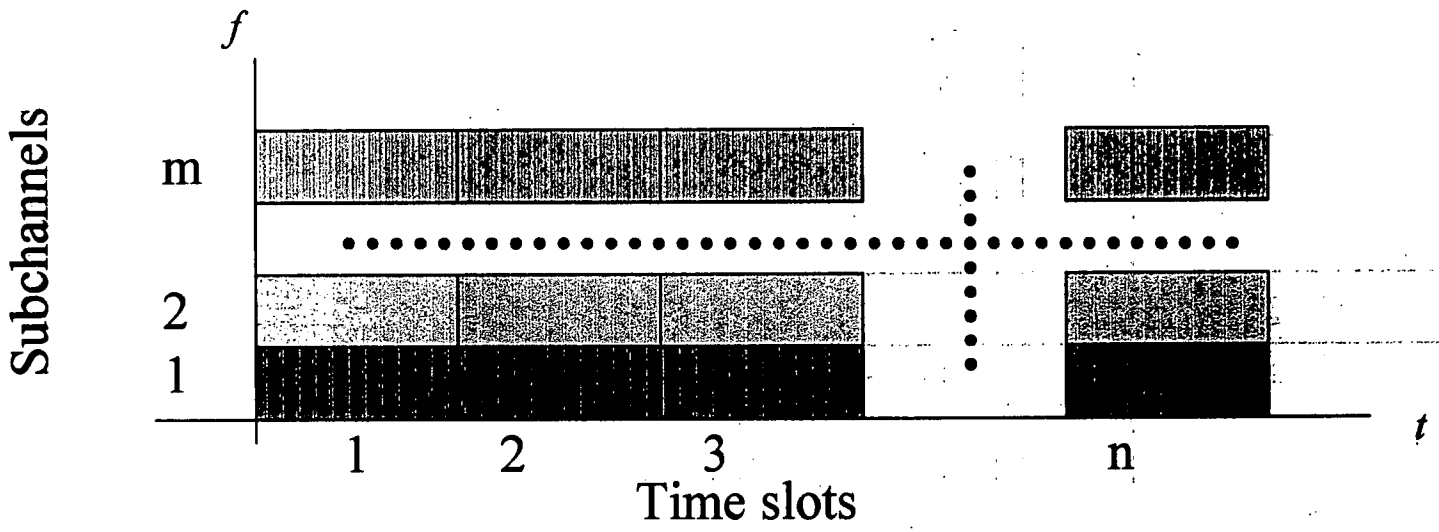
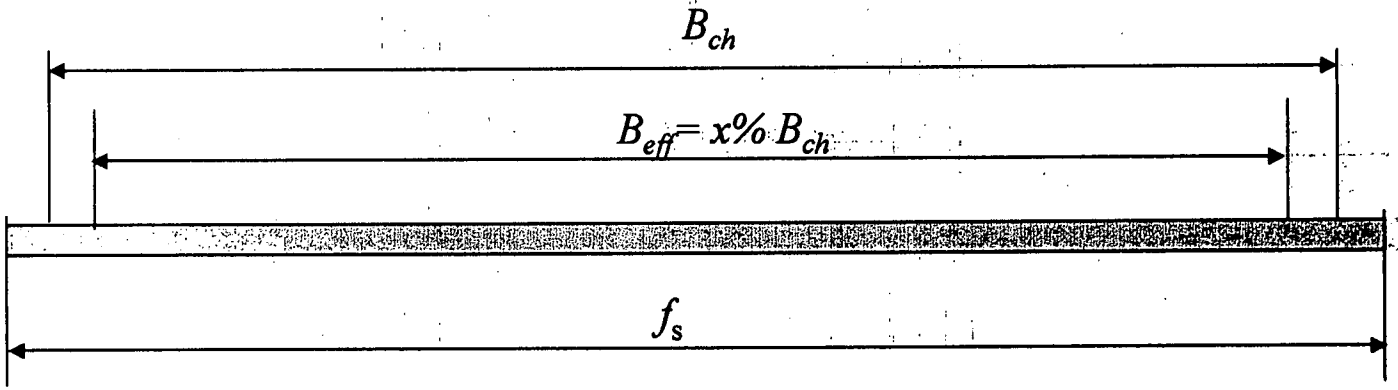


Figure 1



$$\#\ \text{of usable subcarriers} = \frac{B_{eff}}{f_s} \times N_{fft}$$

Figure 2

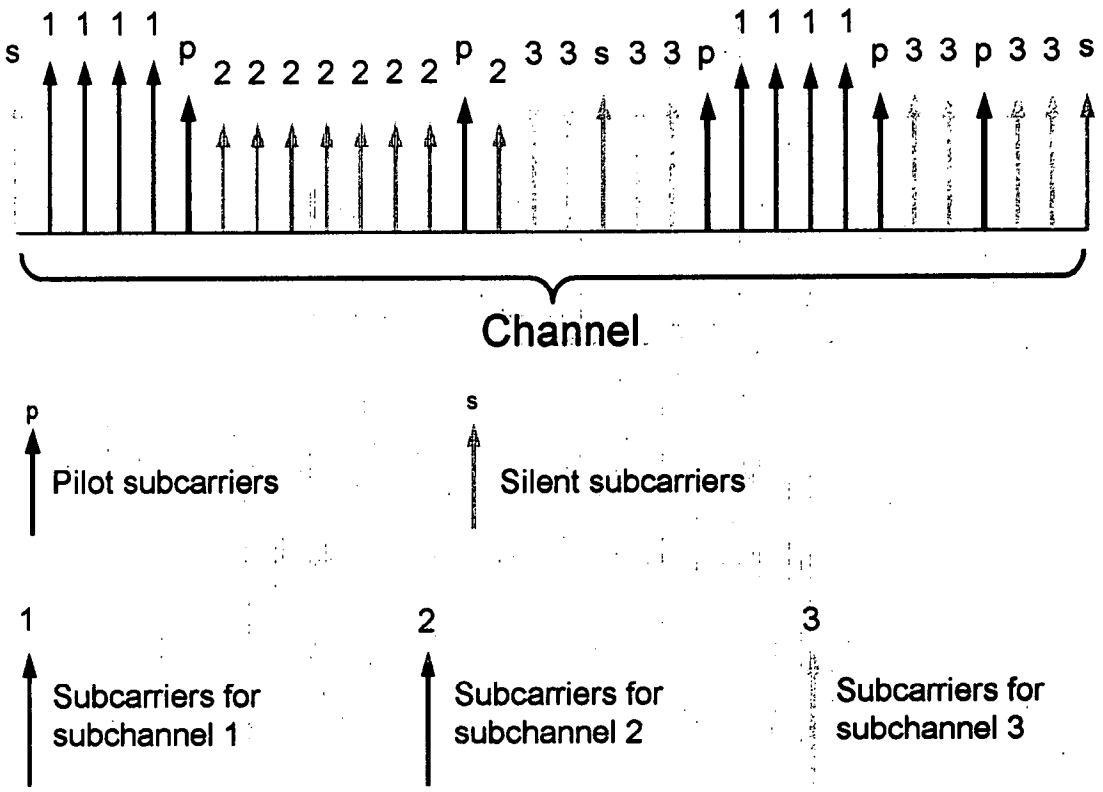


Figure 3

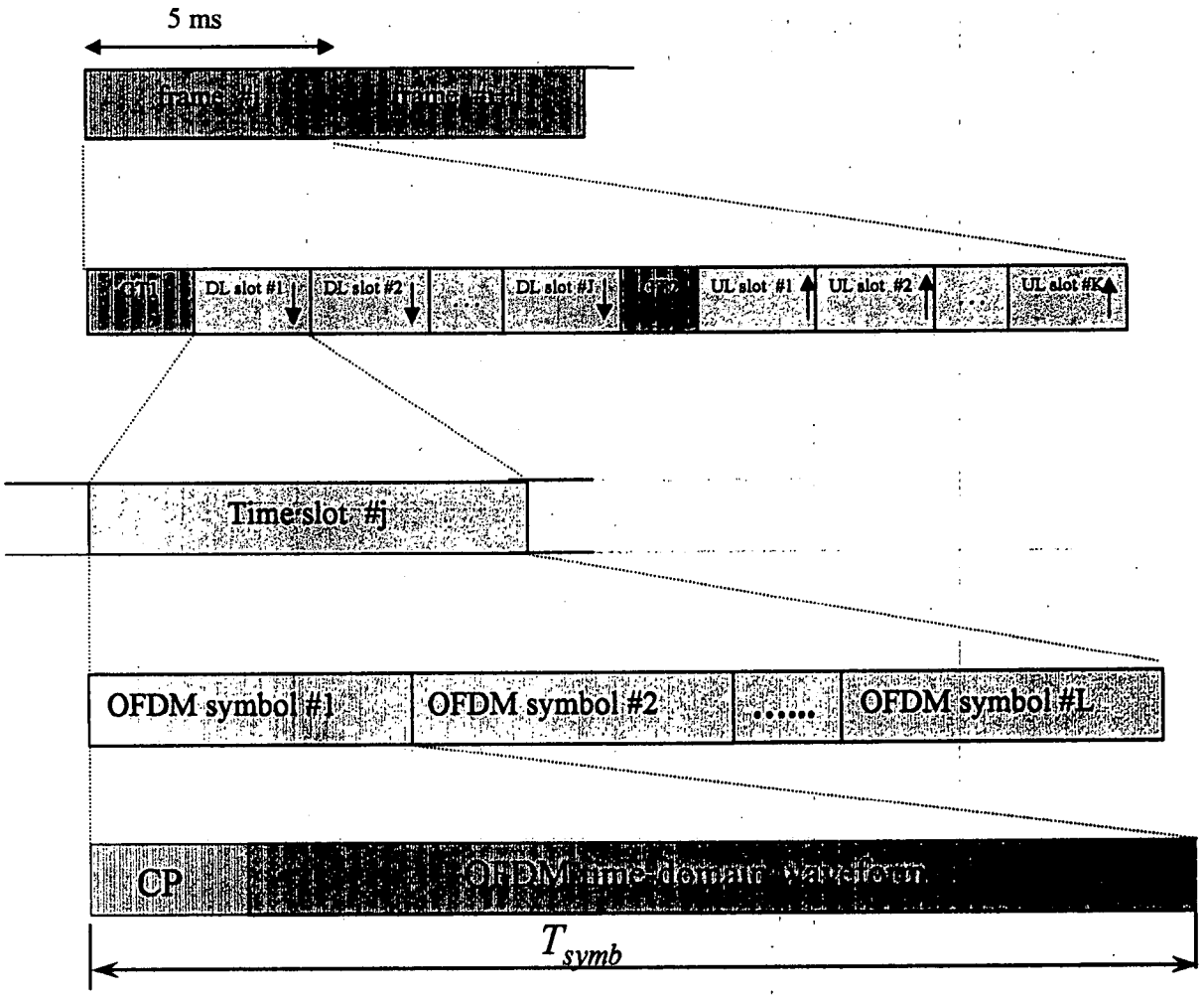

5 ms
DL slot #1
DL slot #2
DL slot #J
UL slot #1
UL slot #2
UL slot #K
Timeslot #j
OFDM symbol #1
OFDM symbol #2
OFDM symbol #L
CP
T_{symb}

Figure 4

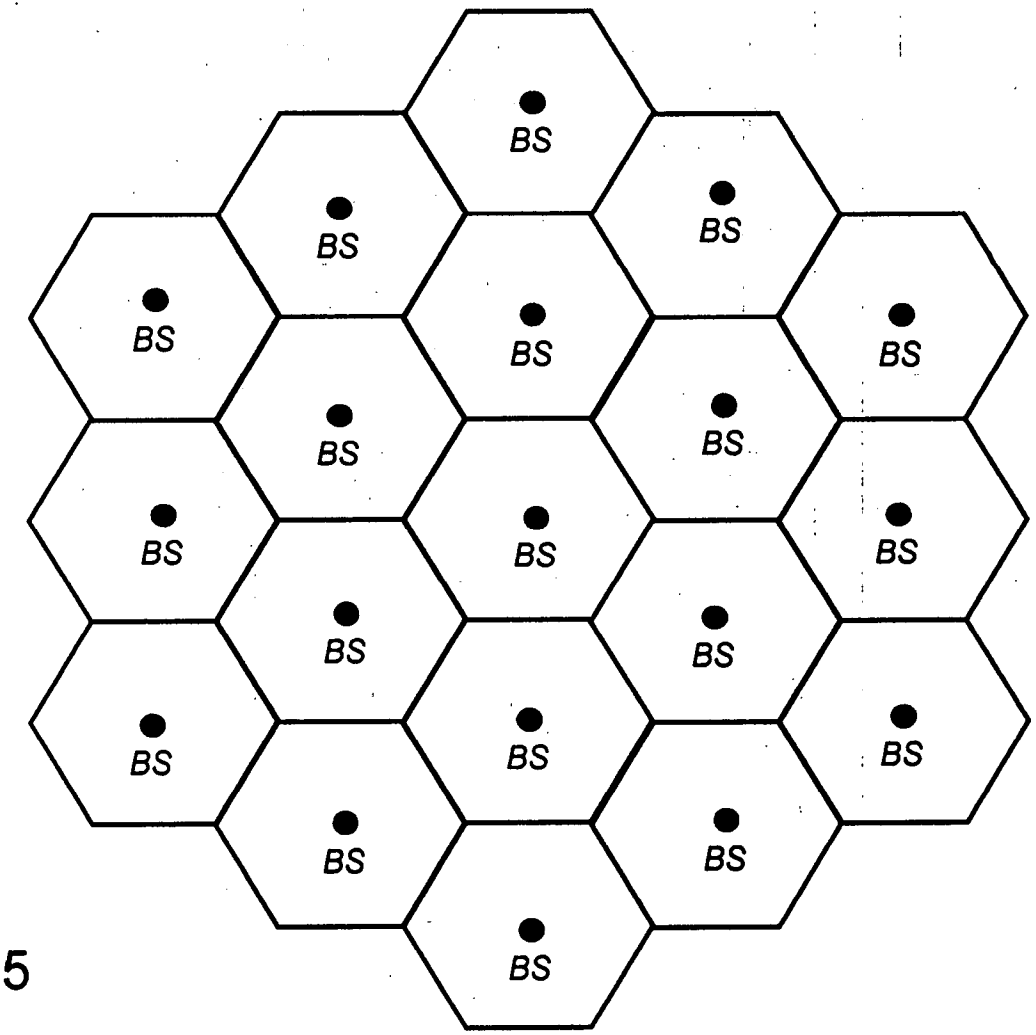
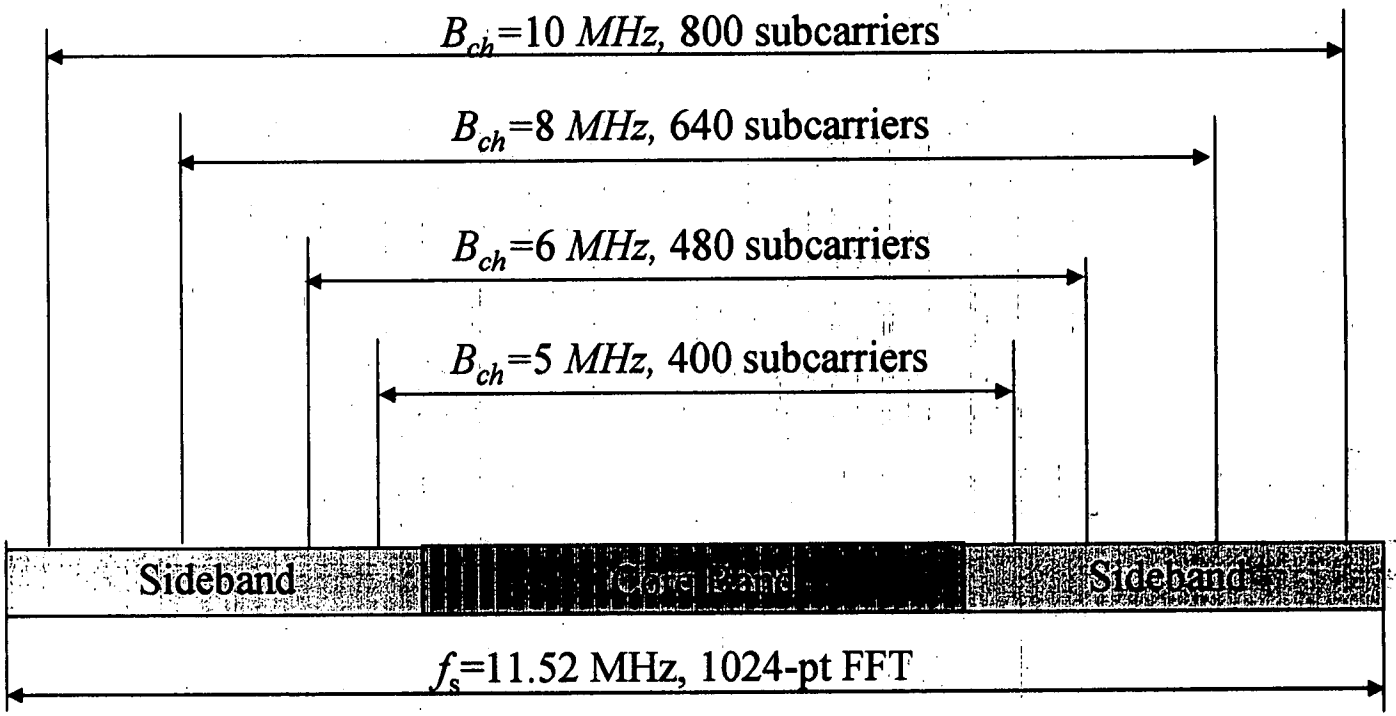
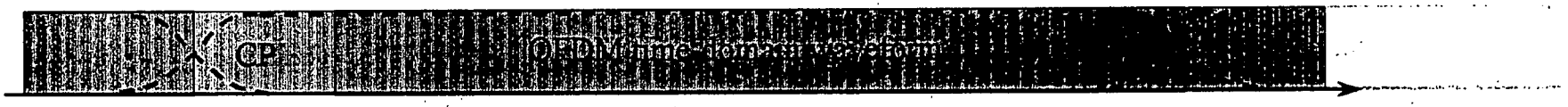


Figure 5



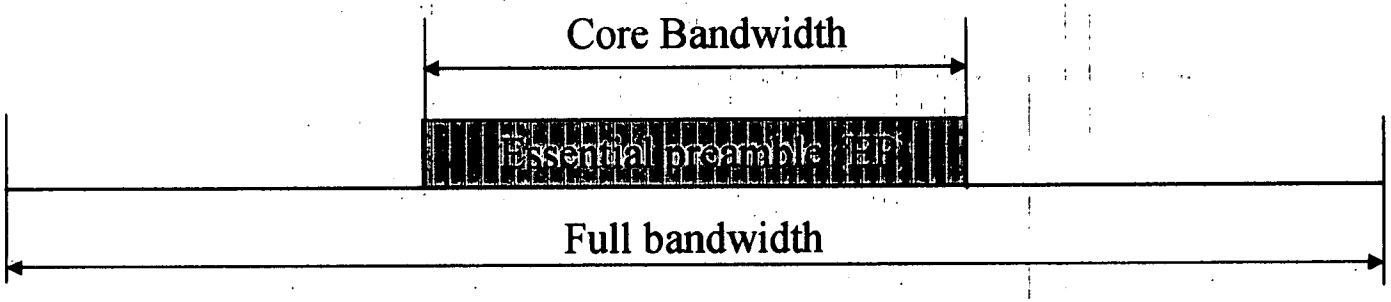
$$B_{eff} = 90\% B_{ch}$$

Figure 6

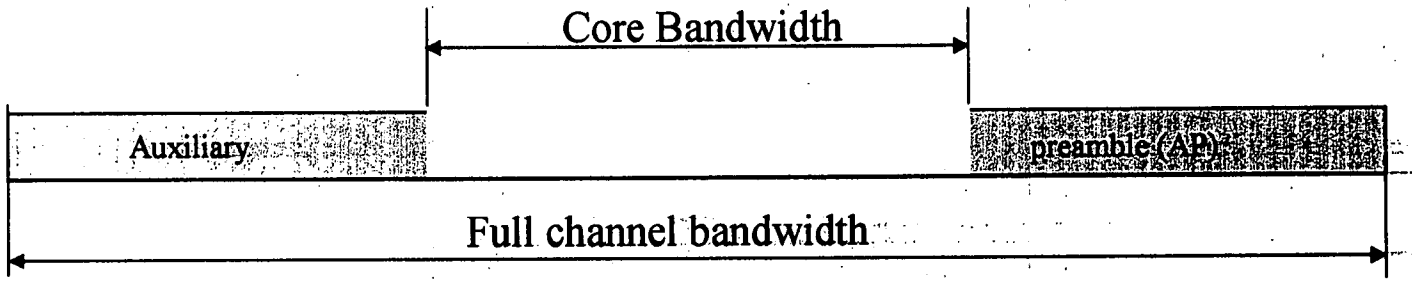


---- Time-domain windowing function

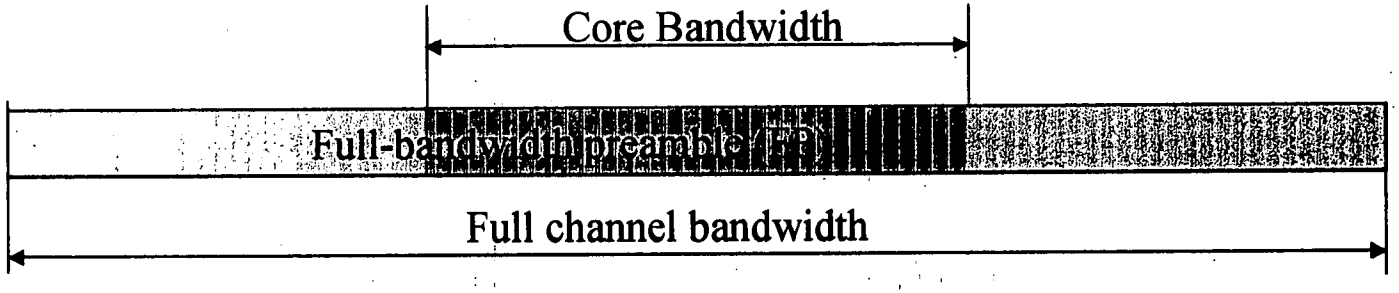
Figure 7



(a) The essential preamble only occupies the CB



(b) The auxiliary preamble occupies the SB



(c) The full-bandwidth preamble occupies the entire channel bandwidth

Figure 8

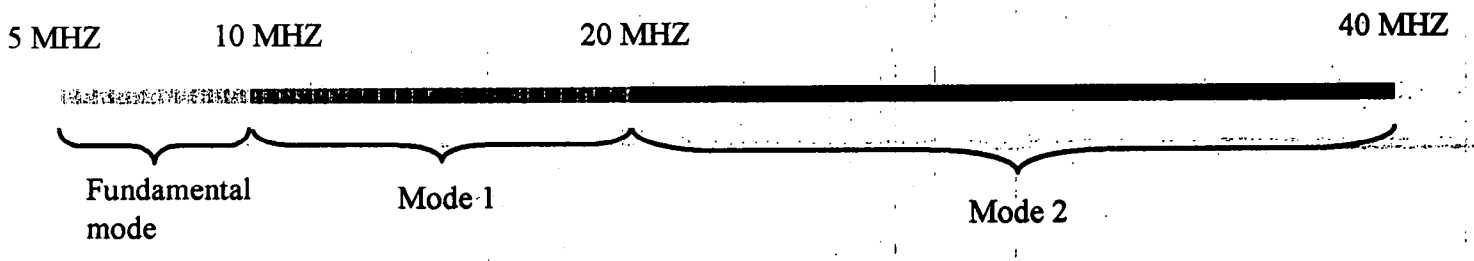


Figure 9

UNITED STATES NATIONAL STAGE SHEET (DO/EO)
Karen Williams, Paralegal

PUBLICATION NO. WO 05/112566

PUBLICATION DATE 01 DEC 05

U. S. APPL. NO. 10/583534

INTERNATIONAL APPL. US05/14828

Application Filed By: 30 MOS

International Application ✓ Translation ____ Defective ____ Reason ____

WIPO Designated US Elected ____ IA Language ENGLISH

Copy of Search Report (ISR) ✓ Article 33 ____ Article 19 ____

371 Filing fees ✓ paid ____ insufficient ____ partial Pages ____

Total Claims 21 Chargeable 21 Independent 6 Multiple N

Total Drawing Sheets 10 Defective ____ Reason ____

Oath/Declaration needed ✓ signed ____ defective ____ Reason ____

Small entity ____ Large entity ✓ Small entity statement/request ____

Biochemical Seq. Diskette ____ needed ____ damaged ____ entered ____ not entered ____

Biochemical Sequence listing ____ needed ____ statement ____ no statement ____

Copy of References Cited in ISR ____ Statement 37 CFR 3.73(b) ____

Copy of IPER ____ Annexes ____ entered ____ not entered ____ Reason ____

Preliminary Amendments ____ entered ____ not entered Reason ____

Information Disclosure Statement ____ Request for Immediate Examination ____

Substitute Specification ____ Assignment ____ Priority document ✓

Power of Attorney ____ Data Sheet ____ RO/101 ____ PCT Easy ____

Other papers ____

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35 USC Receipt of Request 16 JUN 06
Date completion USC 371 Requirements ____
Notice of Missing Requirements 03 APR 07
Notice of Defective ____ Response ____ Translation ____ Declaration ____ Disk ____
Notice of Acceptance ____
Notice of Abandonment ____
Notice of Missing Sequence ____

PATENT APPLICATION FEE DETERMINATION RECORD

Effective December 8, 2004

Application or Docket Number: 10/583534

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
U.S. NATIONAL STAGE FEES	21	
BASIC FEE	SMALL ENT. = $ 150	LARGE ENT. = $ 300
EXAMINATION FEE	Satisfies PCT Article 33(1)-(4) = $ 50 / $ 100	All other situations = $ 100 / $ 200
SEARCH FEE	U.S. is ISA = $ 50 / $ 100 ALL other countries = $ 200 / $ 400	ALL other situations = $ 250 / $ 500
FEE FOR EXTRA SPEC. PGS.	minus 100 =	/ 50 =
TOTAL CHARGEABLE CLAIMS	21 minus 20 =	* 1
INDEPENDENT CLAIMS	6 minus 3 =	* 3
MULTIPLE DEPENDENT CLAIM PRESENT	N ☐	

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

SMALL ENTITY TYPE ☐	RATE	FEE	OR	OTHER THAN SMALL ENTITY	RATE	FEE
	BASIC FEE		OR		BASIC FEE	300
	EXAM. FEE				EXAM. FEE	200
	SEARCH FEE				SEARCH FEE	100
	X $ 125 =				X $ 250 =	
	X $ 25 =		OR		X $ 50 =	50
	X $ 100 =		OR		X $ 200 =	600
	+ $ 180 =		OR		+ $ 360 =	
	TOTAL		OR		TOTAL	1250

CLAIMS AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
AMENDMENT A	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

SMALL ENTITY	RATE	ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY	RATE	ADDITIONAL FEE
	X $ 25 =		OR		X $ 50 =	
	X $ 100 =		OR		X $ 200 =	
	+ $ 180 =		OR		+ $ 360 =	
	TOTAL ADDIT. FEE		OR		TOTAL ADDIT. FEE	

AMENDMENT B		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

	RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
	X $ 25 =		OR	X $ 50 =	
	X $ 100 =		OR	X $ 200 =	
	+ $ 180 =		OR	+ $ 360 =	
	TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

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

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

04/05/2007 KWILLIAM 00000003 500665 10583534

01 FC:1631	300.00	DA
02 FC:1641	100.00	DA
03 FC:1633	200.00	DA
04 FC:1614	600.00	DA
05 FC:1615	50.00	DA

PTO-1556
(2/06)

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

(FOR USE WITH FORM PTO-875)

SERIAL NO. 10/ 583534

FILING DATE

APPLICANT(S)

CLAIMS

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
1	1					
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TOTAL IND.	6	⬇		⬇		⬇
TOTAL DEP.	15	⬅		⬅		⬅
TOTAL CLAIMS	21					

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT	
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TOTAL DEP.		⬅		⬅		⬅
TOTAL CLAIMS						