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 for the Eastern Distirct of Texas - Marshall Division on the following

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

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:24-cv-00009	1/8/2024	for the Eastern Distirct of Texas - Marshall Division

PLAINTIFF	DEFENDANT
PROCOMM INTERNATIONAL PTE. LTD.	VERIZON COMMUNICATIONS, INC., CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS, et al

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	8,583,100 B2	11/12/2013	PROCOMM INTERNATIONAL PTE. LTD.
2	7,103,377 B2	9/5/2006	PROCOMM INTERNATIONAL PTE. LTD.
3	7,834,721 B2	11/16/2010	PROCOMM INTERNATIONAL PTE. LTD.
4	8,497,813 B2	7/30/2013	PROCOMM INTERNATIONAL PTE. LTD.
5	7,724,512 B2	5/25/2010	PROCOMM INTERNATIONAL PTE. LTD.

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

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

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

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

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

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.
11/627,255	11/12/2013	8583100	100.829US01	1589

34206 7590 10/23/2013

FOGG & POWERS LLC
5810 W 78TH STREET
SUITE 100
MINNEAPOLIS, MN 55439

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 1465 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):

Robert J. Koziy, Burnsville, MN;
Harold A. Roberts, Eden Prairie, MN;
Todd Schieffert, Edina, MN;

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

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

PTO/SB/08a (08-08)
Approved for use through 09/30/2008. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/MT/	1	4611323		1986-09-09	Hessenmiiller	
/MT/	2	4628501		1986-12-09	Loscoe	
/MT/	3	4654843		1987-03-31	Roza et al.	
/MT/	4	4691292		1987-09-01	Rothweiler	
/MT/	5	~~4813854~~ 4,183,054		1980-01-08	Patisaul et al.	
/MT/	6	4999831		1991-03-12	Grace	
/MT/	7	5193109		1993-03-09	Chien-Yeh Lee	
/MT/	8	5243598		1993-09-07	Lee	

Change(s) applied to document, /M.H.F./ /MT/ 8/10/2013

EFS Web 2.1.5

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

	42	5587734		1996-12-24	LAUDER et al.	
	43	5732076		1998-03-24	Ketseoglou et al.	
	44	5761619		1998-06-02	DANNE et al.	
	45	5781541		~~1998-06-14~~ July 14, 1998	SCHNEIDER	
	46	5781859		1998-07-14	BEASLEY	
	47	5802173		1998-09-01	Hamilton-Piercy et al.	
	48	5805983		1998-09-08	NAIDU et al.	
	49	5809395		1998-09-15	HAMILTON-PIERCY et al.	
	50	5822324		1998-10-13	KOSTRESTI et al.	

Change(s) applied to document, /M.H.E./ 8/13/2013

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

U.S.PATENT APPLICATION PUBLICATIONS Remove

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

EFS Web 2.0.2

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /MT/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

	42	5381459		1995-01-10	LAPPINGTON	
	43	5400391		1995-03-21	EMURA ET AL.	
	44	5461627		1995-10-24	RYPINSKI	
	45	5519691		1996-05-21	DARCIE ET AL.	
	46	5545397		1996-08-02	SPIELVOGEL	
	47	5566168		1996-10-15	DENT	
	48	5603080		1997-02-11	Kallander et al.	
	49	5621786		1997-04-15	Fischer et al.	
	50	5627679		~~1997-04-25~~ May 6, 1997	IBA	

Change(s) applied to document, /M.T./ 8/13/2013

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

U.S.PATENT APPLICATION PUBLICATIONS Remove

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

EFS Web 2.0.2

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /MT/

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /MT/

PTO/SB/08a (05-07)
Approved for use through 11/30/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	3931473		1976-01-06	FERRIS JR.	
	2	4667319		1987-05-19	CHUM	
	3	4760573		1988-07-26	Calvignac et al.	
Change(s) applied to document, /M.H.E./ 8/13/2013	4	4794649		~~1988-10-21~~ December 27, 1988	FUJIWARA	
	5	4101834		1978-07-18	STUTT et al.	
	6	4112488		1978-09-05	SMITH III	
	7	4144409		1979-03-13	UTANO ET AL.	
	8	4144411		1979-03-13	FRENKIEL	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /MT/

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)

34206 7590 07/15/2013
FOGG & POWERS LLC
5810 W 78TH STREET
SUITE 100
MINNEAPOLIS, MN 55439

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.
11/627,255	01/25/2007	Robert J. Koziy	100.829US01	1589

TITLE OF INVENTION: DISTRIBUTED REMOTE BASE STATION SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1780	$300	$0	$2080	10/15/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
MAGLOIRE, VLADIMIR	2645	455-562100

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 Fogg & Powers LLC
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: ADC Telecommunications, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Shakopee, MN

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 502432 (enclose an extra copy of this form).

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00007

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

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature /Aaron W. Pederson/ Date October 8, 2013

Typed or printed name Aaron W. Pederson Registration No. 58,607

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

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

Electronic Patent Application Fee Transmittal

Application Number:	11627255
Filing Date:	25-Jan-2007
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Filer:	Aaron Wesley Pederson/Emily Reller
Attorney Docket Number:	100.829US01

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	1780	1780
Publ. Fee- Early, Voluntary, or Normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**2080**

Electronic Acknowledgement Receipt	
EFS ID:	17071840
Application Number:	11627255
International Application Number:	
Confirmation Number:	1589
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Customer Number:	34206
Filer:	Aaron Wesley Pederson/Emily Reller
Filer Authorized By:	Aaron Wesley Pederson
Attorney Docket Number:	100.829US01
Receipt Date:	08-OCT-2013
Filing Date:	25-JAN-2007
Time Stamp:	16:20:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$2080
RAM confirmation Number	3672
Deposit Account	502432
Authorized User	PEDERSON, AARON W.
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

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

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	00378717.PDF	122919 9bc4a76e26aa20877f0ac2ee38c100387b531c6a	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32027 f2d2899fc28faf9d7001b19d4904187f70729371	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	154946		

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.

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

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

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

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	11/627,255	KOZIY ET AL.	
	Examiner	Art Unit	
	VLADIMIR MAGLOIRE	2645	

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

(1) *VLADIMIR MAGLOIRE*. (3)_____.

(2) *Attorney Aaron Pederson (Reg. No. 58,607)*. (4)_____.

Date of Interview: *7/9/13*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☐ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1*.

Identification of prior art discussed: *na*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Discussed potential amendments to place application in condition for allowance.

Applicant recordation instructions: 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

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/Vladimir Magloire/ Primary Examiner, Art Unit 2645	

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.

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

34206 7590 07/15/2013

FOGG & POWERS LLC
5810 W 78TH STREET
SUITE 100
MINNEAPOLIS, MN 55439

EXAMINER
MAGLOIRE, VLADIMIR

ART UNIT	PAPER NUMBER
2645	

DATE MAILED: 07/15/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/627,255	01/25/2007	Robert J. Koziy	100.829US01	1589

TITLE OF INVENTION: DISTRIBUTED REMOTE BASE STATION SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1780	$300	$0	$2080	10/15/2013

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PTOL-85 (Rev. 02/11)

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00015

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)

34206 7590 07/15/2013
FOGG & POWERS LLC
5810 W 78TH STREET
SUITE 100
MINNEAPOLIS, MN 55439

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.
11/627,255	01/25/2007	Robert J. Koziy	100.829US01	1589

TITLE OF INVENTION: DISTRIBUTED REMOTE BASE STATION SYSTEM

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1780	$300	$0	$2080	10/15/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
MAGLOIRE, VLADIMIR	2645	455-562100

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).

PTOL-85 (Rev. 02/11)

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

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

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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

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.
11/627,255	01/25/2007	Robert J. Koziy	100.829US01	1589

34206 7590 07/15/2013

FOGG & POWERS LLC
5810 W 78TH STREET
SUITE 100
MINNEAPOLIS, MN 55439

EXAMINER	
MAGLOIRE, VLADIMIR	
ART UNIT	PAPER NUMBER
2645	

DATE MAILED: 07/15/2013

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

The Patent Term Adjustment to date is 1193 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 1193 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.

PTOL-85 (Rev. 02/11)

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 11/627,255	Applicant(s) KOZIY ET AL.	
	Examiner VLADIMIR MAGLOIRE	Art Unit 2645	AIA (First Inventor to File) Status No

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

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

1. ☒ This communication is responsive to *07/09/2013*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-3, 5-11, 16-23, 25-26*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

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

   * Certified copies not received: _____.

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

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

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

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☒ Interview Summary (PTO-413), Paper No./Mail Date *7/9/13* .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Vladimir Magloire/
Primary Examiner, Art Unit 2645

OK TO ENTER: /V.M./

Applicant(s)	Koziy	**AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.116 EXPEDITED EXAMINATION PROCEDURE**
Serial No.	11/627,255	
Filing Date	1/25/2007	
Group Art Unit	2645	
Examiner Name	MAGLOIRE, VLADIMIR	
Confirmation No.	1589	
Attorney Docket No.	100.829US01	
Title: DISTRIBUTED REMOTE BASE STATION SYSTEM		

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

OK TO ENTER: /V.M./

The Final Office Action mailed on May 9, 2013 has been reviewed. Please amend the above-identified application as follows.

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

Amendments to the Claims are reflected in the listing of claims that begins on page 4 of this paper.

Remarks begin on page 10 of this paper.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11627255	KOZIY ET AL.
	Examiner	Art Unit
	VLADIMIR MAGLOIRE	2645

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
	updated	8/18/2010	/mtt/
455	3.01, 422.1	10/27/2012	VM

SEARCH NOTES		
Search Notes	Date	Examiner
updated	8/18/2010	/mtt/
reviewed prior art made of record	10/27/2012	VM
updated search	5/4/2013	VM
updated search	7/10/2013	VM

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
455	3.01,422.1	7/10/2013	VM
455	561	7/10/2013	VM

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	2	"20020191565"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 09:31
S2	35321	network adj layer	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 13:05
S3	13	S2 and (sonet adj rout$3)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 13:06
S4	3	"20060040615"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 13:24
S5	5136	455/3.01,422.1.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 15:50
S6	94	S5 and (network with layer with rout$3)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 15:51
S7	90	("4183054" | "5577029" | "5631916" | "5668562" | "5682403" | "5734699" | "5734979" | "5761195" | "5765099" | "5781582" | "5818824" | "5842138" | "5867535" | "5883882" | "5887256" | "5930682" | "5953651" | "5983070" | "5999813" | "6014546" | "6078823" | "6081716" | "6101400" | "6157810" | "6169907" | "6173177" | "6212395" | "6269255" | "6353600" | "6381463" | "6535732" | "6549772" | "6553111" | "6556551" | "6580924" | "6594496" | "6597912" | "6640108" | "6658259" | "6675004" | "6694134" | "6771933" | "6785558" | "6801767" | "6829477" | "6847653" | "6912409" | "D391967" | "D391968" | "D397693").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 15:52
S8	90	("4183054" | "5577029" | "5631916" | "5668562" | "5682403" | "5734699" | "5734979" | "5761195" | "5765099" |	US-PGPUB; USPAT;	OR	ON	2012/10/27 15:54

		"5781582" | "5818824" | "5842138" | "5867535" | "5883882" | "5887256" | "5930682" | "5953651" | "5983070" | "5999813" | "6014546" | "6078823" | "6081716" | "6101400" | "6157810" | "6169907" | "6173177" | "6212395" | "6269255" | "6353600" | "6381463" | "6535732" | "6549772" | "6553111" | "6556551" | "6580924" | "6594496" | "6597912" | "6640108" | "6658259" | "6675004" | "6694134" | "6771933" | "6785558" | "6801767" | "6829477" | "6847653" | "6912409" | "D391967" | "D391968" | "D397693").PN.	EPO; JPO; DERWENT			
S9	4	"2002019565"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/01/28 12:42
S10	2	"20020191565"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/01/28 12:42
S11	14	("20030040335" | "20040037565" | "20050088999" | "20050153712" | "20080014948" | "20080058018" | "6931261").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/04/26 21:03
S12	6	("20040008737" | "20040062214" | "20060221905").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/04/26 21:04
S13	20	S11 S12	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/04/26 21:04
S14	1	("6963552").PN.	USPAT; USOCR	OR	OFF	2013/05/02 04:32
S15	3	"20050213545"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/05/02 13:40
S24	3	"20090129314"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/05/03 15:06
S25	1305	relay$3 same "IP" same wireless same router	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/05/04 08:27
S26	11	wireless adj home adj agent	US-PGPUB; USPAT; EPO; JPO;	OR	ON	2013/05/04 08:38

			DERWENT			
S27	6351	455/3.01,422.1,15,16.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/07/10 23:29
S28	8684	455/3.01,422.1,15,16.ccls. 370/315.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/07/10 23:32
S29	102	S28 and duplicat$4 near3 (signal packet)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/07/10 23:32
S30	606	wimax same sonet	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/07/10 23:46
S31	1	S30 and remote near2 antenna	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/07/10 23:46
S32	234	S30 and router	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/07/10 23:47
S33	1435	base adj station adj router	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/07/10 23:49
S34	5	S33 and remote near1 antenna	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/07/10 23:49

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	8600	455/3.01,422.1,15,16.ccls. 370/315.ccls.	US-PGPUB; USPAT; UPAD	OR	ON	2013/07/11 01:21
L2	0	1 and ((remote adj antenna) and duplicate and router).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2013/07/11 01:32
L3	1	((remote adj antenna) and duplicate and router).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2013/07/11 01:32

7/ 11/ 2013 1:33:22 AM
C:\ Users\ vmagloire\ Documents\ EAST\ Workspaces\ 11627255.wsp

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11627255	KOZIY ET AL.
	Examiner	**Art Unit**
	VLADIMIR MAGLOIRE	2645

CPC		
Symbol	**Type**	**Version**

CPC Combination Sets				
Symbol	**Type**	**Set**	**Ranking**	**Version**

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 20	
/VLADIMIR MAGLOIRE/ Primary Examiner.Art Unit 2645 07/10/2013 (Primary Examiner) (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 8

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11627255	KOZIY ET AL.
	Examiner	**Art Unit**
	VLADIMIR MAGLOIRE	2645

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
455	422.1	H	0	4	W	4 / 00 (2009.01.01)						

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
455	3.01	561	16		
370	315				

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/VLADIMIR MAGLOIRE/ Primary Examiner.Art Unit 2645	07/10/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	8

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11627255	KOZIY ET AL.
	Examiner	**Art Unit**
	VLADIMIR MAGLOIRE	2645

☒ **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

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 20	
/VLADIMIR MAGLOIRE/ Primary Examiner.Art Unit 2645 (Primary Examiner)	07/10/2013 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 8

Applicant(s)	Koziy	**AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.116 EXPEDITED EXAMINATION PROCEDURE**
Serial No.	11/627,255	
Filing Date	1/25/2007	
Group Art Unit	2645	
Examiner Name	MAGLOIRE, VLADIMIR	
Confirmation No.	1589	
Attorney Docket No.	100.829US01	
Title: DISTRIBUTED REMOTE BASE STATION SYSTEM		

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

The Final Office Action mailed on May 9, 2013 has been reviewed. Please amend the above-identified application as follows.

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

Amendments to the Claims are reflected in the listing of claims that begins on page 4 of this paper.

Remarks begin on page 10 of this paper.

Amendments to the Specification:

Please replace paragraph [0002] of the subject application with the following replacement paragraph:

[0002] U.S. Patent Application Serial No.[[__/___,___]] 11/627,251 (Attorney Docket No. 100.828US01), entitled "MODULAR WIRELESS COMMUNICATIONS PLATFORM" (the '828 Application).

Please replace paragraph [0038] of the subject application with the following replacement paragraph:

[0038] Along with being configurable to communicate on different frequency band/sub-bands and with different technologies, host unit 102 and remote unit 106 are configurable to perform more or less of the wireless processing of the RF signal. Host unit 102 and remote unit 106 are configurable into three different functional configurations. The first configuration is illustrated in Figure 1 and has host unit 101 and remote unit 106 functioning as a range extender for base station 101. In this configuration, ~~backhaul~~ fronthaul data is transmitted between host unit 102 and remote unit 106. The second configuration is illustrated in Figure 6, and has ~~fronthaul~~ backhaul data transmitted between host unit 102 and remote unit 106. In this configuration remote unit 106 performs the functionality of a base station. The third configuration is illustrated in Figure 7 and has 'midhaul' data transmission between host unit 102 and remote unit 106. In this embodiment, 'midhaul' data refers to OBSAI protocol data or similar partially processed wireless signals. Each of the three configurations will now be explained in further detail.

Please replace paragraph [0043] of the subject application with the following replacement paragraph:

[0043] Since host unit 102 and remote unit 106 have multiple input/outputs and can have multiple types of DART modules connected to each, host unit 102 and remote unit 106 are configured to multiplex different functional configurations through different input/outputs simultaneously. Thus, in one embodiment, a first input/output of host unit 102 and remote unit 106 function as a range extender for a base station. A second input/output of host unit 102 and remote unit 106 function to transmit 'midhaul' data. At the same time a third input/output of host unit 102 and remote unit 106 functions to transmit ~~fronthaul~~ backhaul data and remote unit 106 performs baseband processing upon the data.

Amendments to the Claims:

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

Listing of claims:

1. (Currently Amended) A distributed base station system for high speed data transmission comprising:

a host unit;

a plurality of remote antenna[[s]] units communicatively coupled to the host unit;

wherein the host unit is configured to send downlink RF sampled data to the plurality of remote antenna[[s]] units and the plurality of remote antenna[[s]] units are configured to transmit an RF signal based on the downlink RF sampled data;

wherein the plurality of remote antenna[[s]] units are configured to send uplink RF sampled data to the host unit based on RF signals received;

wherein each of the plurality of remote antenna[[s]] units is coupled to a co-located, network layer router, and ~~at least one~~ a first of the plurality of remote antenna[[s]] units is coupled to a co-located remote base station;

wherein the plurality of remote antenna[[s]] units are coupled to each other and are arranged into a network, and wherein the network layer routers are configured to route data corresponding to RF signals transmitted and received at the plurality of remote antenna units, to and from the remote base station over the network; and

wherein the first remote antenna unit is configured to:

generate a fourth RF signal and a transport signal representing a duplicate of the fourth RF signal;

transmit the fourth RF signal from the first remote antenna unit; and

send the transport signal through the network such that the transport signal is routed to a second of the plurality of remote antenna units, wherein the

duplicate of the fourth RF signal is transmitted from the second remote antenna unit.

2. (Currently Amended) The distributed base station system of claim 1, wherein the plurality of remote antenna[[s]] units are arranged in a tree configuration.

3. (Currently Amended) The distributed base station system of claim 1, wherein the plurality of remote antenna[[s]] units are arranged in a ring configuration.

4. (Cancelled)

5. (Currently Amended) The distributed base station system of claim 1, wherein each of the plurality of remote antenna[[s]] units is coupled to a remote base station.

6. (Original) The distributed base station system of claim 1, wherein the system transports data using a protocol that is compliant with IEEE 802.16.

7. (Currently Amended) The distributed base station system of claim 1, further comprising:

a fiber optic transport mechanism between two of the plurality of remote antenna[[s]] units.

8. (Currently Amended) The distributed base station system of claim 1, further comprising:

a millimeter wave transceiver configured to transport data between two of the plurality of remote antenna[[s]] units.

9. (Currently Amended) A method of transmitting a wireless communication signal comprising:

receiving a first RF signal at a first remote wireless communication station;

routing a first transport signal based on the first RF signal to a second remote wireless communication station via a network layer router co-located with the first remote wireless communication station;

receiving the first transport signal at a co-located, network layer router at the second remote wireless communication station;

processing the first transport signal by a base station at the second remote wireless communication station;

receiving a second RF signal at the first remote wireless communication station; ~~and~~

sending a second transport signal to a host unit based on the second RF signal;

generating a fourth RF signal at the base station of the second remote wireless communication station;

transmitting the fourth RF signal from an antenna of the second remote wireless communication station;

generating a fourth transport signal representing a duplicate of the fourth RF signal;

sending the fourth transport signal to the first remote wireless communication station; and

transmitting a duplicate of the fourth RF signal from an antenna at the first remote wireless communication station.

10. (Previously Presented) The method of claim 9, further comprising:

sending a third transport signal from the host unit to the first remote wireless communication system; and

transmitting a third RF signal from the remote wireless communication station based on the third transport signal.

11. (Previously Presented) The method of claim 9, wherein receiving the first RF signal receives the first RF signal via an antenna at the first remote wireless communication station.

12-15. (Cancelled)

16. (Currently Amended) The method of claim [[13,]] 9, wherein transmitting further comprises:

transmitting the fourth RF signal to a mobile device.

17. (Previously Presented) The method of claim 9, further comprising:

processing a fifth RF signal by a base station at the first remote wireless communication station to form a sixth RF signal; and

transmitting the sixth RF signal from an antenna at the first remote wireless communication station.

18. (Previously Presented) The method of claim 9, wherein the first transport signal is transported using a protocol that is compliant with IEEE 802.16.

19. (Previously Presented) The method of claim 9, wherein routing the first transport signal further comprises:

routing the first transport signal through a third wireless communication station and then to the second remote wireless communication station.

20. (Currently Amended) A method of transmitting a wireless communication signal comprising:

receiving a first RF signal at an antenna of a first remote wireless communication station;

processing the first RF signal by a base station at the first remote wireless communication station;

generating a second RF signal and a first transport signal representing a duplicate of the second RF signal at the first remote wireless communication station;

transmitting the second RF signal from the antenna at the first remote wireless communication station;

routing [[a]] the first transport signal ~~based on the processing of the first RF signal~~ through a network of remote wireless communication stations to a second remote wireless communication station, each remote wireless communication station having a co-located, network layer router;

transmitting a duplicate of the second RF signal based on the first transport signal from the antenna of the second remote wireless communication station;

receiving a third RF signal at the first remote wireless communication station; and

sending a second transport signal to a host unit based on the second RF signal.

21. (Previously Presented) The method of claim 20, wherein the first transport signal is transported using a protocol that is compliant with IEEE 802.16.

22. (Previously Presented) The method of claim 20, wherein transmitting further comprises:

transmitting the second RF signal to a mobile device.

23. (Previously Presented) The method of claim 20, wherein receiving the first RF signal receives the first RF signal via an antenna at the first remote wireless communication station.

24. (Cancelled)

25. (Currently Amended) A remote wireless communication station for transmitting high speed wireless data comprising:

a remote unit;

a router co-located with and coupled to the remote unit;

a baseband unit co-located with and coupled to the remote unit; and

an antenna coupled to the remote unit;

wherein the remote unit is configured to send uplink RF sampled data to a host unit based on RF signals received, and is configured to route data corresponding to RF signals transmitted and/or received ~~to and from a remote base station~~ over a network of ~~other~~ remote units of which the remote unit is a member;

wherein the baseband unit is configured to generate a first RF signal and a transport signal representing a duplicate of the first RF signal, wherein the remote unit is configured to:

process the first RF signal to be transmitted from the antenna coupled to the remote unit; and

send the transport signal over the network to be routed to a second of the remote units, such that a duplicate of the first RF signal can be transmitted from the second of the remote units.

26. (Previously Presented) The remote wireless communication station of claim 25, wherein the remote unit is configured to transmit data using a protocol compliant with IEEE 802.16.

27. (Cancelled)

REMARKS

The Final Office Action mailed on May 9, 2013 has been reviewed. The specification amendments above amend paragraph [0002] to fill in the application number of the related application. The specification amendments above also amend paragraphs [0038] and [0043] to address an error relating to "fronthaul" and "backhaul" data. The claim amendments above amend claims 1-3, 5, 7-9, 16, 20, and 25 and cancel claims 13, 14, and 17; as a result claims 1-3, 5-11, 16-23 and 25-26 are pending in this application. No new matter has been added by these amendments.

Examiner Interview Summary

Applicants' representative, Aaron W. Pederson (Reg. No. 58,607), thanks Examiner Magloire for the opportunity to discuss aspects of the subject application in an Applicant initiated telephone interview on July 1, 2013 and again on July 9, 2013. During the call on July 1, 2013 the claims were discussed with respect to the Sabat and Weniger references. Applicant's representative asserted that the claims were novel and non-obvious over Sabat and Weniger as they stand, and that the claims should be allowed. The Examiner did not agree and suggested that the Applicants consider amending the claims based on allowable claim 14. Applicant's representative agreed to consider such an amendment. During the call on July 9, 2013, Applicant's representative presented some proposed claim amendments based on allowable claim 14. Examiner Magloire suggested a minor change and indicated that the claim amendments with the minor change were likely to be allowed.

Applicants believe the substance and scope of the telephone conversations on July 1, 2013 and July 9, 2013 with respect to the subject application are accurately captured in the summary above.

Rejections Under 35 U.S.C. § 102

Claims 1-3, 5, 7, 25 were rejected under 35 USC § 102(b) as being anticipated by Sabat Jr.; John et al. (U.S. Patent No. 6,963,552). Applicants respectfully traverse these rejections.

Independent claims 1 and 25 have been amended based on allowable claim 14. Accordingly, Applicants respectfully request withdrawal of the rejection to claims 1 and 25. Claims 2, 3, 5, and 7 depend from and further define claim 1. Accordingly, Applicants respectfully request withdrawal of the rejection to these claims for the reasons asserted with respect to claim 1.

Claims 9-11, 13, 16, 17, 20, 22, 23, 25, 27 were rejected under 35 USC § 102(b) as being anticipated by Weniger; Kilian et al. (U.S. Publication No. 2009/0129314). Applicants respectfully traverse these rejections.

Independent claims 9, 20, and 25 have been amended based on allowable claim 14. Accordingly, Applicants respectfully request withdrawal of the rejection to claims 9, 20, and 25. Claims 10, 11, 16, 17, 22, and 23 depend from and further define either claim 9 or claim 20. Accordingly, Applicants respectfully request withdrawal of the rejection to these claims for the reasons asserted with respect to claims 9 and 20. Claims 13 and 27 have been cancelled.

Rejections Under 35 U.S.C. § 103

Claims 6, 8, 26 were rejected under 35 USC § 103(a) as being unpatentable over Sabat in view of Louberg et al. (U.S. Publication No. 2006/0111047). Applicants respectfully traverse these rejections.

As discussed above, claims 1 and 25 have been amended based on allowable claim 14. Claims 6, 8, and 26 depend from and further define either claim 1 or claim 25.

Accordingly, Applicants respectfully request withdrawal of the rejection to these claims for the reasons asserted with respect to claims 1 and 25.

Claims 18, 21 and 26 were rejected under 35 USC § 103(a) as being unpatentable over Weniger in view of Louberg et al. (U.S. Publication No. 2006/0111047). Applicants respectfully traverse these rejections.

As discussed above, claims 9, 20, and 25 have been amended based on allowable claim 14. Claims 18, 21, and 26 depend from and further define either claim 9, claim 20, or claim 25. Accordingly, Applicants respectfully request withdrawal of the rejection to these claims for the reasons asserted with respect to claims 9, 20, and 25.

Claim 19 was rejected under 35 USC § 103(a) as being unpatentable over Weniger in view of Borella (U.S. Publication No. 2007/0127383). Applicants respectfully traverse these rejections.

As discussed above, claim 9 has been amended based on allowable claim 14. Claim 19 depends from and further defines claim 9. Accordingly, Applicants respectfully request withdrawal of the rejection to this claim for the reasons asserted with respect to claim 9.

Allowable Subject Matter

Claim 14 was objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants thank Examiner Magloire for the indication of allowable subject matter. Amendments to claims 1, 9, 20, and 25 have been presented based on the language of claim 14.

CONCLUSION

Applicant respectfully submits that claims **1-3, 5-11, 16-23, and 25-26** are in condition for allowance and notification to that effect is earnestly requested. If necessary, please charge any additional fees or credit overpayments to Deposit Account No. 502432.

If the Examiner has any questions or concerns regarding this application, please contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: July 9, 2013	/Aaron W. Pederson/

Aaron W. Pederson
Reg. No. 58607

Attorneys for Applicant
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Electronic Acknowledgement Receipt

EFS ID:	16265603
Application Number:	11627255
International Application Number:	
Confirmation Number:	1589
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Customer Number:	34206
Filer:	Aaron Wesley Pederson/Lisa Gentry
Filer Authorized By:	Aaron Wesley Pederson
Attorney Docket Number:	100.829US01
Receipt Date:	09-JUL-2013
Filing Date:	25-JAN-2007
Time Stamp:	15:57:58
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		00377662.PDF	162186 893d3caaa813e6f73b586fc35c02800004537080	yes	13

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response After Final Action	1	1
	Specification	2	3
	Claims	4	9
	Applicant Arguments/Remarks Made in an Amendment	10	13
Warnings:			
Information:			
	Total Files Size (in bytes):	162186	

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.

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

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

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

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/627,255	Filing Date 01/25/2007	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

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

APPLICATION AS AMENDED – PART II

AMENDMENT	07/09/2013	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 27	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	**0**

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

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

LIE
/KAREN VESTAL/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/627,255	01/25/2007	Robert J. Koziy	100.829US01	1589

34206 7590 05/09/2013

FOGG & POWERS LLC
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EXAMINER	
MAGLOIRE, VLADIMIR	
ART UNIT	PAPER NUMBER
2645	

NOTIFICATION DATE	DELIVERY MODE
05/09/2013	ELECTRONIC

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

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

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

DAVID@FOGGLAW.COM
docketing@fogglaw.com

Office Action Summary	Application No. 11/627,255	Applicant(s) KOZIY ET AL.	
	Examiner VLADIMIR MAGLOIRE	Art Unit 2645	AIA (First Inventor to File) Status No

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

Period for Reply

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

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

Status

1)☒ Responsive to communication(s) filed on *04/17/2013*.

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

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

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

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

Disposition of Claims

5)☒ Claim(s) *1-3,5-11,13,14,16-23 and 25-27* is/are pending in the application.

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

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-3,5-11,13,16-23 and 25-27* is/are rejected.

8)☒ Claim(s) *14* is/are objected to.

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

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

Application Papers

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

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some * c)☐ None of the:

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

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

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

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

Interim copies:

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statements (IDS) submitted on 02/06/2013, 04/17/2013 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements are being considered by the examiner.

Response to Arguments

2. Applicant's arguments with respect to claims 1-3, 5-11, 13-14, 16-23, 25-27 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

Claim Rejections - 35 USC § 102

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

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

4. Claim 1-3, 5, 7, 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Sabat, Jr.; John et al. (US 6963552 B2: hereinafter "Sabat").

Regarding claim 1, Sabat discloses a distributed base station system for high speed data transmission **(see Sabat, fig. 1)** comprising:

a host unit **(see Sabat, fig. 8 35)**;

a plurality of remote antennas communicatively coupled to the host unit **(see Sabat, fig. 1 and 8 multiband antenna connected to 35 via 40)**;

wherein the host unit is configured to send downlink RF sampled data to the plurality of remote antennas and the plurality of remote antennas are configured to transmit an RF signal based on the downlink RF sampled data **(see Sabat, Col 6 lines 37 to 61)**;

wherein the plurality of remote antennas are configured to send uplink RF sampled data to the host unit based on RF signals received **(see Sabat, Col 7 lines 5 to 19)**;

wherein each of the plurality of remote antennas is coupled to a co-located, network layer router **(see Sabat, fig. 8 59)**, and at least one of the plurality of remote antennas is coupled to a co-located remote base station **(see Sabat, fig. 8 item 50)**;

wherein the plurality of remote antennas are coupled to each other and are arranged into a network **(see Sabat, fig. 1 RAN sites, with included antennas, are connected to each other via 40, also see fig. 9 item 40 and fig. 2)**, and wherein the network layer routers are configured to route data corresponding to RF signals transmitted and received at the plurality of remote antenna units, to and from the remote base station over the network **(see Sabat, fig. 8 59 connected to 50)**.

Consider claim 25, Sabat discloses a remote wireless communication station for transmitting high speed wireless data **(see Sabat, fig. 1)** comprising:

a remote unit **(fig. 8)**; a router co-located with and coupled to the remote unit **(see Sabat, fig. 8 59)**; and an antenna coupled to the remote unit **(fig. 8 multiband antenna)**;

wherein the remote unit is configured to send uplink RF sampled data to a host unit based on RF signals received **(see Sabat, fig. 8, fig. 4, RF signals received at the antenna are digitized and sent to the HUB)**, and is configured to route data corresponding to RF signals transmitted and/or received to and from a remote base station over a network of other remote units **(see Sabat, fig. 1, data from RAN is sent to other RANs via 37)**.

Consider claim 2. (Original) The distributed base station system of claim 1, wherein the plurality of remote antennas are arranged in a tree configuration **(see Sabat, fig. 1)**.

Consider claim 3. (Original) The distributed base station system of claim 1, wherein the plurality of remote antennas are arranged in a ring configuration **(see Sabat, fig. 2)**.

Consider claim 5. (Original) The distributed base station system of claim 1, wherein each of the plurality of remote antennas is coupled to a remote base station **(see Sabat, fig. 8)**.

Consider claim 7. (Original) The distributed base station system of claim 1, further comprising: a fiber optic transport mechanism between two of the plurality of remote antennas **(see Sabat, Col 7 lines 5 to 18)**.

5. Claim 9-11, 13, 16, 17, 22, 23, 25, 27 rejected under 35 U.S.C. 102(b) as being anticipated by Weniger; Kilian et al. (US 20090129314 A1: hereinafter "Weniger").

Consider claim 9, Weniger discloses a method of transmitting a wireless communication signal **(see Weniger, fig. 2 - 6, discloses a method of transmitting a wireless communication signal)** comprising:

receiving a first RF signal at a first remote wireless communication station **(see Weniger, ¶[0059, 85], fig. 2 fig. 3, discloses receiving a wireless signal at AR1 sent by MN1)**;

routing a first transport signal based on the first RF signal to a second remote wireless communication station **(see Weniger, ¶[0059, 85], fig. 2 fig. 3, discloses routing a message to MN2 via AR2)** via a network layer router co-located **(access routers 1 and 2 are network layer router since they route based the IP addresses)** with the first remote wireless communication station **(access routers are wireless routers, therefore a router with a wireless transceiver, therefore the router is collocated with a wireless communication station)**;

receiving the first transport signal at a co-located, network layer router at the second remote wireless communication station **(see Weniger, ¶[0059, 85], fig. 2 fig. 3)**; and

processing the first transport signal by a base station at the second remote wireless communication station **(see Weniger, ¶[0059, 85], fig. 2 fig. 3)**;

receiving a second RF signal at the first remote wireless communication station **(see Weniger, fig. 3 306, message from MN1 sent to HA2)**;

and sending a second transport signal to a host unit based on the second RF signal **(see Weniger, fig. 3 306, message from MN1 sent to HA2)**.

Consider claim 20. (Currently Amended) A method of transmitting a wireless communication signal **(see Weniger, fig. 2 - 6, discloses a method of transmitting a wireless communication signal)** comprising:

receiving a first RF signal at an antenna of a first remote wireless communication station **(see Weniger, ¶[0059, 85], fig. 2 fig. 3, discloses receiving a wireless signal at AR1 sent by MN1)**;

processing the first RF signal by a base station at the first remote wireless communication station **(see Weniger, ¶[0059, 85], fig. 2 fig. 3, discloses receiving a wireless signal at AR1 sent by MN1, and determining where to route the signal, AR1, AR2 are wireless routers that provides wireless communication to a wireless device therefore a base station as well as a router and wireless communication stations)**;

routing a first transport signal based on the processing of the first RF signal through a network of remote wireless communication stations to a second remote wireless communication station **(see Weniger, ¶[0059, 85], fig. 2 fig. 3, discloses routing a message to MN2 via AR2)**, each remote wireless communication station

having a co-located, network layer router **(access routers 1 and 2 are network layer router since they route based the IP addresses)**; and

transmitting a processed second RF signal based on the first transport signal from the antenna of the second remote wireless communication station **(see Weniger, fig. 3 message from MN1 to HA2 prior to 300)**;

receiving a third RF signal at the first remote wireless communication station **(302)**; and sending a second transport signal to a host unit based on the second RF signal **(306)**.

Consider claim 25, Weniger discloses a remote wireless communication station for transmitting high speed wireless data **(see Weniger, ¶[0004])** comprising:

a remote unit **(AR2. AR1)**; a router co-located with and coupled to the remote unit **(AR1, AR2 are routers)**; and an antenna coupled to the remote unit **(AR1, AR2 are wireless routers therefore an antenna at the remote units)**;

wherein the remote unit is configured to send uplink RF sampled data to a host unit based on RF signals received **(see Weniger, fig. 3)**, and is configured to route data corresponding to RF signals transmitted and/or received to and from a remote base station over a network of other remote units **(see Weniger, fig. 3)**.

Consider claim 10. (Currently Amended) The method of claim 9, further comprising: sending a third transport signal from the host unit to the first remote wireless communication system; and transmitting a third RF signal from the remote

wireless communication station based on the third transport signal **(see Weniger, fig. 3)**.

Consider claim 11. (Currently Amended) The method of claim 9, wherein receiving the first RF signal receives the first RF signal via an antenna at the first remote wireless communication station **(AR1, AR2 are wireless routers therefore data is received via antenna)**.

Consider claim 13. (Currently Amended) The method of claim 9, further comprising: generating a fourth RF signal at the base station; and transmitting the fourth RF signal from an antenna of the second remote wireless base station **(see Weniger, fig. 3, multiple packets are sent between AR1 and AR2 from MN1 and MN2)**.

Consider claim 16. (Currently Amended) The method of claim 13, wherein transmitting further comprises: transmitting the fourth RF signal to a mobile device **(see Weniger, fig. 3, multiple packets are sent between AR1 and AR2 from MN1 and MN2)**.

Consider claim 17. (Currently Amended) The method of claim 9, further comprising: processing a fifth RF signal by a base station **(AR1)** at the first remote wireless communication station to form a sixth RF signal; and transmitting the sixth RF signal from an antenna at the first remote wireless communication station **(see**

Weniger, fig. 3, multiple packets are sent between AR1 and AR2 from MN1 and MN2).

Consider claim 22. (Currently Amended) The method of claim 20, wherein transmitting further comprises: transmitting the second RF signal to a mobile device **(see Weniger, fig. 3)**.

Consider claim 23. (Currently Amended) The method of claim 20, wherein receiving the first RF signal receives the first RF signal via an antenna at the first remote wireless communication station **(see Weniger, fig. 3 and analyses of claim 25)**.

Consider claim 27. (Previously Presented) The remote wireless communication station of claim 25, further comprising: a baseband unit; and wherein the remote unit is coupled to the baseband unit and is configured as a base station **(Weniger discloses receiving an RF signal and transporting converting transporting over an IP network, therefore a baseband unit coupled or within AR1 and AR2)**.

Claim Rejections - 35 USC § 103

6. 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.

7. Claims 6, 8, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Louberg et al. (US 2006/0111047 hereinafter "Louberg").

Consider claim 6 and 26, the distributed base station system of claim 1, the Sabat fails to specifically disclose wherein the system transports data using a protocol that is compliant with IEEE 802.16.

In the same field of endeavor Louberg, discloses wherein the system transports data using a protocol that is compliant with IEEE 802.16.

Louberg teaches a wireless communication system (title and abstract), that has distributed base stations **(see figures 1 and 3b)**. Louberg teaches the idea that the system uses a protocol compliant with IEEE 802.16 **in par. 2 and 48 (i.e. WiMax)**.

Given that Sabat discusses muli-protocal wireless communications at a HUB and remote antennas, it would have been obvious for one of ordinary skill in the art at the time of invention to utilize the WiMax protocol as in Louberg with the teachings of Sabat. The motivation for doing so would have been to allow for using a well-known and widely used high speed, high bandwidth technology.

Regarding claim 8. Louberg further teaches further a millimeter wave transceiver configured to transport data between two of the plurality of remote antennas. (par. 48).

8. Claims 18, 21, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Louberg et al. (US 2006/0111047 hereinafter "Louberg").

Consider claims 18, 21, and 26, the method of claim 9, Weniger fails to specifically disclose using a protocol that is compliant with IEEE 802.16.

In the same field of endeavor Louberg, discloses wherein the system transports data using a protocol that is compliant with IEEE 802.16.

Louberg teaches a wireless communication system (title and abstract), that has distributed base stations **(see figures 1 and 3b)**. Louberg teaches the idea that the system uses a protocol compliant with IEEE 802.16 **in par. 2 and 48 (i.e. WiMax)**.

Given that Weniger discloses in ¶0004 that other protocols are also applicable, and given that WiMax includes IP based protocols, it would have been obvious for one of ordinary skill in the art at the time of invention to utilize the WiMax protocol as in Louberg with the teachings of Weniger. The motivation for doing so would have been to allow for using a well-known and widely used high speed, high bandwidth technology.

9. Claims 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Borella (US 2007/0127383 A1 hereinafter “Borella”).

Consider claim 19, the method of claim 9, Weniger does not specifically disclose routing the first transport signal through a third wireless communication station and then to the second remote wireless communication station.

However, Weniger does disclose routing the first transport signal through a third communication station **(Home Agent, fig. 3)** and then to the second remote wireless communication station **(AR2)**.

Weniger does not specifically disclose the Home Agent is a wireless communication station, however a home agent being wireless was well known in the art at the time of the invention.

In the same field of endeavor, Borella discloses a wireless home agent **(see Borella, ¶[0015]).**

It would have been obvious to incorporate a wireless home agent as thought by Borella into the system of Weniger thereby removing encumbrances of wired communication.

Allowable Subject Matter

1. Claim 14 is 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

2. 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 VLADIMIR MAGLOIRE whose telephone number is (571)270-5144. The examiner can normally be reached on Monday to Friday, 9:00 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nick Corsaro can be reached on 571-272-7876. 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.

/Vladimir Magloire/
Primary Examiner, Art Unit 2617

Notice of References Cited	Application/Control No. 11/627,255	Applicant(s)/Patent Under Reexamination KOZIY ET AL.	
	Examiner VLADIMIR MAGLOIRE	Art Unit 2645	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,963,552 B2	11-2005	Sabat et al.	370/338
*	B	US-2007/0127383 A1	06-2007	Borella, Michael	370/241
*	C	US-2009/0129314 A1	05-2009	Weniger et al.	370/328
	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
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NON-PATENT DOCUMENTS

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*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
	11627255	KOZIY ET AL.
	Examiner	Art Unit
	MICHAEL T THIER	2617

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
	updated	8/18/2010	/mtt/
455	3.01, 422.1	10/27/2012	VM

SEARCH NOTES		
Search Notes	Date	Examiner
updated	8/18/2010	/mtt/
reviewed prior art made of record	10/27/2012	VM
updated search	5/4/2013	VM

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

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	2	"20020191565"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 09:31
S2	35321	network adj layer	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 13:05
S3	13	S2 and (sonet adj rout$3)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 13:06
S4	3	"20060040615"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 13:24
S5	5136	455/3.01,422.1.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 15:50
S6	94	S5 and (network with layer with rout$3)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 15:51
S7	90	("4183054" | "5577029" | "5631916" | "5668562" | "5682403" | "5734699" | "5734979" | "5761195" | "5765099" | "5781582" | "5818824" | "5842138" | "5867535" | "5883882" | "5887256" | "5930682" | "5953651" | "5983070" | "5999813" | "6014546" | "6078823" | "6081716" | "6101400" | "6157810" | "6169907" | "6173177" | "6212395" | "6269255" | "6353600" | "6381463" | "6535732" | "6549772" | "6553111" | "6556551" | "6580924" | "6594496" | "6597912" | "6640108" | "6658259" | "6675004" | "6694134" | "6771933" | "6785558" | "6801767" | "6829477" | "6847653" | "6912409" | "D391967" | "D391968" | "D397693").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 15:52
S8	90	("4183054" | "5577029" | "5631916" | "5668562" | "5682403" | "5734699" | "5734979" | "5761195" | "5765099" |	US-PGPUB; USPAT;	OR	ON	2012/10/27 15:54

		"5781582" | "5818824" | "5842138" | "5867535" | "5883882" | "5887256" | "5930682" | "5953651" | "5983070" | "5999813" | "6014546" | "6078823" | "6081716" | "6101400" | "6157810" | "6169907" | "6173177" | "6212395" | "6269255" | "6353600" | "6381463" | "6535732" | "6549772" | "6553111" | "6556551" | "6580924" | "6594496" | "6597912" | "6640108" | "6658259" | "6675004" | "6694134" | "6771933" | "6785558" | "6801767" | "6829477" | "6847653" | "6912409" | "D391967" | "D391968" | "D397693").PN.	EPO; JPO; DERWENT			
S9	4	"2002019565"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/01/28 12:42
S10	2	"20020191565"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/01/28 12:42
S11	14	("20030040335" | "20040037565" | "20050088999" | "20050153712" | "20080014948" | "20080058018" | "6931261").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/04/26 21:03
S12	6	("20040008737" | "20040062214" | "20060221905").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/04/26 21:04
S13	20	S11 S12	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/04/26 21:04
S14	1	("6963552").PN.	USPAT; USOCR	OR	OFF	2013/05/02 04:32
S15	3	"20050213545"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/05/02 13:40
S24	3	"20090129314"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/05/03 15:06
S25	1305	relay$3 same "IP" same wireless same router	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/05/04 08:27
S26	11	wireless adj home adj agent	US-PGPUB; USPAT; EPO; JPO;	OR	ON	2013/05/04 08:38

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6931261		2005-08-16	WAYLETT ET AL.	

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	1	20030040335		2003-02-27	MCINTOSH ET AL.	
	2	20040037565		2004-02-26	Young et al.	
	3	20050088999		2005-04-28	WAYLETT ET AL.	
	4	20050153712		2005-07-14	Osaka et al.	
	5	20080014948		2008-01-17	Scheinert	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /V.M./

Receipt date: 02/06/2013	Application Number	11627255	11627255 - GAU: 2645
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	2007-01-25	
	First Named Inventor	Koziy	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	100.829US01	

	6	20080058018		2008-03-06	Scheinert	

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	1	CHINESE PATENT OFFICE, "Notification to Grant Patent Right for Invention", "from Foreign Counterpart of U.S. Application No. 11/627,251", 12/26/2012, Page(s) 1-4, Published in: CN	☐

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Examiner Signature	/Vladimir Magloire/	Date Considered	04/26/2013

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Receipt date: 02/06/2013	Application Number	11627255 11627255 - GAU: 2645
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☐ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Aaron W. Pederson/	Date (YYYY-MM-DD)	2013-02-06
Name/Print	Pederson, Aaron W.	Registration Number	58607

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

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

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

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

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /V.M./

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11627255	KOZIY ET AL.
	Examiner	Art Unit
	VLADIMIR MAGLOIRE	2645

✓	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	08/18/2010	10/27/2012	05/04/2013						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	-						
	5	✓	✓	✓						
	6	✓	✓	✓						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	✓	✓						
	10	✓	✓	✓						
	11	✓	✓	✓						
	12	✓	✓	-						
	13	✓	✓	✓						
	14	✓	✓	O						
	15	✓	✓	-						
	16	✓	✓	✓						
	17	✓	✓	✓						
	18	✓	✓	✓						
	19	✓	✓	✓						
	20	✓	✓	✓						
	21	✓	✓	✓						
	22	✓	✓	✓						
	23	✓	✓	✓						
	24	✓	✓	-						
	25	✓	✓	✓						
	26	✓	✓	✓						
	27	✓	✓	✓						

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	2645
	Examiner Name	Vladimir Magloire
	Attorney Docket Number	100.829US01

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	1	20040008737		2004-01-15	McClellan	
	2	20040062214		2004-04-01	Schnack et al.	
	3	20060221905		2006-10-05	Behzad et al.	

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Receipt date: 04/17/2013	Application Number	11627255	11627255 - GAU: 2645
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	2007-01-25	
	First Named Inventor	Koziy	
	Art Unit	2645	
	Examiner Name	Vladimir Magloire	
	Attorney Docket Number	100.829US01	

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	U.S. PATENT AND TRADEMARK OFFICE, "Office Action", "Application Serial No. 11/627,251", 4/1/2013, Page(s) 1-23	☐
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	Art Unit	2645
	Examiner Name	Vladimir Magloire
	Attorney Docket Number	100.829US01

CERTIFICATION STATEMENT

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

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☐ See attached certification statement.

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

☐ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Aaron W. Pederson/	Date (YYYY-MM-DD)	2013-04-17
Name/Print	Pederson, Aaron W.	Registration Number	58607

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

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Application Number	11627255
Filing Date	2007-01-25
First Named Inventor	Koziy
Art Unit	2645
Examiner Name	Vladimir Magloire
Attorney Docket Number	100.829US01

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Name/Print	Pederson, Aaron W.	Registration Number	58607

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Electronic Patent Application Fee Transmittal

Application Number:	11627255
Filing Date:	25-Jan-2007
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Filer:	Aaron Wesley Pederson/Robert Thrumston
Attorney Docket Number:	100.829US01

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt	
EFS ID:	15545721
Application Number:	11627255
International Application Number:	
Confirmation Number:	1589
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Customer Number:	34206
Filer:	Aaron Wesley Pederson/Robert Thrumston
Filer Authorized By:	Aaron Wesley Pederson
Attorney Docket Number:	100.829US01
Receipt Date:	17-APR-2013
Filing Date:	25-JAN-2007
Time Stamp:	17:31:25
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	4869
Deposit Account	502432
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Warnings:					
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	1	6931261		2005-08-16	WAYLETT ET AL.	

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	1	20030040335		2003-02-27	MCINTOSH ET AL.	
	2	20040037565		2004-02-26	Young et al.	
	3	20050088999		2005-04-28	WAYLETT ET AL.	
	4	20050153712		2005-07-14	Osaka et al.	
	5	20080014948		2008-01-17	Scheinert	

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	6	20080058018		2008-03-06	Scheinert	

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	1	CHINESE PATENT OFFICE, "Notification to Grant Patent Right for Invention", "from Foreign Counterpart of U.S. Application No. 11/627,251", 12/26/2012, Page(s) 1-4, Published in: CN	☐

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Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☐ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Aaron W. Pederson/	Date (YYYY-MM-DD)	2013-02-06
Name/Print	Pederson, Aaron W.	Registration Number	58607

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

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Electronic Patent Application Fee Transmittal

Application Number:	11627255
Filing Date:	25-Jan-2007
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Filer:	Aaron Wesley Pederson/Lisa Gentry
Attorney Docket Number:	100.829US01

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt	
EFS ID:	14892636
Application Number:	11627255
International Application Number:	
Confirmation Number:	1589
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Customer Number:	34206
Filer:	Aaron Wesley Pederson/Lisa Gentry
Filer Authorized By:	Aaron Wesley Pederson
Attorney Docket Number:	100.829US01
Receipt Date:	06-FEB-2013
Filing Date:	25-JAN-2007
Time Stamp:	15:58:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	2974
Deposit Account	502432
Authorized User	FOGG, DAVID N.
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		00346712.PDF	64278 fc904ef6c86fea2394d934fd026591c8cc752dc8	yes	12
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Amendment/Req. Reconsideration-After Non-Final Reject		1	1	
	Claims		2	7	
	Applicant Arguments/Remarks Made in an Amendment		8	12	
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	00342212.PDF	611949 0123d8ac54150aeac285616ef0bdf5ef76ecb998	no	4
Warnings:					
Information:					
3	Non Patent Literature	00337142.PDF	213842 5a7c06f2b025620cae80b3517bd0bbbcc480ddd8	no	4
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30368 3573f5fcd4cbdc0cd3de4961345103220 5c4c8af	no	2
Warnings:					
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		Total Files Size (in bytes):	920437		

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New International Application Filed with the USPTO as a Receiving Office
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Applicant(s)	Koziy	**AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.111**
Serial No.	11/627,255	
Filing Date	1/25/2007	
Confirmation No.	1589	
Examiner Name	MAGLOIRE, VLADIMIR	
Group Art Unit	2645	
Attorney Docket No.	100.829US01	
Title: DISTRIBUTED REMOTE BASE STATION SYSTEM		

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

The Office Action mailed on November 6, 2012 has been reviewed. Please amend the above-identified application as follows.

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

Remarks begin on page 8 of this paper.

Amendments to the Claims:

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

Listing of claims:

1. (Currently Amended) A distributed base station system for high speed data transmission comprising:

a host unit;

a plurality of remote antennas communicatively coupled to the host unit;

wherein the host unit is configured to send downlink RF sampled data to the plurality of remote antennas and the plurality of remote antennas are configured to transmit an RF signal based on the downlink RF sampled data;

wherein the plurality of remote antennas are configured to send uplink RF sampled data to the host unit based on RF signals received;[[,]]

wherein each of the plurality of remote antennas ~~being~~ is coupled to a co-located, network layer router, and at least one of the plurality of remote antennas is coupled to a co-located remote base station;

wherein the plurality of remote antennas are coupled to each other and are arranged into a network, and wherein the network layer routers are configured to route data corresponding to RF signals transmitted and received at the plurality of remote antenna units, to and from the remote base station over the network.

2. (Original) The distributed base station system of claim 1, wherein the plurality of remote antennas are arranged in a tree configuration.

3. (Original) The distributed base station system of claim 1, wherein the plurality of remote antennas are arranged in a ring configuration.

4. (Cancelled)

5. (Original) The distributed base station system of claim 1, wherein each of the plurality of remote antennas is coupled to a remote base station.

6. (Original) The distributed base station system of claim 1, wherein the system transports data using a protocol that is compliant with IEEE 802.16.

7. (Original) The distributed base station system of claim 1, further comprising:

a fiber optic transport mechanism between two of the plurality of remote antennas.

8. (Original) The distributed base station system of claim 1, further comprising:

a millimeter wave transceiver configured to transport data between two of the plurality of remote antennas.

9. (Currently Amended) A method of transmitting a wireless communication signal comprising:

receiving a first RF signal at a first remote wireless communication station;

routing a first transport signal based on the first RF signal to a second remote wireless communication station via a network layer router co-located with the first remote wireless communication station;

receiving the [[RF]] first transport signal at a co-located, network layer router at the second remote wireless communication station; ~~and~~

processing the first transport signal by a base station at the second remote wireless communication station;

receiving a second RF signal at the first remote wireless communication station; and

sending a second transport signal to a host unit based on the second RF signal.

~~transmitting the RF signal from an antenna at the second remote wireless communication station.~~

10. (Currently Amended) The method of claim 9, further comprising:

~~sending the RF signal from a local base station to the first remote wireless communication station.~~

sending a third transport signal from the host unit to the first remote wireless communication system; and

transmitting a third RF signal from the remote wireless communication station based on the third transport signal.

11. (Currently Amended) The method of claim 9, wherein receiving the first RF signal receives the first RF signal via an antenna at the first remote wireless communication station.

12. (Cancelled)

13. (Currently Amended) The method of claim [[12,]] 9, further comprising:

generating a fourth RF signal at the base station; and

transmitting the ~~second~~ fourth RF signal from an antenna of the ~~third~~ second remote wireless base station.

14. (Currently Amended) The method of claim [[9,]] 13, further comprising:

~~splitting the RF signal and~~ sending a duplicate of the fourth RF signal to a third remote wireless communication station; and

transmitting ~~the duplicate~~ the duplicate of the fourth RF signal from an antenna at the third remote wireless communication station.

15. (Cancelled)

16. (Currently Amended) The method of claim [[9,]] 13, wherein transmitting further comprises:

transmitting the fourth RF signal to a mobile device.

17. (Currently Amended) The method of claim 9, further comprising:

processing [[the]] a fifth RF signal by a base station at the first remote wireless communication station to form a ~~second~~ sixth RF signal; and

transmitting the ~~second~~ sixth RF signal from an antenna at the first remote wireless communication station.

18. (Currently Amended) The method of claim 9, wherein the first transport ~~RF~~ signal is transported using a protocol that is compliant with IEEE 802.16.

19. (Currently Amended) The method of claim 9, wherein routing the first transport ~~RF~~ signal further comprises:

routing the first transport ~~RF~~ signal through a third wireless communication station and then to the second remote wireless communication station.

20. (Currently Amended) A method of transmitting a wireless communication signal comprising:

receiving a first RF signal at an antenna of a first remote wireless communication station;

processing the first RF signal by a base station at the first remote wireless communication station;

routing ~~the processed RF~~ a first transport signal based on the processing of the first RF signal through a network of remote wireless communication stations to a second remote wireless communication station, each remote wireless communication station having a co-located, network layer router; ~~and~~

transmitting a ~~processed~~ second RF signal based on the first transport signal from the antenna of the second remote wireless communication station;

receiving a third RF signal at the first remote wireless communication station; and

sending a second transport signal to a host unit based on the second RF signal.

21. (Currently Amended) The method of claim 20, wherein the first transport ~~RF~~ signal is transported using a protocol that is compliant with IEEE 802.16.

22. (Currently Amended) The method of claim 20, wherein transmitting further comprises:

transmitting the ~~processed~~ second RF signal to a mobile device.

23. (Currently Amended) The method of claim 20, wherein receiving the first RF signal receives the first RF signal via an antenna at the first remote wireless communication station.

24. (Cancelled)

25. (Currently Amended) A remote wireless communication station for transmitting high speed wireless data comprising:

a remote unit;

a router co-located with and coupled to the remote unit; and

an antenna coupled to the remote unit;

wherein the remote unit is configured to send uplink RF sampled data to a host unit based on RF signals received, and is configured to route data corresponding to RF signals transmitted and/or received to and from a remote base station over a network of other remote units.

26. (Previously Presented) The remote wireless communication station of claim 25, wherein the remote unit is configured to transmit data using a protocol compliant with IEEE 802.16.

27. (Previously Presented) The remote wireless communication station of claim 25, further comprising:

a baseband unit; and

wherein the remote unit is coupled to the baseband unit and is configured as a base station.

REMARKS

The Office Action mailed on November 6, 2012 has been reviewed. Claims 1, 9-11, 13, 14, 16-23, and 25 have been amended and claims 4, 12, 15 and 24 have been cancelled; as a result, claims 1-3, 5-11, 13, 14, 16-23, and 25-27 are pending in this application.

Examiner Interview Summary

Applicant's representative, Aaron W. Pederson (Reg. No. 58,607), thanks Examiner Magloire for the opportunity to discuss aspects of the subject application in a telephone interview on January 28, 2013. During the call, the claims were discussed generally with respect to the Mani and Mohamadi references. No agreements were reached.

Applicants believe the substance and scope of the telephone conversation January 28, 2013 with respect to this application is accurately captured in the summary above.

Rejections Under 35 U.S.C. § 103

Claims 1, 3-5, 7, 9-17, 20, 22-25 and 27 were rejected under 35 USC § 103(a) as being unpatentable over Mani et al. (U.S. Publication No. 2002/0191565) in view of Mohamadi (U.S. Patent No. 2006/0040615). Applicants respectfully traverse these rejections.

Claim 1 has been amended to recite in pertinent part:

> wherein the host unit is configured to send downlink RF sampled data to the plurality of remote antennas and the plurality of remote antennas are configured to transmit an RF signal based on the downlink RF sampled data;
>
> wherein the plurality of remote antennas are configured to send uplink RF sampled data to the host unit based on RF signals received …

> wherein the network layer routers are configured to route data corresponding to RF signals transmitted and received at the plurality of remote antenna units, to and from the remote base station over the network

Applicants respectfully assert that neither Mani nor Mohamadi nor the combination thereof, teach or suggest a distributed base station system where the remote units can send and receive RF sampled data with a host as well as route data through a network of remote units to a base station at one (or more) of the remote units as recited in claim 1. Such a system enables a signal that can be processed by a base station at a remote unit to be processed locally, while other signals can be sent to a central base station hotel for processing.

Mani does disclose a plurality of base stations (14) communicatively coupled to a plurality of antennas (12), however, Mani does not disclose sending transport signals to both a host unit (e.g., at a base station hotel), and a remote base station that is co-located with a remote unit and antenna. The base stations (12) described in Mani are akin to the host units of the subject application. Mani does not teach or suggest a remote base station that is co-located with a remote unit as recited in claim 1.

Mohamadi also does not teach or suggest the language of claim 1, as Mohamadi is merely related to a wireless repeated that can have a router located therewith. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection to claim 1 in view of Mani and Mohamadi.

Claims 3, 5, and 7 depend from claim 1, and claim 4 has been cancelled. Accordingly, Applicant respectfully requests withdrawal of the rejections for these claims for the reasons stated above with respect to claim 1.

Claim 9 has been amended to recite in pertinent part:

> receiving a first RF signal at a first remote wireless communication station;
>
> routing a first transport signal based on the first RF signal to a second remote wireless communication station via a network layer router co-located with the first remote wireless communication station …

receiving a second RF signal at the first remote wireless communication station; and

sending a second transport signal to a host unit based on the second RF signal

Similar to claim 1, amended claim 9 recites that a first transport signal based on the first RF signal is routed to a second remote wireless communication station via a network layer router co-located with the first remote wireless communication station, and that a second transport signal is sent to a host unit based on a second RF signal received at the first remote wireless communication station. Applicants respectfully assert that neither Mani nor Mohamadi nor the combination thereof, teach or suggest such a method based on the assertions made with respect to claim 1. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection to claim 9 in view of Mani and Mohamadi.

Claims 10, 11, 13, 14, 16, 17, 20, 22, 23, 25 and 27 either depend from or contain similar language to claims 1 or 9, and claims 12, 15, and 24 have been cancelled. Accordingly, Applicants respectfully request withdrawal of the rejections for these claims for the reasons stated above with respect to claim 1 and 9.

Claims 2 and 19 were rejected under 35 USC § 103(a) as being unpatentable over Mani et al. (U.S. Publication No. 2002/0191565) in view of Mohamadi (U.S. Patent No. 2006/0040615) and further in view of Chung et al. (U.S. Publication No. 2004/0110534). Applicants respectfully traverse these rejections.

Claim 2 depends from claim 1 and claim 19 depends from claim 9. Accordingly, Applicants respectfully request that Mani and Mohamadi do not teach or suggest the language of claims 2 or 19 for the reasons stated above with respect to claims 1 and 9. Chung also does not teach or suggest such language. Accordingly, Applicants respectfully request withdrawal of the rejection of claims 2 and 19 with respect to Mani, Mohamadi, and Chung.

Claims 6, 8, 18, 21 and 26 were rejected under 35 USC § 103(a) as being unpatentable over Mani et al. (U.S. Publication No. 2002/0191565) in view of Mohamadi (U.S. Patent No. 2006/0040615) and further in view of Louberg et al. (U.S. Publication No. 2006/0111047). Applicants respectfully traverse these rejections.

Claim 6 depends from claim 1, claims 8 and 19 depend from claim 9, claim 21 depends from claim 20, and claim 26 depends from claim 25. Accordingly, Applicants respectfully request that Mani and Mohamadi do not teach or suggest the language of claims 6, 8, 18, 21, or 26 for the reasons stated above with respect to claims 1 and 9. Louberg also does not teach or suggest such language. Accordingly, Applicants respectfully request withdrawal of the rejection of claims 6, 8, 18, 21, and 26 with respect to Mani, Mohamadi, and Louberg.

CONCLUSION

Applicant respectfully submits that claims **1-3, 5-11, 13, 14, 16-23, and 25-27** are in condition for allowance and notification to that effect is earnestly requested. If necessary, please charge any additional fees or credit overpayments to Deposit Account No. 502432.

If the Examiner has any questions or concerns regarding this application, please contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: February 6, 2013

/Aaron W. Pederson/

Aaron W. Pederson
Reg. No. 58607

Attorneys for Applicant
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T – (952) 465-0770
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PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/627,255	01/25/2007	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ 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 02/06/2013	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 23	Minus	** 27	= 0	X $ =		OR	X $62=	0
Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X $ =		OR	X $250=	0
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	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:
/ROSA WEST/

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/627,255	01/25/2007	Robert J. Koziy	100.829US01	1589

34206 7590 11/06/2012

FOGG & POWERS LLC
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EXAMINER	
MAGLOIRE, VLADIMIR	
ART UNIT	PAPER NUMBER
2645	

NOTIFICATION DATE	DELIVERY MODE
11/06/2012	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):

DAVID@FOGGLAW.COM
docketing@fogglaw.com

Office Action Summary	Application No.	Applicant(s)	
	11/627,255	KOZIY ET AL.	
	Examiner	Art Unit	
	VLADIMIR MAGLOIRE	2645	

-- 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 *08 December 2010*.

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

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

Disposition of Claims

4)☒ Claim(s) *1-27* 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) *1-27* 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 _____ 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

Art Unit – Location

1. The Art Unit location of your application in the USPTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Art Unit 2645.

Continued Examination Under 37 CFR 1.114

2. Receipt is acknowledged of a request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e) and a submission, filed on 12/08/2010. Since this application is eligible for continued examination under CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office Action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/08/2010 has been entered.

Information Disclosure Statement

3. The information disclosure statements (IDS) submitted on 10/19/2012 and 04/09/2012 have been entered and considered by the examiner.

Response to Arguments

4. Applicant's arguments filed 7/10/2010 have been fully considered and they are persuasive with regards to Mani failing to teach a network layer router. However, a new grounds of rejection is made in view of Mohamadi; Farrokh (US 20060040615 A1: hereinafter "Mohamadi").

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.

6. Claims 1, 3-5, 7, 9-17, 20, 22-25, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mani et al. (US 2002/0191565) in view of Mohamadi.

Regarding claim 1. Mani teaches a distributed base station system for high speed data transmission **(title, abstract, and figure 5)** comprising:

a plurality of remote antennas **(figure 5 item 12)**, each antenna being coupled to a co-located network router **(figure 15, item 27, further see par. 57)**;

wherein the plurality of remote antennas are coupled to each other **(figure 5 item 12, the antennas are coupled to each other by the links 16)** and are arranged into a network **(figure 5 item 10 is the network made up by the antennas 12, further see par. 46)**.

Mani does not specifically disclose a network layer router.

In the same field of endeavor, Mohamadi discloses a network layer router **(see Mohamadi, ¶[0032] "Although such demodulation adds to the complexity of the design, it enables a layer 3 routing ability in that the wireless repeater could then act as a router.").**

Given that the Mani discloses a router, and a repeater structure, and given that Mohamadi discusses a wireless layer 3 router (network layer) repeater, it would have

been obvious to one of ordinary skill in the art at the time of the invention to modify the distribution system of Mani by using a network layer router, as taught by Mohamadi, thereby providing routing abilities to remote devices.

Regarding claim 3. Mani further teaches the distributed base station system wherein the plurality of remote antennas are arranged in a ring configuration **(figure 5, see the antennas in a ring configuration, further par. 49 and 51)**.

Regarding claim 4. Mani further teaches wherein at least one of the plurality of remote antennas is coupled to a remote base station. **(figure 5, antenna 12 coupled to remote base station 14 over link 16)**

Regarding claim 5. Mani further teaches wherein each of the plurality of remote antennas is coupled to a remote base station. **(figure 5, each antenna 12 is coupled to remote base station 14 over link 16)**

Regarding claim 7. Mani further teaches further comprising: a fiber optic transport mechanism between two of the plurality of remote antennas. **(fig. 5, fig. 8, and par. 8, 47 and 49)**

Regarding claim 9. Mani teaches a method of transmitting a wireless communication signal (title, abstract, and par. 56), comprising:

receiving a RF signal at a first remote wireless communication station via a network router co-located with the first remote wireless communication station **(par. 56, i.e. RF traffic received at antenna 12 is directed into base station 14, further par. 63, i.e. at antenna 12 an uplink signal is received, converted, and transmitted over the network 10 to the base station units 14)**;

receiving the RF signal at a co-located, network layer router at the second remote wireless communication station **(¶[0045, 80], discloses multiple remote units receiving the same RF signal)**; and

routing the RF signal to a second remote wireless communication station **(par. 56, 57, and 63, i.e. RF traffic from antenna 12 is redirected to base station 14, further the control box 27 provides routing to selected base stations, and at antenna 12 an uplink signal is received, converted, and transmitted over the network 10 to the base station units 14)**; and

transmitting the RF signal from an antenna at the second remote wireless communication station **(par. 63, i.e. the antenna 12 can receive a downlink signal (thus a signal from the base station 14 to the antenna 12), it can then reconstruct and transmit the RF signal).**

Mani does not specifically disclose a network layer router.

In the same field of endeavor, Mohamadi discloses a network layer router **(see Mohamadi, ¶[0032] "Although such demodulation adds to the complexity of the design, it enables a layer 3 routing ability in that the wireless repeater could then act as a router.").**

Given that the Mani discloses a router, and a repeater structure, and given that Mohamadi discusses a wireless layer 3 router (network layer) repeater, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the distribution system of Mani by using a network layer router, as taught by Mohamadi, thereby providing routing abilities to remote devices.

Regarding claim 10. Mani further teaches sending the RF signal from a local base station to the first remote wireless communication station. **(par. 63, i.e. the base station 14 may transmit a downlink digital signal on to the network 10, and thus to a remote communication station)**

Regarding claims 11 and 23. Mani further teaches wherein receiving the RF signal receives the RF signal via an antenna at the first remote wireless communication station. **(par. 63, i.e. antenna 12 can be configured to receive)**

Regarding claim 12. Mani further teaches processing the RF signal by a base station at the second remote wireless communication station to form a second RF signal **(par. 63, i.e. signal received at antenna 12 are transmitted over the network to base station 14, base station 14 receives the signal and processes it, which thus creates a second signal (i.e. a processed version of the first signal received at the base station)**; and routing the second RF signal to a third remote wireless base station.

(par. 63, i.e. the base station can additionally transmit a downlink signal to the network 10)

Regarding claim 13. Mani further teaches transmitting the second RF signal from an antenna of the third remote wireless base station. **(par. 63, the antenna receives the downlink signal and transmits it)**

Regarding claim 14. Mani further teaches splitting the RF signal and sending a duplicate RF signal to a third remote wireless communication station **(see figure 8, de multiplexer)**; and transmitting the duplicate RF signal from an antenna at the third remote wireless communication station. **(par. 63, the antenna receives the downlink signal and transmits it)**

Regarding claims 15 and 24. Mani further teaches sending the RF signal from a host unit to the first wireless communication station. **(par. 63, uplink signals received at antenna 12 from a mobile unit are converted and transmitted over the network 10 to the base station 14)**

Regarding claims 16 and 22. Mani further teaches transmitting the RF signal to a mobile device. **(par. 59, i.e. the signal is received by the remote mobile unit)**

Regarding claim 17. Mani further teaches processing the RF signal by a base station at the first remote wireless communication station to form a second RF signal **(par. 63, i.e. signal received at antenna 12 are transmitted over the network to base station 14, base station 14 receives the signal and processes it, which thus creates a second signal (i.e. a processed version of the first signal received at the base station)**; and transmitting the second RF signal from an antenna at the first remote wireless communication station. **(par. 63, the antenna receives the downlink signal and transmits it)**

Regarding claim 20. Mani teaches a method of transmitting a wireless communication signal **(title, abstract, par. 56 and 63)** comprising:

receiving a RF signal at an antenna of a first remote wireless communication station **(par. 56, i.e. RF traffic received at antenna 12 is directed into base station 14, further par. 63, i.e. at antenna 12 an uplink signal is received, converted, and transmitted over the network 10 to the base station units 14)**;

processing the RF signal by a base station at the first remote wireless communication station **(par. 56, 57, and 63, i.e. RF traffic from antenna 12 is redirected to base station 14, further the control box 27 provides routing to selected base stations, and par. 62-63, i.e. at antenna 12, which serves as a remote unit and provides conventional base station functionality as explained in par. 62, an uplink signal is received, converted (i.e. processed), and transmitted over the network 10 to the base station units 14)**;

routing the processed RF signal through a network of remote wireless communication stations to a second remote wireless communication station **(par. 56, 57, and 63, i.e. RF traffic from antenna 12 is redirected to base station 14, further the control box 27 provides routing to selected base stations, and at antenna 12 an uplink signal is received, converted (i.e. processed), *and transmitted over the network 10 to the base station units 14***); each remote wireless communication station having a co-located, network router **(figure 15, item 27, further see par. 57)** and

transmitting a processed RF signal from the antenna of the second remote wireless communication station. **(par. 63, i.e. the antenna 12 can receive a downlink signal, it can then reconstruct and transmit the RF signal)**

Mani does not specifically disclose a network layer router.

In the same field of endeavor, Mohamadi discloses a network layer router **(see Mohamadi, ¶[0032] "Although such demodulation adds to the complexity of the design, it enables a layer 3 routing ability in that the wireless repeater could then act as a router.").**

Given that the Mani discloses a router, and a repeater structure, and given that Mohamadi discusses a wireless layer 3 router (network layer) repeater, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the distribution system of Mani by using a network layer router, as taught by Mohamadi, thereby providing routing abilities to remote devices.

Regarding claim 25. Mani teaches a remote wireless communication station for transmitting high speed wireless data (title, abstract, and figure 5) comprising:

a remote unit (figure 5 item 14);

a router co-located with and coupled to the remote unit **(figure 5, "Node", further see figures 6 and 7, which shows the node can be a switch or router coupled and co-located with the remote unit)** and

an antenna coupled to the remote unit. **(figure 5, item 12 , coupled to the base station 14 through link 16)**

Mani does not specifically disclose a network layer router.

In the same field of endeavor, Mohamadi discloses a network layer router **(see Mohamadi, ¶[0032] "Although such demodulation adds to the complexity of the design, it enables a layer 3 routing ability in that the wireless repeater could then act as a router.").**

Given that the Mani discloses a router, and a repeater structure, and given that Mohamadi discusses a wireless layer 3 router (network layer) repeater, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the distribution system of Mani by using a network layer router, as taught by Mohamadi, thereby providing routing abilities to remote devices.

Regarding claim 27. Mani further teaches a baseband unit; and the remote unit is coupled to the baseband unit and is configured as a base station. **(figure 5 item 14, further par. 46, i.e. Base stations 14 are configured to provide wireless cellular**

transmission, thus the baseband unit is inherent in view of the base station 14, further see par. 62, i.e. baseband coding)

7. Claims 2 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mani and Mohamadi further in view of Chung et al. (US 2004/0110534).

Regarding claim 2. The combination of Mani and Mohamadi teaches the limitations of the previous claim.

However, the combination of Mani and Mohamadi do not specifically disclose wherein the plurality of remote antennas are arranged in a tree configuration.

Chung teaches a method and system to enhance capacity in a distributed network (title and abstract). Chung further teaches in par. 7 the idea of using a tree configuration.

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to utilize the teachings as in Chung with the teachings as in the combination of Mani and Mohamadi. The motivation for doing so would have been to allow for using a configuration that can be less costly and reduce link distance. (Chung par. 7)

Regarding claim 19. Chung further teaches routing the RF signal through a third wireless communication station and then to the second remote wireless communication station. **(par. 7, i.e. the tree structure would allow for routing a signal through one station to get to another, and thus reading on this claim)**

8. Claims 6, 8, 18, 21, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mani and Mohamadi in view of Louberg et al. (US 2006/0111047).

Regarding claims 6, 18, 21, and 26. Mani teaches the limitations of the previous claim.

However, the combination of Mani and Mohamadi do not specifically disclose wherein the system transports data using a protocol that is compliant with IEEE 802.16.

Louberg teaches a wireless communication system (title and abstract), that has distributed base stations **(see figures 1 and 3b)**. Louberg teaches the idea that the system uses a protocol compliant with IEEE 802.16 **in par. 2 and 48 (i.e. WiMax)**.

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to utilize the teachings as in Louberg with the teachings as in the combination of Mani and Mohamadi. The motivation for doing so would have been to allow for using a well known and widely used high speed, high bandwidth technology.

Regarding claim 8. Louberg further teaches further a millimeter wave transceiver configured to transport data between two of the plurality of remote antennas. **(par. 48)**

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to VLADIMIR MAGLOIRE whose telephone number is (571)270-5144. The examiner can normally be reached on Monday to Friday, 9:00 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Addy can be reached on 571-272-7795. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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.

/Vladimir Magloire/
Primary Examiner, Art Unit 2645

Notice of References Cited	Application/Control No. 11/627,255	Applicant(s)/Patent Under Reexamination KOZIY ET AL.	
	Examiner VLADIMIR MAGLOIRE	Art Unit 2645	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2006/0040615 A1	02-2006	Mohamadi, Farrokh	455/025
	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
L1	5136	455/3.01,422.1.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 15:50
L2	94	1 and (network with layer with rout$3)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 15:51
L3	90	("4183054" | "5577029" | "5631916" | "5668562" | "5682403" | "5734699" | "5734979" | "5761195" | "5765099" | "5781582" | "5818824" | "5842138" | "5867535" | "5883882" | "5887256" | "5930682" | "5953651" | "5983070" | "5999813" | "6014546" | "6078823" | "6081716" | "6101400" | "6157810" | "6169907" | "6173177" | "6212395" | "6269255" | "6353600" | "6381463" | "6535732" | "6549772" | "6553111" | "6556551" | "6580924" | "6594496" | "6597912" | "6640108" | "6658259" | "6675004" | "6694134" | "6771933" | "6785558" | "6801767" | "6829477" | "6847653" | "6912409" | "D391967" | "D391968" | "D397693").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 15:52
L4	90	("4183054" | "5577029" | "5631916" | "5668562" | "5682403" | "5734699" | "5734979" | "5761195" | "5765099" | "5781582" | "5818824" | "5842138" | "5867535" | "5883882" | "5887256" | "5930682" | "5953651" | "5983070" | "5999813" | "6014546" | "6078823" | "6081716" | "6101400" | "6157810" | "6169907" | "6173177" | "6212395" | "6269255" | "6353600" | "6381463" | "6535732" | "6549772" | "6553111" | "6556551" | "6580924" | "6594496" | "6597912" | "6640108" | "6658259" | "6675004" | "6694134" | "6771933" | "6785558" | "6801767" | "6829477" | "6847653" | "6912409" | "D391967" | "D391968" | "D397693").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 15:54
S1	2	"20020191565"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 09:31
S2	35321	network adj layer	US-PGPUB;	OR	ON	2012/10/27 13:05

			USPAT; EPO; JPO; DERWENT			
S3	13	S2 and (sonet adj rout$3)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 13:06
S4	3	"20060040615"	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2012/10/27 13:24

EAST Search History (Interference)

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

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /V.M./

Receipt date: 10/19/2012	Application Number	11627255 11627255 - GAU: 2645
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Filing Date	2007-01-25
(Not for submission under 37 CFR 1.99)	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

	1	CHINESE PATENT OFFICE, "First Office Action", "from Foreign Counterpart of U.S. Application No. 11/627,251", 1/18/2012, Page(s) 1-13, Published in: CN	☐
	2	CHINESE PATENT OFFICE, "Office Action", "from Foreign Counterpart of U.S. Application No. 11/627,251", 8/15/2012, Page(s) 1-14, Published in: CN	☐
	3	U.S. PATENT AND TRADEMARK OFFICE, "Final Office Action", "Application Serial No. 11/627,251", 11/22/2011, Page(s) 1-8	☐
	4	U.S. PATENT AND TRADEMARK OFFICE, "Office Action", "Application Serial No. 11/627,251", 3/8/2010, Page(s) 1-43	☐
	5	U.S. PATENT AND TRADEMARK OFFICE, "Office Action", "Application Serial No. 11/627,251", 11/15/2010, Page(s) 1-12	☐
	6	U.S. PATENT AND TRADEMARK OFFICE, "Office Action", "Application Serial No. 11/627,251", 5/31/2011, Page(s) 1-9	☐
	7	U.S. PATENT AND TRADEMARK OFFICE, "Office Action", "Application Serial No. 11/627,251", 10/11/2012, Page(s) 1-19	☐
	8	INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY, "INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY", "from Foreign Counterpart of U.S. Application No. 11/627,251", 8/6/2009, Page(s) 1-5, Published in: WO	☐
	9	INTERNATIONAL SEARCHING AUTHORITY, "INTERNATIONAL SEARCH REPORT ", "from Foreign Counterpart of U.S. Application No. 11/627,251", Mailed 11/10/2008, Page(s) 1-15, Published in: WO	☐

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

EXAMINER SIGNATURE

Examiner Signature	/Vladimir Magloire/	Date Considered	10/27/2012

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

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /V.M./

Receipt date: 10/19/2012	Application Number	11627255 11627255 - GAU: 2645
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

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

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Receipt date: 10/19/2012	Application Number	11627255 11627255 - GAU: 2645
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Aaron W. Pederson/	Date (YYYY-MM-DD)	2012-10-19
Name/Print	Pederson, Aaron W.	Registration Number	58607

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

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

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

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

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

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

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

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

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11627255	KOZIY ET AL.
	Examiner	Art Unit
	MICHAEL T THIER	2617

SEARCHED			
Class	Subclass	Date	Examiner
	updated	8/18/2010	/mtt/
455	3.01, 422.1	10/27/2012	VM

SEARCH NOTES		
Search Notes	Date	Examiner
updated	8/18/2010	/mtt/
reviewed prior art made of record	10/27/2012	VM

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11627255	KOZIY ET AL.
	Examiner	Art Unit
	MICHAEL T THIER	2617

✓	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	08/18/2010	10/27/2012							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
	13	✓	✓							
	14	✓	✓							
	15	✓	✓							
	16	✓	✓							
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	24	✓	✓							
	25	✓	✓							
	26	✓	✓							
	27	✓	✓							

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	D391967		1998-03-10	BLAIS ET AL.	
	2	D391968		1998-03-10	SHIOZAKI	
	3	D397693		1998-09-01	BLIAS ET AL.	
	4	4183054		1980-01-08	Patisaul et al.	
	5	5577029		1996-11-19	LU ET AL.	
	6	5631916		1997-05-20	GEORGES ET AL.	
	7	5668562		1997-09-16	CUTRER ET AL.	
	8	5682403		1997-10-28	TU ET AL.	

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Receipt date: 04/09/2012	Application Number	11627255 11627255 - GAU: 2645
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	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

	9	5734699		1998-03-31	LU ET AL.	
	10	5734979		1998-03-31	Lu	
	11	5761195		1998-06-02	LU ET AL.	
	12	5765099		1998-06-09	Georges et al.	
	13	5781582		1998-07-14	SAGE ET AL.	
	14	5818824		1998-10-06	LU ET AL.	
	15	5842138		1998-11-24	LU ET AL.	
	16	5867535		1999-02-02	Phillips	
	17	5883882		1999-03-16	SCHWARTZ	
	18	5887256		1999-03-23	LU ET AL.	
	19	5930682		1999-07-27	Schwartz et al.	

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	20	5953651		1999-09-14	LU ET AL.	
	21	5983070		1999-11-09	GEORGES ET AL.	
	22	5999813		1999-12-07	LU ET AL.	
	23	6014546		2000-01-11	GEORGES ET AL.	
	24	6078823		2000-06-20	CHAVEZ ET AL.	
	25	6081716		2000-06-27	LU	
	26	6101400		2000-08-08	Ogaz et al.	
	27	6157810		2000-12-05	GEORGES ET AL.	
	28	6169907		2001-01-02	CHANG ET AL.	
	29	6173177		2001-01-09	LU ET AL.	
	30	6212395		2001-04-03	LU ET AL.	

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	31	6269255		2001-07-31	WAYLETT	
	32	6353600		2002-03-05	SCHWARTZ ET AL.	
	33	6381463		2002-04-30	TU ET AL.	
	34	6535732		2003-03-18	McIntosh et al.	
	35	6549772		2003-04-15	CHAVEZ ET AL.	
	36	6553111		2003-04-22	WANG	
	37	6556551		2003-04-29	SCHWARTZ	
	38	6580924		2003-06-17	Lu et al.	
	39	6594496		2003-07-15	Schwarz	
	40	6597912		2003-07-22	LU ET AL.	
	41	6640108		2003-10-28	LU ET AL.	

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	42	6658259		2003-12-02	MCINTOSH	
	43	6675004		2004-01-06	WAYLETT	
	44	6694134		2004-02-17	LU ET AL.	
	45	6771933		2004-08-03	Eng et al.	
	46	6785558		2004-08-31	Stratford et al.	
	47	6801767		2004-10-05	Schwartz	
	48	6829477		2004-12-07	Lu et al.	
	49	6847653		2005-01-25	Smiroldo	
	50	6912409		2005-06-28	WAYLETT	

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	1	1739871	EP		2007-03-01	Moorti et al.		☐

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	, "Urban Microcell System Layout", 12/3/2004, Pages 1-13	☐

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Examiner Signature	/Vladimir Magloire/	Date Considered	10/27/2012

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Signature	/Aaron W. Pederson/	Date (YYYY-MM-DD)	2012-04-09
Name/Print	Pederson, Aaron	Registration Number	58607

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Examiner Name	Michael Thier
Attorney Docket Number	100.829US01

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	1	CHINESE PATENT OFFICE, "First Office Action", "from Foreign Counterpart of U.S. Application No. 11/627,251", 1/18/2012, Page(s) 1-13, Published in: CN	☐
	2	CHINESE PATENT OFFICE, "Office Action", "from Foreign Counterpart of U.S. Application No. 11/627,251", 8/15/2012, Page(s) 1-14, Published in: CN	☐
	3	U.S. PATENT AND TRADEMARK OFFICE, "Final Office Action", "Application Serial No. 11/627,251", 11/22/2011, Page(s) 1-8	☐
	4	U.S. PATENT AND TRADEMARK OFFICE, "Office Action", "Application Serial No. 11/627,251", 3/8/2010, Page(s) 1-43	☐
	5	U.S. PATENT AND TRADEMARK OFFICE, "Office Action", "Application Serial No. 11/627,251", 11/15/2010, Page(s) 1-12	☐
	6	U.S. PATENT AND TRADEMARK OFFICE, "Office Action", "Application Serial No. 11/627,251", 5/31/2011, Page(s) 1-9	☐
	7	U.S. PATENT AND TRADEMARK OFFICE, "Office Action", "Application Serial No. 11/627,251", 10/11/2012, Page(s) 1-19	☐
	8	INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY, "INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY", "from Foreign Counterpart of U.S. Application No. 11/627,251", 8/6/2009, Page(s) 1-5, Published in: WO	☐
	9	INTERNATIONAL SEARCHING AUTHORITY, "INTERNATIONAL SEARCH REPORT ", "from Foreign Counterpart of U.S. Application No. 11/627,251", Mailed 11/10/2008, Page(s) 1-15, Published in: WO	☐

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	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Aaron W. Pederson/	Date (YYYY-MM-DD)	2012-10-19
Name/Print	Pederson, Aaron W.	Registration Number	58607

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

LUNDBERG, Scott, V.
Fogg & Powers LLC
P.O. Box 581339
Minneapolis, Minnesota 55458-1339
ETATS-UNIS D'AMERIQUE

Date of mailing *(day/month/year)*	
06 August 2009 (06.08.2009)	
Applicant's or agent's file reference	**IMPORTANT NOTICE**
100.828WO01	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2008/052023	25 January 2008 (25.01.2008)	25 January 2007 (25.01.2007)

Applicant
ADC TELECOMMUNICATIONS, INC. et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

Received
AUG 19 2009
Fogg & Powers LLC

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Beate Giffo-Schmitt

e-mail: pt03.pct@wipo.int

Form PCT/IB/326 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 100.828WO01	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2008/052023	International filing date *(day/month/year)* 25 January 2008 (25.01.2008)	Priority date *(day/month/year)* 25 January 2007 (25.01.2007)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant ADC TELECOMMUNICATIONS, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 28 July 2009 (28.07.2009)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Beate Giffo-Schmitt e-mail: pt03.pct@wipo.int

Form PCT/IB/373 (January 2004)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing:

      ☐ contained in the international application as filed.

      ☐ filed together with the international application in electronic form.

      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

1. The following documents D1-D4 are referred to in this communication:

D1: WO 2004/006602 A1
D2: GB-A-2347319
D3: WO 03/079645 A2
D4: US 5657374

Concerning Section V,
Reasoned statement with regard to novelty, inventive step or industrial applicability

1. Regarding **claim 1**, document **D1** discloses a modular wireless communications platform comprising:
a modular host unit comprising:
a serial radio frequency communicator having a logic device programmed to convert serial digital data into RF sampled data and programmed to
convert RF sampled data into serial digital data; and
an interface coupled to the serial radio frequency communicator and
configured to allow transfer of the RF sampled data from the serial radio frequency communicator to a digital to analog radio frequency transceiver module; (see D1, abstract; page 1, line 27 to page 2, line 20; page 6, line 7 to page 7, line 18) and
a modular remote unit in communication with the modular host unit
comprising:
a serial radio frequency communicator configured to convert serial digital data into RF sampled data and configured to convert RF sampled data into serial digital data; and
an interface coupled to the serial radio frequency communicator and configured to allow transfer of the RE sampled data from the serial radio frequency communicator to a digital to analog radio frequency transceiver module (see D1, page 7, line 18 to page 8, line 26; claim 18; figures 2 to 4).

disclosed in document D1 and D2 is not mentioned in the description, nor are these documents identified therein.
- Contrary to the requirements of Rule 6.2 b) PCT the features cited in the independent claims are not provided with **reference signs** in parentheses to increase the intelligibility of the claims.
- Independent claims **1, 4, 13, 22 and 24** are not in the **two-part form** in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(I) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

VIII. Remarks concerning clarity of the international application:

- Although claims **1, 4, 13, 22 and 24** have been drafted as separate independent claims, they appear to either relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and in respect of the terminology used for the features of that subject-matter or some of said claims appear to just represent broader and more vague formulations of the subject-matter for which protection is sought or anyway some of these claims could be re-formulated in terms of one independent claim and related attached dependent claims.
In particular it appears that it would be sufficient to use only one independent claim directed to the overall system (the modular wireless communication platform) and one corresponding claim directed to the host unit and one corresponding claim directed to the remote unit.

The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT (see also PCT Guidelines, 5.42, A5.42, A5.42[1] and A5.42[2]).

- The independent claims **1, 4, 13, 22 and 24** do not meet the requirements of the Rule 10.2 PCT concerning **a consistent terminology** to be kept throughout the whole application, when assuming that eg. the "remote radio head" of claim 4

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00144

PATENT COOPERATION TREATY

JMS
D/ IDS ivo ISR due: 12/10/08

From the INTERNATIONAL SEARCHING AUTHORITY

To:
FOGG & POWERS LLC
Attn. Lundberg, Scott V.
P.O. Box 581339
Minneapolis, MN 55458-1339
ETATS-UNIS D'AMERIQUE

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

DNF|AWP|LDG
D/ Art. 19 Amend Due: 1/10/09

(PCT Rule 44.1)

Date of mailing *(day/month/year)* 10/11/2008	
Applicant's or agent's file reference 100.828WO01	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US2008/052023	International filing date *(day/month/year)* 25/01/2008
Applicant ADC TELECOMMUNICATIONS, INC.	

1. [x] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 338.82.70

   For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Received
NOV 20 2008
Fogg & Powers LLC

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Marlene Benigar

Form PCT/ISA/220 (October 2005) *(See notes on accompanying sheet)*

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims,description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00146

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped),whether

(i) the claim is unchanged;

(ii) the claim is cancelled;

(iii) the claim is new;

(iv) the claim replaces one or more claims as filed;

(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1–10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

If a demand for international preliminary examination is made, the written opinion of the International Searching Authority will, except in certain cases where the International Preliminary Examining Authority did not act as International Searching Authority and where it has notified the International Bureau under Rule 66.1*bis*(b), be considered to be a written opinion of the International Preliminary Examining Authority. If a demand is made, the applicant may submit to the International Preliminary Examining Authority a reply to the written opinion together, where appropriate, with amendments before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later (Rule 43*bis*.1(c)).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the *PCT Applicant's Guide,* Volume II.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
100.828WO01		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2008/052023	25/01/2008	25/01/2007
Applicant		
ADC TELECOMMUNICATIONS, INC.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of:

[X] the international application in the language in which it was filed

[ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**

[X] the text is approved as submitted by the applicant

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

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

[X] the text is approved as submitted by the applicant

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**

a. the figure of the **drawings** to be published with the abstract is Figure No. 1

[X] as suggested by the applicant

[ ] as selected by this Authority, because the applicant failed to suggest a figure

[ ] as selected by this Authority, because this figure better characterizes the invention

b. [ ] none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/052023

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04Q7/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04Q

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2004/006602 A (NOKIA CORP [FI]; HORNEMAN KARI [FI]) 15 January 2004 (2004-01-15) abstract page 1, line 27 - page 2, line 20 page 6, line 7 - page 8, line 26 figures 2-4 claim 18 -----	1-24
X	GB 2 347 319 A (SAMSUNG ELECTRONICS CO LTD [KR]) 30 August 2000 (2000-08-30) abstract page 6, line 9 - page 8, line 9 page 16, line 15 - page 18, line 15 figures 13,14 ----- -/--	1-24

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 October 2008	10/11/2008

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Lombardi, Giuseppe

2

Form PCT/ISA/210 (second sheet) (April 2005)

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00149

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/052023

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 03/079645 A (ADC TELECOMMUNICATIONS INC [US]) 25 September 2003 (2003-09-25) abstract paragraph [0062] - paragraph [0083]	1-24
X	US 5 657 374 A (RUSSELL DAVID S [US] ET AL) 12 August 1997 (1997-08-12) abstract column 3, line 36 - column 4, line 28 column 10, line 12 - column 13, line 43	1-24

2

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00150

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2008/052023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2004006602 A	15-01-2004	AU 2002345137 A1	23-01-2004
		US 2005002353 A1	06-01-2005
GB 2347319 A	30-08-2000	AU 6543799 A	20-07-2000
		CN 1284824 A	21-02-2001
		KR 20000047947 A	25-07-2000
WO 03079645 A	25-09-2003	AU 2003220101 A1	29-09-2003
		US 2004203703 A1	14-10-2004
US 5657374 A	12-08-1997	US 5621786 A	15-04-1997
		US 5642405 A	24-06-1997
		US 5852651 A	22-12-1998
		US 5644622 A	01-07-1997

Form PCT/ISA/210 (patent family annex) (April 2005)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2008/052023	25.01.2008	25.01.2007

International Patent Classification (IPC) or both national classification and IPC
INV. H04Q7/30

Applicant
ADC TELECOMMUNICATIONS, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Lombardi, Giuseppe Telephone No. +49 89 2399-7633

Form PCT/ISA/237 (Cover Sheet) (April 2005)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing:

      ☐ contained in the international application as filed.

      ☐ filed together with the international application in electronic form.

      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1-24
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-24
Industrial applicability (IA)	Yes:	Claims	1-24
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

1. The following documents D1-D4 are referred to in this communication:

   D1: WO 2004/006602 A1
   D2: GB-A-2347319
   D3: WO 03/079645 A2
   D4: US 5657374

Concerning Section V,
Reasoned statement with regard to novelty, inventive step or industrial applicability

1. Regarding **claim 1**, document **D1** discloses a modular wireless communications platform comprising:
   a modular host unit comprising:
   a serial radio frequency communicator having a logic device programmed to convert serial digital data into RF sampled data and programmed to convert RF sampled data into serial digital data; and
   an interface coupled to the serial radio frequency communicator and configured to allow transfer of the RF sampled data from the serial radio frequency communicator to a digital to analog radio frequency transceiver module; (see D1, abstract; page 1, line 27 to page 2, line 20; page 6, line 7 to page 7, line 18) and
   a modular remote unit in communication with the modular host unit comprising:
   a serial radio frequency communicator configured to convert serial digital data into RF sampled data and configured to convert RF sampled data into serial digital data; and
   an interface coupled to the serial radio frequency communicator and configured to allow transfer of the RE sampled data from the serial radio frequency communicator to a digital to analog radio frequency transceiver module (see D1, page 7, line 18 to page 8, line 26; claim 18; figures 2 to 4).

The subject-matter of claim 1 is therefore not **new** (Articles 33(1) and 33(2) PCT).

It should be furthermore noted that claim 1, appears to lack novelty (Articles 33(1) and 33(2) PCT) also in view of the disclosure of document **D2** (see D2, abstract; page 6, line 9 to page 8, line 9; page 16, line 15 to page 18, line 15 and figure 14) and/or in view of the disclosure of document **D3** (see D3, abstract; paragraphs [0062] to [0083]) and/or in view of the disclosure of document **D4** (see D4, abstract; column 3, line 36 to column 4, line 28; column 10, line 12 to column 13, line 43).

2. The same considerations above regarding claim 1 also apply to the independent **claims 4, 13, 22 and 24,** which are based on the same or corresponding features as claim 1 in terms of claims directed to apparatuses which are part of the system disclosed in claim 1.
It is worth noting, at this purpose, that some of said claims are just redundant claims adopting a different terminology to define the same subject-matter (see also section VIII below) whereas claims 4 and 22 also introduce some additional features which are anyway disclosed in document D1 (see D1, page 6, line 6 to page 8, line 26).

Therefore, the subject-matter of **claims 4, 13, 22 and 24** is also **not new** (Articles 33(1) and 33(2) PCT).

3. **Dependent claims 2 to 3, 5 to 12, 14 to 21 and 23** do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect to novelty and/or inventive step because the subject-matter of said claims is either disclosed in documents D1-D4 (**for claims 2, 5, :** see D2, page 14, line 26 to page 18, line 14; **for claims 7, 9, 10, 14, 15, 17:** see D1, page 6, lines 25 to 32; page 8, lines 18 to 26) or anyway represents minor implementing details which are generally known to the person skilled in the field of mobile telecommunication devices and related remote base station techniques.

VII. Remarks concerning formal defects of the international application:

- Contrary to the requirements of Rule 5.1 (a), (ii) PCT, the relevant background art

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00156

disclosed in document D1 and D2 is not mentioned in the description, nor are these documents identified therein.
- Contrary to the requirements of Rule 6.2 b) PCT the features cited in the independent claims are not provided with **reference signs** in parentheses to increase the intelligibility of the claims.
- Independent claims **1, 4, 13, 22 and 24** are not in the **two-part form** in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(I) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

VIII. Remarks concerning clarity of the international application:

- Although claims **1, 4, 13, 22 and 24** have been drafted as separate independent claims, they appear to either relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and in respect of the terminology used for the features of that subject-matter or some of said claims appear to just represent broader and more vague formulations of the subject-matter for which protection is sought or anyway some of these claims could be re-formulated in terms of one independent claim and related attached dependent claims.
In particular it appears that it would be sufficient to use only one independent claim directed to the overall system (the modular wireless communication platform) and one corresponding claim directed to the host unit and one corresponding claim directed to the remote unit.

The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT (see also PCT Guidelines, 5.42, A5.42, A5.42[1] and A5.42[2]).

- The independent claims **1, 4, 13, 22 and 24** do not meet the requirements of the Rule 10.2 PCT concerning **a consistent terminology** to be kept throughout the whole application, when assuming that eg. the "remote radio head" of claim 4

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00157

corresponds to the "remote unit" of claim 1 and the "modular host transceiver" of claim 24 to the "host unit" of claim 1.
Said claims are therefore not clear (Article 6 PCT).

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00158

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
Filing a demand for international preliminary examination	In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT). If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).
Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).
Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

BNSDOCID: <XS_____200704010CK_I_>

Electronic Acknowledgement Receipt

EFS ID:	14026055
Application Number:	11627255
International Application Number:	
Confirmation Number:	1589
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Customer Number:	34206
Filer:	Aaron Wesley Pederson/Robert Thrumston
Filer Authorized By:	Aaron Wesley Pederson
Attorney Docket Number:	100.829US01
Receipt Date:	19-OCT-2012
Filing Date:	25-JAN-2007
Time Stamp:	11:26:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	00325937.PDF	612071 290f75ebc743e61e1ff1afeff1afec84575b203b	no	5
Warnings:					
Information:					

A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
2	Non Patent Literature	00288088.PDF	594581 fce0debddf2e4f55ad4ad3b76977944a45d77809	no	13
Warnings:					
Information:					
3	Non Patent Literature	00318675.PDF	757468 d7c008d311a4a39d0a593fc7574f72f239ccb398	no	14
Warnings:					
Information:					
4	Non Patent Literature	00277643.PDF	304781 26802a3fc9d7f027f2811ffa76faaca78e0318d3	no	8
Warnings:					
Information:					
5	Non Patent Literature	00199067.PDF	1355599 6c97df2fcbc8aedc40c23d275458731516dcc1c5	no	43
Warnings:					
Information:					
6	Non Patent Literature	00230147.PDF	457347 4a3184ffadcebdc5f2013612ad37b3862527f657	no	12
Warnings:					
Information:					
7	Non Patent Literature	00253231.PDF	305967 ddf778c864be00625a19a0ccc2b06c8ad356676a	no	9
Warnings:					
Information:					
8	Non Patent Literature	00325227.PDF	620885 f6caa6c61198ebfc7021a326c1ce0be870d48476	no	19
Warnings:					
Information:					
9	Non Patent Literature	00173896.PDF	356776 78068501234907433 0c8d0b5f28f0a8042f39290	no	5
Warnings:					
Information:					

10	Non Patent Literature	00144119.PDF	843362 c7dfef21a71846754de238355cca39b4b44bf75d	no	15
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Information:					
			Total Files Size (in bytes):	6208837	

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

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

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

Application Number	11627255
Filing Date	2007-01-25
First Named Inventor	Koziy
Art Unit	2617
Examiner Name	Michael Thier
Attorney Docket Number	100.829US01

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	D391967		1998-03-10	BLAIS ET AL.	
	2	D391968		1998-03-10	SHIOZAKI	
	3	D397693		1998-09-01	BLIAS ET AL.	
	4	4183054		1980-01-08	Patisaul et al.	
	5	5577029		1996-11-19	LU ET AL.	
	6	5631916		1997-05-20	GEORGES ET AL.	
	7	5668562		1997-09-16	CUTRER ET AL.	
	8	5682403		1997-10-28	TU ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

	9	5734699		1998-03-31	LU ET AL.	
	10	5734979		1998-03-31	Lu	
	11	5761195		1998-06-02	LU ET AL.	
	12	5765099		1998-06-09	Georges et al.	
	13	5781582		1998-07-14	SAGE ET AL.	
	14	5818824		1998-10-06	LU ET AL.	
	15	5842138		1998-11-24	LU ET AL.	
	16	5867535		1999-02-02	Phillips	
	17	5883882		1999-03-16	SCHWARTZ	
	18	5887256		1999-03-23	LU ET AL.	
	19	5930682		1999-07-27	Schwartz et al.	

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	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

	20	5953651		1999-09-14	LU ET AL.	
	21	5983070		1999-11-09	GEORGES ET AL.	
	22	5999813		1999-12-07	LU ET AL.	
	23	6014546		2000-01-11	GEORGES ET AL.	
	24	6078823		2000-06-20	CHAVEZ ET AL.	
	25	6081716		2000-06-27	LU	
	26	6101400		2000-08-08	Ogaz et al.	
	27	6157810		2000-12-05	GEORGES ET AL.	
	28	6169907		2001-01-02	CHANG ET AL.	
	29	6173177		2001-01-09	LU ET AL.	
	30	6212395		2001-04-03	LU ET AL.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

	31	6269255		2001-07-31	WAYLETT	
	32	6353600		2002-03-05	SCHWARTZ ET AL.	
	33	6381463		2002-04-30	TU ET AL.	
	34	6535732		2003-03-18	McIntosh et al.	
	35	6549772		2003-04-15	CHAVEZ ET AL.	
	36	6553111		2003-04-22	WANG	
	37	6556551		2003-04-29	SCHWARTZ	
	38	6580924		2003-06-17	Lu et al.	
	39	6594496		2003-07-15	Schwarz	
	40	6597912		2003-07-22	LU ET AL.	
	41	6640108		2003-10-28	LU ET AL.	

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	Art Unit	2617
	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

	42	6658259		2003-12-02	MCINTOSH	
	43	6675004		2004-01-06	WAYLETT	
	44	6694134		2004-02-17	LU ET AL.	
	45	6771933		2004-08-03	Eng et al.	
	46	6785558		2004-08-31	Stratford et al.	
	47	6801767		2004-10-05	Schwartz	
	48	6829477		2004-12-07	Lu et al.	
	49	6847653		2005-01-25	Smiroldo	
	50	6912409		2005-06-28	WAYLETT	

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

U.S.PATENT APPLICATION PUBLICATIONS Remove

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2007-01-25
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	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

	1							

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

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	1739871	EP		2007-03-01	Moorti et al.		☐

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	, "Urban Microcell System Layout", 12/3/2004, Pages 1-13	☐

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	Michael Thier
	Attorney Docket Number	100.829US01

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Aaron W. Pederson/	Date (YYYY-MM-DD)	2012-04-09
Name/Print	Pederson, Aaron	Registration Number	58607

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(54) **Multiple protocol wireless communication transceiver**

(57) A multi-protocol wireless communication baseband transceiver includes a baseband transmit processing module and a baseband receive processing module. The baseband transmit processing module includes an encoding module, an interleaving module, a plurality of symbol mapping modules, a plurality of domain conversion modules, a plurality of cyclic prefix modules, a plurality of compensation modules, and a control module that is operably coupled to produce preamble set up information and payload set up information based on a mode of a plurality of protocol modes. The baseband receive processing module includes a plurality of receive compensation modules, a plurality of cyclic prefix removal modules, a plurality of receive domain conversion modules, an equalizing module, a plurality of demapping modules, a deinterleaving module, a decoding module, and a receive control module that is operably coupled to determine the mode from the plurality of protocol modes and the compensation control signals based on the at least one compensated stream of symbols.

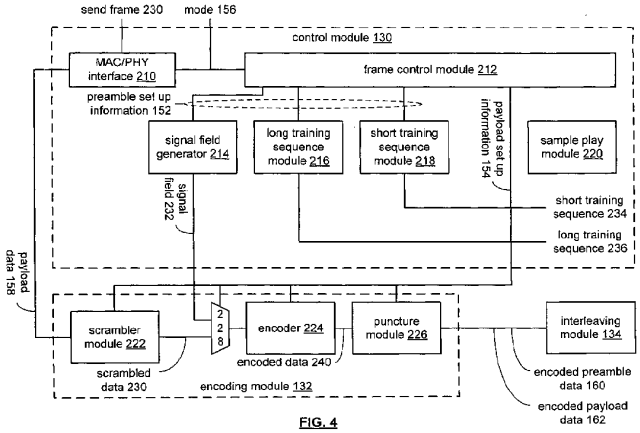


FIG. 4

EP 1 739 871 A2

Description

[0001] This patent application is claiming priority under 35 USC § 119 to a provisionally filed patent application entitled MULTIPLE PROTOCOL WIRELESS COMMUNICATION BASEBAND TRANSCEIVER, having a provisional filing date of 6/29/2005, and a provisional serial number of 60/695,155.

BACKGROUND OF THE INVENTION

TECHNICAL FIELD OF THE INVENTION

[0002] This invention relates generally to wireless communications and more particularly to multiple protocol wireless communication baseband transceivers.

DESCRIPTION OF RELATED ART

[0003] Communication systems are known to support wireless and wire lined communications between wireless and/or wire lined communication devices. Such communication systems range from national and/or international cellular telephone systems to the Internet to point-to-point in-home wireless networks. Each type of communication system is constructed, and hence operates, in accordance with one or more communication standards. For instance, wireless communication systems may operate in accordance with one or more standards including, but not limited to, IEEE 802.11, Bluetooth, advanced mobile phone services (AMPS), digital AMPS, global system for mobile communications (GSM), code division multiple access (CDMA), local multi-point distribution systems (LMDS), multi-channel-multi-point distribution systems (MMDS), and/or variations thereof.

[0004] Depending on the type of wireless communication system, a wireless communication device, such as a cellular telephone, two-way radio, personal digital assistant (PDA), personal computer (PC), laptop computer, home entertainment equipment, et cetera communicates directly or indirectly with other wireless communication devices. For direct communications (also known as point-to-point communications), the participating wireless communication devices tune their receivers and transmitters to the same channel or channels (e.g., one of the plurality of radio frequency (RF) carriers of the wireless communication system) and communicate over that channel(s). For indirect wireless communications, each wireless communication device communicates directly with an associated base station (e.g., for cellular services) and/or an associated access point (e.g., for an in-home or in-building wireless network) via an assigned channel. To complete a communication connection between the wireless communication devices, the associated base stations and/or associated access points communicate with each other directly, via a system controller, via the public switch telephone network, via the Internet, and/or via some other wide area network.

[0005] For each wireless communication device to participate in wireless communications, it includes a built-in radio transceiver (i.e., receiver and transmitter) or is coupled to an associated radio transceiver (e.g., a station for in-home and/or in-building wireless communication networks, RF modem, etc.). As is known, the receiver is coupled to the antenna and includes a low noise amplifier, one or more intermediate frequency stages, a filtering stage, and a data recovery stage. The low noise amplifier receives inbound RF signals via the antenna and amplifies then. The one or more intermediate frequency stages mix the amplified RF signals with one or more local oscillations to convert the amplified RF signal into baseband signals or intermediate frequency (IF) signals. The filtering stage filters the baseband signals or the IF signals to attenuate unwanted out of band signals to produce filtered signals. The data recovery stage recovers raw data from the filtered signals in accordance with the particular wireless communication standard.

[0006] As is also known, the transmitter includes a data modulation stage, one or more intermediate frequency stages, and a power amplifier. The data modulation stage converts raw data into baseband signals in accordance with a particular wireless communication standard. The one or more intermediate frequency stages mix the baseband signals with one or more local oscillations to produce RF signals. The power amplifier amplifies the RF signals prior to transmission via an antenna.

[0007] In many systems, the transmitter will include one antenna for transmitting the RF signals, which are received by a single antenna, or multiple antennas, of a receiver. When the receiver includes two or more antennas, the receiver will select one of them to receive the incoming RF signals. In this instance, the wireless communication between the transmitter and receiver is a single-output-single-input (SISO) communication, even if the receiver includes multiple antennas that are used as diversity antennas (i.e., selecting one of them to receive the incoming RF signals). For SISO wireless communications, a transceiver includes one transmitter and one receiver. Currently, most wireless local area networks (WLAN) that are IEEE 802.11, 802.11a, 802,11b, or 802.11g employ SISO wireless communications.

[0008] Other types of wireless communications include single-input-multiple-output (SIMO), multiple-input-single-output (MISO), and multiple-input-multiple-output (MIMO). In a SIMO wireless communication, a single transmitter processes data into radio frequency signals that are transmitted to a receiver. The receiver includes two or more antennas and two or more receiver paths. Each of the antennas receives the RF signals and provides them to a corresponding receiver path (e.g., LNA, down conversion module, filters, and ADCs). Each of the receiver paths processes the received RF signals to produce digital signals, which are combined and then processed to recapture the transmitted data.

[0009] For a multiple-input-single-output (MISO) wireless communication, the transmitter includes two or more

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00172

transmission paths (e.g., digital to analog converter, filters, up-conversion module, and a power amplifier) that each converts a corresponding portion of baseband signals into RF signals, which are transmitted via corresponding antennas to a receiver. The receiver includes a single receiver path that receives the multiple RF signals from the transmitter. In this instance, the receiver uses beam forming to combine the multiple RF signals into one signal for processing.

[0010] For a multiple-input-multiple-output (MIMO) wireless communication, the transmitter and receiver each include multiple paths. In such a communication, the transmitter parallel processes data using a spatial and time encoding function to produce two or more streams of data. The transmitter includes multiple transmission paths to convert each stream of data into multiple RF signals. The receiver receives the multiple RF signals via multiple receiver paths that recapture the streams of data utilizing a spatial and time decoding function. The recaptured streams of data are combined and subsequently processed to recover the original data.

[0011] With the various types of wireless communications (e.g., SISO, MISO, SIMO, and MIMO) and standards (e.g., IEEE 802.11, IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, extensions and modifications thereof), a large number of combination of types and standards is possible. For a manufacturer of radio frequency transceiver integrated circuits (ICs) to provide ICs for a majority of the combination of standards and types, the manufacturer must produce a significant number of ICs, which is a costly endeavor.

[0012] Therefore, a need exists for a multiple protocol wireless communication baseband transceiver that is capable of processing multiple combinations of standards and types of wireless communications when embodied in an integrated circuit(s).

BRIEF SUMMARY OF THE INVENTION

[0013] The present invention is directed to apparatus and methods of operation that are further described in the following Brief Description of the Drawings, the Detailed Description of the Invention, and the claims.

[0014] According to an aspect of the invention, a multiple protocol wireless communication baseband transmit processing module capable of multiple input multiple output (MIMO) comprises:

control module operably coupled to produce preamble set up information and payload set up information based on a mode of a plurality of protocol modes;

encoding module operably coupled to:

encode preamble data in accordance with the preamble set up information to produce encoded preamble data; and
encode payload data in accordance with the payload set up information to produce encoded payload data;

interleaving module operably coupled to:

interleave the encoded preamble data in accordance with the preamble set up information to produce at least one stream of interleaved encoded preamble data; and
interleave the encoded payload data in accordance with the payload set up information to produce at least one stream of interleaved encoded payload data;

a plurality of symbol mapping modules operably coupled to:

map, in accordance with the preamble set up information, the at least one stream of interleaved encoded preamble data to at least one stream of frequency domain preamble symbols; and
map, in accordance with the payload set up information, the at least one stream of interleaved encoded payload data to at least one stream of frequency domain payload symbols;

a plurality of domain conversion modules operably coupled to:

convert, in accordance with the preamble set up information, the at least one stream of frequency domain preamble symbols into at least one stream of time domain preamble symbols; and
convert, in accordance with the payload set up information, the at least one stream of frequency domain payload symbols into at least one stream of time domain payload symbols;

a plurality of cyclic prefix modules operably coupled to:

add, in accordance with the preamble set up information, a cyclic prefix to the at least one stream of time domain preamble symbols to produce at least one stream of preamble symbols; and
add a cyclic prefix to the at least one stream of time domain payload symbols to produce at least one stream of payload symbols; and

a plurality of compensation modules operably coupled to:

compensate the at least one stream of preamble symbols to produce at least one stream of compensated preamble symbols; and
compensate the at least one stream of payload

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00173

symbols to produce at least
one stream of compensated payload symbols.

[0015] Advantageously, the control module comprises at least one of:

a medium access control (MAC) layer to physical (PHY) layer interface operably coupled to provide the payload data to the encoding module based on the mode;

a frame control module operably coupled to produce the preamble set up information and to produce the payload set up information based on the mode;

signal field generator operably coupled to provide a signal field corresponding to the mode, wherein the signal field is provided to the encoding module as the preamble data;

a long training sequence module operably coupled to provide a long training sequence corresponding to the mode, wherein the long training sequence is provided to the plurality symbol mapping module as part of the preamble set up information, such that the at least one stream of frequency domain preamble symbols includes a mapped representation of the long training sequence; and

a short training sequence module operably coupled to provide a short training sequence corresponding to the mode, wherein the short training sequence is provided to the plurality of cyclic prefix modules as part of the preamble set up information, wherein the at least one stream of preamble symbols includes a representation of the short training sequence.

[0016] Advantageously, the encoding module comprises:

a scrambler module operably coupled to scrambler the payload data in accordance with the payload set up information to produce scrambled data;

an encoder operably coupled to encode the scrambled data or a signal field of the preamble data in accordance with the payload set up information to produce encoded data; and

a puncture module operably coupled to puncture the encoded data in accordance with the payload set up information to produce the encoded payload data and the encoded preamble data.

[0017] Advantageously, the encoding module comprises:

the encoder including:

a serial to parallel converter operably coupled to convert a serial stream of the scrambled data into a plurality of streams of scrambled data; and
a plurality of coding units operably coupled to encode the plurality of streams of scrambler data to produce a plurality of streams of encoded data; and

the puncture module including:

a plurality of puncture units to puncture the plurality of streams of encoded data to produce a plurality of streams of punctured data; and
a parallel to serial module operably coupled to convert the plurality of streams of punctured data into the encoded payload data.

[0018] Advantageously, the encoding module comprises:

a legacy scrambler operably coupled to scrambler the payload data when the mode is a first mode of the plurality of the protocol modes to produce legacy scrambled data;

a legacy encoder operably coupled to encode the legacy scrambled data when the mode is the first mode to produce legacy encoded data; and

a legacy puncture module operably coupled to puncture the legacy encoded data when the mode is the first mode to produce legacy encoded payload data as the encoded payload data.

[0019] Advantageously, the control module functions to:

generate a first preamble set up information and a first payload set up information when the mode is an IEEE 802.11 b mode of the plurality of protocol modes, wherein the first preamble set up information includes at least one of a synchronization field, a start of frame delimiter, a signal field, a service field, and a length field in accordance with the IEEE 802.11b, and wherein the first payload set up information includes transmit power;

generate a second preamble set up information and a second payload set up information when the mode is an IEEE 802.11a mode of the plurality of protocol modes, wherein the second preamble set up information includes at least one of a short training sequence, a long training sequence, a signal field, a service field, and a frame length field in accordance with the IEEE 802.11 a and wherein the second payload set up information includes transmit power, encoding scheme, puncture rate, data rate, modulation scheme, and path selection;

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00174

generate a third preamble set up information and a third payload set up information when the mode is an IEEE 802.11g mode of the plurality of protocol modes, wherein the third preamble set up information includes at least one of a short training sequence, a long training sequence, a signal field, a service field, and a frame length field in accordance with the IEEE 802.11g and wherein the second payload set up information includes transmit power, encoding scheme, puncture rate, data rate, modulation scheme, and path selection; and

generate a fourth preamble set up information and a fourth payload set up information when the mode is a MIMO mode of the plurality of protocol modes, wherein the fourth preamble set up information includes at least one of a short training sequence, a long training sequence, a signal field, a service field, and a frame length field in accordance with the MIMO mode and wherein the second payload set up information includes transmit power, encoding scheme, puncture rate, data rate, modulation scheme, number of transmit paths, and path selection.

[0020] Advantageously, each of the plurality of compensation modules comprises:

a baseband multiplier operably coupled to:

multiple a scaling factor with a corresponding one of the at least one stream of preamble symbols to produce a scaled stream of preamble symbols; and
multiple the scaling factor with a corresponding one of the at least one stream of payload symbols to produce a scaled stream of payload symbols; and

an in-phase and quadrature module operably coupled to:

compensate for in-phase and quadrature imbalances of the scaled stream of preamble symbols to produce a corresponding one of the at least one stream of compensated preamble symbols; and
compensate for the in-phase and quadrature imbalances of the scaled stream of payload symbols to produce a corresponding one of the at least one stream of compensated payload symbols.

[0021] According to an aspect of the invention, a multiple protocol wireless communication baseband receive processing module capable of multiple input multiple output (MIMO) comprises:

a plurality of compensation module operably coupled to compensate at least one received stream of symbols in accordance with compensation control signals to produce at least one stream of compensated symbols;

a plurality of cyclic prefix removal modules operably coupled to remove, in accordance with a mode of a plurality of protocol modes, a cyclic prefix from fields of the at least one stream of compensated symbols to produce at least one stream of cyclic prefix removed symbols;

a plurality of domain conversion modules operably coupled to convert, in accordance with the mode of a plurality of protocol modes, the at least one stream of cyclic prefix removed symbols from a time domain to a frequency domain to produce at least one stream of frequency domain symbols;

an equalizing module operably coupled to equalize the at least one stream of frequency domain symbols based on a channel estimation to produce at least one stream of equalized frequency domain symbols;

a plurality of demapping modules operably coupled to demap the at least one stream of equalized frequency domain symbols in accordance with the mode of the plurality of protocol modes to produce at least one stream of interleaved data;

a deinterleaving module operably coupled to deinterleave, in accordance with the mode of the plurality of protocol modes, the at least one stream of interleaved data to produce encoded data;

a decoding module operably coupled to decode, in accordance with the mode of the plurality of protocol modes, the encoded data to produce data; and

a control module operably coupled to determine the mode from the plurality of protocol modes and the compensation control signals based on the at least one compensated stream of symbols.

[0022] Advantageously, each of the plurality of compensation modules comprises at least one of:

DC offset module operably coupled to compensate for DC offset of a corresponding one of the at least one of the received stream of symbols;

an in-phase (I) and quadrature (Q) compensation module operably coupled to compensate for in-phase and quadrature imbalance of a corresponding one of the at least one of the received stream of symbols in accordance with an IQ imbalance estimation of the compensation control signals to produce at least one stream of IQ balanced symbols;

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00175

frequency correction module operably coupled to compensate for a sampling frequency offset of the at least one stream of IQ balanced symbols in accordance with a sampling frequency offset value of the compensation control signals to produce at least one stream of frequency compensated symbols; and

a filtering module operably coupled to filter the at least one stream of frequency compensated symbols to produce the at least one stream of compensated symbols.

[0023] Advantageously, each of the plurality of domain conversion modules comprises:

a time domain correction module operably coupled to compensate a corresponding one of the at least one stream of cyclic prefix removed symbols for a time domain offset to produce a stream of time domain offset compensated symbols; and
a fast Fourier transform (FFT) module operably coupled to convert the stream of time domain offset compensated symbols into a corresponding one of the at least one stream of frequency domain symbols.

[0024] Advantageously, each of the plurality of demapping modules comprises:

a common phase error and sampling frequency offset compensation module operably coupled to compensate a corresponding one of the at least one stream of equalized frequency domain symbols for at least one of common phase error and sampling frequency offset to produce a stream of phase and frequency compensated symbols; and

a symbol demapper operably coupled to demap the stream of phase and frequency compensated symbols to produce a corresponding one of the at least one of interleaved data.

[0025] Advantageously, the control module comprises:

a plurality of in-phase (I) and quadrature (Q) imbalance estimation modules operably coupled to determine IQ imbalance in each of the least one received stream of symbols to produce an IQ imbalance estimation therefrom;

packet protocol control module operably coupled to determine the mode from the plurality of protocol modes based on a preamble format of the at least one stream of compensated symbols; and

frequency and phase offset determining module operably coupled to determine a frequency offset and a phase offset based on at lest one of the least one stream of compensated symbols, the at least one stream of interleaved symbols, and the at least one stream of equalized frequency domain symbols.

[0026] According to an aspect of the invention, a multi-protocol wireless communication baseband transceiver comprises:

a baseband transmit processing module including:

control module operably coupled to produce preamble set up information and payload set up information based on a mode of a plurality of protocol modes;

encoding module operably coupled to:

encode preamble data in accordance with the preamble set up information to produce encoded preamble data; and
encode payload data in accordance with the payload set up information to produce encoded payload data;

interleaving module operably coupled to:

interleave the encoded preamble data in accordance with the preamble set up information to produce at least one stream of interleaved encoded preamble data; and
interleave the encoded payload data in accordance with the payload set up information to produce at least one stream of interleaved encoded payload data;

a plurality of symbol mapping modules operably coupled to:

map, in accordance with the preamble set up information, the at least one stream of interleaved encoded preamble data to at least one stream of frequency domain preamble symbols; and
map, in accordance with the payload set up information, the at least one stream of interleaved encoded payload data to at least one stream of frequency domain payload symbols;

a plurality of domain conversion modules operably coupled to:

convert, in accordance with the preamble set up information, the at least one stream of frequency domain preamble symbols into at least one stream of time domain preamble symbols; and
convert, in accordance with the payload set

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00176

up information, the at least one stream of frequency domain payload symbols into at least one stream of time domain payload symbols;

a plurality of cyclic prefix modules operably coupled to:

add, in accordance with the preamble set up information, a cyclic prefix to the at least one stream of time domain preamble symbols to produce at least one stream of preamble symbols; and
add a cyclic prefix to the at least one stream of time domain payload symbols to produce at least one stream of payload symbols; and

a plurality of compensation modules operably coupled to:

compensate the at least one stream of preamble symbols to produce at least one stream of compensated preamble symbols; and
compensate the at least one stream of payload symbols to produce
at least one stream of compensated payload symbols; and

a baseband receive processing module including:

a plurality of receive compensation module operably coupled to compensate at least one received stream of symbols in accordance with compensation control signals to produce at least one stream of compensated symbols;

a plurality of cyclic prefix removal modules operably coupled to remove, in accordance with a mode of a plurality of protocol modes, a cyclic prefix from fields of the at least one stream of compensated symbols to produce at least one stream of cyclic prefix removed symbols;

a plurality of receive domain conversion modules operably coupled to convert, in accordance with the mode of a plurality of protocol modes, the at least one stream of cyclic prefix removed symbols from a time domain to a frequency domain to produce at least one stream of frequency domain symbols;

an equalizing module operably coupled to equalize the at least one stream of frequency domain symbols based on a channel estimation to produce at least one stream of equalized frequency domain symbols;

a plurality of demapping modules operably coupled to demap the at least one stream of equalized frequency domain symbols in accordance with the mode of the plurality of protocol modes to produce at least one stream of interleaved data;

a deinterleaving module operably coupled to deinterleave, in accordance with the mode of the plurality of protocol modes, the at least one stream of interleaved data to produce encoded data;

a decoding module operably coupled to decode, in accordance with the mode of the plurality of protocol modes, the encoded data to produce data; and

a receive control module operably coupled to determine the mode from the plurality of protocol modes and the compensation control signals based on the at least one compensated stream of symbols.

[0027] Advantageously, the control module comprises at least one of:

a medium access control (MAC) layer to physical (PRY) layer interface operably coupled to provide the payload data to the encoding module based on the mode;

a frame control module operably coupled to produce the preamble set up information and to produce the payload set up information based on the mode based on the mode;

signal field generator operably coupled to provide a signal field corresponding to the mode, wherein the signal field is provided to the encoding module as the preamble data;

a long training sequence module operably coupled to provide a long training sequence corresponding to the mode, wherein the long training sequence is provided to the plurality symbol mapping module as part of the preamble set up information, such that the at least one stream of frequency domain preamble symbols includes a mapped representation of the long training sequence; and

a short training sequence module operably coupled to provide a short training sequence corresponding to the mode, wherein the short training sequence is provided to the plurality of cyclic prefix modules as part of the preamble set up information, wherein the at least one stream of preamble symbols includes a representation of the short training sequence.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00177

[0028] Advantageously, the control module functions to:

generate a first preamble set up information and a first payload set up information when the mode is an IEEE 802.11b mode of the plurality of protocol modes, wherein the first preamble set up information includes at least one of a synchronization field, a start of frame delimiter, a signal field, a service field, and a length field in accordance with the IEEE 802.11b, and wherein the first payload set up information includes transmit power; generate a second preamble set up information and a second payload set up information when the mode is an IEEE 802.11a mode of the plurality of protocol modes, wherein the second preamble set up information includes at least one of a short training sequence, a long training sequence, a signal field, a service field, and a frame length field in accordance with the IEEE 802.11a and wherein the second payload set up information includes transmit power and path selection;

generate a third preamble set up information and a third payload set up information when the mode is an IEEE 802.11g mode of the plurality of protocol modes, wherein the third preamble set up information includes at least one of a short training sequence, a long training sequence, a signal field, a service field, and a frame length field in accordance with the IEEE 802.11g and wherein the second payload set up information includes transmit power and path selection; and

generate a fourth preamble set up information and a fourth payload set up information when the mode is a MIMO mode of the plurality of protocol modes, wherein the fourth preamble set up information includes at least one of a short training sequence, a long training sequence, a signal field, a service field, and a frame length field in accordance with the MIMO mode and wherein the second payload set up information includes transmit power, number of transmit paths, and path selection.

[0029] Advantageously, each of the plurality of compensation modules comprises:

a baseband multiplier operably coupled to:

multiple a scaling factor with a corresponding one of the at least one stream of preamble symbols to produce a scaled stream of preamble symbols; and
multiple the scaling factor with a corresponding one of the at least one stream of payload symbols to produce a scaled stream of payload symbols; and

an in-phase and quadrature module operably coupled to:

compensate for in-phase and quadrature imbalances of the scaled stream of preamble symbols to produce a corresponding one of the at least one stream of compensated preamble symbols; and
compensate for the in-phase and quadrature imbalances of the scaled stream of payload symbols to produce a corresponding one of the at least one stream of compensated payload symbols.

[0030] Advantageously, the encoding module comprises:

a scrambler module operably coupled to scrambler the payload data in accordance with the payload set up information to produce scrambled data;

an encoder operably coupled to encode the scrambled data or a signal field of the preamble data in accordance with the payload set up information to produce encoded data, wherein the encoder includes:

a serial to parallel converter operably coupled to convert a serial stream of the scrambled data into a plurality of streams of scrambled data; and
a plurality of coding units operably coupled to encode the plurality of streams of scrambler data to produce a plurality of streams of encoded data;

a puncture module operably coupled to puncture the encoded data in accordance with the payload set up information to produce the encoded payload data and the encoded preamble data, wherein the puncture module includes:

a plurality of puncture units to puncture the plurality of streams of encoded data and to produce a plurality of streams of punctured data; and
a parallel to serial module operably coupled to convert the plurality of streams of punctured data into the encoded payload data;

a legacy scrambler operably coupled to scrambler the payload data when the mode is a first mode of the plurality of the protocol modes to produce legacy scrambled data;

a legacy encoder operably coupled to encode the legacy scrambled data when the mode is the first mode to produce legacy encoded data; and

a legacy puncture module operably coupled to punc-

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00178

ture the legacy encoded data when the mode is the first mode to produce legacy encoded payload data as the encoded payload data.

[0031] Advantageously, each of the plurality of receive compensation modules comprises at least one of:

DC offset module operably coupled to compensate for DC offset of a corresponding one of the at least one of the received stream of symbols;

an in-phase (I) and quadrature (Q) compensation module operably coupled to compensate for in-phase and quadrature imbalance of a corresponding one of the at least one of the received stream of symbols in accordance with an IQ imbalance estimation of the compensation control signals to produce at least one stream of IQ balanced symbols;

frequency correction module operably coupled to compensate for a sampling frequency offset of the at least one stream of IQ balanced symbols in accordance with a sampling frequency offset value of the compensation control signals to produce at least one stream of frequency compensated symbols; and

a filtering module operably coupled to filter the at least one stream of frequency compensated symbols to produce the at least one stream of compensated symbols.

[0032] Advantageously, each of the plurality of receive domain conversion modules comprises:

a time domain correction module operably coupled to compensate a corresponding one of the at least one stream of cyclic prefix removed symbols for a time domain offset to produce a stream of time domain offset compensated symbols; and

a fast Fourier transform (FFT) module operably coupled to convert the stream of time domain offset compensated symbols into a corresponding one of the at least one stream of frequency domain symbols.

[0033] Advantageously, the receive control module comprises:

a plurality of in-phase (I) and quadrature (Q) imbalance estimation modules operably coupled to determine IQ imbalance in each of the least one received stream of symbols to produce an IQ imbalance estimation therefrom;

packet protocol control module operably coupled to determine the mode from the plurality of protocol modes based on a preamble format of the at least one stream of compensated symbols; and

frequency and phase offset determining module operably coupled to determine a frequency offset and a phase offset based on at lest one of the least one stream of compensated symbols, the at least one stream of interleaved symbols, and the at least one stream of equalized frequency domain symbols.

[0034] Other features and advantages of the present invention will become apparent from the following detailed description of the invention made with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0035]

Figure 1 is a schematic block diagram of a wireless communication system in accordance with the present invention;

Figure 2 is a schematic block diagram of a wireless communication device in accordance with the present invention;

Figure 3 is a schematic block diagram of a baseband transmit processing module in accordance with the present invention;

Figure 4 is a schematic block diagram of a portion of a baseband transmit processing module in accordance with the present invention;

Figure 5 is a schematic block diagram of another portion of a baseband transmit processing module in accordance with the present invention;

Figure 6 is a schematic block diagram of yet another portion of a baseband transmit processing module in accordance with the present invention;

Figure 7 is a schematic block diagram of a further portion of the baseband transmit processing module in accordance with the present invention;

Figure 8 is a schematic block diagram of a baseband receive processing module in accordance with the present invention;

Figure 9 is a schematic block diagram of a portion of a baseband receive processing module in accordance with the present invention;

Figure 10 is a schematic block diagram of another portion of a baseband receive processing module in accordance with the present invention; and

Figure 11 is a schematic block diagram of yet another

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00179

portion of a baseband receive processing module in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0036] Figure 1 is a schematic block diagram illustrating a communication system 10 that includes a plurality of base stations and/or access points 12, 16, a plurality of wireless communication devices 18-32 and a network hardware component 34. Note that the network hardware 34, which may be a router, switch, bridge, modem, system controller, et cetera provides a wide area network connection 42 for the communication system 10. Further note that the wireless communication devices 18-32 may be laptop host computers 18 and 26, personal digital assistant hosts 20 and 30, personal computer hosts 24 and 32 and/or cellular telephone hosts 22 and 28. The details of the wireless communication devices will be described in greater detail with reference to Figure 2.

[0037] Wireless communication devices 22, 23, and 24 are located within an independent basic service set (IBSS) area and communicate directly (i.e., point to point). In this configuration, these devices 22, 23, and 24 may only communicate with each other. To communicate with other wireless communication devices within the system 10 or to communicate outside of the system 10, the devices 22, 23, and/or 24 need to affiliate with one of the base stations or access points 12 or 16.

[0038] The base stations or access points 12, 16 are located within basic service set (BSS) areas 11 and 13, respectively, and are operably coupled to the network hardware 34 via local area network connections 36, 38. Such a connection provides the base station or access point 12 16 with connectivity to other devices within the system 10 and provides connectivity to other networks via the WAN connection 42. To communicate with the wireless communication devices within its BSS 11 or 13, each of the base stations or access points 12-16 has an associated antenna or antenna array. For instance, base station or access point 12 wirelessly communicates with wireless communication devices 18 and 20 while base station or access point 16 wirelessly communicates with wireless communication devices 26 - 32. Typically, the wireless communication devices register with a particular base station or access point 12, 16 to receive services from the communication system 10.

[0039] Typically, base stations are used for cellular telephone systems and like-type systems, while access points are used for in-home or in-building wireless networks (e.g., IEEE 802.11 and versions thereof, Bluetooth, and/or any other type of radio frequency based network protocol). Regardless of the particular type of communication system, each wireless communication device includes a built-in radio and/or is coupled to a radio.

[0040] Figure 2 is a schematic block diagram illustrating a wireless communication device that includes the host device 18-32 and an associated radio 60. For cellular telephone hosts, the radio 60 is a built-in component. For personal digital assistants hosts, laptop hosts, and/or personal computer hosts, the radio 60 may be built-in or an externally coupled component.

[0041] As illustrated, the host device 18-32 includes a processing module 50, memory 52, radio interface 54, input interface 58 and output interface 56. The processing module 50 and memory 52 execute the corresponding instructions that are typically done by the host device. For example, for a cellular telephone host device, the processing module 50 performs the corresponding communication functions in accordance with a particular cellular telephone standard.

[0042] The radio interface 54 allows data to be received from and sent to the radio 60. For data received from the radio 60 (e.g., inbound data), the radio interface 54 provides the data to the processing module 50 for further processing and/or routing to the output interface 56. The output interface 56 provides connectivity to an output display device such as a display, monitor, speakers, et cetera such that the received data may be displayed. The radio interface 54 also provides data from the processing module 50 to the radio 60. The processing module 50 may receive the outbound data from an input device such as a keyboard, keypad, microphone, et cetera via the input interface 58 or generate the data itself. For data received via the input interface 58, the processing module 50 may perform a corresponding host function on the data and/or route it to the radio 60 via the radio interface 54.

[0043] Radio 60 includes a host interface 62, a baseband processing module 100, memory 65, a plurality of radio frequency (RF) transmitters 106 - 110, a transmit/receive (T/R) module 114, a plurality of antennas 81 - 85, a plurality of RF receivers 118 - 120, a channel bandwidth adjust module 87, and a local oscillation module 74. The baseband processing module 100, in combination with operational instructions stored in memory 65, executes digital receiver functions and digital transmitter functions, respectively. The digital receiver functions include, but are not limited to, digital intermediate frequency to baseband conversion, demodulation, constellation demapping, decoding, de-interleaving, fast Fourier transform, cyclic prefix removal, space and time decoding, and/or descrambling. The digital transmitter functions include, but are not limited to, scrambling, encoding, interleaving, constellation mapping, modulation, inverse fast Fourier transform, cyclic prefix addition, space and time encoding, and digital baseband to IF conversion. The baseband processing modules 100 may be implemented using one or more processing devices. Such a processing device may be a microprocessor, microcontroller, digital signal processor, microcomputer, central processing unit, field programmable gate array, programmable logic device, state machine, logic circuitry, analog circuitry, digital circuitry, and/or any device that manipulates signals (analog and/or digital) based on operational instructions. The memory 65 may be a single memory device

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00180

or a plurality of memory devices. Such a memory device may be a read-only memory, random access memory, volatile memory, non-volatile memory, static memory, dynamic memory, flash memory, and/or any device that stores digital information. Note that when the processing module 100 implements one or more of its functions via a state machine, analog circuitry, digital circuitry, and/or logic circuitry, the memory storing the corresponding operational instructions is embedded with the circuitry comprising the state machine, analog circuitry, digital circuitry, and/or logic circuitry. The functionality of the processing module 100 will be described in greater detail with reference to Figures 3-11.

[0044] In operation, the radio 60 receives outbound data 94 from the host device via the host interface 62. The baseband processing module 64 receives the outbound data 88 and, based on a mode selection signal 102, produces one or more outbound symbol streams 90. The mode selection signal 102 will indicate a particular mode of operation that is compliant with one or more specific modes of the various IEEE 802.11 standards. For example, the mode selection signal 102 may indicate a frequency band of 2.4 GHz, a channel bandwidth of 20 or 22 MHz and a maximum bit rate of 54 megabits-per-second. In this general category, the mode selection signal will further indicate a particular rate ranging from 1 megabit-per-second to 54 megabits-per-second. In addition, the mode selection signal will indicate a particular type of modulation, which includes, but is not limited to, Barker Code Modulation, BPSK, QPSK, CCK, 16 QAM and/or 64 QAM. The mode select signal 102 may also include a code rate, a number of coded bits per subcarrier (NBPSC), coded bits per OFDM symbol (NCBPS), and/or data bits per OFDM symbol (NDBPS). The mode selection signal 102 may also indicate a particular channelization for the corresponding mode that provides a channel number and corresponding center frequency. The mode select signal 102 may further indicate a power spectral density mask value and a number of antennas to be initially used for a MIMO communication.

[0045] The baseband processing module 100, based on the mode selection signal 102 produces one or more outbound symbol streams 104 from the outbound data 94. For example, if the mode selection signal 102 indicates that a single transmit antenna is being utilized for the particular mode that has been selected, the baseband processing module 100 will produce a single outbound symbol stream 104. Alternatively, if the mode select signal 102 indicates 2, 3 or 4 antennas, the baseband processing module 100 will produce 2, 3 or 4 outbound symbol streams 104 from the outbound data 94.

[0046] Depending on the number of outbound streams 104 (e.g., 1 to n) produced by the baseband module 100, a corresponding number of the RF transmitters 106 - 110 will be enabled to convert the outbound symbol streams 104 into outbound RF signals 112. In general, each of the RF transmitters 106 - 110 includes a digital filter and upsampling module, a digital to analog conversion module, an analog filter module, a frequency up conversion module, a power amplifier, and a radio frequency bandpass filter. The RF transmitters 106 - 110 provide the outbound RF signals 112 to the transmit/receive module 114, which provides each outbound RF signal to a corresponding antenna 81-85.

[0047] When the radio 60 is in the receive mode, the transmit/receive module 114 receives one or more inbound RF signals 116 via the antennas 81-85 and provides them to one or more RF receivers 118 - 122. The RF receiver 118 - 122, based on settings provided by the channel bandwidth adjust module 87, converts the inbound RF signals 116 into a corresponding number of inbound symbol streams 124. The number of inbound symbol streams 124 will correspond to the particular mode in which the data was received. The baseband processing module 100 converts the inbound symbol streams 124 into inbound data 92, which is provided to the host device 18-32 via the host interface 62.

[0048] As one of average skill in the art will appreciate, the wireless communication device of figure 2 may be implemented using one or more integrated circuits. For example, the host device may be implemented on one integrated circuit, the baseband processing module 100 and memory 65 may be implemented on a second integrated circuit, and the remaining components of the radio 60, less the antennas 81 - 85, may be implemented on a third integrated circuit. As an alternate example, the radio 60 may be implemented on a single integrated circuit. As yet another example, the processing module 50 of the host device and the baseband processing module 100 may be a common processing device implemented on a single integrated circuit. Further, the memory 52 and memory 65 may be implemented on a single integrated circuit and/or on the same integrated circuit as the common processing modules of processing module 50 and the baseband processing module 100.

[0049] Figure 3 is a functional schematic block diagram of a baseband transmit processing module 100-TX that includes a control module 130, encoding module 132, interleaving module 134, a plurality of symbol mapping modules 136, 138, a plurality of domain conversion modules 140, 142, a plurality of cyclic prefix modules 144, 146, and a plurality of compensation modules 148, 150.

[0050] The baseband transmit processing module 100-TX functions to convert outbound data 94 into a plurality of outbound symbol streams 104 wherein the outbound data 94 is represented by payload data 158 and the outbound symbol streams 104 include at least a version of the compensated preamble symbols 196, 198 and compensated payload symbols 200, 202. In operation, the control module 130, based on a mode 156 of a plurality of protocol modes, generates preamble setup information 152 and payload setup information 154. The protocol modes include two or more of IEEE 802.11, IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, any other current or future versions of IEEE 802.11, and/or any other wireless communication protocols and

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00181

versions thereof.

[0051] Based on the preamble setup information 152 and the payload setup information 154, the baseband transmit processing module 100-TX is configured to support the corresponding wireless communication protocol. For example, if the mode 156 is IEEE 802.11a, the baseband transmit processing module 100-TX is configured to support IEEE 802.11 a transmissions. Accordingly, for IEEE 802.11 a only one of each of the plurality of symbol mapping modules 136, 138, down conversion modules 140, 142, cyclic prefix modules 144, 146 and compensation modules 148, 150 would be activated. As another example, if the particular protocol mode is IEEE 802.11n for a 2x2 MIMO wireless communication, the baseband transmit processing module 100-TX would be configured to support 2x2 MIMO wireless transmissions. In this mode, two symbol mapping modules 136, 138, two domain conversion modules 140, 142, two cyclic prefix modules 144, 146 and two compensation modules 148 and 150 would be activated for the 2x2 MIMO communication.

[0052] In operation, at the beginning of generating a frame for a wireless communication, the encoding module 132 may receive preamble data 157, which may include frame header information, preamble information or any portion thereof. In accordance with the preamble setup information 152, the encoding module 132 encodes the preamble data 157 to produce encoded preamble data 160. The interleaving module 134 processes the encoded preamble data 160 in accordance with the preamble setup information 152 to produce one or more streams of interleaved encoded preamble data 164 and/or 166. For example, for a MIMO transmission, the number of streams of interleaved encoded preamble data 164, 166 will correspond to the number of transmit paths in the MIMO transmission. As one of ordinary skill in the art will appreciate, the interleaving module 134, in accordance with the preamble setup information 152, may interleave the encoded preamble data in accordance with an interleaving convention of the corresponding standard or may pass the encoded data uninterleaved as the interleaved encoded preamble data 164 or 166.

[0053] The symbol mapping module 136 and/or 138 receives the interleaved encoded preamble data 164 and/or 166 and generates frequency domain preamble symbols 172 and/or 174 therefrom. The frequency domain preamble symbols 172, 174 may be in accordance with the particular mode 156 as dictated by the preamble setup information 152. For example, for IEEE 802.11a, the preamble symbols may include a PLCP (physical layer conversion procedure) header, a PSDU (PLCP service data unit) field, a tail field, a pad field, a PLCP preamble that includes 12 symbols, a coded OFDM (orthogonal frequency division multiplex) symbol having a BPSK (binary phase shift keying) rate equal to one-half, wherein the header includes fields for rate, length, parity and service.

[0054] The domain conversion module 140 and/or 142 convert the frequency domain preamble symbols 172 and/or 174 into time domain preamble symbols 180 and/or 182. The time domain conversion modules 140, 142 may be implemented as inverse fast Fourier transforms (IFFT). The cyclic prefix modules 144 and/or 146 add a cyclic prefix to the frame once the data has been created. Thus, with respect to the preamble symbols 188 and 190, the cyclic prefix module 144 and/or 146 passes them to the compensation module 148 and/or 150. The compensation module 148 and/or 150 performs one or more of baseband scaling, in-phase and quadrature imbalance compensation and/or preemphasis on the symbols it receives from the cyclic prefix modules 144, 146. With respect to the preambles, the compensation module 148 and 150 produce compensated preamble symbols 196 and/or 198.

[0055] With the preamble created or being created, the baseband transmit processing module 100-TX also processes payload data 158. The encoding module 132, based on the payload setup information 154 (which may include an encoding scheme, puncture rate, data rate, et cetera), encodes the payload data 158 to produce encoded payload data 162. The interleaving module 134 receives the encoded payload data 162 and, based on the payload setup information 154, produces one or more streams of interleaved payload data 168, 170. With respect to the interleaving module 134, the payload setup information 154 indicates the number of streams of interleaved payload data 168 and 170 to create and may further indicate the particular type of interleaving to be performed. In one embodiment, the interleaving is done in accordance with the particular wireless protocol as indicated by mode 156.

[0056] One or more of the symbol mapping modules 136, 138 are activated to map the interleaved encoded payload data 168 and/or 170 to symbols in the frequency domain to produce frequency domain payload symbols 176 and/or 178. The symbol mapping is done in accordance with the payload setup information 154 which, based on mode 156, indicates the particular constellation to which the payload data is to be mapped. For example, the symbol mapping may be done in accordance with BPSK, QPSK (quadrature phase shift keying), 16 QAM (quadrature amplitude modulation), 64 QAM, 256 QAM, et cetera.

[0057] One or more of the domain conversion modules 140, 142 is activated to convert the frequency domain, payload symbols 176 and/or 178 into time domain payload symbols 184 and/or 186. In one embodiment, each of the domain conversion modules 140, 142 includes an inverse fast Fourier transform module.

[0058] One or more of the cyclic prefix modules 144 and/or 146 are activated to add a cyclic prefix to the frame containing the preamble and payload symbols to produce preamble symbols 188 and payload symbols 192 and/or preamble symbols 190 and payload symbols 194. One or more of the compensation modules 148 and/or 150 is activated to compensate the payload symbols 192 and/or

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00182

194 to produce compensated payload symbols 200 and/or 202. The compensation performed by the compensation modules 148 and/or 150 include baseband scaling, IQ imbalance compensation, preemphasis, et cetera.

[0059] Figure 4 is a more detailed schematic block diagram of a portion of the baseband transmit processing module 100-TX. In this illustration, the control module 130 and the encoding module 132 are shown in greater detail. The control module 130 includes a medium access control (MAC)/physical (PHY) interface 210, a frame control module 212, a signal field generator 214, a long training sequence module 216, a short training sequence module 218 and a sample play module 220. The encoding module 132 includes a scrambler module 222, an encoder 224, a puncture module 226 and may include a multiplexer 228.

[0060] In operation, with respect to generating the preamble and in accordance with the mode 156, the frame control module 212 enables the signal field generator 214 to generate a signal field 232 that corresponds to the particular mode 156. For example, the signal field may be generated in accordance with IEEE 802.11 a, g, n, and/or any other wireless communication protocol. In this embodiment, the signal field 232 is included within the preamble data 157.

[0061] In accordance with the payload and/or preamble setup information 152, 154, the encoding module 224 encodes the signal field 232 to produce the encoded signal field. The puncture module 226 may puncture the encoded signal field to produce the encoded preamble data 160. Alternatively, the puncture module 226 may be bypassed with respect to the encoded preamble data.

[0062] The MAC/PHY interface 210, based on the mode 156 and/or a send frame signal 230, provides the payload data 158 to the scrambler module 222. In accordance with the payload setup information 154, which may dictate a particular mode of scrambling (e.g., scrambler in accordance with the one or more scrambling options per IEEE 802.11a, b, g, n, et cetera), the scrambler module 222 scrambles the payload data 158 to produce scrambled data 230. Multiplexer 228 passes the scrambled data 230 to encoder 224 which encodes, in accordance with the payload setup information 154, the scrambled data 230 to produce encoded data 240. In one embodiment, the encoder 224 may be a convolutional encoder that encodes data in accordance with the particular mode 156 as dictated by the payload setup information 154. The puncture module 226 punctures at a rate indicated by the payload setup information 154 the encoded data 240 to produce the encoded payload data 162.

[0063] The long training sequence 216, the short training sequence 218 and the signal field generator 224 receive inputs from the control module 212, which may be collectively referred to as the preamble setup information 152. Based on the preamble setup information 152, the signal field generator 214 generates the signal field 232 as previously described.

[0064] The long training sequence 216 and short training sequence module 218 generate a long training sequence 236 and a short training sequence 234, respectively, based on the preamble setup information 152. The preamble setup information dictates to modules 216 and 218, the particular type of training sequences 234 and 236 to generate. For example, if the mode 156 corresponds to IEEE 802.1 1a, the short training sequence 234 and long training sequence 236 are generated in accordance therewith. If, however, the mode 156 corresponds to IEEE 802.11n and/or some other MIMO wireless communication protocol, the short and long training sequences 234 and 236 are generated for the multiple transmit paths as discussed in one or more co-pending patent applications including FRAME FORMAT FOR HIGH DATA THROUGHPUT WIRELESS LOCAL AREA NETWORK TRANSMISSIONS having a serial number of 10/778,751, and a filing date of 2/13/04; CONFIGURING A MIMO COMMUNICATION having a serial number of 10/973,549, and a filing date of 10/26/04; PREAMBLE FORMATS FOR MIMO WIRELESS COMMUNICATIONS having a serial number of 10/973,595, and a filing date of 10/26/04; MIMO WIRELESS COMMUNICATION GREENFIELD PREAMBLE FORMATS having a serial number of 10/973,212, and a filing date of 10/26/04; TRANSMISSION OF WIDE BANDWIDTH SIGNALS IN A NETWORK HAVING LEGACY DEVICES having a serial number of 10/973,612, and a filing date of 10/26/04; SIGNALING FORMAT FOR WLANS having a serial number of 10/973,611, and a filing date of 10/26/04; and MIXED MODE PREAMBLE FOR MIMO WIRELESS COMMUNICATIONS having a serial number of 11/079,962, and a filing date of 3/15/05.

[0065] In one embodiment, the long training sequence module 216 and the short training sequence module 218 are each lookup tables that are addressed based on the preamble setup information 152 to retrieve the appropriate short and long training sequences 234 and 236. Similarly, the signal field generator 214 may be a lookup table to produce the signal field 232 or a state machine to produce the signal field 232. The frame control module 212 may be implemented as a state machine to produce the corresponding preamble setup information 152 and payload setup information 154.

[0066] The control module 130, via the frame control module 212, generates the preamble setup information 152 and payload setup information 154 for a variety of modes 156. For example, the control module 130 may generate a first preamble set up information and a first payload set up information when the mode is an IEEE 802.11b mode of the plurality of protocol modes. In this mode, the first preamble set up information includes at least one of a synchronization field, a start of frame delimiter, a signal field, a service field, and a length field in accordance with the IEEE 802.11b, and wherein the first payload set up information includes transmit power. As another example, the control module 130 may generate a second preamble set up information and a second pay-

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00183

load set up information when the mode is an IEEE 802.11 a mode of the plurality of protocol modes. In this mode, the second preamble set up information includes at least one of a short training sequence, a long training sequence, a signal field, a service field, and a frame length field in accordance with the IEEE 802.11a and wherein the second payload set up information includes transmit power, encoding scheme, puncture rate, data rate, modulation scheme, and path selection.

[0067] In yet another example, the control module 130 may generate a third preamble set up information and a third payload set up information when the mode is an IEEE 802.11g mode of the plurality of protocol modes. In this mode, the third preamble set up information includes at least one of a short training sequence, a long training sequence, a signal field, a service field, and a frame length field in accordance with the IEEE 802.11g and wherein the second payload set up information includes transmit power, encoding scheme, puncture rate, data rate, modulation scheme, and path selection. In a further example, the control module 130 may generate a fourth preamble set up information and a fourth payload set up information when the mode is a MIMO mode of the plurality of protocol modes, wherein the fourth preamble set up information includes at least one of a short training sequence, a long training sequence, a signal field, a service field, and a frame length field in accordance with the MIMO mode and wherein the second payload set up information includes transmit power, encoding scheme, puncture rate, data rate, modulation scheme, number of transmit paths, and path selection.

[0068] Figure 5 is a schematic block diagram of an embodiment of encoding module 132 that includes the scrambler module 222, multiplexer 228, the encoder 224, the puncture module 226, a demultiplexer, a legacy scrambler module 223, a legacy encoder 225 and a legacy puncture module 227. The encoder 224 includes a serial-to-parallel converter 250 and a plurality of coding units 250-254. The puncture module 226 includes a plurality of puncture units 256, 258 and a parallel-to-serial converter 260.

[0069] In operation, and in accordance with the payload setup information 154, when the mode 156 corresponds to IEEE 802.11b, the legacy path, which includes legacy scrambler module 223, legacy encoder 225 and legacy puncture module 227, is enabled while the other path is disabled. In this embodiment, the demultiplexer provides the payload data 158 to the legacy path to produce the legacy encoded payload data 162-1. In addition, the legacy path may be activated to produce the legacy encoded preamble data 160-1.

[0070] For other modes 156, the legacy path is disabled and the other path is enabled. In this mode, the demultiplexer provides the payload data 158 to scrambler module 222. The scrambler module 222 scrambles the payload data 158 in accordance with the payload setup information 154 to produce scrambled data 230. The serial-to-parallel converter 250 receives the scrambled data and converts the serial stream of scrambled data 230 into a plurality of streams of scrambled data. Each of the streams of scrambled data is provided to a corresponding coding unit 252, 254, which may be a convolutional encoder. Each coding unit 252, 254, if activated in accordance with the payload setup information 154, encodes its corresponding stream of scrambled data to produce a stream of encoded data.

[0071] Each of the puncture units 256, 258 punctures the corresponding stream of encoded data to produce a stream of punctured data. The parallel-to-serial converter 260 converts the plurality of streams of punctured data into the encoded payload data 162. In addition, the encoder 224 and puncture module 226 may process the signal field 232 via the multiple paths to produce the encoded preamble data 160. Alternatively, only one path through the encoder 224 and puncture module 226 may be activated to encode the signal field 232.

[0072] Figure 6 is a schematic block diagram of another portion of the baseband transmit module 100-TX. In this illustration, the legacy path continues and includes a legacy interleaving module 135, a legacy symbol mapping module 139, a legacy domain conversion module 143 and a legacy cyclic prefix module 147. The legacy path converts the legacy encoded preamble data 160-1 and payload data 162-1 into a legacy symbol 191 in accordance with the IEEE 802.11b wireless protocol. Accordingly, when the legacy path is enabled, the other path or paths are disabled.

[0073] When the legacy path is disabled, the other path or paths is/are enabled. The other paths include the interleaving module 134, a plurality of multiplexers, symbol mapping modules 136, 138, down conversion modules 140, 142 and cyclic prefix modules 144, 146. As one of ordinary skill in the art will appreciate, the number of symbol mapping modules 136, 138, down conversion modules 140, 142 and cyclic prefix modules 144, 146 will correspond to the number of transmit paths needed to support the particular mode 156. For example, if the mode 156 corresponds to IEEE 802.11 a or g, only one path is activated. Conversely, when the mode 156 corresponds to IEEE 802.11n, a proprietary MIMO convention, and/or any other type of public-accessible MIMO wireless communication standard, the number of paths activated correspond to the number of transmit antennas. For example, for a 2x2 MIMO transmit wireless communication, 2 transmit paths are enabled.

[0074] To process the preamble, the multiplexers are enabled to provide the long training sequence 236 to the symbol mapping modules 136, 138. Accordingly, the symbol mapping modules map the long training sequence 236 to corresponding symbols. The symbol mapped long training sequences are then converted from the frequency domain to the time domain by the corresponding domain conversion modules 140, 142, which may be IFFT modules. The 2nd grouping of multiplexers, in accordance with the preamble setup information 152 provide the short training sequences 234 to the cyclic

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00184

prefix module 144, 146 as part of the preamble symbols and subsequently provides the time domain symbols of the long training sequence 236 to the cyclic prefix modules 144 and 146. In addition, the multiplexers provide the payload data to the corresponding modules 136-146 to produce the payload symbols 192 and 194.

[0075] Figure 7 illustrates yet another portion of the baseband transmit processing module 100-TX. In this illustration, the compensation modules 148, 150 are shown to include baseband multipliers 270, 272, IQ, DC, and/or LO compensation modules 274, 276 up-sampling modules 278, 280, filters 282, 284, a multiplexer, up-conversion modules 286, 288, a legacy IQ compensation module 275, and a legacy resampling module 290.

[0076] When the legacy mode is enabled (e.g., IEEE 802.11b), the legacy resampling modules 290 is activated to process the legacy symbols 191. The multiplexer provides the processed legacy symbols 191 to the up-conversion module 288 as the outbound symbol stream 104. In this instance, the outbound symbol stream 104 only includes one path which is provided to a corresponding RF transmitter for subsequent transmission as an RF signal.

[0077] In other modes, the legacy path is disabled and the other path is enabled based on the number of transmit paths needed for the particular mode 156. Each of the baseband multipliers 270, 272 multiply the preamble symbols 188 and payload symbols 192, 194 with a scaling factor to provide a desired level of the corresponding symbols 188, 190, 192 and 194.

[0078] The upscale modules 278, 280 process the compensated symbols 196, 198, 200 and 202 by adjusting the sample rate of the corresponding symbols to a higher rate, which may be in the range of 44 MHz to 80 MHz or greater. The filters 282, 284 are bandpass filters to filter unwanted signal components of the up-sampled symbols 196, 198, 200 and 202.

[0079] The up-conversion modules 286, 288 adjust the frequency of the symbols to compensate for variations in channel width. For example, a 40 MHz channel may be deemed to be the default channel width such that the center of the 40 MHz channel is deemed to be the center of the channels. If, however, the particular mode includes a 20 MHz channel, the center frequency needs to be adjusted to be centered within the 20 MHz channel. In general, a 40 MHz channel will include two adjacent 20 MHz channels, thus, necessitating the adjustment of the center channel. A similar adjustment would need to be made for a 10 MHz channel. Conversely, a 20 MHz channel may be deemed to be the default channel bandwidth where adjustments would need to be made for 40 MHz channels and/or 10 MHz channels.

[0080] The IQ, DC, and/or LO compensation modules 274, 276 compensate for IQ imbalances, DC offsets, and/or LO leakage within the symbols 188, 190, 192 and 194 to produce compensated preamble symbols 196, 198 and compensated payload symbols 200, 202. IQ compensation may be done in a variety of ways as are known in the art. The resulting symbols may be referred to as the outbound symbol streams 104, which include the preamble symbols and payload symbols. The RF transmitter sections convert the outbound symbol streams 104 into RF signals that are subsequently transmitted to one or more other RF transceivers.

[0081] Figure 8 is a schematic block diagram of a baseband receive processing module 100-RX that includes a plurality of compensation modules 300, 302, cyclic prefix (CP) removal modules 304, 306, down-conversion modules 308, 309, a detection module 315 (which, in one embodiment includes an equalizing module 310 and a plurality of demapping modules 312, 314 and in another embodiment, includes a maximum likelihood detector), a deinterleaving module 316, decoding module 318 and a control module 320. As one of ordinary skill in the art will appreciate, the number of compensation modules 300, 302, CP removal modules 304, 306, down-conversion modules 308, 309, and demapping modules 312, 314 that are activated are depending on the particular mode 156 of the transceiver. For example, for an IEEE 802.11a wireless communication, only one of each of the respective modules would be activated. Alternatively, if the mode 156 corresponds to a 4x4 MIMO transmission, four of each of the modules would be activated to support the particular communication.

[0082] In this embodiment, the control module 320 is operably coupled to determine compensation control signals 326, channel estimation 336 and the mode 342 from the received inbound symbols 124. The functionality of control module 320 will be described in greater detail with reference to Figures 9-11.

[0083] The compensation modules 300, 302 receive the inbound symbol streams 124 and, in accordance with the compensation control signal 326 compensates the inbound stream of symbols 124 to produce compensated symbols 322, 324. The compensation may include DC offset adjustment, IQ imbalance adjustment, frequency correction, phase correction and/or filtering. The IQ imbalance adjustment may be performed in accordance with the teachings of co-pending patent application entitled RX IMBALANCE ESTIMATION having an attorney docket number of BP 4655.

[0084] The CP removal modules 304, 306 are operably coupled to remove the cyclic prefixes from the compensated symbols 322 and/or 324 to produce CP remove symbols 328, 330. The domain conversion modules 308, 309, which may be fast Fourier transform modules, convert the time domain CP remove symbols 328, 330 to frequency domain symbols 332, 334.

[0085] The equalizing module 310 in accordance with the channel estimation 336, equalizes the frequency domain symbols 332, 334 to produce equalized frequency domain (FD) symbols 338, 340. Such equalization may be done in accordance with the teachings of a co-pending patent application entitled MAXIMUM LIKELIHOOD DETECTION FOR MIMO RECEIVERS, having an attorney docket number of BP 4647.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00185

[0086] The demapping modules 312, 314 are operably coupled to demap in accordance with the mode 342 the equalized frequency domain symbols 338, 340 to produce interleaved data 344, 346. The demapping modules 312, 314 function in accordance with the particular wireless protocol selected. For example, if the particular wireless protocol is IEEE 802.11a, one of the demapping modules functions in accordance with the particular constellation mapping as indicated within the preamble of the packet received. Conversely, if the mode 156 is for a MIMO wireless communication, each of the demapping modules is activated to demap the symbols 338, 340 to retrieve the appropriate data.

[0087] The deinterleaving module 316, in accordance with the mode 342, deinterleaves the interleaved data 344, 346 to produce encoded data 348. The decoding module 318 decodes the encoded data 348 to produce the inbound data 92.

[0088] Figure 9 is a functional schematic block diagram of a portion of the baseband receive processing module 100-RX that includes the control module 320 and compensation modules 300, 302 in greater detail. The control module 320 includes a packet protocol control module 370, a plurality of carrier sense modules 372, 374, a combining module 376, a frequency and phase offset determining module 378, a coarse/fine frequency estimation 380, a plurality of IQ imbalance estimation modules 366, 368, a MAC/PHY interface 386, a plurality of compute power modules 386, 388 and a plurality of gain control modules 390, 392. Each of the compensation modules 300, 302 include a DC offset module 350, 352, IQ compensation module 354, 356, frequency correction module 358, 360, and a filter module 362, 364.

[0089] The compute power modules 386, 388 receive the inbound symbol stream 124 and compute the power of each of the symbol streams 124 using one of a variety of techniques. For example, one power measurement technique is to compute the received signal strength based on the magnitude of the in-phase component and the magnitude of the quadrature component. The gain control modules 390, 392 interpret the corresponding power to establish the gain for an automatic gain control loop of the plurality of receiver sections 118-122 of Figure 2.

[0090] The IQ imbalance estimation modules 366, 368 are each operably coupled to determine an IQ imbalance within each of the received paths. The IQ imbalance estimation modules 366, 368 monitor the output of the IQ compensation modules 354, 356 and determine the corresponding IQ imbalance there from. The IQ imbalance may be determined in a variety of ways including the ones disclosed in co-pending patent application RX IMBALANCE ESTIMATION having an attorney docket number of BP 4655. The coarse/fine frequency estimation module 380, based on information provided by the packet control module 370, monitors the compensated symbols 322, 324 to determine frequency differences between the received signal and the clocking circuitry of the baseband receive processing module 100-RX. The information provided by the packet protocol modules 370 corresponds to the desired packet format for example, OFDM packet format and the channel bandwidth, and the number of tones-per-channel. For example, the channel bandwidth may be 20 MHz including 64 OFDM tones-per-channel. Alternatively, the channel bandwidth may be 40 MHz and the channel may include 128 tones-per-channel. Accordingly, the coarse/fine frequency estimation module 380 determines the frequency difference and provides a correction signal to frequency correction modules 358, 360.

[0091] The frequency correction module 358, 360 compensate for frequency differences to produce frequency compensated symbols. The filter modules 362, 364 filter the frequency compensated signals to produce the compensated symbols 322, 324.

[0092] The carrier sense modules 372, 374 monitor each of the streams of compensated symbols 322, 324 to detect the presence of a valid signal. Carrier sense is typically done in the first stages of a preamble thus, each carrier sense module 372, 374 is monitoring received signals to determine whether the received signals correspond to preambles of a frame of a particular wireless communication protocol. The combining module 376 combines the outputs of the carrier sense modules 372, 374 and provides it to the packet protocol control module 370.

[0093] The packet protocol control module 370 which is described in greater detail in co-pending patent application entitled PROGRAMMABLE MIMO RECEIVER PACKET PROCESSING and having an attorney docket number of BP 4646, interprets the received information from the combining module 376 to determine the particular mode 342 that corresponds to the frame. For example, the received frame may be in accordance with one of a plurality of wireless protocol formats including, but not limited to IEEE 802.11a, b, g, n, et cetera. From this information, the packet protocol control module 370 generates the mode 342 such that the baseband receive processing module 100-RX may appropriately process the received inbound symbol streams 124.

[0094] In addition, the packet protocol control module 370 provides an indication of the mode to the MAC/PHY interface 386 such that the MAC/PHY interface may provide the recovered information to the MAC layer of the wireless communication device.

[0095] Figure 10 is a schematic block diagram of another portion of the baseband received processing module 100-RX that includes the control module, the CP removal modules 304, 306, the time domain conversion modules 308, the equalizing module 310, the demapping modules 312, 314. The frequency and phase offset determining module 378 is further shown to include a compute SFO (sampling frequency offset) correction module 424, carrier PLL (phase locked loop) 422, a compute TD (time domain) correction module 426, a compute metrics module 416, a channel buffer 418, and a channel update

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00186

module 420. The control module also includes a channel estimation module 382 and a channel buffer 384 which provides the channel estimation 336 to equalizing module 310.

[0096] Each of the CP remove modules 304, 306 that are activated receive the corresponding compensated symbol 322, 324 and remove there from a cyclic prefix based on information provided by the packet protocol control module 370. Accordingly, information provided by the packet control module 370 includes at least frame delineation information, and the tones and/or symbols which comprise the cyclic prefix. The cyclic prefix removal modules 304, 306 provide the cyclic prefix remove symbols to the corresponding domain conversion modules 308, 309.

[0097] Each of the domain conversion modules 308, 309 include a time domain correction module 400, 402 and a fast Fourier transform (FFT) module 404, 406. The time domain correction modules 400, 402 receive a time domain correction signal from the compute TD correction module 426 that adjusts for analog impairments and/or channel variations of the time domain signals. Accordingly, the time domain correction modules 400, 402 reduce the time domain errors caused by analog impairments and/or channel variations within the symbols. The FFT modules 404, 406 are operably coupled to convert the time domain symbols into frequency domain symbols.

[0098] The equalizing module 310 is operably coupled to equalize the frequency domain symbols in accordance with the channel estimation signal 336. The channel estimation module 382 monitors the compensated symbols 322, 324 to determine a corresponding channel response. The channel response is stored in channel buffer 384. The functionality of the channel estimation module 382 and equalizing module 310 may be further described in co-pending patent application RX IMBALANCE ESTIMATION having an attorney docket number of BP 4655.

[0099] Each of the demapping modules 312 and 314 include a CPE (common phase error) and SFO (sampling frequency offset) compensation module 408, 410 and a symbol demapper 412, 414. The compute SFO correction module 424, within the phase and frequency offset determining module 378, monitors the carrier PLL 422 based on the coarse/fine frequency estimation module output 380 to produce the correction signal for the sampling frequency offset. In general, this results if the analog-to-digital conversion process is not in lock step with the clock of the received signal. The common phase error occurs as a result of phase rotation of the symbols, phase noise and/or carrier frequency offset. The compute metrics 416, based on information of the channel update 420 and channel buffer 418, provide the corresponding correction signals. As such, the CPE and SFO compensation modules 408 and 410 compensate for common phase error and/or sampling frequency offset of the received symbols.

[0100] The symbol demappers 412, 414 in accordance with the particular mode and mapping scheme as determined by the packet protocol module 370 demap the symbols to produce the interleaved data 344, 346.

[0101] Figure 11 illustrates another portion of the baseband receive processing module 100-RX. In this illustration, the interleaving module 316 is shown to include a plurality of deinterleavers 430, 432 and the decoding module 318 is shown to include a plurality of depuncture modules 434, 436, plurality of VITERBI decoders 436, 438, a serialized module 440 and a packet and descrambler module 442.

[0102] Each of the deinterleavers 430, 432 that are activated for the particular mode, receive the interleaved data 344, 346 and deinterleave the corresponding data. The decoding module 318, via the depuncture modules 434, 436, which at least one is activated, receives the deinterleaved data and depunctures it in accordance with the mode and puncturing convention employed by the transmitter. The particular puncturing scheme is determined by the packet protocol module 370. The VITERBI decoders 436, 438 decode the depunctured data to produce decoded data. The serializing module 440 serializes the decoded data and provides it to the packet and descrambler module 442. The packet and descrambler module 442 packetizes and descrambles the data to produce the inbound data 92.

[0103] As one of ordinary skill in the art will appreciate, the term "substantially" or "approximately", as may be used herein, provides an industry-accepted tolerance to its corresponding term and/or relativity between items. Such an industry-accepted tolerance ranges from less than one percent to twenty percent and corresponds to, but is not limited to, component values, integrated circuit process variations, temperature variations, rise and fall times, and/or thermal noise. Such relativity between items ranges from a difference of a few percent to magnitude differences. As one of ordinary skill in the art will further appreciate, the term "operably coupled", as may be used herein, includes direct coupling and indirect coupling via another component, element, circuit, or module where, for indirect coupling, the intervening component, element, circuit, or module does not modify the information of a signal but may adjust its current level, voltage level, and/or power level. As one of ordinary skill in the art will also appreciate, inferred coupling (i.e., where one element is coupled to another element by inference) includes direct and indirect coupling between two elements in the same manner as "operably coupled". As one of ordinary skill in the art will further appreciate, the term "compares favorably", as may be used herein, indicates that a comparison between two or more elements, items, signals, etc., provides a desired relationship. For example, when the desired relationship is that signal 1 has a greater magnitude than signal 2, a favorable comparison may be achieved when the magnitude of signal 1 is greater than that of signal 2 or when the magnitude of signal 2 is less than that of signal 1.

[0104] The preceding discussion has presented a multi-protocol programmable baseband transceiver

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00187

processing module. As one of ordinary skill in the art will appreciate, other embodiments may be derived from the teaching of the present invention without deviating from the scope of the claims.

Claims

1. A multiple protocol wireless communication baseband transmit processing module capable of multiple input multiple output (MIMO) comprises:

control module operably coupled to produce preamble set up information and payload set up information based on a mode of a plurality of protocol modes;
encoding module operably coupled to:

encode preamble data in accordance with the preamble set up information to produce encoded preamble data; and
encode payload data in accordance with the payload set up information to produce encoded payload data;

interleaving module operably coupled to:

interleave the encoded preamble data in accordance with the preamble set up information to produce at least one stream of interleaved encoded preamble data; and
interleave the encoded payload data in accordance with the payload set up information to produce at least one stream of interleaved encoded payload data;

a plurality of symbol mapping modules operably coupled to:

map, in accordance with the preamble set up information, the at least one stream of interleaved encoded preamble data to at least one stream of frequency domain preamble symbols; and
map, in accordance with the payload set up information, the at least one stream of interleaved encoded payload data to at least one stream of frequency domain payload symbols;

a plurality of domain conversion modules operably coupled to:

convert, in accordance with the preamble set up information, the at least one stream of frequency domain preamble symbols into at least one stream of time domain preamble symbols; and

convert, in accordance with the payload set up information, the at least one stream of frequency domain payload symbols into at least one stream of time domain payload symbols;

a plurality of cyclic prefix modules operably coupled to:

add, in accordance with the preamble set up information, a cyclic prefix to the at least one stream of time domain preamble symbols to produce at least one stream of preamble symbols; and
add a cyclic prefix to the at least one stream of time domain payload symbols to produce at least one stream of payload symbols; and

a plurality of compensation modules operably coupled to:

compensate the at least one stream of preamble symbols to produce at least one stream of compensated preamble symbols; and
compensate the at least one stream of payload symbols to produce at least one stream of compensated payload symbols.

2. The multiple protocol wireless communication baseband transmit processing module of claim 1, wherein the control module comprises at least one of:

a medium access control (MAC) layer to physical (PHY) layer interface operably coupled to provide the payload data to the encoding module based on the mode;
a frame control module operably coupled to produce the preamble set up information and to produce the payload set up information based on the mode;
signal field generator operably coupled to provide a signal field corresponding to the mode, wherein the signal field is provided to the encoding module as the preamble data;
a long training sequence module operably coupled to provide a long training sequence corresponding to the mode, wherein the long training sequence is provided to the plurality symbol mapping module as part of the preamble set up information, such that the at least one stream of frequency domain preamble symbols includes a mapped representation of the long training sequence; and
a short training sequence module operably coupled to provide a short training sequence corresponding to the mode, wherein the short training sequence is provided to the plurality of cyclic

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00188

prefix modules as part of the preamble set up information, wherein the at least one stream of preamble symbols includes a representation of the short training sequence.

3. The multiple protocol wireless communication baseband transmit processing module of claim 1, wherein the encoding module comprises:

a scrambler module operably coupled to scrambler the payload data in accordance with the payload set up information to produce scrambled data;
an encoder operably coupled to encode the scrambled data or a signal field of the preamble data in accordance with the payload set up information to produce encoded data; and
a puncture module operably coupled to puncture the encoded data in accordance with the payload set up information to produce the encoded payload data and the encoded preamble data.

4. The multiple protocol wireless communication baseband transmit processing module of claim 3, wherein the encoding module comprises:

the encoder including:

a serial to parallel converter operably coupled to convert a serial stream of the scrambled data into a plurality of streams of scrambled data; and
a plurality of coding units operably coupled to encode the plurality of streams of scrambler data to produce a plurality of streams of encoded data; and

the puncture module including:

a plurality of puncture units to puncture the plurality of streams of encoded data to produce a plurality of streams of punctured data; and
a parallel to serial module operably coupled to convert the plurality of streams of punctured data into the encoded payload data.

5. A multiple protocol wireless communication baseband receive processing module capable of multiple input multiple output (MIMO) comprises:

a plurality of compensation module operably coupled to compensate at least one received stream of symbols in accordance with compensation control signals to produce at least one stream of compensated symbols;
a plurality of cyclic prefix removal modules operably coupled to remove, in accordance with a mode of a plurality of protocol modes, a cyclic prefix from fields of the at least one stream of compensated symbols to produce at least one stream of cyclic prefix removed symbols;
a plurality of domain conversion modules operably coupled to convert, in accordance with the mode of a plurality of protocol modes, the at least one stream of cyclic prefix removed symbols from a time domain to a frequency domain to produce at least one stream of frequency domain symbols;
an equalizing module operably coupled to equalize the at least one stream of frequency domain symbols based on a channel estimation to produce at least one stream of equalized frequcrcy domain symbols;
a plurality of demapping modules operably coupled to demap the at least one stream of equalized frequency domain symbols in accordance with the mode of the plurality of protocol modes to produce at least one stream of interleaved data;
a deinterleaving module operably coupled to deinterleave, in accordance with the mode of the plurality of protocol modes, the at least one stream of interleaved data to produce encoded data;
a decoding module operably coupled to decode, in accordance with the mode of the plurality of protocol modes, the encoded data to produce data; and
a control module operably coupled to determine the mode from the plurality of protocol modes and the compensation control signals based on the at least one compensated stream of symbols.

6. The multiple protocol wireless communication baseband receive processing module of claim 5, wherein each of the plurality of compensation modules comprises at least one of:

DC offset module operably coupled to compensate for DC offset of a corresponding one of the at least one of the received stream of symbols;
an in-phase (I) and quadrature (Q) compensation module operably coupled to compensate for in-phase and quadrature imbalance of a corresponding one of the at least one of the received stream of symbols in accordance with an IQ imbalance estimation of the compensation control signals to produce at least one stream of IQ balanced symbols;
frequency correction module operably coupled to compensate for a sampling frequency offset of the at least one stream of IQ balanced symbols in accordance with a sampling frequency offset value of the compensation control signals

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00189

to produce at least one stream of frequency compensated symbols; and
a filtering module operably coupled to filter the at least one stream of frequency compensated symbols to produce the at least one stream of compensated symbols.

7. The multiple protocol wireless communication baseband receive processing module of claim 5, wherein each of the plurality of domain conversion modules comprises:

a time domain correction module operably coupled to compensate a corresponding one of the at least one stream of cyclic prefix removed symbols for a time domain offset to produce a stream of time domain offset compensated symbols; and
a fast Fourier transform (FFT) module operably coupled to convert the stream of time domain offset compensated symbols into a corresponding one of the at least one stream of frequency domain symbols.

8. The multiple protocol wireless communication baseband receive processing module of claim 5, wherein each of the plurality of demapping modules comprises:

a common phase error and sampling frequency offset compensation module operably coupled to compensate a corresponding one of the at least one stream of equalized frequency domain symbols for at least one of common phase error and sampling frequency offset to produce a stream of phase and frequency compensated symbols; and
a symbol demapper operably coupled to demap the stream of phase and frequency compensated symbols to produce a corresponding one of the at least one of interleaved data.

9. A multi-protocol wireless communication baseband transceiver comprises:

a baseband transmit processing module including:

control module operably coupled to produce preamble set up information and payload set up information based on a mode of a plurality of protocol modes;
encoding module operably coupled to:

encode preamble data in accordance with the preamble set up information to produce encoded preamble data; and
encode payload data in accordance with the payload set up information to produce encoded payload data;

interleaving module operably coupled to:

interleave the encoded preamble data in accordance with the preamble set up information to produce at least one stream of interleaved encoded preamble data; and
interleave the encoded payload data in accordance with the payload set up information to produce at least one stream of interleaved encoded payload data;

a plurality of symbol mapping modules operably coupled to:

map, in accordance with the preamble set up information, the at least one stream of interleaved encoded preamble data to at least one stream of frequency domain preamble symbols; and
map, in accordance with the payload set up information, the at least one stream of interleaved encoded payload data to at least one stream of frequency domain payload symbols;

a plurality of domain conversion modules operably coupled to:

convert, in accordance with the preamble set up information, the at least one stream of frequency domain preamble symbols into at least one stream of time domain preamble symbols; and
convert, in accordance with the payload set up information, the at least one stream of frequency domain payload symbols into at least one stream of time domain payload symbols;

a plurality of cyclic prefix modules operably coupled to:

add, in accordance with the preamble set up information, a cyclic prefix to the at least one stream of time domain preamble symbols to produce at least one stream of preamble symbols; and
add a cyclic prefix to the at least one stream of time domain payload symbols to produce at least one stream of payload symbols; and

a plurality of compensation modules oper-

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00190

ably coupled to:

compensate the at least one stream of preamble symbols to produce at least one stream of compensated preamble symbols; and
compensate the at least one stream of payload symbols to produce at least one stream of compensated payload symbols; and

a baseband receive processing module including:

a plurality of receive compensation module operably coupled to compensate at least one received stream of symbols in accordance with compensation control signals to produce at least one stream of compensated symbols;
a plurality of cyclic prefix removal modules operably coupled to remove, in accordance with a mode of a plurality of protocol modes, a cyclic prefix from fields of the at least one stream of compensated symbols to produce at least one stream of cyclic prefix removed symbols;
a plurality of receive domain conversion modules operably coupled to convert, in accordance with the mode of a plurality of protocol modes, the at least one stream of cyclic prefix removed symbols from a time domain to a frequency domain to produce at least one stream of frequency domain symbols;
an equalizing module operably coupled to equalize the at least one stream of frequency domain symbols based on a channel estimation to produce at least one stream of equalized frequency domain symbols;
a plurality of demapping modules operably coupled to demap the at least one stream of equalized frequency domain symbols in accordance with the mode of the plurality of protocol modes to produce at least one stream of interleaved data;
a deinterleaving module operably coupled to deinterleave, in accordance with the mode of the plurality of protocol modes, the at least one stream of interleaved data to produce encoded data;
a decoding module operably coupled to decode, in accordance with the mode of the plurality of protocol modes, the encoded data to produce data; and
a receive control module operably coupled to determine the mode from the plurality of protocol modes and the compensation control signals based on the at least one compensated stream of symbols.

10. The multi-protocol wireless communication baseband transceiver of claim 9, wherein the control module comprises at least one of:

a medium access control (MAC) layer to physical (PHY) layer interface operably coupled to provide the payload data to the encoding module based on the mode;
a frame control module operably coupled to produce the preamble set up information and to produce the payload set up information based on the mode based on the mode;
signal field generator operably coupled to provide a signal field corresponding to the mode, wherein the signal field is provided to the encoding module as the preamble data;
a long training sequence module operably coupled to provide a long training sequence corresponding to the mode, wherein the long training sequence is provided to the plurality symbol mapping module as part of the preamble set up information, such that the at least one stream of frequency domain preamble symbols includes a mapped representation of the long training sequence; and
a short training sequence module operably coupled to provide a short training sequence corresponding to the mode, wherein the short training sequence is provided to the plurality of cyclic prefix modules as part of the preamble set up information, wherein the at least one stream of preamble symbols includes a representation of the short training sequence.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00191

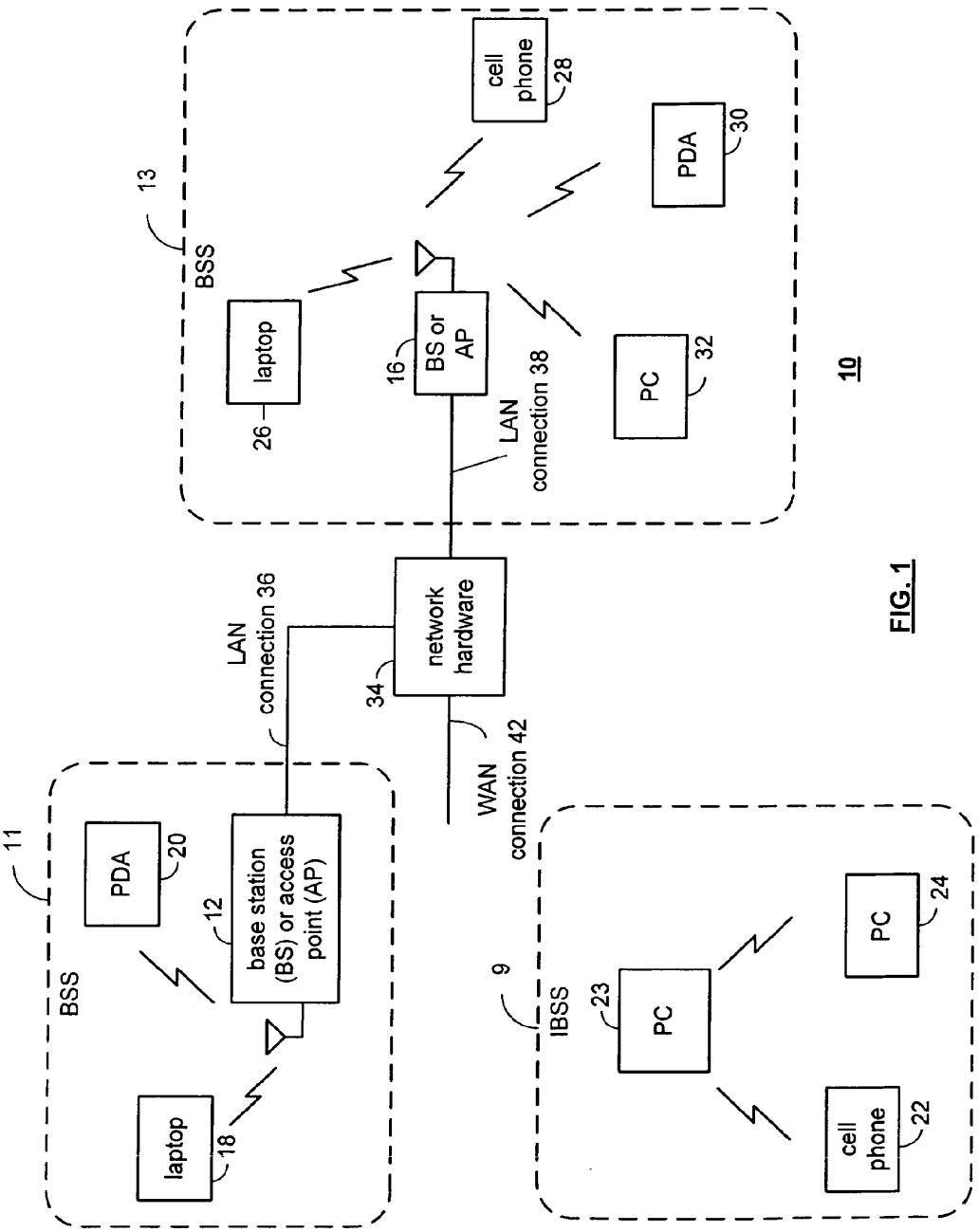
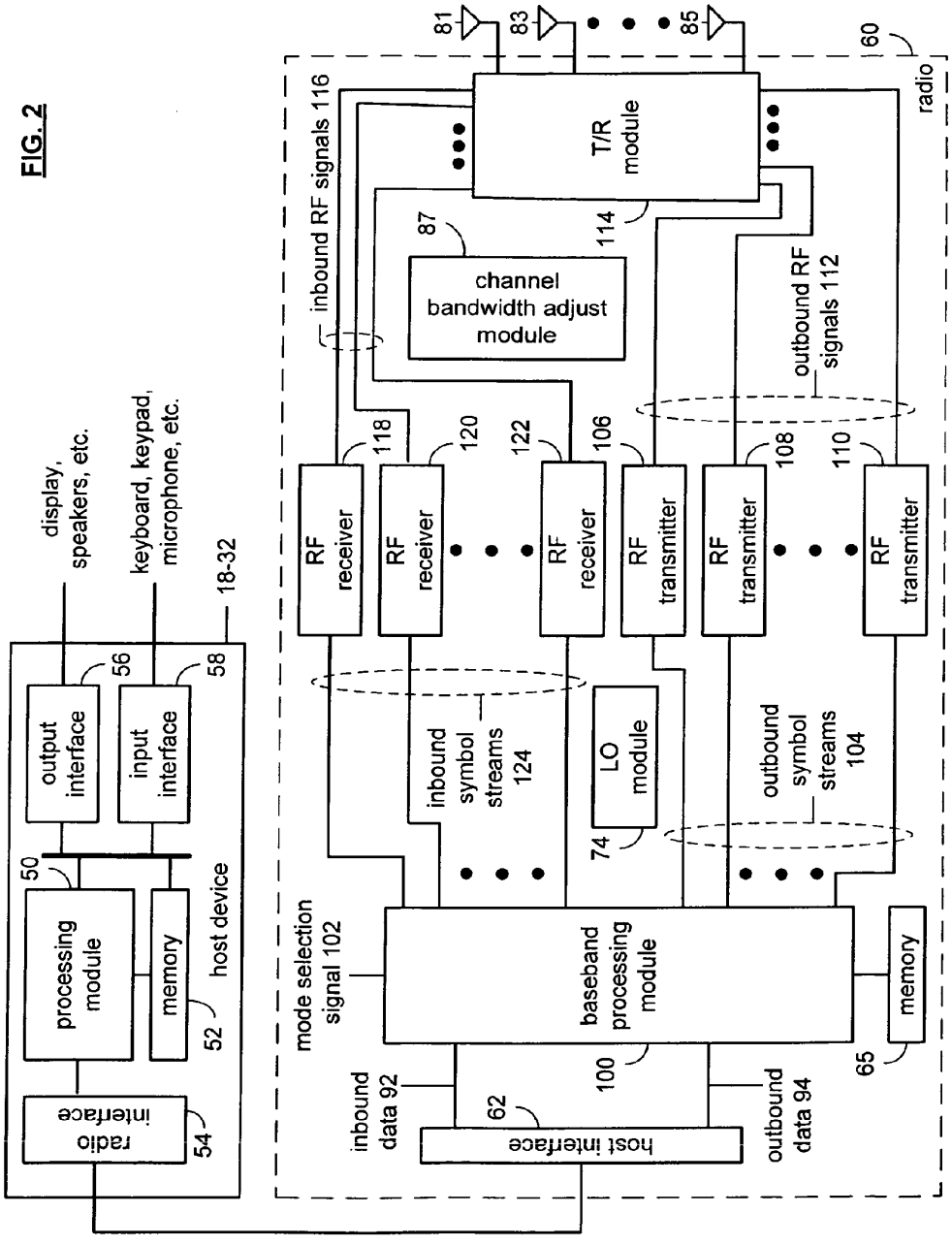


FIG. 1

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00192

FIG. 2



EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00193

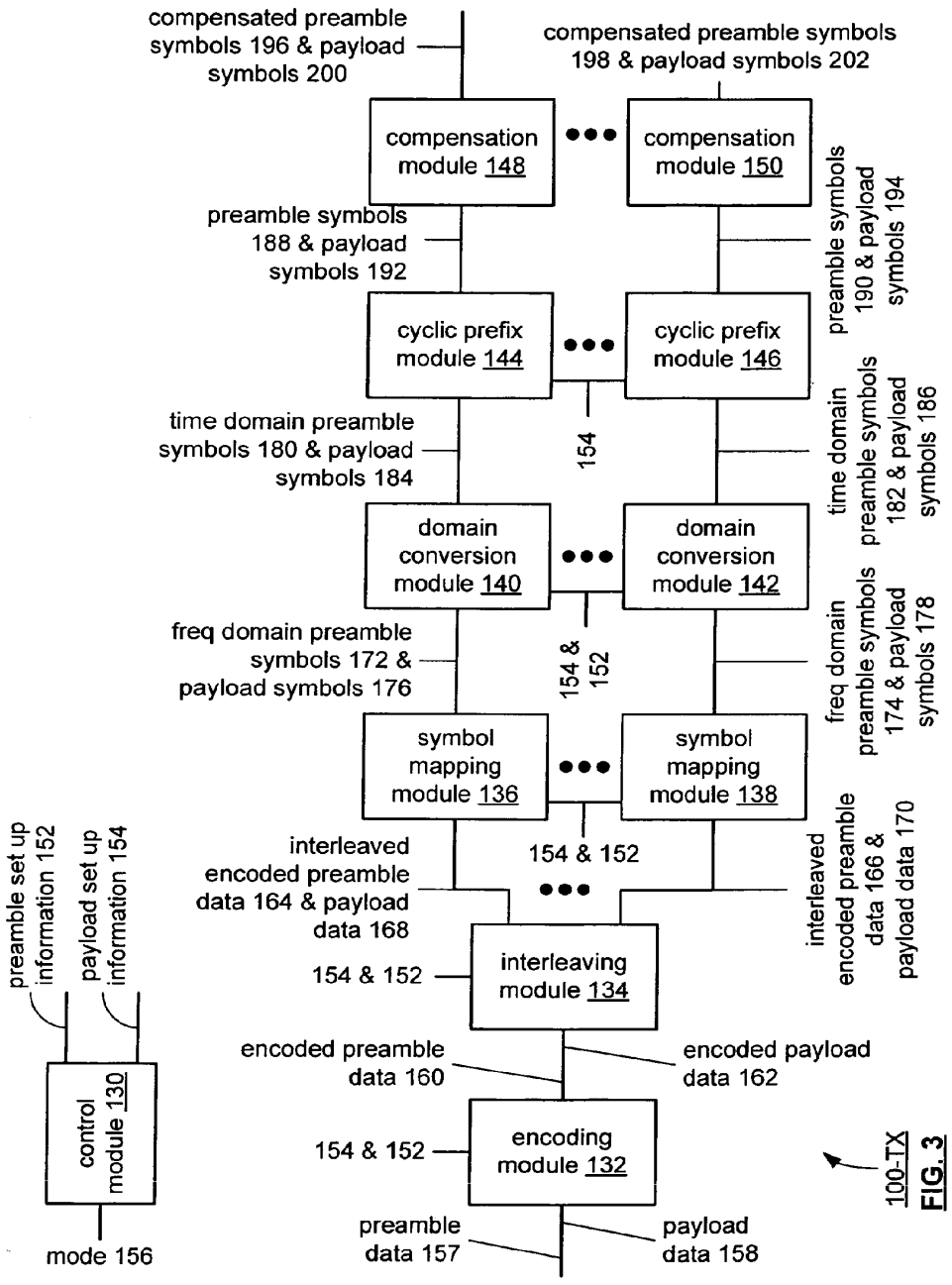


FIG. 3

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00194

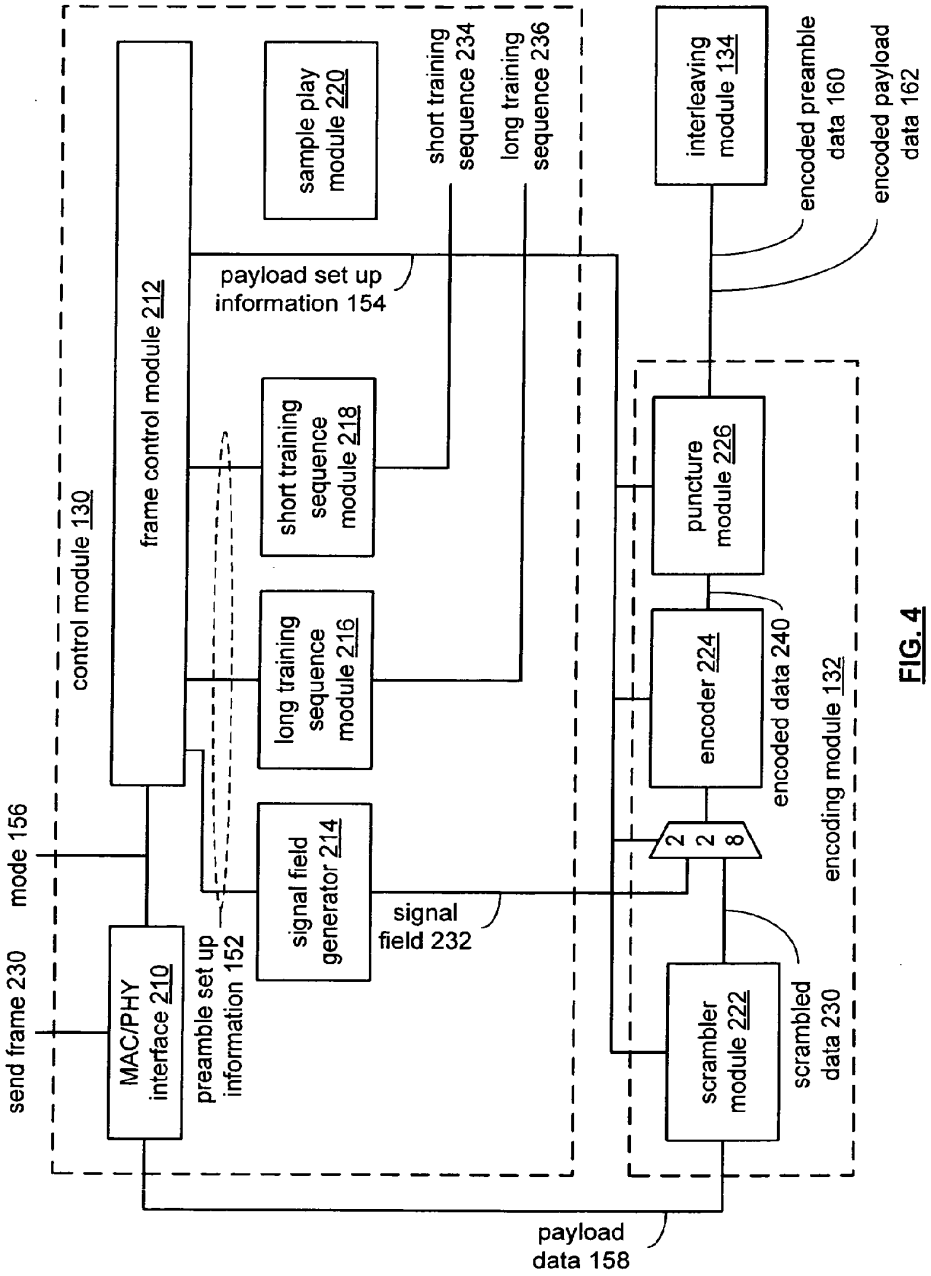


FIG. 4

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00195

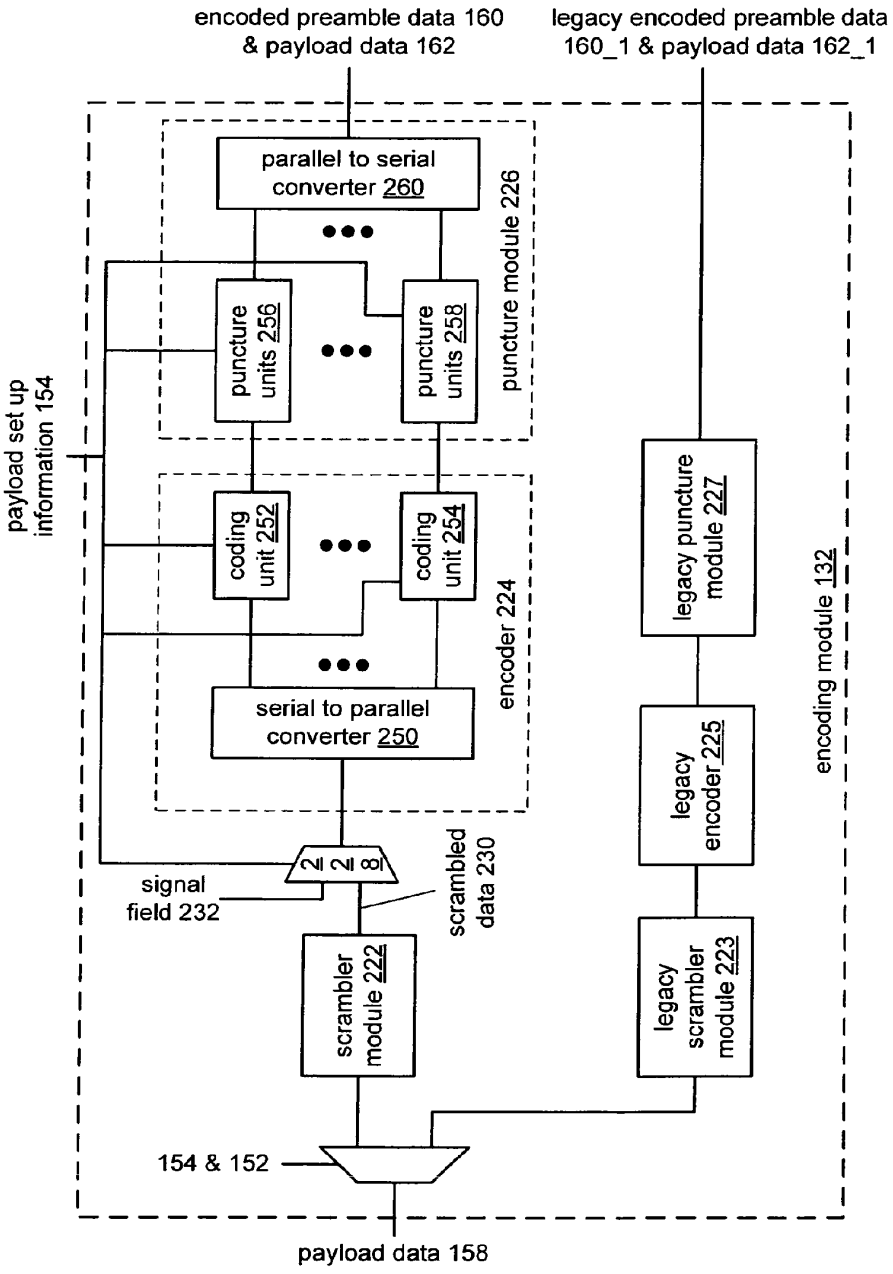


FIG. 5

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00196

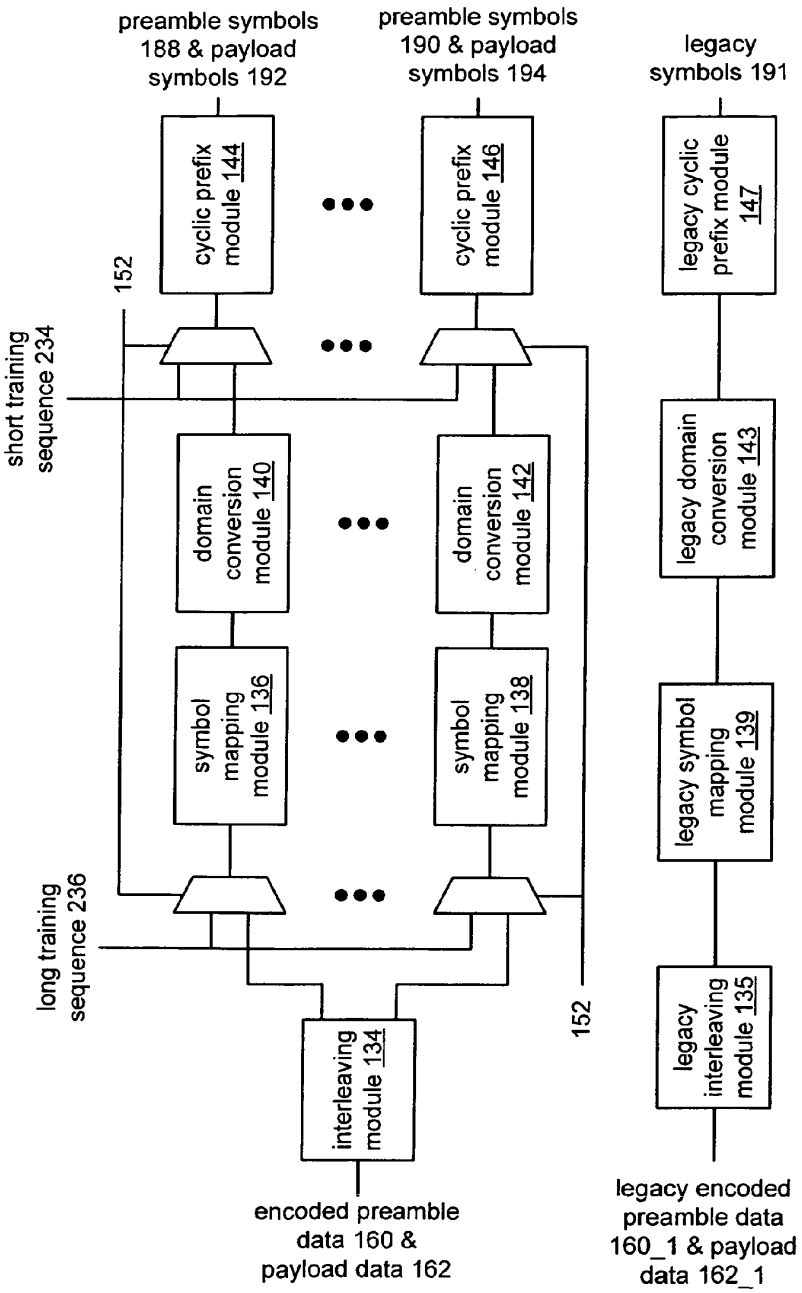


FIG. 6

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00197

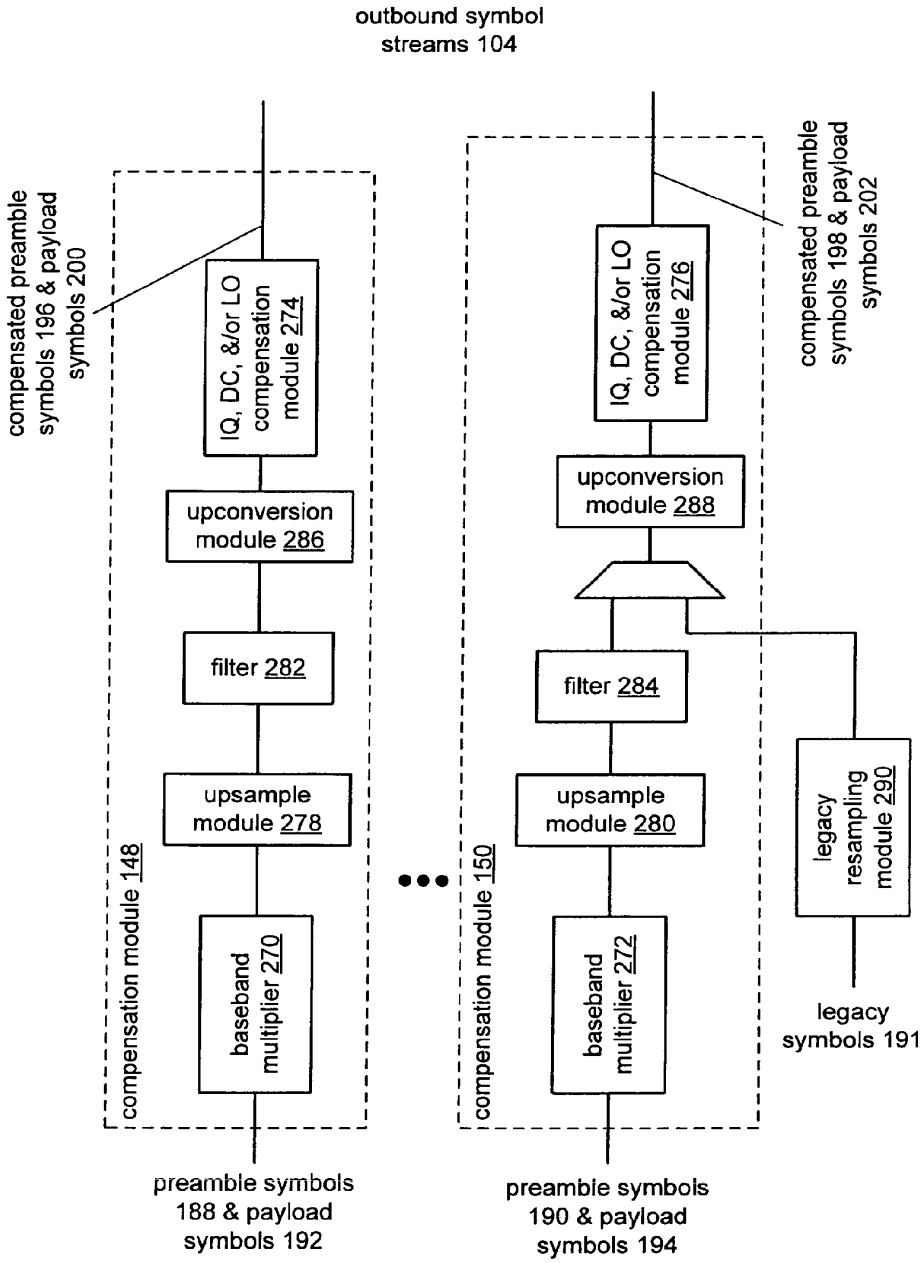


FIG. 7

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00198

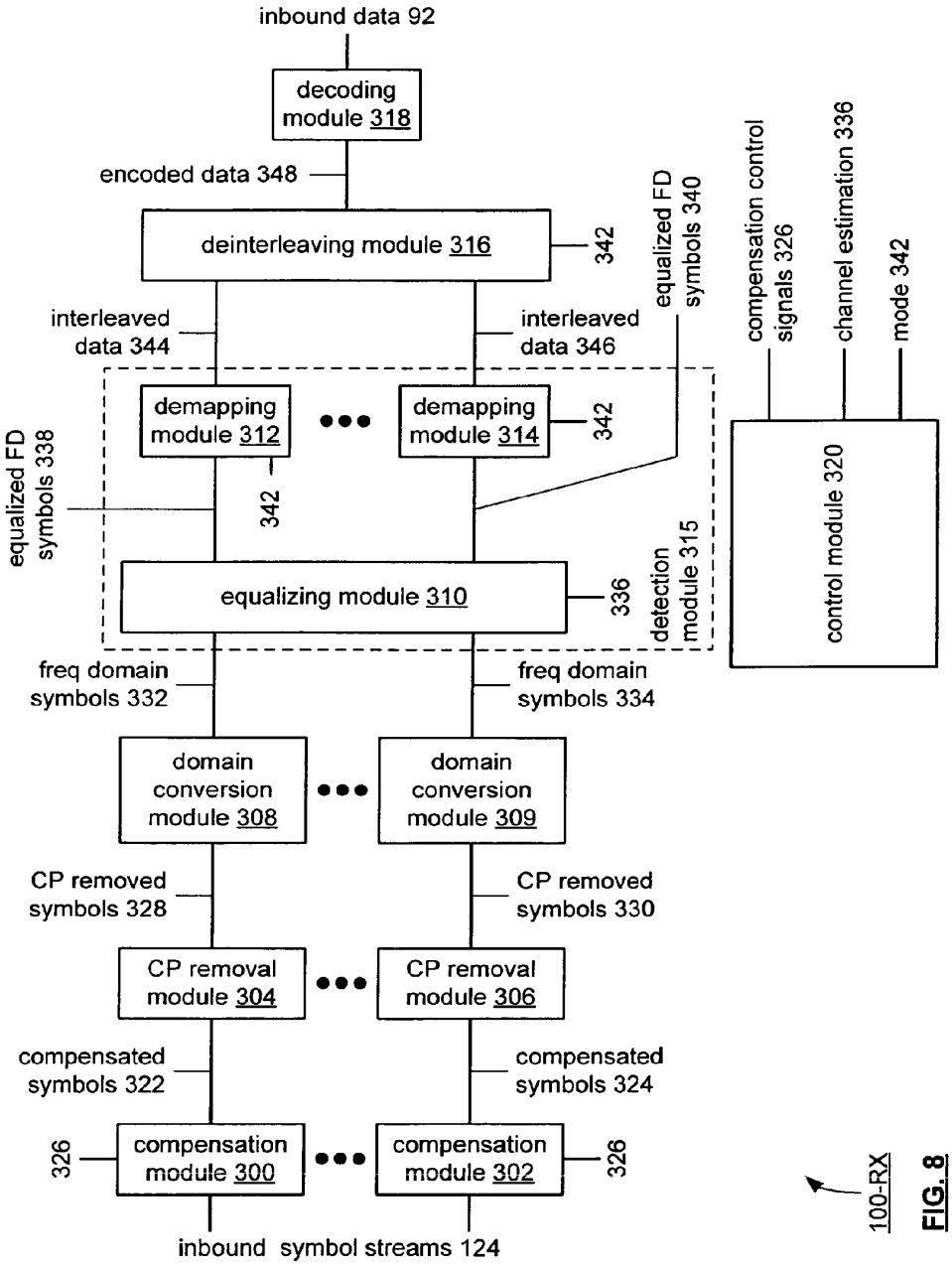


FIG. 8

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00199

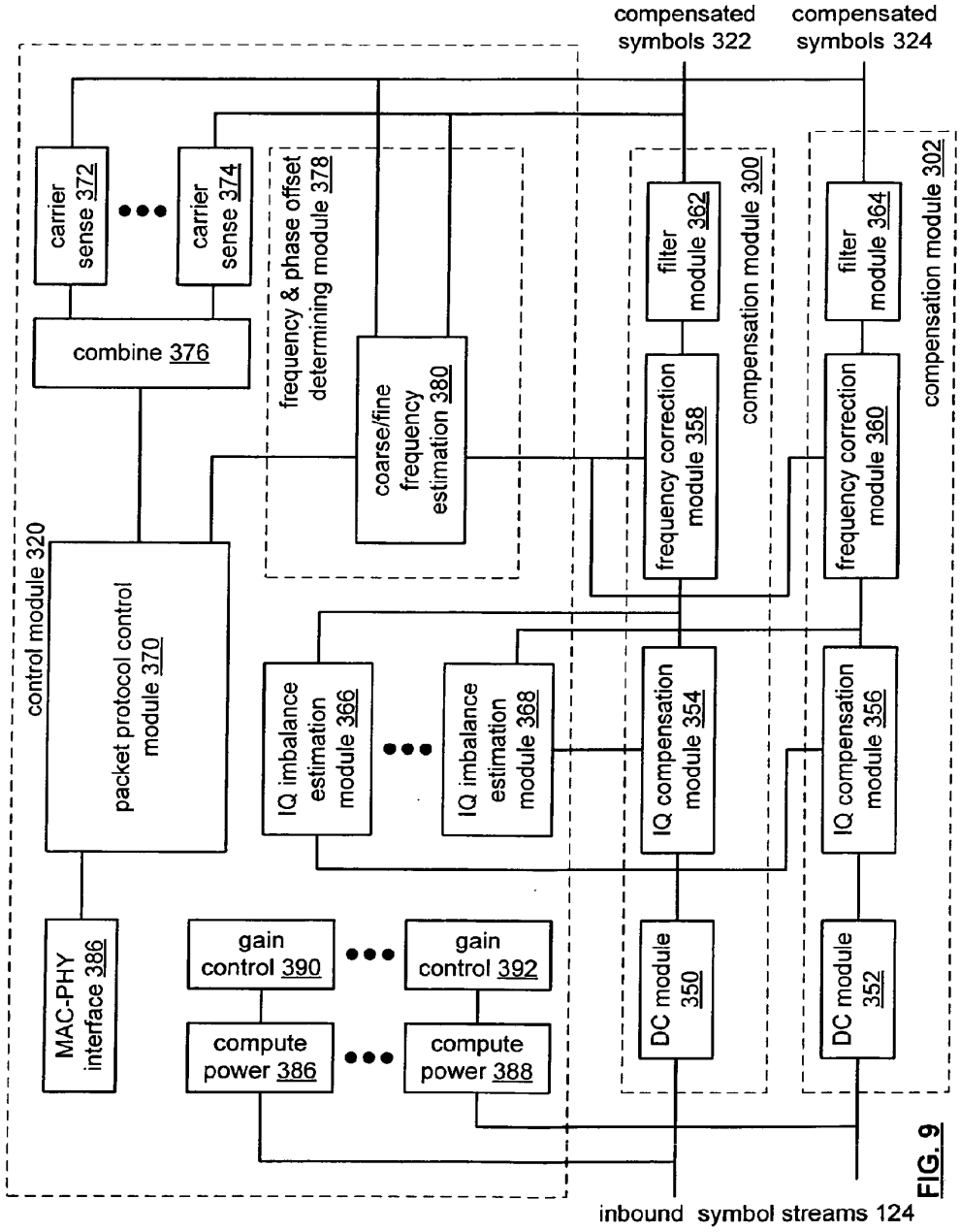


FIG. 9

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00200

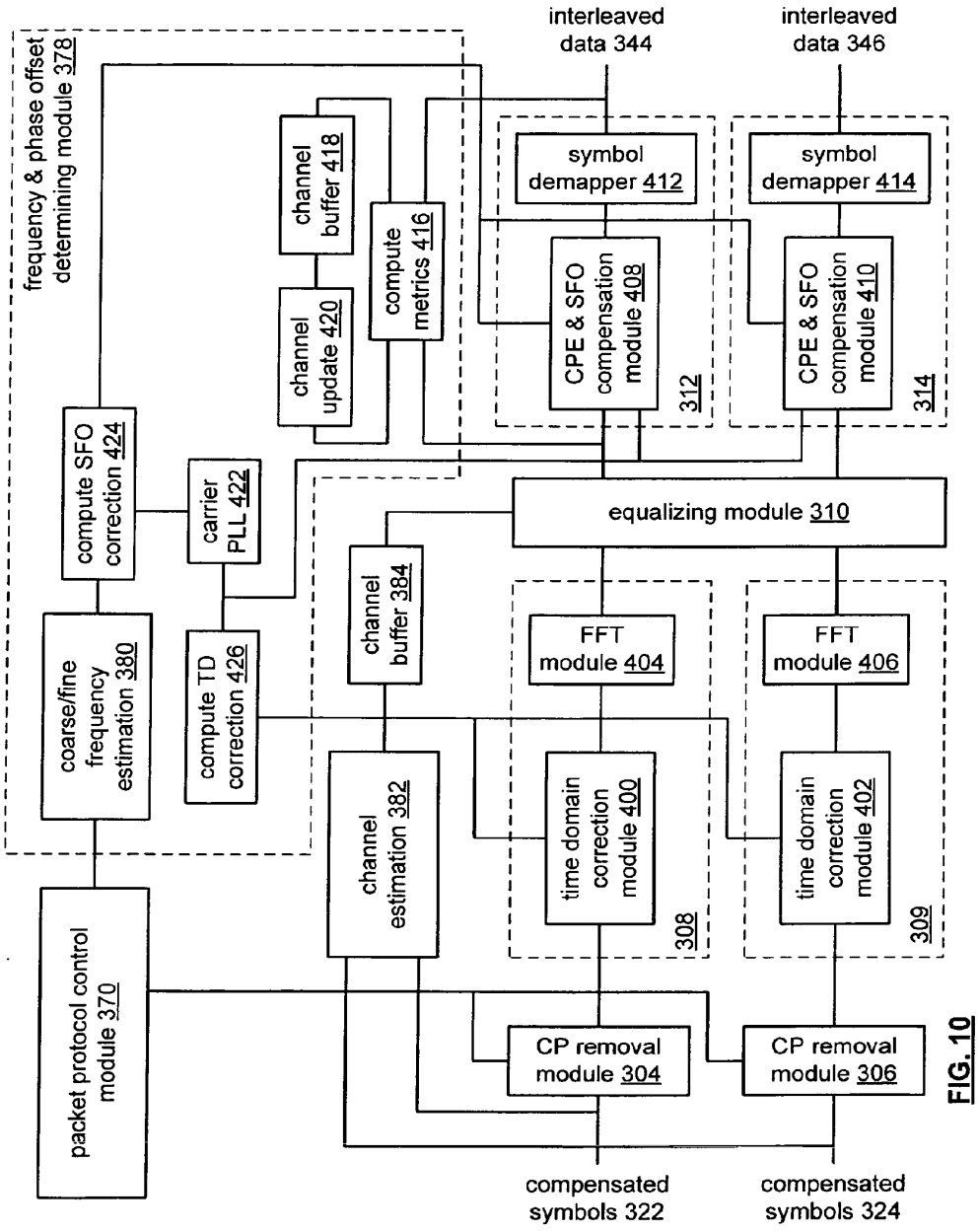


FIG. 10

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00201

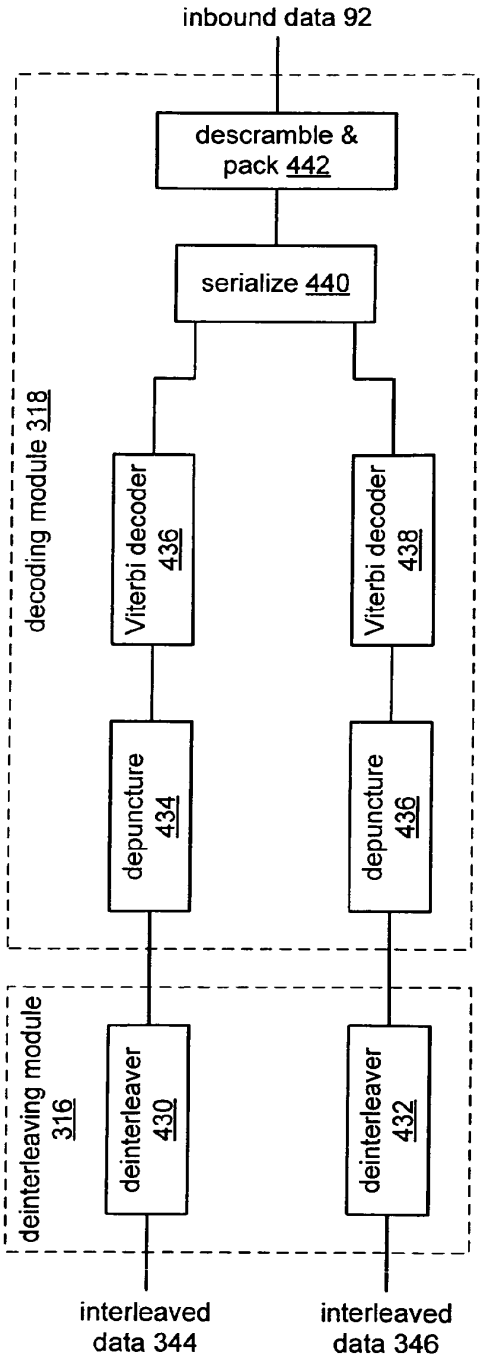


FIG. 11

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00202

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 60695155 B **[0001]**

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00203

Electronic Acknowledgement Receipt

EFS ID:	12500210
Application Number:	11627255
International Application Number:	
Confirmation Number:	1589
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Customer Number:	34206
Filer:	Aaron Wesley Pederson/Robert Thrumston
Filer Authorized By:	Aaron Wesley Pederson
Attorney Docket Number:	100.829US01
Receipt Date:	09-APR-2012
Filing Date:	25-JAN-2007
Time Stamp:	17:14:24
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	00295936.PDF	613112 a1b7ec4bab159a7e788724fe9b3ee5d76405d9bd	no	8

Warnings:	
Information:	

2	Foreign Reference	00288170.PDF	2009930 87fb825255c3ad94b131180f45faa6abdf17a12e	no	33
Warnings:					
Information:					
3	Non Patent Literature	00050534.pdf	1352071 023ab0dc5a51bd5a6850d20cc981ab3e9a459f72	no	13
Warnings:					
Information:					
		Total Files Size (in bytes):	3975113		

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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.

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

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

Application Number	11627255	Filing Date	2007-01-25	Docket Number (if applicable)	100.829US01	Art Unit	2617
First Named Inventor	KOZIY			Examiner Name	Michael Thier		

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

SUBMISSION REQUIRED UNDER 37 CFR 1.114

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

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

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

☒ Enclosed

- ☒ Amendment/Reply
- ☐ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

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

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 502432

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/David N. Fogg/	Date (YYYY-MM-DD)	2010-12-08
Name	David N. FOGG	Registration Number	35138

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

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

Electronic Patent Application Fee Transmittal

Application Number:	11627255
Filing Date:	25-Jan-2007
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Filer:	David Fogg/Lisa Gentry
Attorney Docket Number:	100.829US01

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for continued examination	1801	1	810	810
		Total in USD ($)		**810**

Electronic Acknowledgement Receipt	
EFS ID:	8989738
Application Number:	11627255
International Application Number:	
Confirmation Number:	1589
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Customer Number:	34206
Filer:	David Fogg/Lisa Gentry
Filer Authorized By:	David Fogg
Attorney Docket Number:	100.829US01
Receipt Date:	08-DEC-2010
Filing Date:	25-JAN-2007
Time Stamp:	15:14:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$810
RAM confirmation Number	1626
Deposit Account	502432
Authorized User	FOGG,DAVID N.
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		00232930.PDF	111267 1eb2b034bfde23328639e4b2c189adba75bb80f7	yes	11
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Amendment Submitted/Entered with Filing of CPA/RCE		1	1	
	Claims		2	6	
	Applicant Arguments/Remarks Made in an Amendment		7	11	
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	00233042.PDF	769106 fad30eb8509e7fb320c12f31a698b4ac85a73ed0	no	3
Warnings:					
Information:					
3	Fee Worksheet (PTO-875)	fee-info.pdf	30406 7ab00d48a1b2adef0bdc1f9efc3a051601b1d894	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	910779		

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

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

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

Applicant(s)	Koziy	**AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.114**
Serial No.	11/627,255	
Filing Date	1/25/2007	
Group Art Unit	2617	
Examiner Name	THIER, MICHAEL	
Confirmation No.	1589	
Attorney Docket No.	100.829US01	
Title: DISTRIBUTED REMOTE BASE STATION SYSTEM		

The Final Office Action mailed on September 8, 2010 has been reviewed. A Request for Continued Examination has been filed with this Amendment and Response. Please amend the above-identified application as follows.

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

Remarks begin on page 7 of this paper.

Amendments to the Claims:

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

Listing of claims:

1. (Currently amended) A distributed base station system for high speed data transmission comprising:

a plurality of remote antennas, each antenna being coupled to a co-located, network layer router;

wherein the plurality of remote antennas are coupled to each other and are arranged into a network.

2. (Original) The distributed base station system of claim 1, wherein the plurality of remote antennas are arranged in a tree configuration.

3. (Original) The distributed base station system of claim 1, wherein the plurality of remote antennas are arranged in a ring configuration.

4. (Original) The distributed base station system of claim 1, wherein at least one of the plurality of remote antennas is coupled to a remote base station.

5. (Original) The distributed base station system of claim 1, wherein each of the plurality of remote antennas is coupled to a remote base station.

6. (Original) The distributed base station system of claim 1, wherein the system transports data using a protocol that is compliant with IEEE 802.16.

7. (Original) The distributed base station system of claim 1, further comprising:

a fiber optic transport mechanism between two of the plurality of remote antennas.

8. (Original) The distributed base station system of claim 1, further comprising:

a millimeter wave transceiver configured to transport data between two of the plurality of remote antennas.

9. (Currently amended) A method of transmitting a wireless communication signal comprising:

receiving a RF signal at a first remote wireless communication station;

routing the RF signal to a second remote wireless communication station via a network layer router co-located with the first remote wireless communication station; ~~and~~

receiving the RF signal at a co-located, network layer router at the second remote wireless communication station; and

transmitting the RF signal from an antenna at the second remote wireless communication station.

10. (Original) The method of claim 9, further comprising:

sending the RF signal from a local base station to the first remote wireless communication station.

11. (Original) The method of claim 9, wherein receiving the RF signal receives the RF signal via an antenna at the first remote wireless communication station.

12. (Original) The method of claim 11, further comprising:

processing the RF signal by a base station at the second remote wireless communication station to form a second RF signal; and

routing the second RF signal to a third remote wireless base station.

13. (Original) The method of claim 12, further comprising:

transmitting the second RF signal from an antenna of the third remote wireless base station.

14. (Original) The method of claim 9, further comprising:

splitting the RF signal and sending a duplicate RF signal to a third remote wireless communication station; and

transmitting the duplicate RF signal from an antenna at the third remote wireless communication station.

15. (Original) The method of claim 9, further comprising:

sending the RF signal from a host unit to the first wireless communication station.

16. (Original) The method of claim 9, wherein transmitting further comprises:

transmitting the RF signal to a mobile device.

17. (Original) The method of claim 9, further comprising:

processing the RF signal by a base station at the first remote wireless communication station to form a second RF signal; and

transmitting the second RF signal from an antenna at the first remote wireless communication station.

18. (Original) The method of claim 9, wherein the RF signal is transported using a protocol that is compliant with IEEE 802.16.

19. (Original) The method of claim 9, wherein routing the RF signal further comprises:

routing the RF signal through a third wireless communication station and then to the second remote wireless communication station.

20. (Currently amended) A method of transmitting a wireless communication signal comprising:

receiving a RF signal at an antenna of a first remote wireless communication station;

processing the RF signal by a base station at the first remote wireless communication station;

routing the processed RF signal through a network of remote wireless communication stations to a second remote wireless communication station, each remote wireless communication station having a co-located, network layer router; and

transmitting a processed RF signal from the antenna of the second remote wireless communication station.

21. (Original) The method of claim 20, wherein the RF signal is transported using a protocol that is compliant with IEEE 802.16.

22. (Original) The method of claim 20, wherein transmitting further comprises:

transmitting the processed RF signal to a mobile device.

23. (Original) The method of claim 20, wherein receiving the RF signal receives the RF signal via an antenna at the first remote wireless communication station.

24. (Original) The method of claim 20, further comprising:

sending the RF signal from a local base station to the first remote wireless communication station.

25. (Currently amended) A remote wireless communication station for transmitting high speed wireless data comprising:

a remote unit;

a router co-located with and coupled to the remote unit; and

an antenna coupled to the remote unit.

26. (Previously Presented) The remote wireless communication station of claim 25, wherein the remote unit is configured to transmit data using a protocol compliant with IEEE 802.16.

27. (Previously Presented) The remote wireless communication station of claim 25, further comprising:

a baseband unit; and

wherein the remote unit is coupled to the baseband unit and is configured as a base station.

REMARKS

The Final Office Action mailed on September 8, 2010 has been reviewed. Claims 1-27 are pending in this application.

Rejections Under 35 U.S.C. § 102

Claims 1, 3-5, 7, 9-17, 20, 22-25 and 27 were rejected under 35 USC § 102(b) as being anticipated by Mani et al. (U.S. Publication No. 2002/0191565). Applicant respectfully traverses this rejection.

Claim 1 calls for:

> A distributed base station system for high speed data transmission comprising:
>
> a plurality of remote antennas, each antenna being coupled to a co-located, network layer router;
>
> wherein the plurality of remote antennas are coupled to each other and are arranged into a network.

Applicant respectfully asserts that Mani does not teach or suggest this claimed invention.

Mani does not disclose a network layer router that is co-located at each of a plurality of remote antennas in a network as claimed. The term "router" as used in claim 1 and the current specification refers to a network layer router. See, e.g., Specification at paragraph [0046]. Although Mani uses the term "routing" it does not anticipate a router as claimed. Specifically, Mani describes, in paragraph [0057], the control box 27

> provide[s] routing to selected base stations 14. The routing by the control boxes 27 can be performed according to a desired schedule. For example, the switch could allocate more channels to highways during commute hours, and more channels to commercial office parks during business hours.

Applicant respectfully submits that this description in Mani is more akin to a multiplexing function that associates an antenna with a radio rather than a router that selectively routs signals between antennas based on the destination of the signal.

Therefore, Mani does not anticipate claim 1. Withdrawal of the rejection and allowance of claim 1 are respectfully requested.

Claims 3-5 and 7 depend from claim 1 and are thus allowable at least for the reasons identified above with respect to claim 1. Withdrawal of the rejection and allowance of claims 2-5 and 7 are respectfully requested.

Claim 9 reads as follows:

> A method of transmitting a wireless communication signal comprising:
> receiving a RF signal at a first remote wireless communication station;
> routing the RF signal to a second remote wireless communication station via a network layer router co-located with the first remote wireless communication station;
> receiving the RF signal at a co-located, network layer router at the second remote wireless communication station; and
> transmitting the RF signal from an antenna at the second remote wireless communication station.

For the reasons discussed above, Mani does not teach or suggest "routing the RF signal to a second remote wireless communication station via a network layer router co-located with the first remote wireless communication station" and "receiving the RF signal at a co-located, network layer router at the second remote wireless communication station." Therefore, claim 9 is not anticipated by Mani. Withdrawal of the rejection and allowance of claim 9 are respectfully requested.

Claims 10 -17 depend from claim 9 and thus are also allowable at least for the reasons discussed above with respect to claim 9. Withdrawal of the rejection and allowance of claims 10-17 are respectfully requested.

Claim 20 reads as follows:

> A method of transmitting a wireless communication signal comprising:
> receiving a RF signal at an antenna of a first remote wireless communication station;

processing the RF signal by a base station at the first remote wireless communication station;

routing the processed RF signal through a network of remote wireless communication stations to a second remote wireless communication station, each remote wireless communication station having a co-located, network layer router; and

transmitting a processed RF signal from the antenna of the second remote wireless communication station.

For the reasons discussed above, Mani does not teach or suggest "routing the processed RF signal through a network of remote wireless communication stations to a second remote wireless communication station, each remote wireless communication station having a co-located, network layer router" and "transmitting a processed RF signal from the antenna of the second remote wireless communication station." Therefore, claim 20 is not anticipated by Mani. Withdrawal of the rejection and allowance of claim 20 are respectfully requested.

Claims 22-24 depend from claim 20 and are thus also allowable at least for the reasons identified above with respect to claim 20. Withdrawal of the rejection and allowance of claims 22-24 are respectfully requested.

Claim 25 reads as follows:

A remote wireless communication station for transmitting high speed wireless data comprising:

a remote unit;

a router co-located with and coupled to the remote unit; and

an antenna coupled to the remote unit.

For the reasons discussed above, Mani does not teach or suggest "a remote unit," and "a router co-located with and coupled to the remote unit." Therefore, claim 25 is not anticipated by Mani. Withdrawal of the rejection and allowance of claim 25 are respectfully requested.

Claim 27 depends from claim 25 and is allowable at least for the same reasons as claim 25. Withdrawal of the rejection and allowance of claim 27 are respectfully requested.

Rejections Under 35 U.S.C. § 103

Claims 2 and 19 were rejected under 35 USC § 103(a) as being unpatentable over Mani et al. (U.S. Publication No. 2002/0191565) in view of Chung et al. (U.S. Publication No. 2004/0110534). Applicant respectfully traverses this rejection.

Claims 2 and 19 depend from claims 1 and 9 respectively and thus are allowable for the reasons identified above. The addition of Chung does not cure the defect in the rejection above. Therefore, withdrawal of the rejection of claims 2 and 19 is respectfully requested.

Claims 6, 8, 18, 21 and 26 were rejected under 35 USC § 103(a) as being unpatentable over Mani et al. (U.S. Publication No. 2002/0191565) in view of Louberg et al. (U.S. Publication No. 2006/0111047). Applicant respectfully traverses this rejection.

Claims 6, 8, 18, 21 and 26 depend from claims that are allowable over Mani for the reasons identified above. The addition of Louberg does not cure the defect in the above rejection. Therefore, these dependent claims are also allowable. Withdrawal of the rejection of claims 6, 8, 18, 21, and 26 is respectfully requested.

CONCLUSION

Applicant respectfully submits that claims **1-27** are in condition for allowance and notification to that effect is earnestly requested. If necessary, please charge any additional fees or credit overpayments to Deposit Account No. 502432.

If the Examiner has any questions or concerns regarding this application, please contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: December 8, 2010 /David N. Fogg/

David N.Fogg
Reg. No. 35138

Attorneys for Applicant
Fogg & Powers LLC
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Minneapolis, MN 55439
T – (952) 465-0770
F – (952) 465-0771

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/627,255	01/25/2007	Robert J. Koziy	100.829US01	1589

34206 7590 09/08/2010

FOGG & POWERS LLC
5810 W 78TH STREET
SUITE 100
MINNEAPOLIS, MN 55439

EXAMINER	
THIER, MICHAEL	
ART UNIT	PAPER NUMBER
2617	

NOTIFICATION DATE	DELIVERY MODE
09/08/2010	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):

DAVID@FOGGLAW.COM
docketing@fogglaw.com

Office Action Summary	Application No.	Applicant(s)	
	11/627,255	KOZIY ET AL.	
	Examiner	Art Unit	
	MICHAEL T. THIER	2617	

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

Period for Reply

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

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

Status

1)☒ Responsive to communication(s) filed on *10 July 2010*.

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

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

Disposition of Claims

4)☒ Claim(s) *1-27* 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) *1-27* 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 *25 January 2007* 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 *7/10/2010*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statements (IDS) submitted on 7/10/2010 has been entered and considered by the examiner.

Response to Arguments

2. Applicant's arguments filed 7/10/2010 have been fully considered but they are not persuasive.

Applicant argues, "Mani does not disclose a router at each of the plurality of remote antennas as claimed. The term router as used in claim 1 and the current specification refers to a network layer router." The applicant further argues that since Mani does not disclose the router as claimed, he does not disclose the "routing" limitations.

In response to applicant's argument, the examiner respectfully disagrees. Although the claims are read in light of the specification, limitations from the specification are not read into the claims. The claims very broadly recite "a plurality of remote antennas, each antenna being coupled to a router". Therefore, the claims merely recite that each antenna is coupled to a router, and Mani teaches in figure 15 and par. 57 that a control box can be included for each antenna and will *provide routing to selected base stations (thus reading on the routing limitations)*. This control box clearly reads on the router coupled to each antenna since it provides routing, and thus can clearly be considered a router as broadly claimed. Further, the examiner would like

to note that the applicants argument that "Mani does not disclose a router at each of the plurality of remote antennas as claimed", is irrelevant since the claims in no way recite *a router at each of the plurality of antennas,* they simply recite that each antenna is coupled to a router, which could mean one single router for each antenna or multiple routers, one for each antenna.

Claim Rejections - 35 USC § 102

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

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

4. Claims 1, 3-5, 7, 9-17, 20, 22-25, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Mani et al. (US 2002/0191565).

Regarding claim 1. Mani teaches a distributed base station system for high speed data transmission (title, abstract, and figure 5) comprising:

a plurality of remote antennas (figure 5 item 12), each antenna being coupled to a router (figure 15, item 27, further see par. 57);

wherein the plurality of remote antennas are coupled to each other (figure 5 item 12, the antennas are coupled to each other by the links 16) and are arranged into a network (figure 5 item 10 is the network made up by the antennas 12, further see par. 46).

Regarding claim 3. Mani further teaches the distributed base station system

wherein the plurality of remote antennas are arranged in a ring configuration (figure 5, see the antennas in a ring configuration, further par. 49 and 51).

Regarding claim 4. Mani further teaches wherein at least one of the plurality of remote antennas is coupled to a remote base station. (figure 5, antenna 12 coupled to remote base station 14 over link 16)

Regarding claim 5. Mani further teaches wherein each of the plurality of remote antennas is coupled to a remote base station. (figure 5, each antenna 12 is coupled to remote base station 14 over link 16)

Regarding claim 7. Mani further teaches further comprising: a fiber optic transport mechanism between two of the plurality of remote antennas. (fig. 5, fig. 8, and par. 8, 47 and 49)

Regarding claim 9. Mani teaches a method of transmitting a wireless communication signal (title, abstract, and par. 56), comprising:

receiving a RF signal at a first remote wireless communication station (par. 56, i.e. RF traffic received at antenna 12 is directed into base station 14, further par. 63, i.e. at antenna 12 an uplink signal is received, converted, and transmitted over the network 10 to the base station units 14);

routing the RF signal to a second remote wireless communication station (par. 56, 57, and 63, i.e. RF traffic from antenna 12 is redirected to base station 14, further the control box 27 provides routing to selected base stations, and at antenna 12 an uplink signal is received, converted, and transmitted over the network 10 to the base station units 14); and

transmitting the RF signal from an antenna at the second remote wireless communication station (par. 63, i.e. the antenna 12 can receive a downlink signal (thus a signal from the base station 14 to the antenna 12), it can then reconstruct and transmit the RF signal).

Regarding claim 10. Mani further teaches sending the RF signal from a local base station to the first remote wireless communication station. (par. 63, i.e. the base station 14 may transmit a downlink digital signal on to the network 10, and thus to a remote communication station)

Regarding claims 11 and 23. Mani further teaches wherein receiving the RF signal receives the RF signal via an antenna at the first remote wireless communication station. (par. 63, i.e. antenna 12 can be configured to receive)

Regarding claim 12. Mani further teaches processing the RF signal by a base station at the second remote wireless communication station to form a second RF signal (par. 63, i.e. signal received at antenna 12 are transmitted over the network to base station 14, base station 14 receives the signal and processes it, which thus creates a second signal (i.e. a processed version of the first signal received at the base station); and routing the second RF signal to a third remote wireless base station. (par. 63, i.e. the base station can additionally transmit a downlink signal to the network 10)

Regarding claim 13. Mani further teaches transmitting the second RF signal from an antenna of the third remote wireless base station. (par. 63, the antenna receives the downlink signal and transmits it)

Regarding claim 14. Mani further teaches splitting the RF signal and sending a

duplicate RF signal to a third remote wireless communication station (see figure 8, de multiplexer); and transmitting the duplicate RF signal from an antenna at the third remote wireless communication station. (par. 63, the antenna receives the downlink signal and transmits it)

Regarding claims 15 and 24. Mani further teaches sending the RF signal from a host unit to the first wireless communication station. (par. 63, uplink signals received at antenna 12 from a mobile unit are converted and transmitted over the network 10 to the base station 14)

Regarding claims 16 and 22. Mani further teaches transmitting the RF signal to a mobile device. (par. 59, i.e. the signal is received by the remote mobile unit)

Regarding claim 17. Mani further teaches processing the RF signal by a base station at the first remote wireless communication station to form a second RF signal (par. 63, i.e. signal received at antenna 12 are transmitted over the network to base station 14, base station 14 receives the signal and processes it, which thus creates a second signal (i.e. a processed version of the first signal received at the base station); and transmitting the second RF signal from an antenna at the first remote wireless communication station. (par. 63, the antenna receives the downlink signal and transmits it)

Regarding claim 20. Mani teaches a method of transmitting a wireless communication signal (title, abstract, par. 56 and 63) comprising:

receiving a RF signal at an antenna of a first remote wireless communication station (par. 56, i.e. RF traffic received at antenna 12 is directed into base station 14,

further par. 63, i.e. at antenna 12 an uplink signal is received, converted, and transmitted over the network 10 to the base station units 14);

processing the RF signal by a base station at the first remote wireless communication station (par. 56, 57, and 63, i.e. RF traffic from antenna 12 is redirected to base station 14, further the control box 27 provides routing to selected base stations, and par. 62-63, i.e. at antenna 12, which serves as a remote unit and provides conventional base station functionality as explained in par. 62, an uplink signal is received, converted (i.e. processed), and transmitted over the network 10 to the base station units 14);

routing the processed RF signal through a network of remote wireless communication stations to a second remote wireless communication station (par. 56, 57, and 63, i.e. RF traffic from antenna 12 is redirected to base station 14, further the control box 27 provides routing to selected base stations, and at antenna 12 an uplink signal is received, converted (i.e. processed), *and transmitted over the network 10 to the base station units 14*); and

transmitting a processed RF signal from the antenna of the second remote wireless communication station. (par. 63, i.e. the antenna 12 can receive a downlink signal, it can then reconstruct and transmit the RF signal)

Regarding claim 25. Mani teaches a remote wireless communication station for transmitting high speed wireless data (title, abstract, and figure 5) comprising:

a remote unit (figure 5 item 14);

a router coupled to the remote unit (figure 5, "Node", further see figures 6 and 7,

which shows the node can be a switch or router) and

an antenna coupled to the remote unit. (figure 5, item 12 , coupled to the base station 14 through link 16)

Regarding claim 27. Mani further teaches a baseband unit; and the remote unit is coupled to the baseband unit and is configured as a base station. (figure 5 item 14, further par. 46, i.e. Base stations 14 are configured to provide wireless cellular transmission, thus the baseband unit is inherent in view of the base station 14, further see par. 62, i.e. baseband coding)

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.

6. Claims 2 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mani et al. (US 2002/0191565) in view of Chung et al. (US 2004/0110534).

Regarding claim 2. Mani teaches the limitations of the previous claim.

However, he does not specifically disclose wherein the plurality of remote antennas are arranged in a tree configuration.

Chung teaches a method and system to enhance capacity in a distributed network (title and abstract). He teaches in par. 7 the idea of using a tree configuration.

Therefore it would have been obvious for one of ordinary skill in the art at the

time of invention to utilize the teachings as in Chung with the teachings as in Mani. The motivation for doing so would have been to allow for using a configuration that can be less costly and reduce link distance. (Chung par. 7)

Regarding claim 19. Chung further teaches routing the RF signal through a third wireless communication station and then to the second remote wireless communication station. (par. 7, i.e. the tree structure would allow for routing a signal through one station to get to another, and thus reading on this claim)

7. Claims 6, 8, 18, 21, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mani et al. (US 2002/0191565) in view of Louberg et al. (US 2006/0111047).

Regarding claims 6, 18, 21, and 26. Mani teaches the limitations of the previous claim.

However, he does not specifically disclose wherein the system transports data using a protocol that is compliant with IEEE 802.16.

Louberg teaches a wireless communication system (title and abstract), that has distributed base stations (see figures 1 and 3b). He teaches the idea that the system uses a protocol compliant with IEEE 802.16 in par. 2 and 48 (i.e. WiMax).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to utilize the teachings as in Louberg with the teachings as in Mani. The motivation for doing so would have been to allow for using a well known and widely used high speed, high bandwidth technology.

Regarding claim 8. Louberg further teaches further a millimeter wave transceiver configured to transport data between two of the plurality of remote antennas. (par. 48)

Conclusion

8. **THIS ACTION IS MADE FINAL.** 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 mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL T. THIER whose telephone number is (571)272-2832. The examiner can normally be reached on Monday thru Friday 7:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on (571) 272-7603. 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.

/MICHAEL T THIER/
Examiner, Art Unit 2617
8/18/2010

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

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

Application Number	11627255
Filing Date	2007-01-25
First Named Inventor	Koziy
Art Unit	2617
Examiner Name	THIER, MICHAEL
Attorney Docket Number	100.829US01

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/MT/	1	20020027892		2002-03-07	Sasaki	
/MT/	2	20050084076		2005-04-21	Dhir et al	
/MT/	3	20060029171		2006-02-09	Jensen	
/MT/	4	20060128347		2006-06-15	Piriyapoksombut et al	
/MT/	5	20060283952		2006-12-21	Wang	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	THIER, MICHAEL
	Attorney Docket Number	100.829US01

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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	1		☐

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EXAMINER SIGNATURE

Examiner Signature	/Michael Thier/	Date Considered	08/18/2010

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

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

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11627255	KOZIY ET AL.
	Examiner	Art Unit
	MICHAEL T THIER	2617

✓	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	08/18/2010								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
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	20	✓								
	21	✓								
	22	✓								
	23	✓								
	24	✓								
	25	✓								
	26	✓								
	27	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11627255	KOZIY ET AL.
	Examiner	Art Unit
	MICHAEL T THIER	2617

SEARCHED			
Class	Subclass	Date	Examiner
	updated	8/18/2010	/mtt/

SEARCH NOTES		
Search Notes	Date	Examiner
updated	8/18/2010	/mtt/

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

Applicant(s)	Koziy	**AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.111**
Serial No.	11/627,255	
Filing Date	1/25/2007	
Confirmation No.	1589	
Examiner Name	THIER, MICHAEL	
Group Art Unit	2617	
Attorney Docket No.	100.829US01	
Title: A DISTRIBUTED REMOTE BASE STATION SYSTEM		

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

The Office Action mailed on March 10, 2010 has been reviewed. Please amend the above-identified application as follows.

This paper is accompanied by a Petition, as well as the appropriate fee, to obtain a 1-month extension of the period for responding to the Office action, thereby moving the deadline for response from June 10, 2010 to July 10, 2010.

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

Amendments to the Claims are reflected in the listing of claims that begins on page 3 of this paper.

Remarks begin on page 8 of this paper.

Amendments to the Specification:

Please amend the **Title** as follows:

~~[A]~~ DISTRIBUTED REMOTE BASE STATION SYSTEM

Amendments to the Claims:

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

Listing of claims:

1. (Original) A distributed base station system for high speed data transmission comprising:

a plurality of remote antennas, each antenna being coupled to a router;

wherein the plurality of remote antennas are coupled to each other and are arranged into a network.

2. (Original) The distributed base station system of claim 1, wherein the plurality of remote antennas are arranged in a tree configuration.

3. (Original) The distributed base station system of claim 1, wherein the plurality of remote antennas are arranged in a ring configuration.

4. (Original) The distributed base station system of claim 1, wherein at least one of the plurality of remote antennas is coupled to a remote base station.

5. (Original) The distributed base station system of claim 1, wherein each of the plurality of remote antennas is coupled to a remote base station.

6. (Original) The distributed base station system of claim 1, wherein the system transports data using a protocol that is compliant with IEEE 802.16.

7. (Original) The distributed base station system of claim 1, further comprising:

a fiber optic transport mechanism between two of the plurality of remote antennas.

8. (Original) The distributed base station system of claim 1, further comprising:

a millimeter wave transceiver configured to transport data between two of the plurality of remote antennas.

9. (Original) A method of transmitting a wireless communication signal comprising:

receiving a RF signal at a first remote wireless communication station;

routing the RF signal to a second remote wireless communication station; and

transmitting the RF signal from an antenna at the second remote wireless communication station.

10. (Original) The method of claim 9, further comprising:

sending the RF signal from a local base station to the first remote wireless communication station.

11. (Original) The method of claim 9, wherein receiving the RF signal receives the RF signal via an antenna at the first remote wireless communication station.

12. (Original) The method of claim 11, further comprising:

processing the RF signal by a base station at the second remote wireless communication station to form a second RF signal; and

routing the second RF signal to a third remote wireless base station.

13. (Original) The method of claim 12, further comprising:

transmitting the second RF signal from an antenna of the third remote wireless base station.

14. (Original) The method of claim 9, further comprising:

splitting the RF signal and sending a duplicate RF signal to a third remote wireless communication station; and

transmitting the duplicate RF signal from an antenna at the third remote wireless communication station.

15. (Original) The method of claim 9, further comprising:

sending the RF signal from a host unit to the first wireless communication station.

16. (Original) The method of claim 9, wherein transmitting further comprises:

transmitting the RF signal to a mobile device.

17. (Original) The method of claim 9, further comprising:

processing the RF signal by a base station at the first remote wireless communication station to form a second RF signal; and

transmitting the second RF signal from an antenna at the first remote wireless communication station.

18. (Original) The method of claim 9, wherein the RF signal is transported using a protocol that is compliant with IEEE 802.16.

19. (Original) The method of claim 9, wherein routing the RF signal further comprises:

routing the RF signal through a third wireless communication station and then to the second remote wireless communication station.

20. (Currently Amended) A method of transmitting a wireless communication signal comprising:

receiving a RF signal at an antenna of a first remote wireless communication station;

processing the RF signal by a base station at the first remote wireless communication station;

routing the processed RF signal through a network of remote wireless communication stations to a second remote wireless communication station; and

transmitting a processed RF signal from the antenna of the ~~first~~ second remote wireless communication station.

21. (Original) The method of claim 20, wherein the RF signal is transported using a protocol that is compliant with IEEE 802.16.

22. (Original) The method of claim 20, wherein transmitting further comprises:

transmitting the processed RF signal to a mobile device.

23. (Original) The method of claim 20, wherein receiving the RF signal receives the RF signal via an antenna at the first remote wireless communication station.

24. (Original) The method of claim 20, further comprising:

sending the RF signal from a local base station to the first remote wireless communication station.

25. (Previously Presented) A remote wireless communication station for transmitting high speed wireless data comprising:

a remote unit;

a router coupled to the remote unit; and

an antenna coupled to the remote unit.

26. (Previously Presented) The remote wireless communication station of claim 25~~24~~, wherein the remote unit is configured to transmit data using a protocol compliant with IEEE 802.16.

27. (Previously Presented) The remote wireless communication station of claim 25~~24~~, further comprising:

a baseband unit; and

wherein the remote unit is coupled to the baseband unit and is configured as a base station.

REMARKS

The Office Action mailed on March 10, 2010 has been reviewed. Claims 1-27 are pending in this application.

Claim Objections

Claim 20 is objected to because of informalities. Specifically, the Examiner objected to "transmitting a processed RF signal from the antenna of the first remote wireless communication station" because the RF signal had been previously routed to the second station. Applicant has corrected the claim as suggested by the Examiner.

Rejections Under 35 U.S.C. § 102

Claims 1, 3-5, 7, 9-17, 20, 22-25 and 27 were rejected under 35 USC § 102(b) as being anticipated by Mani et al. (U.S. Publication No. 2002/0191565). Applicant respectfully traverses this rejection.

Claim 1 calls for:

> A distributed base station system for high speed data transmission comprising:
> a plurality of remote antennas, each antenna being coupled to a router;
> wherein the plurality of remote antennas are coupled to each other and are arranged into a network.

Applicant respectfully asserts that Mani does not teach or suggest this claimed invention.

Mani does not disclose a router at each of a plurality of remote antennas in a network as claimed. The term "router" as used in claim 1 and the current specification refers to a network layer router. See, e.g., Specification at paragraph [0046]. Although Mani uses the term "routing" it does not anticipate a router as claimed. Specifically, Mani describes, in paragraph [0057], the control box 27

> provide[s] routing to selected base stations 14. The routing by the control boxes 27 can be performed according to a desired schedule. For example,

> the switch could allocate more channels to highways during commute hours, and more channels to commercial office parks during business hours.

Applicant respectfully submits that this description in Mani is more akin to a multiplexing function that associates an antenna with a radio rather than a router that selectively routs signals between antennas based on the destination of the signal. Therefore, Mani does not anticipate claim 1. Withdrawal of the rejection and allowance of claim 1 are respectfully requested.

Claims 3-5 and 7 depend from claim 1 and are thus allowable at least for the reasons identified above with respect to claim 1. Withdrawal of the rejection and allowance of claims 2-5 and 7 are respectfully requested.

Claim 9 reads as follows:

> A method of transmitting a wireless communication signal comprising:
> receiving a RF signal at a first remote wireless communication station;
> routing the RF signal to a second remote wireless communication station; and
> transmitting the RF signal from an antenna at the second remote wireless communication station.

For the reasons discussed above, Mani does not teach or suggest "routing the RF signal to a second remote wireless communication station" and "transmitting the RF signal from an antenna at the second remote wireless communication station." Therefore, claim 9 is not anticipated by Mani. Withdrawal of the rejection and allowance of claim 9 are respectfully requested.

Claims 10 -17 depend from claim 9 and thus are also allowable at least for the reasons discussed above with respect to claim 9. Withdrawal of the rejection and allowance of claims 10-17 are respectfully requested.

Claim 20 reads as follows:

A method of transmitting a wireless communication signal comprising:
receiving a RF signal at an antenna of a first remote wireless communication station;
processing the RF signal by a base station at the first remote wireless communication station;
routing the processed RF signal through a network of remote wireless communication stations to a second remote wireless communication station; and
transmitting a processed RF signal from the antenna of the second remote wireless communication station.

For the reasons discussed above, Mani does not teach or suggest "routing the processed RF signal through a network of remote wireless communication stations to a second remote wireless communication station" and "transmitting a processed RF signal from the antenna of the second remote wireless communication station." Therefore, claim 20 is not anticipated by Mani. Withdrawal of the rejection and allowance of claim 20 are respectfully requested.

Claims 22-24 depend from claim 20 and are thus also allowable at least for the reasons identified above with respect to claim 20. Withdrawal of the rejection and allowance of claims 22-24 are respectfully requested.

Claim 25 reads as follows:

A remote wireless communication station for transmitting high speed wireless data comprising:
a remote unit;
a router coupled to the remote unit; and
an antenna coupled to the remote unit.

For the reasons discussed above, Mani does not teach or suggest "a remote unit," and "a router coupled to the remote unit." Therefore, claim 25 is not anticipated by Mani. Withdrawal of the rejection and allowance of claim 25 are respectfully requested.

Claim 27 depends from claim 25 and is allowable at least for the same reasons as claim 25. Withdrawal of the rejection and allowance of claim 27 are respectfully requested.

Rejections Under 35 U.S.C. § 103

Claims 2 and 19 were rejected under 35 USC § 103(a) as being unpatentable over Mani et al. (U.S. Publication No. 2002/0191565) in view of Chung et al. (U.S. Publication No. 2004/0110534). Applicant respectfully traverses this rejection.

Claims 2 and 19 depend from claims 1 and 9 respectively and thus are allowable for the reasons identified above. The addition of Chung does not cure the defect in the rejection above. Therefore, withdrawal of the rejection of claims 2 and 19 is respectfully requested.

Claims 6, 8, 18, 21 and 26 were rejected under 35 USC § 103(a) as being unpatentable over Mani et al. (U.S. Publication No. 2002/0191565) in view of Louberg et al. (U.S. Publication No. 2006/0111047). Applicant respectfully traverses this rejection.

Claims 6, 8, 18, 21 and 26 depend from claims that are allowable over Mani for the reasons identified above. The addition of Louberg does not cure the defect in the above rejection. Therefore, these dependent claims are also allowable. Withdrawal of the rejection of claims 6, 8, 18, 21, and 26 is respectfully requested.

CONCLUSION

Applicant respectfully submits that claims **1-27** are in condition for allowance and notification to that effect is earnestly requested. If necessary, please charge any additional fees or credit overpayments to Deposit Account No. 502432.

If the Examiner has any questions or concerns regarding this application, please contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: July 10, 2010

/David N. Fogg/
David N. Fogg
Reg. No. 35138

Attorneys for Applicant
Fogg & Powers LLC
5810 W. 78th Street, Ste. 100
Minneapolis, MN 55439
T – (952) 465-0770
F – (952) 465-0771

PTO/SB/22 (07-09)
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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) 100.829US01
Application Number **11/627,255**	Filed **1/25/2007**
For **A DISTRIBUTED REMOTE BASE STATION SYSTEM**	
Art Unit **2617**	Examiner **Michael Thier**

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	
[X] One month (37 CFR 1.17(a)(1))	$ 130	$ 65	$ 130
[ ] Two months (37 CFR 1.17(a)(2))	$ 490	$ 245	$
[ ] Three months (37 CFR 1.17(a)(3))	$ 1,110	$ 555	$
[ ] Four months (37 CFR 1.17(a)(4))	$ 1,730	$ 865	$
[ ] Five months (37 CFR 1.17(a)(5))	$ 2,350	$ 1,175	$

[ ] 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, or credit any overpayment, to Deposit Account Number 502432.

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 35138

[ ] attorney or agent under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 _____.

/David N. Fogg/ — Signature

July 10, 2010 — Date

David N. Fogg — Typed or printed name

952-465-0770 — 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.

[ ] Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**.

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

Electronic Patent Application Fee Transmittal

Application Number:	11627255
Filing Date:	25-Jan-2007
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Filer:	David Fogg
Attorney Docket Number:	100.829US01

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with $0 paid	1251	1	130	130

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

Electronic Acknowledgement Receipt

EFS ID:	7989955
Application Number:	11627255
International Application Number:	
Confirmation Number:	1589
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Customer Number:	34206
Filer:	David Fogg
Filer Authorized By:	
Attorney Docket Number:	100.829US01
Receipt Date:	10-JUL-2010
Filing Date:	25-JAN-2007
Time Stamp:	19:02:09
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$130
RAM confirmation Number	5737
Deposit Account	
Authorized User	

File Listing:

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

1		00214559.PDF	111696 9d3c7c8a77045ba81d38307eeeb9dedc070028f9	yes	12

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Specification	2	2
	Claims	3	7
	Applicant Arguments/Remarks Made in an Amendment	8	12

Warnings:					
Information:					
2	Extension of Time	00214501.PDF	109826 13ece03e91c59995d22102c838701bdf12f2670b	no	1
Warnings:					
Information:					
3	Fee Worksheet (PTO-875)	fee-info.pdf	30315 16ba24883df881d34ef4cfd6d5b262a405c2e972	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	251837		

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

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

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

PTO/SB/08a (01-10)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

Application Number	11627255
Filing Date	2007-01-25
First Named Inventor	Koziy
Art Unit	2617
Examiner Name	THIER, MICHAEL
Attorney Docket Number	100.829US01

U.S.PATENTS Remove

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

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

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020027892		2002-03-07	Sasaki	
	2	20050084076		2005-04-21	Dhir et al	
	3	20060029171		2006-02-09	Jensen	
	4	20060128347		2006-06-15	Piriyapoksombut et al	
	5	20060283952		2006-12-21	Wang	

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

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	THIER, MICHAEL
	Attorney Docket Number	100.829US01

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] ¡	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

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NON-PATENT LITERATURE DOCUMENTS Remove

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

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

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	2617
	Examiner Name	THIER, MICHAEL
	Attorney Docket Number	100.829US01

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

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

☐ None

SIGNATURE

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

Signature	/David N. Fogg/	Date (YYYY-MM-DD)	2010-07-10
Name/Print	Fogg, David N.	Registration Number	35138

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

Electronic Patent Application Fee Transmittal

Application Number:	11627255
Filing Date:	25-Jan-2007
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Filer:	David Fogg
Attorney Docket Number:	100.829US01
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	7989995
Application Number:	11627255
International Application Number:	
Confirmation Number:	1589
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Customer Number:	34206
Filer:	David Fogg
Filer Authorized By:	
Attorney Docket Number:	100.829US01
Receipt Date:	10-JUL-2010
Filing Date:	25-JAN-2007
Time Stamp:	20:16:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	5760
Deposit Account	
Authorized User	

File Listing:

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

1	Information Disclosure Statement (IDS) Filed (SB/08)	00214561.PDF	612158 0e3e981b819e49132118cd99f06c8f86ea845974	no	4
Warnings:					
Information:					
2	Fee Worksheet (PTO-875)	fee-info.pdf	30103 281d434a368b106e224a56e354b556df77beb598	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	642261		

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

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

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

PTO/SB/06 (07-06)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/627,255	Filing Date 01/25/2007	☐ To be Mailed

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (l), 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

		(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	07/10/2010	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	* 27	Minus	** 27	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)					
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	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:
/CHRISTINE MOLLISH/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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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.
11/627,255	01/25/2007	Robert J. Koziy	100.829US01	1589

34206 7590 03/10/2010

FOGG & POWERS LLC
5810 W 78TH STREET
SUITE 100
MINNEAPOLIS, MN 55439

EXAMINER	
THIER, MICHAEL	
ART UNIT	PAPER NUMBER
2617	

NOTIFICATION DATE	DELIVERY MODE
03/10/2010	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):

DAVID@FOGGLAW.COM
docketing@fogglaw.com

Office Action Summary	Application No.	Applicant(s)	
	11/627,255	KOZIY ET AL.	
	Examiner	Art Unit	
	MICHAEL T. THIER	2617	

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

Period for Reply

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

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

Status

1)☒ Responsive to communication(s) filed on *25 January 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) *1-27* 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) *1-27* 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 *25 January 2007* 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

Information Disclosure Statement

1. The information disclosure statements (IDS) submitted on 6/11/2008 (3), 8/22/2008, 12/10/2008, and 3/30/2009 have been entered and considered by the examiner.

Claim Objections

2. Claim 20 is objected to because of the following informalities: Claim 20 recites at the end the idea of "transmitting a processed RF signal from the antenna of the first remote wireless communication station." However, prior to this step the processed RF signal is routed to a second wireless communication station, it seems the signal should be transmitted from the antenna of the second station and not the first. Appropriate correction is required.

Claim Rejections - 35 USC § 102

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

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

4. Claims 1, 3-5, 7, 9-17, 20, 22-25, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Mani et al. (US 2002/0191565).

Regarding claim 1. Mani teaches a distributed base station system for high speed data transmission (title, abstract, and figure 5) comprising:

a plurality of remote antennas (figure 5 item 12), each antenna being coupled to a router (figure 15, item 27, further see par. 57);

wherein the plurality of remote antennas are coupled to each other (figure 5 item 12, the antennas are coupled to each other by the links 16) and are arranged into a network (figure 5 item 10 is the network made up by the antennas 12, further see par. 46).

Regarding claim 3. Mani further teaches the distributed base station system wherein the plurality of remote antennas are arranged in a ring configuration (figure 5, see the antennas in a ring configuration, further par. 49 and 51).

Regarding claim 4. Mani further teaches wherein at least one of the plurality of remote antennas is coupled to a remote base station. (figure 5, antenna 12 coupled to remote base station 14 over link 16)

Regarding claim 5. Mani further teaches wherein each of the plurality of remote antennas is coupled to a remote base station. (figure 5, each antenna 12 is coupled to remote base station 14 over link 16)

Regarding claim 7. Mani further teaches further comprising: a fiber optic transport mechanism between two of the plurality of remote antennas. (fig. 5, fig. 8, and par. 8, 47 and 49)

Regarding claim 9. Mani teaches a method of transmitting a wireless communication signal (title, abstract, and par. 56), comprising:

receiving a RF signal at a first remote wireless communication station (par. 56, i.e. RF traffic received at antenna 12 is directed into base station 14, further par. 63, i.e. at antenna 12 an uplink signal is received, converted, and transmitted over the network 10 to the base station units 14);

routing the RF signal to a second remote wireless communication station (par. 56, 57, and 63, i.e. RF traffic from antenna 12 is redirected to base station 14, further the control box 27 provides routing to selected base stations, and at antenna 12 an uplink signal is received, converted, and transmitted over the network 10 to the base station units 14); and

transmitting the RF signal from an antenna at the second remote wireless communication station (par. 63, i.e. the antenna 12 can receive a downlink signal (thus a signal from the base station 14 to the antenna 12), it can then reconstruct and transmit the RF signal).

Regarding claim 10. Mani further teaches sending the RF signal from a local base station to the first remote wireless communication station. (par. 63, i.e. the base station 14 may transmit a downlink digital signal on to the network 10, and thus to a remote communication station)

Regarding claims 11 and 23. Mani further teaches wherein receiving the RF signal receives the RF signal via an antenna at the first remote wireless communication station. (par. 63, i.e. antenna 12 can be configured to receive)

Regarding claim 12. Mani further teaches processing the RF signal by a base station at the second remote wireless communication station to form a second RF signal

(par. 63, i.e. signal received at antenna 12 are transmitted over the network to base station 14, base station 14 receives the signal and processes it, which thus creates a second signal (i.e. a processed version of the first signal received at the base station); and routing the second RF signal to a third remote wireless base station. (par. 63, i.e. the base station can additionally transmit a downlink signal to the network 10)

Regarding claim 13. Mani further teaches transmitting the second RF signal from an antenna of the third remote wireless base station. (par. 63, the antenna receives the downlink signal and transmits it)

Regarding claim 14. Mani further teaches splitting the RF signal and sending a duplicate RF signal to a third remote wireless communication station (see figure 8, de multiplexer); and transmitting the duplicate RF signal from an antenna at the third remote wireless communication station. (par. 63, the antenna receives the downlink signal and transmits it)

Regarding claims 15 and 24. Mani further teaches sending the RF signal from a host unit to the first wireless communication station. (par. 63, uplink signals received at antenna 12 from a mobile unit are converted and transmitted over the network 10 to the base station 14)

Regarding claims 16 and 22. Mani further teaches transmitting the RF signal to a mobile device. (par. 59, i.e. the signal is received by the remote mobile unit)

Regarding claim 17. Mani further teaches processing the RF signal by a base station at the first remote wireless communication station to form a second RF signal (par. 63, i.e. signal received at antenna 12 are transmitted over the network to base

station 14, base station 14 receives the signal and processes it, which thus creates a second signal (i.e. a processed version of the first signal received at the base station); and transmitting the second RF signal from an antenna at the first remote wireless communication station. (par. 63, the antenna receives the downlink signal and transmits it)

Regarding claim 20. Mani teaches a method of transmitting a wireless communication signal (title, abstract, par. 56 and 63) comprising:

receiving a RF signal at an antenna of a first remote wireless communication station (par. 56, i.e. RF traffic received at antenna 12 is directed into base station 14, further par. 63, i.e. at antenna 12 an uplink signal is received, converted, and transmitted over the network 10 to the base station units 14);

processing the RF signal by a base station at the first remote wireless communication station (par. 56, 57, and 63, i.e. RF traffic from antenna 12 is redirected to base station 14, further the control box 27 provides routing to selected base stations, and par. 62-63, i.e. at antenna 12, which serves as a remote unit and provides conventional base station functionality as explained in par. 62, an uplink signal is received, converted (i.e. processed), and transmitted over the network 10 to the base station units 14);

routing the processed RF signal through a network of remote wireless communication stations to a second remote wireless communication station (par. 56, 57, and 63, i.e. RF traffic from antenna 12 is redirected to base station 14, further the control box 27 provides routing to selected base stations, and at antenna 12 an uplink

signal is received, converted (i.e. processed), *and transmitted over the network 10 to the base station units 14*); and

transmitting a processed RF signal from the antenna of the second remote wireless communication station. (par. 63, i.e. the antenna 12 can receive a downlink signal, it can then reconstruct and transmit the RF signal)

Regarding claim 25. Mani teaches a remote wireless communication station for transmitting high speed wireless data (title, abstract, and figure 5) comprising:

a remote unit (figure 5 item 14);

a router coupled to the remote unit (figure 5, "Node", further see figures 6 and 7, which shows the node can be a switch or router) and

an antenna coupled to the remote unit. (figure 5, item 12 , coupled to the base station 14 through link 16)

Regarding claim 27. Mani further teaches a baseband unit; and the remote unit is coupled to the baseband unit and is configured as a base station. (figure 5 item 14, further par. 46, i.e. Base stations 14 are configured to provide wireless cellular transmission, thus the baseband unit is inherent in view of the base station 14, further see par. 62, i.e. baseband coding)

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.

6. Claims 2 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mani et al. (US 2002/0191565) in view of Chung et al. (US 2004/0110534).

Regarding claim 2. Mani teaches the limitations of the previous claim.

However, he does not specifically disclose wherein the plurality of remote antennas are arranged in a tree configuration.

Chung teaches a method and system to enhance capacity in a distributed network (title and abstract). He teaches in par. 7 the idea of using a tree configuration.

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to utilize the teachings as in Chung with the teachings as in Mani. The motivation for doing so would have been to allow for using a configuration that can be less costly and reduce link distance. (Chung par. 7)

Regarding claim 19. Chung further teaches routing the RF signal through a third wireless communication station and then to the second remote wireless communication station. (par. 7, i.e. the tree structure would allow for routing a signal through one station to get to another, and thus reading on this claim)

7. Claims 6, 8, 18, 21, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mani et al. (US 2002/0191565) in view of Louberg et al. (US 2006/0111047).

Regarding claims 6, 18, 21, and 26. Mani teaches the limitations of the previous claim.

However, he does not specifically disclose wherein the system transports data using a protocol that is compliant with IEEE 802.16.

Louberg teaches a wireless communication system (title and abstract), that has distributed base stations (see figures 1 and 3b). He teaches the idea that the system uses a protocol compliant with IEEE 802.16 in par. 2 and 48 (i.e. WiMax).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to utilize the teachings as in Louberg with the teachings as in Mani. The motivation for doing so would have been to allow for using a well known and widely used high speed, high bandwidth technology.

Regarding claim 8. Louberg further teaches further a millimeter wave transceiver configured to transport data between two of the plurality of remote antennas. (par. 48)

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL T. THIER whose telephone number is (571)272-2832. The examiner can normally be reached on Monday thru Friday 7:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on (571) 272-7603. 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.

/MICHAEL T THIER/
Examiner, Art Unit 2617
3/2/2010

Notice of References Cited	Application/Control No. 11/627,255	Applicant(s)/Patent Under Reexamination KOZIY ET AL.	
	Examiner MICHAEL T. THIER	Art Unit 2617	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2004/0110534	06-2004	Chung et al.	455/561
*	B	US-2006/0111047	05-2006	Louberg et al.	455/041.2
	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.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11627255	KOZIY ET AL.
	Examiner	Art Unit
	MICHAEL T THIER	2617

✓	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	03/02/2010								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
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	21	✓								
	22	✓								
	23	✓								
	24	✓								
	25	✓								
	26	✓								
	27	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11627255	KOZIY ET AL.
	Examiner	Art Unit
	MICHAEL T THIER	2617

SEARCHED			
Class	Subclass	Date	Examiner
455	550.1,561,562.1,575.7	3/2/2010	/mtt/
370	315,319	3/2/2010	/mtt/

SEARCH NOTES		
Search Notes	Date	Examiner
inventor name search. no DP found.	3/2/2010	/mtt/
see attached EAST search.	3/2/2010	/mtt/

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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PTO/SB/08a (05-07)
Approved for use through 11/30/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	3931473		1976-01-06	FERRIS JR.	
	2	4667319		1987-05-19	CHUM	
	3	4760573		1988-07-26	Calvignac et al.	
	4	4794649		1988-10-21	FUJIWARA	
	5	4101834		1978-07-18	STUTT et al.	
	6	4112488		1978-09-05	SMITH III	
	7	4144409		1979-03-13	UTANO ET AL.	
	8	4144411		1979-03-13	FRENKIEL	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /MT/

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	Examiner Name	
	Attorney Docket Number	100.829US01

	9	4231116		1980-10-28	SEKIGUCHI et al.	
	10	4244046		1981-01-06	BROUARD et al.	
	11	4354167		1982-10-12	TERREAULT et al.	
	12	4402076		1983-08-30	KRAJEWSKI	
	13	4451699		1984-05-29	GRUENBERG	
	14	4451916		1984-05-29	CASPER et al.	
	15	4456793		1984-06-26	BAKER et al.	
	16	4475010		1984-10-02	HUENSCH et al.	
	17	4485486		1984-11-27	WEBB et al.	
	18	4525861		1985-06-25	FREEBURG	
	19	4531239		1985-07-23	USUI	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /MT/

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	20	4556760		1985-12-03	GOLDMAN	
	21	4596051		1986-06-17	FELDMAN	
	22	4613990		1986-09-23	HALPERN	
	23	4669107		1987-05-26	ERIKSSON-LENNARTSSON	
	24	4701909		1987-10-20	KAVEHRAD et al.	
	25	4704733		1987-11-03	KAWANO	
	26	4718004		1988-01-05	DALAL	
	27	4754451		1988-06-28	ENG et al.	
	28	4759051		1988-07-19	HAN	
	29	4790000		1988-12-06	KINOSHITA	
	30	4797947		1989-01-10	LABEDZ	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /MT/

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	Examiner Name	
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	31	4816825		1989-03-28	CHAN et al.	
	32	4831662		1989-05-16	KUHN	
	33	4849963		1989-07-18	KAWANO et al.	
	34	4916460		1990-04-10	POWELL	
	35	4920533		1990-04-24	DUFRESNE et al.	
	36	4932049		1990-06-05	LEE	
	37	4959829		1990-09-25	GRIESING	
	38	4977593		1990-12-11	BALLANCE	
	39	5299198		1994-03-29	Kay et al.	
	40	5303289		1994-02-07	QUINN	
	41	5321736		1994-06-14	BEASLEY	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /MT/

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	42	5381459		1995-01-10	LAPPINGTON	
	43	5400391		1995-03-21	EMURA ET AL.	
	44	5461627		1995-10-24	RYPINSKI	
	45	5519691		1996-05-21	DARCIE ET AL.	
	46	5545397		1996-08-02	SPIELVOGEL	
	47	5566168		1996-10-15	DENT	
	48	5603080		1997-02-11	Kallander et al.	
	49	5621786		1997-04-15	Fischer et al.	
	50	5627679		1997-04-25	IBA	

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	1	20020167954		2002-11-14	HIGHSMITH ET AL.	
	2	20020191565		2002-12-19	MANI et al.	
	3	20030015943		2003-01-23	KIM ET AL.	
	4	20030043928		2003-03-06	LING et al.	
	5	20030143947		2003-07-31	LYU	
	6	20040010609		2004-01-15	VILANDER ET AL.	
	7	20040037565		2004-02-26	YOUNG ET AL.	
	8	20040198453		2004-10-07	CUTRER et al.	
	9	20050147067		2005-07-07	MANI ET AL.	
	10	20050201323		2005-09-15	MANI ET AL.	
	11	20050250503		2005-11-10	CUTRER	

EFS Web 2.0.2

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	1	2008900	CA		1998-01-20	CHU		☐
	2	3707244	DE	A	1988-09-15	Schalamon		☐
	3	0166885	EP		1986-01-08	KETTERLING		☐
	4	0346925	EP		1989-12-20	TAKAGI		☐
	5	0368673	EP		1990-05-16	MOTLEY		☐
	6	0391597	EP		1990-10-10	CHU		☐
	7	0468688	EP		1992-01-29	RUSSELL		☐
	8	0664621	EP		1995-07-26	Zarem et al.		☐
	9	0876073	EP		1998-11-04	GERSZBERG et al.		☐

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	10	2345865	FR		1977-10-21	SINA SPA (IT)		☐
	11	2253770	GB		1992-09-16	HAMILTON-PIERCY et al.		☐
	12	2289198	GB		1995-11-08	HAMILTON-PIERCY et al.		☐
	13	2315959	GB		1998-02-11	HABER		☐
	14	2320653	GB		1998-06-24	Phillips		☐
	15	326031	JP		1991-02-04	TOMIO et al.		☐
	16	512374	JP		1993-01-22	MATSUMI		☐
	17	58164007	JP		1983-09-28	MASATSUGU, et al.		☐
	18	0174013	WO		2001-10-04	SABAT et al.		☐
	19	0174100	WO		2001-10-04	SABAT et al.		☐
	20	9533350	WO		1995-12-07	CARNEY		☐

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	Examiner Name	
	Attorney Docket Number	100.829US01

	21	9628946	WO		1996-09-19	CARNEY et al.		☐
	22	9716000	WO		1997-05-01	KETSEOGLOU et al.		☐
	23	9732442	WO		1997-09-04	CARNEY		☐
	24	9824256	WO		1998-06-04	BEXTEN		☐
	25	9937035	WO		1999-07-22	LU		☐

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	WALA, "A NEW MICROCELL ARCHITECTURE USING DIGITAL OPTICAL TRANSPORT", "43RD IEEE VEHICULAR TECHNOLOGY CONFERENCE, PERSONAL COMMUNICATION--FREEDOM THROUGH WIRELESS TECHNOLOGY", May 18-20, 1993, Page(s) 585-588, Publisher: IEEE, Published in: US	☐
	2	MERRETT ET AL., "A CORDLESS ACCESS SYSTEM USING RADIO-OVER-FIBRE TECHNIQUES", "41ST IEEE VEHICULAR TECHNOLOGY CONFERENCE GATEWAY TO THE FUTURE TECHNOLOGY IN MOTION", 5/19/1991, Page(s) 921-924, Published in: ST.LOUIS, MO	☐
	3	LEE ET AL., "INTELLIGENT MICROCELL APPLICATIONS IN PCS", "43RD IEEE VEHICULAR TECHNOLOGY CONFERENCE, PERSONAL COMMUNICATION--FREEDOM THROUGH WIRELESS TECHNOLOGY ", May 18, 1993, Page(s) 722-725, Publisher: PACTEL CORPORATION, Published in: SECAUCUS, NJ	☐
	4	TELOCATOR BULLETIN, ""ADC Kentrox Introduces CityCell 824, A Replacement For Conventional Cell Sites"", 02/01/1993, Published in: US	☐

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /MT/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

	5	ADC KENTROX, "ADC Kentrox Introducess Innovative Wireless Network Access Solution ", 3/1/1993, Published in: US	☐
	6	, "ADC KENTROX WIRELESS SYSTEMS GROUP CITYCELL 824 -- A POSITIONING WHITE PAPER", 3/1993, Publisher: CITA TRADE SHOW	☐
	7	AKOS ET AL., "DIRECT BANDPASS SAMPLING OF MULTIPLE DISTINCT RF SIGNALS", 7/1/1999, Page(s) 983-988, Volume 47, Publisher: IEEE Transactions on Communications	☐
	8	COX, "A RADIO SYSTEM PROPOSAL FOR WIDESPREAD LOW-POWER TETHERLESS COMMUNICATIONS", "IEEE TRANSACTIONS ON COMMUNICATIONS", 2/1991, Page(s) 324-335, Volume 39, Number 2, Publisher: IEEE	☐
	9	ISHIO, "A TWO-WAY WAVELENGTH-DIVISION-MULTIPLEXING TRANSMISSION AND ITS APPLICATION TO A SWITCHED TV-DISTRIBUTION SYSTEM", , Publisher: EKECTRICAL COMMUNICATION LABORATORIES, NIPON TELEGRAPH AND TELEPONE CORPORATION , Published in: YOKOSUKA, JAPAN	☐
	10	AMERITECH, "BROADBAND OPTICAL TRANSPORT DIGITAL MICROCELL CONNECTION SERVICE-INTERFACE AND PERFORMANCE SPECIFICATIONS A TECHNICAL D", "CELLULAR INDUSTRY", 10/1993, Page(s) 1-26, Publisher: THE DAY GROUP	☐
	11	ADC KENTROX, ""And Now a Few Words from Your Customers"", "Advertising Brochure", 8/92, Published in: US	☐
	12	CITY CELL, CELLULAR INDUSTRY THE DAY GROUP, "ADC KENTROX CITYCELL FIELD TRIAL YIELDS ANOTHER FIRST- SIMULTANEOUS ANALOG AND DIGITAL CALLS",	☐
	13	1998 FOXCOM WIRELESS PROPRIETARY INFORMATION, "Application Note "RFiber- RF Fiberoptic Links for Wireless Applications"", , Page(s) 3-11, Published in: US	☐
	14	DOULAS D. TANG, "Fiber Optic Antenna Remoting For Multi-Sector Cellular Cell Sites", 7/09/1993, Published in: US	☐
	15	STEELE, "Towards a High-Capacity Digital Cellular Mobile Radio System", 08/1995, Published in: US	☐

EFS Web 2.0.2

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	Examiner Name	
	Attorney Docket Number	100.829US01

	16	TITCH, "KENTROX BOOSTS COVERAGE AND CAPACITY", "TELEPHONY", 1/25/1993	☐
	17	ADC, "First Field Trial Results Exceed Expectations", 3/2/1993, Published in: US	☐
	18	KOBB, ""Personal Wireless" Special Report/Communications IEEE Spectrum", 06/01/1993, Page(s) 20-25	☐
	19	GUPTA ET AL., "LAND MOBILE RADIO SYSTEMS-A TUTORIAL EXPOSITION", "IEEE COMMUNICATIONS MAGAZINE", 6/1985, Page(s) 34-45, Volume 23, Number 6, Publisher: IEEE	☐
	20	FOXCOM WIRELESS PROPERIETARY INFORMATION, "LITENNA IN-BUILDING RF DISTRIBUTION SYSTEM", 1998, Page(s) 1-8, Publisher: FOXCOM WIRELESS	☐
	21	SCHNEIDERMAN, "OFFSHORE MARKETS GAIN IN SIZE, COMPETITIVENESS EVEN THE SMALLEST INDUSTRY COMPANIES ARE EXPANDING THEIR GLOBAL BUISNESS", "MICROWAVES AND RF", 3/1993, Page(s) 33-39, Volume 32, Number 3, Publisher: PENTON PUBLISHING, INC, Published in: BEREA, OH	☐
	22	, "DIGITAL TRANSPORT FOR CELLULAR", "MICROWAVES AND RF", 2/1993, Published in: PORTLAND, OR	☐
	23	NAKATSUGAWA ET AL., "SOFTWARE RADIO BASE AND PERSONAL STATIONS FOR CELLULAR/PCS SYSTEMS", , Page(s) 617-621, Publisher: IEEE	☐
	24	RUSSELL, "NEW MICROCELL TECHNOLOGY SETS CELLULAR CARRIERS FREE", "TELEPHONY", 3/1993, Page (s) 40, 42, AND 46	☐
	25	CELLULAR INDUSTRY, THE DAY GROUP, "NEW SIGNAL TRANSPORT TECHNOLOGY DIGITIZES THE CELLULAR BAND",	☐
	26	, "TEKTRONIX SYNCHRONOUS OPTICAL NETWORK (SONET)", "http://www.iec.org/online/tutorials/sonet/topic03.html", 2002, Publisher: INTERNATIONAL ENGINEERING CONSORTIUM	☐

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	Examiner Name	
	Attorney Docket Number	100.829US01

	27	DAVID RUSSEL, "New Microcell Technology Sets Cellular Carriers Free", 3/1993, Published in: US	☐
	28	GTE LABORATORIES, "URBAN MICROCELL SYSTEM LAYOUT", , Published in: US	☐
	29	O'BYRNE, "TDMA AND CDMA IN A FIBER-OPTIC ENVIRONMENT", "VEHICULAR TECHNOLOGY SOCIETY 42ND VTS CONFERENCE FRONTIERS OF TECHNOLOGY FROM PIONEERS TO THE 21ST CENTURY", 5/10-13/1992, Page(s) 727-731, Volume 2 OF 2, Publisher: GTE LABORATORIES INC., Published in: DENVER, CO	☐
	30	ZONEMASTER, "MAXIMUM COVERAGE FOR HIGH-CAPACITY LOCATIONS", "1993 DECIBEL PRODUCTS", 1993, Page(s) 1-4, Publisher: DECIBEL MULTI MEDIA MICROCELL SYSTEM	☐

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/MT/	2	9909769	WO		1999-02-25	OGAZ ET AL.		☐

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Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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L4	290	2 and L3	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2010/03/02 14:30

L5	170	((distributed adj2 base adj2 station) or (distributed adj2 antenna)) and (((split$4 or duplicat$3) with signal) with transmit$4)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2010/03/02 14:35
L6	160	3 and 5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2010/03/02 14:35
L7	152	KOZIY-ET-AL KOZIY-ROBERT-J ROBERTS-HAROLD ROBERTS-HAROLD-A ROBERTS-HAROLD-B ROBERTS-HAROLD-D ROBERTS-HAROLD-DEVERE ROBERTS-HAROLD-E SCHIEFFERT-TODD	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2010/03/02 14:53
L8	87	distributed and 7	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2010/03/02 14:53
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S7	113022	S3 and S6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2010/03/01 13:41

S8	2617	tree and ring and S3	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2010/03/01 13:45
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	1	6005884		1999-12-21	COOK ET AL.	
	2	6034950		2000-03-07	SAUER ET AL.	
	3	6108113		2000-08-22	FEE	
	4	6108550		2000-08-22	WIOREK ET AL.	
	5	6108626		2000-08-22	CELLARIO ET AL.	
	6	6112086		2000-08-29	Wala	
	7	6147786		2000-11-14	Pan	
	8	6157659		2000-12-05	BIRD	

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	9	6181687		2001-01-30	Bisdikian	
	10	6188693		2001-02-13	MURAKAMI	
	11	6198558		2001-03-06	Graves et al.	
	12	6222660		2001-04-24	TRAA	
	13	6226274		2001-05-01	REESE ET AL.	
	14	6262981		2001-07-17	SCHMUTZ	
	15	6275990		2001-08-14	Dapper et al.	
	16	6317884		2001-11-13	EAMES ET AL	
	17	6337754		2002-01-08	IMAJO	
	18	6362908		2002-03-26	Kimbrough et al.	
	19	6466572		2002-10-15	ETHRIDGE ET AL.	

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	20	6480551		2002-11-12	OHISHI ET AL.	
	21	6486907		2002-11-26	Farber et al.	
	22	6498936		2002-12-24	RAITH	
	23	6667973		2003-12-23	GORSHE ET AL.	
	24	6697603		2004-02-24	LOVINGGOOD ET AL.	
	25	6729929		2004-05-04	SAYERS ET AL.	
	26	6768745		2004-07-27	GORSHE ET AL.	
	27	6771933		2004-08-03	ENG ET AL.	
	28	6785558		2004-08-31	STRATFORD ET AL.	
	29	6801767		2004-10-05	SCHWARTZ ET AL.	
	30	6826163		2004-11-30	MANI ET AL.	

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	31	6826164		2004-11-30	MANI ET AL.	
	32	6831901		2004-12-14	MILLAR	
	33	6917614		2005-07-12	LAUBACH ET AL.	
	34	6963552		2005-11-08	SABAT JR ET AL	
	35	6967966		2005-11-02	DONOHUE	
	36	6192216		2001-02-20	SABAT Jr. et al.	
	37	6373887		2002-04-16	AIYAGARI et al.	
	38	6374124		2002-04-16	SLABINSKI	
	39	6377640		2002-04-23	TRANS	
	40	6567473		2003-05-20	TZANNES	
	41	6907048		2005-06-14	TREADAWAY et al.	

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	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

	42	7016308		2006-03-01	GALLAGHER	
	43	7031335		2006-03-29	DONOHUE	
	44	7035671		2006-04-25	SOLUM	
	45	7127175		2006-10-24	MANI ET AL.	
	46	7205864		2007-06-04	SCHULTZ JR. ET AL	
	47	7215651		2007-05-08	MILLAR	

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SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/627,255	01/25/2007 RULE	375	2617	100.829US01

APPLICANTS

Robert J. Koziy, Burnsville, MN;
Harold A. Roberts, Eden Prairie, MN;
Todd Schieffert, Edina, MN;

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

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Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /MICHAEL THIER/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
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/MT/	1	2347319	GB		2000-08-30	Appel et al.		☐
/MT/	2	03079645	WO		2003-09-25	FISCHER		☐
/MT/	3	2004006602	WO		2004-01-15	Horneman		☐

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/MT/	1	4611323		1986-09-09	Hessenmiiller	
/MT/	2	4628501		1986-12-09	Loscoe	
/MT/	3	4654843		1987-03-31	Roza et al.	
/MT/	4	4691292		1987-09-01	Rothweiler	
/MT/	5	4813054		1980-01-08	Patisaul et al.	
/MT/	6	4999831		1991-03-12	Grace	
/MT/	7	5193109		1993-03-09	Chien-Yeh Lee	
/MT/	8	5243598		1993-09-07	Lee	

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/MT/	9	5321849		1994-06-14	Lemson	
/MT/	10	5339184		1994-08-16	Tang	

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/MT/	1	GRACE, MARTIN K., "Synchronous Quantized Subcarrier Multiplexing for Transport of Video, Voice and Data", "IEEE Journal on Selected Areas in Communications", Sept. 1990, Page(s) 1351-1358, Volume 8, Number 7, Publisher: IEEE	☐
/MT/	2	HARVEY ET AL., "Cordless Communications Utilising Radio Over Fibre Techniques for the Local Loop", "IEEE International Conference on Communications",June 1991 , Page(s) 1171-1175, Publisher: IEEE	☐

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	1	5627879		1997-05-06	Russell et al.	
	2	5642405		1997-06-24	Fischer et al.	
	3	5644622		1997-07-01	Russell et al.	
	4	5657374		1997-08-12	Russell et al.	
	5	5682256		1997-10-28	MOTLEY ET AL.	
	6	5708961		1998-01-13	HYLTON ET AL.	
	7	5765097		1998-06-09	Dail	
	8	5765099		1998-06-09	Georges et al.	

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	9	5774789		1998-06-30	Van der Kaay et al.	
	10	5802173		1998-09-01	Hamilton-Piercy et al.	
	11	5852651		1998-12-22	Fischer et al.	
	12	5878325		1999-03-02	Dail	
	13	5907544		1999-05-25	RYPINSKI	
	14	5946622		1999-08-31	Bojeryd	
	15	5969837		1999-10-19	Farber et al.	
	16	5987014		1999-11-16	MAGILL ET AL.	
	17	5067147		1991-11-19	LEE	
	18	5067173		1991-11-19	GORDON et al.	
	19	5084869		1992-01-28	RUSSELL	

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	20	5136410		1992-08-04	HEILING et al.	
	21	5138440		1992-08-11	RADICE	
	22	5159479		1992-10-27	TAKAGI	
	23	5175867		1992-12-29	WEJKE et al.	
	24	5193109		1993-03-09	CHIEN-YEH LEE	
	25	5243598		1993-09-07	LEE	
	26	5251053		1993-10-05	HEIDEMANN	
	27	5267261		1993-11-30	BLAKENEY, II et al.	
	28	5272700		1993-12-21	HANSEN et al.	
	29	5278690		1994-01-11	VELLA-COLEIRO	
	30	5280472		1994-01-18	GILHOUSEN et al.	

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	31	5285469		1994-02-08	VANDERPOOL	
	32	5297193		1994-03-22	BOUIX et al.	
	33	5301056		1994-04-05	O'NEILL	
	34	5303287		1994-04-12	LABORDE	
	35	5305308		1994-04-19	ENGLISH et al.	
	36	5309474		1994-05-03	GILHOUSEN et al.	
	37	5313461		1994-05-17	AHL et al.	
	38	5339184		1994-08-16	TANG	
	39	5392453		1995-02-21	GUNDMUNDSON et al.	
	40	5442700		1995-08-15	SNELL et al.	
	41	5586121		1996-12-17	MOURA et al.	

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	42	5587734		1996-12-24	LAUDER et al.	
	43	5732076		1998-03-24	Ketseoglou et al.	
	44	5761619		1998-06-02	DANNE et al.	
	45	5781541		1998-06-14	SCHNEIDER	
	46	5781859		1998-07-14	BEASLEY	
	47	5802173		1998-09-01	Hamilton-Piercy et al.	
	48	5805983		1998-09-08	NAIDU et al.	
	49	5809395		1998-09-15	HAMILTON-PIERCY et al.	
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	2	HARVEY ET AL., "Cordless Communications Utilising Radio Over Fibre Techniques for the Local Loop", "IEEE International Conference on Communications",June 1991 , Page(s) 1171-1175, Publisher: IEEE	☐

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

☒ None

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EFS ID:	5037808
Application Number:	11627255
International Application Number:	
Confirmation Number:	1589
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First Named Inventor/Applicant Name:	Robert J. Koziy
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Foreign Reference	00147271.PDF	695262 47ef4b79d873225cbeac57ed86fef013d8e55e95	no	17

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4	Information Disclosure Statement (IDS) Filed (SB/08)	00155312.PDF	852157 e65e61eee349b6d46a1a7ea8aeb272beab64a9d3	no	5
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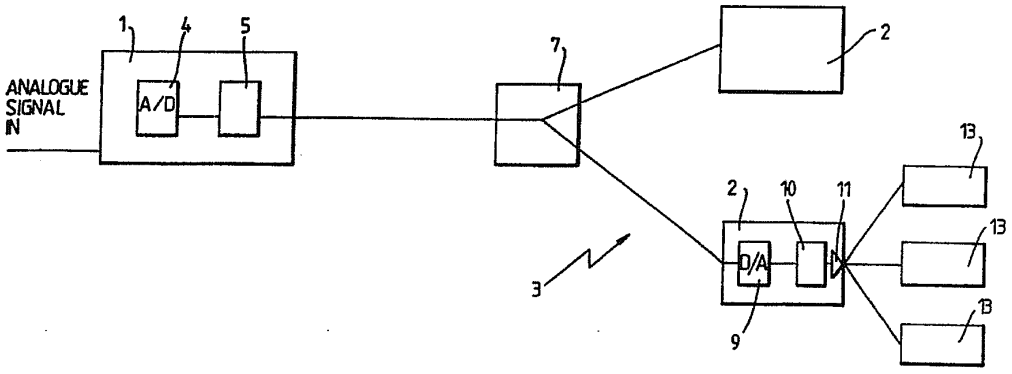
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(57) Abstract

Signals, such as television signals, are distributed from a head-end station (1) via a fibre network (3). The signals are amplitude modulated on carriers at different frequencies, and the different carriers combined to form a composite analogue signal. In the head-end station (1) the composite analogue signal is clipped to reduce the peak-to-mean ratio and the clipped composite signal is digitised. The resulting digital data is transmitted onto the fibre network and is received at an optical receiver (2). The optical receiver (2) reconstitutes the composite analogue signal for reception by a termination. In one example the composite analogue signal has a bandwidth of one octave or less, and is digitised by sampling at a sampling rate below the Nyquist rate.

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SIGNAL DISTRIBUTION

The present invention relates to the distribution of signals on a network and in particular to the distribution of AM (amplitude modulated) television signals.

Conventionally, television has been broadcast as AM signals with different channels modulated onto sub-carriers at different frequencies. Existing cable television services using copper coaxial cable have adopted corresponding analogue AM techniques to provide channels in a region of the same UHF spectrum used for broadcast television.

It is now proposed to use cable networks such as fibre optic networks for the distribution of television signals. The wide bandwidth offered by such networks offers the possibility of upgrading to carry future wideband services such as HDTV and the same network may also be used for services other than television, such as telephony. However whilst the use of AM techniques is necessary if the television signals are to be received by conventionally equipped television sets there are a number of problems associated with the use economically of AM techniques on optical networks. In particular the carrying of AM optical signals requires less splitting in order to allow a high power budget, and the use of highly specified linear opto-electronic devices.

According to the present invention, a method of distributing signals from a head-end station via an network comprises combining a plurality of AM channels modulated on sub-carriers at different frequencies to form a composite analogue signal, treating the composite analogue signal to reduce the peak-to-mean ratio, digitising the composite analogue signal, transmitting resulting digital data onto the network, receiving the

digital data at a receiver and reconstituting the composite analogue signal for reception at a termination.

Preferably the network is an optical network and the receiver is an optical receiver. Preferably the composite analogue signal is treated by clipping the signal.

A preferred aspect of the present invention provides a method of distributing, e.g., television signals which is particularly well-adapted to use with optical networks whilst at the same time maintaining compatibility with conventional analogue television sets. As noted above, television signals used for terrestrial broadcasting are modulated onto sub-carriers at different frequencies. When a composite signal is formed by adding together the different channels the resulting waveform has a much higher peak-to-mean ratio than the individual carriers. It is therefore possible to clip or compress the maxima and minima before quantising without significantly degrading the performance. The A/D converter used for digitising the signal can then operate over a more restricted input amplitude range and so requires fewer quantisation levels to achieve an adequate output video signal-to-noise ratio.

Preferably the method includes receiving the digitised signal at a node remote from the termination and transmitting the reconstituted signal onwards for reception at the termination.

The detection of the digital data is advantageously carried out at a node such as a distribution box or pedestal near the customer's premises. The television signals may then be delivered over conventional coaxial cable in a standard format, avoiding the need for a special adapter or other equipment at the customer-end.

Preferably the composite analogue signal has a bandwidth of one octave or less and is digitised by sampling at a sampling rate below the Nyquist rate.

Preferably, in addition to or as an alternative to clipping the composite analogue signal the method further comprises compressing the composite analogue signal at the head-end station and applying complementary expansion at the receiver.

Companding may be carried out either in the analogue or in the digital domain and preferably the compression function is the cumulative distribution function of the Gaussian probability distribution function.

According to a further aspect of the present invention there is provided a system for distributing signals comprising a head-end station, one or more receivers, and a network connecting the head-end station to the or each receiver, the head-end station including an input stage arranged to receive a composite analogue signal comprising a plurality of AM channels modulated on sub-carriers at different frequencies, converter means arranged to treat the composite analogue signal to reduce the peak-to-mean ratio and to digitise the composite analogue signal, and transmitter means arranged to transmit the resulting digital data onto the network, the receiver including reconstituting means arranged to reconstitute the composite analogue signal and output means arranged to output the composite analogue signal for reception by a termination.

A method and system in accordance with the present invention will now be described in further detail with reference to the accompanying drawings, in which:

Figure 1 is a block diagram showing a distribution system;

Figure 2 is a block diagram showing a signal path in greater detail;

Figure 3 is a diagram showing an alternative arrangement for the multiplexer of Figure 2; and

Figures 4a - 4d are diagrams showing sub-carriers and a composite signal.

A system for distributing television signals via an optical fibre network comprises a head-end station 1 and a number of optical receivers 2 connected to the head-end station 1 via a fibre network 3. In the present example the fibre network 3 is a passive optical network using a star topology but the present invention is equally applicable to other fibre optic networks using different topologies.

The head-end station 1 receives at its input a composite analogue signal which in the present example covers the spectrum from 470-860 MHz. This input signal comprises sub-carriers at different frequencies amplitude-modulated with different television signals. These signals are input to an A/D converter 4 which, as described in further detail below, clips and digitises the signal. An optical transmitter 5 modulates an optical signal with the digital data output by the A/D converter and outputs the signal onto the fibre network 3. The signal passes through different stages of the fibre network 3, including one or more passive optical splitters 7 and is received by the optical receivers 2. For clarity only two optical receivers 2 are shown in Figure 1, but in practice many more may be connected to each network. At the receivers 2 which may, for example, be positioned in street cabinets, the composite optical signal is reconstituted from the optical data and output as an analogue signal via coaxial cables 8 to conventional television sets 13.

The signal path from the head-end station 1 to the television set is shown in greater detail in Figure 2. Data is output from the A/D converter 4 in parallel as

8-bit words. An 8:1 multiplexer 8 converts the output from the A/D converter 4 to a serial bit stream. This bit stream is used to modulate the output from the optical transmitter 5 using conventional techniques. The operation of the multiplexer 8 is locked to a 7 GHz clock generated locally in the head-end station. This clock signal is divided by eight to provide a lower rate clock for the A/D converter 4. In transmission over the fibre network 3 the signal output by the transmitter 5 may be split up to 49 ways, within the constraints of the power budget in the present example. At the receiver 2 a 1:8 demultiplexer 12 assembles 8-bit parallel words from the serial datastream and outputs those 8-bit words to a D/A converter 9. The output from the D/A converter 9 passes through a band pass filter 10 and via an output amplifier stage 11 to up to 20 different television sets 13 connected to the receiver 2 by conventional coaxial cables.

The system may be used to distribute signals to so-called "cable ready" sets. Such sets typically have a VHF baseband input up to 450 MHz. For such systems use can be made of aliasing channels present in the lower frequency range. These are channels at frequencies below those of the original components of the composite analogue signal which are generated as a result of sampling below the Nyquist rate. In this case the reconstituting filter 10 is a low-pass filter rather than a band-pass filter. The low frequency channels output from the reconstituting filter are inverted unless the input to the A/D converter is first inverted.

Figures 4a - 4d, show schematically the formation of the composite analogue signal from three carriers c_1, c_2, c_3. The carriers have amplitudes p_1, p_2, p_3 respectively. The mean (rms) level of each carrier is then $p_n/(2\ 2)$. The different component carriers add

together to form the composite signal shown in Figure 4d. It can be shown that the amplitude of the composite signal, when it comprises n channels, each of amplitude p is np and its mean level is n(p/2 2). The peak-to-mean ratio of the composite signal is therefore far greater than that of the individual sub-carriers. At the input to the A/D converter relatively severe clipping may be applied to limit the dynamic range of the signal prior to quantisation making it possible to minimise the number of quantisation levels without significant loss in the quality of the signal. Clipping may be applied using an appropriate clipping stage before the A/D converter. Alternatively if that converter has suitable clipping characteristics clipping may be achieved by overloading it by a suitable margin.

The composite analogue signal is limited in bandwidth to less than one octave. Not only does this serve to reduce second order intermodulation distortion but it makes possible sampling at a rate below the Nyquist minimum, that is twice the frequency of the maximum frequency component of the signal. Sampling below the Nyquist rate causes aliasing distortion. When however the signal is confined to less than one octave and sampled at a rate only slightly greater than the maximum frequency component the aliasing distortion falls in the unused frequency band below the signal octave band. The aliasing distortion therefore does not compromise the performance of the system and the bit rate of the system is only one half that needed for full Nyquist sampling. As noted above, when generating signals for cable-ready VHF TV sets the production of low frequency aliasing channels may be used to shift the received channels into the desired frequency range.

The A/D converter 4 defines a number of amplitude bands and determines which amplitude band matches the

sample value. Each amplitude band is represented by a binary word and a byte is output accordingly. The resultant bit rate when these bytes are converted to a serial stream by the 8:1 multiplexer 8, is the product of the sampling rate and the number of digits in a byte. Clipping minimises the number of quantisation levels required and so enables a reduction in the byte size and bit rate.

Optionally compression may be applied to the signal before or after it is sampled by the A/D converter 4. Known A/D converters for video signals use linear quantising with one output byte representing one quantisation level. The present system however by applying compression to the composite analogue signal as it is digitised reduces the number of possible output words required for a given output video quality by a factor of two or more, giving a further saving in the bit rate. The preferred compression function is the cumulative distribution function of the Gaussian probability distribution function (PDF). If the input waveform to the compressor has a Gaussian PDF, the output PDF from the compressor is uniform with output in the range 0 to 1. This uniform PDF can then be quantised linearly and each output codeword is then equi-probable. The compressor and matching expander at the receiver may be realised in hardware using a network of diodes and resistors, or in software using a look-up table following a suitable linear A/D converter.

The digital circuits in the head-end station 1 and the receiver 2 are synchronised using word alignment techniques. For example, the least significant bit in each word may be identified by a periodic function such as a Barker code by regular bit stealing. This sequence is then detected using a suitable sampler, logic function

and clock slip circuit. Preferably the clock operates at the word rate rather than the serialised bit rate.

In an alternative arrangement shown in Figure 3 two 8:1 multiplexers are used in parallel at a lower clock rate of 1.2 GHz. In this case a pair of A/D converters are used, operating at a clock rate one eighth of that of the multiplexers.

Although the embodiment discussed above relates to the distribution of television signals, the invention, in its broadest aspects, is applicable to other signals such as, e.g., audio signals.

CLAIMS

1. A method of distributing signals from a head-end station via a network comprising combining a plurality of AM channels modulated on sub-carriers at different frequencies to form a composite analogue signal, treating the composite analogue signal to reduce the peak-to-mean ratio, digitising the composite analogue signal, transmitting resulting digital data onto the network, receiving the digital data at a receiver and reconstituting the composite analogue signal for reception at a termination.

2. A method according to claim 1, in which the network is an optical network, the receiver is an optical receiver, and the composite analogue signal is treated by clipping the signal.

3. A method according to claim 1 or 2, including receiving the digitised signal at a node remote from the termination, and transmitting the reconstituted signal onwards for reception at the termination.

4. A method according to claim 2 or 3, in which the composite analogue signal has a bandwidth of one octave or less and is digitised by sampling at a sampling rate below the Nyquist rate.

5. A method according to any one of claims 1 to 4, including compressing the composite analogue signal at the head-end station and applying complementary expansion to the signal at the receiver.

6. A system for distributing signals comprising a head-end station, one or more receivers, and a network connecting the head-end station to the or each receiver, the head-end station including an input stage arranged to receive a composite analogue signal comprising a plurality of AM channels modulated on sub-carriers at different frequencies, converter means arranged to treat

the composite analogue signal to reduce the peak-to-mean ratio and to digitise the composite analogue signal, and transmitter means arranged to transmit the resulting digital data onto the network, the receiver including reconstituting means arranged to reconstitute the composite analogue signal and output means arranged to output the composite analogue signal for reception by a termination.

7. A system according to claim 6, in which the network is an optical network, the receiver is an optical receiver, and the converter means are arranged to clip the composite analogue signal.

8. A system according to claim 7, in which the or each optical receiver is located at a respective node remote from the termination and is arranged to transmit the reconstituted signal onwards for reception at the termination.

9. A system according to claim 7 or 8, in which the composite analogue signal has a bandwidth of one octave or less and the converter means are arranged to sample the composite analogue signal at a sampling rate below the Nyquist rate.

10. A system according to any one of claims 6 to 9, further including compression means located in the head-end station and expansion means located in the or each receiver and arranged to apply complementary compression and expansion to the composite analogue signals.

9. A method of distributing signals substantially as described with respect to the accompanying drawings.

10. A system for distributing signals substantially as described with respect to the accompanying drawings.

11. A method or system according to any one of the preceding claims, in which the signals distributed from the head-end station are television signals.

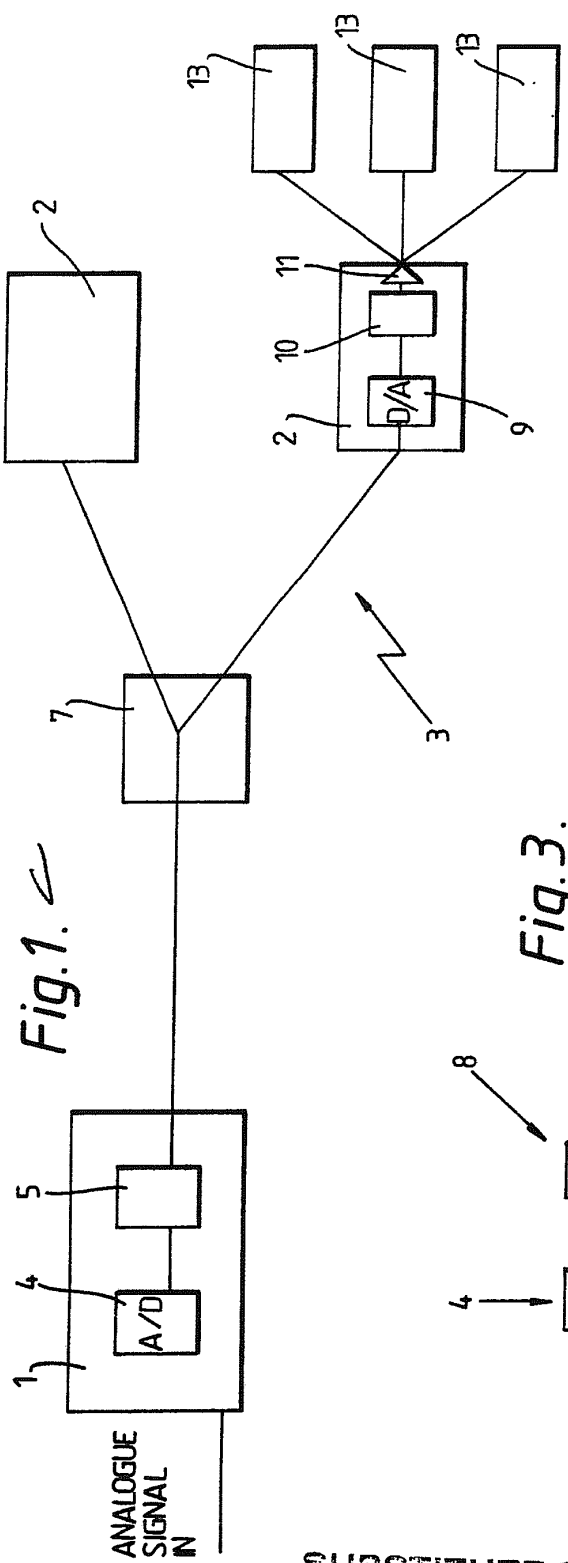


Fig.1.

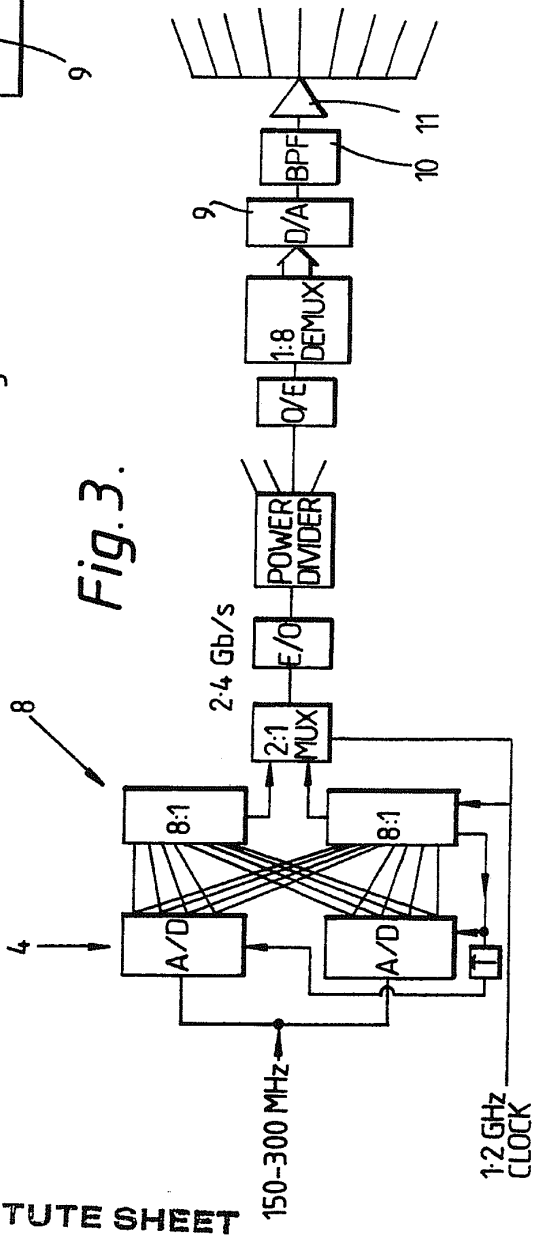


Fig.3.

EX-1002
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00336

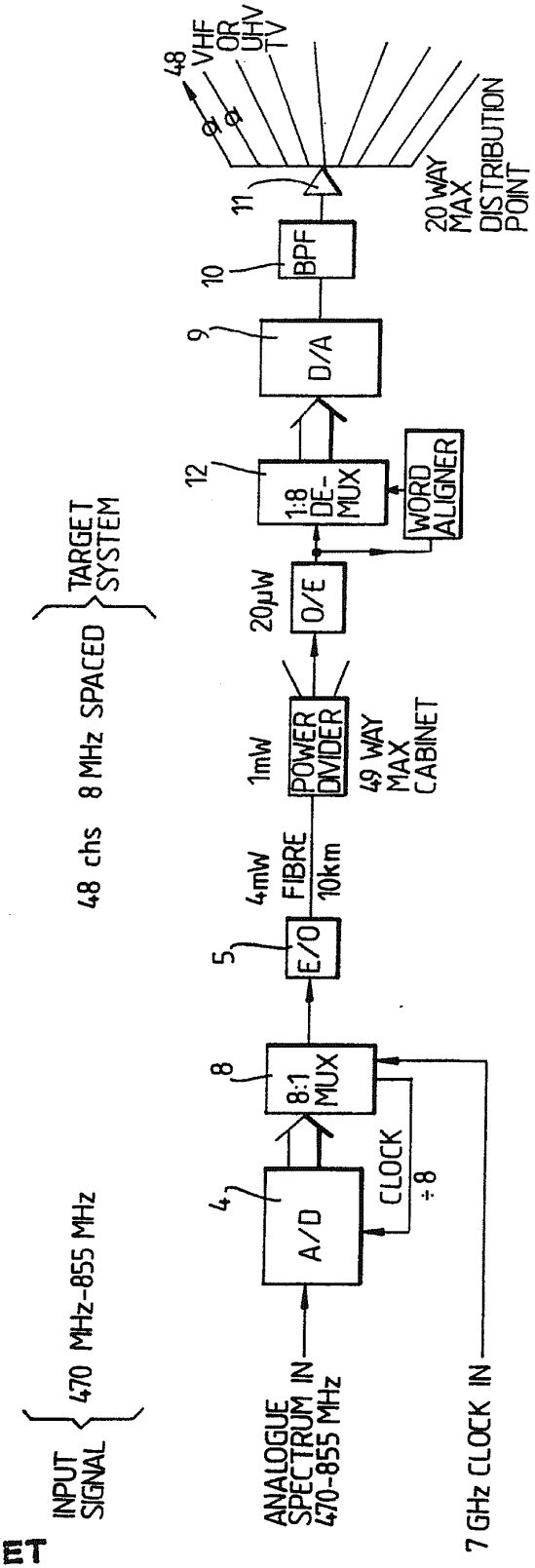
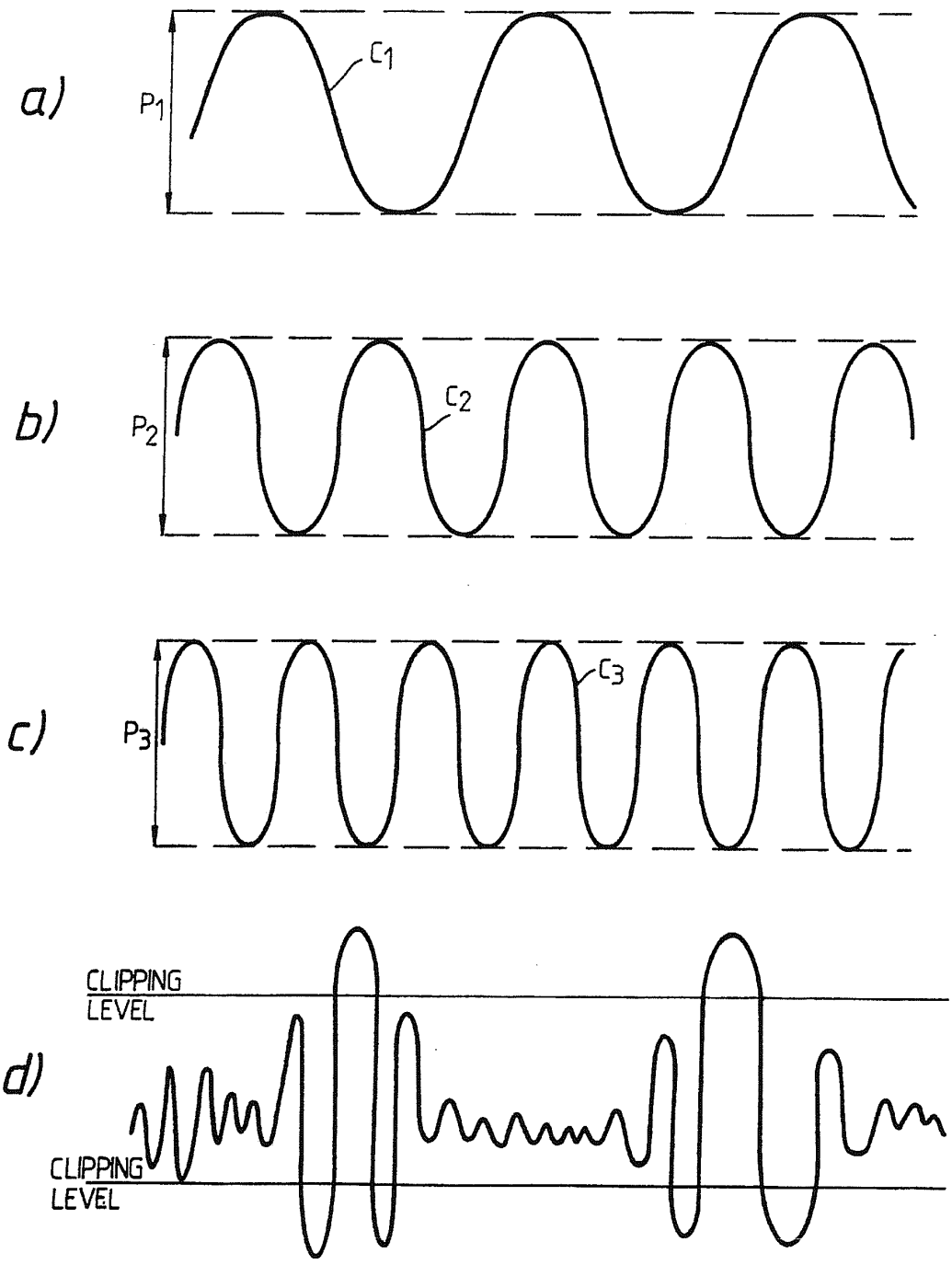


Fig. 2.

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Fig.4.



EX-1002
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00338

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 91/00568

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[5]: H 04 N 7/22

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[5]	H 04 N

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	Symposium Record, CATV sessions 16th International TV Symposium, Montreux, 17-22 June 1989, H.H. Tan et al.: "CATV distribution over a fibre optic local network", pages 262-272 see abstract; page 266, lines 1-10 ---	1,2,6-8,11
A	Funkschau, volume 62, no. 1, 29 December 1989/90, (Munich, DE), M.Gendisor et al.: "Signale auf der Glasfaser", pages 51-55 see page 54, right-hand column, line 46 - page 55, left-hand column, line 5 ---	1-3,6-8, 9-11
A	Conférence Européenne sur les Communications Optiques, Cannes, 21-24 September 1982, E. Roza et al.: "TV system with remote selection for subscriber glass fiber networks", pages 497-500 see page 499, left-hand column, lines 17-37; figure 1 ---	1-3,6-8, 9-11

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* Special categories of cited documents: [10]

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
19th June 1991	24 JUN 1991
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	Electronics Letters, volume 24, no. 7, 31 March 1988, (Stevenage, Herts, GB), F.V.C. Mendis et al.: "20 Km single-mode optical fibre system for multichannel video", pages 442-443 see page 442, left-hand column, lines 16-28 ---	1-4,6-11
A	Patent Abstracts of Japan, volume 10, no. 363 (E-461)(2420), 5 December 1986, & JP, A, 61158281 (MATSUSHITA ELECTRIC IND. CO. LTD.) 17 July 1986	1-11

Form PCT/ISA 210(extra sheet) (January 1985)

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

PTO/SB/08a (08-08)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
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	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

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	3	2004006602	WO		2004-01-15	Horneman		☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	First Named Inventor	Koziy
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

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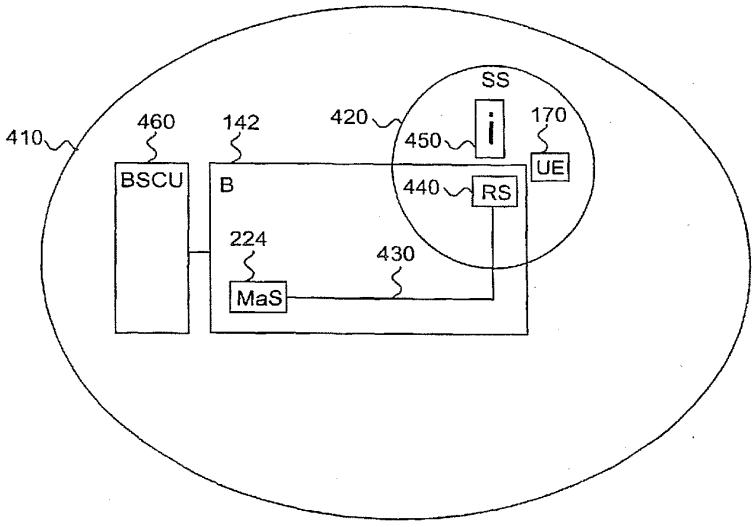
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[Continued on next page]

(54) Title: METHOD FOR ALLOCATING INFORMATION TRANSFER CAPACITY IN MOBILE COMMUNICATION SYSTEM, AND MOBILE COMMUNICATION SYSTEM



(57) Abstract: The invention relates to a method for allocating information transfer capacity in a mobile communication system, and to a mobile communication system. In the method according to the invention, the information transfer capacity is allocated to the user by forming a high capacity service site inside a cell of a base station by using a remote unit of a base station. The invention enables allocation of capacity to a specific mobile station with a low cost of multi-user interference generated to other receivers in the cell.

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CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

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METHOD FOR ALLOCATING INFORMATION TRANSFER CAPACITY IN MOBILE COMMUNICATION SYSTEM, AND MOBILE COMMUNICATION SYSTEM

FIELD

The invention relates to a method for allocating information transfer capacity in a mobile communication system, and a mobile communication system.

BACKGROUND

As the number of mobile equipments increases and the need for transferring great amounts of information, such as video and audio signals, over wireless communications systems has increased, the capacity requirements imposed on the mobile communication systems have been substantially restricted. In communication systems based on CDMA-technology and its derivatives, the capacity is mainly limited by multi-user interference occurring between the transceivers using the same carrier frequency, and by fading of the communication channels due to multi-path propagation of a radio signal.

According to prior art solutions, the capacity of a mobile communication system is increased by using sectorization of a cell of a base station. In sectorization, the cell of a base station is physically divided into several subcells, which are possibly further separated by sector-specific coding. If the radiation pattern of each sector were ideal, the capacity of the cell would increase linearly as a function of the number of sectors.

The prior art solutions provide very limited tools for increasing the capacity of a mobile communication system. The limitations arise from the fact that the sectors overlap giving rise to multi-user interference, and from the fact that the sectorization cannot fully resolve the problems of the fading channels.

BRIEF DESCIPTION

An object of the invention is to provide an improved method and an improved mobile communication system for providing increased capacity in a mobile communication system.

An aspect of the invention is a method for allocating information transfer capacity in a mobile communication system, the mobile communication system comprising a base station and a mobile station, the method comprising: forming a connection between the base station and the mobile station,

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00347

requesting for allocation of information transfer capacity to the mobile station; connecting the mobile station to a service site formed by a remote station of the base station, the service site being located inside the cell formed by the base station, the service site using the same radio interface as the cell, the service site providing the mobile station with higher information transfer capacity than the cell, the remote station being controlled by the base station, and the traffic of the remote station being routed via the base station; and transferring information by using the service site.

An aspect of the invention is a mobile communication system comprising: a base station for providing a mobile station with radio transmission and reception; a mobile station connected to the base station for providing a user of the mobile station with access to the mobile communication system; a base station control unit for controlling the radio connection between the base station and the mobile station; the base station comprises a main station for forming a cell; the base station comprises a remote station connected to the main station for providing the mobile station with radio transmission and reception; the remote station is configured to use the same radio interface as the main station; and the remote station is configured to form a service site inside the cell, the service site providing the mobile station with higher information transfer capacity than the cell.

Preferred embodiments of the invention are disclosed in the dependent claims.

The invention is based on the idea that the mobile communication system can allocate information transfer capacity to a specific user by forming a service site inside the base station cell, which service site is entered by the user whenever increased capacity is needed.

The method and the system of the invention provide several advantages. For example, they enable high data transfer rates for a user using the service site with low multi-user interference effects.

LIST OF DRAWINGS

The invention is now described in closer detail in connection with the preferred embodiments and with reference to the accompanying drawings, in which

Figure 1 shows an example of a structure of a radio system,

Figure 2 shows another example of a structure of a radio system,

Figure 3 shows an example of a structure of a remote station,

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Figure 4 shows an example of the cell and a service site according to the invention, and

Figure 5 shows a flow diagram illustrating the operation of the service site according to the invention.

DESCRIPTION OF EMBODIMENTS

Since the invention is suitable for use in radio systems between different generations, embodiments will be described in a radio system illustrated in Figure 1, wherein network elements of different generations coexist. In the description, a 2G radio system is represented e.g. by a GSM (Global System for Mobile Communications), which is based on the TDMA (Time Division Multiple Access) technology. A 2.5G is represented e.g. by a GPRS (General Packet Radio System). A 3G radio system is represented e.g. by a system which is based on the GSM system and which utilizes WCDMA (Wideband Code Division Multiple Access) technology, and systems known at least by the names IMT-2000 (International Mobile Telecommunications 2000) and UMTS (Universal Mobile Telecommunications System). The embodiments are not, however, restricted to these systems described as examples but a person skilled in the art can also apply the teachings to other radio systems comprising corresponding characteristics.

Figure 1 is a simplified block diagram showing, at a network element level, the most important parts of a radio system. The structure and functions of the network elements are only described when relevant to the present solution.

The main parts of a radio system are a core network (CN) 100, a radio access network 130 and a mobile station (MS) 170. For simplicity, a radio access network called UTRAN (UMTS Terrestrial Radio Access Network) 130 is taken as an example. UTRAN belongs to the third generation and is implemented by wideband code division multiple access technology. The network elements of the GSM system not shown in Figure 1 can be implemented as a separate system from UTRAN known as GERAN (GSM/EDGE Radio Access network), or included in the UTRAN infrastructure. However, the division between the different radio systems is not relevant to the present solution. Furthermore, the solution is not limited to a WCDMA radio interface but applications exist which are implemented with MC-CDMA (Multi-Carrier Code Division Multiple Access) or OFDMA (Orthogonal Frequency Division Multiple Access) technologies.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00349

On a general level, the radio system can also be defined to comprise a mobile station and a network part. The mobile station is also called user equipment, a terminal, a subscriber terminal and a mobile telephone. The network part comprises the fixed infrastructure of the radio system, i.e. the core network, radio access network and the base station system.

The structure of the core network 100 corresponds to a system which incorporates both circuit-switched and packet-switched domains. Both domains can utilize the same radio access network 130.

A mobile services switching center (MSC) 102 is the center point of the circuit-switched side of the core network 100. The mobile services switching center 102 is used to serve the connections of the radio access network 130. The tasks of the mobile services switching center 102 include: switching, paging, user equipment location registration, handover management, collection of subscriber billing information, encryption parameter management, frequency allocation management, and echo cancellation.

Large core networks 100 may have a separate gateway mobile services switching center (GMSC) 110, which is responsible for circuit-switched connections between the core network 100 and external networks 180. The gateway mobile services switching center 110 is located between the mobile services switching center 102 and the external networks 180. An external network 180 can be, for instance, a public land mobile network (PLMN) or a public switched telephone network (PSTN).

A serving GPRS support node (SGSN) 118 is the center point of the packet-switched side of the core network 100. The main task of the serving GPRS support node 118 is to transmit and receive packets together with the mobile station 170 supporting packet-switched transmission by using the radio access network 130 or the base station system. The serving GPRS support node 118 contains subscriber and location information related to the mobile station 170.

A gateway GPRS support node (GGSN) 120 is the packet-switched side counterpart to the gateway mobile services switching center 110 of the circuit-switched side with the exception, however, that the gateway GPRS support node 120 must also be capable of routing traffic from the core network 100 to external networks 182, whereas the gateway mobile services switching center 110 only routes incoming traffic. In our example, external networks 182 are represented by the Internet.

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The radio access network 130 comprises radio network subsystems 140, 150. Each radio network subsystem 140, 150 comprises radio network controllers (RNC) 146, 156 and nodes B 142, 144, 152, 154. Node B is a rather abstract concept; the terms 'base transceiver station' or 'base station' are often used instead. In this application Node B is called a base station. The base station provides the mobile station 170 with radio transmission and reception. Solutions exist in which the base station is capable of implementing both the TDMA and WCDMA radio interfaces simultaneously.

The mobile station 170 provides a user of the mobile station with access to the mobile communication system. The mobile station comprises two parts: mobile equipment (ME) 172 and a UMTS subscriber identity module (USIM) 174. The GSM system naturally uses its own identity module. The mobile station 170 comprises at least one transceiver for establishing a radio link to the radio access network 130. The mobile station 170 may comprise at least two different subscriber identity modules. The mobile station 170 further comprises an antenna, a user interface and a battery. Today, different types of mobile station 170 exist, for instance equipment installed in cars, and portable equipment.

The USIM 174 comprises user-related information and information related to information security, such as an encryption algorithm.

Figure 2 shows a mobile services switching center 102, a gateway mobile services switching center 110, which is responsible for the connections of the mobile communication system to the external world, herein to the public telephone network 180, and a network part 200.

The network part 200 comprises a base station 142 controlled by a radio network controller 146, a group switching field 220, and a control unit 222. The group switching field 220 is used for switching speech and data and for connecting signalling circuits. Solutions exist in which the network controller 146 is implemented in the base station 142. The tasks that the network controller 146 performs include, for example: control of logical operations of the base station and maintenance management, traffic management of common channels, handover management, allocation of downlink channelization codes, uplink outer-loop control, load and admission control, and traffic management of shared channels. The control unit 222, in turn, carries out call control, mobility management, collecting statistical data, signalling, and control and management of resources.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00351

The base station 142 and the radio network controller 146 constitute a radio network subsystem 140, which further comprises a transcoder 226, which converts different digital speech encoding formats used between a public telephone network and a radio telephone network into compatible ones, e.g. from the format of the fixed network into another format of the cellular radio network, and vice versa.

The base station 142 comprises a main station 224 and a remote station 240, 242, 244, 246. The remote station 240, 242, 244, 246 provides the mobile station with radio transmission and reception, and uses the same radio interface as the main station 224. Furthermore, the remote station 240, 242, 244, 246 is controlled by the base station 142, and the traffic of the remote station 240, 242, 244, 246 is routed e.g. to the external networks 180,182 via the base station 142. On a general level, the remote station 240, 242, 244, 246 can include all the basic functionalities included in the base station 142.

The main station 224 comprises a multiplexer unit 212, a baseband unit 214, an analog-digital converter unit 216, a transceiver unit 218 and a control unit 210.

The multiplexer unit 212 is used for arranging the traffic and control channels used by the transceiver unit 218 onto a single transmission connection 211. Furthermore, the multiplexer unit 212 carries out error correction operations and, possibly, bit interleaving and de-interleaving.

The baseband unit 214 comprises e.g. a digital signal processor, ASICs (Application-Specific Integrated Circuits), data busses, data storage media, and software, for example, for coding and decoding of signals.

The analog-digital converter unit 216 comprises A/D (analog-to-digital) and D/A (digital-to-analog) converters for digitizing analog antenna signals and for converting digital antenna signals to analog form.

The transceiver unit 218 comprises e.g. frequency modulators for modulating the baseband signals to the radio frequency and vice versa, and amplifiers for amplifying antenna signals. Furthermore, the transceiver unit 218 comprises e.g. duplex filters for separating the received and transmitted antenna signals from each other.

The transceiver unit 218 is connected to an antenna unit 234. The antenna unit 234 is used for implementing a radio connection to a mobile station 170. In an embodiment of the present solution, the antenna unit 234 com-

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00352

prises an antenna array for beam forming. The antenna unit 234 can also comprise leaky cables for forming an elongated radiation pattern.

The control unit 210 controls the operation of the multiplexer unit 212, baseband unit 214, analog-to-digital converter unit 216, the transceiver unit 218, and the remote station 240, 242, 244, 246.

The combination of the multiplexer unit 212, the baseband unit 214, the analog-digital converter unit 216, and the transceiver unit 218 constitute at least two collector-distributor routes 236, 238 for processing transmitted and received signals. Each collector-distributor route 236, 238 is capable of independent antenna signal processing, which includes e.g. weighting of the antenna signals and user-specific signals. At least one of the collector- distributor routes 236, 238 is dedicated to processing the signals transmitted and received by the antenna unit 234. At least one of the collector-distributor routes 236, 238, respectively, deals with the signals transmitted and received by the remote station 240, 242, 244, 246. However, in the latter case, the details in the set-up of the collector-distributor route 236, 238 depend on the details of the specific embodiment.

Referring to Figures 2 and 3 examine embodiments of transferring traffic between the remote station 240, 242, 244, 246 and the main station 224, and the corresponding coupling arrangements between the remote station 240, 242, 244, 246 and the main station 224. In an embodiment, the remote station 240 is connected to the transceiver unit 218 of the base station 142. The remote station 240, correspondingly, comprises at least an antenna unit 320. The antenna unit 320 comprises at least one antenna element for providing the mobile station 170 with radio transmission and reception. The antenna unit 320 can also comprise an adaptive antenna array, thus enabling beam forming and user-specific antenna beams that can follow the motion of the mobile station 170. In this case, the radio frequency analog signals are transmitted between the main station 224 and the remote station 240. The signals can be further subjected to amplification and/or filtering in an amplifier-filter unit 322, which comprises power amplifiers and/or duplex filters, respectively. The physical connection 250 between the transceiver unit 218 of the main station 224 and the amplifier-filter unit 322 of the remote station 240 can be implemented, for example, with coaxial cables suitable for conducting radio frequency signals.

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In an embodiment, the remote station 242 is connected to the analog-digital converter unit 216 of the main station 224. The remote station 242, correspondingly, comprises the antenna unit 320 and the amplifier-filter unit 322 described above. Furthermore, the remote station 242 comprises a transceiver unit 330 including similar elements and performing similar tasks to those of the transceiver unit 218 of the main station 224. However, the maximum output power requirement is substantially lower than that of the main station 224. In this embodiment, analog baseband signals are transmitted between the main station 224 and the remote station 242. The modulation of the base band signals to the radio frequency is now carried out in the transceiver unit 330 of the remote station 242. The connection 252 between the transceiver unit 330 of the remote station 242 and the analog-digital converter unit 216 of the main station 224 can be implemented with a galvanic conductor arrangement, such as a coaxial cabling, an optical data transmission, or with a fixed radio link. The means for optical data transmission and radio link transmission are not shown, but their structure and implementation are well known to a person skilled in the art.

In an embodiment, the remote station 244 is connected to the base band unit 214 of the main station. The remote station 244, correspondingly, comprises the antenna unit 320, the amplifier-filter unit 322, and the transceiver unit 330 described above. Furthermore, the remote station 244 comprises an analog-digital converter unit 340 including similar elements and performing similar tasks as the analog-digital converter unit 216 of the main station 224. The connection 254 between the analog-digital converter unit 340 of the remote station 244 and the base band unit 214 of the main station 224 can be implemented in the manner described above.

In an embodiment, the remote station 246 is connected to the multiplexer unit 212 of the main station 224. The remote station 246, correspondingly, comprises the antenna unit 320, the amplifier-filter unit 322, the transceiver unit 330, and the analog-digital converter unit 340 described above. Furthermore, the remote station 246 comprises a base band unit 350 including similar elements and performing similar tasks to those of the base band unit 212 of the main station 224. The connection 256 between the analog-digital converter unit 340 of the remote station 244 and the base band unit 214 of the main station 224 can be implemented e.g. with a galvanic conductor arrangement well known to a person skilled in the art.

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The control unit 210 controls the relevant elements 322, 330, 340 350 of the remote station 240, 242, 244, 246. For example, the control unit 210 controls the transmit power of the remote station 242, 244, 246 by adjusting the transceiver unit 330 and possibly the base band unit 350 accordingly. Furthermore, the control unit 210 deals with handover management, which handover occurs between the cell of the main station 224 and the coverage area of the remote station 240, 242, 244, 246. In a WCDMA system, such handover is called softer handover. The control unit 210 is connected to the remote station 240, 242, 244, 246 by the conductor means 260, such as a coaxial cable.

In an embodiment, the remote station 240, 242, 244, 246 comprises a control unit 360 to control local functions of the remote station 240, 242, 244, 246. Such local functions include e.g. power control and associated measurements, load and admission control, and tasks associated with ARQ (Automatic Repeat Requets). The tasks controlled by the control unit 360 can also be subfunctions of the radio network controller 146.

Referring to Figure 4 consider the basics of the operation of the radio system presented in the present solution. Figure 4 shows the base station 142, the base station control unit 460, and the mobile station 170. The base station control unit 460 deals e.g. with load and admission control, and control of scrambling and channel coding. The base station control unit 460 can be implemented as a part of the radio network controller 146.

The base station 142 comprises a main station 224 for forming a cell 410. The coverage of the cell 410 can vary from dozens of kilometers of the macro cell range to dozens of meters of the pico cell range. The cell 410 can be, for example, a sectorized cell, and it can include user-specific radiation patterns. The remote station 240, 242, 244, 246, indicated with a single reference number 440 in Figure 4, is configured to form a service site 420 inside the cell 410, the service site 420 providing the mobile station 170 with higher capacity than the cell 410. The service site 420 is a zone wherein the radio transmission and reception of the remote station 440 are available to the mobile station 170. The capacity of the service site 420 is based on a short distance, typically of the order of meters, between the remote station 440 and the mobile station thus enabling low transmit power of the order of several nW of both the mobile station 170 and the remote station 440. The capacity allocated by using the service site 440 to a single mobile station 170 can be of the order of the capacity of the entire cell 410 or a sector of the cell 410, and it is primar-

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ily limited by the multi-user interference arising from other radio sources in the cell. The shape and the size of the service site 420 depend on the specific application of the service site 420. On a general level, the dimensions of the service site 420 are in accordance with the free path of the mobile station 170 connected to the remote station 440. The free path of the mobile station 170 can be defined as a space taken by the user during the connection to the remote station 420. If the service site 420 serves a user who is virtually immobile, the operating range of the service site 420 can be as short as half a meter. The corresponding transmit power can vary from 1 nW to 10 nW. In an application where the service site 420 serves a moving user, such as a mobile station in a vehicle, a prolate shape of the service site 420 can be applied and the operating range can be as long as 50 meters, corresponding to a transmit power of the order of 1 μW. The desired shape of the radiation pattern can be obtained with antenna beam techniques or leaky cables used as an antenna. The characteristics described above give rise to the term "femto cell" used for the service site 420.

In an embodiment, the operating range of the service site 420 is confined to a line-of-sight range from the remote station 440, thus enabling good quality of the communication channel. The good quality of the communication channel gives rise to reduced signalling, reduced retransmitting, and efficiency in channel coding.

In an embodiment, the operating range of the service site 420 is based on a channel estimate produced by the base station 142 or by the mobile station 170. The channel estimate can be e.g. SINR (Signal-to-Interference +Noise Ratio), which characterizes the quality of the radio channel and from which the information transfer capacity can be further derived. If the channel meets the desired capacity requirement and if the multi-user interference generated by the remote station 440 in the cell 410 is acceptable, the connection between the mobile station 170 and the service site 440 can be established.

In an embodiment, the service site 420 uses a different physical radio channel from that used in the cell 410. The separation between the physical radio channels can be achieved by using different multiple access methods. In the CDMA-based methods including WCDMA, the radio channels can be implemented with different codes used by the service site 420 and the cell 410. The physical channels can also be identified by different carrier frequencies, which is characteristic of FDMA (Frequency Division Multiple accees)

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00356

based methods. The channels can also be separated by using different time-slots, which is characteristic, for instance, of TDMA (Time Division Multiple Access) methods, which further apply different frequency bands to separate signals between different sectors. Furthermore, multiplexing can be based on a combination of the aforementioned methods. However, the multiplexing scheme irrelevant to the present solution.

The operation and usage of the service site 440 will be discussed in the following. For simplicity, the examples shown are limited to an operation with a single mobile station 170, but the examples also apply to cases wherein two or more mobile stations 170 communicate with the service site 420 simultaneously. The basic idea of the operation of the service site 420 is illustrated in a flow diagram shown in Figure 5. In the start block 500, the mobile station 170 is situated with in the coverage of the cell 410 and connected 510 to the main station 224 of the base station 142. In the meantime, the mobile station 170 can transfer information with the main station 224, or be in an idle mode. The procedure continues with a request 520 for allocation of information transfer capacity to the mobile station 170. In an embodiment, the request is directed to the base station control unit 460, which deals with the radio resource control of the cell 410 and the service site 420. In an embodiment, the mobile station 170 detects, before requesting for allocation of information transfer capacity to the mobile station 170, a need for allocating information transfer capacity to the mobile station 170. The detection can arise, for example, from data reception or transmission. The request for allocating capacity can also be generated in the base station control unit 460 if there is a need to decrease the load of the cell 410. In such a case, the base station control unit 460 suggests a suitable mobile station 170 to enter the service site 420, and the radio resources of the mobile station 170 will be released for other users in the cell.

After requesting 520 allocation of capacity to the mobile station 170, the mobile station 170 is connected 530 to the service site by forming a radio connection with the remote station 440. The connection between the remote station 440 and the mobile station can be established with a softer-hand over procedure controlled by the control unit 210 of the base station 142. In an embodiment of the hand-over procedure, in the transition phase, the mobile station 170 is connected both to the main station 224 and to the remote station 440 using the same scrambling code. The signals from the main station 224 and the remote station can be distinguished by generating an artificial delay in

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00357

the signal of the remote station followed by a change in the scrambling code used by the remote station 440. The command to change the scrambling code can be generated in the base station control unit 460, and delivered to the mobile station by the control channels, such as the random access channel (RACH) according to the 3G specification. After the mobile station 170 has been connected to the service site 420, information is transferred 540 between the mobile station 170 and the service site 420. The information is e.g. speech or audiovisual data.

In an embodiment, the transmit power of the mobile station 170 is decreased to a predetermined level, after the mobile station 170 has been connected to the service site 420. In an embodiment, the predetermined power level is lower than a normal minimum transmit power defined in the radio system. For example in the 3G specifications, the minimum transmit power of the mobile station is –50 dBm corresponding to 10 nW.

The low transmit power reduces the multi-user interference in the cell 410, and it can be used when short distance exists between the mobile station 170 and the remote station 440. The power control command can be given by the base station control unit 460, or it can be generated by the mobile station 170 itself. In an embodiment, the transmit power of the remote station 440 is controlled according to the information transfer capacity requirement of the mobile station 170. For example, if the signals from the cell 410 give rise to an increase in the multi-user interference, the power of the remote station 440 can be increased.

In an embodiment, the mobile station 170 is connected to the service site 420 based on an intentional act of the user of the mobile station 170 to use the service site 420.The intentional act comprises e.g. entering the service site 420 or switching on a specific application in the mobile station 170, the application requiring high capacity. Consequently, it is preferred, that the location information on the service site 420 is known to the user a priori. The location information can be delivered to the user with visual signs 450, which can be used to show the exact location of the service site 420 and which can further guide the user to the proximity of the service site 420. A visual sign 450 is an identifier, such as a signboard by which the user can identify the service site 420.

In an embodiment, the mobile station 170 is connected to the service site 420 whenever the mobile station 170 is located within the operating

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00358

range of the service site 420 and whenever there is a request for a capacity allocation to the mobile station 170. Also, in an embodiment, the mobile station 170 is disconnected 560 from the service site 420 whenever the mobile station 170 is located outside the operation range of the service site 420. The mobile station 170 can also be disconnected 560 from the service site 420 whenever the data transfer between the remote station 440 and the mobile station 170 is completed. After the mobile station 170 has been disconnected 560 from the service site 420, the mobile station 170 can be reconnected to the cell 410 of the base station 142 or it can be switched off.

In an embodiment, the location of the mobile station 170 is determined based, for example, on a direction-of-arrival (DoA) estimate of the mobile station. The DoA estimate can be generated in the base station control unit 460 based on the signals received from the mobile station 170 as is known to a person skilled in the art. As the remote station 440 is located in a fixed position, the location of the service site 420 is known a priori to the base station 142, and it is a matter of trivial calculation to obtain the relative position of the mobile station 170 and the service site 420. The positioning of the mobile station 170 can also be based on measurements carried out by at least two base stations on the direction of the mobile station 170.

The location determination of the mobile station 170 can also be based on positioning systems available to public, such as GPS (Global Positioning System). In this case, the mobile equipment itself has elements for generating the location information or it is attached to specific equipment for that purpose.

In an embodiment, the mobile station 170 is provided with accessibility information on the service site 440. The accessibility information comprises e.g. the data transfer capacity available in the service site 420, and the information whether or not the specific service site 440 is reserved for another user. The accessibility information can be produced and processed in the base station control unit 460, and transferred to the mobile station 170 by means of the control channels of the radio system.

In an embodiment, the mobile station 170 is provided with guidance information to the service site 420. The guidance information comprises the location of the nearby service sites 420 relative to the position of the mobile station 170, and possibly instructions for finding a service site 420. The guid-

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00359

ance information can be produced and processed in the base station control unit 460, but it can be downloaded to and stored in the mobile station as well.

In an embodiment, the mobile station 170 is provided with means for indicating the location information on the service site 420. The mobile station can display a map of the relevant area, which includes an indication of the direction of the service site 420 and other relevant information necessary for finding it.

A single base station 142 can comprise several remote stations 440, each of which forms a service site 420. It is believed that especially in the urban areas, the remote stations 440 can form a web-like structure, the distance between the service sites 420 being the order of the range of line-of-sight. Suitable locations of the service sites 420 also include places where the radio interference is a severe problem, such as hospitals.

The remote stations 440 can also be arranged along a highway to provide spot-like high capacity areas, which become available to a user whenever the user enters such an area. This arrangement can be applied if the user is satisfied with burst-like capacity peaks for data transfer. This is possible due to the softer handover procedure applied in the present solution when the connection is interchanged between the cell 410 and the service site 420. Furthermore, the remote station 440 can utilize beam forming in transmission and reception, wherein antenna beams are aimed along a road alignment and possible at the vehicles driving on the highway. Leaky cables installed along the road alignment can also be utilized to form an elongated radiation pattern that covers the vehicles driving on the highway. In such a case, the operating range of the service site 420 is in the order of the width of the highway, which is of the order of dozens of meters.

Although the invention has been described above with reference to the example in accordance with the accompanying drawings, it is obvious that the invention is not restricted thereto but can be modified in many ways within the scope of the inventive idea disclosed in the attached claims.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00360

CLAIMS

1. A method for allocating information transfer capacity in a mobile communication system, the mobile communication system comprising a base station (142) and a mobile station (170), the method comprising

forming (510) a connection between the base station (142) and the mobile station (170),

characterized by

requesting (520) for allocation of information transfer capacity to the mobile station (170);

connecting (530) the mobile station (170) to a service site (420) formed by a remote station (440) of the base station (142), the service site (420) being located inside the cell (410) formed by the base station (142), the service site (420) using the same radio interface as the cell (410), the service site (420) providing the mobile station (170) with higher information transfer capacity than the cell (410), the remote station (420) being controlled by the base station (142), and the traffic of the remote station (440) being routed via the base station (142); and

transferring (540) information by using the service site (420).

2. A method as claimed in claim 1, **characterized** by detecting in the mobile station (170), before requesting (520) for allocation of information transfer capacity to the mobile station (170), a need to allocate information transfer capacity to the mobile station (170).

3. A method as claimed in claim 1, **characterized** by, connecting (530) the mobile station (170) to the service site (420) by using a different physical radio channel in the service site (420) than that used in the cell (410).

4. A method as claimed in claim 1, **characterized** by connecting (530) the mobile station (170) to the service site (420) based on an intentional act of the user of the mobile station (170) to use the service site (420).

5. A method as claimed in claim 1, **characterized** by decreasing, the transmit power of the mobile station (170) to a predetermined level after the mobile station (170) has been connected (530) to the service site (420).

6. A method as claimed in claim 1, **characterized** by controlling the transmit power of the remote station (440) according to the informa-

tion transfer capacity requirement of the mobile station (170) after the mobile station (170) has been connected (530) to the service site (420).

7. A method as claimed in claim 1, **characterized** by disconnecting (560) the mobile station (170) from the service site (420) after the information has been transferred (540).

8. A method as claimed in claim 1, **characterized** by determining the location of the mobile station (170) before the mobile station (170) has been connected (530) to the service site (440).

9. A method as claimed in claim 1, **characterized** by connecting (530) the mobile station (170) to the service site (420) whenever the mobile station (170) is located within the operating range of the service site (420).

10. A method as claimed in claim 1, **characterized** by disconnecting (560) the mobile station (170) from the service site (420) whenever the mobile station (170) is located outside the operation range of the service site (420).

11. A method as claimed in claim 1, **characterized** by providing the mobile station (170) with accessibility information on the service site (420).

12. A method as claimed in claim 1, **characterized** by providing the mobile station (170) with guidance information to the service site (420).

13. A method as claimed in claim 1, **characterized** by indicating to the user, in the mobile station (170), the location information on the service site (420).

14. A method as claimed in claim 1, **characterized** by informing the user about the location of the service site (420) with visual signs (450).

15. A method as claimed in claim 1, **characterized** in that the operating range of the service site (420) depends on the free path of the mobile station (170).

16. A method as claimed in claim 1, **characterized** in that the operating range of the service site (420) is confined to half a meter from the remote station (440).

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17. A method as claimed in claim 1, **characterized** in that the operating range of the service site (420) is confined to a line-of-sight range from the remote station (440).

18. A mobile communication system comprising

a base station (142) for providing a mobile station (170) with radio transmission and reception;

a mobile station (170) connected to the base station (142) for providing a user of the mobile station (170) with access to the mobile communication system; and

a base station control unit (460) for controlling the radio connection between the base station (142) and the mobile station (170),

characterized in that

the base station (142) comprises a main station (224) for forming a cell (410);

the base station (142) comprises a remote station (440) connected to the main station (224) for providing the mobile station (170) with radio transmission and reception;

the remote station (440) is configured to use the same radio interface as the main station (224); and

the remote station (440) is configured to form a service site (420) inside the cell (410), the service site (420) providing the mobile station (170) with higher information transfer capacity than the cell (410).

19. A mobile communication system as claimed in claim 18, **characterized** in that the base station control unit (460) is configured to detect a need to allocate information transfer capacity to the mobile station (170).

20. A mobile communication system as claimed in claim 18, **characterized** in that the mobile station (170) is configured to detect a need for allocating information transfer capacity to the mobile station (170).

21. A mobile communication system as claimed in claim 18, **characterized** in that the base station (142) is configured to use a different physical radio channel in the service site (420) than that used in the cell (410).

22. A mobile communication system as claimed in claim 18, **characterized** in that the base station control unit (460) is configured

BNSDOCID: <WO____2004006602A1_I_>

to decrease the transmit power of the mobile station (170) connected to the remote station (440) to a predetermined level.

23. A mobile communication system as claimed in claim 18, **characterized** in that the base station control unit (460) is configured to control the transmit power of the remote station (440) according to the information transfer capacity requirement of the mobile station (170) connected to the remote station (440).

24. A mobile communication system as claimed in claim 18, **characterized** in that the base station control unit (460) is configured to determine the location of the mobile station (170).

25. A mobile communication system as claimed in claim 18, **characterized** in that the base station (142) is configured to connect the mobile station (170) to the remote station (440) as the mobile station (170) is located within the operating range of the remote station (440).

26. A mobile communication system as claimed in claim 18, **characterized** in that the base station (142) is configured to the disconnect the mobile station (170) from the remote station (440) according to the information transfer capacity requirement of the mobile station (170).

27. A mobile communication system as claimed in claim 18, **characterized** in that the base station (142) is configured to the disconnect the mobile station (170) from the remote station (440) whenever the mobile station is located outside the operation range of the service site (420).

28. A mobile communication system as claimed in claim 18, **characterized** in that the base station control unit (460) is configured to provide the mobile station (170) with accessibility information of the service site (420).

29. A mobile communication system as claimed in claim 18, **characterized** in that the base station control unit (460) is configured to provide the user of the mobile station (170) with guidance information to the service site (420).

30. A mobile communication system as claimed in claim 18, **characterized** in that the mobile station (170) is configured to indicate the location information of the service site (420) to the user.

31. A mobile communication system as claimed in claim 18, **characterized** in that the mobile communication system further com-

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00364

prises means (450) for informing the user about the location of the service site (420).

32. A mobile communication system as claimed in claim 18, **characterized** in that the base station (142) is configured to confine the operating range of the service site (420) according to the free path of the mobile station (170).

33. A mobile communication system as claimed in claim 18, **characterized** in that the base station (142) is configured to confine the operating range of the service site (420) to half a meter from the remote station (440).

34. A mobile communication system as claimed in claim 18, **characterized** in that the base station (142) is configured to confine the operating range of the service site (420) to a line-of-sight range from the remote station (440).

35. A mobile communication system as claimed in claim 18, **characterized** in that the remote station (440) is configured to confine the transmit power to 10 nW.

36. A mobile communication system as claimed in claim 18, **characterized** in that the main station (224) comprises means (212, 214, 216, 218) for transmitting traffic from the remote station (440) and for receiving traffic at the remote station (440).

37. A mobile communication system as claimed in claim 18, **characterized** in that the main station (224) comprises means (210) for controlling the remote station (440).

38. A mobile communication system as claimed in claim 18, **characterized** in that the base station (142) comprises means (430) for transferring signals between the main station (224) and the remote station (440).

39. A mobile communication system as claimed in claim 18, **characterized** in that the remote station (440) comprises means (320, 330) for radio transmission and reception.

40. A mobile communication system as claimed in claim 18, **characterized** in that the remote station (440) comprises means (350) for signal processing.

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41. A mobile communication system as claimed in claim 18, **characterized** in that the remote station (440) comprises means (350) for storing information.

42. A mobile communication system as claimed in claim 18, **characterized** in that the remote station (440) comprises means (320, 330) for beam forming.

43. A mobile communication system as claimed in claim 18, **characterized** in that the remote station (440) comprises a control unit (360) for controlling local functions of the remote station (440).

44. A mobile communication system as claimed in claim 18, **characterized** in that the remote station (440) comprises leaky cables for forming an elongated radiation pattern.

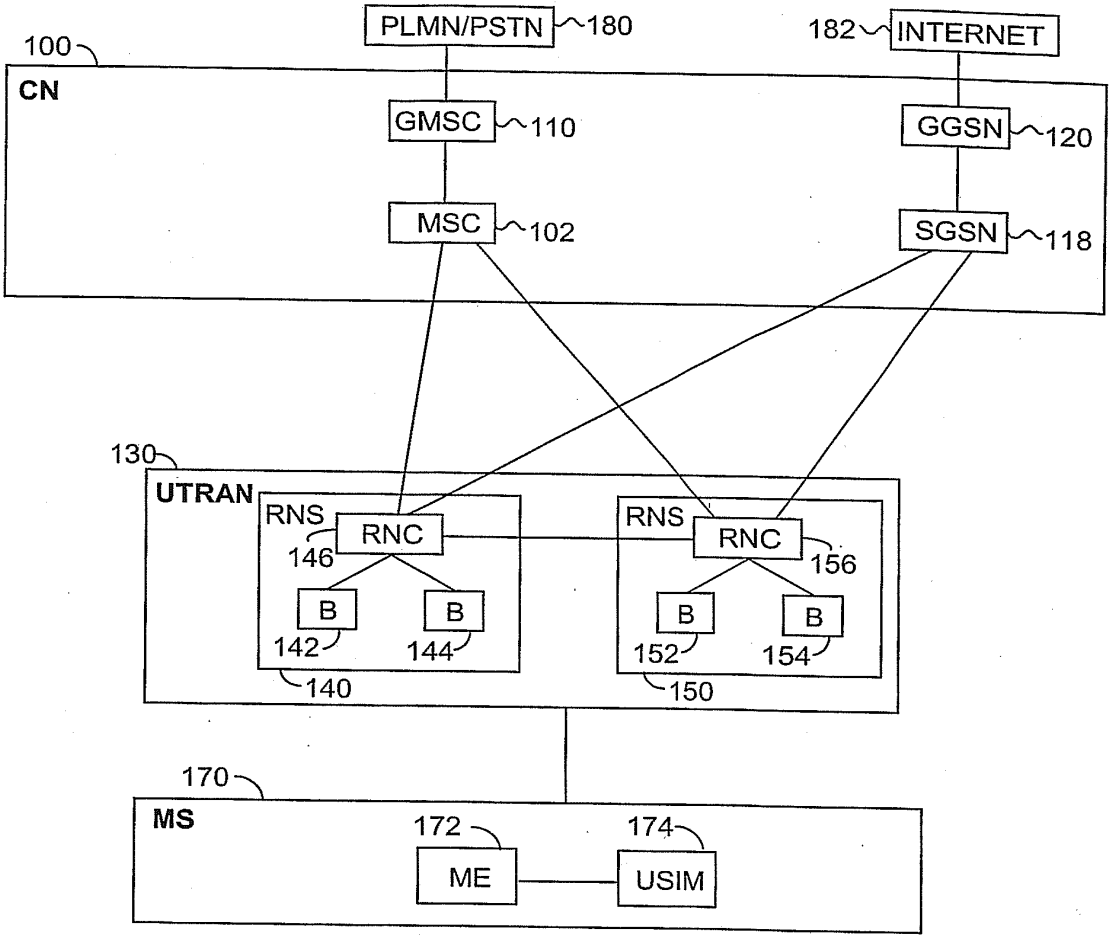


Fig. 1

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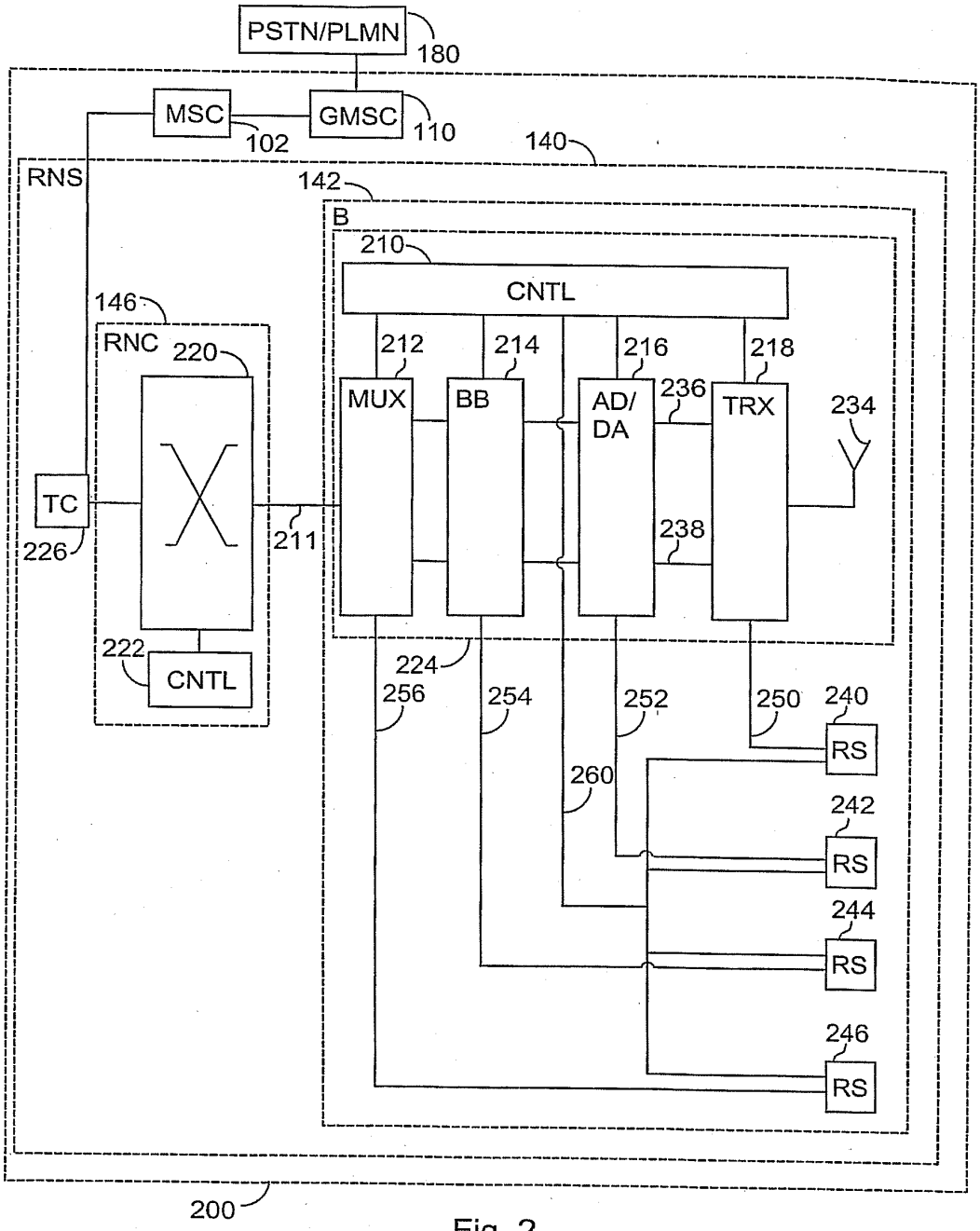

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BB
AD/
DA
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Fig. 2

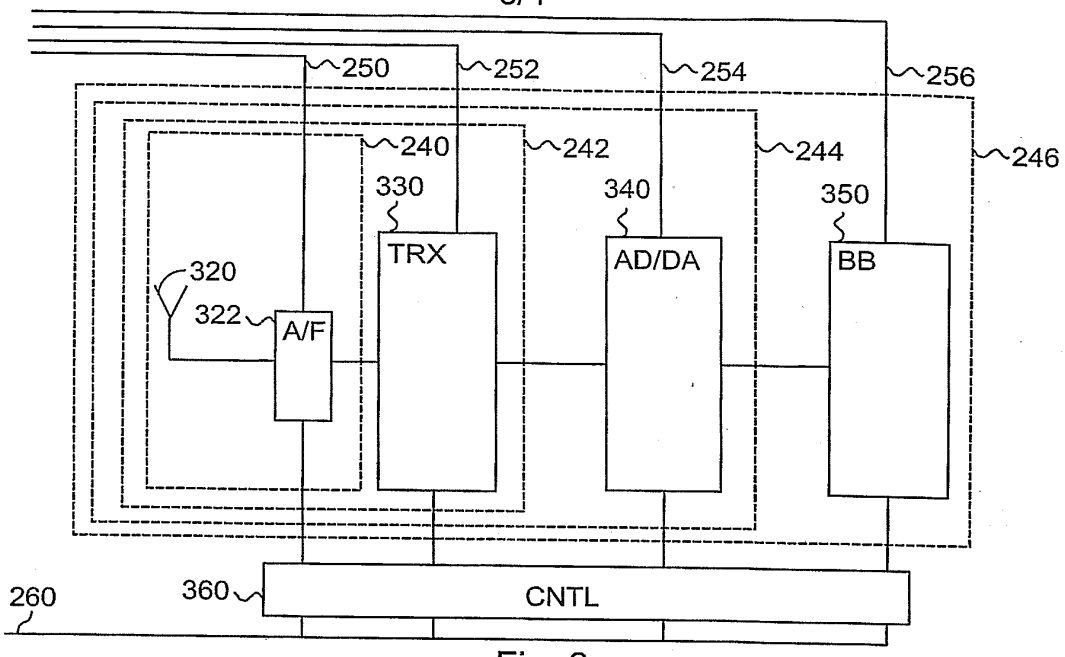


Fig. 3

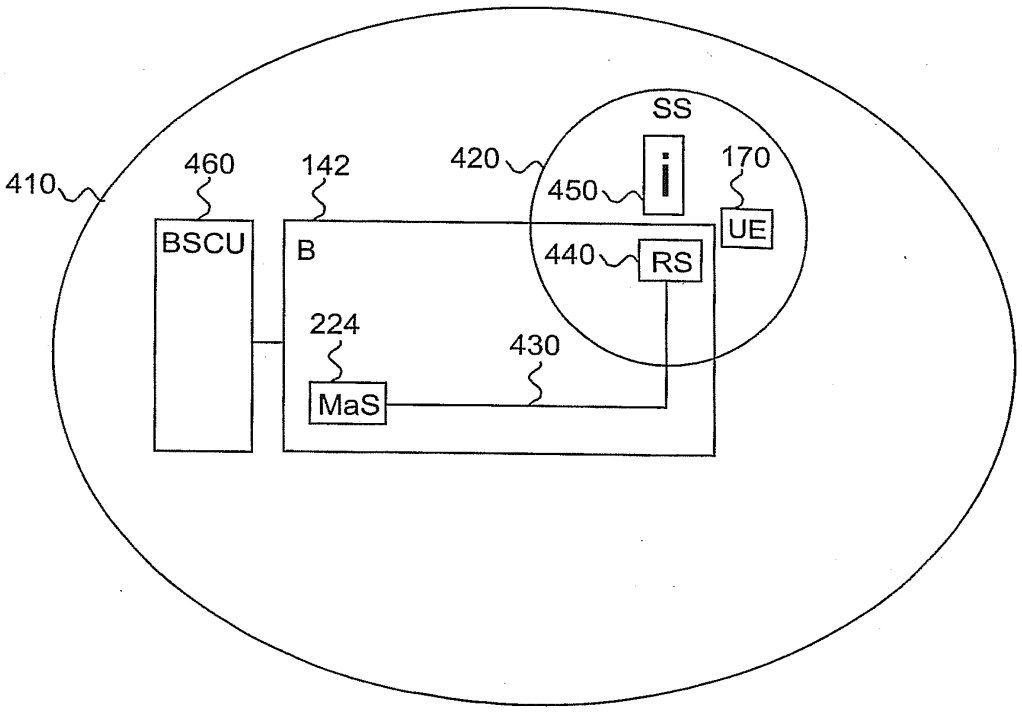


Fig. 4

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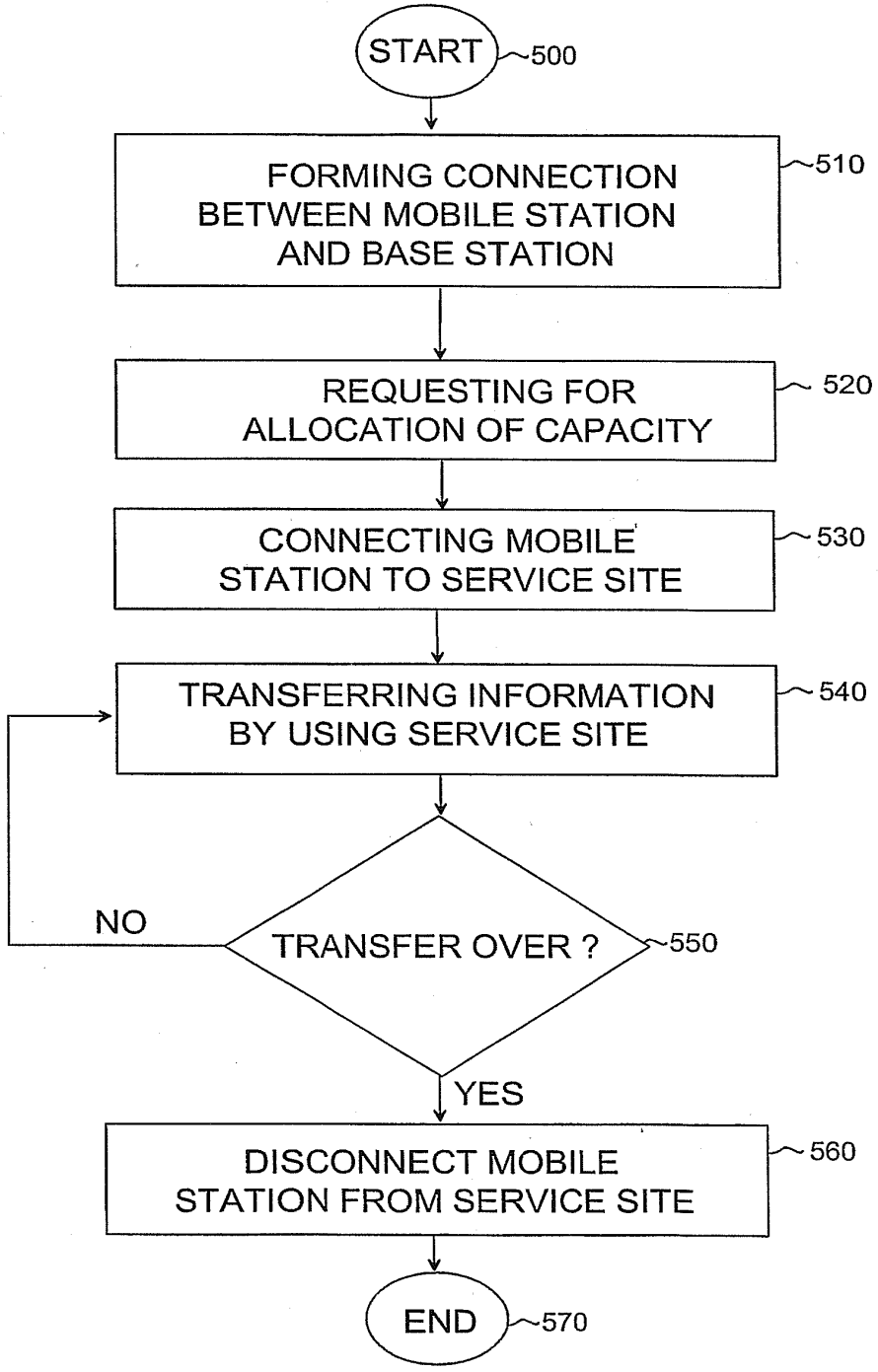


Fig. 5

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 02/00603

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/36, H04B 7/26
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q, H04B

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

SE,DK,FI,NO classes as above

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1217852 A1 (NTT DOCOMO, INC.), 26 June 2002 (26.06.02), column 2, line 33 - column 3, line 30; column 5, line 52 - column 6, line 36, figure 4 --	1,2,4,7,15, 17-20,26,32, 34,36-43
A	WO 0217107 A1 (COMSAT CORPORATION), 28 February 2002 (28.02.02), abstract --	1-44
A	WO 0174096 A2 (SOMA NETWORKS, INC.), 4 October 2001 (04.10.01), page 3, line 17 - page 4, line 23 --	1-44
A	WO 0163851 A1 (NOKIA NETWORKS OY), 30 August 2001 (30.08.01), page 5, line 18 - page 7, line 22 --	1-44

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

* Special categories of cited documents:
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 February 2003	07 -02- 2003
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Stefan Hansson /OGU Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1998)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

30/12/02

International application No.
PCT/FI 02/00603

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1217852 A1	26/06/02	CN 1360446 A	24/07/02
		JP 2002199435 A	12/07/02
		US 2002082021 A	27/06/02
WO 0217107 A1	28/02/02	AU 8465301 A	04/03/02
WO 0174096 A2	04/10/01	AU 4399001 A	08/10/01
WO 0163851 A1	30/08/01	AU 1152901 A	08/05/01
		AU 4058601 A	03/09/01
		EP 1258117 A	20/11/02
		GB 0004088 D	00/00/00

BNSDOCID: <WO 2004006602A1_I_>

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United Kingdom

(51) INT CL[7]
H04Q 7/30

(52) UK CL (Edition R)
H4L LECY

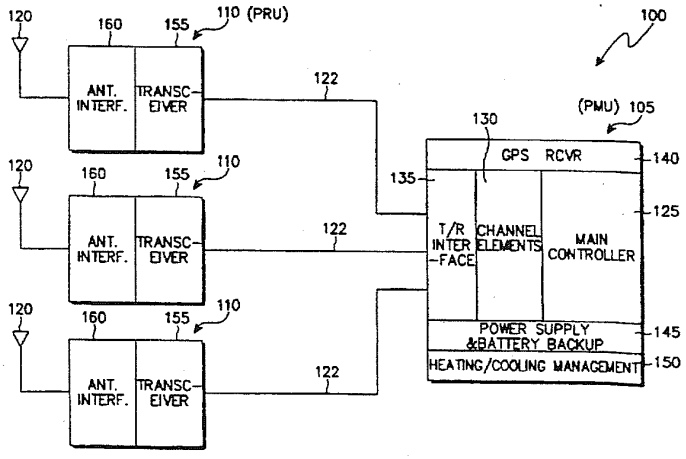
(56) Documents Cited
EP 0938241 A2 EP 0749252 A2 EP 0600681 A1
WO 99/44297 A2 WO 96/27269 A1 JP 050292002 A
US 5768685 A US 5680438 A

(58) Field of Search
UK CL (Edition R) H4L LDDSX LDRS LECY LEQF
INT CL[7] H04Q 7/30 7/36
ONLINE: WPI, PAJ, EPODOC

(54) Abstract Title
Base station transceiver subsystem

(57) A base station transceiver system is divided into at least one remotely located radio unit 110 and a main unit 105. The main unit and radio units are connected together by coaxial cables 122, and communicate using IF or baseband signals which results in lower power losses through the cable than would be the case for higher frequency signals. The main unit comprises: a main controller 125 which may communicate with a base station controller, channel elements 130 for modulating and demodulating CDMA signals, a transmit/receive interface connected to the channel elements, GPS receiver 140 which provides accurate clock and frequency signals to the controller, as well as power supply 145 and temperature control subsystems 150. The radio units comprise transceiver circuitry 155, and antenna interfaces 160 which may include low noise amplifiers which provide amplified signals for the antennas 120.

FIG.13

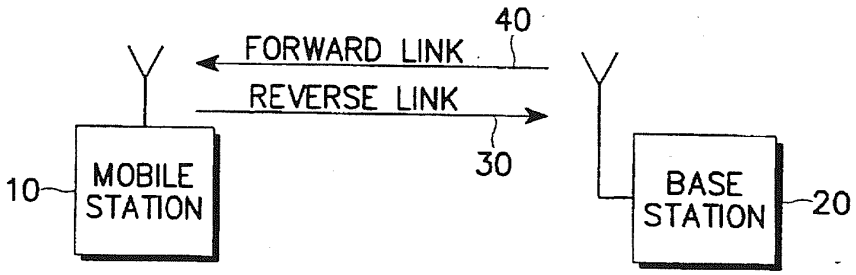


At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

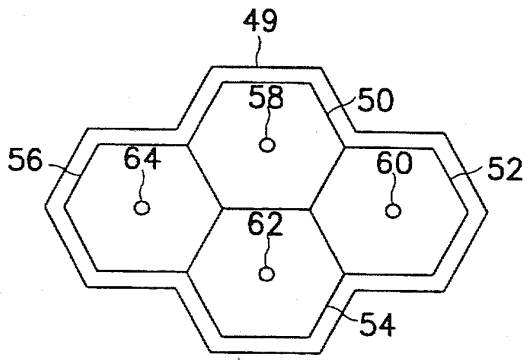
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(PRIOR ART)

FIG.1

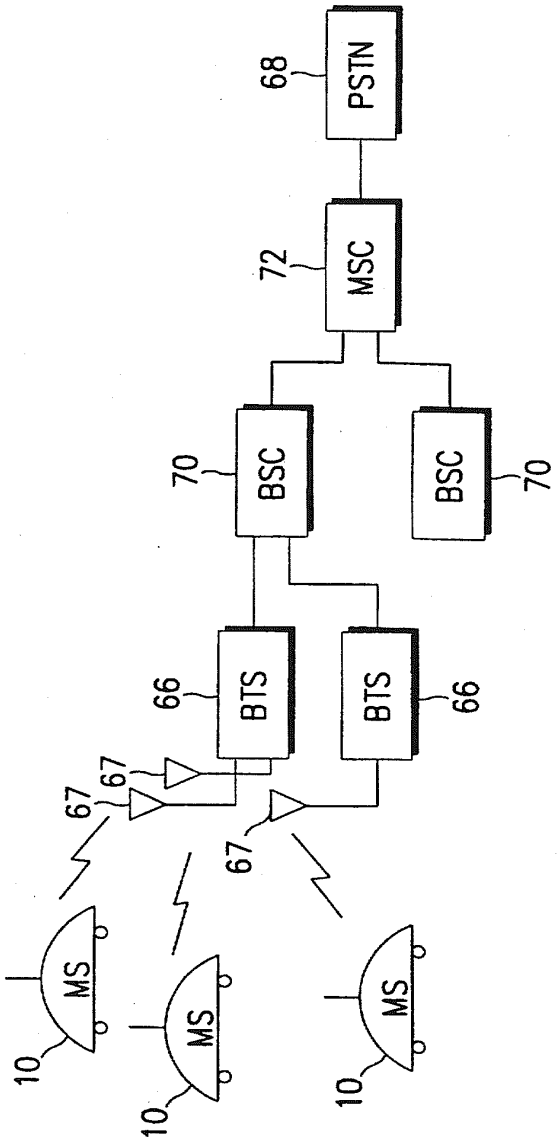


(PRIOR ART)

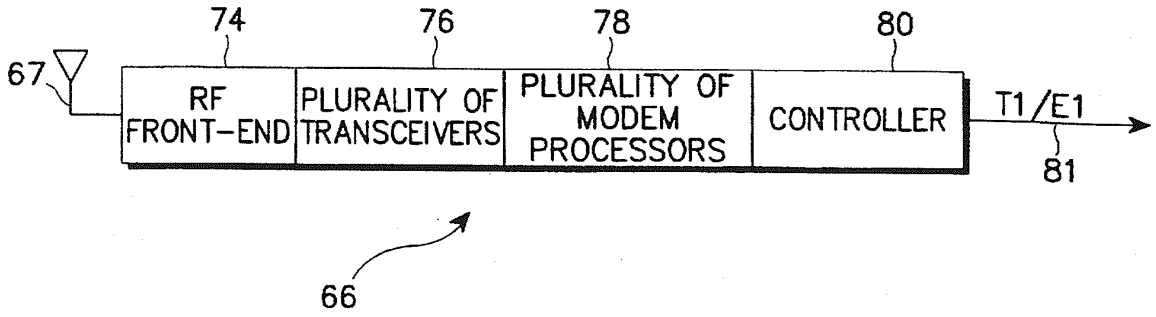
FIG.2

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FIG.3
(PRIOR ART)

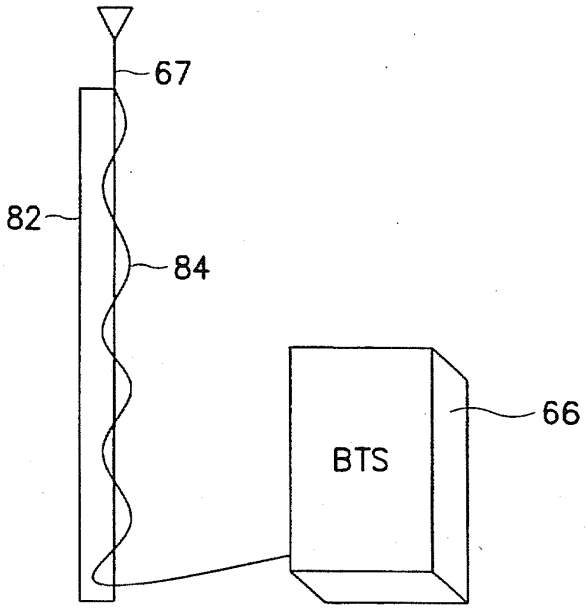


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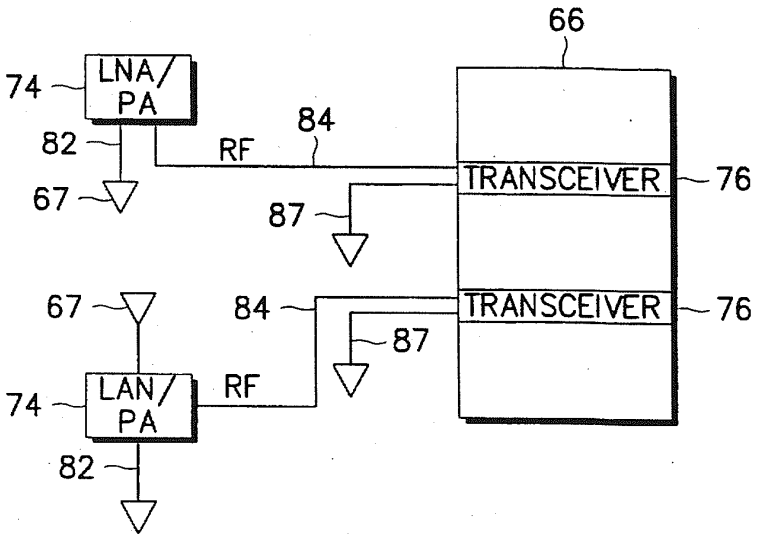


(PRIOR ART)
FIG.4

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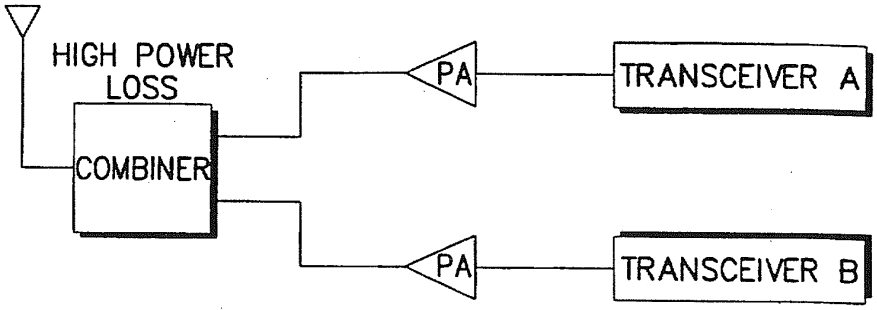


(PRIOR ART)
FIG.5

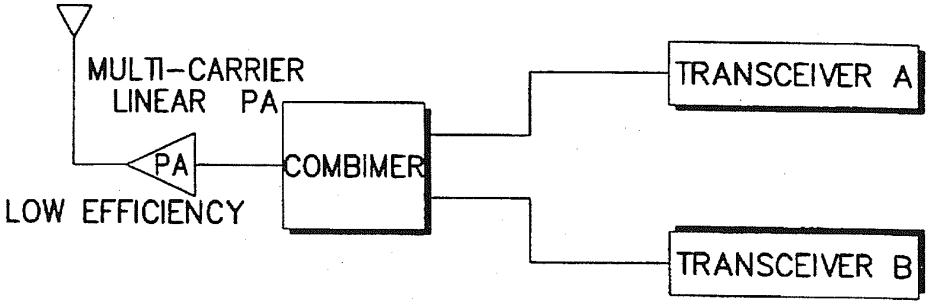


(PRIOR ART)
FIG.6

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(PRIOR ART)
FIG.7



(PRIOR ART)
FIG.8

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PICO-BTS ACRONYMS

ACRONYM	FULL NAME
A/D.....	ANALOG TO DIGITAL
AIF.....	ANTENNA INTERFACE
ASIC.....	APPLICATION SPECIFIC INTEGRATED CIRCUIT
BBU.....	BATTERY BACKUP UNIT
BSC.....	BASE STATION CONTROLLER
BSM.....	BASE STATION MANAGER
BTS.....	BASE TRANSCEIVER SUBSYSTEM
CDMA....	CODE DIVISION MULTIPLE ACCESS
CE-BIT...	CHANNEL ELENENT BUILT-IN TEST
CP.....	COMMUNICATION PROCESSOR
D/A.....	DIGITAL TO ANALOG
DCP.....	DATA COLLECTION PC
DSP.....	DIGITAL SIGNAL PROCESSOR
FPGA....	FIELD PROGRAMMABLE GATE ARRAY
MAP.....	MAINTENANCE AND ADMINISTRATION PC
MCU.....	MICRO-CONTROLLER UNIT
MPU.....	MICRO-PROCESSOR UNIT
MSC.....	MOBILE SWITCHNG CENTER
MTTF.....	MEAN TIME TO FAILURE
MTTR.....	MEAN TIME TO REPAIR
PCC.....	PICO-BTS CHANNEL CARD
PCCM....	PICO-BTS CALL CONTROL MANAGER
PCEM....	PICO-BTS CHANNEL ELEMENT MANAGER
PCM.....	PICO-BTS CONFIGURATION MANAGEMENT
PCRM.....	PICO-BTS CALL RESORUCE MANAGER
PFM.....	PICO-BTS FAULT MANAGEMENT
PLD.....	PROGRAM LOAD DATA
PMCC....	PICO-BTS MAIN CHNNEL CARD
PMU.....	PICO-BTS MAIN UNIT
PPM.....	PICO-BTS PERFORMANCE MANAGEMENT
PRU.....	PICO-BTS RADIO UNIT
PSA.....	POWER SYSTEM TSSEMBLY
PSLM.....	PICO-BTS SOFTWARE LOAD MANAGEMENT
PSM.....	PICO-BTS SECURITY MANAGEMENT
PTM.....	PICO-BTS TEST MANAGEMENT
RISC.....	REDUCED INSTRUCTION COUNT
SCC.....	SERIAL COMMUNICATIONS CONTROLLER
TFC.....	TIME AND FREQUENCY CARD
TRIC.....	TRANSMIT AND RECEIVE INTERFACE CARD
UART.....	UNIVERSAL ASYNCHRONOUS RECEIVER TRANSCEIVER
XCVR.....	TRANSCEIVER

FIG.9

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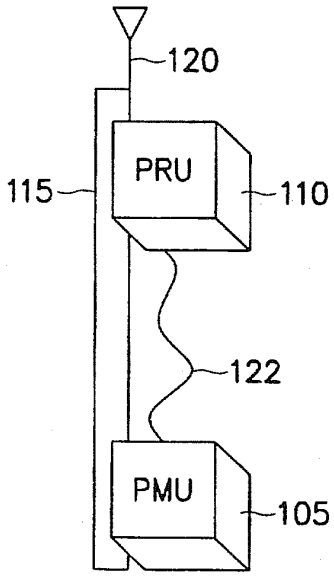


FIG. 10

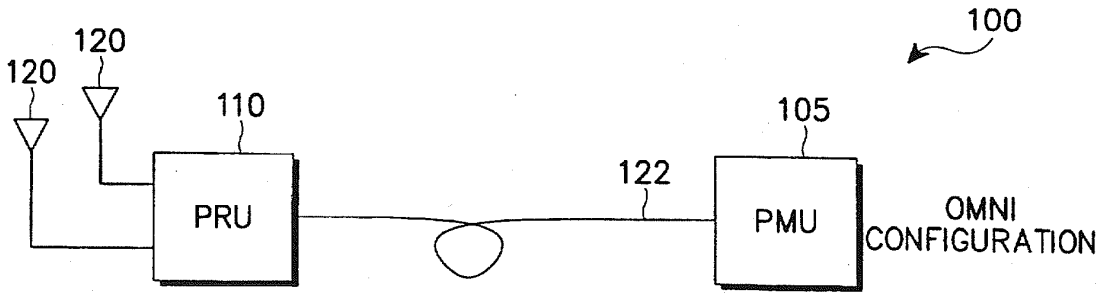


FIG. 11

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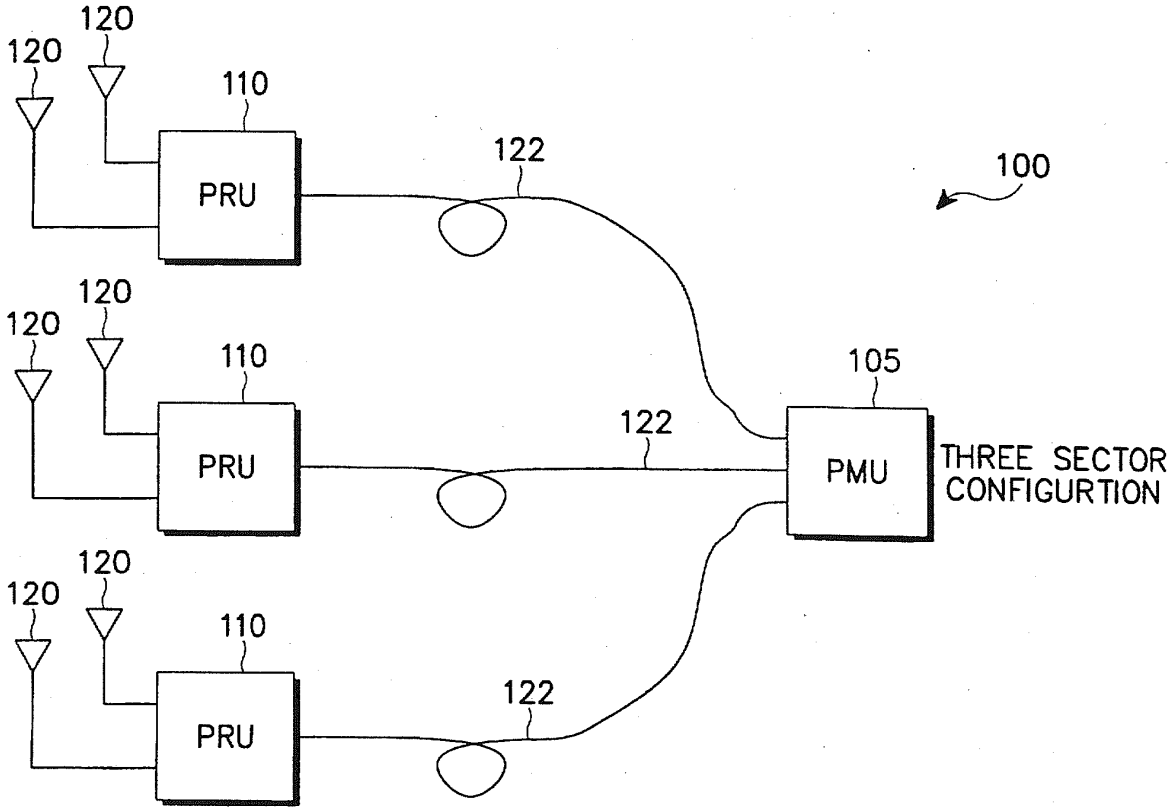
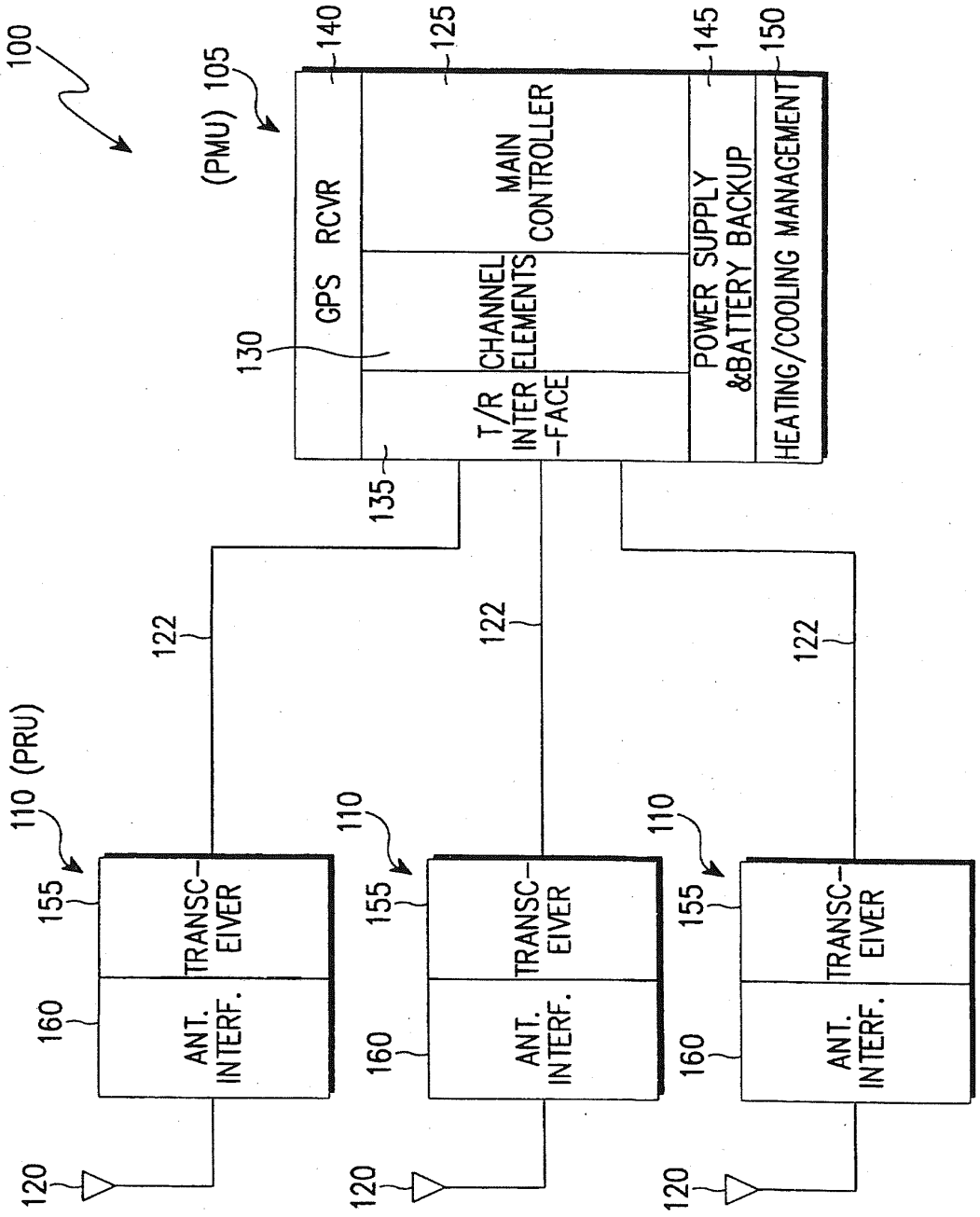


FIG.12

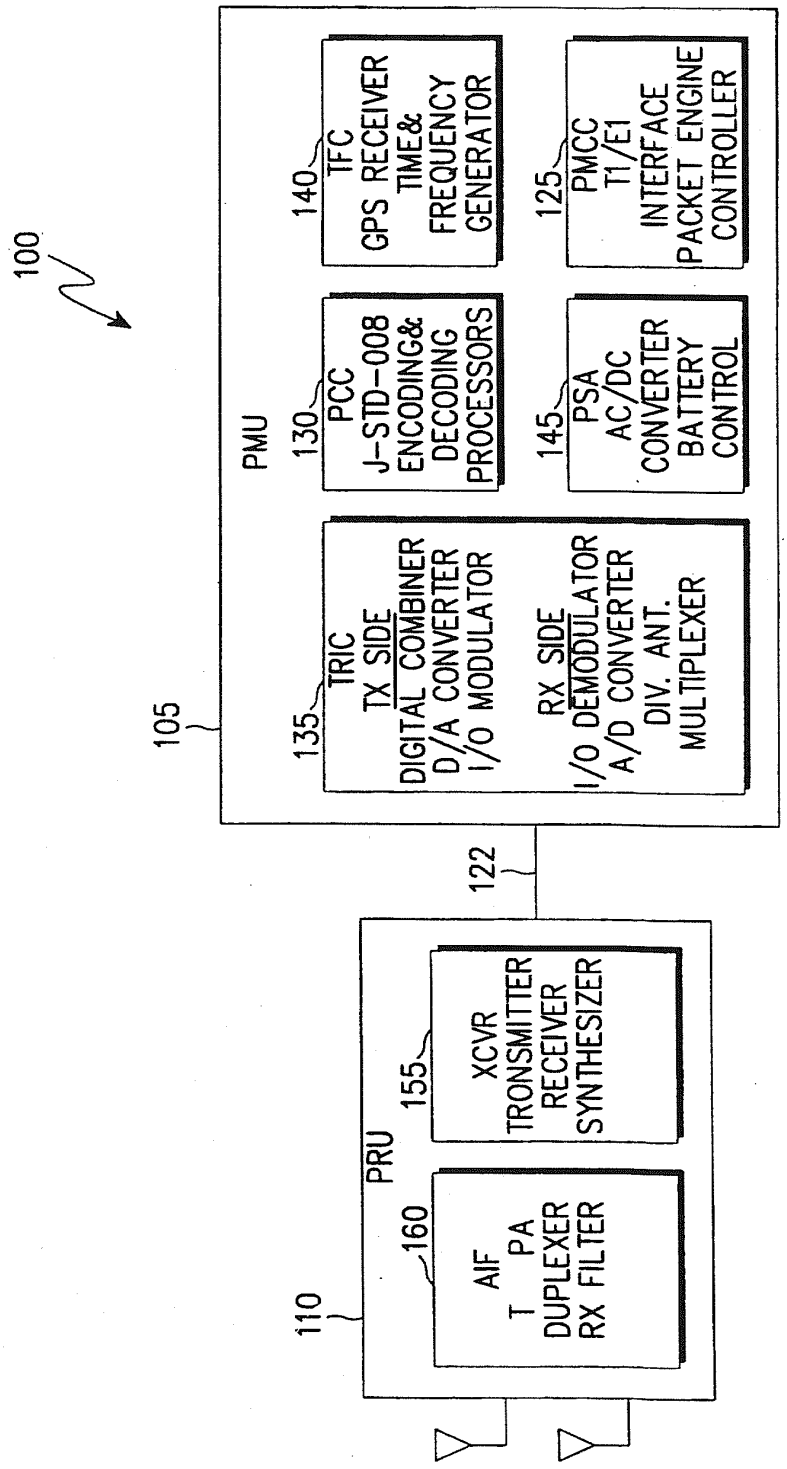
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FIG. 13



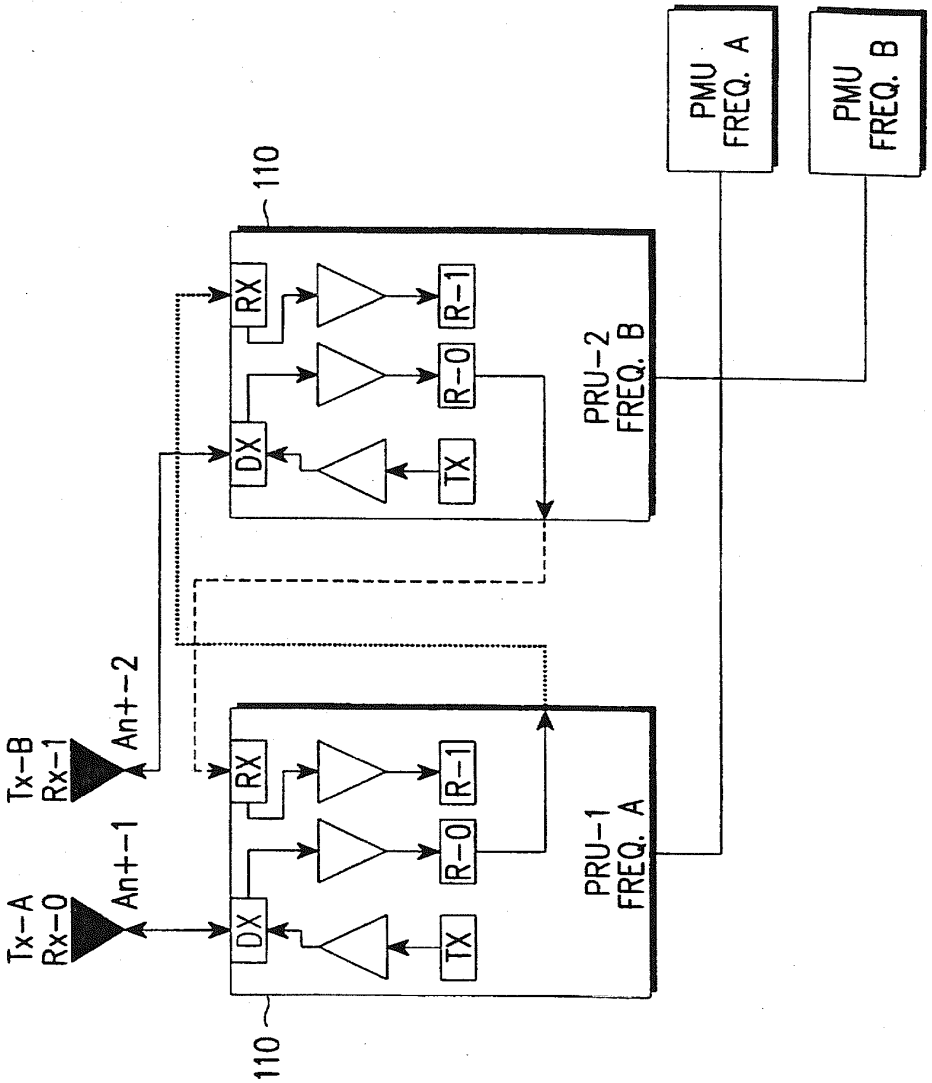
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FIG. 14



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FIG.15



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A BASE STATION TRANSCEIVER SUBSYSTEM

The present invention generally relates to wireless communication systems and, more particularly, to base station transceiver subsystems used in a Code Division Multiple Access (CDMA) network.

Figure 1 (prior art) is a block-flow diagram which graphically represents a wireless communication system. From figure 1 it is seen that a wireless communication system comprises a mobile station 10, a base station 20, a reverse link 30 which represents the electromagnetic wave communication link transmitted from mobile station 10 to base station 20 and a forward link 40 which represents the electromagnetic wave communication link transmitted from base station 20 to mobile station 10.

Figure 2 (prior art) shows a cell grid and cell sites. In a wireless communication system based on the cellular principle, a service area 49 is divided geographically, into a number of small areas 50, 52, 54, 56 called "cells." In each cell there is a cell site 58, 60, 62, 64 where radio equipment known as a Base Station Transceiver Subsystem (BTS) is installed. Multiple cell layouts such as macro cells, micro cells, and Pico cells can be provided within a particular geographical area to effect hierarchical coverage (where macro cells provide the largest coverage and Pico cells the smallest). Pico cells may be used to provide coverage inside buildings, to cover a special area (campus, stadium, airport and shopping mall), to temporarily cover for special events or areas hit by natural disasters, to cover outlying remote locations, to supplement macro or mini cells with hole-filling, or to enhance the capacity of hot spots.

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Figure 3 (prior art) is a block diagram of a wireless system network connected to a land line Public Switched Telephone Network (PSTN) 68. As shown in figure 3, a BTS 66 provides a link to mobile subscribers or (mobile stations) 10. Each BTS 66 typically may include two or more antennas 67, which may be omni antennas or directional antennas. Omni antenna configurations provide 360° of coverage, whereas directional antennas provide less than 360° of coverage across an area known as a sector. For example, there may be two or three sectors in a typical directional configuration such that each sector of a two sector configuration generally provides 180° of coverage and each sector of a three sector configuration generally provides 120° of coverage. For satisfactory reception and transmission, each sector typically requires at least two antennas for diversity reception.

Continuing with the description of figure 3, each BTS 66 is coupled to a Base Station Controller (BSC) 70 (multiple BTSs 66 may be coupled to a single BSC 70). Likewise, each BSC 70 is coupled to a Mobile Switching Center (MSC) 72 and the MSC 72 is in turn coupled to a PSTN 68.

Figure 4 (prior art) is a functional block diagram of a BTS. As shown in figure 4, a conventional BTS 66 typically comprises four major functional blocks for each sector of coverage: an RF front-end 74, a plurality of transceivers 76, a plurality of modem processors 78, and a controller 80. Controller 80 interfaces with a BSC 70 over a T1 or E1 line 81, and the RF front-end 74 is connected to the antennas 67 which are typically mounted at the top of a tower or pole 82 as represented in figure 5 (prior art), where figure 5 illustrates an outdoor and

ground based BTS coupled to a tower top mounted antenna.

In a typical system, the four major functional blocks of the BTS 66, shown in figure 4, are contained in one physical cabinet or housing which is in close proximity to a pole (or tower) 82 at ground level. Long coaxial cables 84 are then run to the top of the pole 82 where the antennas 67 are mounted. The cable length typically varies from 50 to 200 feet, depending on various installation scenarios. Cables of these lengths suffer from undesirable power losses. Accordingly, thick coaxial cable diameters of approximately 0.75"(3/4) to 1"(3/2) are used to minimize the cable power loss, which is typically about 2 to 4 dB. Minimizing these power losses is important because such losses in the cables degrade the receiver sensitivity and reduce transmission power.

Figure 5 depicts a prior art BTS unit 66 connected via a long length of cable 84 to an antenna 67 at the top of a supporting structure 82. Figure 6 (prior art) is a block diagram of yet another known BTS architecture were a tower top mounted RF front-end module consists of a Low Noise Amp (LNA) and a Power Amp (PA) 74 (hereinafter LNA/PA unit 74). The cable power loss in this architecture is not as critical as in the previous mentioned architecture because the power loss can be made up with additional amplification. However, there is still a need to use rather thick cables between the LNA/PA unit 74 and the transceiver 76 in the BTS 66 as the signals are high frequency / radio-frequency (RF) signals. Other problems are associated with transmitted RF signals between the LNA/PA unit 74 and the BTS 66, such as power losses, system noise, and mechanical clutter. Furthermore additional complex circuitry either or both

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00387

in the RF front-end module and the transceiver may be required to compensate automatically for the wide range of cable losses that arise in different installation scenarios due to varying cable lengths. Such problems become more severe as the operating RF Frequencies utilise increasingly higher frequency bands. This is the case for personal communications systems such as CPCS.

In other words, as the length of a cable 84 increases, or as the frequency transmitted through a cable 84 increases, power losses between the LNA/PA unit 74 and the BTS 66 increase. Thus, the long cables 84 used to connect the LNA/PA unit 74 to the BTSs 66 (often in excess of 150 feet, sometimes even exceeding 300 feet) introduce large power losses. For example, a 100 W power amplifier in a base station transceiver unit transmits only 50 W of power at the antenna as there is a 3 dB loss in the cable. Power losses in the cable also adversely affect reception by reducing the ability of the receiver to detect received signals. Also, with Personal Communication Systems (PCS) operating at high frequencies, the power loss in the cable 84 running between the LNA/PA unit 74 and the transceiver 76 in the BTS 66 increases. Thus, RF cable losses incurred on both the transmit and receive paths result in poorer than desired transmission efficiency and lower than desired receiver sensitivity, making the use of relatively thick (high conductance) coaxial cables necessary to reduce loss.

Noise generated through ground loops, magnetic coupling, or multi-tower units can cause problems. In these applications, there are usually one or more large coaxial cables which carry RF signals from the antennas 67 to the base station 66. The RF frequencies associated

with such base stations make it difficult to duplex RF signals onto the same coaxial cable, and thus, usually only a single signal is propagated in a single coax cable. Thus, these RF signals are not bundled or duplexed, and therefore require separate cables for each signal and separate connectors for each cable. The RF signal shield of the coax cable 84 is grounded at both ends of the coax cable 84. One end is grounded to the chassis of the BTS, which is grounded to ground 87, whereas the other end of the RF signal shield is grounded through a braid or cable 82 to the chassises of the LNA/PA unit 74. This, unfortunately, creates a ground loop. This ground loop may cause noise in the signal path due to common mode currents adding in phase, and may also cause magnetic coupling. Also, because each tower-top unit generates noise, using multiple tower-top units contributes to noise generation.

In some cell sites where higher capacity is required there is a need to transmit more than one RF carrier signal. The transmission of multiple RF carriers per sector normally would require a corresponding number of transmit antennas per sector, unless a special effort is made to combine multiple RF carriers prior to RF coupling to the antennas. A single set of antennas, per sector, can be shared on the receive side for multiple RF carrier reception.

The conventional technique for reducing the number of transmit antennas required for multiple RF carrier transmission are shown in figure 7 and figure 8. In figure 7 (prior art) the carriers are combined with a high power combiner. In figure 8 (prior art) the carriers are combined at low power and then the combined signal is amplified with a multi-carrier linear power

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00389

amplifier.

Neither design is very suitable for use in a compact BTS system. Thus, there is a need for a BTS system which reduces power loss from the BTS to the antennas and is capable transmitting multiple RF carriers per sector/per antenna.

Accordingly, an aspect of the present invention provides A base station transceiver system for a telecommunication system, the base station transceiver system being divided into at least a radio unit for transmitting and receiving telecommunication signals and which can be connected to a first antenna and a main unit, in communication with the radio unit, an interface for communicating with the radio subsystem and a main controller for communicating with a base station controller, the radio and main units being remotely located and communicating using IF or baseband signals.

Advantageously, since the transmission losses between the radio unit and the main unit are less than the losses between radio unit and an antenna, a more efficient system can be realised.

An embodiment of the present invention provides a BTS having a radio unit (RU) located very near to where antenna(s) are mounted, a main unit (MU) connected to, and remotely located from the RU, and one or more antennas coupled to the RU. There can be multiple RUs connected to one MU, which may operate on the same frequency, or at different frequencies.

Furthermore, an exemplary embodiment of the present invention provides a BTS comprising (a) a MU, having a

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00390

controller module and channel element modules for base band signal processing of CDMA signals, (b) a RU having a transceiver module, and a power amplifier electrically coupled to the transceiver module and antenna, and (c) a MU connected to a RU via a length of cable carrying low frequency signals (e.g.,. baseband and/or IF signals). The transceiver module in the RU may comprise a transmitter circuit, a receiver circuit and a synthesizer circuit, or a low-noise amplifier (LNA) electrically coupled to the transceiver unit module. The antenna interface module may incorporate a duplexer module, or a power amplifier module and a receiver filter module.

Further, the BTS may comprise: (a) a MU having a channel element module which provides the interface for connectivity to one of the RUs, and (b) a RU having a transceiver module and an antenna interface module.

In addition, the main unit module may further comprise a power system assembly (power supply and battery backup), a time and frequency module, and a temperature management assembly. The RU may also comprise a local controller module and a DC conversion and regulator module. The transceiver module may further comprise transmitter circuitry and two receiver circuits for diversified reception. Furthermore, the RU may incorporate an antenna interface module which may comprise receive filter circuitry and a duplexer circuitry comprising a transmit and receive filter circuit(s) combined into a single cavity.

The present invention provides a BTS consisting of up to three RUs and a MU, whereby the RUs can be remotely located from the MU. The RU primarily comprises a transceiver and an RF front-end. The transceiver, in

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00391

turn, comprises an up-converter, down-converter, a synthesizer, a low-noise amplifier and transmit amplifiers. Additionally, the RU comprises an antenna interface unit consisting of a duplexer, a receiver filter and a power amplifier. The MU comprises up to four channel cards, an interface card to RUs, a controller card, a time and reference frequency card, a power system assembly, and a heat management assembly.

The architecture of embodiments of the invention, in essence, separates those of RF elements and dependent elements thereof, which reside in the RU, where there is one RU per sector, from the base band elements and other commonly shared elements thereof, which reside in the MU, supporting up to three RUs.

There are many advantages to this architecture and some of them are as follows.

It results in a compact size RU which can be easily mounted close to the antennas, whereby the cable loss is virtually eliminated. Cable losses degrade the receiver sensitivity and reduce the transmit power. The present invention, thus, allows a relatively low power PA to be used and provides a transmit power level equivalent to a higher power PA used with a conventional BTS.

The inclusion of the transceiver in the RU allows a lower frequency interface, all the way down to DC, rather than RF interface typically used in the prior art, to the MU. The lower frequency interfaces mean low loss in the cable and this allows the use of inexpensive and small diameter interconnect cables between the RUs and the MU.

The separation of RF elements and dependent elements

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00392

thereof, also, results in easier adaptation of the BTS design to support different RF operating environments or conditions, such as different frequency bands and different transmission power levels, as only the RU needs to be modified, while the same MU is used. This also results in a compact size MU for ease of handling and mounting, since less space required without the RF elements and, at the same time, less heat load in the MU for cooling.

This architecture also allows the BTS to be configured to support either omni or sector antennas, or to be upgraded from omni to sector operations as the traffic demand increases. This is especially important in CDMA systems where soft handoffs need to be supported between the sectors. For an omni configuration, only one RU is needed. For two or three sector configurations, two and three RUs are needed, respectively. The three RUs can be operated on the same frequency in a three sector configuration or at different frequencies in a three carrier omni configuration.

The present invention also allows the connectivity of another set of three RUs connected to its own MU to the same antennas without the use of a combiner.

Some advantages, features and similar features of the present invention are as follows:

1. By locating the transceiver module in the RU, the only low frequency signals can be passed from the transceiver module to the MU. On the receive side, the transceiver module converts a high frequency signal to a low frequency signal, and on the transmit side, the transceiver module converts a low frequency signal from

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00393

the MU to a high frequency signal for transmission. Thus, only relatively low frequency signals are passed between the RU and MU, minimizing power loss in the cables connecting the two units. This results in the ability to use smaller diameter, less costly cables.

2. As the synthesizers are located remotely from the channel processing elements, and ground loops are eliminated, the signals being transmitted and received are subject to far less noise than conventional systems.

3. Another advantage to removing the transceiver subsystem from the MU is that the resulting MU is physically much smaller in size and weighs less. This translates into easier installation and maintenance, as well as into flexibility in meeting the technical demands of a challenging operating assignment or challenging environmental considerations. In addition, smaller size and lighter weight BTSs are especially advantageous for Pico-cell applications or micro-cell applications where a greater number of BTSs are required than are needed for macro cell implementations.

4. With the entire transmit functionality contained in the RU, the RU receives only a baseband signal for transmitted data and performs all of the up-conversion and amplification at the RU. This eliminates the need for transmitting high loss RF signals to the RU, and allows the RU to operate at a higher efficiency than a unit in which the RF signal must travel the length of the pole.

5. As all up-conversion is performed in the RU, direct modulation reduces the complexity of the transmit signal line, and provides a significant cost reduction

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00394

over systems that an RF transmit signal up the pole and then up-convert again to RF. Far less RF components are required in the present invention than in the prior art.

6. Output power calibration can be done at the factory and the RU can be programmed for use with any MU. The RU will store full-power settings, as well as reduced power settings, in local memory thus enabling cell size adjustment from the RU, instead of at the BTS.

7. Increased or decreased attenuation can be accomplished in the RU rather than in the BTS.

8. Detection of power control is performed in the RU and, more importantly, can be used to verify the integrity of the entire signal transit path. Previously, in units where the PA is mounted on the pole, the output power attenuation could be detected, but the operator could not determine if the problem was in the PA module or the MU.

9. System upgrades can be accomplished more easily as entire RUs or MUs can be replaced. In addition, because like elements are configured together, board or device level upgrades are also more easily accomplished than with traditional BTS units.

These and other advantages of the present invention will become apparent to one of ordinary skill in the art after consideration of the figures and detailed description which follows hereinafter.

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00395

figure 1 depicts a prior art wireless communication system architecture;

figure 2 is a graphical representation of a prior art cell grid and cell sites.

figure 3 is a block diagram of a prior art base station system (BTS) shown connected to a land-line PSTN;

figure 4 is a functional block diagram of a prior art BTS;

figure 5 is an illustration of a prior art ground based BTS coupled to a tower top mounted antenna;

figure 6 is a block diagram of a prior art tower top configuration;

figure 7 is a block diagram illustrating the prior art combiner method for using one antenna to support multiple transceivers;

figure 8 is a block diagrams illustrating the prior art combiner/multi-carrier method for using one antenna to support multiple transceivers;

figure 9 is a list of Pico-BTS acronyms utilized throughout the present application;

figure 10 illustrates a base station system according to an embodiment of the present invention coupled to a pole-mounted antenna;

figure 11 is a block diagram illustrating a base station transceiver subsystem architecture according to an embodiment of the present invention for an omni configuration;

figure 12 is a block diagram illustrating a base station transceiver subsystem architecture according to an embodiment of the present invention for a three sector configuration;

figure 13 is a functional block diagrams of a BTS architecture according to an embodiment of the present invention, with selected subsystems shown;

figure 14 is a modular level block diagram of an

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00396

exemplary BTS; and

figure 15 is a block diagram of an alternate embodiment of the present invention of the transceiver/RF front-end module that accommodates two antennas.

In the description which follows, an exemplary preferred embodiment of the invention is described for a Pico base station transceiver subsystem architecture (figure 9 provides a list of Pico-BTS acronyms utilized throughout this application, and which are familiar to those skilled in the art). However, it will be understood that the present invention may be applied to any base station transceiver subsystem architecture in a wireless communication system, including, but not limited to, macro and micro base station transceiver subsystems.

Figure 10 illustrates the basic idea underlying a base station transceiver subsystem (BTS) architecture according to an exemplary embodiment of the present invention. The BTS is separated into two units, the Pico-BTS Radio Unit 110 and the Pico-BTS Main Unit 105. The Pico-BTS comprises the Pico-BTS architecture 100 which is divided into the Pico-BTS Main Unit ("Main Unit System" PMU or MU) 105 which may be located, as shown, at the base of a pole, tower, or other support structure 115, and the Pico-BTS Radio Unit ("Radio Unit System" PRU or RU) 110, which transmits and receives signals through at least one pole-mounted antenna 120, and communicates with the PMU 105 via a plurality of wires 122 which may include a coax cable.

An embodiment of the present invention is illustrated in a high-level block diagram as an omni configuration in Figure 11. PRU 110 can be distally connected to the PMU via wires or cables 122. The

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00397

distance or separation between the PRU 110 and the PMU 105 can be from approximately 5 feet to more than 350 feet (current systems are typically separated by about 150 feet). This is adequate since the PMU 105 is designed to be placed at the bottom of a tower building, pole or other supporting structure 115 and the PRU 110 is to be placed at the top of the tower building, pole or other supporting structure near the antenna(s). To transmit and receive signals, the PRU 110 is shown coupled to one of the, but, tower top mounted antennas 120. However, the PRU 110 is typically coupled to at least two antennas.

The wires or cables 122 can include optical cables between the PMU 105 and the PRU 110. Optical cables will increase the distance allowable between the PMU and RMU because an optical signal is less lossy than an electrical signal in, for example, a coaxial cable.

Figure 12 illustrates a BTS architecture according to an exemplary embodiment of the present invention for a three sector configuration. Note that the hardware systems which are required to be duplicated are only duplicated in the PRU 110. Thus, the PMU is capable of interfacing with 1, 2, 3 or potentially more PRU's.

Figure 13 is a block diagram illustrating exemplary elements of the PRU 110 and the PMU 105. It can be seen that the PRU 110 is composed of a transceiver module 155 which is coupled to the antenna interface assembly 160. The antenna interface assembly 160 is coupled to the antennas 120.

The PRU 110 is coupled to the PMU 105 through a set of cables 122 which terminate in the PMU 105 at the

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00398

Transmit and Receive interface 135 (T/R interface), which is coupled to the channel elements 130. The channel elements 130 are where the CDMA signal is modulated and demodulated. The PMU 105 may also contain a global positioning receiver 140 which provides accurate clock and frequency signals to a main controller module 125, the channel elements 130, the T/R interface 135, and the PRU(s). Also within the PMU 105 is a power system 145, and a temperature control subsystem 150. Figure 14 provides additional detail of the PRU 110 and PMU 105 subsystems. As shown in figure 14, each PRU 110 essentially comprises two modules: a transceiver module 155 (XCVR) and antenna interface module 160 (AIF). These modules, however, can be combined into one module.

Accordingly, the antenna interface module 160 may include a transmit power amplifier (PA) which amplifies the signal to a level required for desired cell coverage, two low-noise amplifiers (not shown) for amplifying received signals to increase receiver sensitivity, a duplexer module for transmitting to and receiving from a single antenna, and a receiver filter (Rx). The transceiver module 155 may include synthesizer circuitry, transmitter circuitry, and two receiver circuits (it is common to refer to a system's transmitter and receiver circuitry collectively as a "transceiver").

The PRU 110 also includes a microprocessor and non-volatile memory (not shown) to store calibration data and provide real-time temperature operating parameter compensation to the transceiver. Thus, a mobile station or mobile simulator is not needed for calibration, and system calibration in the field is also no longer needed.

PRU 110 preferably houses the duplexer and the

receive filter in a common cavity. This is essentially three filters (two receive and one transmit) combined into one aluminium cavity. By combining the prior art duplexer cavity with the prior art diversity receive cavity, valuable space inside the unit may be used for other circuitry and cost is further reduced.

In the preferred exemplary embodiment, the duplexer/receiver filter cavity of PRU 110 is designed so that the connectors on the filter protrude directly through the cover of the unit, eliminating any coaxial cable bulkhead connectors. This approach requires fewer parts in the unit, again saving valuable space and reducing cost.

As illustrated in figure 14, the PMU 105 includes six functional subsystems: a Pico-BTS main controller card 125 (PMCC), a Pico-BTS channel card 130 (PCC), a transmit and receive interface card 135 (TRIC), a time and frequency card 140 (TFC), and a power supply assembly 145 (PSA) for converting AC to DC and for distributing the DC power throughout the PMU 105 and the PRU 110. The temperature management subsystem 150 is not shown in figure 14 to simplify the figure.

In operation, the PMCC 125, which includes an external interface module and a communications controller module, often called a packet engine, monitors all of the cards in the BTS architecture 100 and routes traffic and signaling packets between a Base Station Controller (BSC, see figure 3) shown) and the PCCs 130. Likewise, the TRIC 135 provides the interfaces between the transceiver module 155 and the PCCs 130. The TRIC provides the connectivity to the PRU 110 through interconnect cables 122.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00400

Base-band analog signals and intermediate frequency (IF) signals in the frequency range of about 1 kHz to about 700 MHz are propagated in cables 122 connecting PMU 105 with PRU 110. The preferred IF frequency range is 239 MHz with a 1.26 MHz bandwidth and a signal strength of between -50 dBm and -70 dBm. The advantage of this approach is that the modulated signals can be duplexed and sent through a standard, inexpensive RG-58 coaxial cable. Other signals to be carried between the units include 48V power, a 10 MHz reference, and RS-422 control lines.

The separation of the PRU 110 and the PMU 105 allows the PRU 110 to be installed close to the antennas 120. Since in practice power losses in the antenna cable degrade receiver sensitivity and reduce the transmit power at a 1:1 ratio (dB per dB), locating the PRU 110 in close proximity to the antenna 120 increases the performance of the BTS 100. The location of the PRU also reduces power and signal losses through a cable and thereby may save energy.

It is worth noting that all wires and coaxial cables may be bundled into a single polymer jacket. Thus, a single multi-wire/coaxial connector is used at both ends of the cable. The resulting cable is typically built as a unitary item which provides ease of installation and repair in the field. Thus, the cable diameter may easily be kept under 0.75 inches, providing easy installation in the field, as well as in an indoor applications (which require turning corners).

Coaxial cables coming into PRU 110 are transformer coupled to the transceiver, which eliminates the possibility of ground loops (and their corresponding

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00401

ground noise), and ensures that the PRU 110 can be placed up to and in excess of 150 feet away from PMU 105. In addition, if the PRU 110 is connected to a pole or other conductive structure which is grounded, there will be no system performance degradation due to noise coupling. Power, at 24 or 48 VDC or an AC voltage, is sent to the tower top with a separate return. This provides less power loss in the power wires, making the system more efficient.

The signals carried by the cable 122 between PMU 105 and PRU 110 operate efficiently over a range of about 1 kHz to 240 MHz. This results in low signal attenuation, even when using thin, low cost cables.

Figure 15 depicts an exemplary embodiment whereby two PRUs 110 provide an additional means of connectivity such that only two antennas are required with two PRUs for dual frequency carrier operation. As shown, both antennas are connected to the duplexer (DX) ports of the PRUs. In a single RF carrier operation, antenna 1 (Ant-1) would transmit and receive one diversity signal (Rx-0), and the other antenna would receive only the other diversity signal (Rx-1). In a dual carrier operation in either omni or sector configuration, both antennas transmit, i.e., Ant-1 transmits Freq. A from PRU-1 and Ant-2 transmits Freq. B from PRU-2, and at the same time both antennas receive one diversity signal each. One receive diversity signal Rx-0 is received and the other receive diversity signal Rx-1 comes from the other antenna Ant-2 indirectly through the other PRU after it has been pre-amplified to increase or maintain the receive sensitivity. This diagram does not necessarily reflect the actual implementation, as there can be many different possibilities with different advantages and

disadvantages. This technique thus allows the addition of a second RF carrier for higher capacity operation without requiring additional antennas.

While the invention has been particularly shown and described with reference to specific embodiments thereof, it will be understood by those skilled in the art that various changes in form and detail may be made thereto, and that other embodiments of the present invention, beyond embodiments specifically described herein, may be made or practiced without departing from the spirit and scope of the present invention as limited solely by the appended claims.

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CLAIMS

1. A base station transceiver system for a telecommunication system, the base station transceiver system being divided into at least a radio unit for transmitting and receiving telecommunication signals and which can be connected to a first antenna and a main unit, in communication with the radio unit, an interface for communicating with the radio subsystem and a main controller for communicating with a base station controller, the radio and main units being remotely located and communicating using IF or baseband signals.

2. A base station transceiver system as claimed in claim 1, in which a main unit further comprises at least one channel circuit for modulating and demodulating CDMA signals exchanged with the radio unit.

3. A base station transceiver system as claimed in either of claims 1 and 2, in which a main unit further comprises a temperature management system to control heat generated by other components of the main unit.

4. A base station transceiver system as claimed in any preceding claim in which the main unit further comprises a global positioning unit connected to the main controller.

5. A base station transceiver system as claimed in any preceding claim in which the interface can receive demodulated telecommunication signals that were

received and demodulated in the radio unit.

6. A base station transceiver system as claimed in any preceding claim which handles CDMA communications such that the main unit converts land line telecommunication signals to a CDMA signal and the radio unit modulates the CDMA signals for transmission via the first antenna.

7. A base station transceiver system as claimed in any preceding claim in which the radio includes a radio transceiver portion comprising a transceiver circuitry and an antenna interface circuitry connected to the transceiver circuitry.

8. A base station transceiver system as claimed in claim 7 in which the antenna interface circuitry comprises a transmit power amplifier which provides an amplified signal to a first antenna.

9. A base station transceiver system as claimed in either of claims 7 and 8 in which the antenna interface circuitry comprises at least one low-noise amplifier for amplifying received signals.

10. A base station transceiver subsystem as claimed in any of claims 7 to 9 in which the antenna interface circuitry includes duplexer circuitry for allowing the transmission reception of signals to and from the first antenna.

11. A base station transceiver system as claimed in any of claims 7 to 10 in which the antenna interface circuitry interfaces to the first antenna and a second antenna.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00405

12. A base station transceiver system as claimed in any of claims 7 to 11 in which the transceiver circuitry comprises a transmitter circuit for transmitting signals via the first antenna and at least a first receiver for receiving signals from the first antenna.

13. A base station transceiver as claimed in any of claims 7 to 12 in which the transceiver circuitry further comprises a synthesiser for setting the transmit and receive frequencies and a communication link for communicating between the radio unit portion and the main unit portion.

14. A base station transceiver system substantially as described herein with reference to and/or as illustrated in any of figures 10 to 15.

INVESTOR IN PEOPLE

Application No: GB 9930250.7 **Examiner:** Robert Macdonald
Claims searched: 1-14 **Date of search:** 21 June 2000

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): H4L(LDDSX, LDRS, LEQF, LECY)

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Other: ONLINE: WPI, PAJ, EPODOC

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X,E	EP 0938241 A2	(LUCENT TECHNOLOGIES) See figure 4 and abstract.	1, at least
Y	EP 0749252 A2	(NEC) See whole document.	4
X	EP 0600681 A1	(AT & T) See whole document.	1,5,7,8,9
X,E	WO 99/44297 A2	(ADICOM WIRELESS INC) See claim 1 and abstract.	1,8,10
X,Y	WO 96/27269 A1	(NOKIA TELECOMMUNICATIONS) See figure 1, especially.	X (1,5,7, 11,12) Y(3,4)
X	US 5768685	(HUGHES ELECTRONICS) See whole document.	1,5,7,8,9, 11,13.
X	US 5680438	(AT & T) See figure 1, especially	1, at least
Y	JP 050292002	(NEC) See enclosed abstracts.	3

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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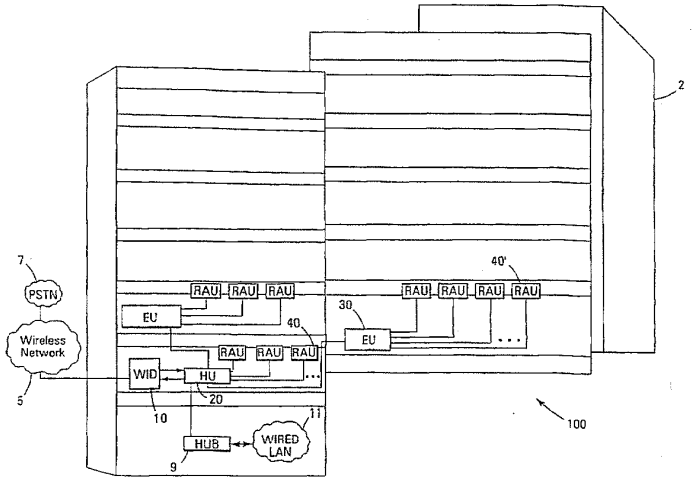
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(54) Title: DISTRIBUTION OF WIRELESS TELEPHONY AND DATA SIGNALS IN A SUBSTANTIALLY CLOSED ENVIRONMENT



(57) Abstract: A communication system is provided. The communication system includes a host unit that is adapted to communicate wireless telephony signals with a telephony network and adapted to communicate wireless data with at least one data network. A communication link carries both the wireless telephony signals and the wireless data. At least one remote antenna unit is communicatively coupled to the host unit over the communication link. The remote antenna unit communicates the wireless telephony signals and the wireless data with wireless terminals. The at least one remote unit further communicates digitized telephony signals and wireless data signals with the host unit over the communication link.

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DISTRIBUTION OF WIRELESS TELEPHONY AND DATA SIGNALS IN A SUBSTANTIALLY CLOSED ENVIRONMENT

Cross Reference to Related Applications

[0001] This application is related to the commonly assigned, co-pending application serial number 09/619,431, filed on 19 July 2000, and entitled "Point-to-Multipoint Digital RF Transport" (pending) (the '431 Application). The '431 Application is incorporated by reference.

Technical Field

[0002] The present invention is related to telecommunications systems, and more particularly to distribution of wireless telephony and data signals in a substantially closed environment.

Background Information

[0003] Wireless communications systems have evolved into a common mode of communicating used by a wide variety of people. One obstacle to the widespread use of wireless technologies is providing full coverage in areas such as steel frame buildings that tend to inhibit the transmission of radio frequency (RF) signals. Inside these tall shiny buildings (TSBs), signals transmitted from wireless base stations outside the TSBs attenuate dramatically and thus significantly impact the ability to communicate with wireless telephones or terminals located in the buildings.

[0004] In some buildings, very low power transmitters with antennas are mounted on the ceiling in hallways and conference rooms within the building to distribute RF signals throughout the building or other substantially closed structure or environment. Various systems have been developed to transport the RF signals to

the distributed antennas. For example, in some systems, signals are fed from a single point and then split in order to feed the signals to different points in the building. Simultaneous bi-directional RF distribution often involves splitting signals in the forward path (toward the antennas) and combining signals in the reverse path (from the antennas). Currently this can be performed directly at RF frequencies using passive splitters and combiners to feed a coaxial cable distribution network. In other systems, RF signals from a booster or base station are down converted to a lower frequency, and distributed via CAT 5 (LAN) or coaxial cable wiring to remote antenna units. At the remote antenna units, the signal is up converted and transmitted. In another approach, fiber optic cables are used to distribute signals to antennas inside of a building using either analog modulation or digitization of the RF spectrum.

[0005] Other systems have been developed that use wireless communication to transport data between computers of a network. These other systems are referred to as wireless local area networks or WLANs. Conventionally, wireless data and wireless telephony have been implemented in separate systems. The merger of wireless data and wireless telephony in a single system poses many issues including transport of signals to and from remote antennas in a substantially enclosed structure.

[0006] Therefore, there is a need in the art for a system that economically provides for transport of both wireless telephony and wireless data in a substantially enclosed structure or environment.

Summary

[0007] The above-mentioned problems with distributing RF signals within a building and other problems are addressed by the present invention and will be understood by reading and studying the following specification. Embodiments of the present invention transport wireless data for a wireless data network with

digitized telephony signals over a common, digital transport network within substantially closed environments, e.g., buildings, thereby providing an integrated solution for in-building distribution of data and telephony traffic.

[0008] In one embodiment, a communication system is provided. The communication system includes a host unit that is adapted to communicate wireless telephony signals with a telephony network and adapted to communicate wireless data with at least one data network. A communication link carries both the wireless telephony signals and the wireless data. At least one remote antenna unit is communicatively coupled to the host unit over the communication link. The remote antenna unit communicates the wireless telephony signals and the wireless data with wireless terminals. The at least one remote unit further communicates digitized telephony signals and wireless data signals with the host unit over the communication link.

Brief Description of the Drawings

[0009] Figure 1 is an illustration of one embodiment of a communication system for wireless data and telephony according to the teachings of the present invention.

[0010] Figure 2 is a block diagram of one embodiment of a remote antenna unit for a communication system according to the teachings of the present invention.

[0011] Figure 2A is a block diagram of one embodiment of a data format according to the teachings of the present invention.

[0012] Figure 3 is a block diagram of one embodiment of an expansion unit for a communication system according to the teachings of the present invention.

[0013] Figure 4 is a block diagram of one embodiment of a host unit according to the teachings of the present invention.

[0014] Figure 5 is a block diagram of another embodiment of a remote antenna unit according to the teachings of the present invention.

[0015] Figure 6 is a block diagram of another embodiment of an expansion unit according to the teachings of the present invention.

[0016] Figure 7 is a block diagram of another embodiment of a host unit according to the teachings of the present invention.

Detailed Description

[0017] In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings that form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. It is to be understood that other embodiments may be utilized and structural changes may be made without departing from the scope of the present invention.

I. Overview – First Embodiment

[0018] Figure 1 is an illustration of one exemplary embodiment of a communication system, indicated generally at 100, that provides distribution of wireless telephony and other data in a substantially closed environment, e.g., a building, a campus or other structure. System 100 transports wireless telephony and wireless data over a common infrastructure within the substantially closed environment. Advantageously, the use of a common infrastructure for both telephony and other data reduces the costs and time associated with installing and maintaining two separate systems--one for telephony and one for data--as would be done conventionally.

[0019] System 100 communicates with wireless telephones using one or more standard-based protocols. For example, in one embodiment, system 100 supports cellular communication according to any appropriate standard, e.g., Analog Mobile Phone System (AMPS), Total Access Communication System (TACS), Global System for Mobile Communications (GSM), IS-54, IS-95, IS-136 or other analog or

digital cellular communication standard. In other embodiments, system 100 supports communications in the Personal Communication Service (PCS) frequency band, e.g., 2 GHz.

[0020] System 100 also communicates with wireless data terminals using the same infrastructure as for wireless telephony to implement a wireless local area network (WLAN) using one of a number of standards. For example, in one embodiment, system 100 uses the HIPERLAN standard that is prevalent in Europe. In other embodiments, system 100 supports one of the 802.11 family of WLAN standards promulgated by the Institute of Electrical and Electronics Engineers (IEEE) to implement its wireless data portion. Further, in other embodiments, wireless personal area network (PAN) technology from the Bluetooth Special Interest Group or the HomeRF working group is used to implement the wireless data portion of system 100.

[0021] System 100 is shown distributed within a complex of tall shiny buildings (TSBs) 2. Although system 100 is shown in a complex of TSBs 2, it is understood that system 100 is not limited to this embodiment. Rather, system 100 in other embodiments is used to distribute signals in a single building, or other appropriate structure or indoor or outdoor location that exhibits high attenuation to RF signals.

[0022] System 100 transports wireless telephony signals and wireless data through a network of remote antenna units (RAUs) 40 and 40', one or more expansion units (EUs) 30 and a host unit (HU) 20. Host unit 20 interfaces with a wireless network 5 for the wireless telephony portion of system 100. Wireless network 5 is coupled to the public switched telephone network (PSTN), or a mobile telecommunications switching office (MTSO) or other switching office/network. Host unit 20 further interfaces with a wired local area network (LAN) 11 (data network) through hub 9 for the wireless data portion of system 100.

[0023] In one embodiment, system 100 operates by transporting wireless telephony and data signals digitally over fiber optic cables. In other embodiments,

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00414

system 100 operates by transporting wireless telephony and data signals as analog signals. In the digital embodiment, telephony and data signals received at HU 20 are distributed to multiple RAUs 40 and 40' to provide coverage throughout a building complex. The digital telephony signals transported between the HU 20 and the RAUs 40 and 40' comprise a digital representation of the telephony RF spectrum. Telephony signals received at each of the RAUs 40 and 40' are summed together at the HU 20 for interface to a wireless network. In one embodiment, the signals are transmitted from the RAUs 40 and 40' as 1.2 Gigabit/s digital signal in 20 bit words. Advantageously, in one embodiment, four of the bits from the 20-bit word are not used for telephony data and are used instead to transport the wireless data from the RAUs 40 and 40' to HU 20. This effectively provides a data pipe with 284 Mbits/s throughput. The multiple RAUs 40 and 40' thus provide an interface for transmission of telephony signals to wireless terminals over a telephony wireless network and data to be transmitted to wireless terminals in a wireless data network.

[0024] In one embodiment, expansion unit EU 30 is situated between the HU 20 and one or more RAUs 40'. In the forward path, EU 30 expands the coverage area by splitting signals received from HU 20 to a plurality of RAUs 40'. This includes both telephony data received from WID 10 and wireless data received from hub 9. In the reverse path, EU 30 receives signals from a plurality of RAUs 40'. This includes both wireless telephony and wireless data. EU 30 extracts the wireless data from the signal and digitally sums the digital telephony signals together. EU 30 buffers and formats the wireless data and inserts it into the summed digital telephony signal for transport to HU 20 or another EU 30. This system allows for successive branching of signals using EUs 30 and expanded coverage to multiple RAUs 40 and 40'. This system provides an efficient way of providing signal coverage for wireless communication without added attenuation loss and distance constraint found with analog systems. By using EUs 30, antennas can be placed further from HU 20 without adversely affecting signal strength.

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[0025] Digital transport system 100 includes a wireless interface device (WID) 10 that provides an interface to a wireless network. In one embodiment, the WID 10 includes either conventional transmitters and receivers or all digital transmitter and receiver equipment, and interface circuitry to a mobile telecommunications switching office (MTSO). In one embodiment, the wireless interface device 10 is coupled to an MTSO via a T1 line and receives and transmits signals between the MTSO and the HU 20. In another embodiment, the wireless interface device 10 is coupled to the public switched telephone network (PSTN). In one embodiment, WID 10 comprises a base station and connects directly to HU 20 via coaxial cables. In another embodiment, WID 10 comprises a base station and wirelessly connects to HU 20 via a bi-directional amplifier that is connected to an antenna. In one embodiment, the antenna is an outdoor antenna.

[0026] WID 10 communicates signals between wireless units and the wireless network via remote antenna units RAUs 40 and 40'. WID 10 is coupled to HU 20. The HU 20 is coupled to at least one digital expansion unit EU 30 and a plurality of RAUs 40. In addition, EU 30 is coupled to a plurality of RAUs 40'. The HU 20 receives RF signals from WID 10 and converts the RF signals to digitized RF signals. HU 20 further optically transmits the digital RF signals to multiple RAUs 40 either directly or via one or more EUs 30.

[0027] Each RAU 40 and 40' is connected through a fiber optic cable (or optionally another high bandwidth carrier) to transport digital RF signals to one of HU 20 or EU 30. In one embodiment, the fiber optic cable comprises multimode fiber pairs coupled between the RAUs 40 and the HU 20, between the RAUs 40 and 40' and the EUs 30 and between the EUs 30 and the HU 20. In one embodiment, the EU 30 is coupled to the HU 20 via single mode fiber and the EU 30 is coupled to the RAUs 40' via multimode fiber pairs. Although, transport system 100 has been described with fiber optic cable other carriers may be used, e.g., coaxial cable, twisted pair, infrared, microwave, or other appropriate wireless, fiber or copper-based communication medium.

[0028] In another embodiment, the HU 20 is coupled to the RAUs 40 by a direct current power cable in order to provide power to each RAU 40. In one embodiment, the direct current power cable delivers 48 VDC to each RAU 40 connected to the HU 20. In another embodiment, the EU 30 is coupled to RAUs 40' by a direct current power cable to provide power to each RAU 40'. In one embodiment, the direct current power cable delivers 48 VDC to each RAU 40' connected to the EU 30. In an alternate embodiment, RAUs 40 and 40' are connected directly to a power supply. In one embodiment, the power supply provides DC power to the RAUs 40 and 40'. In an alternate embodiment, the power supply provides AC power to the RAUs 40 and 40'. In one embodiment, RAUs 40 and 40' each include an AC/DC power converter. In another embodiment, the power cable also carries data between HU 20 and RAUs 40 in addition to providing power to the RAUs.

[0029] Both HU 20 and EU 30 split signals in the forward path and sum signals in the reverse path. In order to accurately sum the digital telephony signals together at HU 20 or EU 30 the data needs to come in to the HU 20 or EU 30 at exactly the same rate. As a result all of the RAUs 40 and 40' need to be synchronized so that their digital sample rates are all locked together. Synchronizing the signals in time is accomplished by locking everything to the bit rate over the fiber. In one embodiment, the HU 20 sends out a digital bit stream and the optical receiver at the EU 30 or HU 40 detects that bit stream and locks its clock to that bit stream. In one embodiment, this is being accomplished with a multiplexer chip set and local oscillators, as will be described below. Splitting and combining the signals in a digital state avoids the combining and splitting losses experienced with an analog system. In addition, transporting the digital signals over multimode fiber results in a low cost transport system that is not subject to much degradation.

II. Second Embodiment

A. Remote Antenna Unit

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00417

[0030] Figure 2 is a block diagram of one embodiment of a remote antenna unit, indicated generally at 200, for a communication system according to the teachings of the present invention. Remote antenna unit 200 advantageously combines both wireless telephony and wireless data into a common housing for transport over a common network. Remote antenna unit 200 includes broadband digitization circuit 202 and wireless data transceiver 204.

[0031] Remote antenna unit 200 receives and transmits telephony signals using broadband digitization circuit 202 and antenna 206. Broadband digitization circuit 202 is adapted to support cellular communication according to any appropriate standard, e.g., Analog Mobile Phone System (AMPS), Total Access Communication System (TACS), Global System for Mobile Communications (GSM), IS-54, IS-95, IS-136 or other analog or digital cellular communication standard. In other embodiments, broadband digitization circuit 202 supports communications in the Personal Communication Service (PCS) frequency band, e.g., 2 GHz. Broadband digitization circuit 202 that digitizes the RF spectrum and communicates with a host unit or expansion unit over links 210 and 212. In one embodiment, links 210 and 212 comprise fiber optic links. In other embodiment, links 210 and 212 comprise other appropriate communication medium such as coaxial cable, twisted pair, infrared, or other appropriate fiber, wireless or copper-based communication medium for carrying wireless telephony signals and wireless data.

[0032] Remote antenna unit 200 further communicates data with wireless data terminals using wireless data transceiver 204 and antenna 214. In one embodiment, antenna 214 and antenna 206 are combined in a common antenna used for both data and telephony. Wireless data transceiver 204 comprises a chip set that uses one or more of a number of standards for wireless local area networks. For example, in one embodiment, wireless data transceiver 204 uses the HIPERLAN standard that is prevalent in Europe. In other embodiments, wireless data transceiver 204 supports one of the 802.11 family of WLAN standards promulgated by the Institute of Electrical and Electronics Engineers (IEEE) to implement its wireless data portion.

Further, in other embodiments, wireless data transceiver 204 uses wireless personal area network (PAN) technology from the Bluetooth Special Interest Group or the HomeRF working group.

[0033] Wireless data transceiver 204 provides data to data formatting circuit 216. Data formatting circuit 216 formats the wireless LAN data for transport to the host unit along with the telephony signals from broadband digitization circuit 202. In one embodiment, data formatting circuit 216 is implemented in a Xilynx processor that generates Ethernet data from the wireless data transceiver 204.

[0034] This Ethernet data is formatted for transmission to the host unit. In one embodiment, the Ethernet data is formatted to be inserted into 20 bit words shown in Figure 2A. Each word 230 includes 14 bits of telephony data 232. This data is a digitization of the RF spectrum used to carry the wireless telephony data. Further, alarm bits 236 make up another 2 bits of the 20 bit word. The remaining 4 bits, 234, are used to carry the wireless data, e.g., the Ethernet data, to the host unit. Further, in other embodiments, one or more bits in word 230 are used for control of the transmission of the Ethernet data.

[0035] In one embodiment, the broadband digitization circuit 202 processes signals at a data rate of approximately 1.2 Gigabits/second. With this rate, the four bits 234 correspond to a data channel with 284 Megabits/second capacity.

[0036] In other embodiments, wireless transceiver 202 provides the data to the host unit as analog data. In this case, the data from formatting circuit 216 is provided on an appropriate carrier and added to the analog signal for transmission to the host unit.

[0037] In operation, remote antenna unit 200 processes both wireless telephony signals and wireless data within a substantially enclosed structure, e.g., an office building, using a single distribution network and a common housing for both services. In one embodiment, telephony signals are received at antenna 206 and digitized by broadband digitization circuit 202 for transmission to the host unit.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00419

When wireless data is received with transceiver 204, it is provided to data formatting circuit 216. The formatted data is provided to broadband digitization circuit 202. Broadband digitization circuit 202 incorporates the wireless data in with the digitized wireless telephony signals for transmission over link 210 to the host unit.

[0038] In the upstream direction, broadband digitization circuit 202 receives signals over link 212. These signals include wireless telephony signals and wireless data. The wireless telephony signals are converted to signals for transmission at antenna 206. The wireless data is provided to formatting circuit 216. Formatting circuit 216 formats the data for transmission by wireless data transceiver 204.

B. Expansion Unit

[0039] Figure 3 is a block diagram of one embodiment of an expansion unit, indicated generally at 300, for a communication system according to the teachings of the present invention. Expansion unit 300 is used to allow multipoint to point communication. Specifically, expansion unit 300 allows a single connection to the host unit to provide connection to a plurality, e.g., six, twelve or other appropriate number, remote antenna units such as remote antenna units as shown and described with respect to Figure 2. In the upstream direction from the host unit to the remote antenna units, expansion unit 300 includes splitter circuit 302. Splitter circuit 302 receives signals that include both wireless data and wireless telephony signals from the host unit. Splitter 302 splits these signals and provides the signals to the plurality of remote antenna units.

[0040] Expansion unit 300 includes additional circuitry in the reverse direction from the remote antenna units to the host unit. Specifically, in one embodiment, expansion unit 300 includes data extraction circuit 304 that receives data from the remote antenna units. In one embodiment, this data comprises digital data in the format described above with respect to Figure 2A. Data extraction circuit 304

extracts the wireless data from the four bit positions in each 20-bit word and provides the data to data formatter 308. In one embodiment, data extraction circuit 304 further buffers data depending on, for example, traffic levels. The wireless telephony signals, e.g., 14 of the 20 bits in each word, are provided to summer 306. Summer 306 sums the signals from each of the remote antenna units thus effectively combining the RF signals from these remote antenna units as described in the '431 Application.

[0041] Data formatter 308 formats the wireless data from the plurality of remote antenna units for insertion into the wireless telephony data output by summer 306.

[0042] Expansion unit 300 also includes multiplexer 310. Multiplexer 310 inserts the wireless data from data formatter 308 into the wireless telephony data from summer 306. In one embodiment, multiplexer 310 inserts the telephony data into 14 bits of 20 bit words and inserts the wireless data into 4 bits of the 20 bit words. This combined data is provided to the host unit as, for example, a 1.4 Gbit/s signal. In one embodiment, this insertion is accomplished on a first-in first-out basis for the Ethernet packets received at data formatter 308.

C. Host Unit

[0043] Figure 4 is a block diagram of one embodiment of a host unit, indicated generally at 400, according to the teachings of the present invention. Host unit (HU) 400 supports both wireless telephony and wireless data. On the wireless telephony side, host unit 400 is coupled to wireless interface 404. In one embodiment, wireless interface 404 comprises a bi-directional amplifier. In another embodiment, wireless interface 404 comprises a base station that is adapted to support cellular communication according to any appropriate standard, e.g., Analog Mobile Phone System (AMPS), Total Access Communication System (TACS), Global System for Mobile Communications (GSM), IS-54, IS-95, IS-136 or other analog or digital cellular communication standard. In other embodiments, broadband digitization

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00421

circuit 202 supports communications in the Personal Communication Service (PCS) frequency band, e.g., 2 GHz. Wireless interface 404 provides connection to an external network at 408, e.g., a base station, a mobile switching center, the Public Switched Telephone Network (PSTN) or other appropriate network.

[0044] Host unit 400 further includes wireless telephony transport circuit 402. In one embodiment, telephony transport circuit 402 receives RF signals from the wireless interface 404 and digitizes the RF signals and optically transmits the digital RF signals to multiple RAUs via transmission lines 410. Telephony transport circuit 402 also receives digitized RF signals over transmission lines 412 from a plurality of RAUs either directly or indirectly via EUs, reconstructs the corresponding analog RF signals, and applies the analog RF signals to wireless interface 404.

[0045] In one embodiment, host unit 400 receives signals directly from a plurality of RAUs. Wireless telephony transport circuit 402 separates telephony signals from the data signals. The telephony signals are digitally summed and then converted to analog signals and transmitted to wireless interface 404. In another embodiment, host unit 400 receives signals from one or more EUs and one or more RAUs directly. Again, the telephony signals are separated from the data signals and the telephony signals are digitally summed and then converted to analog signals and transmitted to wireless interface 404. The signals received via transmission lines 412 may be received directly from a RAU or from an EU. If the signals are from an EU, the EU sums signals from a plurality of RAUs together and then transports the summed signal to the host unit 400 via transmission lines 412 for additional summing and conversion for transport to wireless interface 404.

[0046] In one embodiment, transmission lines 410 and 412 comprise multimode fiber pairs. In an alternate embodiment, each fiber pair is replaced by a single fiber, carrying bi-directional optical signals through the use of wavelength division multiplexing (WDM). In an alternate embodiment, transmission lines 410 and 412 comprise single mode fibers, coaxial cable, twisted pair or other alternative wireless,

fiber or copper-based communication medium. In one embodiment, host unit 400 provides six connections that are each coupled to one of a remote antenna unit or an expansion unit.

[0047] Data interface 406 is coupled to wireless telephony transport circuit 402. Data interface 406 processes the wireless data for host unit 400. Data interface 406 is coupled to a wired local area network (LAN) at 414. In the upstream direction, data interface 406 receives data at 414 from a wired LAN, e.g., from an Ethernet hub. Data interface 406 provides the data to wireless telephony transport circuit. This data is inserted into the wireless telephony data for transport to remote antenna units. For example, in one embodiment, the wireless data is inserted into 4 bit positions in 20 bit words as shown in Figure 2A. This data is transported over connection 410 to remote antenna units and expansion units.

[0048] In the downstream direction, host unit 400 receives signals that include wireless data at wireless telephony transport circuit 402. This wireless data is extracted from the wireless telephony data and provided to data interface 406. Data interface 406 provides this wireless data to the wired LAN or hub.

III. Third Embodiment

A. Remote Antenna Unit

[0050] Figure 5 is a block diagram of another embodiment of a remote antenna unit (RAU) 540 constructed according to the teachings of the present invention. RAU 540 includes circuitry for communication of wireless telephony and for communication of other wireless data. The circuitry for each function is described in turn below.

i. Wireless Telephony

[0051] A digital optical receiver 501 receives the optical digital data stream transmitted from a HU directly or via a EU. Receiver 501 converts the optical data stream to a corresponding series of electrical pulses. The electrical pulses are

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00423

applied to clock and bit recovery circuit 503. The series of electrical pulses are then applied to demultiplexer 505. Demultiplexer 505 extracts the digitized telephony traffic and the wireless data from the electrical pulses from clock and bit recovery circuit 503. Demultiplexer 505 also converts the telephony signals from serial to parallel. The output parallel signal is then applied to digital to RF converter 595 for conversion to RF and transmission to duplexer 547. RF converter 595 is connected to antenna 599 through duplexer 547. Accordingly, radio frequency telephony signals originating from a wireless interface device are transmitted from antenna 599.

[0052] In one embodiment, digital to RF converter 595 includes a digital-to-analog (D/A) converter 509, which reconstructs the analog RF signal and applies it to IF filter 504 and amplifier 506. The analog signal is mixed with an output signal of reference oscillator 515 by mixer 502. The output of amplifier 506 is mixed with a signal from local oscillator 519 that locks the RF signal with the return digital signal via reference oscillator 515 that is coupled to local oscillator 519. In one embodiment, the reference oscillator 515 is coupled to frequency divider 517 that in turn is coupled to local oscillators 519 and 529. The local oscillators 519 and 529 are also coupled to synthesizer 521 that is coupled to programmable logic device 525.

[0053] RF signals received at antenna 599 are passed through duplexer 547 to RF to digital converter 593. The RF signals are converted to digital telephony signals and then applied to multiplexer 536. Multiplexer 536 converts the digital telephony signals from parallel-to-serial and combines the digital telephony signals with wireless data and optically transmits the combined signals via optical transmitter 532 to a EU or HU.

[0054] In one embodiment, RF to digital converter 593 includes a first amplifier 543 that receives RF signals from duplexer 547, amplifies the signals and transmits them to digital attenuator 539. In one embodiment, amplifier 543 is a low noise

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00424

amplifier. Digital attenuator 539 receives the amplified signals and digitally attenuates the signal to control the levels in case of an overload situation. RF to digital converter 593 further includes a second amplifier 537, which receives the attenuated signals, amplifies the signals and applies the amplified signals to mixer 535. Mixer 535 mixes the amplified signals with a signal received from local oscillator 529. The resultant signals are applied to a third amplifier 533 an IF filter 548 and a fourth amplifier 546 in series to down convert to an IF signal. The IF signal is then mixed with a signal from reference oscillator 515 and the mixed signal is summed with a signal from dither circuit 527. The resultant signal is applied to analog-to-digital converter 538 and converted to a digital signal. The output digital signal is then applied to a multiplexer 536. In one embodiment, the multiplexer 536 multiplexes the signal together with a couple of extra bits to do framing and control information. In one embodiment, multiplexer 536, clock and bit recovery circuit and demultiplexer 505 comprise a multiplexer chip set.

[0055] Programmable logic circuit 525 programs synthesizer 521 for the reference oscillator and for the up and down conversion of local oscillators 519 and 529. The programmable logic circuit 525 looks for error conditions, for out of lock conditions on the oscillators and reports error modes and looks for overflow condition in the A/D converter 538. If an overflow condition occurs the programmable logic circuit 525 indicates that signals are saturating and adds some extra attenuation at digital attenuator 539 in order to reduce the RF signal levels coming in from RF antenna 599 and protect the system from overload.

[0056] In one embodiment, RAU 540 includes an internal direct current power distribution system 5. In one embodiment, the distribution system receives 48 VDC and internally distributes 3 outputs of +3.8V, +5.5V and +8V.

ii. Wireless Data

[0057] Remote antenna unit 540 includes wireless data transceiver 550 and antenna 554 for communicating wireless data as part of a wireless local area network. In one embodiment, antenna 554 and antenna 599 are combined in a common antenna used for both data and telephony through a triplexer in place of diplexer 547. Wireless data transceiver 550 comprises a chip set that uses one of a number of standards for wireless local area networks. For example, in one embodiment, wireless data transceiver 550 uses the HIPERLAN standard that is prevalent in Europe. In other embodiments, wireless data transceiver 550 supports one of the 802.11 family of WLAN standards promulgated by the Institute of Electrical and Electronics Engineers (IEEE) to implement its wireless data portion. Further, in other embodiments, wireless data transceiver 550 uses wireless personal area network (PAN) technology from the Bluetooth Special Interest Group or the HomeRF working group.

[0058] Wireless data transceiver 550 provides data to data formatting circuit 552. Data formatting circuit 552 formats the wireless LAN data for transport to the host unit along with the telephony signals at multiplexer 536. In one embodiment, data formatting circuit 552 is implemented in a Xilynx processor that generates Ethernet data from the wireless data transceiver 550.

[0059] This Ethernet data is formatted for transmission to the host unit. In one embodiment, the Ethernet data is formatted to be inserted into 20 bit words shown in Figure 2A as described above.

[0060] In operation, remote antenna unit 540 processes both wireless telephony and wireless data within a substantially enclosed structure, e.g., an office building, using a single distribution network and a common housing for both services. In one embodiment, telephony signals is received at antenna 599 and RF to digital converter 593 and digitized for transmission to the host unit. When wireless data is

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00426

received with transceiver 550, the wireless data is provided to data formatting circuit 552. The formatted data is provided to multiplexer 536. Multiplexer 536 incorporates the wireless data in with the wireless telephony signals for transmission over link 556 to the host unit.

[0061] In the upstream direction, optical receiver 503 receives signals over link 212. These signals include wireless telephony and wireless data. The wireless telephony signals are converted to signals for transmission at antenna 599 by digital to RF converter 595. The wireless data is provided to formatting circuit 552. Formatting circuit 552 formats the data for transmission by wireless data transceiver 550 and antenna 554.

B. Expansion Unit

[0062] Figure 6 is a block diagram of one embodiment of a digital expansion unit (EU) 630 constructed according to the teachings of the present invention. EU 630 is designed to receive optical signals and transmit optical signals. The optical signals include both wireless telephony and wireless data that are carried over the same transport medium.

[0063] In the upstream direction (to the remote antenna units), an optical receiver 651 receives digital signals that include both digitized RF signals and wireless data. These digital signals are transmitted to clock and bit recovery circuit 653 that performs clock and bit recovery to lock the local clock and clean up the signal. The signals are then split into X digital signals by 1 to X fan out buffer 607. The signals are then transmitted via optical transmitters 655-1 to 655-X to X receiving units such as EUs or RAUs. The X receiving units may be any combination of EUs or RAUs. In one embodiment, X is equal to six.

[0064] EU 630 also includes optical receivers 669-1 to 669-X, which receive digital signals directly from RAUs or indirectly via EUs. These digital signals include digitized RF signals for wireless telephony and wireless data. In operation

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00427

the signals are received, applied to clock and bit recovery circuits 673-1 to 673-X respectively to lock the local clock and clean up the signals and then applied to demultiplexers 671-1 to 671-X. Demultiplexers 671-1 to 671-X each extract the digitized wireless telephony traffic and apply the samples to field programmable gate array 661. The wireless telephony signals are summed together digitally and transmitted to multiplexer 657.

[0065] Demultiplexers 671-1 to 671-X extract the wireless data and provide the wireless data to data formatter 690. Demultiplexers 671-1 to 671-X further buffer data as necessary due to, for example traffic levels. Data formatter 690 formats the data for transmission to the host unit. In one embodiment, data formatter 690 processes the data in a first-in first-out based on the order of data received from demultiplexers 671-1 to 671-X.

[0066] Multiplexer 657 is coupled to FPGA 661 and data formatter 690. Multiplexer 657 multiplexes the wireless data signals with the wireless data signal. Further, framing and control information is also added. In addition, the multiplexer 657 converts the signals parallel to serial. The signals are then applied to optical transmitter 659 for further transmission. In one embodiment, the signals are directly transmitted to a HU or indirectly via one or more additional EUs.

[0067] In one embodiment, the FPGA 661 includes summer 665, which mathematically sums together the wireless telephony signals received from demultiplexers 671-1 to 671-X. In another embodiment, FPGA 661 includes an overflow algorithm circuit 663 coupled to the output of summer 665. The algorithm circuit 663 allows the summed digital RF signals to saturate and keep the summed signal within a defined number of bits. In one embodiment, the algorithm circuit includes a limiter. In one embodiment, the RF signals are 14-bit signals and when summed and limited by summer 665 and overflow algorithm 663 result in a 14-bit output signal.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00428

[0068] In one embodiment, EU 630 includes an alternating current to digital current power distribution circuit 7 that provides direct current power to each of the RAUs coupled to EU 630.

[0069] In an alternate embodiment, the digital host unit (HU) and wireless interface device (WID) are located some distance from the building being served. The HU in the building is replaced by a EU, and the link between that EU and the remotely located HU is via single mode fiber.

[0070] In another alternate embodiment, the wireless interface device (WID) is a software defined base station, and the interface between the HU and WID takes place digitally, eliminating the need for the RF to digital conversion circuitry in the HU.

C. Host Unit

[0071] Figure 7 is a block diagram of another embodiment of a host unit (HU), indicated generally at 720, that supports the distribution of wireless telephony and wireless data over the same infrastructure according to the teachings of the present invention. HU 720 includes an RF to digital converter 791 receiving the wireless telephony signals from a wireless interface device such as a base station, BDA or the like. RF to digital converter 791 provides a digitized traffic stream that is transmitted to multiplexer 766. Multiplexer 766 converts the parallel output of the A/D converter into a framed serial bit stream.

[0072] Advantageously, multiplexer 766 is also coupled to data interface 791. Data interface 766 processes the wireless data for host unit 720. Data interface 766 is coupled to a wired local area network (LAN) at 793. In the upstream direction, data interface 766 receives data at 793 from a wired LAN, e.g., from an Ethernet hub. Data interface 766 provides the data to multiplexer 764 for combination with the wireless telephony signals to be transported to a remote antenna unit.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00429

[0073] At the output of the multiplexer 766 is a 1 to P fan out buffer 707, which splits the digital signal P ways. There are P optical transmitters 731-1 to 731-P one feeding each of the P optical transmission lines 714-1 to 714-P. The digitized signals are applied to fibers 714-1 to 714-P for transmission to corresponding RAUs either directly or via EUs. In one embodiment, P is equal to 6.

[0074] In one embodiment, HU 720 includes an amplifier 750 that receives the combined RF signal from a wireless interface device such as a base station or BDA. The combined RF signal is amplified and then mixed by mixer 752 with a signal received from local oscillator 768. Local oscillator 768 is coupled to reference oscillator 715. In one embodiment the local oscillator is coupled to a frequency divider circuit 770, which is in turn coupled to reference oscillator 715. The local oscillator is locked to the reference oscillator 715 as a master clock so that the down conversion of the RF signals is the same as the up conversion. The result is end to end, from HU to RAU, or HU to one or more EUs to RAU, no frequency shift in the signals received and transmitted. The local oscillator 763 is also coupled to a synthesizer circuit 776.

[0075] The output signal of mixer 752 is provided to amplifier 754 amplified and then filtered via intermediate frequency (IF) filter 756. The resultant signal is the combined RF signal converted down to an IF signal. The IF signal is mixed with another signal originating from the reference oscillator 715 via mixer 760. The output of mixer 760 is summed together at 762 with a signal produced by field programmable gate array (FPGA) 767. The output is then converted from an analog signal to a digital signal via analog/digital (A/D) converter 764 once converted the digital RF signal is applied to multiplexer 766. In one embodiment, the A/D converter 764 is a 14-bit converter handling a 14-bit signal. In other embodiments, the A/D converter 764 may be of any size to accommodate an appropriate signal. In one embodiment, the input signal from FPGA 767 is a dither signal from dither circuit 762 that adds limited out of band noise to improve the dynamic range of the RF signal.

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[0076] In one embodiment, HU 720 includes an alternating current to digital current power distribution circuit 6 that provides direct current power to each of the RAUs coupled to HU 720.

[0077] HU 720 further includes a plurality of digital optical receivers 718-1 to 718-P in the reverse path. Receivers 718-1 to 718-P each output an electronic digital signal, which is applied to clock and bit recovery circuits 745-1 to 745-P, respectively, for clock and bit recovery of the electronic signals. The signals are then applied to demultiplexers 741-1 to 741-P, respectively. Demultiplexers 741-1 to 741-P extract the digitized signals generated at the RAUs, as will be explained in detail below. Demultiplexers 741-1 to 741-P further extract wireless data and alarm (monitoring) and control information framed with the wireless telephony signals. The wireless data extracted by demultiplexers 741-1 to 741-P is applied to data interface 791. Data interface 791 provides this wireless data to the wired LAN or hub at 793.

[0079] The wireless telephony signals output at each demultiplexer 741-1 to 741-P are then applied to FPGA 767 where the signals are summed together and then applied to digital to RF converter 795. Converter 795 operates on the sum of the digitized signals extracted by demultiplexers 741-1 to 741-P, reconstructing baseband replicas of the RF signals (wireless telephony) received at all the digital remote units. The baseband replicas are then up-converted to their original radio frequency by mixing with a local oscillator 782 and filtering to remove image frequencies. Local oscillator 782 is coupled to synthesizer 776 and reference oscillator as discussed with respect to local oscillator 768 above.

[0080] In one embodiment, digital to RF converter 795 includes digital to analog (D/A) converter 784 coupled to an output of FPGA 767 the digitized RF signals are converted to analog RF signals and then mixed with a signal from reference oscillator 715 by mixer 792. The signal is then filtered by IF filter 790 and amplified by amplifier 788. The resultant signal is then mixed with a signal from

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00431

local oscillator 782 and then applied to RF filter 784, amplifier 780 and RF filter 778 for transmission by a wireless interface device such as a BDA or base station.

[0081] In one embodiment, FPGA 767 includes an alarm/control circuit 774, which extracts overhead bits from RAUs to monitor error and alarm information. In one embodiment, the FPGA 767 includes a summer 798, which mathematically sums together the wireless telephony signals received from fibers 716-1 to 716-P. In another embodiment FPGA includes an overflow algorithm circuit 796 coupled to the output of summer 798. The algorithm circuit 796 allows the summed digital RF signals to saturate and keep the summed signal within a defined number of bits. In one embodiment, the algorithm circuit includes a limiter. In one embodiment, the RF signals are 14-bit signals and when summed and limited by summer 798 and overflow algorithm 796 result in a 14-bit output signal.

[0082] For example, in one embodiment each of the digital RF signals received from fibers 716-1 to 716-P, where P is equal to 6, comprise 14 bit inputs. All of those 6 different 14 bit inputs then go into summer 798. In order to allow for overflow, at least 17 bits of resolution is needed in the summer 798 to handle a worst-case scenario when all 6 of the 14 bit inputs are at full scale at the same time. In this embodiment, a 17-bit wide summer 798 is employed to handle that dynamic range. Coming out of summer 798 is needed a 14-bit signal going in the reverse path. In one embodiment, an algorithm circuit 796 for managing the overflow is implemented. In one embodiment, the summer and 798 and overflow algorithm 796 are included in FPGA 767. In one embodiment, overflow algorithm 796 acts like a limiter and allows the sum to saturate and keeps the summed signal within 14 bits. In an alternate embodiment, overflow algorithm circuit 796 controls the gain and scales the signal dynamically to handle overflow conditions.

[0083] Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement which is calculated to achieve the same purpose may be substituted for

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00432

the specific embodiments shown. For example, a remote antenna unit is not limited to the receipt and summing and splitting and transmitting of digitized radio frequency signals. In other embodiments, the host unit is capable of receiving and summing analog radio frequency signals in addition to or instead of digitized radio frequency signals. As well, the host unit is capable of splitting and transmitting analog radio frequency signals in addition to or instead of digitized radio frequency signals. Further, it is understood that a single wireless terminal may function as both a wireless data terminal and a wireless telephony terminal by communicating both wireless telephony signals and wireless data. Thus, the data and telephony portions of the remote antenna units may both communicate with the same wireless terminals. This application is intended to cover any adaptations or variations of the present invention. Therefore, it is intended that this invention be limited only by the claims and the equivalents thereof.

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00433

What is claimed is:

1. A communication system, comprising:

a host unit that is adapted to communicate wireless telephony signals with a telephony network and adapted to communicate wireless data with at least one data network;

a communication link that carries both the wireless telephony signals and the wireless data; and

at least one remote antenna unit, communicatively coupled to the host unit over the communication link, wherein the remote antenna unit includes:

a broadband digitization circuit, that is adapted to communicate wireless telephony signals with wireless terminals,

a wireless data transceiver that is adapted to communicate wireless data with wireless terminals, and

a data formatting circuit coupled between the wireless data transceiver and the broadband digitization circuit that formats the wireless data for transmission to the host unit and to the wireless terminals.

2. The system of claim 1, wherein the broadband digitization circuit supports wireless telephony communication according to at least one of Analog Mobile Phone System (AMPS), Total Access Communication System (TACS), Global System for Mobile Communications (GSM), IS-54, IS-95, IS-136 and Personal Communication Service (PCS) standards and services.

3. The system of claim 1, wherein the wireless data transceiver supports at least one of the HIPERLAN standard, one of the 802.11 family of wireless local area network standards promulgated by the Institute of Electrical and Electronics

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00434

Engineers (IEEE), and wireless personal area network (PAN) technology from the Bluetooth Special Interest Group and the HomeRF working group.

4. The system of claim 1, wherein the broadband digitization circuit includes an RF to digital converter that digitizes the RF spectrum used for the wireless telephony signals.

5. The system of claim 4, wherein the broadband digitization circuit includes a multiplexer that inserts wireless data into data words with the digitized RF spectrum.

6. The system of claim 5, wherein the data words include 14 bit locations for the wireless telephony signals and 4 bit locations for the wireless data.

7. A remote antenna unit for communicating with wireless data terminals and wireless telephones, the unit comprising:

a broadband digitization circuit, that is adapted to communicate with the wireless telephones;

wherein the broadband digitization circuit includes a port that is configured to communicate with a host unit over a communication link used for both wireless data and wireless telephony signals;

a wireless data transceiver that is adapted to communicate with the wireless data terminals; and

a data formatting circuit coupled between the wireless data transceiver and the broadband digitization circuit that formats the wireless data for transmission to the wireless data terminals and for transmission to a host unit over the communication link with the wireless telephony signals.

8. The remote antenna unit of claim 7, wherein the broadband digitization circuit supports wireless telephony communication according to at least one of

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00435

Analog Mobile Phone System (AMPS), Total Access Communication System (TACS), Global System for Mobile Communications (GSM), IS-54, IS-95, IS-136 and Personal Communication Service (PCS) standards and services.

9. The remote antenna unit of claim 7, wherein the wireless data transceiver supports at least one of the HIPERLAN standard, one of the 802.11 family of wireless local area network standards promulgated by the Institute of Electrical and Electronics Engineers (IEEE), and wireless personal area network (PAN) technology from the Bluetooth Special Interest Group and the HomeRF working group.

10. The remote antenna unit of claim 7, wherein the broadband digitization circuit includes an RF to digital converter that digitizes the RF spectrum used for the wireless telephony signals.

11. The remote antenna unit of claim 10, wherein the broadband digitization circuit includes a multiplexer that inserts wireless data into data words with the digitized RF spectrum.

12. The remote antenna unit of claim 11, wherein the data words include 14 bit locations for the digitized wireless telephony signals and 4 bit locations for the wireless data.

13. A method for transporting wireless telephony signals and wireless data in a substantially closed environment, the method comprising:

receiving wireless telephony signals and wireless data at a common location;

formatting the wireless data for transmission;

inserting the formatted wireless data into the wireless telephony signals;

transmitting the wireless data and the wireless telephony signals over a common communication link to a host unit;

providing the wireless telephony signals to a telephony network; and

providing the wireless data to a data network.

14. The method of claim 13, wherein receiving wireless telephony signals and wireless data comprises receiving wireless telephony signals and wireless data at a common antenna.

15. The method of claim 13, and further including digitizing the RF spectrum carrying the wireless telephony signals prior to inserting the formatted wireless data.

16. The method of claim 13, wherein inserting the wireless data into the wireless telephony signals comprises forming N-bit words with X bits for the wireless telephony signals and up to N-X bits for the wireless data.

17. The method of claim 13, wherein transmitting comprises transmitting over a fiber optic communication medium.

18. The method of claim 13, wherein transmitting comprises transmitting over a copper-based communication medium.

19. A communication system, comprising:

a host unit that is adapted to communicate wireless telephony signals with a telephony network and adapted to communicate wireless data with at least one data network;

a communication link that carries both the wireless telephony signals and the wireless data;

at least one remote antenna unit, communicatively coupled to the host unit over the communication link, wherein the remote antenna unit communicates the wireless telephony signals and the wireless data with wireless terminals; and

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00437

wherein the at least one remote unit further communicates digitized telephony signals and wireless data signals with the host unit over the communication link.

20. The system of claim 19, wherein the at least one remote antenna unit supports wireless telephony communication according to at least one of Analog Mobile Phone System (AMPS), Total Access Communication System (TACS), Global System for Mobile Communications (GSM), IS-54, IS-95, IS-136 and Personal Communication Service (PCS) standards and services.

21. The system of claim 19, wherein the at least one remote antenna unit supports at least one of the HIPERLAN standard, one of the 802.11 family of wireless local area network standards promulgated by the Institute of Electrical and Electronics Engineers (IEEE), and wireless personal area network (PAN) technology from the Bluetooth Special Interest Group and the HomeRF working group.

22. The system of claim 19, wherein the at least one remote antenna unit includes an RF to digital converter that digitizes the RF spectrum used for the wireless telephony signals.

23. The system of claim 22, wherein the at least one remote antenna unit includes a multiplexer that inserts wireless data into data words with the digitized RF spectrum.

24. The system of claim 23, wherein the data words include 14 bit locations for the wireless telephony signals and 4 bit locations for the wireless data.

25. A transport system for transporting signals for first and second wireless networks, the transport system comprising:

EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00438

a first interface that is adapted to communicate signals with wireless terminals from the first and second wireless networks;

a second interface that is adapted to communicate signals with the first and second wireless networks; and

a communication medium, coupled between the first and second interfaces, the communication medium adapted to transport the signals for the first and second wireless networks between the first and second interfaces.

26. The transport system of claim 25, wherein the first interface includes a broadband digitization circuit that digitizes a frequency spectrum for transmission over the communication medium.

27. The transport system of claim 26, wherein the first interface further combines signals from the first and second wireless networks into selected bit locations of shared data words.

28. The transport system of claim 25, wherein the first interface is adapted to communicate signals with a wireless data network and a wireless telephony network.

29. The transport system of claim 25, wherein the communication medium comprises at least one of fiber optic cable, coaxial cable, twisted pair, infrared, microwave, wireless, and copper-based communication medium.

30. The transport system of claim 25, wherein the first interface comprises:

circuitry that supports wireless telephony communication according to at least one of Analog Mobile Phone System (AMPS), Total Access Communication System (TACS), Global System for Mobile Communications (GSM), IS-54, IS-95, IS-136 and Personal Communication Service (PCS) standards and services; and

circuitry that supports at least one of the HIPERLAN standard, one of the 802.11 family of wireless local area network standards promulgated by the Institute of Electrical and Electronics Engineers (IEEE), and wireless personal area network (PAN) technology from the Bluetooth Special Interest Group and the HomeRF working group.

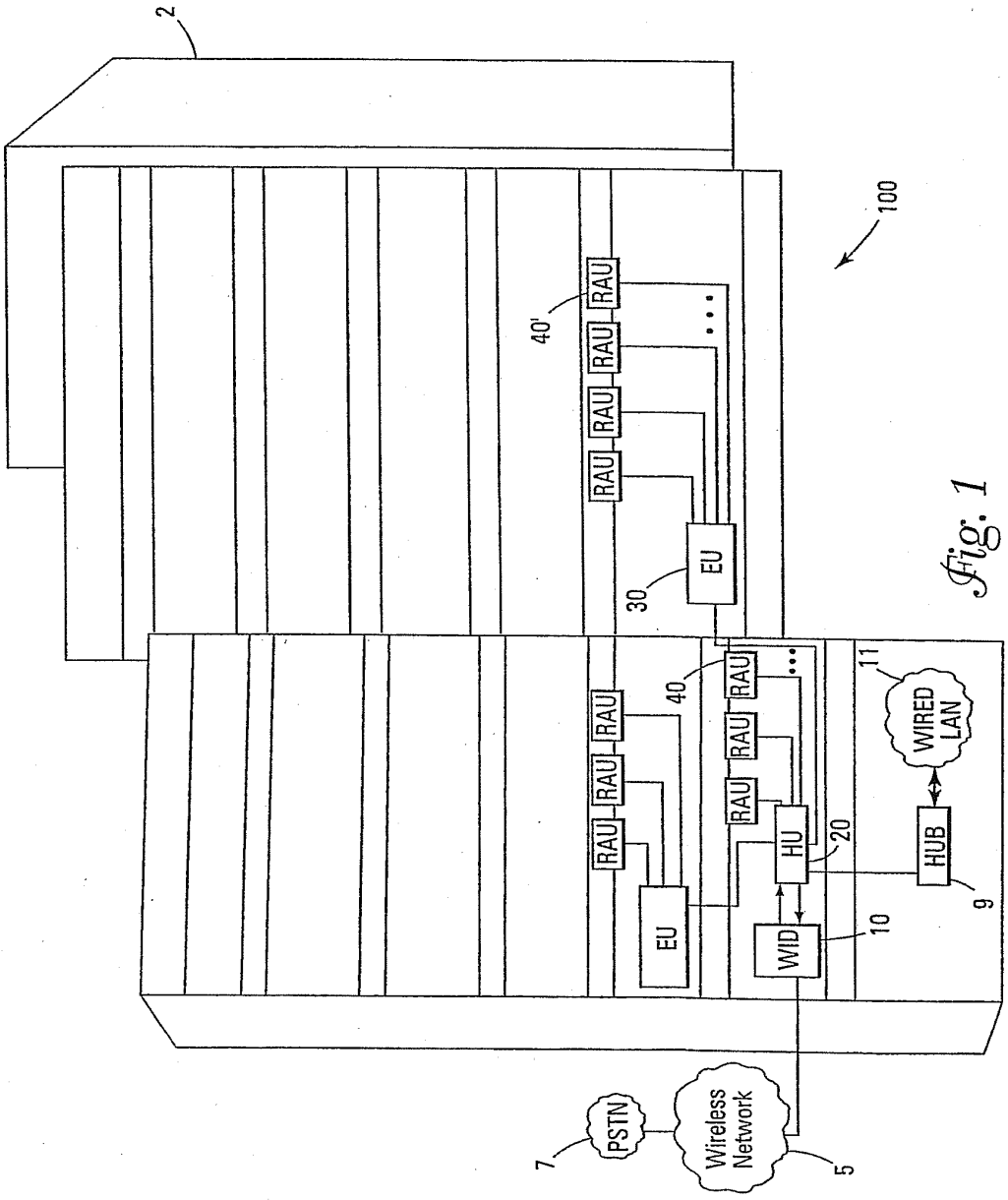

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RAU
RAU
RAU
RAU
EU
11
WIRED LAN
HUB
9
HU
20
WID
10
PSTN
7
Wireless Network
5

Fig. 1

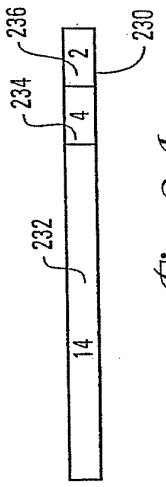

236
230
234
2
4
232
14

Fig. 2A

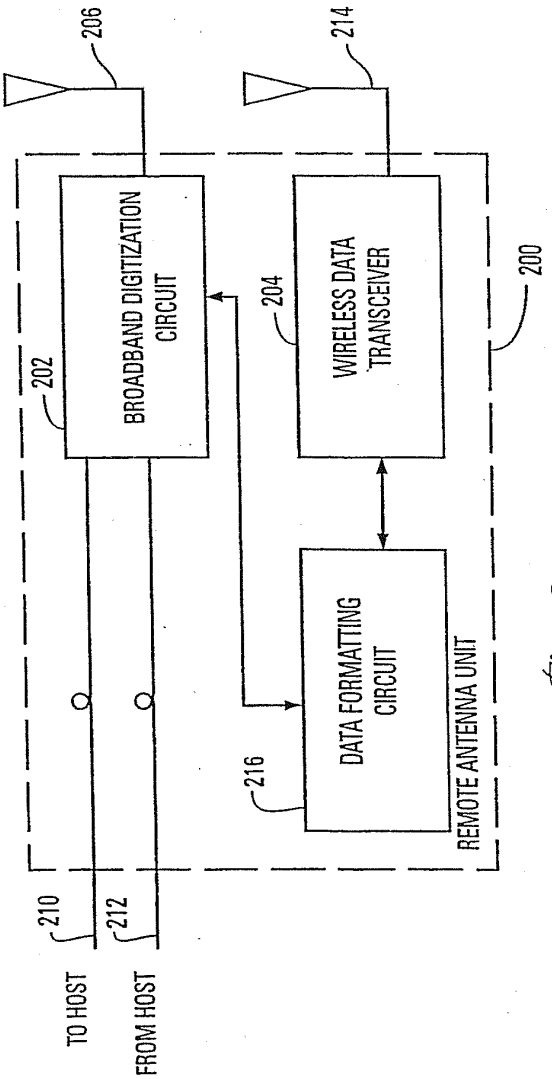

206
214
BROADBAND DIGITIZATION CIRCUIT
WIRELESS DATA TRANSCEIVER
202
204
200
DATA FORMATTING CIRCUIT
216
REMOTE ANTENNA UNIT
210
212
TO HOST
FROM HOST

Fig. 2

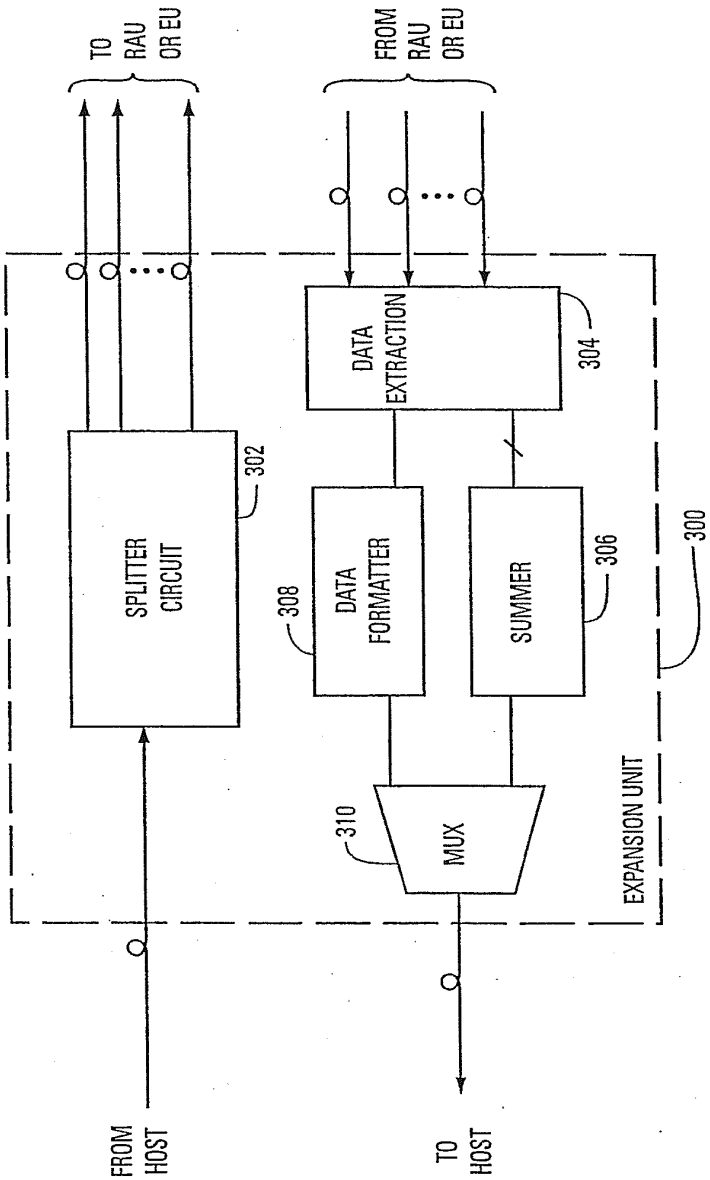


Fig. 3

BNSDOCID: <WO_____03079645A2_I_>

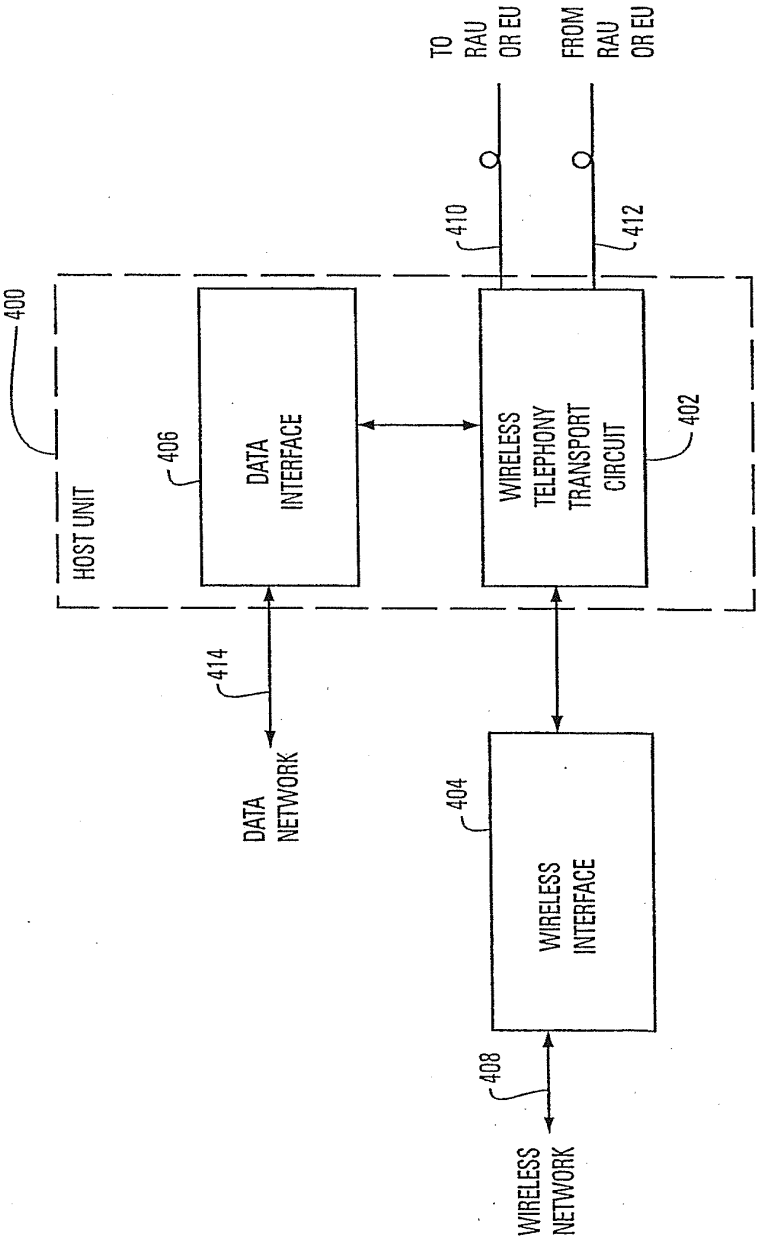


Fig. 4

BNSDOCID: <WO_____03079645A2_I_>

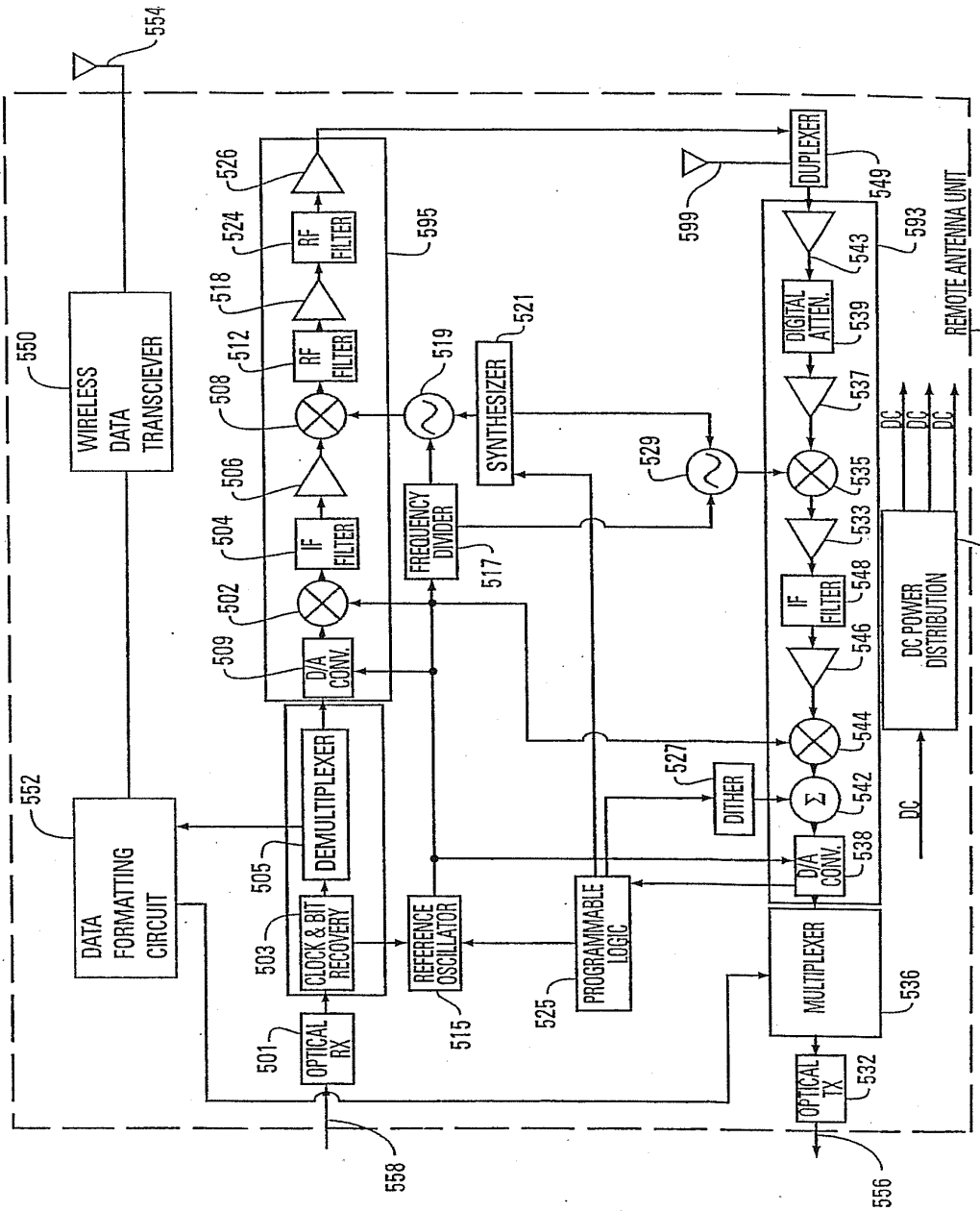


Fig. 5

BNSDOCID: <WO_____03079645A2_I_>

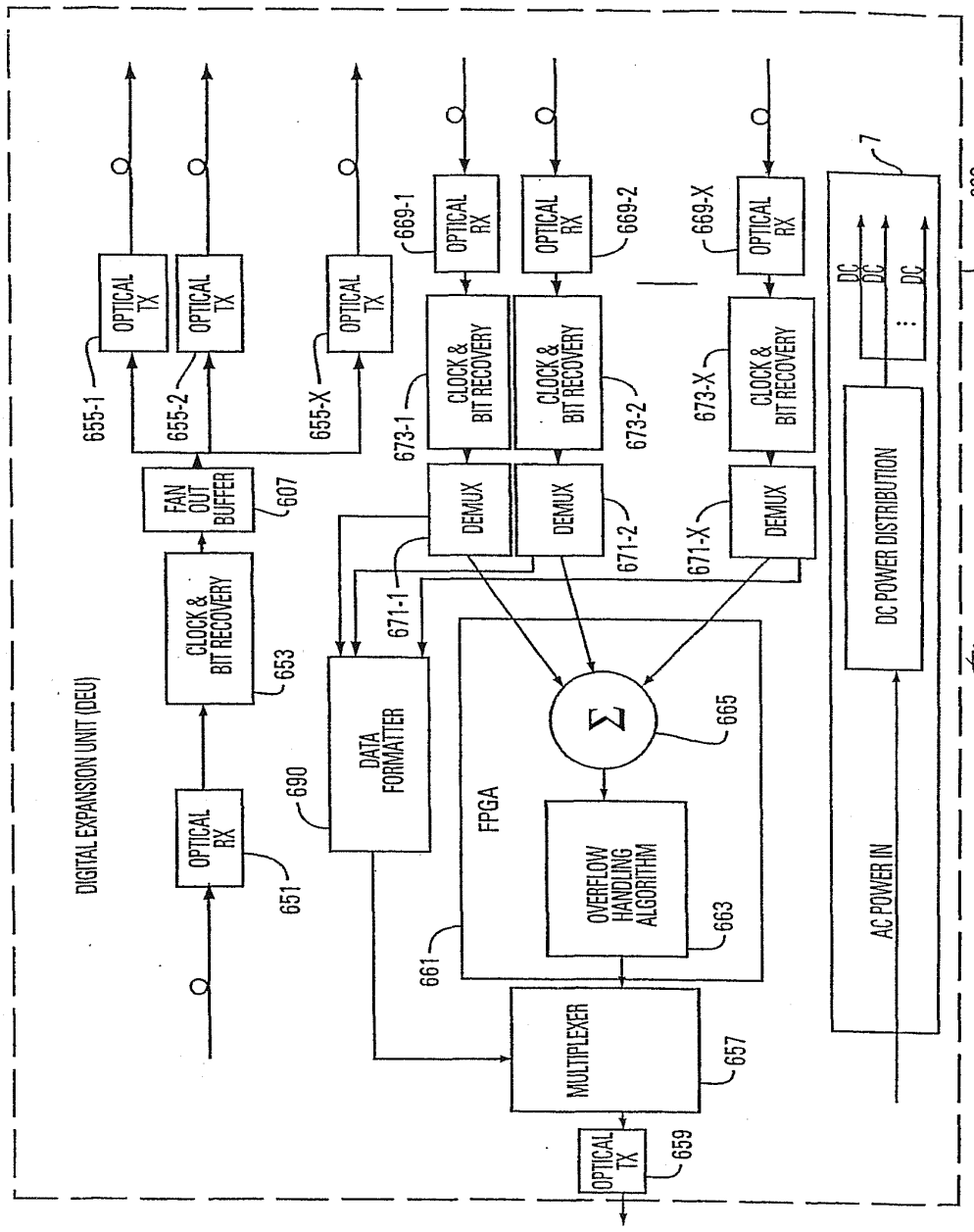

DIGITAL EXPANSION UNIT (DEU)
OPTICAL RX
651
CLOCK & BIT RECOVERY
653
FAN OUT BUFFER
607
OPTICAL TX
655-1
655-2
655-X
DATA FORMATTER
690
FPGA
661
Σ
665
OVERFLOW HANDLING ALGORITHM
663
MULTIPLEXER
657
OPTICAL TX
659
OPTICAL RX
669-1
669-2
669-X
CLOCK & BIT RECOVERY
673-1
673-2
673-X
DEMUX
671-1
671-2
671-X
DC
DC
DC
DC POWER DISTRIBUTION
AC POWER IN
630

Fig. 6

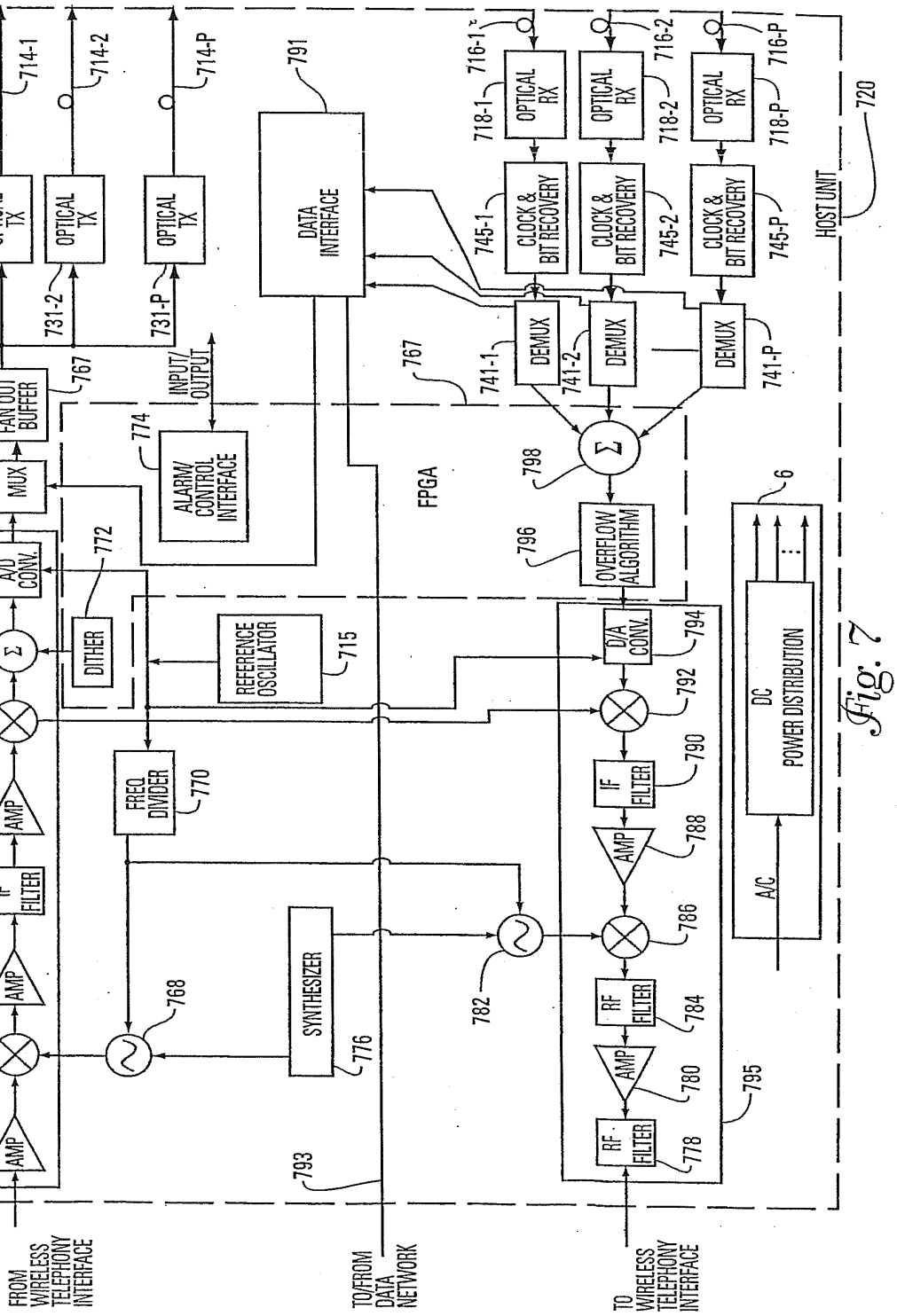

FROM WIRELESS TELEPHONY INTERFACE
TO/FROM DATA NETWORK
TO WIRELESS TELEPHONY INTERFACE
HOST UNIT
720
FPGA
AMP
IF FILTER
RF FILTER
MUX
DEMUX
A/D CONV.
D/A CONV.
DITHER
FREQ DIVIDER
SYNTHESIZER
REFERENCE OSCILLATOR
FAN OUT BUFFER
INPUT/ OUTPUT
ALARM/ CONTROL INTERFACE
DATA INTERFACE
OVERFLOW ALGORITHM
OPTICAL TX
OPTICAL RX
CLOCK & BIT RECOVERY
DC POWER DISTRIBUTION
A/C

Fig. 7

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
25 September 2003 (25.09.2003)

PCT

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(22) International Filing Date: 10 March 2003 (10.03.2003)

(25) Filing Language: English

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(71) Applicant: ADC TELECOMMUNICATIONS, INC. [US/US]; 13625 Technology Drive, Eden Prairie, MN 55344-2252 (US).

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(74) Agent: FOGG, David, N.; Fogg And Associates, LLC, P.O. Box 581339, Minneapolis, MN 55458-1339 (US).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.

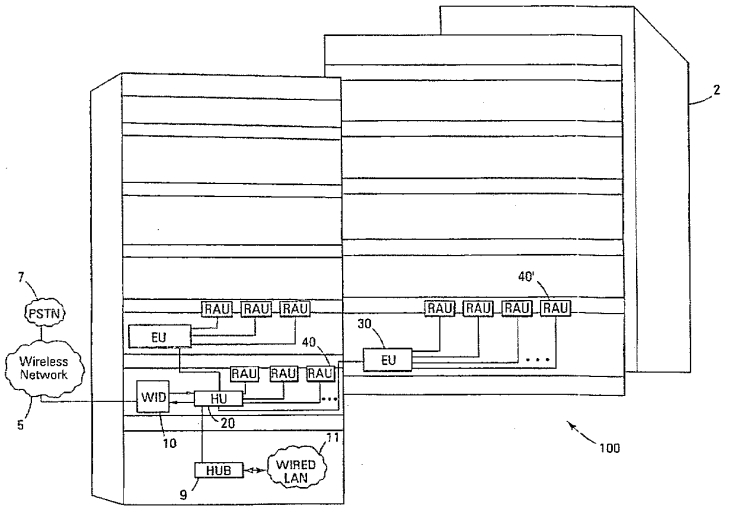
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(88) Date of publication of the international search report: 22 January 2004

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: DISTRIBUTION OF WIRELESS TELEPHONY AND DATA SIGNALS IN A SUBSTANTIALLY CLOSED ENVIRONMENT



(57) Abstract: A communication system (fig. 1) is provided. The communication system includes a host unit (100) that is adapted to communicate wireless telephony signals with network (5). A communication link carries both the wireless telephony signals and the wireless data. At least one remote antenna unit is communicatively coupled to the wirwless telephony signals and the wireless data with wireless terminals. The at least one remote unit further communicates digitized telephony signals and wireless data signals with the host unit over the communication link.

WO 2003/079645 A3

BNSDOCID: <WO_____03079645A3_I_>

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US03/07135

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H04Q 7/20,7/24,7/28
US CL : 455/426.1, 422.1, 403, 517; 370/329, 370/463

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 455/426.1, 422.1, 403, 517; 370/329, 370/463

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
none

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
East

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y,P	US 2002/0034168 A1 (SWARTZ er al.) 21 March 2002, see fig. 6e, pararaphs 0014, 0048.	1,2,3,4,19,20,21
A	US 2002/0090915 A1 (KOMARA et al.) 11 July 2002, see fig. 1 number 50 and 52.1, paragraphs 0017, 0018, 005.	1,2,3,4,19,20,21
X,P	2002/0191635 A1 (CHOW et al.) 19 December 2002, see paragraphs 0147, 0148, 0223, 0207, 0205, 0152, 0146, fig. 9 number 930.	7, 8,9,10,18,13,14,15,17 ,25,26,28,29,30

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Date of the actual completion of the international search	Date of mailing of the international search report
16 June 2003 (16.06.2003)	03 NOV 2003
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230	Authorized officer Keith Ferguson Telephone No. (703) 305-4888

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BNSDOCID: <WO_____03079645A3_I_>

Electronic Acknowledgement Receipt

EFS ID:	4427845
Application Number:	11627255
International Application Number:	
Confirmation Number:	1589
Title of Invention:	DISTRIBUTED REMOTE BASE STATION SYSTEM
First Named Inventor/Applicant Name:	Robert J. Koziy
Customer Number:	34206
Filer:	Aaron Wesley Pederson/Julia Sisterman
Filer Authorized By:	Aaron Wesley Pederson
Attorney Docket Number:	100.829US01
Receipt Date:	10-DEC-2008
Filing Date:	25-JAN-2007
Time Stamp:	12:31:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed (SB/08)	00145900.PDF	780527 4eddf26260a521dda30246bc1083d7d4e0c0d24d	no	4
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Doc code :IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-08)
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	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

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	1	2386037	GB		2003-09-03	MANI ET AL.		☐
	2	9909769	WO		1999-02-25	OGAZ ET AL.		☐

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	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11627255
	Filing Date	2007-01-25
	First Named Inventor	Koziy
	Art Unit	
	Examiner Name	
	Attorney Docket Number	100.829US01

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☒ See attached certification statement.

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

☐ None

SIGNATURE

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

Signature	/David N. Fogg/	Date (YYYY-MM-DD)	2008-08-22
Name/Print	Fogg, David N.	Registration Number	35138

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(12) UK Patent Application (19) GB (11) 2 386 037 (13) A

(43) Date of A Publication 03.09.2003

(21) Application No 0311316.4

(22) Date of Filing 07.06.2002

Date Lodged 16.05.2003

(30) Priority Data

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(31)	60313360	(32)	17.08.2001	
(31)	10012208	(32)	05.11.2001	
(31)	10012246	(32)	05.11.2001	
(31)	10012264	(32)	05.11.2001	
(31)	10117433	(32)	04.04.2002	

(62) Divided from Application No 0213145.6 under Section 15(4) of the Patents Act 1977

(51) INT CL^7 H04Q 7/22

(52) UK CL (Edition V) H4L LRRMX L201 L203

(56) Documents Cited US 5657374 A US 20020186436 A

(58) Field of Search UK CL (Edition V) H4L INT CL^7 H04Q Other: Online: WPI EPODOC PAJ

(71) Applicant(s) NextG Networks (Incorporated in USA - Delaware) 203 Gateway Place, San Jose, California 95110, United States of America

(72) Inventor(s) Sanjay Mani David Cutrer

(74) Agent and/or Address for Service D Young & Co 21 New Fetter Lane, LONDON, EC4A 1DA, United Kingdom

(54) Abstract Title

Distributed network and base stations where each transmission path of a plurality of paths carries a signal representative of an operator's spectrum segment

(57) A network is provided with a plurality of links that couple a plurality of antennas with a plurality of base stations. At least one base station or antenna location is geographically remote from the network and is connected to the network with a free space link. At least one of the plurality of links provides multiple transmission paths between at least a portion of the base stations with at least a portion of the antennas. Each transmission path of the plurality of transmission paths carries a signal representative of a respective segment of wireless spectrum that is associated with a respective operator.

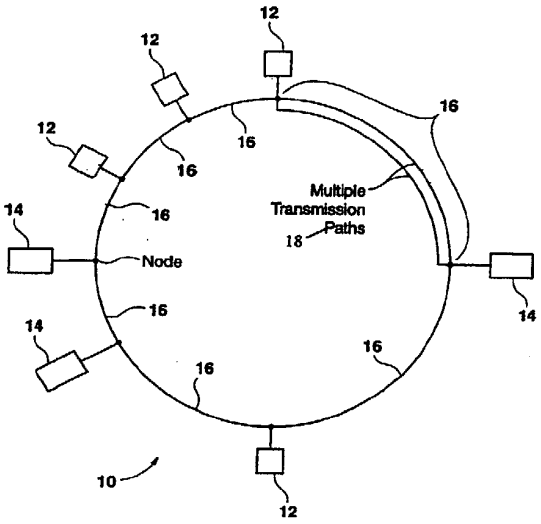


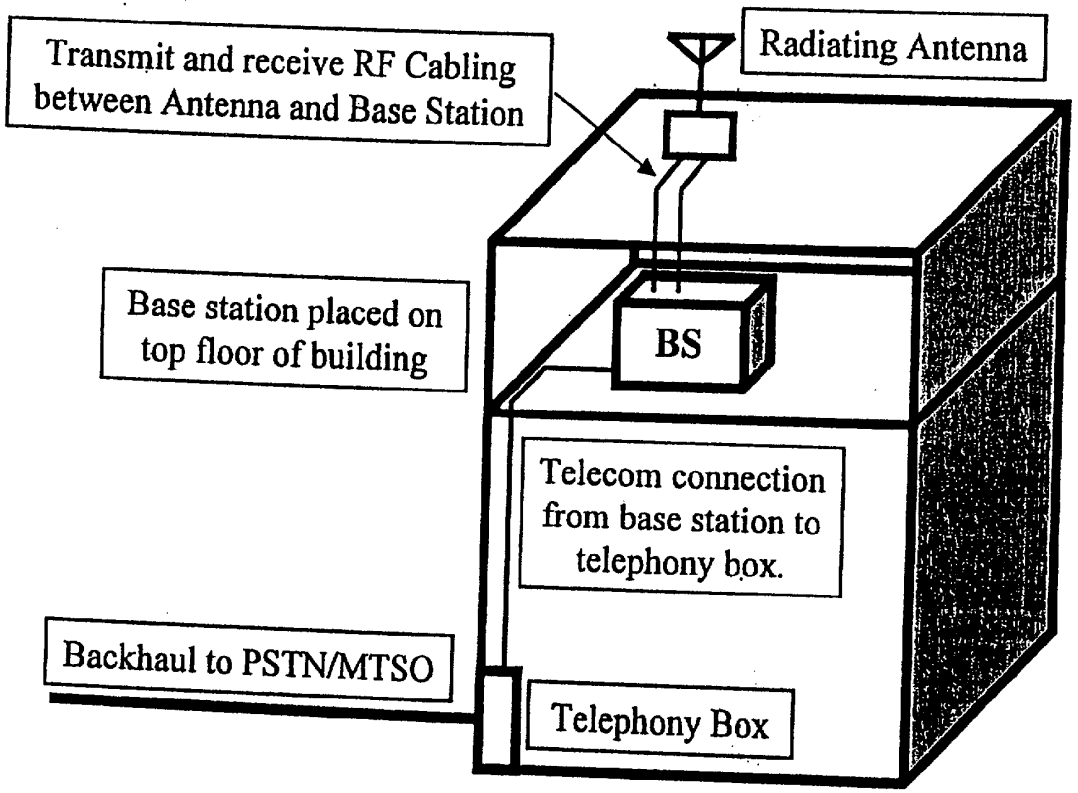
Fig. 5

GB 2 386 037 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

Figure 1

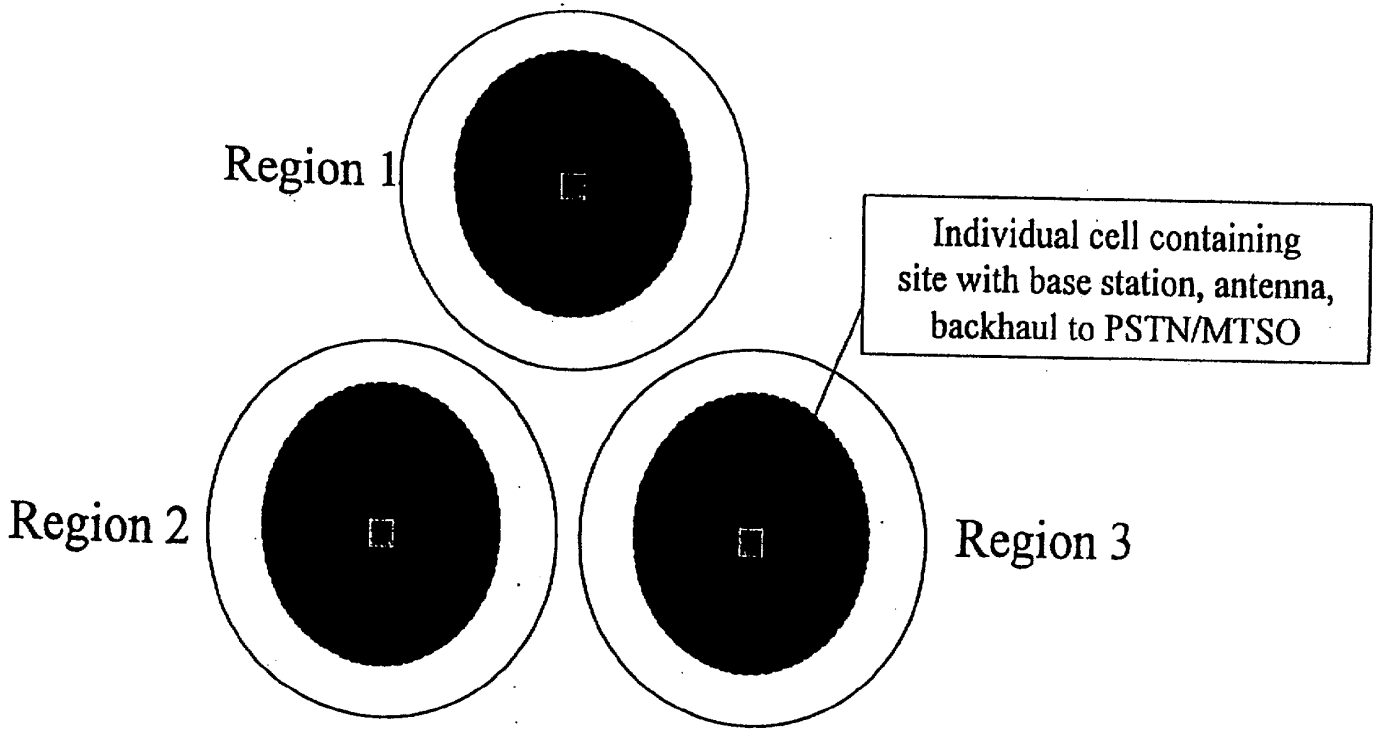
(Prior Art)



EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00458

Figure 2

(Prior Art)



EX-1002
Ericsson Inc. and Verizon Wireless v. Procomm International PTE Ltd.
00459

(Prior Art)

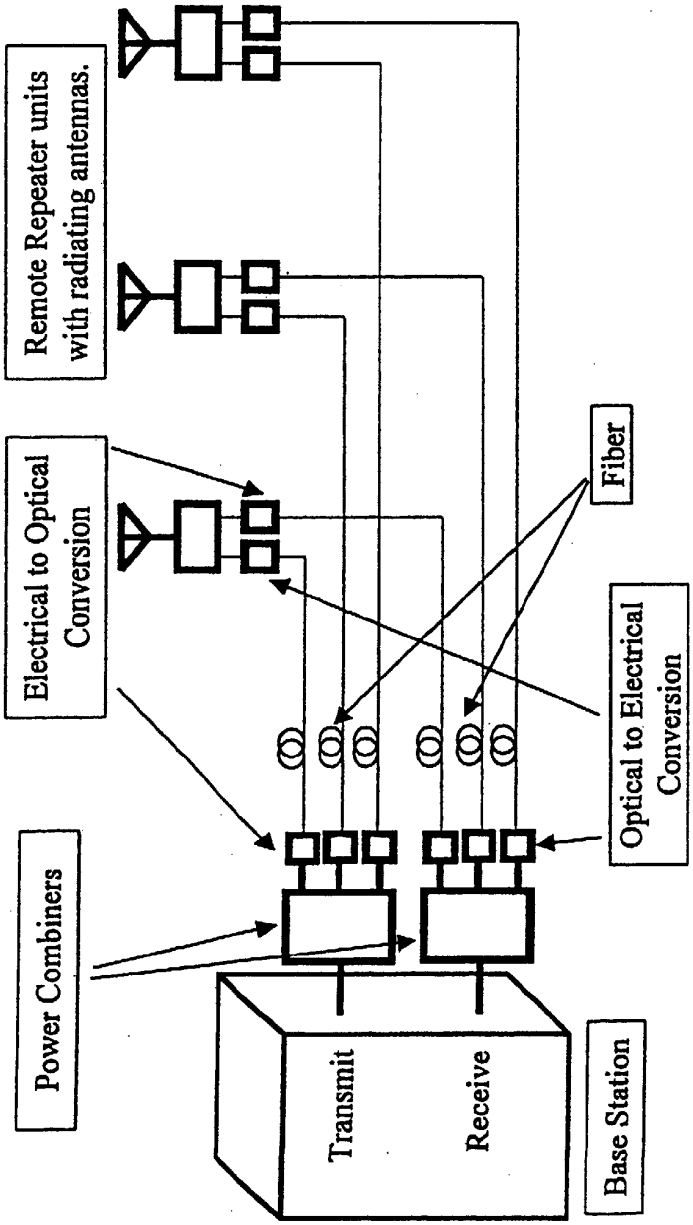


Figure 3

(Prior Art)

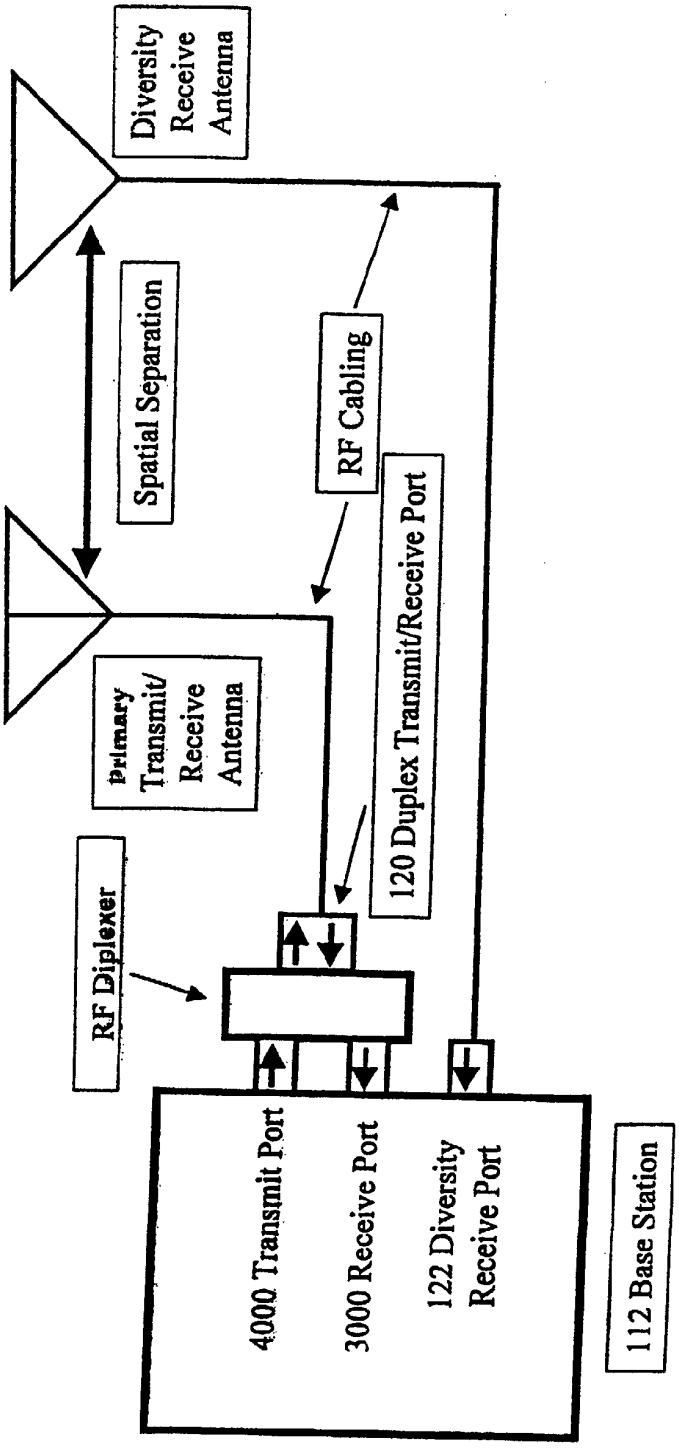


Figure 4

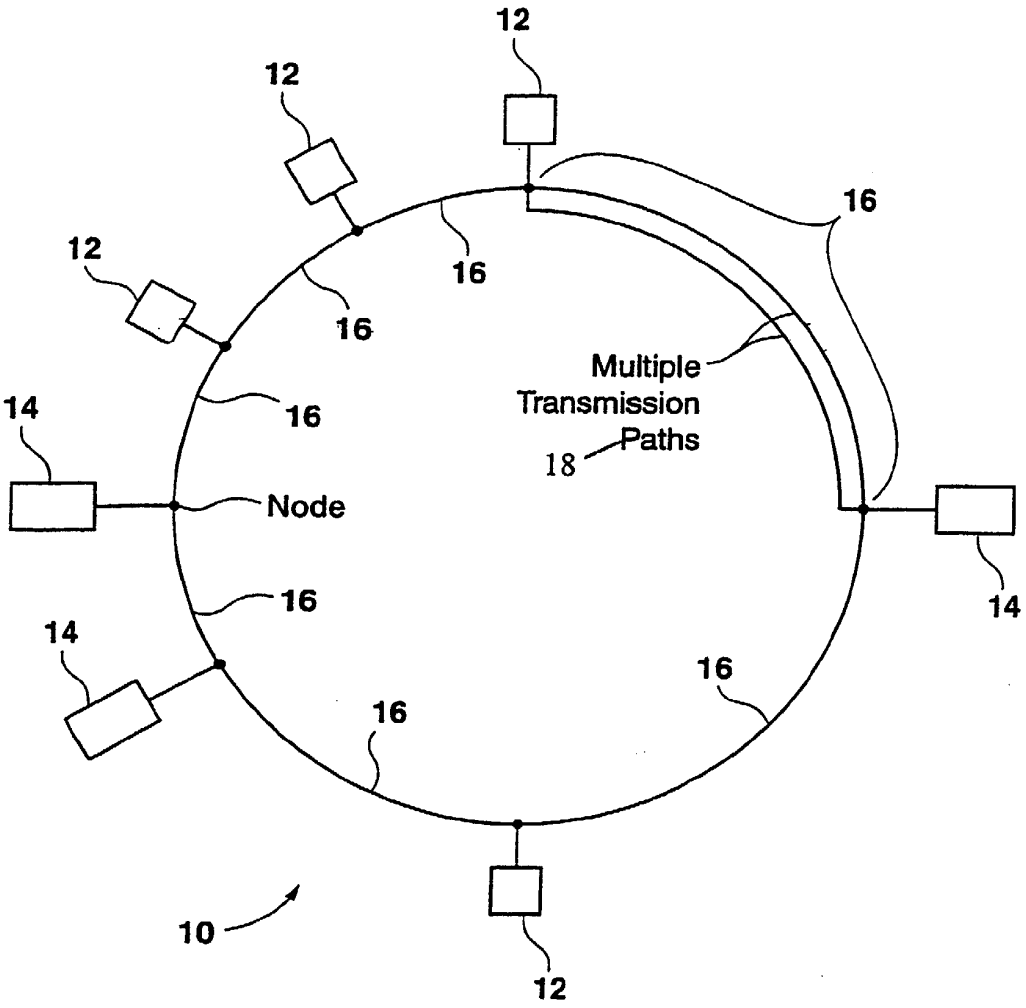

12
12
12
16
16
16
16
Multiple
Transmission
Paths
18
14
Node
16
14
16
16
16
14
10
12

Fig. 5

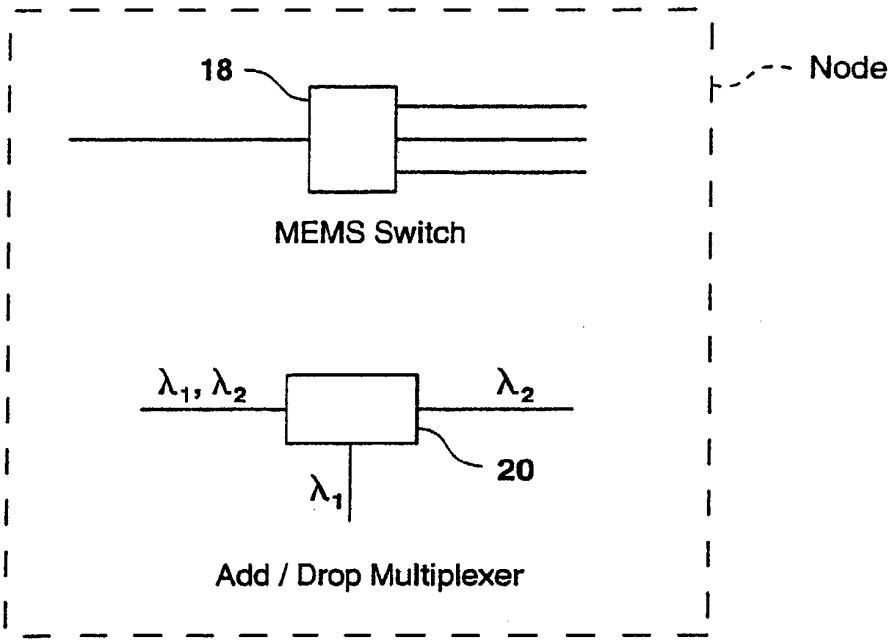

18
Node
MEMS Switch
λ_1, λ_2
λ_2
20
λ_1
Add / Drop Multiplexer

Fig. 6

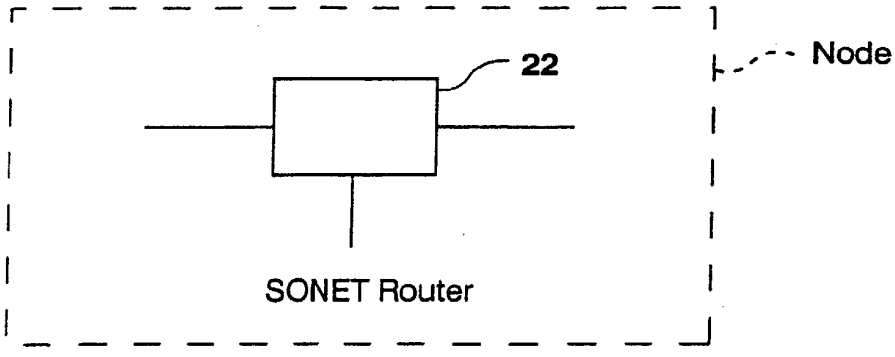

22
Node
SONET Router

Fig. 7

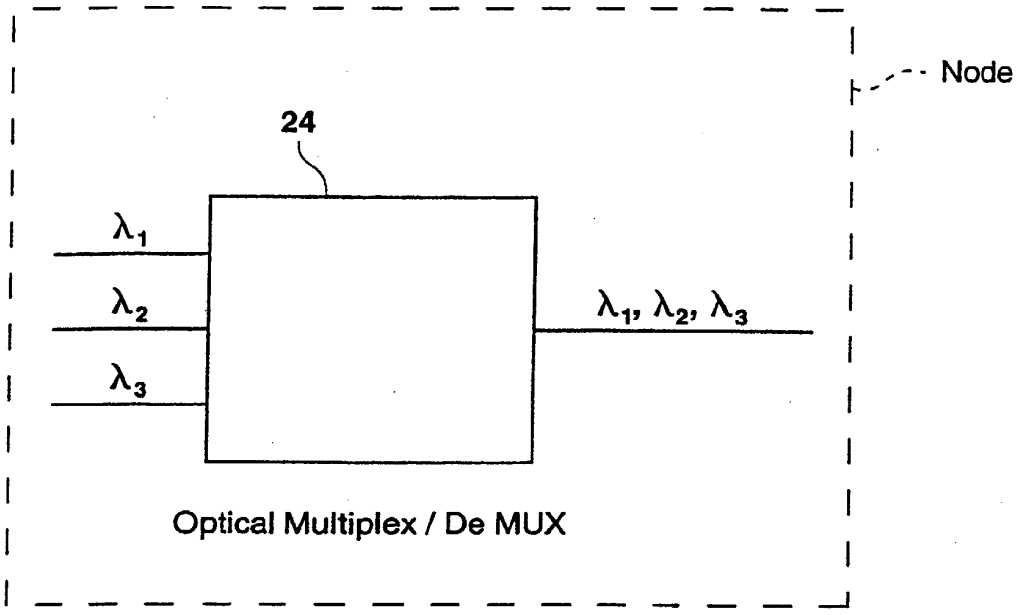

Node
24
λ_1
λ_2
λ_3
$\lambda_1, \lambda_2, \lambda_3$
Optical Multiplex / De MUX

Fig. 8