IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Paul F. Struhsaker	Conf. No.:	2192
Application No.:	13/488,374	Examiner:	Huy C. Ho
Filing Date:	June 4, 2012	Art Unit:	2644
For:	WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS		

INTERVIEW SUMMARY

Dear Examiner:

On January 21, 2015, the undersigned representative conducted a telephonic interview with the Examiner's Supervisor, Examiner Edouard, regarding this case. During the interview, the Request for Suspension of Action filed with the Request for Continued Examination (RCE) filed September 22, 2014 was discussed. It was agreed that because of the Request for Suspension of Action, the mailing of the Notice of Allowance dated October 21, 2014 was improper and that the Notice of Allowance should be vacated. Examiner Edouard indicated that he or the Examiner would issue an Interview Summary today vacating the Notice of Allowance.

The Director is hereby authorized to charge any fees that may be due, or credit any overpayment of fees, to Deposit Account No. 50-4207.

Respectfully submitted,

Date: January 21, 2015

/Matthew T Byrne/
Matthew T. Byrne
Registration No. 40,934
Attorney for Applicant

Byrne Poh LLP
11 Broadway, Suite 1115
New York, NY 10004
Telephone: (212) 509-8870
Facsimile: (212) 931-8521

PETITIONER VERIZON
Ex. 1008

Electronic Acknowledgement Receipt

EFS ID:	21263197
Application Number:	13488374
International Application Number:	
Confirmation Number:	2192
Title of Invention:	WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Customer Number:	70763
Filer:	Matthew T. Byrne/shawn roche
Filer Authorized By:	Matthew T. Byrne
Attorney Docket Number:	9030101.141-US0
Receipt Date:	21-JAN-2015
Filing Date:	04-JUN-2012
Time Stamp:	16:02:30
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)	00072711.PDF	328994 730472e480bb422344978644abe4225da2679813	no	2

Warnings:	
Information:	

This is not an USPTO supplied IDS fillable form					
2	Transmittal Letter	00072825.PDF	184559 a26dbcbb08420dda0d3f3c56d6907d6da981be86	no	1
Warnings:					
Information:					
3	Applicant summary of interview with examiner	00072826.PDF	158910 0ab069bf1794b68cc90d5493ef295cf3a9087a3e	no	1
Warnings:					
Information:					
		Total Files Size (in bytes):	672463		

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

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

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

70763 7590 10/21/2014

Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004

EXAMINER
HO, HUY C

ART UNIT	PAPER NUMBER
2644	

DATE MAILED: 10/21/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0	2192

TITLE OF INVENTION: WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	01/21/2015

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

70763 7590 10/21/2014
Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004

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.
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0	2192

TITLE OF INVENTION: WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	01/21/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
HO, HUY C	2644	455-443000

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

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

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

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

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

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

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

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0	2192

70763 7590 10/21/2014

Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004

EXAMINER	
HO, HUY C	

ART UNIT	PAPER NUMBER
2644	

DATE MAILED: 10/21/2014

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

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

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

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 13/488,374	Applicant(s) STRUHSAKER, PAUL F.	
	Examiner HUY C. HO	Art Unit 2644	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 *09/22/2014*.
   ☐ 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 *1-6*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

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

   * Certified copies not received: _____.

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

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

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

Attachment(s)

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

/HUY C HO/
Primary Examiner, Art Unit 2644

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 09/22/2014 has been entered.

Allowable Subject Matter

2. Claims 1-6 are allowed.

3. The following is an examiner’s statement of reasons for allowance: The reason for allowance is the same as the reason for allowance stated in the Notice of Allowance mailed on 03/11/2014.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUY C. HO whose telephone number is (571)270-1108. The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

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.

/HUY C HO/
Primary Examiner, Art Unit 2644

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	72	((PAUL) near2 (STRUHSAKER)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/07 14:00
S2	45	"6374078"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/07 16:56
S3	2	"US 20080268835"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2012/10/07 17:04
S4	7	"7346347"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/07 17:05
S5	565	455/443.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:28
S6	563	455/444.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:28
S7	9	S6 and (WLAN and WWAN)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:29
S8	170	S6 and (WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:30
S9	28	S8 and (@ad<"20010119"	US-PGPUB;	OR	OFF	2012/10/08

		@rlad<"20010119")	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			13:31
S10	45	"6374078"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:44
S11	145	S5 and (WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:46
S12	18	S11 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:46
S13	56	370/274.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S14	0	S13 and (WLAN and WWAN)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S15	4	S13 and (WLAN WWAN)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S16	0	S15 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S17	13	S13 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2012/10/08 13:51

			IBM_TDB			
S18	12253	370/401.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S19	2505	S18 and (WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S20	751	S18 and (WLAN and (WWAN cellular mobile))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S21	32	S20 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S22	2299	WLAN and (WWAN cellular mobile) and (hot$pot wi$fi) and ((dual multi) near4 mode)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:58
S23	14	S22 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:58
S24	203	455/554.2.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:00
S25	23	S24 and (WLAN and (WWAN cellular mobile))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:00
S26	1	S25 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS;	OR	OFF	2012/10/08 14:00

			EPO; JPO; DERWENT; IBM_TDB			
S27	53	S24 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:01
S28	45	"6374078"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:13
S29	0	S6 and ((dual$mode multi$mode) near5 (tranceiver))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:41
S30	0	S8 and ((dual multiple bi) near5 (mode protocol technology) near7 (tranceiver))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:42
S31	211037	(WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:43
S32	0	S22 and ((dual multiple bi) near5 (mode protocol technology) near7 (tranceiver))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:43
S33	0	S22 and ((dual multiple bi) with mode with tranceiver)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:44
S34	2268	S22 and (dual multiple bi)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:44
S35	290	S22 and ((dual multiple) near5 (tranceiver receiver transmitter))	US-PGPUB; USPAT;	OR	OFF	2012/10/08 14:44

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S36	217	S35 and (access near4 point)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:45
S37	35	S36 and (WLAN near4 (access near4 point))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:46
S38	2	S36 and ((dual$mode multi$mode) near4 (access near4 point))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:46
S39	0	S38 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:46
S40	2582	(WLAN and WWAN) and (access near4 point)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:47
S41	526	S40 and (dual$mode multi$mode)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:47
S42	57	S41 and ((dual multiple) near5 (transceiver receiver transmitter))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:48
S43	5	S42 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:48

S44	47	"6141531"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 15:01
S45	2	"US 20120307815"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2013/06/19 21:12
S46	127829	(mobile moving) near5 ((base near3 station) (access near2 point))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/06/26 00:00
S47	30703	S46 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/06/26 00:04
S48	640	455/426.2.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:01
S49	133	S48 and (wireless near3 (WAN LAN))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:02
S50	126	S49 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:03
S51	1139	455/444.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:17
S52	1139	S51	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:17
S53	634	S52 and (@ad<"20071031"	US-PGPUB;	OR	OFF	2014/01/25

		@rlad<"20071031")	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			15:17
S54	634	S53 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:17
S55	92	S52 and (wireless near3 (WAN LAN))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:18
S56	68	S55 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:18
S57	12	"7346347"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/18 16:38
S58	1030	455/443.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:00
S59	1030	S58	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:00
S60	1030	455/443.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:02
S61	1030	S60	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2014/02/24 04:02

			IBM_TDB			
S62	9784	h04w84/045.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:28
S63	308	S62 and (wireless near3 (WAN LAN))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:28
S64	53	S63 and (monitor$3 near5 (signal channel link))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:29
S65	24	S64 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:29
S66	29324	h04w88/06.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:31
S67	2507	S66 and (wireless near3 (WAN LAN))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:31
S68	391	S67 and (monitor$3 near5 (signal channel link))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:31
S69	298	S68 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:31
S70	108	S69 and ((re$transmit$4 forward$3) near4 (signal))	US-PGPUB; USPAT; USOCR; FPRS;	OR	OFF	2014/02/24 04:33

			EPO; JPO; DERWENT; IBM_TDB			
S71	2	"US 20120120918"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2014/02/24 15:31
S72	1856	455/443-444.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 15:44
S73	22	S72 and ((hand$off hand$over) near6 (fail$3 succeed success) near6 (rate))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 15:45
S74	12	S73 and (@ad<"20070503" @rlad<"20070503")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 15:47
S75	163	("20040213188" | "20120147797" | "5694424" | "6023459" | "6289213" | "6363252" | "7002929" | "7075967" | "20010046859" | "20020098799" | "6013311" | "6014546" | "6188873" | "6587444" | "7069047" | "7239618" | "6560213" | "6564051" | "6859655" | "7031738" | "7230931" | "6374078" | "5115463" | "5915215" | "6052408" | "6097968" | "6839334" | "5604789" | "5684791" | "5790936" | "6035178" | "6150955" | "6891810" | "6925516" | "7274946" | "20020164991" | "5638371" | "5673307" | "5745837" | "5991292" | "6804527" | "6947477" | "7065098" | "20010004595" | "20010041569" | "20020141355" | "5475735" | "5745841" | "5809086" | "5901352" | "6226274" | "6421329" | "6526290" | "7010023" | "7173916" | "20050243745" | "5416831" | "6222503" | "6378119" | "7035241" | "7099383").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/06/13 12:04
S76	2	"US 20130053066"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2014/06/13 17:13

10/15/2014 12:48:17 AM
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BIB DATA SHEET

CONFIRMATION NO. 2192

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/488,374	06/04/2012	455	2644	9030101.141-US0

APPLICANTS

INVENTORS

Paul F. Struhsaker, Plano, TX;

**** CONTINUING DATA ***************************

This application is a CON of 11/982,424 10/31/2007 ABN

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **

06/13/2012

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /HUY C HO/ Examiner's Signature	☐ Met after Allowance HH Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		TX	3	5	1

ADDRESS

Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004
UNITED STATES

TITLE

WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS

FILING FEE RECEIVED		
530	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	**Art Unit**
	HUY C HO	2644

CPC						
Symbol					**Type**	**Version**
H04W		84	/	14	F	2013-01-01
H04W		84	/	12	A	2013-01-01
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	6	
/HUY C HO/ Primary Examiner.Art Unit 2644	10/15/2014	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	**Art Unit**
	HUY C HO	2644

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED				
455	443	H	0	4	W	36 / 00 (2009.01.01)	H	0	4	W	4 / 00 (2009.01.01)
CROSS REFERENCE(S)							H	0	4	W	36 / 00 (2009.01.01)
							H	0	4	W	40 / 00 (2009.01.01)
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)						H	0	4	B	1 / 56 (2006.01.01)
455	426.2	444	448				H	0	4	L	12 / 56
370	274	401									

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	6	
/HUY C HO/ Primary Examiner.Art Unit 2644	10/15/2014	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	**Art Unit**
	HUY C HO	2644

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

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1														
	2														
	3														
	4														
	5														
	6														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 6	
/HUY C HO/ Primary Examiner.Art Unit 2644 (Primary Examiner)	10/15/2014 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	Art Unit
	HUY C HO	2644

CPC- SEARCHED		
Symbol	Date	Examiner
H04W 84/045	2/24/2014	HH

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner
H04W 88/06	2/24/2014	HH

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
455	443	10/8/2012	HH

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Database Search	10/8/2012	HH
Inventor Search complete	10/8/2012	HH
Search update	6/26/2013	HH
Search update	2/24/2014	HH
Information Disclosure Statement (IDS) filed on 06/10/2014 is considered by the examiner.	6/13/2014	HH
Search update	10/15/2014	HH

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
455	444, 554.2	10/8/2012	HH
370	274, 401	10/8/2012	HH

	/HUY C HO/ Primary Examiner.Art Unit 2644

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	13488374	Filing Date	2012-06-04	Docket Number (if applicable)	9030101.121-US0	Art Unit	2644
First Named Inventor	Paul F. Struhsaker			Examiner Name	Huy C. Ho		

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 3
(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 504207

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-09)
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Signature of Registered U.S. Patent Practitioner			
Signature	/Matthew T Byrne/	Date (YYYY-MM-DD)	2014-09-22
Name	Matthew T Byrne	Registration Number	40934

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.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Paul F. Struhsaker	Conf. No.:	2192
Application No.:	13/488,374	Art Unit:	2644
Filed:	June 4, 2012	Examiner:	HO, HUY C
For:	Wireless Communication System and Device for Coupling a Base Station and Mobile Stations		

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Arlington, VA 22313-1450

RCE SUBMISSION AND AMENDMENT

Dear Examiner,

This paper is being filed concurrently with the filing of a Request for Continued Examination (RCE). Prior to this filing, this application has been allowed and the issue fee is due on September 22, 2014. Accordingly, this paper and the RCE are being timely filed.

Amendments to the claim begin on page **2** of this paper.

Remarks begin on page **5** 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. (Previously Presented) A wireless communication device, comprising:

a first wireless transceiver operable to communicate with a base station, wherein the base station communicates with the first wireless transceiver and a plurality of other wireless communication devices according to a wide area wireless communication protocol; and

a second wireless transceiver coupled to the first wireless transceiver and operable to directly communicate with a first mobile station and a second mobile station, wherein the second wireless transceiver communicates with the first mobile station and the second mobile station according to a local area wireless communication protocol,

wherein the first wireless transceiver receives from the base station a first downlink signal intended for the first mobile station and provides the first downlink signal to the second wireless transceiver and wherein the second wireless transceiver receives the first downlink signal and re-transmits the first downlink signal to the first mobile station as a second downlink signal according to the local area wireless communication protocol, and

wherein the second transceiver monitors first signal characteristics of the second downlink signal of the first mobile station and monitors second signal characteristics of the second mobile station, and based on the first signal characteristics and the second characteristics, routes information to the first mobile station and the second mobile station, respectively.

2. (Original) The wireless communication device of claim 1, wherein the second wireless transceiver is coupled to the first wireless transceiver by a wireline connection.

3. (Original) The wireless communication device of claim 2, wherein the second wireless transceiver is removably coupled to the first wireless transceiver.

4. (Previously Presented) The wireless communication device of claim 1, wherein the first wireless transceiver and second wireless transceiver are disposed in a fixed site subscriber station.

5. (Original) The wireless communication device of claim 1, wherein the first wireless transceiver and the second wireless transceiver are part of an integrated device.

6. (New) A method for communicating with a wireless communication device, comprising:

a first wireless transceiver operable to communicate with a base station, wherein the base station communicates with the first wireless transceiver and a plurality of other wireless communication devices according to a wide area wireless communication protocol; and

a second wireless transceiver coupled to the first wireless transceiver and operable to directly communicate with a first mobile station and a second mobile station, wherein the second wireless transceiver communicates with the first mobile station and the second mobile station according to a local area wireless communication protocol,

the method comprising:

receiving, using the first wireless transceiver from the base station, a first downlink signal intended for the first mobile station;

providing, using the first wireless transceiver, the first downlink signal to the second wireless transceiver;

receiving, using the second wireless transceiver, the first downlink signal and re-transmitting the first downlink signal to the first mobile station as a second downlink signal according to the local area wireless communication protocol;

monitoring, using the second transceiver, first signal characteristics of the second downlink signal of the first mobile station;

monitoring, using the second transceiver, second signal characteristics of the second mobile station; and

based on the first signal characteristics and the second characteristics, routing, using the second transceiver, information to the first mobile station and the second mobile station, respectively.

REMARKS

Claims 1-5 were pending in the present application. A Notice of Allowance and Issue Fee Due was mailed on June 20, 2014, making the issue fee due on September 22, 2014 (September 20, 2014 was a Saturday).

This paper is being filed with a Request for Continued Examination (RCE). **In the RCE, applicant has requested a three-month suspension of the examination of this application.**

In this paper, applicant has added new claim 6. New claim 6 is fully supported and justified by the original specification, claims, and drawings, and no new matter has been added. For example, new claim 6 is supported by allowed claim 1.

The Director is hereby authorized to charge any fees that may be due, or to credit any overpayment of the same, to Deposit Account No. 50-4207.

In the event that an extension of time is required, or which may be required in addition to that requested in any petition for extension of time filed previously or herewith, the Director is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. 50-4207.

For at least the reasons set forth above, applicant respectfully submits that the present application, as amended, is in condition for allowance. Reconsideration and prompt allowance of the application (after the three-month suspension requested in the RCE filed herewith) are respectfully requested.

Respectfully submitted,

/Matthew T. Byrne /

Matthew T. Byrne
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Date: September 22, 2014

Electronic Patent Application Fee Transmittal

Application Number:	13488374
Filing Date:	04-Jun-2012
Title of Invention:	WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Filer:	Matthew T. Byrne
Attorney Docket Number:	9030101.141-US0

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
PROCESSING FEE, EXCEPT PROV. APPLS.	2830	1	70	70
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
RCE - 2nd and Subsequent Request	2820	1	850	850
		Total in USD ($)		**920**

Electronic Acknowledgement Receipt

EFS ID:	20212126
Application Number:	13488374
International Application Number:	
Confirmation Number:	2192
Title of Invention:	WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Customer Number:	70763
Filer:	Matthew T. Byrne
Filer Authorized By:	
Attorney Docket Number:	9030101.141-US0
Receipt Date:	22-SEP-2014
Filing Date:	04-JUN-2012
Time Stamp:	21:56:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$920
RAM confirmation Number	8448
Deposit Account	504207
Authorized User	BYRNE, MATTHEW T.

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	Request for Continued Examination (RCE)	9030101_141_US0_RCE.pdf	697522 1ceca7deabe81bc8dbe829836a15d71a3a959938	no	3
Warnings:					
Information:					
2		9030101_141_US0_RCESubmission.pdf	159978 8d6cc1bcd0b9bb1f4b3287a6567cfb535e0a4c12	yes	6

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment Submitted/Entered with Filing of CPA/RCE	1	1
	Claims	2	4
	Applicant Arguments/Remarks Made in an Amendment	5	6

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32215 37800df73db46a017fa052f7e81df86c1422f0a7	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	889715	

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/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/488,374	Filing Date 06/04/2012	☐ 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	09/22/2014	(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))	* 6	Minus	** 20	= 0	X $40 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $210 =	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
/KIMBERLY PANNELL/

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.

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

70763 7590 06/20/2014

Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004

EXAMINER
HO, HUY C

ART UNIT	PAPER NUMBER
2644	

DATE MAILED: 06/20/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0	2192

TITLE OF INVENTION: WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	09/22/2014

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

70763 7590 06/20/2014
Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004

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.
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0	2192

TITLE OF INVENTION: WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	09/22/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
HO, HUY C	2644	455-443000

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

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

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

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

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

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

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

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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.
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0	2192

70763 7590 06/20/2014

Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004

EXAMINER	
HO, HUY C	

ART UNIT	PAPER NUMBER
2644	

DATE MAILED: 06/20/2014

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

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

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

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 13/488,374	Applicant(s) STRUHSAKER, PAUL F.	
	Examiner HUY C. HO	Art Unit 2644	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 *06/10/2014*.
   ☐ 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 *1-5*. 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 06/10/2014
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/HUY C HO/
Primary Examiner, Art Unit 2644

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 06/10/2014 has been entered.

Information Disclosure Statement

2. The Information Disclosure Statement (IDS) filed on 06/10/2014 is acknowledged and considered by the examiner.

Allowable Subject Matter

3. Claims 1-5 are allowed.

4. The following is an examiner’s statement of reasons for allowance: The Information Disclosure Statement (IDS) filed on

06/10/2014 has been acknowledged and considered by the examiner. No reference shown from the new IDS provides teachings, suggestions or disclosures of the unique claimed features of the independent claim 1 as filed on 01/01/2014.

Therefore, claims 1-5 are deemed allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUY C. HO whose telephone number is (571)270-1108. The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

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.

/HUY C HO/
Primary Examiner, Art Unit 2644

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BIB DATA SHEET

CONFIRMATION NO. 2192

SERIAL NUMBER	FILING or 371(c) DATE / RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/488,374	06/04/2012	455	2644	9030101.141-US0

APPLICANTS

INVENTORS

Paul F. Struhsaker, Plano, TX;

**** CONTINUING DATA ***************************

This application is a CON of 11/982,424 10/31/2007 ABN

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **

06/13/2012

Foreign Priority claimed	35 USC 119(a-d) conditions met	Verified and Acknowledged		STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ Yes ☑ No	☐ Yes ☑ No	/HUY C HO/ Examiner's Signature	☐ Met after Allowance HH Initials	TX	3	5	1

ADDRESS

Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004
UNITED STATES

TITLE

Wireless Communication System and Device For Coupling A Base Station and Mobile Stations

FILING FEE RECEIVED		
530	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

BIB (Rev. 05/07).

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	Art Unit
	HUY C HO	2644

CPC- SEARCHED		
Symbol	Date	Examiner
H04W 84/045	2/24/2014	HH

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner
H04W 88/06	2/24/2014	HH

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
455	443	10/8/2012	HH

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Database Search	10/8/2012	HH
Inventor Search complete	10/8/2012	HH
Search update	6/26/2013	HH
Search update	2/24/2014	HH
Information Disclosure Statement (IDS) filed on 06/10/2014 is considered by the examiner.	6/13/2014	HH

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
455	444, 554.2	10/8/2012	HH
370	274, 401	10/8/2012	HH

	/HUY C HO/ Primary Examiner.Art Unit 2644

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	**Art Unit**
	HUY C HO	2644

CPC						
Symbol					**Type**	**Version**
H04W		84	/	14	F	2013-01-01
H04W		84	/	12	A	2013-01-01
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	5	
/HUY C HO/ Primary Examiner.Art Unit 2644	06/13/2014	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	**Art Unit**
	HUY C HO	2644

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED				
455	443	H	0	4	W	36 / 00 (2009.01.01)	H	0	4	W	4 / 00 (2009.01.01)
CROSS REFERENCE(S)							H	0	4	W	36 / 00 (2009.01.01)
							H	0	4	W	40 / 00 (2009.01.01)
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)						H	0	4	B	1 / 56 (2006.01.01)
455	426.2	444	448				H	0	4	L	12 / 56
370	274	401									

NONE (Assistant Examiner) (Date)	Total Claims Allowed: 5	
/HUY C HO/ Primary Examiner.Art Unit 2644 06/13/2014 (Primary Examiner) (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	**Art Unit**
	HUY C HO	2644

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

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1														
	2														
	3														
	4														
	5														

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	5	
/HUY C HO/ Primary Examiner.Art Unit 2644	06/13/2014	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	72	((PAUL) near2 (STRUHSAKER)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/07 14:00
S2	45	"6374078"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/07 16:56
S3	2	"US 20080268835"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2012/10/07 17:04
S4	7	"7346347"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/07 17:05
S5	565	455/443.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:28
S6	563	455/444.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:28
S7	9	S6 and (WLAN and WWAN)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:29
S8	170	S6 and (WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:30
S9	28	S8 and (@ad<"20010119"	US-PGPUB;	OR	OFF	2012/10/08

		@rlad<"20010119")	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			13:31
S10	45	"6374078"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:44
S11	145	S5 and (WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:46
S12	18	S11 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:46
S13	56	370/274.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S14	0	S13 and (WLAN and WWAN)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S15	4	S13 and (WLAN WWAN)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S16	0	S15 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S17	13	S13 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2012/10/08 13:51

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S18	12253	370/401.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S19	2505	S18 and (WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S20	751	S18 and (WLAN and (WWAN cellular mobile))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S21	32	S20 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S22	2299	WLAN and (WWAN cellular mobile) and (hot$pot wi$fi) and ((dual multi) near4 mode)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:58
S23	14	S22 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:58
S24	203	455/554.2.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:00
S25	23	S24 and (WLAN and (WWAN cellular mobile))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:00
S26	1	S25 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS;	OR	OFF	2012/10/08 14:00

			EPO; JPO; DERWENT; IBM_TDB			
S27	53	S24 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:01
S28	45	"6374078"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:13
S29	0	S6 and ((dual$mode multi$mode) near5 (tranceiver))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:41
S30	0	S8 and ((dual multiple bi) near5 (mode protocol technology) near7 (tranceiver))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:42
S31	211037	(WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:43
S32	0	S22 and ((dual multiple bi) near5 (mode protocol technology) near7 (tranceiver))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:43
S33	0	S22 and ((dual multiple bi) with mode with tranceiver)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:44
S34	2268	S22 and (dual multiple bi)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:44
S35	290	S22 and ((dual multiple) near5 (tranceiver receiver transmitter))	US-PGPUB; USPAT;	OR	OFF	2012/10/08 14:44

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S36	217	S35 and (access near4 point)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:45
S37	35	S36 and (WLAN near4 (access near4 point))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:46
S38	2	S36 and ((dual$mode multi$mode) near4 (access near4 point))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:46
S39	0	S38 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:46
S40	2582	(WLAN and WWAN) and (access near4 point)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:47
S41	526	S40 and (dual$mode multi$mode)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:47
S42	57	S41 and ((dual multiple) near5 (transceiver receiver transmitter))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:48
S43	5	S42 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:48

S44	47	"6141531"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 15:01
S45	2	"US 20120307815"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2013/06/19 21:12
S46	127829	(mobile moving) near5 ((base near3 station) (access near2 point))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/06/26 00:00
S47	30703	S46 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/06/26 00:04
S48	640	455/426.2.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:01
S49	133	S48 and (wireless near3 (WAN LAN))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:02
S50	126	S49 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:03
S51	1139	455/444.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:17
S52	1139	S51	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:17
S53	634	S52 and (@ad<"20071031"	US-PGPUB;	OR	OFF	2014/01/25

		@rlad<"20071031")	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			15:17
S54	634	S53 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:17
S55	92	S52 and (wireless near3 (WAN LAN))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:18
S56	68	S55 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:18
S57	12	"7346347"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/18 16:38
S58	1030	455/443.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:00
S59	1030	S58	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:00
S60	1030	455/443.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:02
S61	1030	S60	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2014/02/24 04:02

			IBM_TDB			
S62	9784	h04w84/045.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:28
S63	308	S62 and (wireless near3 (WAN LAN))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:28
S64	53	S63 and (monitor$3 near5 (signal channel link))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:29
S65	24	S64 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:29
S66	29324	h04w88/06.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:31
S67	2507	S66 and (wireless near3 (WAN LAN))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:31
S68	391	S67 and (monitor$3 near5 (signal channel link))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:31
S69	298	S68 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:31
S70	108	S69 and ((re$transmit$4 forward$3) near4 (signal))	US-PGPUB; USPAT; USOCR; FPRS;	OR	OFF	2014/02/24 04:33

			EPO; JPO; DERWENT; IBM_TDB			
S71	2	"US 20120120918"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2014/02/24 15:31
S72	1856	455/443-444.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 15:44
S73	22	S72 and ((hand$off hand$over) near6 (fail$3 succeed success) near6 (rate))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 15:45
S74	12	S73 and (@ad<"20070503" @rlad<"20070503")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 15:47
S75	163	("20040213188" | "20120147797" | "5694424" | "6023459" | "6289213" | "6363252" | "7002929" | "7075967" | "20010046859" | "20020098799" | "6013311" | "6014546" | "6188873" | "6587444" | "7069047" | "7239618" | "6560213" | "6564051" | "6859655" | "7031738" | "7230931" | "6374078" | "5115463" | "5915215" | "6052408" | "6097968" | "6839334" | "5604789" | "5684791" | "5790936" | "6035178" | "6150955" | "6891810" | "6925516" | "7274946" | "20020164991" | "5638371" | "5673307" | "5745837" | "5991292" | "6804527" | "6947477" | "7065098" | "20010004595" | "20010041569" | "20020141355" | "5475735" | "5745841" | "5809086" | "5901352" | "6226274" | "6421329" | "6526290" | "7010023" | "7173916" | "20050243745" | "5416831" | "6222503" | "6378119" | "7035241" | "7099383").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/06/13 12:04

6/13/2014 4:26:40 PM
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of 7

Complete if Known	
Application Number	13/488,374
Filing Date	06-04-2012
First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
Attorney Docket Number	9030101.141-US0

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 20020164991	11-07-2002	Arazi et al.	
		US- 5694424	12-02-1997	Ariyavisitakul	
		US- 5809086	09-15-1998	Ariyavisitakul	
		US- 6097968	08-01-2000	Bannister et al.	
		US- 6035178	03-07-2000	Chennakeshu et al.	
		US- 5416831	05-16-1995	Chewning et al.	
		US- 6023459	02-08-2000	Clark et al.	
		US- 2001-0004595	06-21-2001	Dent, Paul Wilkinson	
		US- 5790936	08-04-1998	Dinkins	
		US- 6289213	09-11-2001	Flint et al.	
		US- 5991292	11-23-1999	Focsaneanu et al.	
		US- 5745837	04-28-1998	Fuhrmann, Amir Michael	
		US- 20120147797	06-14-2012	Furuskar et al.	
		US- 6014546	01-11-2000	Georges et al.	
		US- 6222503	04-24-2001	Gietema et al.	
		US- 6016311	01-18-2000	Gilbert et al.	
		US- 6363252	03-26-2002	Hamalainen et al.	
		US- 5673307	09-30-1997	Holland et al.	
		US- 6560213	05-06-2003	Izadpanah et al.	

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		WO/1999/009762	12-30-1899	Elrefaie et al.		
		WO/1999/029126	12-30-1899	Joeressen, Olaf J.		
		EP 0690637	01-03-1996	Lerman, Ruvin I.		
		EP 0690638	01-03-1996	Lerman, Ruvin I.		

Examiner Signature	/Huy Ho/ (06/13/2014)	Date Considered	

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Sheet 2 of 7

Complete if Known	
Application Number	13/488,374
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First Named Inventor	Paul F. Struhsaker
Art Unit	2644
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Attorney Docket Number	9030101.141-US0

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		US- 6421329	07-16-2002	Kikinis, Dan	
		US- 2001-0046859	11-29-2001	Kil, Tae-Young	
		US- 6839334	01-04-2005	Krishnamoorthy et al.	
		US- 7239618	07-03-2007	La Porta et al.	
		US- 6587444	07-01-2003	Lenzo et al.	
		US- 5604789	02-18-1997	Lerman	
		US- 5115463	05-19-1992	Moldavsky et al.	
		US- 20010041569	11-15-2001	Rahman	
		US- 6378119	04-23-2002	Raves	
		US- 5638371	06-10-1997	Raychaudhuri et al.	
		US- 5684791	11-04-1997	Raychaudhuri et al.	
		US- 6226274	05-01-2001	Reese et al.	
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		US- 7010023	03-07-2006	Sato, Toshifumi	
		US- 20050243745	11-03-2005	Stanwood et al.	
		US- 5901352	05-04-1999	St-Pierre et al.	
		US- 20020141355	10-03-2002	Struhsaker et al.	
		US- 7173916	02-06-2007	Struhsaker et al.	
		US- 6891810	05-10-2005	Struhsaker et al.	

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Sheet 3 of 7

Complete if Known	
Application Number	13/488,374
Filing Date	06-04-2012
First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
Attorney Docket Number	9030101.141-US0

U. S. PATENT DOCUMENTS

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		US- 20020098799	07-25-2002	Struhsaker et al.	
		US- 20040213188	10-28-2004	Struhsaker et al.	
		US- 7075967	06-11-2006	Struhsaker et al.	
		US- 7099383	08-29-2006	Struhsaker et al.	
		US- 6947477	09-20-2005	Struhsaker et al.	
		US- 6564051	05-13-2003	Struhsaker et al.	
		US- 7069047	06-27-2006	Struhsaker et al.	
		US- 6804527	10-12-2004	Struhsaker et al.	
		US- 7065098	06-20-2006	Struhsaker et al.	
		US- 7002929	02-21-2006	Struhsaker et al.	
		US- 6925516	08-02-2005	Struhsaker et al.	
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		US- 6859655	02-22-2005	Struhsaker, Paul F.	
		US- 7274946	09-25-2007	Struhsaker, Paul F.	
		US- 7031738	04-18-2006	Struhsaker, Paul F.	
		US- 7035241	04-25-2006	Struhsaker, Paul F.	
		US- 6150955	11-21-2000	Tracy et al.	
		US- 6188873	02-13-2001	Wickman et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 4 of 7

Complete if Known	
Application Number	13/488,374
Filing Date	06-04-2012
First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
Attorney Docket Number	9030101.141-US0

U. S. PATENT DOCUMENTS

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		US- 5475735	12-12-1995	Williams et al.	
		US- 5915215	06-22-1999	Williams et al.	
		US- 6526290	02-25-2003	Yla-Mella et al.	
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Examiner Signature	/Huy Ho/ (06/13/2014)	Date Considered	

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Sheet 5 of 7

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Application Number	13/488,374
Filing Date	06-04-2012
First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
Attorney Docket Number	9030101.141-US0

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Bellamy, J., "Digital Telephony", 2nd Edition, John Wiley and Sons, 1990.	
		European Telecommunications Standards Institute, "Broadband Radio Access Networks, Inventory of Broadband Radio Technologies and Techniques", ETSI TR 101 173 V1.1, May 1998, chapter 7, pp. 29-38.	
		Goodman, D. J. et. al., "Packet Reservation Multiple Access for Local Wireless Communications", In IEEE Transactions on Communications, vol. 37, no. 8, August 1989, pp. 885-890.	
		Kubbar, O. and Mouftah, H.T., "Multiple Access Control Protocols for Wireless ATM: Problems Definition and Design Objectives", In IEEE Comunication Magazine, vol. 35, no. 11, November 1997, pp. 93-99.	
		Office Action dated 05/04/2011 in US Application No. 11/982,424	
		Office Action dated 05/23/2011 in US Application No. 11/982,404	
		Office Action dated 06/14/2013 in US Application No. 13/532,650	
		Office Action dated 06/27/2011 in US Application No. 11/982,459	
		Office Action dated 07/06/2011 in US Application No. 11/982,458	
		Office Action dated 09/02/2010 in US Application No. 11/982,404	

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Sheet 6 of 7

Complete if Known	
Application Number	13/488,374
Filing Date	06-04-2012
First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
Attorney Docket Number	9030101.141-US0

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Office Action dated 09/16/2010 in US Application No. 11/982,461	
		Office Action dated 09/25/2012 in US Application No. 13/532,650	
		Office Action dated 09/29/2010 in US Application No. 11/982,424	
		Office Action dated 09/29/2010 in US Application No. 11/982,459	
		Office Action dated 10/13/2010 in US Application No. 11/982,458	
		Office Action dated 10/29/2010 in US Application No. 11/982,463	
		Office Action dated 5/7/2004 in U.S. Patent Application No. 09/839,499.	
		Office Action dated 7/21/2006 in U.S. Patent Application No. 09/839,499.	
		Rappaport, T., "Wireless Communications, Principles and Practice", IEEE Press, 1996, chapter 8, pp. 395-436.	
		Roman, V.I., "Frequency Reuse and System Deployment in Local Multipoint Distibution Service," IEEE Personal Communications, December 1999, pp. 20-27.	

Examiner Signature	/Huy Ho/ (06/13/2014)	Date Considered	

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Complete if Known	
Application Number	13/488,374
Filing Date	06-04-2012
First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
Attorney Docket Number	9030101.141-US0

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Sklar, B., "Digital Communications Fundamentals and Applications", Prentice Hall, 1988, chapter 9, pp. 520-597.	

Examiner Signature	/Huy Ho/ (06/13/2014)	Date Considered	

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

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

This collection of information is required by 37 CFR 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 2 hours 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, 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 (1-800-786-9199) and select option 2.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /H.H./

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

Application Number	13/488,374	Filing Date	2012-06-04	Docket Number (if applicable)	9030101.141-US0	Art Unit	2644
First Named Inventor	Paul F. Struhsaker			Examiner Name	Huy C. Ho		

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 _____

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Signature of Registered U.S. Patent Practitioner			
Signature	/Matthew T Byrne/	Date (YYYY-MM-DD)	2014-06-10
Name	Matthew T. Byrne	Registration Number	40934

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:	13488374
Filing Date:	04-Jun-2012
Title of Invention:	Wireless Communication System and Device For Coupling A Base Station and Mobile Stations
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Filer:	Matthew T. Byrne/Renece Robin
Attorney Docket Number:	9030101.141-US0

Filed as Small 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($)
Miscellaneous:				
RCE - 2nd and Subsequent Request	2820	1	850	850
		Total in USD ($)		**850**

Electronic Acknowledgement Receipt

EFS ID:	19260485
Application Number:	13488374
International Application Number:	
Confirmation Number:	2192
Title of Invention:	Wireless Communication System and Device For Coupling A Base Station and Mobile Stations
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Customer Number:	70763
Filer:	Matthew T. Byrne/Renece Robin
Filer Authorized By:	Matthew T. Byrne
Attorney Docket Number:	9030101.141-US0
Receipt Date:	10-JUN-2014
Filing Date:	04-JUN-2012
Time Stamp:	14:29:13
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$850
RAM confirmation Number	773
Deposit Account	504207
Authorized User	BYRNE, MATTHEW T.

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)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	9030101_141_US0_Trans.pdf	134138 9e9138c1723f77cac87df14e79f5f64d94cd5a0d	no	1
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	9030101_141_US0_IDS_6_10_2014.pdf	647264 a4d70c8db3d3a7f69e05673cdbee7a8eeda2d29b	no	7
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	1989_Goodman.PDF	2620306 acf9bed65c5b3bf2960e8c011d0b598ec3bd0355	no	6
Warnings:					
Information:					
4	Non Patent Literature	1997_Kubbar.PDF	3631422 0c561b32fc1301e4fccce79c1b8d2ac2ffa014b5	no	7
Warnings:					
Information:					
5	Foreign Reference	EP0690637.pdf	3076423 3de3508b6d50de1d758598310ac5204f7a423ef5	no	9
Warnings:					
Information:					
6	Foreign Reference	EP0690638.pdf	117334 95bedca08f0167127245797853942 0fff069d0fb	no	30
Warnings:					
Information:					
7	Non Patent Literature	ETSI_1998.PDF	2951739 0d377f266a3edb357675929284fcf23e4c96d6d7	no	10
Warnings:					
Information:					

8	Non Patent Literature	Rappaport_1996.PDF	23351847 5d972c13e5dcb4bc89258a9b4556316b7bc954d5	no	42
Warnings:					
Information:					
9	Non Patent Literature	Roman_1999.PDF	971262 7b10e1444a47773327d79a721339c513fa438266	no	8
Warnings:					
Information:					
10	Non Patent Literature	Sklar_1988.PDF	14879225 cb4da6a1b3e7e220547125a48f57a9f72f8e28bd	no	78
Warnings:					
Information:					
11	Other Reference-Patent/App/Search documents	WO1999009762_.pdf	2713638 90efd024c093385e355996e8087b172c4ccd0d6c	no	14
Warnings:					
Information:					
12	Other Reference-Patent/App/Search documents	WO1999029126_.pdf	4900767 0e7bf9be9f59cdd80a205fd51b95524f5bdcf784	no	29
Warnings:					
Information:					
13	Request for Continued Examination (RCE)	9030101_141_US0_RCE_.PDF	697838 392e06e90694d798319e3be2d36024ec2810e9ff	no	3
Warnings:					
Information:					
14	Non Patent Literature	1990_Bellamy.pdf	19785614 f9d692219afa6c870aeb70d783d18b3bb45a6e49	no	670
Warnings:					
Information:					
15	Fee Worksheet (SB06)	fee-info.pdf	30463 434482240a341dd02ecf967a68703cc199dbe706	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	80509280	

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.

Attorney Docket No. 9030101.141-US0
PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Paul F. Struhsaker	Confirmation No.:	2192
Application No.:	13/488,374	Examiner:	Huy C. Ho
Filing Date:	June 4, 2012	Art Unit:	2644
For:	WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS		

Information Disclosure Statement

Dear Examiner:

Attached hereto are seven sheets of SB08a identifying references in accordance with 37 CFR 1.56.

The Director is hereby authorized to charge any fees that may be due, or credit any overpayment of fees, to Deposit Account No. 50-4207.

Respectfully submitted,

Date: June 10, 2014

/Matthew T Byrne/
Matthew T. Byrne
Registration No. 40,934
Attorney for Applicants

Byrne Poh LLP
11 Broadway, Suite 1115
New York, NY 10004
Telephone: (212) 509-8870
Facsimile: (212) 931-8521

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 7

Complete if Known	
Application Number	13/488,374
Filing Date	06-04-2012
First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
Attorney Docket Number	9030101.141-US0

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 20020164991	11-07-2002	Arazi et al.	
		US- 5694424	12-02-1997	Ariyavisitakul	
		US- 5809086	09-15-1998	Ariyavisitakul	
		US- 6097968	08-01-2000	Bannister et al.	
		US- 6035178	03-07-2000	Chennakeshu et al.	
		US- 5416831	05-16-1995	Chewning et al.	
		US- 6023459	02-08-2000	Clark et al.	
		US- 2001-0004595	06-21-2001	Dent, Paul Wilkinson	
		US- 5790936	08-04-1998	Dinkins	
		US- 6289213	09-11-2001	Flint et al.	
		US- 5991292	11-23-1999	Focsaneanu et al.	
		US- 5745837	04-28-1998	Fuhrmann, Amir Michael	
		US- 20120147797	06-14-2012	Furuskar et al.	
		US- 6014546	01-11-2000	Georges et al.	
		US- 6222503	04-24-2001	Gietema et al.	
		US- 6016311	01-18-2000	Gilbert et al.	
		US- 6363252	03-26-2002	Hamalainen et al.	
		US- 5673307	09-30-1997	Holland et al.	
		US- 6560213	05-06-2003	Izadpanah et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
		WO/1999/009762	12-30-1899	Elrefaie et al.		
		WO/1999/029126	12-30-1899	Joeressen, Olaf J.		
		EP 0690637	01-03-1996	Lerman, Ruvin I.		
		EP 0690638	01-03-1996	Lerman, Ruvin I.		

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 7

Complete if Known	
Application Number	13/488,374
Filing Date	06-04-2012
First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
Attorney Docket Number	9030101.141-US0

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 6421329	07-16-2002	Kikinis, Dan	
		US- 2001-0046859	11-29-2001	Kil, Tae-Young	
		US- 6839334	01-04-2005	Krishnamoorthy et al.	
		US- 7239618	07-03-2007	La Porta et al.	
		US- 6587444	07-01-2003	Lenzo et al.	
		US- 5604789	02-18-1997	Lerman	
		US- 5115463	05-19-1992	Moldavsky et al.	
		US- 20010041569	11-15-2001	Rahman	
		US- 6378119	04-23-2002	Raves	
		US- 5638371	06-10-1997	Raychaudhuri et al.	
		US- 5684791	11-04-1997	Raychaudhuri et al.	
		US- 6226274	05-01-2001	Reese et al.	
		US- 5745841	04-28-1998	Reudink et al.	
		US- 7010023	03-07-2006	Sato, Toshifumi	
		US- 20050243745	11-03-2005	Stanwood et al.	
		US- 5901352	05-04-1999	St-Pierre et al.	
		US- 20020141355	10-03-2002	Struhsaker et al.	
		US- 7173916	02-06-2007	Struhsaker et al.	
		US- 6891810	05-10-2005	Struhsaker et al.	

FOREIGN PATENT DOCUMENTS

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

Examiner Signature		Date Considered	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 3 of 7

Complete if Known	
Application Number	13/488,374
Filing Date	06-04-2012
First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
Attorney Docket Number	9030101.141-US0

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 20020098799	07-25-2002	Struhsaker et al.	
		US- 20040213188	10-28-2004	Struhsaker et al.	
		US- 7075967	06-11-2006	Struhsaker et al.	
		US- 7099383	08-29-2006	Struhsaker et al.	
		US- 6947477	09-20-2005	Struhsaker et al.	
		US- 6564051	05-13-2003	Struhsaker et al.	
		US- 7069047	06-27-2006	Struhsaker et al.	
		US- 6804527	10-12-2004	Struhsaker et al.	
		US- 7065098	06-20-2006	Struhsaker et al.	
		US- 7002929	02-21-2006	Struhsaker et al.	
		US- 6925516	08-02-2005	Struhsaker et al.	
		US- 6052408	04-18-2000	Struhsaker et al.	
		US- 7230931	06-12-2007	Struhsaker, Paul F.	
		US- 6859655	02-22-2005	Struhsaker, Paul F.	
		US- 7274946	09-25-2007	Struhsaker, Paul F.	
		US- 7031738	04-18-2006	Struhsaker, Paul F.	
		US- 7035241	04-25-2006	Struhsaker, Paul F.	
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Sheet 4 of 7

Complete if Known	
Application Number	13/488,374
Filing Date	06-04-2012
First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
Attorney Docket Number	9030101.141-US0

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Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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Sheet 5 of 7

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Filing Date	06-04-2012
First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
Attorney Docket Number	9030101.141-US0

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Sheet 6 of 7

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First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
Attorney Docket Number	9030101.141-US0

NON PATENT LITERATURE DOCUMENTS

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Sheet 7 of 7

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Filing Date	06-04-2012
First Named Inventor	Paul F. Struhsaker
Art Unit	2644
Examiner Name	Huy C. Ho
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US005604789A

United States Patent [19]

Lerman

[11] Patent Number: 5,604,789

[45] Date of Patent: Feb. 18, 1997

[54] **METHOD AND SYSTEM FOR PROVIDING A DIGITAL WIRELESS LOCAL LOOP**

[75] Inventor: **Ruvin I. Lerman**, Longmont, Colo.

[73] Assignee: **U S West Technologies, Inc.**, Boulder, Colo.

[21] Appl. No.: **349,769**

[22] Filed: **Dec. 6, 1994**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 270,070, Jul. 1, 1994.

[51] **Int. Cl.**[6] **H04Q 7/30**

[52] **U.S. Cl.** **379/59**; 455/20; 455/33.1

[58] **Field of Search** 379/58, 59; 455/33.1, 455/54.1, 33.4, 56.1, 11.1, 20, 22, 15, 16

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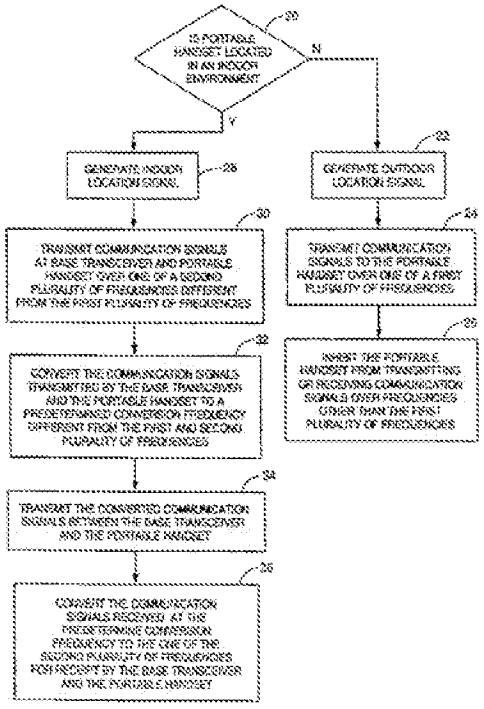
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Primary Examiner—Wing F. Chan
Assistant Examiner—William G. Trost
Attorney, Agent, or Firm—Brooks & Kushman

[57] **ABSTRACT**

A method and system for providing a digital wireless local loop for use by a wireless transceiver, e.g., a portable handset, in an indoor environment utilizing an outdoor base transceiver. Upon determining that the portable handset is located in an outdoor environment, the base transceiver and the portable handset communicate over one of a first plurality of frequencies. The outdoor portable handset is prohibited from transmitting and receiving signals over frequencies other than the first plurality of frequencies. Upon determining that the portable handset is located in an indoor environment, the base transceiver first transmits the communication signal to a first converter at one of a second plurality of frequencies different from the first plurality of frequencies. The first converter then converts the frequency to a predetermined conversion frequency different from the first and second plurality of frequencies. The signal is then transmitted to a second converter located in the indoor environment over the predetermined conversion frequency. The second converter shifts the frequency of the signal back to the one of the second plurality of frequencies and transmits the signal to the portable handset.

17 Claims, 3 Drawing Sheets



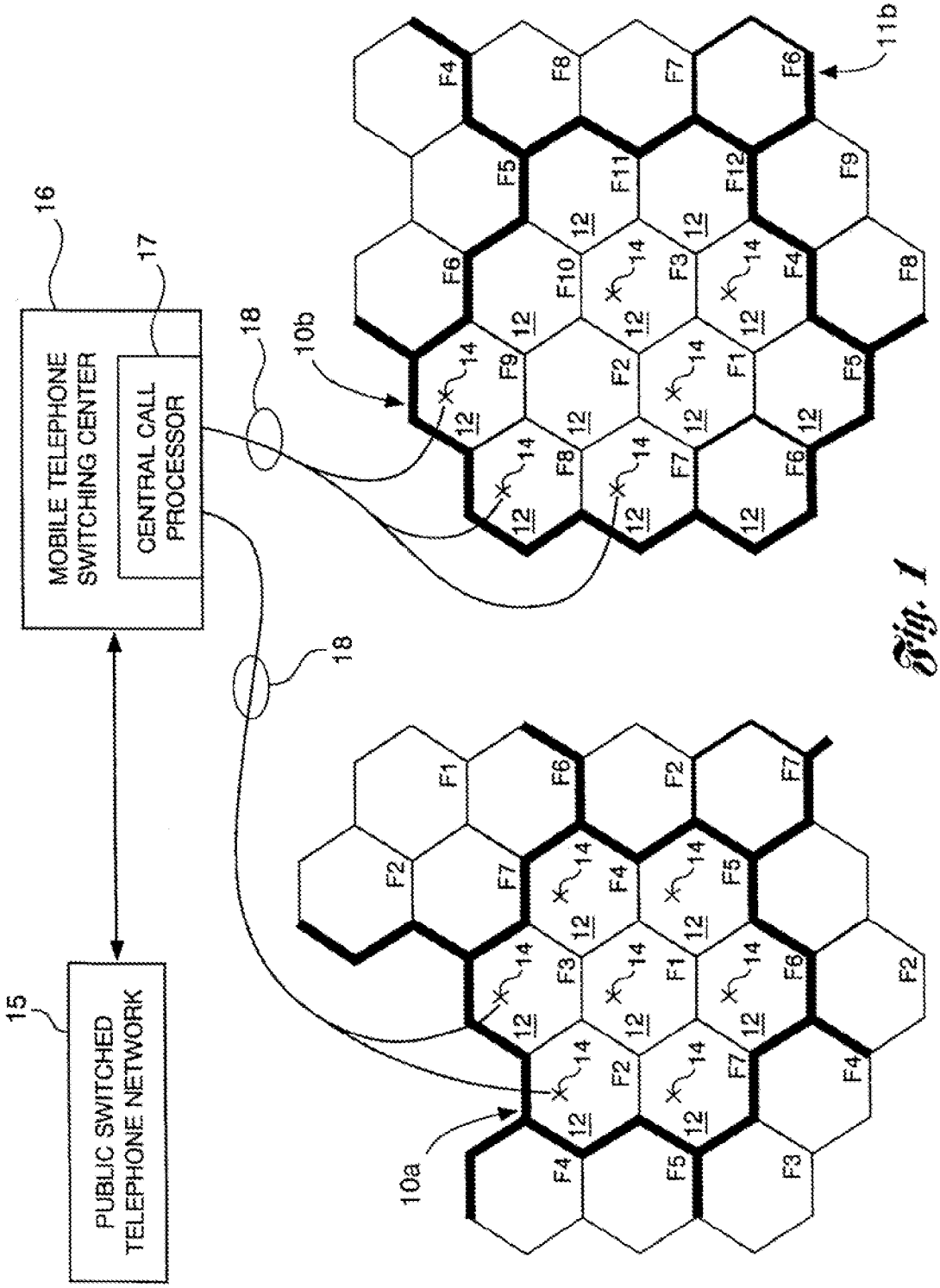

MOBILE TELEPHONE SWITCHING CENTER
CENTRAL CALL PROCESSOR
PUBLIC SWITCHED TELEPHONE NETWORK
16
17
15
18
18
10b
10a
11b
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
F11
F12
12
14

Fig. 1

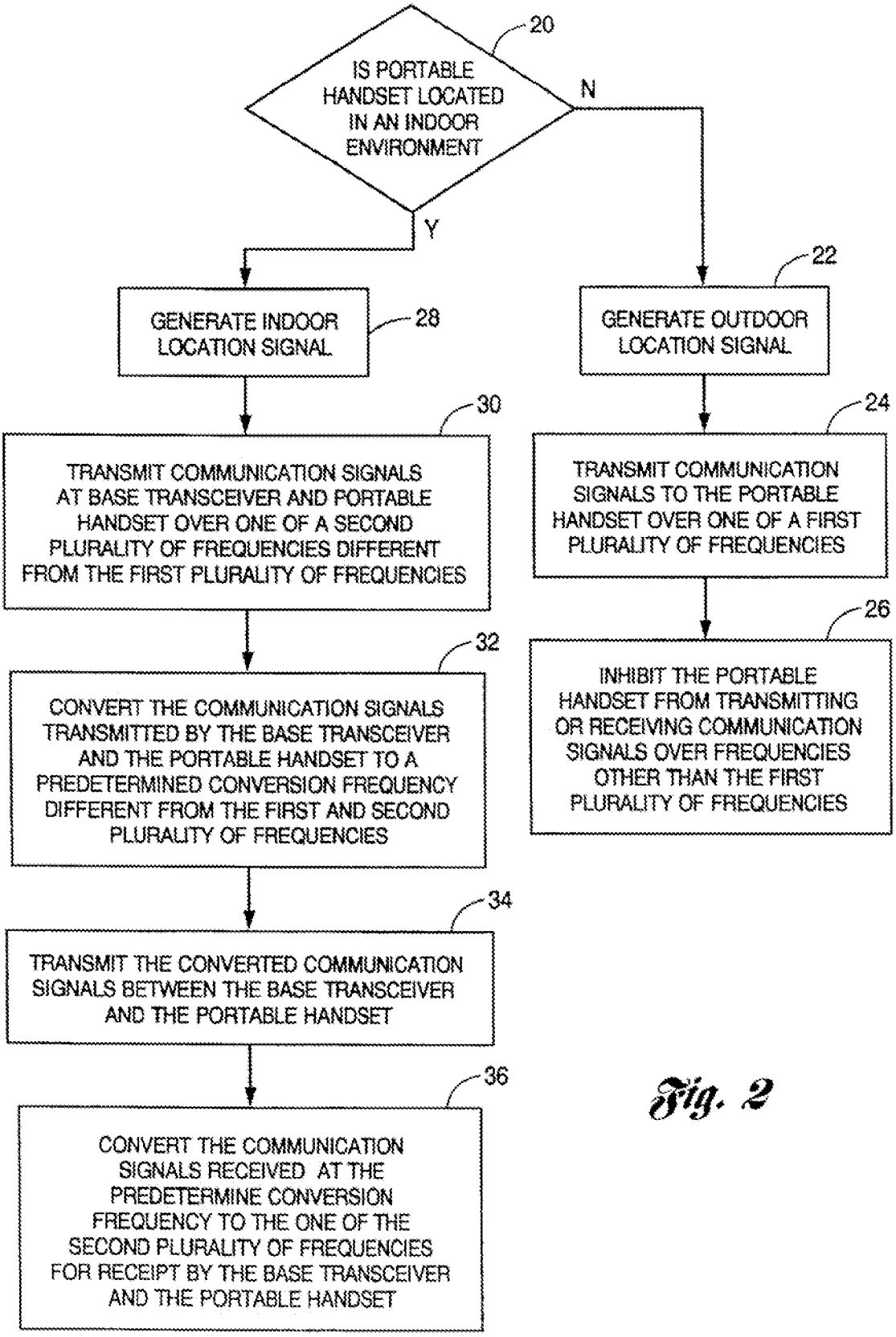

20
IS PORTABLE HANDSET LOCATED IN AN INDOOR ENVIRONMENT
N
Y
22
GENERATE OUTDOOR LOCATION SIGNAL
28
GENERATE INDOOR LOCATION SIGNAL
24
TRANSMIT COMMUNICATION SIGNALS TO THE PORTABLE HANDSET OVER ONE OF A FIRST PLURALITY OF FREQUENCIES
30
TRANSMIT COMMUNICATION SIGNALS AT BASE TRANSCEIVER AND PORTABLE HANDSET OVER ONE OF A SECOND PLURALITY OF FREQUENCIES DIFFERENT FROM THE FIRST PLURALITY OF FREQUENCIES
26
INHIBIT THE PORTABLE HANDSET FROM TRANSMITTING OR RECEIVING COMMUNICATION SIGNALS OVER FREQUENCIES OTHER THAN THE FIRST PLURALITY OF FREQUENCIES
32
CONVERT THE COMMUNICATION SIGNALS TRANSMITTED BY THE BASE TRANSCEIVER AND THE PORTABLE HANDSET TO A PREDETERMINED CONVERSION FREQUENCY DIFFERENT FROM THE FIRST AND SECOND PLURALITY OF FREQUENCIES
34
TRANSMIT THE CONVERTED COMMUNICATION SIGNALS BETWEEN THE BASE TRANSCEIVER AND THE PORTABLE HANDSET
36
CONVERT THE COMMUNICATION SIGNALS RECEIVED AT THE PREDETERMINE CONVERSION FREQUENCY TO THE ONE OF THE SECOND PLURALITY OF FREQUENCIES FOR RECEIPT BY THE BASE TRANSCEIVER AND THE PORTABLE HANDSET

Fig. 2

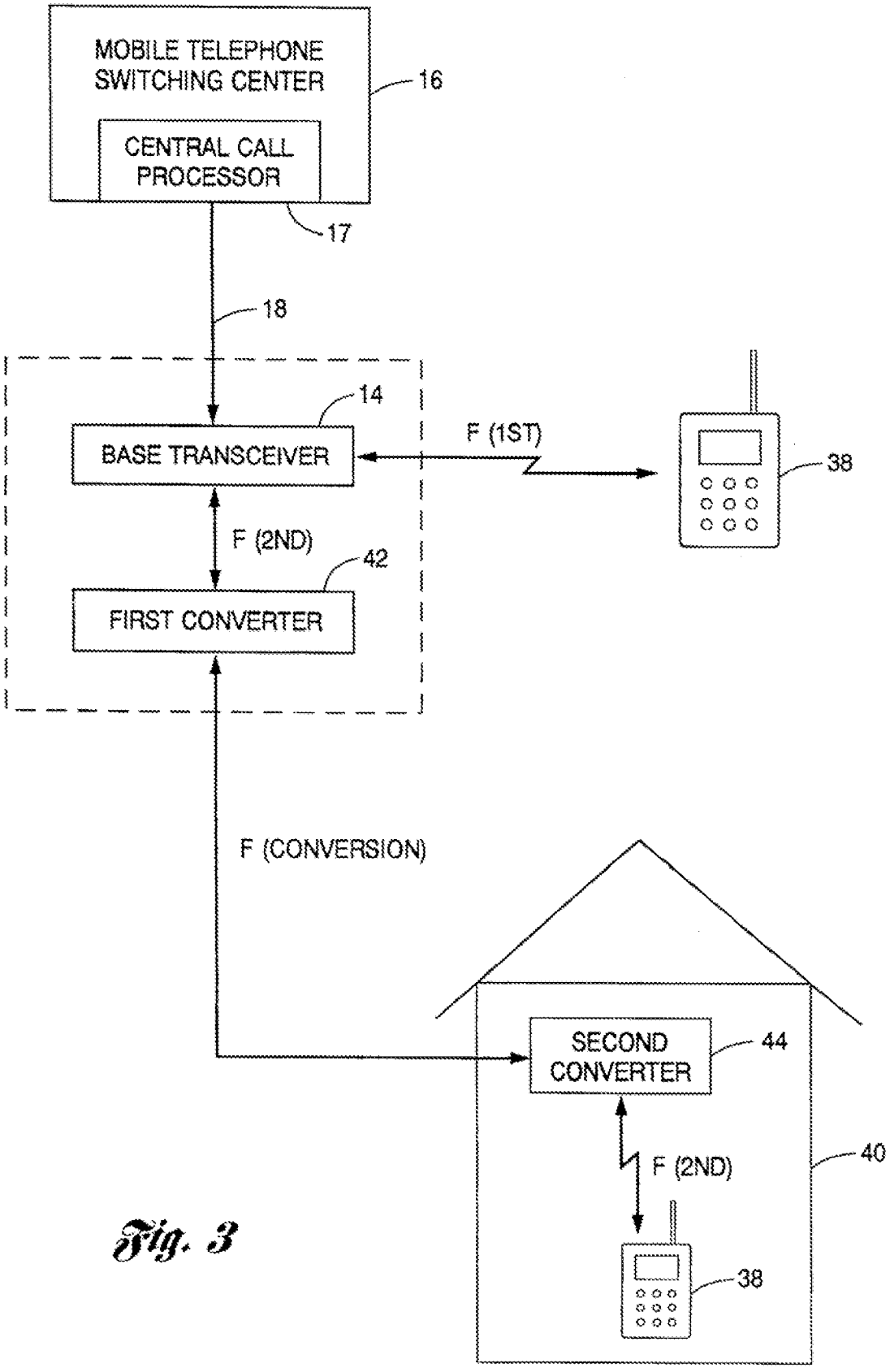

MOBILE TELEPHONE SWITCHING CENTER
16
CENTRAL CALL PROCESSOR
17
18
14
BASE TRANSCEIVER
F (1ST)
38
F (2ND)
42
FIRST CONVERTER
F (CONVERSION)
SECOND CONVERTER
44
F (2ND)
40
38

Fig. 3

METHOD AND SYSTEM FOR PROVIDING A DIGITAL WIRELESS LOCAL LOOP

CROSS-REFERENCE TO RELATED APPLICATION

The present application is a continuation-in-part of U.S. patent application Ser. No. 08/270,070, filed Jul. 1, 1994, titled "Method And System For Providing A Digital Wireless Local Loop."

TECHNICAL FIELD

This invention relates to cellular wireless local loops. In particular, this invention relates to digital wireless local loops derived from an outdoor cellular base transceiver for use by a portable handset or a device incorporating handset functionality operating in an indoor environment. The invention is particularly suited for single or multi-family dwellings or a multi-use building environment.

BACKGROUND ART

Most metropolitan areas are now equipped with one or more forms of wireless communications networks which provide radio transmissions in the microwave frequency band to wireless telephone customers. For example, a plurality of base transceivers capable of transmitting and receiving radio communication signals to and from one or more portable handsets are located throughout various wireless service areas. A portable handset, as the term is used herein, refers to a wireless voice telephone such as a cellular telephone or a cordless telephone or the like in a speech or data mode that can be installed at a fixed location in an indoor environment, temporarily installed in a vehicle or be completely mobile. In the case of cellular telephones, a typical cellular service area comprises a metropolitan area or larger region.

An example illustrating two possible configurations of a cellular service area comprised of segments **10***a*, **10***b* is shown in FIG. **1**. The segment **10***a* illustrates a seven-cell reuse pattern; i.e., the frequency band allocated to cellular telephone customers is divided into seven macrocells **12** operating at seven different frequency channels F1–F7. The frequency channels F1–F7 typically are not consecutive frequencies of the cellular radio frequency band. For example, frequency channel F1 may comprise channels **1**, **3** and **5**, while frequency channel F2 may comprise channels **2**, **4** and **6**. The seven frequency channels F1–F7 are repeated for each segment **10***a* of the entire cellular service area. The cellular service area **10***b* illustrates a twelve cell site reuse pattern.

Service area **10***b* has reduced capacity per coverage area since the cellular frequency band is divided into twelve macrocells **12**, and hence twelve frequency channels F1–F12, as opposed to the seven frequency channels F1–F7 of segment **10***a*. However, the larger segment **10***b* provides a greater distance between macrocells **12** that use the same frequency channel, resulting in reduced co-channel interference, e.g., frequency channel F6 of segment **10***b* versus frequency channel F6 of segment **11***b*.

Located within each macrocell **12** is a base transceiver **14**. Each base transceiver **14** is able to broadcast and receive radio signals utilizing its corresponding frequency channel. For example, a base transceiver **14** located in segment **10***a* would transmit and receive radio signals from a wireless transceiver utilizing frequency channels F4 while adjacent base transceivers **14** would operate at frequency channels F1, F2, F3, F5, F6 and F7.

When a telephone call to a wireless transceiver originates from either another wireless transceiver or a land-based telephone via a Public Switched Telephone Network (PSTN) **15**, a caller must access a Mobile Telephone Switching Center (MSC) **16**. The MSC **16** receives the call request and instructs a central call processor **17** to begin call processing. The central call processor **17** transmits a signal over a dedicated line **18** (such as a land-based line or microwave link, etc.) to a predetermined base transceiver **14**. The central call processor **17** determines which base transceiver **14** to transmit the signal based on the location of the portable handset. When the portable handset enters a macrocell **12**, the portable handset registers its location with a corresponding home or visitor location register. The control call processor **17** has access to the registers and, therefore, directs the telephone call to the appropriate base transceiver **14**.

Portable handsets can be used indoors as well as outdoors. Therefore, a portable handset located in an indoor environment requires service from a base transceiver **14** located outdoors. The indoor portable handset can communicate directly with an outdoor base transceiver **14** if both the base transceiver **14** and the portable handsets are allowed to exert sufficient power to penetrate the walls of a building. However, the more power a base transceiver **14** or a wireless transceiver transmits the more interference it causes to other base transceivers **14** as well as the associated portable handsets which are assigned the same frequencies.

Consequently, a need has developed for a wireless transmission system and, in particular, wireless local loops or links (WLL) which utilize the attenuation properties of buildings within their associated service areas. A WLL is a wireless link which connects an indoor cellular portable handset or a customer premises wired standard telephone to an outdoor cellular base transceiver on demand. Such a system should permit the buildings to act as shields so as to isolate outdoor users as well as the user's respective base transceiver **14** from interference caused by the indoor WLL. Still further, the WLL should allow users to make inexpensive local calls using the same portable handsets which were used to make expensive outdoor calls. Further, the WLL should provide indoor communication quality for users of outdoor portable handsets when the users transfer to indoor environments.

Indoor coverage by an outdoor base transceiver requires a device that compensates for most of the indoor propagation loss due to the attenuation properties of the building. The indoor propagation loss can be as high as 90 dB. A device such as an on-frequency repeater can be utilized to recover the indoor propagation loss if the repeater's directive antennas are professionally installed and reflectors are not located in close vicinity to the repeater's antennas. This requirement can rarely be guaranteed when a consumer-installed Customer Premises Equipment (CPE) is utilized.

One known method of improving indoor coverage for portable handsets includes utilizing an expensive Frequency Shifting Repeater (FSR) that resembles two back-to-back base transceivers. The first base transceiver receives a signal from the outdoor base transceiver, demodulates the signal to a baseband form including error correction and speech processing, and then sends the signal to the second base transceiver that performs a reverse process. Finally, the signal is sent by the second base transceiver to the indoor portable handset. The double baseband processing by this type of FSR doubles an already existing speech delay. This

type of FSR is expensive and, therefore, is not feasible for use in a mass market application.

A second known method utilizes an inexpensive FSR which does not possess any demodulation or error correction/speech processing capabilities. A base transceiver transmits a signal at a first frequency and the portable handset receives the signal at a second frequency. In order to avoid co-channel interference, the second frequency assigned to indoor operations must be different from the first frequency assigned to outdoor operation.

The portable handset may receive a message on the second frequency to move to a traffic channel (time slot) on the first frequency and attempt to do so. Since the indoor power of the signal on the first frequency is very low due to the attenuation property of the building, the portable handset will attempt to report that condition to the base transceiver. It is possible that the base transceiver will not receive the message; however, if the base transceiver does receive the low power message, the base transceiver will assign another of its channels to the portable handset. Since none of the base transceiver's channels operate on the second frequency, the assignment will not succeed.

As referenced above, the known prior art fails to disclose an inexpensive cellular WLL. Consequently, a need has developed to provide a wireless local loop system and method as referenced above which may be practically and economically implemented for use by single and multi-family dwellings and multi-use building environments.

It is further desirable that such a system be compatible with existing digital cellular radio communications. Finally, such a system should neither require the allocation of more radio frequencies than are currently allocated to wireless communication systems, nor require a substantial portion of existing wireless frequencies.

DISCLOSURE OF THE INVENTION

It is thus a general object of the present invention to overcome the limitations of the prior art by providing a cellular wireless local loop for use in single and multi-family dwellings and multi-use building environments which utilizes cellular radio communications.

Yet another object of the present invention is the provision of a digital wireless local loop that provides cellular services to indoor users utilizing the attenuation properties of buildings.

In carrying out the above objects and other objects of the present invention, a method is disclosed for providing a digital wireless local loop for use by a wireless transceiver in an indoor environment utilizing an outdoor macrocell base transceiver.

The method begins with the step of determining whether the portable handset is located in an indoor environment or an outdoor environment. When the portable handset registers its location with a corresponding home or visitor location register of the Mobile Telephone Switching Center, the portable handset also registers its operating environment, i.e., indoor environment or outdoor environment. A central call processor then generates an indoor or outdoor location signal accordingly.

Communication signals are transmitted between the base transceiver and the portable handset over one of a first plurality of frequencies in response to a generated outdoor location signal. Also, the portable handset is inhibited from transmitting or receiving communication signals over frequencies other than the first plurality of frequencies.

If an indoor location signal is generated, the method continues with the step of transmitting communication signals at the base transceiver and the portable handset over one of a second plurality of frequencies. The second plurality of frequencies is different from the first plurality of frequencies.

Next, the method continues with the step of converting the communication signals transmitted by the base transceiver and the portable handset to a predetermined conversion frequency. The predetermined conversion frequency is also different from the first and second plurality of frequencies.

The method continues with the step of transmitting the converted communication signal between the base transceiver and the portable handset.

Finally, the method concludes with the step of converting the communication signal received at the predetermined conversion frequency to one of the second plurality of frequencies for receipt by the base transceiver and the portable handset.

In further carrying out the above objects and other objects, features and advantages of the present invention, a system is also provided for carrying out the steps of the above described method.

The system includes a processor for determining whether the portable handset is located in an indoor environment or an outdoor environment and for generating a corresponding indoor or outdoor location signal in response thereto.

The system also includes a base transceiver located in one of a plurality of cells which define a cellular service area. The base transceiver is in communication with the processor and a portable handset, and it operates to communicate with the portable handset over a plurality of frequencies assigned to the base transceiver.

Upon receiving an outdoor location signal, the base transceiver transmits and receives communication signals to and from the portable handset over one of a first plurality of frequencies.

However, upon receiving an indoor location signal, the base transceiver transmits and receives communication signals over one of the second plurality of frequencies.

The system further includes a first converter in communication with the base transceiver for receiving communication signals over one of the second plurality of frequencies and retransmitting the communication signals over a predetermined conversion frequency. The first converter also receives communications over the predetermined conversion frequency and retransmits the communication signals over one of the second plurality of frequencies to the base transceiver.

The system also includes a second converter in communication with the first converter and a portable handset for receiving communication signals from the first converter over the predetermined conversion frequency and retransmitting the communication signals over the one of the second plurality of frequencies to the portable handset. The second converter also receives communication signals at the one of the second plurality of frequencies from the portable handset and retransmits the communication signals over the predetermined conversion frequency for receipt by the first converter.

The system finally includes an inhibitor in communication with the portable handset for inhibiting the portable handset from transmitting or receiving communication signals over frequencies other than the first plurality of frequencies when the portable handset is located in an outdoor environment.

The above objects, features and advantages of the present invention, as well as others, are readily apparent from the following detailed description of the best mode for carrying out the invention when taken in connection with the accompanying drawings, wherein like reference numbers correspond to like components.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be apparent from the detailed description taken in conjunction with the accompanying drawings in which:

FIG. **1** is a schematic diagram of a prior art cellular telephone system illustrating typical layouts of cellular service areas;

FIG. **2** is a block diagram illustrating the general sequence of steps associated with the operation of the present invention; and

FIG. **3** is a block diagram of the preferred embodiment of the present invention.

BEST MODES FOR CARRYING OUT THE INVENTION

With reference to FIG. **2** of the drawings, there is provided a block diagram illustrating the sequential steps associated with the operation of the present invention when a telephone call to a wireless transceiver originates from either another portable handset or a land-based telephone via a Public Switched Telephone Network (PSTN).

The central call processor **17** transmits the signal over a dedicated line **18** (such as a land-based line or microwave link, etc.) to the appropriate base transceiver **14** based on the location of the portable handset. The central call processor **17** also transmits information to the base transceiver **14** indicating whether the portable handset is located in an indoor environment or an outdoor environment.

A portable handset located in an indoor environment requires service from a base transceiver **14** located outdoors. The indoor portable handset can communicate directly with an outdoor base transceiver **14** if both the base transceiver **14** and the portable handsets are allowed to exert sufficient power to penetrate the walls of a building. However, the more power a base transceiver **14** or a wireless transceiver transmits the more interference it causes to other base transceivers **14** as well as the associated portable handsets which are assigned the same frequencies.

An outdoor base transceiver **14** is assigned a plurality of predetermined frequencies for transmitting communication signals outdoors. The predetermined plurality of frequencies are within the frequency band constituting the cellular radio spectrum of segments **10***a*, **10***b*. The predetermined frequencies of a base transceiver **14** located in a cell are different from the predetermined frequencies of a base transceiver located in an adjacent cell. The communication signal may be either an audio, data or video signal.

As shown by block **20**, the first step of the present invention includes determining whether the portable handset is located in an indoor environment or an outdoor environment.

If the portable handset has informed the local location register that it is operating in an outdoor environment, the processor **17** generates an outdoor location signal for receipt by the base transceiver **14**, as shown by block **22**.

Upon receiving the outdoor location signal, the base transceiver **14** transmits the communication signal to the portable handset over one of a first plurality of frequencies as shown by block **24**. Also, the portable handset is inhibited from transmitting or receiving communication signals over frequencies other than the first plurality of frequencies, as shown by block **26**.

If the portable handset has informed the local location register that it is operating in an indoor environment, the processor **17** generates an indoor location signal, as shown by block **28**.

Upon receiving the indoor location signal, the base transceiver **14** and the portable handset transmit the communication signal over one of a second plurality of frequencies, as shown by block **30**. The second plurality of frequencies is different from any of the first plurality of frequencies assigned to the base transceiver **14**. The second plurality of frequencies corresponds to a predetermined plurality of frequencies assigned to a base transceiver in an adjacent cell **12**.

Next, as shown by block **32**, the method continues with the step of converting the frequency of the communication signal to a predetermined conversion frequency. The predetermined conversion frequency is different from the first and second plurality of frequencies, yet it is still one of the predetermined plurality of frequencies assigned to the base transceiver **14**.

The first and second plurality of frequencies are a dynamically changing set of channels. As most of the communication traffic occurs outdoors during the day, a majority of the channels are assigned to the first plurality of frequencies to support outdoor service. However, as communication traffic shifts indoors towards the night, more channels are assigned to the second plurality of frequencies to support indoor service. The repartitioning of the available channels (resources) allows more channels to be accessed during peak traffic, and, hence, higher paying customers.

The method proceeds with the step of transmitting the communication signal over the predetermined conversion frequency between the base transceiver and the portable handset, as shown by block **34**.

Finally, as shown by block **36**, the method concludes with the step of converting the communication signal received at the predetermined conversion frequency to one of the second plurality of frequencies for receipt by the base transceiver and the portable handset.

The method disclosed describes the process of transmitting a signal from a base transceiver to a portable handset, as well as the process of transmitting a signal from the portable handset to the base transceiver.

Referring now to FIG. **3**, there is shown a digital wireless local loop ("W.L.L.") made in accordance with the teachings of the present invention. As shown, the W.L.L. consists of a base transceiver **14**. The base transceiver **14** transmits and receives communication signals to and from a portable handset at predetermined plurality of frequencies. The predetermined plurality of frequencies are disposed within a predetermined frequency band constituting a portion of the predefined wireless and preferably cellular radio spectrum.

Upon receiving an outdoor location signal from the processor **17**, the outdoor base transceiver **14** transmits and receives communication signals to and from a portable handset **38** over one of a plurality of frequencies, F(1st).

For portable handsets **34** located in an indoor environment **40**, such as a house or office building, the base transceiver

14 receives an indoor location signal and first transmits the communication signal to a first converter 42 over one of a second plurality of frequencies, F(2nd). The second plurality of frequencies F(2nd) is different from any of the predetermined plurality of frequencies utilized by the base transceiver 14 when communicating to portable handsets 38 located in the outdoor environment. The second plurality of frequencies, F(2nd), corresponds to a predetermined plurality of frequencies assigned to a base transceiver disposed in an adjacent cell 12. The base transceiver 14 also receives communication signals from the first converter 42 over one of the second plurality of frequencies.

The first converter 42 converts the frequency of the communication signal from one of the second plurality of frequencies, F(2nd), to a predetermined conversion frequency, F(conversion). The first converter 42 may be any conventional device known by one skilled in the art that changes the frequency of a signal to a second different frequency. The first converter 42 does not change the content of the message being transmitted or received. Therefore, there is no delay due to modulation and demodulation as well as baseband speech processing or control channel processing. The first converter 42 is disposed at the base transceiver 14.

The first converter 42 is further adapted to receive communication signals over the predetermined conversion frequency and to retransmit the signals to the base transceiver 14 over one of the second plurality of frequencies.

The first converter 42 transmits the communication signal over the predetermined conversion frequency for receipt by a second converter 44. The second converter 44 receives the signal over the predetermined conversion frequency and retransmits the signal at one of the second plurality of frequencies, F(2nd) for receipt by the portable handset 38. The second converter 44 is located in the indoor environment 40.

The second converter 44 is also adapted to receive communication signals from the portable handset 38 over one of the second plurality of frequencies and to retransmit the signal to the first converter 42 over the predetermined conversion frequency.

Preferably, the second converter 44 is a frequency shifting repeater (FSR). Since the digital signal is retransmitted using only a different frequency, there is no change in the content of the message being transmitted or received nor is there a need to decipher the content of the message. Consequently, there is no delay due to modulation and demodulation as well as baseband speech processing or control channel processing.

The double frequency conversion of the communication signal eliminates the frequency confusion experienced by a portable handset 38 located in an indoor environment 40. However, the portable handset 38 located in the outdoor environment experiences frequency confusion. If the outdoor portable handset 38 receives signals over the predetermined conversion frequency, the handset 38 may receive a message from the base transceiver 14 instructing the handset 38 to tune to a channel on one of the second plurality of frequencies, F(2nd), which is not available to the handset 38.

Therefore, the outdoor portable 38 has to be inhibited from transmitting and receiving signals to and from the base transceiver 14 over frequencies other than the first plurality of frequencies. The handset 38 may be inhibited utilizing an indoor/outdoor switch in the portable handset 38. The switch can be a physical button, or a smart card Subscriber IdentityModule (SIM) specifically designated for indoor or outdoor use.

A practical application of the above identified method and system can be illustrated in connection with a GSM or DCS-1800 system. The SIM utilized in these systems would contain, among many other information, information that assigns a portable handset user to one of several network or classes of subscribers, whereby indoor and outdoor wireless services are distinguished.

For example, a customer can subscribe to outdoor service only. That customer will then be issued a single "outdoor" only SIM that forbids the portable to respond to the base transceiver over frequencies other than the first plurality of frequencies. Since a subscriber is not usually confined to a single cell, the first plurality of frequencies utilized for outdoor communications by a base transceiver 14 must be assigned according to a frequency reuse pattern. This assignment is usually accomplished via the central processor 17.

A customer that subscribes to cordless (indoor) service only will be issued an "indoor" SIM that allows the portable to respond to the base transceiver over one of the second plurality of frequencies only and forbids it from responding to the base transceiver at one of the first plurality of frequencies.

A customer that subscribes to both outdoor mobile and indoor cordless services will be issued either two physical cards or a single double edged "indoor"/"outdoor" SIM. When the "outdoor" edge is inserted into the portable, the SIM will forbid the portable to listen to any "indoor" communications. When the customer walks indoors, he will have to pull the SIM out from the portable and reinsert it with the "indoor" edge facing the portable.

If a customer is charged according to the amount and quality/cost of network resources he or she is using then a clear customer hierarchy evolves. The highest revenue producer is the indoor/outdoor customer and the lowest revenue is collected from the cordless customer. The above described invention allows a preferential treatment of high paying customers during peak communication traffic hour(s) by partitioning more frequencies to the type of communication (i.e., indoor/outdoor) that occurs most during the peak hour(s).

For example, assume that during the day most communication traffic occurs outdoors. A majority of the frequencies within the predetermined frequency band assigned to the base transceiver are allotted for outdoor communications, i.e., the first plurality of frequencies, F(1st). As traffic shifts indoors towards the night, more frequencies are allotted for indoor communications, i.e., more frequencies are assigned to the second plurality of frequencies, F(2nd).

The second plurality of frequencies may be further partitioned to allow for distinguishing between a permanent indoor user, e.g., a cordless telephone, and a variable indoor user, e.g., mobile telephone. Since both types of subscribers will contend for the indoor frequencies, the network resources can be adjusted to allow more frequencies to be accessed by the higher paying customer.

while the best modes for carrying out the invention have been described in detail, those familiar with the art to which this invention relates will recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

What is claimed is:

1. For use with one of a plurality of base transceivers located in one of a plurality of cells defining a cellular service area, each of the plurality of base transceivers having a plurality of frequencies assigned thereto, and one of the plurality of base transceivers operative to communicate with

a portable handset at a first plurality of frequencies assigned to the one of the plurality of base transceivers, a method for providing a wireless local loop comprising:

determining whether the portable handset is located in an indoor environment or an outdoor environment and generating an indoor or outdoor location signal in response thereto;

in response to a generated outdoor location signal, (a) transmitting communication signals between the base transceiver and the portable handset at one of the first plurality of frequencies, and (b) inhibiting the portable handset from transmitting or receiving communication signals at frequencies other than the first plurality of frequencies; and

in response to a generated indoor location signal, (a) transmitting communication signals at one of the base transceiver and the portable handset at one of a second plurality of frequencies different from the first plurality of frequencies, the second plurality of frequencies corresponding to one of the plurality of frequencies assigned to another one of the plurality of base transceivers located at another one of the plurality of cells, (b) converting the communication signals to a predetermined conversion frequency, the predetermined conversion frequency corresponding to another one of the first plurality of frequencies, (c) transmitting the converted communication signals to an indoor environment base transceiver and the portable handset at the predetermined conversion frequency, and (d) converting the communication signals received at the predetermined conversion frequency to the one of the second plurality of frequencies for receipt by the indoor environment base transceiver and the portable handset.

2. The method of claim **1** wherein the first and second plurality of frequencies comprise a portion of the cellular radio spectrum.

3. The method of claim **1** wherein the communication signals are audio signals.

4. The method of claim **1** wherein the communication signals are video signals.

5. The method of claim **1** wherein the communication signals are data signals.

6. The method of claim **1** wherein the first and second plurality of frequencies are selected based upon an amount of indoor and outdoor location signals generated.

7. The method of claim **1** wherein the step of converting the communication signals to the predetermined conversion frequency is performed at the base transceiver.

8. The method of claim **1** wherein the plurality of base transceivers are in communication with a mobile telephone switching center having a central call processor and wherein the step of determining whether the portable handset is located in an indoor environment or an outdoor environment is performed by the central call processor.

9. For use with a plurality of base transceivers, each of the plurality of base transceivers located in one of a plurality of cells defining a cellular service area and having a plurality of frequencies assigned thereto, and a portable handset adapted to transmit and receive communication signals to one of the plurality of base transceivers, a wireless local loop, comprising:

a processor for determining whether the portable handset is located in either an indoor or outdoor environment and for generating a corresponding indoor or outdoor location signal in response thereto;

the one of the base transceivers provided in communication with the processor and the portable handset and operative to communicate with the portable handset at a first plurality of frequencies assigned thereto by (a) transmitting and receiving communication signals to and from the portable handset at one of the first plurality of frequencies upon receiving the outdoor location signal, and (b) transmitting and receiving communication signals at one of a second plurality of frequencies upon receiving the indoor location signal, the second plurality of frequencies corresponding to one of the plurality of frequencies assigned to another one of the plurality of base transceivers located at another one of the plurality of cells;

a first converter in communication with the one of the base transceivers for receiving communication signals at the one of the second plurality of frequencies and retransmitting the communication signals at a predetermined conversion frequency corresponding to another one of the first plurality of frequencies, the first converter further operative for receiving communication signals at the predetermined conversion frequency and retransmitting the communication signals at the one of the second plurality of frequencies to the base transceiver;

a second converter in communication with the first converter and the portable handset for receiving communication signals from the first converter at the predetermined conversion frequency and for retransmitting the communication signals at the one of the second plurality of frequencies to the portable handset, the second converter further operative for receiving communication signals at the one of the second plurality of frequencies from the portable handset and retransmitting the communication signals at the predetermined conversion frequency to the first converter; and

an inhibitor in communication with the portable handset for inhibiting the portable handset from transmitting or receiving communication signals at frequencies other than the first plurality of frequencies in response to the generation of the outdoor location signal.

10. The system of claim **9** wherein the first converter is located at the base transceiver.

11. The system of claim **9** wherein the first converter transmits and receives communications signals to and from the base transceiver via a wireline link.

12. The system of claim **9** wherein the second converter is located in the indoor environment.

13. The system of claim **9** wherein the second converter comprises a frequency shifting repeater.

14. The system of claim **9** wherein the inhibitor is a switch.

15. The system of claim **14** wherein the switch is a physical button disposed on the portable handset.

16. The system of claim **14** wherein the switch is at least one electronic module adapted to be inserted into the portable handset in order to operate the portable handset in either the indoor environment or the outdoor environment.

17. The system of claim **16** wherein the at least one electronic module provides operation of the portable handset in both the indoor environment and the outdoor environment.

* * * * *

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DESCRIPTION JPH0847032

[0001]

The present invention relates to a process is related to cellular wireless local loop system.

The present invention relates to a digital wireless local loop system was directed to an apparatus function incorporating the handset or portable handset function, derive from outdoor cellular base transceiver, running on the indoor environment.

The present invention is particularly suitable for building environment of the multi-line use or housing, more than one door and single residence.

[0002]

In the metropolitan areas most current Background of the Invention, wireless communication network of more than one has been developed, providing wireless communication by assigning a microwave frequency band to wireless phone customers.

For example, macro cell base a plurality of transceivers that can send and receive the portable handset of one or more digital radio signal, which covers all over the wireless service various areas.

As well be placed in a fixed position in the indoor environment, As used herein, the term "portable handset" as cellular telephone to be used in data mode or voice as a mobile phone to which self by or vehicle as a temporary I have been meaning to wireless voice telephone etc..

In the case of a cellular telephone, the cellular service area consists of an area larger than it, or an exhaustive metropolitan area usually.

[0003]

Configuration of the cellular service area is two illustrated in Figure 1, it consists 10b and 10a, respectively compartments.

Section 10a represents the reuse pattern of seven cells.

That is, a spectrum assigned to a customer of the cellular telephone is divided into macrocells 12 seven operating channels F1 ~ F7 different frequencies 7.

The frequency channels F1 ~ F7 may be, but is not configured with a frequency continuous cellular radio frequency band.

For example, the frequency channel F1 includes a 1, 3 and 5 channel, frequency channel F2 contains a 6 and channels 2 and 4.

The frequency channel F1 ~ F7 these seven, I used repeatedly in each compartment 10a of the cellular service area as a whole.

On the other hand, cellular service area 10b represents a quotation cell reuse pattern of 12.

[0004]

The service area 10b, the cellular frequency band is divided into a macro cell 12 12, since operating at 12 frequency channels F1 ~ F12 unlike frequency channels F1 ~ F7 seven compartments 10a, the maximum output of the service area for each is reduced But, to expand the distance 12 between the macro cell using the same frequency channel, for example, generated in the F6 between such frequency channel of section 11b frequency channels and F6 of section 10b, this section 10b relatively large, reduction of inter-symbol interference lead to.

[0005]

Base transceiver 14 is disposed in the interior 12 each macrocell.

Each base transceiver 14 allows reception and broadcasting of the radio signal using the corresponding frequency channel.

For example, in the case of receiving a radio signal from the radio transceiver base transceiver 14 located in the compartment 10a is using the frequency channel F4, base transceiver 14 to be adjacent or F7, F2, F3, F5, F6 frequency channel F1 in I operate.

[0006]

May result from the phone of the land base station originating the public switched telephone network (PSTN) 15 via, or wireless transceiver other, call destined to one radio transceiver, mobile telephone switching center access (MSC) 16 The called party must.

MSC16 the order so that it receives the call request, to start call processing in the central call processor 17.

The central call processor 17 transmits to the predetermined base transceiver 14 signals via a dedicated line 18 (the line such as micro-earth base station transmitting line).

The central call processor 17 determines based on the position of the portable handset, it sends out a signal to the base transceiver 14 either.

Portable handset enters the macrocell 12, its position is registered in accordance with the visitor location register or home, portable handset corresponding.

Therefore, the central call processor 17 to access the registration these matters, I will send to the appropriate base transceiver 14 the corresponding telephone call.

[0007]

Portable handset can also be used indoors as well as outdoors.

portable handset therefore placed indoors, which requires service from the base transceiver 14 installed outdoors.

If able to give a sufficient output both a portable handset and the base transceiver 14 is to penetrate the building wall, and can directly communicate with the outdoor base transceiver 14 and portable handset placed indoors made.

[0008]

However, problems to be solved by the invention, as to transmit radio transceiver and base transceiver 14 through the increase output, in addition to the interference to the relevant handset same frequency is assigned, the base transceiver 14 other further interference caused also increased.

[0009]

Therefore, the wireless communication system, especially in the context coverage inside developed using attenuation characteristics of building wireless local links or wireless subscriber line (WLL) have been sought.

WLL is a wireless line that connects to the cellular base transceiver outdoor at the request as soon as the home wired standard phone or mobile cellular handset, indoor.

In order to isolate the interference caused by the WLL of the indoors to the outdoors users in addition to the individual base transceiver 14 of the user, the system may serve as a protective layer of a building.

Furthermore, by utilizing WLL, in portable handset in the same to that used outdoors call of higher call charges, it is possible to make a local call cheap charges.

Furthermore, in the case where the user of the portable handset of outdoor transferred to indoor environment the call, WLL to provide communication quality of indoor.

[0010]

The reach of radio waves to indoors, it is necessary to such devices compensate for most of the indoor propagation loss resulting from the attenuation characteristics of the building by an outdoor base transceiver.

This indoor propagation loss is the height of about 90dB.

Therefore, it is possible to compensate for indoor propagation loss when the reflector is not in proximity to the repeater antenna utilizing apparatus of the on-frequency repeater, such as the antenna of the relay directional property and are disposed in earnest .

If, however, but in the case of using a (CPE) customer premises equipment that is installed in the customer rarely requirements as described above is ensured.

[0011]

The one known method that is proposed to increase the utilization of the portable handset dexterity indoor coverage are those including the use of expensive frequency shift repeater, such as back-to-back base transceiver two (FSR).

The base transceiver first receives a signal from an outdoor base transceiver including audio processing and error correction, demodulates the signal to baseband form, to the base transceiver a second signal is demodulated send.

The signal is transmitted to the indoor portable handset by the base transceiver a second in the end.

However, double Baseband Processing FSR of this kind, to doubling the delay of voice that already exists.

Also, FSR of this type is the expensive and not suitable for use in mass market applications.

[0012]

The known methods of second, there is one that uses an inexpensive FSR that do not have a voice processing capacity and error correction capability or demodulation,.

Here, the base transceiver transmits a signal at a first frequency, a portable handset is received at a second frequency of the signal.

The frequency of the second in order to avoid intersymbol interference, assigned to the operation

of the indoors, must be different from the first frequency assigned to run outdoors.

[0013]

It may attempt this portable handset, so try and receive messages through the second frequency, and move or traffic channel (time slot) through the first frequency.

Indoor output signal of which was placed on the frequency of the first, very low by the attenuation characteristics of the building, portable handset attempts to convey to the base transceiver the state.

It is also possible that the base transceiver does not receive the message, but if it does not receive the low power message, the base transceiver assigned to the portable handset and the other one of that channel.

However, since both does not start at the frequency of the second channel of the base transceiver, this assignment does not work.

[0014]

As mentioned above, the known prior art has failed to disclose an inexpensive cellular WLL.

Therefore, as described above, and prepares to use it for the building environment of the multi-line use, the method and radio system local loop system capable of production of economically or indeed housing complex, more than one door and single dwelling need to develop is occurring.

[0015]

Further, the above system is compatible with a digital cellular radio communication existing is desired.

Finally, the system should not be allocated radio frequency many portions corresponding to the radio frequency of the existing required than are currently assigned to the wireless communication system.

[0016]

Accordingly, the present invention has been made to overcome the limitations of the prior art, provided for use in a building environment of multi-line use, a digital radio communication network or apartment building, a plurality of doors and a single housing and an object thereof is to provide a cellular radio system the subscriber line to be utilized.

[0017]

The present invention is directed to a supply of a digital wireless local loop that provides cellular services in indoor user of the attenuation characteristics as a building.

[0018]

In order to achieve the other objects of the present invention and the above object for Solving the Problems], then use the outdoor macro-cell based transceiver, a method of providing a digital radio system subscriber line comprising the wireless transceiver in the indoor environment is disclosed Ru.

[0019]

The method begins with the step of determining whether there is an outdoor environment or in the indoor environment corresponding portable handset.

If you want to register its position in the visitor location register or home, the corresponding mobile telephone switching center, its operating environment, ie this portable handset, register also be outdoor environments or indoor environment, the portable handset.

Then, the central call processor to generate a position signal of the indoor or outdoor accordingly.

[0020]

Communication signals are transmitted by the portable handset between the base transceiver in response to the outside position signal via a plurality of first frequency, the generated.

Further, the portable handset is prevented from transmitting and receiving communication signals over a plurality of frequencies other than the frequency of said one.

[0021]

Indoor location if the signal is generated, step through one of the plurality of second frequency, and transmits a communication signal in a portable handset and a base transceiver followed.

Multiple frequency of the second plurality is different from the first frequency.

[0022]

Then, converting the predetermined conversion frequency communication signal transmitted by the portable handset and the base transceiver followed.

This predetermined conversion frequency is different from the plurality of frequencies of the first and second.

[0023]

Then, the method continues with the step of transmitting to and from the portable handset and base transceiver communication signal converted.

[0024]

Finally, the method ends in step with the acceptance by the portable handset and the base transceiver, converts the one of the plurality of second frequency communication signal received at a predetermined conversion frequency.

[0025]

Further, in order to achieve other objects of the present invention and the objects, advantages and features, a system for implementing the steps of the method is also provided.

[0026]

The system includes a processor for generating a position signal to determine whether there is an outdoor environment or in the indoor environment corresponding portable handset, corresponding to indoor or outdoor depending on the determination result.

[0027]

The system also includes a well-based transceiver is installed in one of the plurality of cells that defines a range of cellular service area one.

It is in conjunction with a portable handset and the processor, the base transceiver, operates to perform communication with a portable handset via a plurality of frequencies assigned to the base transceiver.

By receiving an outside position signal, the base transceiver transmits and receives communication signals with a portable handset via the one of the plurality of frequencies of the first.

[0028]

However, upon receiving an indoor location signal, the base transceiver transmits and receives communication signals over one of a plurality of frequencies in the second.

[0029]

Further, in cooperation with the base transceiver, as well as receiving a communication signal through one of the plurality second frequency, the system comprises a transducer first retransmitting the communication signals over a predetermined conversion frequency have.

Also receives communication information over the predetermined frequency conversion, the conversion of the first re-transmitted to the base transceiver and the communication signal through one of the plurality of frequencies in the second.

[0030]

Next transducers of the first and in association with a portable handset, it is possible to receive communication signals from the transducer of the first through the conversion predetermined frequency, the system, via one of the plurality of frequencies the second I have a converter of the second to re-send to the portable handset the communication signal Te.

It also receives a communication signal from the portable handset via the one of the plurality of frequencies in the second, with the acceptance by the conversion of the first transducer of the second, the through the conversion frequency of the predetermined I will re-send the communication signal.

[0031]

Finally, in association with a portable handset, when in the outdoor environment wherein the portable handset, the system transmits and receives communication signals wherein the portable handset via the frequency of the plurality of frequencies other than the first I a deterrent device for preventing the.

[0032]

It is determined in the delivery system and method for providing a [action] the digital wireless local loop system, first, whether in the outdoor environment either in the indoor environment is appropriate portable handset.

If you want to register its position in the visitor location register or home, the corresponding mobile telephone switching center, its operating environment, ie this portable handset, register also be

outdoor environments or indoor environment, the portable handset.

Then, the central call processor to generate a position signal of the indoor or outdoor accordingly.

[0033]

Communication signals are transmitted by the portable handset between the base transceiver in response to the outside position signal via a plurality of first frequency, the generated.

Further, the portable handset is prevented from transmitting and receiving communication signals over a plurality of frequencies other than the frequency of said one.

[0034]

Indoor position signal if it is generated, through the one of the plurality of frequency second communication signal in a portable handset and the base transceiver are transmitted.

Multiple frequency of the second plurality is different from the first frequency.

[0035]

The communication signal transmitted by the portable handset and the base transceiver is converted to a predetermined conversion frequency.

This predetermined conversion frequency is different from the plurality of frequencies of the first and second.

[0036]

The communication signal communication signal converted is transmitted between the portable handset and the base transceiver, and finally, with the acceptance by the portable handset and the base transceiver and received by the conversion frequency of the predetermined first It is converted into one of the plurality of frequency two.

[0037]

For a case to produce a telephone call to the EXAMPLES radio transceiver via a public switched telephone network (PSTN) from a terrestrial base station originating telephone or portable handset other, will be described in Figure 2 the operation of the present invention.

In this diagram, sequential steps associated with the operation of the present invention is shown.

[0038]

A central call processor 17 sends a signal to the appropriate base transceiver 14 based on the position of the portable handset through a (microwave network or terrestrial base stations calling line), corresponding dedicated line 18.

Further, the central call processor 17 transmits to the base transceiver 14 is also information indicating which of the outdoor environment or indoor environment is appropriate portable handset.

[0039]

In the case of the portable handset in the indoor environment, it requires service from the base transceiver 14 at the outside.

If able to give a sufficient output both a portable handset and the base transceiver 14 is to penetrate the building wall, communicating with the outdoor base transceiver 14 and portable handset placed indoors can be directly .

However, transmission is performed by increasing the output of the radio transceiver and the base transceiver 14, in addition to the interference with the associated handset co-channel is allocated, the interference caused to the base transceiver 14 of the other increases further.

[0040]

The outdoor base transceiver 14, in preparation for communication signal transmission in the outdoors, the predetermined plurality of frequencies are allocated.

Multiple frequency of the predetermined frequency is in the band constituting the cellular radio spectrum and 10b section 10a.

The predetermined frequency of the base transceiver 14 installed in a certain cell is different from the predetermined frequency of the base transceiver installed in the cell of another adjacent.

The signal used for the communication, where the signal may be of any of voice, video or data.

[0041]

As indicated by block 20, in the first step of the present invention, it is determined whether or outdoor environment it is in an indoor environment is a portable handset.

[0042]

This portable handset, if informed the local position register running in an outdoor environment, in Shimesuru so in block 22, processor 17, to generate an outdoor position signal to be received by 14 base transceiver .

[0043]

By receiving an outside position signal, as shown in block 24, the base transceiver 14 transmits to the portable handset communication signals over one of the plurality of frequencies of the first.

Further, as shown in block 26, the portable handset may be prevented from transmitting and receiving communication signals over a plurality of frequencies other than the frequency of the first.

[0044]

On the other hand, if it notifies the local position register portable handset is operating in the indoor environment, as shown in block 28, processor 17, to generate a position signal indoors.

[0045]

By receiving an indoor location signal, as shown in block 30, via one of the plurality of frequencies the second portable handset and the base transceiver 14 transmits a communications signal.

Multiple frequency of the second is a frequency different from any of the plurality of frequencies of the first assigned to the base transceiver 14 but have code to a plurality of predetermined frequency assigned to the base transceiver of the adjacent cells 12 .

[0046]

Next, as indicated by block 32, and continues to step into a transformed predetermined frequency communication signals.

Conversion frequency of the predetermined frequency is different from any of the plurality of frequencies in the first and second, it is one of the plurality of predetermined frequency is still assigned to the base transceiver 14.

[0047]

Multi-Frequency second is a channel of a set of dynamically changing and first.

During the time of day when most of the communication traffic takes place outdoors, to support the services of the outdoor channel the majority assigned to the multiple of the first frequency.

However, traffic generated Turning indoors over night, in order to support the services of indoor channels allocated to multiple second frequency increases.

The distribution of (resources), more channels will be accessible by the peak traffic time channels that are available, customers pay higher rates than therefore can be accessed on advantageously.

[0048]

Then, as shown in block 34, the operation proceeds to the step of transmitting to and from the portable handset and base transceiver communication signals over the conversion frequency of interest.

[0049]

Finally, as indicated by block 36, and ends at the step of preparation for receiving by the portable handset and the base transceiver, converts the one of the plurality of second frequency communication signal received at the converted predetermined frequency .

[0050]

The method disclosed above, is also one in which in addition to the process of transmitting a signal to the base transceiver from the portable handset, showing the process of sending a signal to the portable handset from the base transceiver.

[0051]

Showing (WLL) digital radio system subscriber line using FIG 3, constructed as described in the present invention.

As illustrated, WLL is includes a base transceiver 14.

A plurality of predetermined frequency, the base transceiver 14 transmits and receives communication signals with a portable handset.

Some wireless subtended advance, several predetermined frequency is adjusted to a predetermined frequency band which constitutes the cellular radio spectrum is preferred.

[0052]

By receiving from the processor 17 to an outdoor location signal, via one of a plurality of frequencies F (1st), the base transceiver 14 outdoor, performs transmission and reception of communication signals with a portable handset 38.

[0053]

In preparation for the portable handset which is located in the indoor environment 40 office buildings such as residential, the base transceiver 14 receives an indoor location signal, the first through one of the (2nd) multiple frequency F of the second I will send a communication signal to the first converter 42.

Multiple frequency F of the second (2nd) is different from any of the plurality of predetermined frequency to be used by the 14-based transceiver when communicating to the portable handset 38 is placed in an outdoor environment, the cell 12 adjacent It is the sign to a plurality of predetermined frequency assigned to the base transceiver disposed.

Then, through the one of the plurality of frequencies the second base transceiver 14 receives a communication signal from the transducer 42 of the first.

[0054]

Converter 42 of the first converts conversion frequency F given in (conversion) the frequency of the communication signal from one of the (2nd) multiple frequency F of the second.

As a transducer 42 of the first, and are known to those skilled in the art, it is possible to use conventional devices such as those used to change the frequency of a second, different frequencies of the signal.

However, the converter 42 of the first, it does not change the content of the messages sent and received, and not only the control channel processor and baseband speech processing, there is no delay due to modulation and demodulation.

[0055]

Converter 42 of the first, adapted to receive communication signals over the conversion frequency of predetermined, but also for re-transmitting the signal to the base transceiver 14 via the one of the plurality of frequencies the second further.

[0056]

Provided by the receiving transducer 44 of the second transducer 42 of the first to transmit a communication signal over a predetermined frequency conversion.

The transducer 44 of the second receive signals via a transformation predetermined frequency, comprising the receiving by the portable handset 38, and retransmits a signal at one frequency multiple frequency F of the second (2nd) in.

Converter 44 of the second is placed in an indoor environment 40.

[0057]

Also receives from the portable handset communication signals over one of a plurality of frequencies in the second converter 44 of the second re-conversion unit 42 first the signal through the conversion frequency of the predetermined The fit is also for transmission.

[0058]

The converter 44 of the second frequency shifting repeater of a (FSR) is preferred.

The digital signals because it is retransmitted by using only different frequencies, there is no change in the content of the message to be transmitted and received, there is no need to decrypt the message content.

Therefore, in addition to the control channel processor and baseband speech processing delays by the modulation and demodulation does not occur.

[0059]

It is possible to eliminate the confusion of a frequency known to experienced by a communication signal frequency conversion of the double type, to be caused by a portable handset 38 is in an indoor environment 40.

However, in the portable handset 38 is placed in the outdoor environment, confusion of frequency can be seen.

If the portable handset 38 outdoor receives signals through the conversion predetermined frequency, and the handset 38, a message receiving instruction and to tune to one channel (2nd) multiple frequency F of the second are likely to receive from the base transceiver 14, but this is not something that can be used by applying to the handset 38.

[0060]

Therefore, the portable handset 38 outdoor, must be prevented from transmitting and receiving signals to and from the base transceiver 14 via a plurality of frequencies other than the frequency of the first.

This portable handset 38, the transmission and reception may be prevented by using the indoor and outdoor changeover switch of the handset 38 side.

As the switch, there is a (SIM), such as subscriber identification modules of smart card types that are specific buttons and physical, for outdoor applications and indoor.

[0061]

For practical use of the system and the identity verification process, it is revealed in connection with the DCS-1800 system and GSM.

Information among many other, SIM used in these systems, since the enclosing the information to be assigned to one of the subscriber class and subscriber network of various users of portable handset, and indoor and outdoor Wireless services can be identified.

[0062]

For example, a customer may be subscribed to only outdoor service.

Then the customer is prohibited SIM of one of the only "outdoor" is issued, to respond to the base transceiver through the frequency of multiple frequency other than the first.

It is not to be limited in its position in the normal single cells, the plurality first frequency used for outdoor communication by 14 base transceiver, the subscriber must be allocated according to a frequency reuse pattern.

This allocation is achieved through the normal central processor 17.

[0063]

On the other hand, "indoor" SIM is issued, the response to the base transceiver is allowed through only one of the multiple frequency of the second, customers who subscribe to only cordless service (in the room) is more than one frequency of the first response to the base transceiver through one is prohibited.

[0064]

In addition, customers who subscribe to both services outdoor mobile and cordless indoor, either physical card of two, the double-ended structure of the single "indoor and outdoor" SIM is issued.

I forbid to the handset here, towards the end, "outdoors" is inserted into the portable handset, communication becomes high or SIM of "indoor" also to listening.

If the customer enters the chamber, and pulled out of the portable handset and SIM, and re-inserted towards the handset end towards the "indoor".

[0065]

In addition to the total amount of network resources that you are using the customer's fee according to the price and the quality if it is the claims, and to develop a clear customer hierarchy.

In other words, the highest revenue producing party is indoor and outdoor customer, the lowest revenue is collected from customers of cordless.

(I.e., indoor and outdoor), by partitioning, the invention as described above may be the traffic hours during peak communication is handled by preferential customers to pay high rates communication type that occurs most often at the peak frequency of the more .

[0066]

For example, during the day is assumed most of the communication traffic to occur outdoors.

Thus, outdoor communications most, ie, the frequency of the predetermined frequency band allocated to the base transceiver is allocated a plurality of frequency F of the first to the (1st).

Turning traffic indoors over night, frequency is allocated by many indoor communication.

That is, the frequency is assigned a number by the (2nd) multiple frequency F of the second.

[0067]

It is further divided plurality of frequencies of the second to take into account the identity between the movable indoor users of mobile telephones such as permanent indoor users of cordless telephones or the like.

Subscribers both types because it conflicts frequencies, it is possible to adjust the frequency of the network resources more to be more accessible by the customer to pay a high price.

[0068]

The foregoing has described the invention in detail by way of examples, but when commercializing the invention as defined by the appended claims, the embodiments and design alternatives that various possible techniques of the present invention related I is considered to be approved by those skilled in the field.

[0069]

It should be noted that the present application, the "" supply system and method of supplying the digital radio system local loop "Method And System For Providing A Digital Wireless Local Loop" U.S. patent application 08/270, 070 filed on July 1, 1994 which is a continuation-in-part application.

[0070]

As described in detail above, according to the present invention, in accordance with the present invention, it is determined whether there outdoor environment either in the indoor environment is appropriate portable handset first, indoor or outdoor depending on the result of the determination the position signal is generated.

When the outside position signal is generated, as well as transmitted by the portable handset between the base transceiver via a plurality of first frequency, the portable handset via the frequency of the plurality of frequencies other than said first transmission and reception of communication signals is prevented.

Further, when the indoor location signal is generated, transmitted and received at the portable handset between the base transceiver is performed through the plurality of second frequency.

Then, by distributing it in accordance with the peak traffic different frequencies, adjusting the network resources more frequencies to be a more accessible by the customer to pay high rates and more such as using both indoor and outdoor I can be.

[0071]

Also, in response to the generation of indoor location signal, the signal transmitted from the base transceiver, the signal frequency conversion since it is made in duplicate through the transducer first and second, is caused by the portable handset in the indoor environment It is also possible to eliminate the confusion of a frequency known empirically.

[0072]

According to the present invention, since it is transmitted by using only different frequency signals, no change in the content of the messages transmitted and received, there is no need to decrypt the message content.

Accordingly, there is no possibility that in addition to the control channel processor and baseband audio processing delay by modulation and demodulation may occur.

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CLAIMS JPH0847032

[0001]

Supply of the wireless local loop to operate to perform communication with a portable handset via a plurality of frequencies the base transceiver installed in one of a plurality of cells defining a range of cellular service area is assigned to it In the system, a step of determining whether there is an outdoor environment it is in an indoor environment wherein the portable handset, to generate a position signal of the indoor or outdoor depending on the determination result, according to the outdoor position signal generated , to be received from one to the other and from the portable handset (a) and the base transceiver, as well as transmit a communication signal via one of the plurality of frequencies of the first, (b) the a step of blocking the handset is to transmit and receive communication signals over a plurality of frequencies a frequency other than the first, in response to the indoor position signal is generated, and the portable handset (a) and the base transceiver The transmitting communication signals over one of the plurality second frequency different from the plurality of frequencies of the first between, and the second communication signal transmitted by the portable handset and (b) the base transceiver converting the converted predetermined frequency different from the plurality of frequencies and the second one, it is possible to transmit to and from the portable handset and the base transceiver communication signals that are (c) conversion,And characterized by comprising the step of having the receiving by the portable handset (d) and the base transceiver, converts the one of the plurality of said second frequency of the communication signal received at the conversion frequency of the predetermined the method of supplying the wireless local loop that.

[0002]

The method of supplying the wireless local loop according to claim 1, characterized in that the

translation frequency and the predetermined plurality of frequencies in the second form part of the cellular radio spectrum and the first.

[0003]

The method of supplying the wireless local loop according to claim 1, characterized in that a plurality of said second frequency is, to code a plurality of frequencies assigned to the base transceiver installed in one cell to another cell of the plurality .

[0004]

The method of supplying the wireless local loop according to claim 1, characterized in that said communication signal is a voice signal.

[0005]

The method of supplying the wireless local loop according to claim 1, characterized in that said communication signal is a video signal.

[0006]

The method of supplying the wireless local loop according to claim 1, characterized in that said communication signal is a data signal.

[0007]

The method of supplying the wireless local loop according to claim 1, characterized in that a plurality of the second frequency is selected based on the total amount of the position signals generated indoors and said first and.

[0008]

The method of supplying the wireless local loop in accordance with claim 1, wherein the step of converting a communication signal transmitted by the base transceiver is performed in the base transceiver.

[0009]

The method of supplying the wireless local loop in accordance with claim 1, wherein the step of determining whether or outdoors or indoors in the portable handset is executed by the processor of the mobile telephone switching center.

[0010]

In wireless local loop system for the portable handset adapted to send and receive communication signals, it is determined whether or outdoors or is indoors the portable handset, either indoors in accordance with the judgment result is provided with a processor for generating a position signal corresponding to the outside, to one of a plurality of cells defining a range of cellular service areas, are provided in order to work with the portable handset and the processor, the position of (a) Outdoor response to receipt of the signal, and performs transmission and reception of communication signals with the portable handset via the one of the plurality of frequencies of the first, according to the receiving of the position signal (b) indoors, the plurality of frequencies the second By transmitting and receiving communication signals over a single base transceiver operates to perform communication with the portable handset through a plurality of frequencies assigned to it, and in cooperation with the base transceiver, and the second receiving communication signals over one of a plurality of frequencies, as well as re-transmitting the communication signal via the conversion predetermined frequency different from the plurality of frequencies of the first and second, and via the conversion frequency of the predetermined a transducer first Te receives the communication signal, and operates to re-transmit the communication signal to the base transceiver through the one of the plurality of frequencies of said second transducer of the first and the portable In cooperation with the handset,Receiving communication signals from the transducer of the first through the conversion frequency of the predetermined, as well as re-transmitting the communication signal to the portable handset via the one of the plurality said second frequency, the second converter second is received from the portable handset a communication signal in one of a plurality of frequencies of two, and operates to re-transmit the communication signal to the transducer of the first through the conversion

frequency of the predetermined and, and a suppression device which works with the portable handset, to prevent the portable handset to send and receive communication signals over a plurality of frequencies a frequency other than the first in response to the position signal generation outdoor wireless local loop system, which is characterized by.

[0011]

Wireless local loop system according to claim 10, characterized in that the converter, wherein the first is mounted on the base transceiver side.

[0012]

Wireless local loop system according to claim 10, characterized in that transmit and receive communication signals with the base transceiver transducer, wherein said first via the wireless network.

[0013]

Wireless local loop system according to claim 10, characterized in that the transducer of the second, wherein is installed in an indoor environment.

[0014]

Wireless local loop system according to claim 10, wherein the converter second, wherein a frequency shift repeater.

[0015]

Wireless local loop system according to claim 10, characterized in that wherein said inhibiting device is a switch.

[0016]

Wireless local loop system according to claim 15, characterized in that it is a physical button, wherein said switch is disposed on the portable handset on.

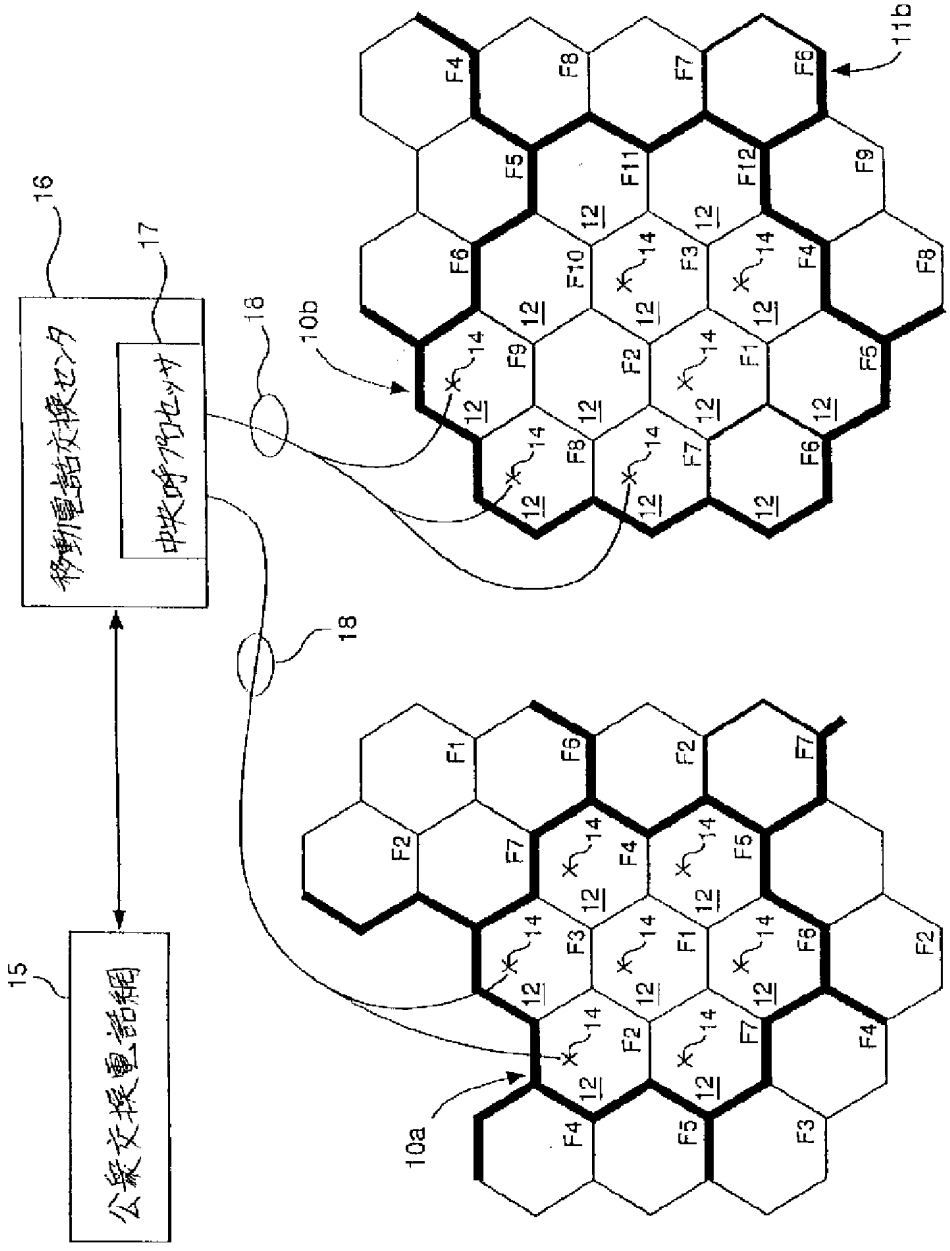
[0017]

claim 15 wherein, characterized in that it is an electronic module of at least one wherein the switch has been adapted to be inserted into the handset to operate the portable handset in either an outdoor environment or indoor environment wireless local loop systems.

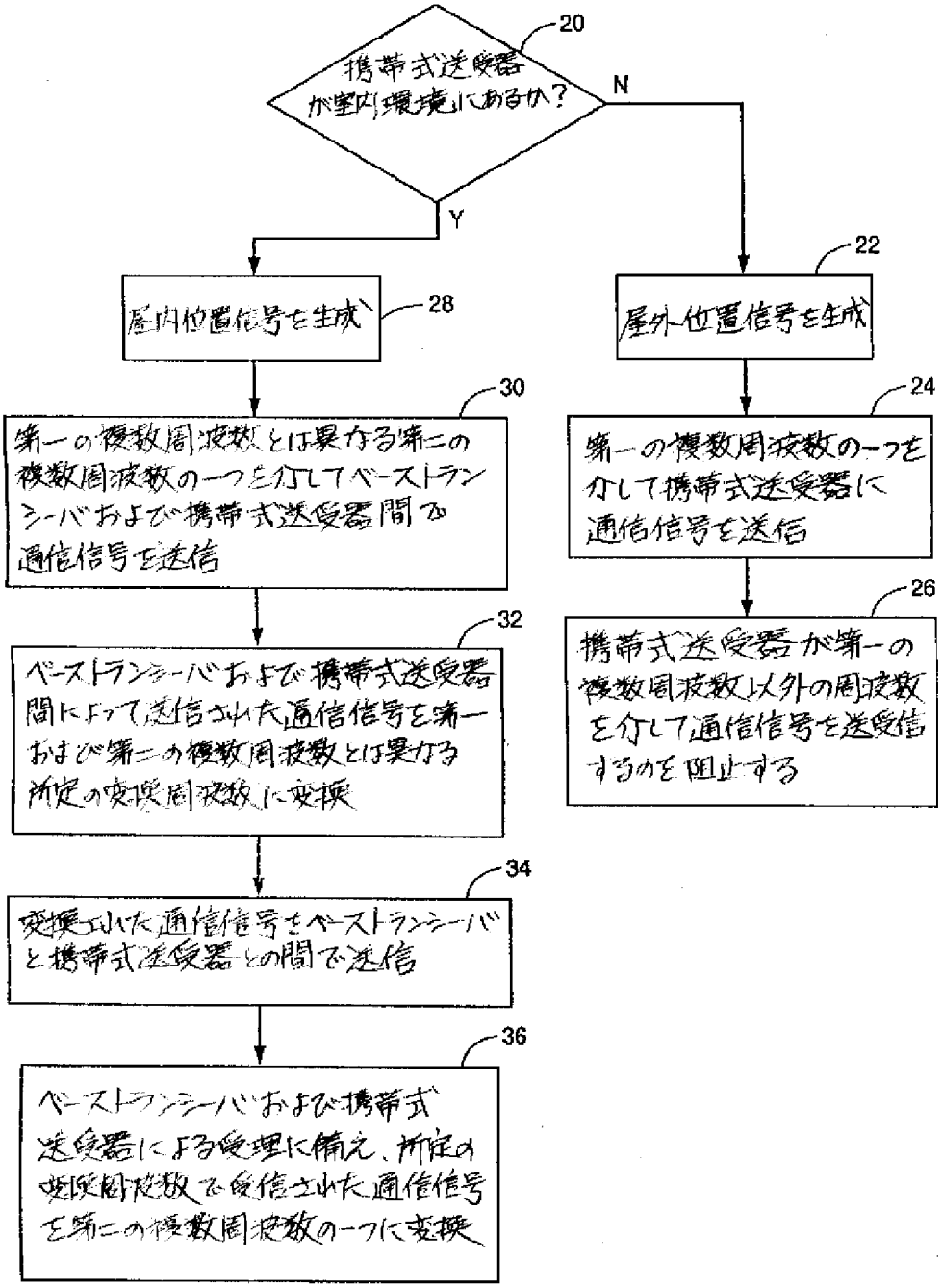
[0018]

] Wireless local loop system as claimed in claim 17, characterized in that said one electronic module may provide the operation of the portable handset in any of the outdoor environment and an indoor environment, at least.

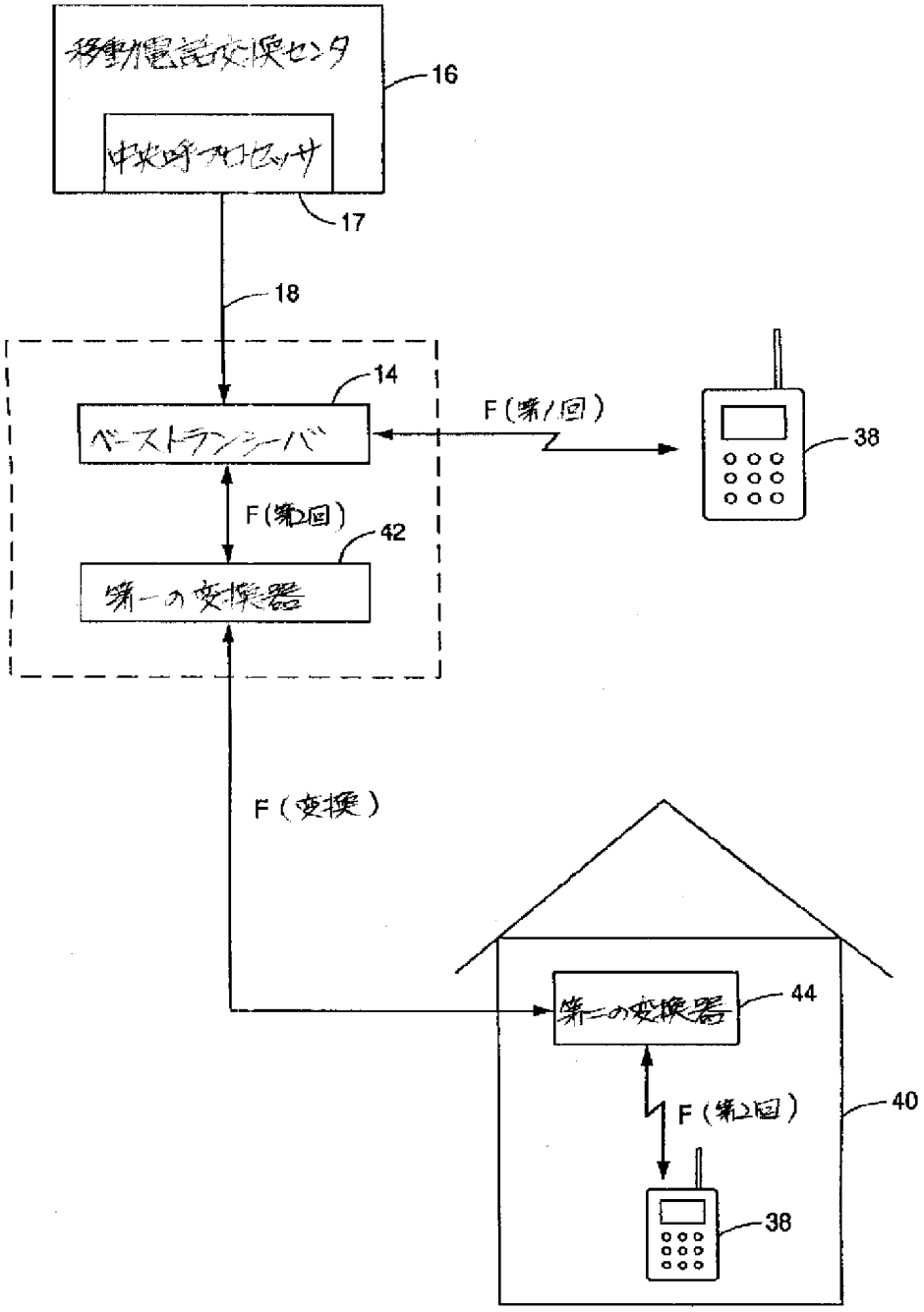
【図１】



【図２】


20
携帯式送受器が室内環境にあるか？
N
Y
22
屋外位置信号を生成
28
屋内位置信号を生成
24
第一の複数周波数のうちを介して携帯式送受器に通信信号を送信
26
携帯式送受器が第一の複数周波数以外の周波数を介して通信信号を送受信するのを阻止する
30
第一の複数周波数とは異なる第二の複数周波数のうちを介してベーストランシーバおよび携帯式送受器間で通信信号を送信
32
ベーストランシーバおよび携帯式送受器間によって送信された通信信号を第一および第二の複数周波数とは異なる所定の変換周波数に変換
34
変換された通信信号をベーストランシーバと携帯式送受器との間で送信
36
ベーストランシーバおよび携帯式送受器による受理に備え、所定の変換周波数で受信された通信信号を第二の複数周波数のうちに変換

【図３】


移動電話交換センタ
16
中央呼プロセッサ
17
18
14
ベーストランシーバ
F（第1回）
38
F（第2回）
42
第一の変換器
F（変換）
第二の変換器
44
F（第2回）
40
38

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04Q 7/20 — A1

(11) International Publication Number: **WO 99/09762**

(43) International Publication Date: 25 February 1999 (25.02.99)

(21) International Application Number: PCT/US98/16884

(22) International Filing Date: 13 August 1998 (13.08.98)

(30) Priority Data:
08/912,912 15 August 1997 (15.08.97) US

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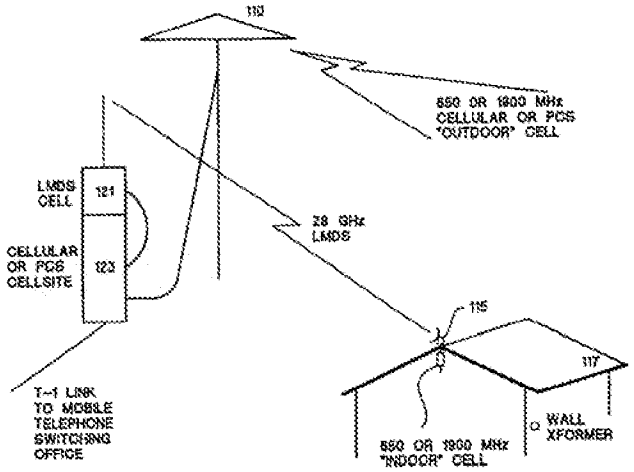
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(81) Designated States: CA, JP, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: FREQUENCY TRANSLATION TO LOCAL MULTI-POINT DISTRIBUTION SYSTEMS FOR PERSONAL COMMUNICATIONS SERVICES



(57) Abstract

A first embodiment of the present invention discloses a system for extending the range of Personal Communication Services (''PCS'') band wireless local loop services. A frequency translation unit at both the user's residence and at the central hub translates the PCS signal from the PCS frequency band to the Local Multipoint Distribution System (''LMDS'') band and back. As LMDS has a significant range advantage over DECT and PHS without greatly increased costs, this frequency translation allows DECT and PHS telephones to be used over greater ranges, without the necessity of constructing a large number of cellular transceiver sites. A second embodiment of the present invention uses a frequency translation unit to permit the use of either PCS or known cellular telephones inside a user's residence without the call being routed through the more expensive cellular network. The frequency translation unit translates from PCS or cellular frequencies to LMDS frequencies. The user's calls are then completed over the less expensive LMDS network. When outside the user's residence, the PCS or cellular telephone operates in its original known fashion.

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Frequency Translation To Local Multi-point Distribution Systems for Personal Communications Services

Background of the Invention

Low cost Personal Communication Services ("PCS"), which typically include wireless telephone service, paging, and digital data transmission, can succeed commercially only if several conflicting requirements are properly balanced. Among these requirements are low handset cost, low transmission power to extend battery life and permit a lighter handset, good speech quality, and high user density.

At least two forms of PCS are currently available. The first form, Digital European Cordless Telecommunications ("DECT") standard wireless telephones operate at 1880-1900 MHZ. A U.S. version of DECT, operating at 900 MHZ (ISM band) also exists, and a second U.S. version of DECT operating at 1900 MHZ, called Personal Access Communication Systems ("PACS") will be available in early 1997. In Japan, a second form of PCS with similar characteristics to DECT is available and is called the Personal Handyphone System("PHS"). The technical parameters and capacities of these systems are known.

Summary of the Invention

Broadband wireless access systems operating at millimeter wavelengths including Local Multipoint Distribution Systems ("LMDS") operating at 28 Ghz and other point-to-multiple-point systems such as Digital Electronic Messaging Systems ("DEMS") at 24 Ghz can be used to extend the range of PCS systems including DECT, PACS, and PHS as well as providing other operational advantages. LMDS resembles in some respects cellular telephone networks. Each home using LMDS is equipped with a Customer Premises Equipment ("CPE") unit comprising a narrow beam antenna/millimeter transceiver unit on or at the roof line. Inside the home, a general purpose modem or similar gateway connects the antenna/transceiver unit to various home information appliances, including but not limited to telephones, televisions, and computers. The home antenna/transceiver units in turn communicate with sector hubs, each hub having an antenna, the height of which will vary from 15-25 meters, depending on desired range, local terrain, and local zoning and building

restrictions. Each hub is in turn connected to a central office, which may act as a content provider, an interface to the telephone system, or an interface to the Internet.

In a first embodiment of the present invention, each user will have a home gateway that includes an interface to the DECT's or PHS's Fixed Access Unit ("FAU"). The FAU provides the user with a standard telephone socket for connecting conventional analog equipment such as telephones, facsimile machines, modems, and possibly Integrated Service Digital Network ("ISDN") equipment. The home gateway interface to the PCS FAU provides frequency translation from the DECT/PHS system to the LMDS system. The home gateway will be connected to a CPE unit at roof level. At the hub, the telephony signal will be received from the LMDS system and connected to a DECT/PHS base station through an interface that provides the necessary frequency translation.

In a second embodiment of the present invention, LMDS is used to provide a cost-effective home use option for users of known cellular telephones and PCS users. In this embodiment, when cellular telephone or PCS users are outside their homes, their handsets transmit and receive signals to and from the host cellular/PCS site. Operation is conventional and known in this second embodiment when the user is outside the home environment. Inside a house, the PCS or cellular telephone no longer sends and receives signals to and from the host cellular/PCS site. Instead, a special channel is used which is dedicated to indoor use and a picocell unit transmits and receives signals from the PCS or cellular telephone user and translates the signals up to or down from the LMDS frequency range. In turn, the picocell unit communicates with an LMDS cell. The LMDS cell is coupled to a cellular or PCS cell site, which in turn can be coupled to a mobile telephone switching office.

These embodiments of the present invention will now be described in detail, with reference to the figures listed and described below.

Brief Description of the Drawings

Fig. 1 is a block diagram of the user's side of a first embodiment of the present invention;

Fig. 2 is a block diagram of the hub side of the first embodiment of the present invention;

and

Fig. 3 is a diagram illustrating a second embodiment of the present invention.

Detailed Description of the Invention

Cellular telephone systems are known. Typically, the cell size is a circle with a radius of 5 km, which in turn requires a tall antenna. Given the relatively large cell size, individual handsets are typically relatively powerful (approximately 1W into the handset's antenna). Often, the battery life of these handsets is fairly limited. Although digital cellular telephones have improved voice quality over analog cellular telephones, neither digital nor analog cellular telephones are considered to be of "wire line" quality.

DECT/PHS systems offer nearly wire line voice quality but only at very short ranges, typically 50-150 meters. Given the short transmission distance, the handsets are usually considerably less expensive than those used in cellular telephone networks and the battery life is also typically longer. DECT/PHS and similar technologies have been incorporated into various cordless telephone systems. One standard for such systems is DECT which is available in Europe, operating at 1880-1900 MHZ, and in the U.S., operating at 905-910 MHZ. Both DECT systems are time division, multiple access ("TDMA")/time division duplex("TDD") multicarrier and provide multiple slots for users within range of the basestations. In Europe, 12 slots are allocated per frame, and in the U.S., 8 slots are allocated per frame. The PHS in Japan is a TDD system.

DECT products are already in wide use in Europe and Asia and are becoming increasingly available in the U.S. Both embodiments of the present invention can be readily adapted to operate with any DECT product or any other PCS system .

To provide wireless local loop service using DECT/PHS over LMDS, each user will have a home gateway that includes a frequency translation interface to the DECT/PHS Fixed Access Unit ("FAU"). The DECT/PHS FAU provides users with a standard telephone socket for connecting conventional analog equipment such as telephones, facsimile machines, modems, and possibly ISDN equipment. The DECT/PHS FAU will be modified by replacing the antenna unit with a shielded coaxial cable. The translation from the particular DECT/PHS FAU frequency band to the LMDS band is achieved using a simple frequency

translation interface. The use of the simple frequency translation interface allows LMDS service providers and other broadband wireless distribution systems to carry such PCS technologies as DECT, PHS, or PACS over their systems anywhere in the world.

At the hub end, the telephony signal will be received over LMDS, with a cell size of up to 2 km radius, and connected to a modified PCS radio port, with no antenna, through a simple frequency interface similar to the one used by the users. The PCS radio port can be connected to the radio port control units located at the central office using known transmission techniques, including copper wire, radio links, or fiber optic lines.

Fig. 1 is a block diagram of the user's side of a first embodiment of the present invention. The original DECT fixed access unit ("FAU") 15 is coupled to the user's telephone, fax, and modem. Frequency translation unit ("FTU") 25 is coupled to FAU 15. FTU 25 is further comprised of power splitter 27, first and second amplifiers 29 and 31, first and second mixers 33 and 35, and second power splitter 37. FTU 25 steps up outgoing traffic from DECT/PHS frequency to LMDS frequency and steps down incoming traffic from LMDS frequencies to DECT/PHS frequency.

FTU 25 is in turn coupled to a home gateway unit 41. Home gateway unit 41 contains a splitter which separates in-coming video and other high data rate signals from telephone and other low rate signals and directs the telephone and low data rate signals into FTU 25. A power supply also resides within home gateway unit 41 and home gateway unit 41 is in turn coupled to the CPE, including MM/RF transmitter unit 51, which comprises at least a transceiver operating at the LMDS frequency band.

Fig. 2 is a block diagram of the hub equipment used in this first embodiment of the present invention. Hub FTU 70 comprises first power splitter 71, first and second amplifiers 73 and 75, first and second mixers 77 and 79, and second power splitter 81. Hub FTU 70 is coupled through second power splitter 81 to a bi-directional PCS radio port 82 . Through first power splitter 71, hub FTU is coupled to hub interface 83 and data transceiver 85. Data transceiver 85 and TV transmitter 87 are coupled through power splitter 89 to hub interface 83. Hub interface 83 is in turn coupled to MM/RF transceiver 95.

This first embodiment of the present invention offers the possibility of significantly reducing infrastructure cost and increasing the system's range from 150 m to 2 km by using

only one tall antenna at a hub to distribute telephone, video, and high speed data services in the LMDS band to users located within a 2 km radius by one service provider instead of using several other antenna towers in the same area for wireless local loop services only at the PCS band. The relatively simple and inexpensive frequency translation interface proposed in this first embodiment allows LMDS or any broadband wireless system service provider at millimeter wavelengths to use PCS technologies such as DECT, PHS, or PACS in any part of the world with minimum modification.

This first embodiment of the present invention has been described using DECT/PHS systems over LMDS and has been tested with both U.S. and European DECT systems. In a similar fashion, other embodiments of the present invention could be adapted for use with other low tier PCS and cordless systems, such as the Japanese PHS and the U.S. PACS, if the service providers so desire.

In a second embodiment of the present invention, LMDS is used to provide a cost-effective home use option for users of known cellular telephones and PCS users. As shown in Fig. 3, when cellular telephone or PCS users are outside, their handsets transmit and receive signals to and from cellular tower 110. While the user is in an outside environment, operation of the cellular and PCS telephones is conventional and known.

Once inside house 117, however, the PCS or cellular telephone no longer sends and receives signals to and from cellular tower 110. Instead, a picocell unit 115 transmits and receives signal from the PCS or cellular telephone users, translating them up to or down from the LMDS frequency range. In turn, picocell unit 115 communicates with an LMDS cell transmitter 121. It is readily foreseeable that an LMDS cell 121 and a cellular or PCS system cell 123 would be co-located. LMDS cell transmitter 121 is coupled to cellular or PCS cell site 123, which is in turn coupled by a T-1 link to a mobile telephone switching office .

In this second embodiment, a portion of the LMDS' bandwidth in the 28 GHz band is used to extend the range of installed cellular or PCS base stations to very low power on-premises/in-premises re-radiators, called herein picocell units 115. Between 1.5 MHZ and 30 MHZ of the LMDS bandwidth is used for this purpose.

When the user is inside a house, the cellular/PCS handset communicates with picocell unit 115 at cellular or PCS frequencies. As the user moves outdoors, the service is provided

directly between the user and a host cellular/PCS cell site in a known manner. The link between the cellular/PCS system and the picocell units is implemented by co-locating an LMDS host cell site 121 with each cellular/PCS cell site. This host cell 121 will use some of the 28 GHz band to transport up-converted cellular/PCS signals to the premises-located picocell units, which will in turn down-convert the signals back to the appropriate cellular/PCS band and re-radiate at very low power. The mirror image of this process provides the reverse channel capability.

Additional LMDS band re-radiator host cells may be necessary to assure coverage at 28 GHz, where propagation is generally more limited and typical cellular/PCS cell spacings may not provide adequate coverage. In the cellular regime, a separate, perhaps properly called "virtual" cellular/PCS cell site can be defined as a PN offset for CDMA or a dedicated RF channel for GSM/TDMA for in-premises use. This allows the cellular/PCS operator to distinguish between in-premises use and outdoor use so that different billing rates can be used for these different usages.

As in traditional microcells, either fiber connected or microwave connected, the LMDS signal now transports the fully modulated cellular/PCS bandwidth, and the picocell unit does not perform any modulation or demodulation function. The downlink functions performed at the picocell unit are reception and filtering in the LMDS band, down conversion from LMDS frequencies (28 Ghz) to cellular or PCS frequencies (850 MHZ/1.9 Ghz), and re-radiation in the cellular or PCS band. In the uplink direction, the picocell unit performs the functions of LNA for cellular or PCS, upconversion to LMDS, combining with any other usage of the LMDS spectrum in the uplink, and propagation of the combined LMDS signal back to the LMDS host cell. All portions of this second embodiment use digital modulation, which is somewhat more fraud resistant than analog cellular.

This second embodiment allows wireless in-premises access to compete with wireline telephony prices while supporting full mobile telephony, at market-driven mobile telephony prices outside the premises. It simultaneously supports the "one-number access" that personal communications concepts envision. By linking the user to in-premises wireline-alternative service and still allowing cellular/PCS service, it should encourage co-ordinated long distance service.

Claims

What Is Claimed Is:

1. In a wireless telephone network operating at a first frequency band, the network having a plurality of user wireless handsets and network transceiver hubs, a system for extending the range of the transceiver hubs and the handsets, the system comprising:

a hub frequency translation unit, for receiving incoming telephone signals at a first predetermined frequency, for translating the incoming telephone signals to a second predetermined frequency, for receiving outgoing telephone signals at the second predetermined frequency, and for translating the outgoing telephone signals to the first predetermined frequency; and

a user frequency translation unit, for receiving incoming telephone signals at the second predetermined frequency, for translating the incoming telephone signals to the first predetermined frequency, for receiving outgoing telephone signals at the first predetermined frequency, and for translating the outgoing telephone signals from the first predetermined frequency to the second predetermined frequency.

2. In a Personal Communication Service telephony system having user equipment, a plurality of hubs, and a central office, a range extending system comprised of:

a plurality of access units coupled to the Personal Communication Service user equipment of a plurality of users for translating signals from the user equipment operating at an operating frequency of the Personal Communication Service telephony system to a second predetermined operating frequency and back;

a plurality of transceiver units for transmitting and receiving signals at the second predetermined frequency coupled to the access units;

a plurality of translating hubs for receiving signals at the second predetermined operating frequency, for translating the signals to the operating frequency of the Personal Communication Service telephony system, for providing the translated signals to the Personal Communication Service telephony system, for receiving signals from the Personal Communication Service telephony system at the operating frequency of the Personal

Communication Service, for translating the received signals to the second predetermined operating frequency, and for transmitting the translated signals to the transceiver units.

3. The range extending system of claim 2 wherein the operating frequency of the Personal Communication System is between 800 and 2000 MHZ and the second predetermined operating frequency is between 24 and 28 Ghz.

4. In a cellular telephone system, a system for utilizing a second wireless telephone system to reduce telephony costs, the system comprising:

a residential frequency translation unit for receiving and transmitting to at least a first cell of the second wireless telephone system at a predetermined second wireless system operating frequency and for receiving and transmitting at a first wireless system operating frequency to a cellular telephone hand-held transceiver, the frequency translation unit translating telephony signals to and from the first and second wireless system operating frequencies.

5. A system for reducing the cost of using cellular telephones having an operating frequency, the system comprising a plurality of user premises micro-cellular transceivers, for receiving and transmitting telephony signals at a first predetermined frequency to a plurality of micro-cellular base stations operating at the first predetermined frequency, the micro-cellular base stations and the micro-cellular transceivers both translating the signals from the first predetermined frequency to the operating frequency of the cellular telephones.

6. The system of claim 5 wherein the transceivers and micro-cellular base stations first predetermined operating frequency is between 24 and 28 Ghz and the cellular telephone operating frequency is between 800 to 2000 MHZ.

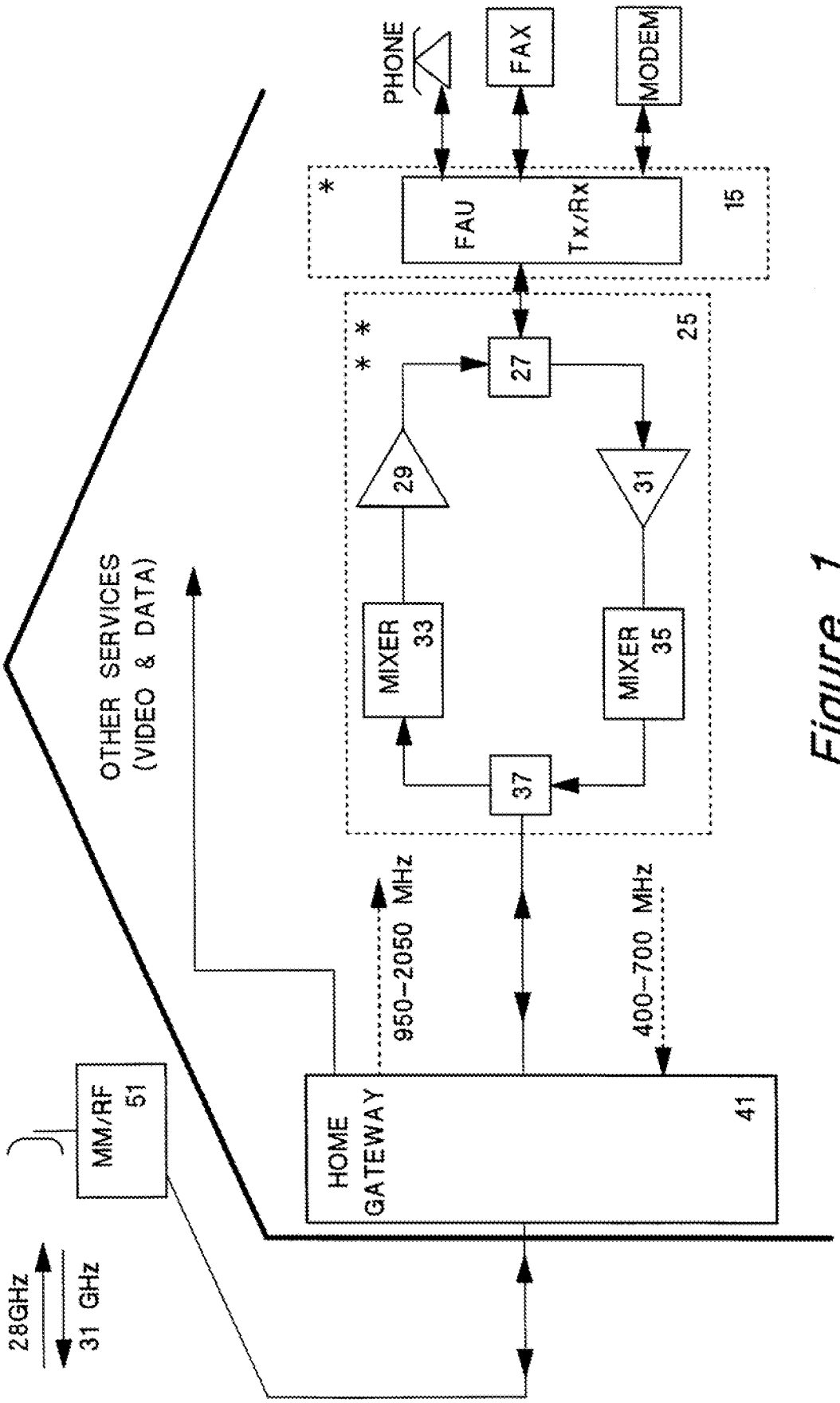

PHONE
FAX
MODEM
FAU
Tx/Rx
15
25
27
29
31
MIXER
33
MIXER
35
37
OTHER SERVICES
(VIDEO & DATA)
950–2050 MHz
400–700 MHz
HOME
GATEWAY
41
MM/RF
51
28GHz
31 GHz

Figure 1

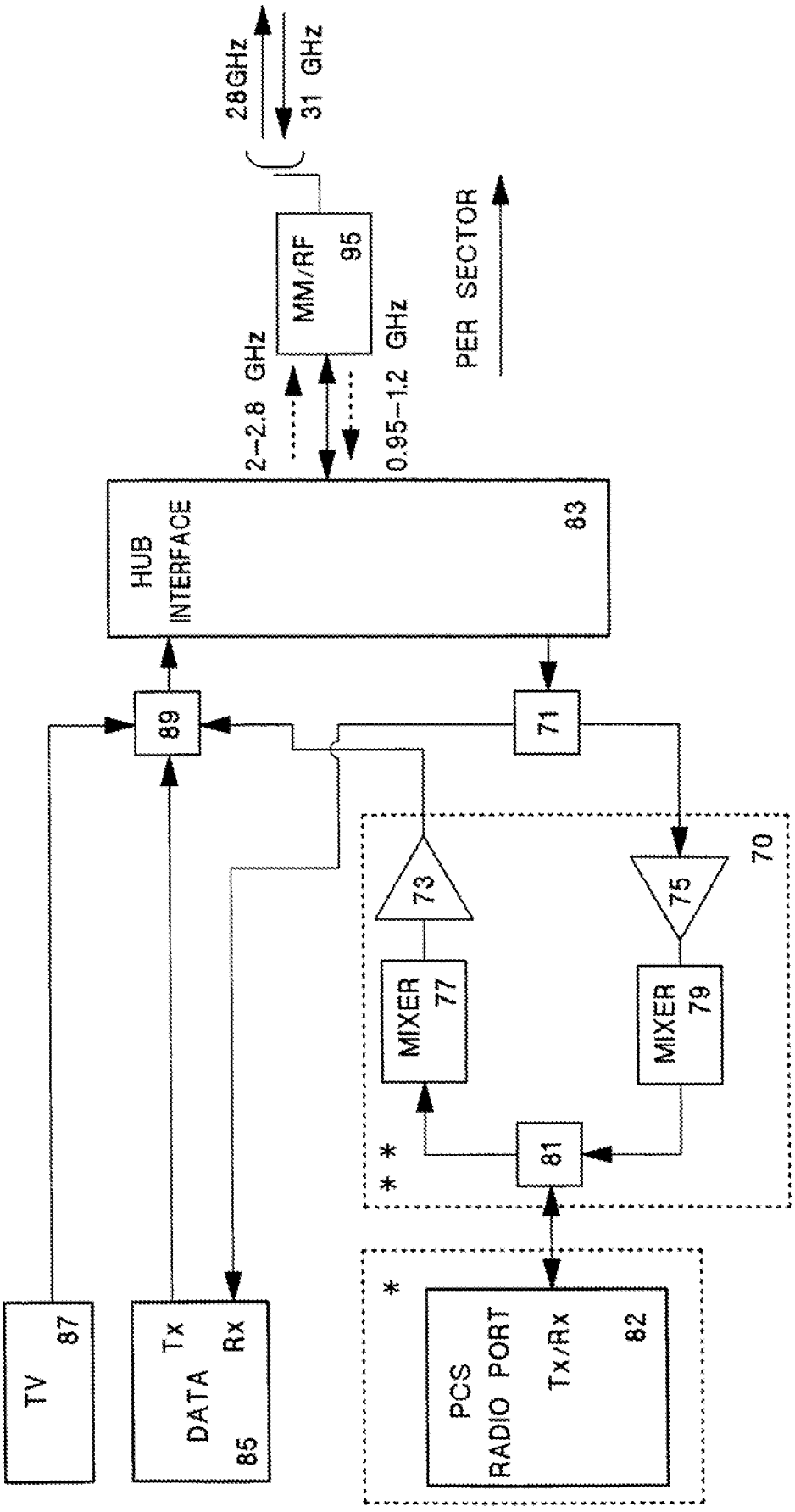

28GHz
31 GHz
MM/RF
95
2–2.8 GHz
0.95–1.2 GHz
PER SECTOR
HUB
INTERFACE
83
89
71
73
75
70
MIXER
77
MIXER
79
81
TV
87
Tx
DATA
Rx
85
PCS
RADIO PORT
Tx/Rx
82

Figure 2

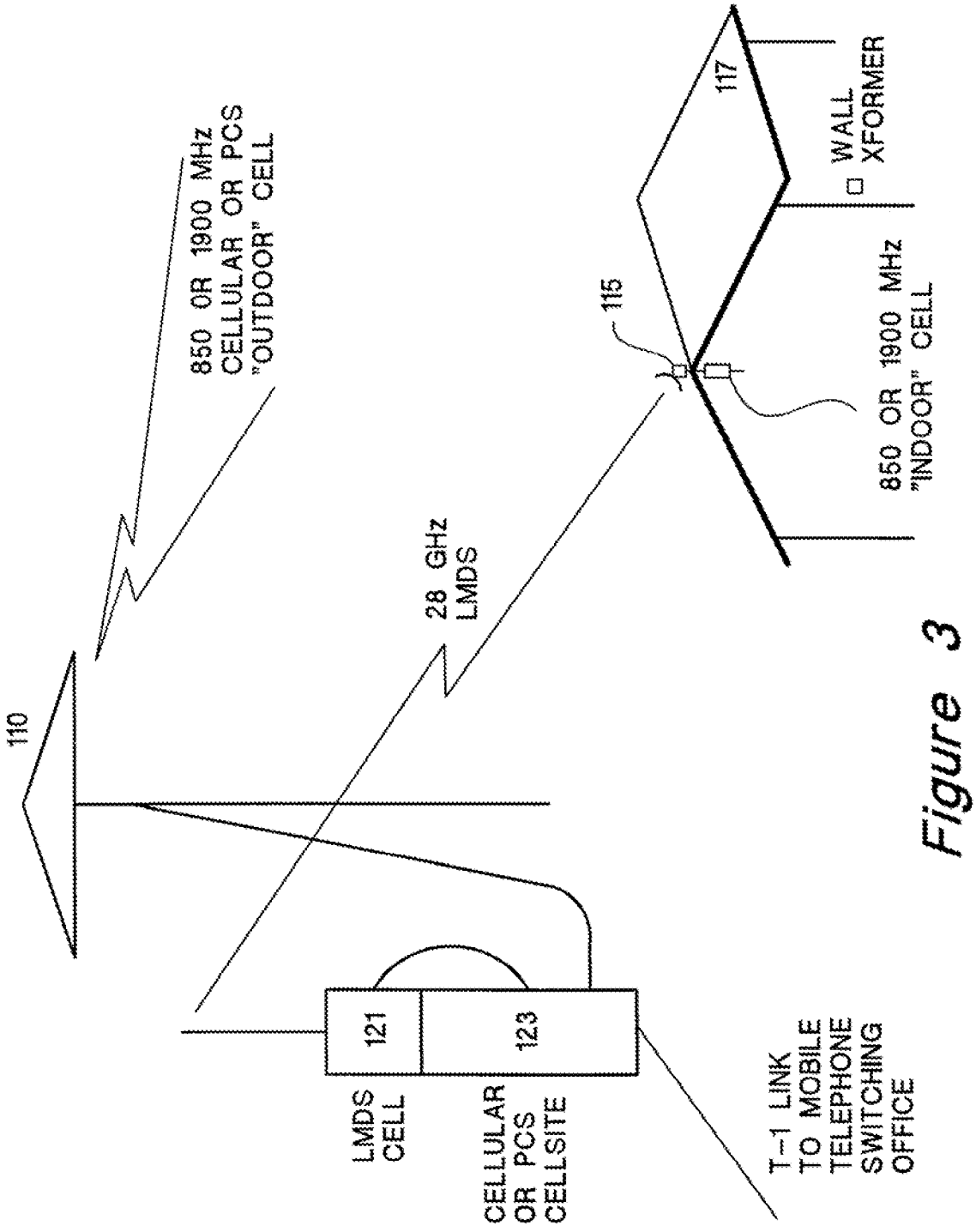

850 OR 1900 MHz
CELLULAR OR PCS
"OUTDOOR" CELL
110
28 GHz
LMDS
115
117
WALL
XFORMER
850 OR 1900 MHz
"INDOOR" CELL
121
123
LMDS
CELL
CELLULAR
OR PCS
CELLSITE
T-1 LINK
TO MOBILE
TELEPHONE
SWITCHING
OFFICE

Figure 3

INTERNATIONAL SEARCH REPORT

Interr nal Application No
PCT/US 98/16884

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04Q7/20

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 786 876 A (TELIA AB) 30 July 1997 see column 4, line 42 - column 5, line 9 see column 5, line 21 - line 26	1-6

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
30 November 1998	07/12/1998

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04Q 7/22 — A1

(11) International Publication Number: **WO 99/29126**

(43) International Publication Date: 10 June 1999 (10.06.99)

(21) International Application Number: PCT/IB98/02032

(22) International Filing Date: 3 December 1998 (03.12.98)

(30) Priority Data:
9725659.8 3 December 1997 (03.12.97) GB

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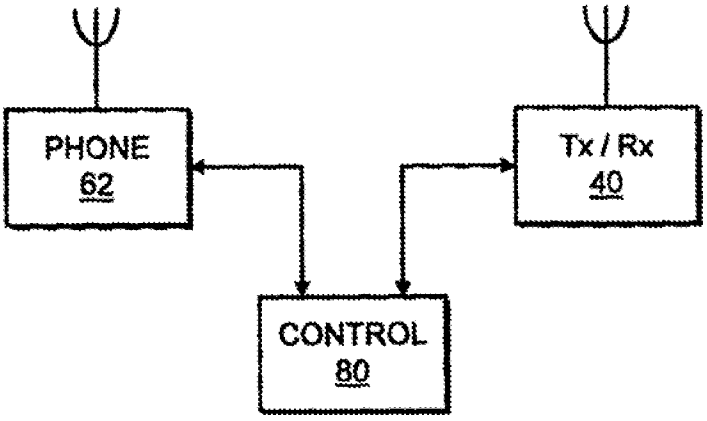
(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: INTEGRATING COMMUNICATIONS NETWORKS

(57) Abstract

A terminal for simultaneously operating in a first mobile radio communications network and a second different radio communications network. The terminal comprises: first radio transceiver means (62) for transmitting and receiving in said mobile communications network and second radio transceiver means (40) for transmitting and receiving packets in the second radio communications network. The first transceiver means (62) is arranged such that successive transmissions by said first transceiver means in said mobile communications network are separated by a first period of time or a multiple thereof. The second transceiver (40) means is arranged for transmitting and/or receiving an integer number of packets sequentially in the first period of time or a multiple thereof.



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INTEGRATING COMMUNICATIONS NETWORKS.

The present invention relates to the integration of two different communications networks. It particularly relates to a terminal which can be operate simultaneously in both networks.

Existing mobile communication networks have protocols which rigidly define specific parameters. For example, the GSM, D-AMPS and PDC networks operate using time division multiplexing (TDMA). For each frequency channel, a TDMA time frame is defined. The TDMA time frame has a fixed number of time slots of fixed duration and each time slot represents a channel through which a mobile terminal and a base station communicate. A particular terminal uses a time slot to transmit a message to the base station once per time frame and the base station uses another slot to transmit a message to the particular terminal once per time frame. The TDMA time frames are cyclically repeated one after the other.

The characteristics of the time frame vary from network to network. In the GSM network, the time frame is divided into eight time slots and each frame has a duration of 60/13 ms. In the D-AMPS and PDC networks, the time frame is divided into 3 slots, and each frame has a duration of 20 ms.

Other types of radio communications networks are proposed. One such network is the Bluetooth low power radio frequency (LPRF) network described at http://www.bluetooth.com. This communications network is proposed to obviate the need for physical electrical connections between electrical devices.

It would be desirable to integrate the new or proposed communications networks with an existing communications network or networks.

According to one aspect of the present invention there is provided a terminal in a mobile radio communications network, as claimed in claim 1.

The timing of the second radio communications network is such that the timing of the mobile communications network and the timing of the second radio communications network can be aligned. This allows the two networks to be easily integrated through the terminal.

The terminal can simultaneously operate in both networks by transmitting or receiving in one network while simultaneously transmitting or receiving in the other network.

The second transceiver means defines a super-frame having said integer number of slots and a slot allocation pattern for each connection. The allocation patterns define what each slot in the super-frame is used for. The super-frame has a finite length and is cyclically repeated. The allocation pattern has the same finite length and is repeated with the super-frame. The finite length may be fixed or variable. The allocation pattern is preferably variable. The second communications network is preferably controlled using allocation patterns by transmitting one to each of the other transceivers in the network. The slot length in the second communications network may be fixed or variable.

The terminal by defining the allocation pattern is capable of avoiding critical concurrent activities by the terminal in the first and second communication networks. This supports integration of the first and second networks, eases type approval and simplifies RF design. The critical concurrent activities may

be predefined in the terminal. They are typically those activities which are difficult or impossible to handle concurrently. One example may be simultaneous transmission in both networks another may be simultaneous reception in both networks.

For a better understanding of the present invention and to understand how the same may be brought into effect, reference will now be made by way of example only to the following drawings in which:

Figure 1 illustrates an LPRF communications network including master and slave units;

Figure 2 illustrates the common time frame of the LPRF communications network;

Figure 3 illustrates a transceiver suitable for use as a master unit or a slave unit;

Figure 4 illustrates a mobile terminal for simultaneously operating in two communications networks;

Figure 5 illustrates the integration of a mobile communications network and an LPRF communications network via the mobile terminal of Figure 4;

Figure 6 illustrates the time frame used in the mobile communications network;

Figure 7 illustrates the allocation of LPRF time slots in an LPRF communications network integrated with a first GSM mobile communications network;

Figure 8 illustrates the allocation of LPRF time slots in an LPRF communications network integrated with a second GSM mobile communications network;

Figure 9 illustrates the allocation of LPRF time slots in an LPRF communications network integrated with a PDC or D-AMPS mobile communications network; and

Figure 10 illustrates how the common time frame of the LPRF communications system can be shifted.

Figure 1 illustrates a network 2 of radio transceiver units, including a master unit 4 and slave units 6, 8 and 10, communicating by transmitting and receiving radio packets. The master unit is the transceiver unit which initiates the connection of a slave to the network. There is only one master in a network. Referring to Figure 3, the transceiver units are synchronised to a common time frame 20 for the network controlled by the master unit 4. This time frame consists of a series of time slots 22-29 of equal length *l*. Each radio packet transmitted in the network has its start aligned with the start of a slot and a single packet is transmitted in the network at a time.

When the master unit is performing point-to-point communication a transmitted radio packet is addressed to a particular transceiver which may reply to the master unit by transmitting a radio packet addressed to the master unit in a following time slot. Any time misalignment between the master and a slave is corrected by adjusting the timing of the slave so that it corresponds to that of the master unit 4.

The transceivers transmit and receive, in this example, in a microwave frequency band, illustratively 2.4 GHz. The network reduces interference by changing the frequency at which each radio packet is transmitted. A number of separate frequency channels are assigned each with a bandwidth of 1MHz, and the frequency may hop once every time slot at a rate of *f* hops/s. The frequency hopping of the transceivers communicating in or joining the network is synchronised and controlled by the master unit. The sequence of hopping frequencies is unique for the network and is uniquely determined by the master unit. Although each slot is allocated a different one of a sequence of hopping frequencies it is possible for a radio packet to extend over a number

of slots and in this case the frequency at which the packet is transmitted remains constant at that allocated to the slot at the start of the packet.

The network is a radio frequency network suitable for transmitting voice information or data information between transceivers. The transmissions made are of low power, for example 0 to 20dBm, and the transceiver units can effectively communicate over the range of a few centimetres to a few tens or hundred of metres. The master unit identifies the other transceiver units within its transmission range and sets up a communication link between the master unit and that slave unit.

An allocation pattern is defined for each connection in the network. This allocation pattern defines whether a slot is used or not. If the slot is used it defines how the slot is used. Possibilities for using slots may include that a slot is:

a down-link slot (D);

an up-link slot (U);

a continuation slot (ie a slot in which the activity of the previous slot may be continued e.g. to transmit packets that extend over several slots) (C);

an unused slot (-);

a slot with the property above but fixedly reserved for a certain connection (F).

Up-link is transmission from the slave unit to the master unit and down-link is transmission from the master unit to a slave unit. An example of two allocation patterns is:

Slot No	Pattern 1 for Slave Unit 6	Pattern 2 for Slave Unit 8
0	D	D
1	U	U

		6
2	DF	-
3	DCF	-
4	UF	-
5	UCF	-

The allocation patterns have a finite length of six slots in this example and are cyclically repeated until changed. The collection of slots to which each of the allocation patterns are applied, in this case six slots, form a super-frame. The master uses radio packets to supply control information to the slave units. This control information controls the size of the super-frame and the allocation patterns for the super-frame used by each of the slave units.

In the example slave unit 6 may be active at any slot. Slots 3 and 5 are marked as continuation slots, thus packets that extend over two slots starting in slot 2 and 4 can be used. Furthermore, slots 2 to 5 are fixedly reserved for slave unit 6 providing a guaranteed capacity to this slave. Slots 0 and 1 are shared with the connection to slave unit 8. Slave unit 8 may save power by ignoring the traffic in the slots 2 to 5 completely.

Referring to Figure 3, a schematic illustration of a transceiver unit 40 is shown. This transceiver unit may function as a slave or a master unit. Only as many functional blocks and interconnections are shown in this diagram as are necessary to explain in the following how a transceiver unit and the communication network operates. The transceiver unit 40 contains a number of functional elements including: an antenna 46, receiver 50, synchroniser/packet decoder 54, controller 60, memory 56, packetiser 42 and transmitter 44. Although these elements are shown as separate elements they may in fact be integrated together and may be carried out in software or in hardware.

Data to be transmitted in the payload of a packet by the transceiver unit 40 is supplied as data signal 41 to the packetiser 42 or as control information from the controller 60. This control information may define the length of a super-frame and the allocation pattern for the super-frame. The packetiser 42 places the data or control information into a packet 30 which is addressed to a particular unit and supplied as signal 43 to the transmitter 44. The transmitter 44 modulates a carrier wave in dependence upon the transmission frequency control signal 47 supplied by the controller. The frequency of the carrier wave is controlled to be one of a sequence of hop frequencies by the transmission frequency control signal 47, which also controls the timing of the transmission.

The antenna 46 receives a radio signal 51 and supplies it to the receiver 50 which demodulates the radio signal 51 under the control of a reception frequency control signal 49 supplied by the controller 60 to produce a digital signal 53. The digital signal 53 is supplied to the synchroniser/decoder 54. The synchroniser accepts those received radio packets addressed to the transceiver 40 and rejects those received radio packets that are not addressed to the transceiver 40. The synchroniser/decoder 54 in combination with the controller 60 synchronises the transceiver unit 40 to the time frame of the LPRF network. The controller compares the time at which a radio packet was received with the time at which the radio packet was expected to be received and shifts its timing to offset the difference. The synchroniser/decoder 54 also decodes the received packet. If the transceiver is a slave unit any control information in the packet is supplied to the controller 60 and any data in the packet is provided as data output signal 57. The control information including the length of a slot, the length of a super-frame and the pattern allocation is stored in the memory 56.

The frequency at which the transceiver 40 transmits or receives cycles or hops through a sequence of frequencies, with one hop per slot. The

frequency f of the hopping is the inverse of the slot length l. The transmission frequency control signal 47 and the reception frequency control signal 49 respectively control the transmitter 44 and the receiver 50. A slave unit emulates the timing of the master unit. The sequence of frequencies through which the hopping cycles is dependent upon the master unit. The position within the cycle is dependent upon the emulated time. The transmission frequency control signal 47 and the reception frequency control signal 49 also control when and for how long the transceiver is receiving or transmitting

The controller 60 in a master transceiver unit defines the allocation patterns by allocating time slots in the common LPRF time frame. It controls the slaves via transmitted control information including the allocation pattern. Figure 5 illustrates the integration of the LPRF communications network 2 previously illustrated in Figure 1 with a mobile radio communications network 106. The mobile network 106 comprises a base station (BTS) 102 and a plurality of mobile terminals (MT) one 100 of which is illustrated. The mobile network 106 is a conventional network such as GSM, DCS 1800, D-AMPS or PDC. The mobile terminal 100 transmits to the base station (up-link, U) and receives from the base station (down-link, D) in the manner defined by the network and known to those skilled in the art. The mobile terminal 100 also simultaneously functions as a master transceiver in the LPRF communications network 2. The mobile terminal 100 transmits to the slave units (down-link, D) and receives from the slave units (up-link, U) in the manner previously described. Thus the mobile terminal is an interface and can interact in both the mobile network 106 and the LPRF network 2.

Referring to Figure 4, the mobile terminal 100 is illustrated. The mobile terminal 100 has a transceiver 40 for use in the LPRF network 2, a cellular phone unit 62 which allows it to communicate in the mobile network 106 and a control unit 80. The transceiver unit 40 was previously described in

connection with Figure 3. The cellular phone unit 62 functions as a normal cellular phone and controls the activity of the terminal 100 in the network 106. The control unit 80 controls the integration of the mobile network 106 and the LPRF network 2. Although in this figure the cellular phone unit 62, the control unit 80 and the transceiver 40 are shown as separated units they may in fact share common resources such as hardware interfaces, processors especially DSP, and memory or be integrated as a single unit. Thus the controller 60 in transceiver 40 may also function as the control unit and provide resources to the phone unit 62. Resource conflict may arise in this instance and the allocation patterns for the LPRF network may be defined to avoid such conflict.

The mobile network 106 is typically a TDMA network. Figure 6 illustrates the common timing system 110 used in the mobile network. The system cyclically repeats a time frame as time frames 112 and 114 etc.. Each of the mobile time frames 112 and 114 are subdivided into mobile time slots 116, 118, 120 ...130 each having a length L. Each mobile slot is used for the transmission of a message from a mobile terminal to a base station or from a base station to a mobile terminal. The terminal 100 in the mobile network 106 will generally transmit one message and receive one message each frame. The remaining slots are used by other mobile terminals.

In the GSM network the frame size is 60/13 ms and the there are 8 time slots per frame. In the D-AMPS and PDC networks the frame size is 20 ms and there are 3 time slots per frame

The LPRF slot length used by the mobile terminal 100 is chosen so that synchronisation between the mobile network and the LPRF network is possible. The length l of the LPRF time slot is chosen so that a whole number of LPRF time slots fit into one time frame of the mobile network 106 or a

multiple number of such time frames. A super-frame in the LPRF network will have this whole number of slots. Consequently when a super-frame is cyclically repeated in the LPRF network, the relationship between the slots of the LPRF network and the slots of the mobile network is specified. The beginning of each super-frame is preferably aligned with the beginning of a time frame in the mobile network.

The mobile terminal may be adapted or adaptable to operate in two different mobile networks which use different mobile frame lengths. The length of the LPRF time slot is chosen so that a whole number of time slots fit into one time frame of the mobile network 106 or a multiple thereof, irrespective of the size of the time frame of the mobile network i.e. irrespective of whether it is GSM or alternatively PDC or D-AMPS.

If N LPRF time slots of size *l* fit into α GSM frames of size L and N' LPRF time slots of size *l* fit into β PDC or D-AMPS time frames of size L' then, because L=60/13 ms and L'= 20ms:

$$l = (60/13)x(\alpha/N) = (20)x(\beta/N')$$

The value *l* represents the size of a slot in the LPRF network. The value N represents the size of a super-frame in the LPRF network when it is integrated with a GSM mobile network. The value N' represents the size of a super-frame in the LPRF network when it is integrated with a D-AMPS or PDC mobile network. It should be appreciated that the size of the slot *l* may vary if for example the mobile terminal operates in a mobile network of another type with a different size of slot.

To reduce packet overhead it is preferable to have *l* as large as possible. It is also preferable to have an even number of LPRF time slots per mobile time frame thus allowing pairs of up-link and down-link activities.

If l is given (eg l=0.625 ms as in Bluetooth) searching for the smallest possible α,β,N',N (with even N', N) yields: α=13,β=1,N'=32,N=96=3*N'

Referring to Figure 5 the LPRF network 2 is configured to use slot lengths of this length by the mobile terminal 100. The master and slave units are configured. Referring to Figure 4, the control unit 80 via the phone unit 62 identifies the mobile network. It then determines the value of l and the size of the super-frame, or if l is predetermined and fixed, determines the size of the super-frame. Thus the slot length used by the mobile terminal in the LPRF network may be fixed permanently or may be varied in the future when the mobile terminal moves into different mobile network environments.

The control unit also determines suitable allocation patterns for the super-frame. The allocation patterns and the super-frame size are then provided to the transceiver unit 40. This transceiver unit acts as a master unit in the LPRF network. Its activity is controlled by the parameters: super-frame size, slot length l and the allocation patterns. The master also transmits the super-frame size and allocation patterns to the slave units. The slot length l will also be transmitted if it is not fixed for the network. Thus all the units in the LPRF network have the necessary parameters to synchronise with the mobile network.

The terminal 100 acts as an interface between the mobile and LPRF networks and it operates simultaneously in both. However, concurrent activities and especially concurrent transmission by the mobile terminal 100 in the mobile network 106 and in the LPRF network 2 may cause interference and type approval difficulties. The communication of the base station 102 and the mobile terminal 100 in the mobile network is controlled by the base station. The communication of the mobile terminal (master unit) 100 with the slave

units in the LPRF network is controlled by the mobile terminal (master unit) 100 as previously described. The LPRF network may be controlled by the mobile terminal acting as a master unit to maintain synchronisation of the two networks and to prevent simultaneous transmission by the mobile terminal 100 in the two networks. The controller 60 in the mobile terminal 100 can synchronise the two networks by shifting the LPRF timing relative to the mobile network. This preferably aligns the timings.

One possible algorithm for determining an allocation pattern such that the mobile terminal does not transmit simultaneously in both networks will now be described. The control unit 80 is informed by the phone unit 62 when the mobile terminal 100 will next transmit and receive in the mobile network 106. Having identified the period of next transmission by the mobile terminal in the mobile network, the control unit 80 can create an allocation pattern by allocating any LPRF time slots which are wholly or partly contemporaneous with this period to transmission by the slave units in the LPRF network, that is reception by the mobile terminal (master unit). The remaining LPRF slots are then allocated to either transmission or reception by the mobile terminal in the LPRF network. Preferably, the LPRF network and mobile network are aligned so that an LPRF time slot begins at the end of the mobile slot in which the mobile terminal transmitted in the mobile network. This LPRF slot is preferably used by the mobile terminal 100 to transmit into the LPRF network.

The master unit (mobile terminal 100) in the LPRF network may or may not be allowed to receive packets when the mobile terminal is transmitting in the mobile network.

The allocation pattern may depend upon the type and number of devices which are active as slave units in the LPRF network. Particular devices may require higher communication rates or real time communication for example.

Referring to Figure 7, three possible allocation patterns 1), 2) and 3) made by the control unit 80 according to the above algorithm are illustrated. The mobile network is a GSM network and in these examples N=6 and /=10/12ms. A super-frame comprises 6 LPRF time slots labelled 0 to 5 in the Figure and it spans one GSM time frame. Transmission (down-link, D) in the LPRF network by the mobile terminal during slot 5 is forbidden. In these allocations, the up-link transmission from slave to master unit immediately follows the down-link transmission from master unit to slave. According to the first allocation, in the LPRF network the mobile terminal transmits in slot 0, receives in slot 1, and is otherwise inactive. According to the second allocation, in the LPRF network the mobile terminal transmits in slots 0 and 3 and receives in slots 1 and 4. According to the third allocation, in the LPRF network the mobile terminal transmits a packet, which extends over slots 0 and 1, and another which extends over slots 3 and 4 and receives in slots 2 and 5.

Referring to Figure 8, another allocation made by the control unit 80 is illustrated. The mobile network is a GSM High Speed Circuit Switched Data (HSCSD) 2+2 network and the number of LPRF time slots per GSM time frame is six labelled 0 to 5 in the Figure. In this allocation, the up-link transmission from an addressed slave to the master unit follows two LPRF time slots after the down-link transmission from master unit addressing that slave. Three separate slave units are addressed in slots 0, 1 and 2. Transmission (down-link, D) in the LPRF network by the mobile terminal during slots 4 and 5 is forbidden. In the allocation, in the LPRF network the mobile terminal transmits in slots 0, 1 and 2 and receives in slots 3, 4 and 5.

Referring to Figure 9, another allocation pattern made by the controller 60 is illustrated. The mobile network is a PDC or D-AMPS network and the number

of LPRF time slots per GSM time frame is 26 labelled 1 to 26 in the Figure. Transmission (down-link, D) in the LPRF network by the mobile terminal during slots 18 to 26 is forbidden. In this allocation pattern, the mobile terminal is able to transmit and receive in the LPRF network slots 1 to 17 and to receive only in slots 18 to 26.

Figure 10 illustrates how the LPRF timing readjust to a change in the timing of the mobile network. In this example the mobile time slot in which the mobile terminal transmits in the mobile network changes from slot 3 to slot 6. This may occur for example when the mobile terminal is handed over by one base station to another in the mobile network. The resynchronisation of mobile and LPRF networks is achieved by the cellular circuitry 62 informing the control unit 80 which in turn changes the timing of the master transceiver 40 in the mobile terminal 100. The super-frame is shifted by an integer number of LPRF time slots but the allocation pattern within the super-frame remains unchanged and shifts with the super-frame.

Although a particular implementation of the invention has been described it should be appreciated that the implementation may be varied without departing from the scope of the invention as defined by the claims. In particular the invention is not limited to the particular mobile networks and LPRF network described.

Claims

1. A terminal for simultaneously operating in a first mobile radio communications network and a second different radio communications network, comprising:

first radio transceiver means for transmitting and receiving in said mobile communications network and arranged such that successive transmissions by said first transceiver means in said mobile communications network are separated by a first period of time or a multiple thereof; and

second radio transceiver means for transmitting and receiving packets in the second radio communications network, arranged for transmitting and/or receiving an integer number of packets sequentially in the first period of time or a multiple thereof.

2. A terminal as claimed in any preceding claim, wherein the second transceiver means controls the second communications network by defining allocation patterns for transmission and/or reception of packets in the second communications network.

3.A terminal as claimed in claim 2, wherein said allocation patterns controls the timing of transmissions of packets within the second communications network.

4.A terminal as claimed in claim 3, wherein said allocation patterns controls at what time transceiver units in the second communications network are given access to the network, whether that access is for transmission or reception and the duration of that access.

5. A terminal as claimed in any one of claims 2 to 4, wherein said allocation patterns avoid predetermined concurrent activities at the terminal.

6. A terminal as claimed in claim 5, wherein said allocation patterns avoids or prevents transmission of packets in the second communication network by the second transceiver means while said first transceiver means is transmitting in the first communications network.

7. A terminal as claimed in any one of claims 2 to 6, wherein said allocation patterns allows the transmission of packets in the second communication network by the second transceiver means only when the first transceiver means is not transmitting in the first communications network.

8. A terminal as claimed in any one of claims 2 to 6, wherein said allocation patterns have a finite length, equal to said first period of time or a multiple thereof, and is cyclically repeated.

9.A terminal as claimed in claim 8 wherein said length of the allocation patterns are variable, being controlled by said second transceiver means.

10. A terminal as claimed in any one of claims 2 to 9, wherein said allocation patterns are variable being controlled by said second transceiver means.

11. A terminal as claimed in any preceding claim, wherein the second radio transceiver means is a TDMA transceiver and said first period of time corresponds to a TDMA frame.

12. A terminal as claimed in any preceding claim, wherein the second radio transceiver defines a common time frame used in the second radio communications network

13. A terminal as claimed in claim 12, wherein the common time frame comprises a series of slots having the same length, wherein at most one packet is transmitted in the second communications network during each slot.

14. A terminal as claimed in claim 13, wherein the length of the slot is such that a first integer number of slots correspond to the first period of time or a multiple thereof.

15. A terminal as claimed in claim 14 wherein said first integer number of slots is an even number of slots.

16. A terminal as claimed in claim 14 or 15, wherein said first integer number of slots is minimum but greater than one.

17. A terminal as claimed in claim 13 or any preceding claim when dependent upon claim 13, wherein the length of a slot is such that a second integer number of slots correspond to a second period of time, representing the period of time between successive transmissions in a third mobile radio communications network, or a multiple thereof.

18. A terminal as claimed in claim 17 wherein said second integer number of slots is an even number of slots.

19. A terminal as claimed in claim 18 wherein said second integer number of slots is minimum but greater than one.

20. A terminal as claimed in claim 17, wherein the length of the slot is variable depending on the first and/or third communication systems.

21. A terminal as claimed in any one of claims 13 to 19, wherein the length of the slot is fixed.

22. A terminal as claimed in any preceding claim, wherein the second transceiver means controls the second communications network such that the frequency at which packets are transmitted therein hops with successive slots.

23. A terminal as claimed in claim 11 or any preceding claim when dependent upon claim 11, comprising means for shifting the common time frame to maintain synchronisation with its activities in the first communications network.

24. A terminal as claimed in any one of the preceding claims, wherein said first transceiver means is adapted for use in a TDMA system wherein the first period of time corresponds to the length of a TDMA frame.

25. A terminal as claimed in claim 24, wherein said first transceiver means is adapted for use in a GSM, D-AMPS or PDC network.

26. A terminal as claimed in any one of the preceding claims wherein each transmission by the first transceiver means does not exceed a predetermined duration.

27. A terminal as claimed in claim 17 or any preceding claim when dependent upon claim 17, wherein the third transceiver means is adapted for use in a TDMA system, the first period of time corresponding to the length of a TDMA frame.

28. A terminal as claimed 27, wherein said third transceiver means is adapted for use in a GSM, D-AMPS or PDC network.

29. A first mobile radio communications network comprising a terminal as claimed in any preceding claim.

30. A terminal substantially as herein before described with reference to and/or as shown in the accompanying drawings.

31. A radio communications system comprising a plurality of transceivers synchronised to a common time frame having a succession of equal time slots, wherein a single transceiver transmits in any one time slot, the duration of said time slots being programmable.

32. A radio communications system as claimed in claim 31 wherein said programmable duration corresponds to 20/(13*K) ms or a multiple thereof, where K is a natural number whose value may be programmed.

33. A radio communications system comprising a plurality of transceivers synchronised to a common time frame having a succession of equal time slots, wherein a single transceiver transmits in any one time slot, each of said time slots having a duration 20/(13*K) ms or a multiple thereof, where K is a natural number.

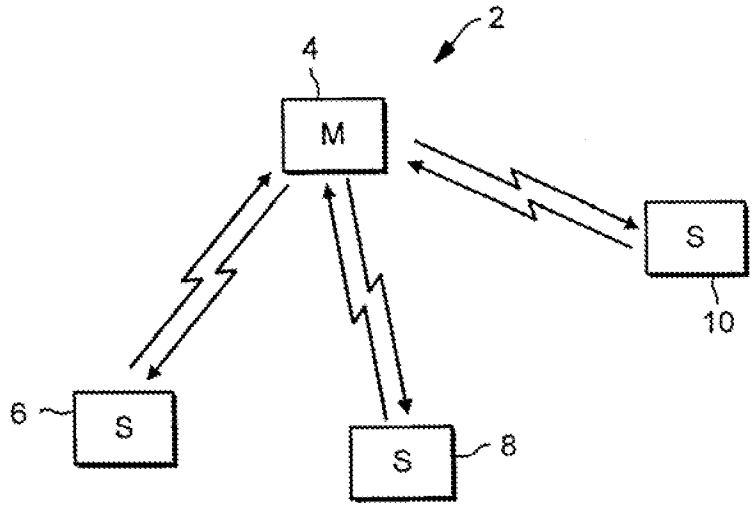


FIG. 1

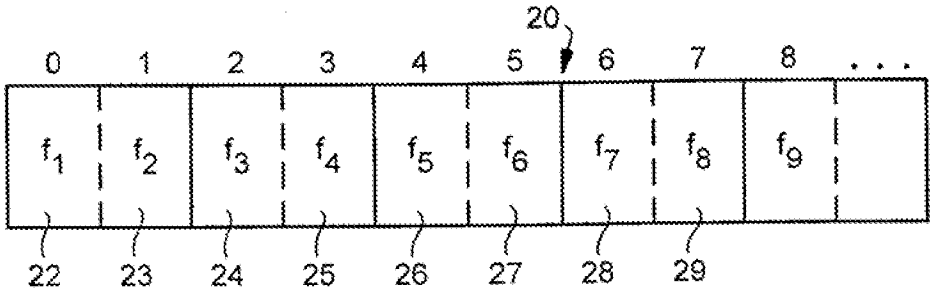


FIG. 2

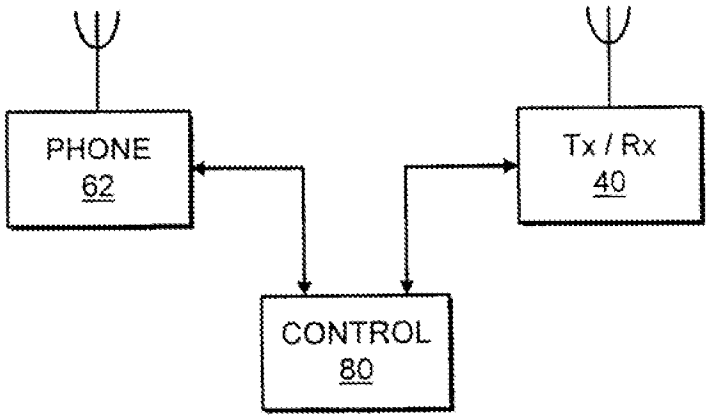


FIG. 4

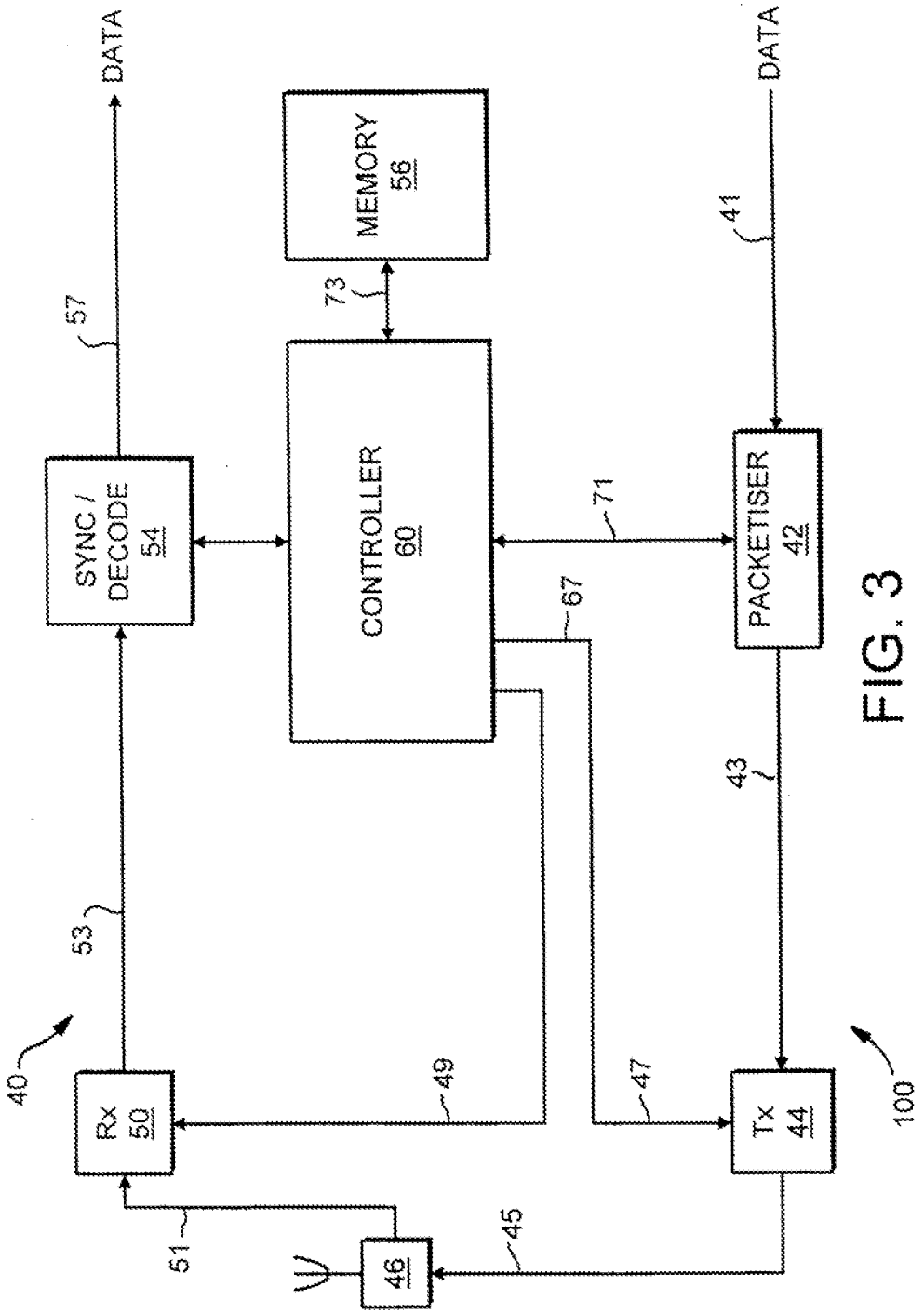

DATA
MEMORY
56
DATA
57
73
41
SYNC /
DECODE
54
CONTROLLER
60
71
PACKETISER
42
67
43
53
40
Rx
50
49
47
Tx
44
100
51
46
45

FIG. 3

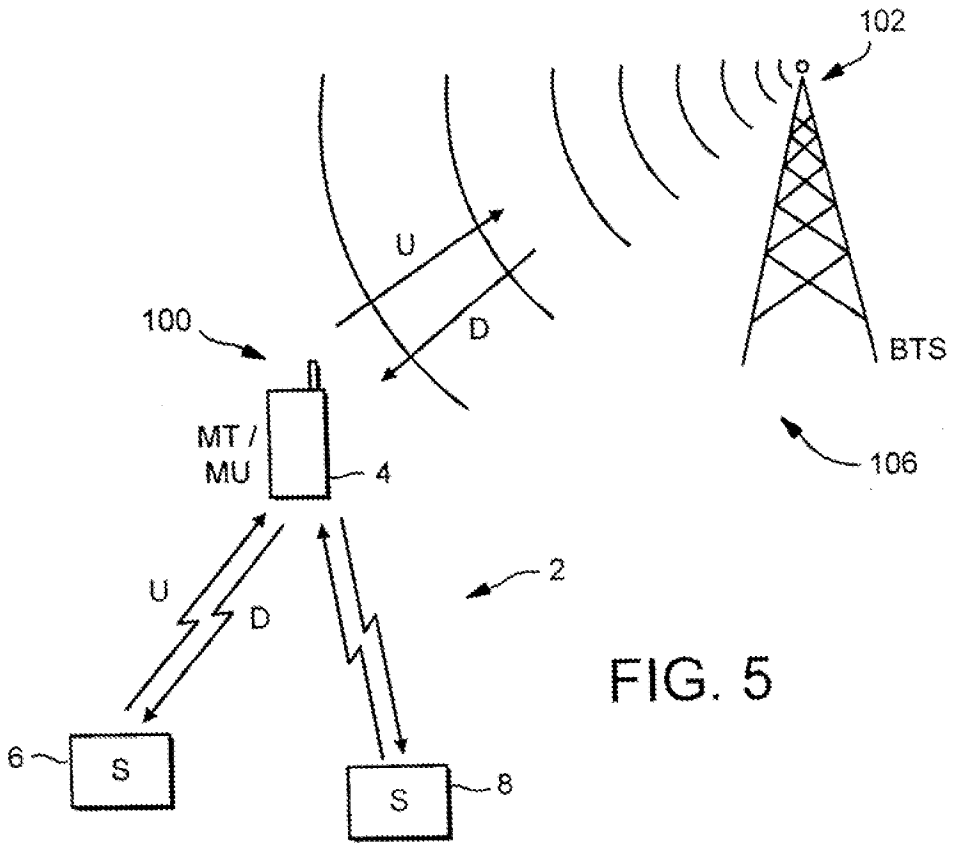

102
U
D
100
BTS
MT /
MU
4
106
2
U
D
6
S
S
8

FIG. 5

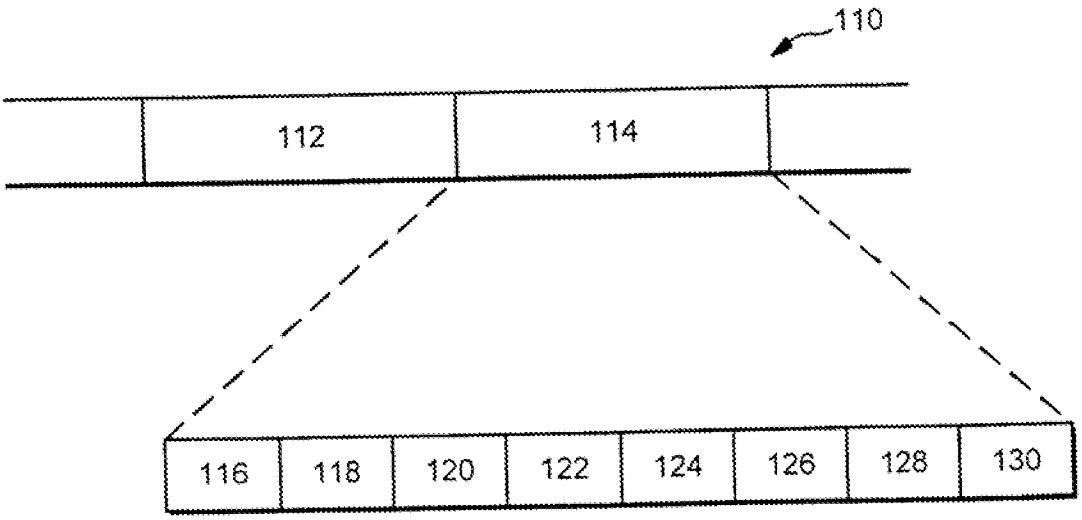

110
112
114
116
118
120
122
124
126
128
130

FIG. 6

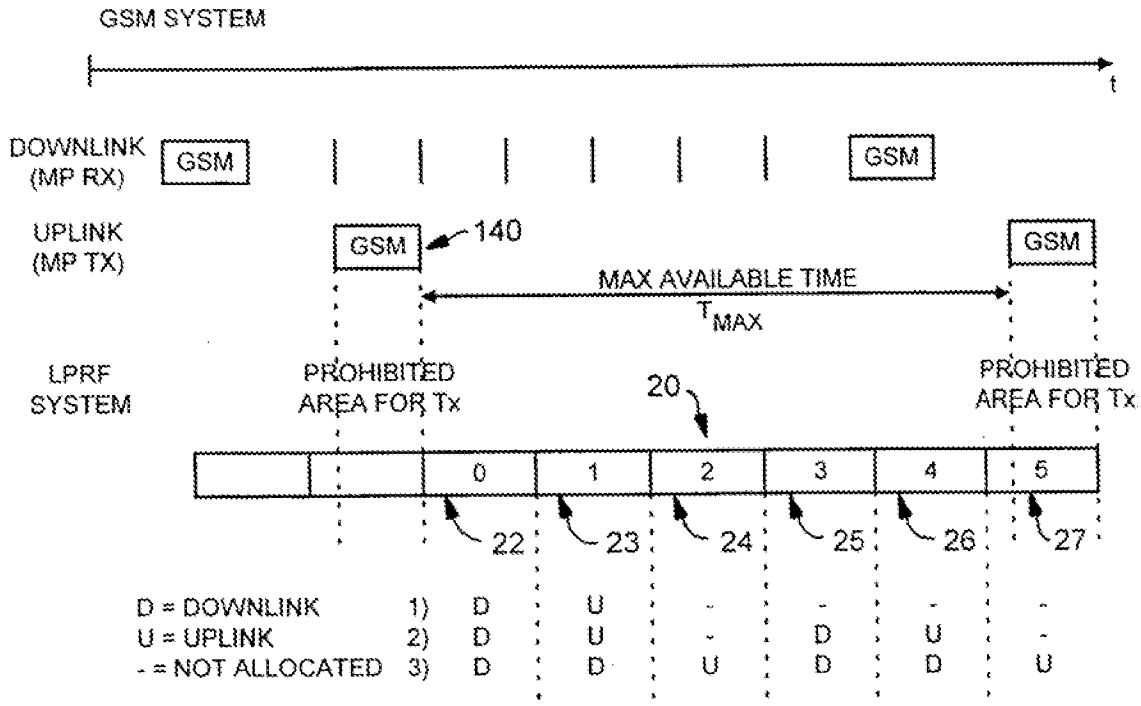

GSM SYSTEM
t
DOWNLINK (MP RX)
GSM
GSM
UPLINK (MP TX)
GSM
140
GSM
MAX AVAILABLE TIME
T_{MAX}
LPRF SYSTEM
PROHIBITED AREA FOR Tx
20
PROHIBITED AREA FOR Tx
0
1
2
3
4
5
22
23
24
25
26
27
D = DOWNLINK
U = UPLINK
- = NOT ALLOCATED
1) D U - - - -
2) D U - D U -
3) D D U D D U

FIG. 7

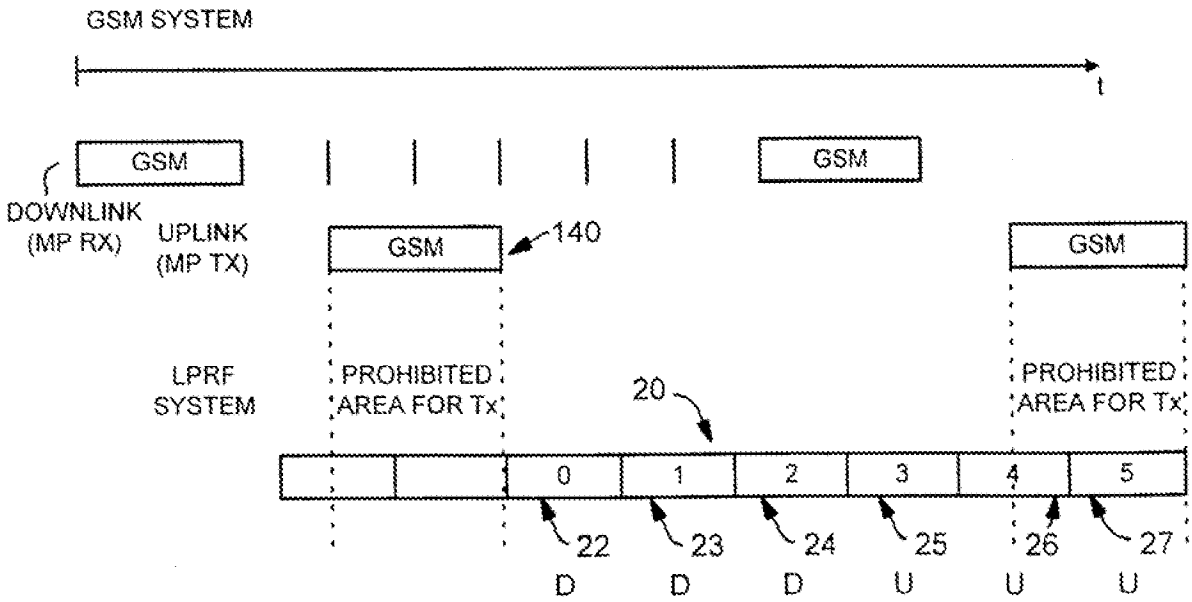
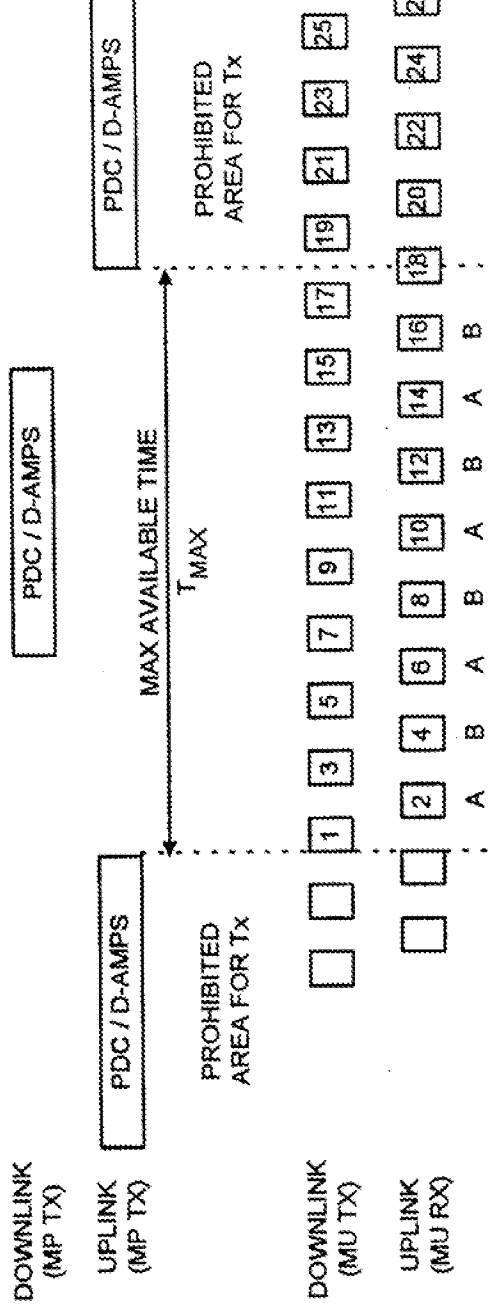

GSM SYSTEM
t
GSM
GSM
DOWNLINK (MP RX)
UPLINK (MP TX)
GSM
140
GSM
LPRF SYSTEM
PROHIBITED AREA FOR Tx
20
PROHIBITED AREA FOR Tx
0
1
2
3
4
5
22
23
24
25
26
27
D D D U U U

FIG. 8

FIG. 9


PDC / D-AMPS SYSTEM
t
PDC / D-AMPS
PDC / D-AMPS
PDC / D-AMPS
MAX AVAILABLE TIME
T_{MAX}
PROHIBITED AREA FOR Tx
PROHIBITED AREA FOR Tx
DOWNLINK (MP TX)
UPLINK (MP TX)
DOWNLINK (MU TX)
UPLINK (MU RX)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
A B A B A B A B A

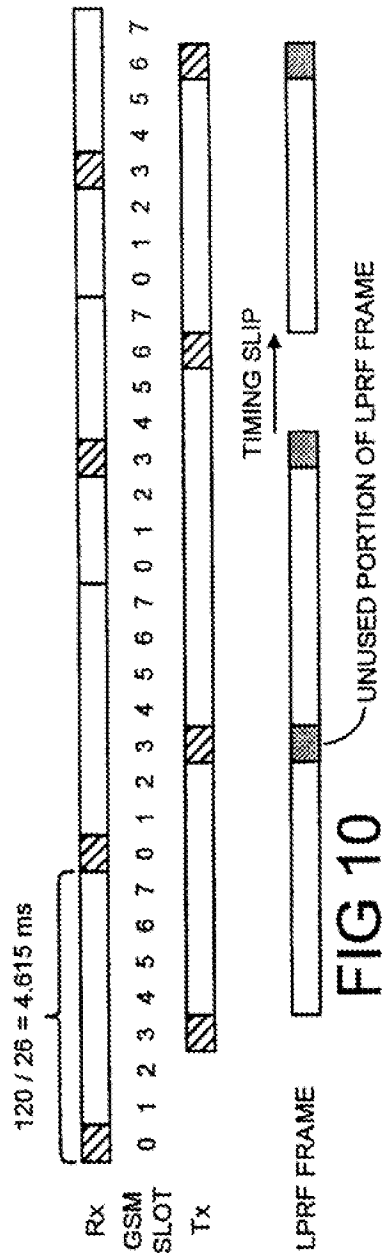

120 / 26 = 4.615 ms
Rx
GSM SLOT
0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7
Tx
TIMING SLIP
LPRF FRAME
UNUSED PORTION OF LPRF FRAME

FIG 10

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 98/02032

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04Q7/22

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04Q H04L

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

Electronic data base consulted during the international search (name of data base and, where practical, 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.
A	EP 0 681 406 A (NOKIA MOBILE PHONES LTD) 8 November 1995 see abstract see column 5, line 2 - line 12 see column 9, line 2 - line 37 ---	1-4, 10-13, 21,24, 25,27-29
A	US 5 521 925 A (LI FAYU ET AL) 28 May 1996 see abstract see column 5, line 3 - line 39 see column 7, line 20 - line 56 see column 8, line 37 - column 9, line 11 see figure 3 --- -/--	1-4,6,7, 9-13,21, 22,24, 27,29

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

[X] Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 February 1999	24/02/1999

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, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Masche, C

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INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/IB 98/02032

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 96 41491 A (PACIFIC COMM SCIENCES INC) 19 December 1996 see abstract see page 3, line 7 - line 27 see page 15, line 34 - page 16, line 12 see page 22, line 22 - line 28 see figure 3	1,5
A	EP 0 711 088 A (TELIA AB) 8 May 1996 see column 4, line 56 - column 5, line 10 see figure 4	1,11-13, 24,25, 27-29

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte onal Application No
PCT/IB 98/02032

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US 5521925 A	28-05-1996	NONE	
WO 9641491 A	19-12-1996	US 5819184 A	06-10-1998
EP 0711088 A	08-05-1996	NO 954372 A	08-05-1996
		SE 9403839 A	08-05-1996

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70763 7590 03/11/2014

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New York, NY 10004

EXAMINER
HO, HUY C

ART UNIT	PAPER NUMBER
2644	

DATE MAILED: 03/11/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0	2192

TITLE OF INVENTION: Wireless Communication System and Device For Coupling A Base Station and Mobile Stations

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	06/11/2014

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

70763 7590 03/11/2014
Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004

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.
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0	2192

TITLE OF INVENTION: Wireless Communication System and Device For Coupling A Base Station and Mobile Stations

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	06/11/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
HO, HUY C	2644	455-426200

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

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

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

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

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

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

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

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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.
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0	2192

70763 7590 03/11/2014

Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004

EXAMINER	
HO, HUY C	

ART UNIT	PAPER NUMBER
2644	

DATE MAILED: 03/11/2014

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

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

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

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

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

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 13/488,374	Applicant(s) STRUHSAKER, PAUL F.	
	Examiner HUY C. HO	Art Unit 2644	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 *01/01/2014*.
   ☐ 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 *1-5*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

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

   * Certified copies not received: _____.

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

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

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

Attachment(s)

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

/HUY C HO/
Primary Examiner, Art Unit 2644

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 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 01/01/2014 has been entered.

Response to Arguments

2. Applicant’s arguments, see Applicant Arguments/Remarks Made in an Amendment, filed on 01/01/2014, with respect to the rejection of claims 1, 2, 4 and 5 under 35 U.S.C. § 102(e) as being anticipated by Williams et al. (U.S. Patent No. 6,374,078), and claim 3 under 35 U.S.C. § 103(a) as being unpatentable over Williams in view of Lerman (European Patent No. EP 0690637A2), have been fully considered and are persuasive. The rejection of claims 1-5 has been withdrawn.

Allowable Subject Matter

3. Claims 1-5 are allowed.

4. The following is an examiner's statement of reasons for allowance: the Applicant's arguments made in the Arguments/Remarks filed on 01/01/2014 have been fully considered and are persuasive. Further search update has been performed but no reference is found to provide fairly teachings, suggestions or disclosures of the unique claimed invention as recited in the independent claim 1 as filed on 01/01/2014.

Therefore, claims 1-5 are deemed allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUY C. HO whose telephone number is (571)270-1108. The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

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.

/HUY C HO/
Primary Examiner, Art Unit 2644

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	**Art Unit**
	HUY C HO	2644

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

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	5	
/HUY C HO/ Primary Examiner.Art Unit 2644	02/24/2014	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	**Art Unit**
	HUY C HO	2644

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED				
455	443	H	0	4	W	36 / 00 (2009.01.01)	H	0	4	W	4 / 00 (2009.01.01)
CROSS REFERENCE(S)							H	0	4	W	36 / 00 (2009.01.01)
							H	0	4	W	40 / 00 (2009.01.01)
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)						H	0	4	B	1 / 56 (2006.01.01)
455	426.2	444	448				H	0	4	L	12 / 56
370	274	401									

NONE (Assistant Examiner) (Date)	Total Claims Allowed: 5	
/HUY C HO/ Primary Examiner.Art Unit 2644 02/24/2014 (Primary Examiner) (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office

Part of Paper No. 20140219

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	**Art Unit**
	HUY C HO	2644

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

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1														
	2														
	3														
	4														
	5														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 5	
/HUY C HO/ Primary Examiner.Art Unit 2644 (Primary Examiner)	02/24/2014 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	9784	h04w84/045.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:28
L2	308	1 and (wireless near3 (WAN LAN))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:28
L3	53	2 and (monitor$3 near5 (signal channel link))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:29
L4	24	3 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:29
L5	29324	h04w88/06.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:31
L6	2507	5 and (wireless near3 (WAN LAN))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:31
L7	391	6 and (monitor$3 near5 (signal channel link))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:31
L8	298	7 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:31
L9	108	8 and ((re$transmit$4 forward$3) near4 (signal))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:33
S1	72	((PAUL) near2 (STRUHSAKER)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/07 14:00
S2	45	"6374078"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/07 16:56
S3	2	"US 20080268835"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2012/10/07 17:04
S4	7	"7346347"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/07 17:05

S5	565	455/443.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:28
S6	563	455/444.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:28
S7	9	S6 and (WLAN and WWAN)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:29
S8	170	S6 and (WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:30
S9	28	S8 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:31
S10	45	"6374078"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:44
S11	145	S5 and (WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:46
S12	18	S11 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:46
S13	56	370/274.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S14	0	S13 and (WLAN and WWAN)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S15	4	S13 and (WLAN WWAN)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S16	0	S15 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S17	13	S13 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S18	12253	370/401.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S19	2505	S18 and (WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2012/10/08 13:52

			IBM_TDB			
S20	751	S18 and (WLAN and (WWAN cellular mobile))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S21	32	S20 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S22	2299	WLAN and (WWAN cellular mobile) and (hot$pot wi$fi) and ((dual multi) near4 mode)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:58
S23	14	S22 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:58
S24	203	455/554.2.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:00
S25	23	S24 and (WLAN and (WWAN cellular mobile))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:00
S26	1	S25 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:00
S27	53	S24 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:01
S28	45	"6374078"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:13
S29	0	S6 and ((dual$mode multi$mode) near5 (tranceiver))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:41
S30	0	S8 and ((dual multiple bi) near5 (mode protocol technology) near7 (tranceiver))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:42
S31	211037	(WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:43
S32	0	S22 and ((dual multiple bi) near5 (mode protocol technology) near7 (tranceiver))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:43
S33	0	S22 and ((dual multiple bi) with mode with tranceiver)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:44
S34	2268	S22 and (dual multiple bi)	US-PGPUB; USPAT;	OR	OFF	2012/10/08

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			14:44
S35	290	S22 and ((dual multiple) near5 (tranceiver receiver transmitter))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:44
S36	217	S35 and (access near4 point)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:45
S37	35	S36 and (WLAN near4 (access near4 point))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:46
S38	2	S36 and ((dual$mode multi$mode) near4 (access near4 point))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:46
S39	0	S38 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:46
S40	2582	(WLAN and WWAN) and (access near4 point)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:47
S41	526	S40 and (dual$mode multi$mode)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:47
S42	57	S41 and ((dual multiple) near5 (transceiver receiver transmitter))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:48
S43	5	S42 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:48
S44	47	"6141531"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 15:01
S45	2	"US 20120307815"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2013/06/19 21:12
S46	127829	(mobile moving) near5 ((base near3 station) (access near2 point))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/06/26 00:00
S47	30703	S46 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/06/26 00:04
S48	640	455/426.2.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:01
S49	133	S48 and (wireless near3	US-PGPUB; USPAT;	OR	OFF	2014/01/25

		(WAN LAN))	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			15:02
S50	126	S49 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:03
S51	1139	455/444.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:17
S52	1139	S51	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:17
S53	634	S52 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:17
S54	634	S53 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:17
S55	92	S52 and (wireless near3 (WAN LAN))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:18
S56	68	S55 and (@ad<"20071031" @rlad<"20071031")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/01/25 15:18
S57	12	"7346347"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/18 16:38
S58	1030	455/443.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:00
S59	1030	S58	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:00
S60	1030	455/443.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/02/24 04:02
S61	1030	S60	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/02/24 04:02

2/24/2014 4:37:44 AM
C:\Users\hho3\Documents\EAST\Workspaces\13488374.wsp

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BIB DATA SHEET

CONFIRMATION NO. 2192

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/488,374	06/04/2012	455	2644	9030101.141-US0

APPLICANTS

INVENTORS

Paul F. Struhsaker, Plano, TX;

**** CONTINUING DATA ***************************

This application is a CON of 11/982,424 10/31/2007 ABN

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **

06/13/2012

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /HUY C HO/ Examiner's Signature	☐ Met after Allowance HH Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		TX	3	5	1

ADDRESS

Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004
UNITED STATES

TITLE

Wireless Communication System and Device For Coupling A Base Station and Mobile Stations

FILING FEE RECEIVED		
530	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	Art Unit
	HUY C HO	2644

CPC- SEARCHED		
Symbol	Date	Examiner
H04W 84/045	2/24/2014	HH

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner
H04W 88/06	2/24/2014	HH

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
455	443	10/8/2012	HH

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Database Search	10/8/2012	HH
Inventor Search complete	10/8/2012	HH
Search update	6/26/2013	HH
Search update	2/24/2014	HH

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
455	444, 554.2	10/8/2012	HH
370	274, 401	10/8/2012	HH

	/HUY C HO/ Primary Examiner.Art Unit 2644

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

Application Number	13488374	Filing Date	2012-06-04	Docket Number (if applicable)	9030101.141-US0	Art Unit	2644
First Named Inventor	Paul F. Struhsaker			Examiner Name	Huy C. Ho		

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 504207

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
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Signature of Registered U.S. Patent Practitioner			
Signature	/Matthew T Byrne/	Date (YYYY-MM-DD)	2014-01-01
Name	Matthew T Byrne	Registration Number	40934

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

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Paul F. Struhsaker et al.	Conf. No.:	2192
Application No.:	13/488,374	Art Unit:	2644
Filed:	June 4, 2012	Examiner:	Ho, Huy C.

For: WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS

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

RCE SUBMISSION, REPLY TO FINAL OFFICE ACTION, AND AMENDMENT

Dear Examiner,

This RCE Submission, Reply to Final Office Action, and Amendment is in response to the final Office Action dated July 1, 2013 (hereinafter, "Office Action"). A three-month extension of the shortened statutory period is hereby requested to make the due date for response January 2, 2014 (January 1, 2013 was a federal holiday).

This paper is organized as follow:

Amendments to the Claims begin on page **2**; and

Remarks begin on page **4** 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 wireless communication device, comprising:

a first wireless transceiver operable to communicate with a base station, wherein the base station communicates with the first wireless transceiver and a plurality of other wireless communication devices according to a wide area wireless communication protocol; and

a second wireless transceiver coupled to the first wireless transceiver and operable to directly communicate with a first mobile station and a second mobile station, wherein the second wireless transceiver communicates with the first mobile station and the second mobile station according to a local area wireless communication protocol,

wherein the first wireless transceiver receives from the base station a first downlink signal intended for the first mobile station and provides the first downlink signal to the second wireless transceiver and wherein the second wireless transceiver receives the first downlink signal and re-transmits the first downlink signal to the first mobile station as a second downlink signal according to the local area wireless communication protocol, and

wherein the second transceiver monitors first signal characteristics of the second downlink signal of the first mobile station and monitors second signal characteristics of the second mobile station, and based on the first signal characteristics and the second characteristics, routes information to the first mobile station and the second mobile station, respectively.

2. (Original) The wireless communication device of claim 1, wherein the second wireless transceiver is coupled to the first wireless transceiver by a wireline connection.

3. (Original) The wireless communication device of claim 2, wherein the second wireless transceiver is removably coupled to the first wireless transceiver.

4. (Previously Presented) The wireless communication device of claim 1, wherein the first wireless transceiver and second wireless transceiver are disposed in a fixed site subscriber station.

5. (Original) The wireless communication device of claim 1, wherein the first wireless transceiver and the second wireless transceiver are part of an integrated device.

REMARKS

I. Summary of the Office Action

Claims 1-5 are pending in the present application.

The Examiner has rejected claims 1, 2, 4, and 5 under 35 U.S.C. § 102(e) as allegedly being anticipated by Williams et al. U.S. Patent No. 6,374,078 (hereinafter, "Williams").

Claim 3 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Williams in view of Lerman European Patent No. EP0690637A2 (hereinafter, "Lerman").

II. Summary of Applicants' Reply

Applicants have amended claim 1. The amendment to claim 1 is fully supported and justified by the original specification, claims, and drawings, and no new matter has been added.

The Examiner's objection and rejections are respectfully traversed. Applicants' silence (except as set forth herein) with regard to the Examiner's rejections of the dependent claims constitutes a recognition by applicants that the rejections are moot based on applicants' remarks relative to the independent claim from which the dependent claims depend.

Reconsideration and prompt allowance of the present application are respectfully requested.

III. The Rejections Under 35 U.S.C. §§ 102(e) and 103(a)

The Examiner has rejected claims 1, 2, 4, and 5 under 35 U.S.C. § 102(e) as allegedly being anticipated by Williams, and has rejected claim 3 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Williams in view of Lerman.

Claim 1 has been amended. The amendment to claim 1 is fully supported and justified by the original specification, claims, and drawings, and no new matter has been added. For example, the amendment to claim 1 is supported by the original specification by paragraphs [0052] through [0054] as shown in the publication of the application.

Claim 1 is directed to a wireless communication device. Among other things, claim 1, as amended, recites:

> [a] first wireless transceiver receives from [a] base station a first downlink signal intended for [a] first mobile station and provides the first downlink signal to the second wireless transceiver and wherein [a] second wireless transceiver receives the first downlink signal and re-transmits the first downlink signal to the first mobile station as a second downlink signal according to the local area wireless communication protocol, and
>
> wherein the second transceiver monitors first signal characteristics of the second downlink signal of [a] first mobile station and monitors second signal characteristics of [a] second mobile station, and based on the first signal characteristics and the second characteristics, routes information to the first mobile station and the second mobile station, respectively.

(Emphasis added).

In the Examiner's response to the applicants' previous arguments, the Examiner asserted that: "Williams teaches a signal extender 603, which monitors signals and routes information to mobile stations 303 and 304 in downlinks B3MH and B3ML respectively in a microcell C3 (Williams, Figure 7, column 11 lines 40-56)." (Office Action, page 2).

Williams' FIG. 7 and column 11, lines 40-56 describe "a local path call ... between handsets 303, 304 in the same microcell C3, 71, **in which case no central NE switching is required**" (Williams, column 11, lines 44-46; emphasis added). Unlike what is recited in claim 1 as amended, what is described in Williams' FIG. 7 and column 11, lines 40-56 does not disclose or suggest "monitor[ing] first signal characteristics of the second downlink signal of [a]

first mobile station" (claim 1 as amended), wherein the second downlink signal is a "re-transmi[ssion of] the first downlink signal" "receive[d] from [a] base station"(claim 1 as amended; emphasis added). The fact that this is true is evident from the fact that Williams' FIG. 7 and column 11, lines 40-56 describe "a local path call ... between handsets 303, 304 in the same microcell C3, 71, in which case no central NE switching is required" (Williams, column 11, lines 44-46; emphasis added) and hence in which case no base station transmission, or "re-transmi[ssion of] the first downlink signal" "receive[d] from [a] base station"(claim 1 as amended; emphasis added), would be involved.

Thus, because the cited portions of the cited references, whether taken alone or in combination, do not disclose or suggest the above-quoted limitations of claim 1 as amended, claim 1, and clams 2-5 which depend therefrom, are allowable over the cited references. Therefore, claims 1-5 are in condition for allowance.

Accordingly, for at least these reasons, applicants respectfully request that the rejections of claims 1-5 under 35 U.S.C. §§ 102(e) and 103(a) be withdrawn.

IV. Deposit Account Authorization

The Director is hereby authorized to charge any fees that may be due, or to credit any overpayment of the same, to Deposit Account No. 50-4207.

In the event that an extension of time is required, or which may be required in addition to that requested in any petition for extension of time filed previously or herewith, the Director is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. 50-4207.

V. Conclusion

For at least the reasons set forth above, applicants respectfully submit that the present application, as amended, is in condition for allowance. Reconsideration and prompt allowance of the application are respectfully requested.

Respectfully submitted,

/Matthew T. Byrne /

Matthew T. Byrne
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Date: January 1, 2014

Electronic Patent Application Fee Transmittal

Application Number:	13488374
Filing Date:	04-Jun-2012
Title of Invention:	Wireless Communication System and Device For Coupling A Base Station and Mobile Stations
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Filer:	Matthew T. Byrne
Attorney Docket Number:	9030101.141-US0

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 3 months with $0 paid	2253	1	700	700

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for Continued Examination	2801	1	600	600
		Total in USD ($)		**1300**

Electronic Acknowledgement Receipt

EFS ID:	17792673
Application Number:	13488374
International Application Number:	
Confirmation Number:	2192
Title of Invention:	Wireless Communication System and Device For Coupling A Base Station and Mobile Stations
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Customer Number:	70763
Filer:	Matthew T. Byrne
Filer Authorized By:	
Attorney Docket Number:	9030101.141-US0
Receipt Date:	01-JAN-2014
Filing Date:	04-JUN-2012
Time Stamp:	06:38:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1300
RAM confirmation Number	8504
Deposit Account	504207
Authorized User	

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

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (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	Request for Continued Examination (RCE)	9030101_141_US0_Reply7_1_13RCE.pdf	697552 bda19bfd3ed8733a81bfb7d51d39f7396b6b1493	no	3
Warnings:					
Information:					
2		9030101_141_US0_Reply7_1_13.pdf	170644 03f9818d65bee355a031d4e9acfb199c8f5d3d90	yes	7

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment Submitted/Entered with Filing of CPA/RCE	1	1
Claims	2	3
Applicant Arguments/Remarks Made in an Amendment	4	7

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32271 96b961b6bc96de03ab413222c79027f978432c1d	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	900467		

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/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/488,374	Filing Date 06/04/2012	☐ 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	01/01/2014	(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))	* 5	Minus	** 20	= 0	X $40 =	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $210 =	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
/ALLYSON PURNELL/

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.
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0	2192

70763 7590 07/01/2013

Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004

EXAMINER
HO, HUY C

ART UNIT	PAPER NUMBER
2644	

NOTIFICATION DATE	DELIVERY MODE
07/01/2013	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):

info@byrnepoh.com

Office Action Summary	Application No. 13/488,374	Applicant(s) STRUHSAKER, PAUL F.	
	Examiner HUY C. HO	Art Unit 2644	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 *17 April 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) *1-5* 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) *1-5* is/are rejected.

8)☐ Claim(s) _____ 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 *04 June 2012* 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.

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

Response to Arguments

1. Applicant's arguments filed 04/17/2013 have been fully considered but they are not persuasive because with respect to the argued features on pages 5-6 of the Remarks that nothing in the cited portion of Williams discloses or suggests of "[a] second transceiver monitors first signal characteristics of [a] first mobile station and monitors second signal characteristics of [a] second mobile station, and based on the first signal characteristics and the second characteristics, routes information to the first mobile station and the second mobile station, respectively." The examiner respectfully disagrees because Williams teaches a signal extender 603, which monitors signals and routes information to mobile stations 303 and 304 in downlinks B3MH and B3ML respectively in a microcell C3 (Williams, Figure 7, col 11 lines 40-56), thus read upon the argued features "[a] second transceiver monitors first signal characteristics of [a] first mobile station and monitors second signal characteristics of [a] second mobile station, and based on the first signal characteristics and the second characteristics, routes information to the first mobile station and the second mobile station, respectively."

As such, the argued features were written such that they read upon the cited reference as explained above.

Claim Rejections - 35 USC § 102

2. 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 –
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 4 and 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Williams et al. (U.S. Patent No. 6,374,078).

Regarding claim 1, Williams teaches a wireless communication device (*Williams, the abstract, Figure 7, the signal extender*), comprising:

a first wireless transceiver operable to communicate with a base station, wherein the base station communicates with the first wireless transceiver and a plurality of other wireless

communication devices according to a wide area wireless communication protocol (*Williams, Figures 6, 13A, microcell transceivers 820s for serving microcell communication links, e.g., a mobile station 301 and base station 801, col 11 lines 9-40, col 20 lines 23-67)*; and

a second wireless transceiver coupled to the first wireless transceiver and operable to directly communicate with a first mobile station and a second mobile station, wherein the second wireless transceiver communicates with the first mobile station and the second mobile station according to a local area wireless communication protocol (*Williams, Figures 6, 13A, microcell transceivers 820s for serving microcell communication links, e.g., a mobile station 301 and base station 801, col 11 lines 9-40, col 20 lines 23-67)*;

wherein the first wireless transceiver receives from the base station a first downlink signal intended for the first mobile station and transmits provides the first downlink signal to the second wireless transceiver and wherein the second wireless transceiver receives the first downlink signal and re-transmits the first downlink signal to the first mobile station as a second downlink signal according to the local area wireless communication protocol (*Williams, Figures 6, 13A, col 11 lines 9-40, col 20 lines 23-67)*, and

wherein the second transceiver monitors first signal characteristics of the first mobile station and monitors second signal characteristics of the second mobile station, and based on the first signal characteristics and the second characteristics, routes information to the first mobile station and the second mobile station, respectively (*Williams, Figures 6, 13A, col 11 lines 9-40, col 20 lines 23-67).*

Regarding claim 2, Williams teaches the wireless communication device of claim 1, wherein the second wireless transceiver is coupled to the first wireless transceiver by a wireline connection (*Williams, Figure 13A, col 20 lines 23-67).*

Regarding claim 4, Williams teaches the wireless communication device of claim 1, wherein the first wireless transceiver and second transceivers wireless transceiver are disposed in a fixed site subscriber station (*Williams, Figure 13A, col 20 lines 23-67).*

Regarding claim 5, Williams teaches the wireless communication device of claim 1, wherein the first wireless transceiver and the second wireless transceiver are part of an integrated device (*Williams, Figures 6, 13A, col 11 lines 9-40, col 20 lines 23-67, the signal extender).*

Claim Rejections - 35 USC § 103

4. 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.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (U.S. Patent No. 6,374,078) and further in view of Lerman (EP 0690637 A2).

Regarding claim 3, Williams does not teach the wireless communication device of claim 2, wherein the second wireless transceiver is removably coupled to the first wireless transceiver.

Lerman teaches the second wireless transceiver is removably coupled to the first wireless transceiver (*Lerman in figure 5, col 7 lines 7-59, col 8 lines 1-10, secondary and supplemental transceivers can be added or removed to/from a primary transceiver*).

Therefore, therefore it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify Williams by combining teachings of Lerman extra

transceivers may be configurable added or removable to a primary transceiver to provide coverage extensions for mobile stations in a local area network.

Conclusion

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.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUY C. HO whose telephone number is (571)270-1108. The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

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.

/HUY C HO/
Primary Examiner, Art Unit 2644

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	Art Unit
	HUY C HO	2644

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
455	443	10/8/2012	HH

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Database Search	10/8/2012	HH
Inventor Search complete	10/8/2012	HH
Search update	6/26/2013	HH

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
455	444, 554.2	10/8/2012	HH
370	274, 401	10/8/2012	HH

	/HUY C HO/ Primary Examiner.Art Unit 2644

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BIB DATA SHEET

CONFIRMATION NO. 2192

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/488,374	06/04/2012 RULE	455	2644	9030101.141-US0

APPLICANTS
Paul F. Struhsaker, Plano, TX;

**** CONTINUING DATA ***************************
This application is a CON of 11/982,424 10/31/2007 ABN

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
06/13/2012

Foreign Priority claimed	35 USC 119(a-d) conditions met	Verified and Acknowledged	Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ Yes ☑ No	☐ Yes ☑ No	/HUY C HO/ Examiner's Signature	☐	TX	3	5	1
			HH Initials				

ADDRESS

Byrne Poh LLP
11 Broadway, Ste 1115
New York, NY 10004
UNITED STATES

TITLE

Wireless Communication System and Device For Coupling A Base Station and Mobile Stations

FILING FEE RECEIVED	FEES: Authority has been given in Paper	
530	No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	127829	(mobile moving) near5 ((base near3 station) (access near2 point))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/06/26 00:00
L2	30703	1 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/06/26 00:04
S1	72	((PAUL) near2 (STRUHSAKER)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/07 14:00
S2	45	"6374078"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/07 16:56
S3	2	"US 20080268835"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2012/10/07 17:04
S4	7	"7346347"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/07 17:05
S5	565	455/443.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:28
S6	563	455/444.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:28
S7	9	S6 and (WLAN and WWAN)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:29
S8	170	S6 and (WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:30
S9	28	S8 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:31
S10	45	"6374078"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:44
S11	145	S5 and (WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:46

S12	18	S11 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:46
S13	56	370/274.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S14	0	S13 and (WLAN and WWAN)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S15	4	S13 and (WLAN WWAN)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S16	0	S15 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S17	13	S13 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:51
S18	12253	370/401.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S19	2505	S18 and (WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S20	751	S18 and (WLAN and (WWAN cellular mobile))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S21	32	S20 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:52
S22	2299	WLAN and (WWAN cellular mobile) and (hot$pot wi$fi) and ((dual multi) near4 mode)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:58
S23	14	S22 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 13:58
S24	203	455/554.2.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:00
S25	23	S24 and (WLAN and (WWAN cellular mobile))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:00
S26	1	S25 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	2012/10/08 14:00

			IBM_TDB			
S27	53	S24 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:01
S28	45	"6374078"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:13
S29	0	S6 and ((dual$mode multi$mode) near5 (tranceiver))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:41
S30	0	S8 and ((dual multiple bi) near5 (mode protocol technology) near7 (tranceiver))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:42
S31	211037	(WLAN (local near3 area)) and (WWAN cellular mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:43
S32	0	S22 and ((dual multiple bi) near5 (mode protocol technology) near7 (tranceiver))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:43
S33	0	S22 and ((dual multiple bi) with mode with tranceiver)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:44
S34	2268	S22 and (dual multiple bi)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:44
S35	290	S22 and ((dual multiple) near5 (tranceiver receiver transmitter))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:44
S36	217	S35 and (access near4 point)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:45
S37	35	S36 and (WLAN near4 (access near4 point))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:46
S38	2	S36 and ((dual$mode multi$mode) near4 (access near4 point))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:46
S39	0	S38 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:46
S40	2582	(WLAN and WWAN) and (access near4 point)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:47
S41	526	S40 and (dual$mode	US-PGPUB; USPAT;	OR	OFF	2012/10/08

		multi$mode)	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			14:47
S42	57	S41 and ((dual multiple) near5 (transceiver receiver transmitter))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:48
S43	5	S42 and (@ad<"20010119" @rlad<"20010119")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 14:48
S44	47	"6141531"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/10/08 15:01
S45	2	"US 20120307815"	US-PGPUB; USPAT; USOCR; DERWENT	OR	OFF	2013/06/19 21:12

6/26/2013 12:53:39 AM
C:\Users\hho3\Documents\EAST\Workspaces\13488374.wsp

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	Art Unit
	HUY C HO	2644

✓	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	10/08/2012	06/26/2013							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Paul F. Struhsaker et al.	Conf. No.:	2192
Application No.:	13/488,374	Art Unit:	2644
Filed:	June 4, 2012	Examiner:	Ho, Huy C.

For: WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS

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

REPLY TO OFFICE ACTION AND AMENDMENT

Dear Examiner,

This Reply to Office Action and Amendment is in response to the non-final Office Action dated October 17, 2012 (hereinafter, "Office Action"). A three-month extension of the shortened statutory period is hereby requested to make the due date for response April 17, 2013.

This paper is organized as follow:

Amendments to the Claims begin on page **2**; and

Remarks begin on page **4** 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 wireless communication device, comprising:

a first wireless transceiver operable to communicate with a base station, wherein the base station communicates with the first wireless transceiver and a plurality of other wireless communication devices according to a wide area wireless communication protocol; and

a second wireless transceiver coupled to the first wireless transceiver and operable to directly communicate with a first mobile station and a second mobile station, wherein the second wireless transceiver communicates with the first mobile station and the second mobile station according to a local area wireless communication protocol,

wherein the first wireless transceiver receives from the base station a first downlink signal intended for the first mobile station and ~~transmits~~ provides the first downlink signal to the second wireless transceiver and wherein the second wireless transceiver receives the first downlink signal and re-transmits the first downlink signal to the first mobile station as a second downlink signal according to the local area wireless communication protocol, and

wherein the second transceiver monitors first signal characteristics of the first mobile station and monitors second signal characteristics of the second mobile station, and based on the first signal characteristics and the second characteristics, routes information to the first mobile station and the second mobile station, respectively.

2. (Original) The wireless communication device of claim 1, wherein the second wireless transceiver is coupled to the first wireless transceiver by a wireline connection.

3. (Original) The wireless communication device of claim 2, wherein the second wireless transceiver is removably coupled to the first wireless transceiver.

4. (Currently Amended) The wireless communication device of claim 1, wherein the first wireless transceiver and second ~~transceivers~~ wireless transceiver are disposed in a fixed site subscriber station.

5. (Original) The wireless communication device of claim 1, wherein the first wireless transceiver and the second wireless transceiver are part of an integrated device.

REMARKS

I. Summary of the Office Action

Claims 1-5 are pending in the present application.

The Examiner has rejected claims 1, 2, 4, and 5 under 35 U.S.C. § 102(e) as allegedly being anticipated by Williams et al. U.S. Patent No. 6,374,078 (hereinafter, "Williams").

Claim 3 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Williams in view of Lerman European Patent No. EP0690637A2 (hereinafter, "Lerman").

II. Summary of Applicants' Reply

Applicants have amended claim 1 and 4 to correct minor typographical errors. The amendments to claims 1 and 4 are fully supported and justified by the original specification, claims, and drawings, and no new matter has been added.

The Examiner's objection and rejections are respectfully traversed. Applicants' silence (except as set forth herein) with regard to the Examiner's rejections of the dependent claims constitutes a recognition by applicants that the rejections are moot based on applicants' remarks relative to the independent claim from which the dependent claims depend.

Reconsideration and prompt allowance of the present application are respectfully requested.

III. The Rejections Under 35 U.S.C. §§ 102(e) and 103(a)

The Examiner has rejected claims 1, 2, 4, and 5 under 35 U.S.C. § 102(e) as allegedly being anticipated by Williams, and has rejected claim 3 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Williams in view of Lerman.

Claim 1 is directed to a wireless communication device. Among other things, claim 1, as amended, recites:

> [a] second transceiver monitors first signal characteristics of [a] first mobile station and monitors second signal characteristics of [a] second mobile station, and based on the first signal characteristics and the second characteristics, routes information to the first mobile station and the second mobile station, respectively.

In rejecting claim 1, the Examiner cites the following portions of Williams as allegedly disclosing this portion of the claim: FIG. 6; FIG. 13A; column 11, lines 9-40; and column 20, lines 23-67. Because the Examiner did not provide a correlation between the components described in these portions of Williams and the components of the claims, applicants assume that the Examiner is asserting the following correlation:

Applicants' Claims	**Williams**
a first wireless transceiver	a portion of the signal extender that communicates with the network extender
a base station	the network extender
a second wireless transceiver	a portion of the signal extender that communicates with the handset
a first mobile station	a handset
a second mobile station	another handset (not shown in FIG. 6)

Should this assumption be incorrect, applicants request that the Examiner clarify the rejection.

Contrary to the Examiner's assertion, applicants respectfully submit that nothing in the cited portion of Williams is there any disclosure or suggestion of:

> [a] second transceiver monitors first signal characteristics of [a] first mobile station and monitors second signal

> characteristics of [a] second mobile station, and based on the first signal characteristics and the second characteristics, routes information to the first mobile station and the second mobile station, respectively.

Rather, FIG. 6 merely illustrates "a signal flow diagram ... of communication paths ... between handsets ... in two different microcells." (Williams, column 11, lines 9-12.) Nothing in FIG. 6 discloses or suggests monitoring and routing by a second transceiver.

FIG. 13A merely illustrates part of a block diagram of a network extender. (Williams, column 8, line 34.) As described above, it is assumed that the Examiner is asserting that the network extender discloses the claimed base station. Hence the network extender cannot disclose the second transceiver. Because FIG. 13A merely describes the network extender, nothing in this figure, or in FIG. 13B, discloses or suggests monitoring and routing by a second transceiver.

Column 11, lines 9-40 merely describes the communication paths illustrated in FIG. 6. As with FIG. 6, nothing in column 11, lines 9-40 discloses or suggests monitoring and routing by a second transceiver.

Finally, column 20, lines 23-67 merely describes features of the network extender of FIG. 13A. As with FIG. 13A, nothing in column 20, lines 23-67 discloses or suggests monitoring and routing by a second transceiver.

Thus, because the cited portions of the cited references, whether taken alone or in combination, do not disclose or suggest the above-quoted limitations of claim 1, applicants respectfully submit that the Examiner has failed to establish a *prima facie* basis for the rejections of claim 1 and clams 2-5 which depend therefrom. Therefore, claims 1-5 are in condition for allowance.

Accordingly, for at least these reasons, applicants respectfully request that the rejections of claims 1-5 under 35 U.S.C. §§ 102(e) and 103(a) be withdrawn.

IV. Deposit Account Authorization

The Director is hereby authorized to charge any fees that may be due, or to credit any overpayment of the same, to Deposit Account No. 50-4207.

In the event that an extension of time is required, or which may be required in addition to that requested in any petition for extension of time filed previously or herewith, the Director is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. 50-4207.

V. Conclusion

For at least the reasons set forth above, applicants respectfully submit that the present application, as amended, is in condition for allowance. Reconsideration and prompt allowance of the application are respectfully requested.

Respectfully submitted,

/Matthew T. Byrne /

Matthew T. Byrne
Registration No. 40,934
Attorney for Applicants

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Telephone: 212.509.8870
Facsimile: 212.931.8521

Date: April 17, 2013

Electronic Patent Application Fee Transmittal

Application Number:	13488374
Filing Date:	04-Jun-2012
Title of Invention:	Wireless Communication System and Device For Coupling A Base Station and Mobile Stations
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Filer:	Matthew T. Byrne
Attorney Docket Number:	9030101.141-US0

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 3 months with $0 paid	2253	1	700	700

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**700**

Electronic Acknowledgement Receipt

EFS ID:	15547781
Application Number:	13488374
International Application Number:	
Confirmation Number:	2192
Title of Invention:	Wireless Communication System and Device For Coupling A Base Station and Mobile Stations
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Customer Number:	70763
Filer:	Matthew T. Byrne
Filer Authorized By:	
Attorney Docket Number:	9030101.141-US0
Receipt Date:	17-APR-2013
Filing Date:	04-JUN-2012
Time Stamp:	20:34:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$700
RAM confirmation Number	6978
Deposit Account	504207
Authorized User	BYRNE, MATTHEW T.

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		9030101_141_US0_Reply.pdf	952072 9253de654a768ed8e2bff5c02305fb547c8b8ea1	yes	8

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	3
	Applicant Arguments/Remarks Made in an Amendment	4	8

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30336 83c1771ffda3ffc77a4f544700291331168c4009	no	2

Warnings:

Information:

Total Files Size (in bytes):	982408

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/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/488,374	Filing Date 06/04/2012	☐ 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 **04/17/2013**

	(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))	* 5	Minus	** 20	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $210 =	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
/MARGARET BYARS/

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0

CONFIRMATION NO. 2192

70763
Byrne Poh LLP
11 Broadway, Ste 814
New York, NY 10004

PUBLICATION NOTICE

OC000000058006958

Title: Wireless Communication System and Device For Coupling A Base Station and Mobile Stations

Publication No.US-2012-0307815-A1
Publication Date:12/06/2012

NOTICE OF PUBLICATION OF APPLICATION

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

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

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

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

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

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0	2192

70763 7590 10/17/2012

Byrne Poh LLP
11 Broadway, Ste 814
New York, NY 10004

EXAMINER
HO, HUY C

ART UNIT	PAPER NUMBER
2644	

NOTIFICATION DATE	DELIVERY MODE
10/17/2012	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):

info@byrnepoh.com

Office Action Summary	Application No.	Applicant(s)	
	13/488,374	STRUHSAKER, PAUL F.	
	Examiner	Art Unit	
	HUY C. HO	2644	

-- 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 June 2012*.

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) *1-5* 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) *1-5* is/are rejected.

8)☐ Claim(s) _____ 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 *06/04/2012* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

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

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

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

Priority under 35 U.S.C. § 119

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

a)☐ All b)☐ Some * c)☐ None of:

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

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

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

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

Attachment(s)

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

Claim Rejections - 35 USC § 102

1. 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 –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, 4 and 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Williams et al. (U.S. Patent No. 6,374,078).

Regarding claim 1, Williams teaches a wireless communication device (*Williams, the abstract, Figure 7, the signal extender*), comprising:

a first wireless transceiver operable to communicate with a base station, wherein the base station communicates with the first wireless transceiver and a plurality of other wireless communication devices according to a wide area wireless communication protocol (*Williams, Figures 6, 13A, microcell transceivers 820s for serving microcell communication links, e.g., a mobile station 301 and base station 801, col 11 lines 9-40, col 20 lines 23-67)*; and

a second wireless transceiver coupled to the first wireless transceiver and operable to directly communicate with a first mobile station and a second mobile station, wherein the second wireless transceiver communicates with the first mobile station and the second mobile station according to a local area wireless communication protocol (*Williams, Figures 6, 13A, microcell transceivers 820s for serving microcell communication links, e.g., a mobile station 301 and base station 801, col 11 lines 9-40, col 20 lines 23-67);*

wherein the first wireless transceiver receives from the base station a first downlink signal intended for the first mobile station and transmits provides the first downlink signal to the second wireless transceiver and wherein the second wireless transceiver receives the first downlink signal and re-transmits the first downlink signal to the first mobile station as a second downlink signal according to the local area wireless communication protocol (*Williams, Figures 6, 13A, col 11 lines 9-40, col 20 lines 23-67)*, and

wherein the second transceiver monitors first signal characteristics of the first mobile station and monitors second signal

characteristics of the second mobile station, and based on the first signal characteristics and the second characteristics, routes information to the first mobile station and the second mobile station, respectively (*Williams, Figures 6, 13A, col 11 lines 9-40, col 20 lines 23-67).*

Regarding claim 2, Williams teaches the wireless communication device of claim 1, wherein the second wireless transceiver is coupled to the first wireless transceiver by a wireline connection (*Williams, Figure 13A, col 20 lines 23-67).*

Regarding claim 4, Williams teaches the wireless communication device of claim 1, wherein the first wireless transceiver and second transceivers wireless transceiver are disposed in a fixed site subscriber station (*Williams, Figure 13A, col 20 lines 23-67).*

Regarding claim 5, Williams teaches the wireless communication device of claim 1, wherein the first wireless transceiver and the second wireless transceiver are part of an integrated device (*Williams, Figures 6, 13A, col 11 lines 9-40, col 20 lines 23-67, the signal extender).*

Claim Rejections - 35 USC § 103

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

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was

made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (U.S. Patent No. 6,374,078) and further in view of Lerman (EP 0690637 A2).

Regarding claim 3, Williams does not teach the wireless communication device of claim 2, wherein the second wireless transceiver is removably coupled to the first wireless transceiver.

Lerman teaches the second wireless transceiver is removably coupled to the first wireless transceiver (*Lerman in figure 5, col 7 lines 7-59, col 8 lines 1-10, secondary and supplemental transceivers can be added or removed to/from a primary transceiver*).

Therefore, therefore it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify Williams by combining teachings of Lerman extra transceivers may be configurable added or removable to a primary transceiver to provide coverage extensions for mobile stations in a local area network.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUY C. HO whose telephone number is (571)270-1108. The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

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.

/HUY C HO/
Examiner, Art Unit 2644

Notice of References Cited	Application/Control No. 13/488,374	Applicant(s)/Patent Under Reexamination STRUHSAKER, PAUL F.	
	Examiner HUY C. HO	Art Unit 2644	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,374,078	04-2002	Williams et al.	455/7
	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	EP 0690637	01-1996		RUVIN I. LERMAN	
	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.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 690 637 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.01.1996 Bulletin 1996/01

(51) Int. Cl.[6]: **H04Q 7/20**, H04Q 7/32

(21) Application number: **95109795.5**

(22) Date of filing: **23.06.1995**

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **01.07.1994 US 270070**

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(54) Method and system for providing a digital wireless local loop

(57) A method and system for providing a digital wireless local loop. The system includes a primary transceiver for transmitting and receiving a digital signal at a first selected frequency from an outdoor macrocell base transceiver and for transmitting and receiving the digital signal at the first selected frequency to and from a portable handset. The method includes the step of receiving a digital audio/video/data signal having a first frequency from an outdoor macrocell base transceiver. The method also includes the step of retransmitting the signal having the first frequency at a second frequency to a portable handset. The step of retransmitting the signal includes receiving the signal having the first frequency and retransmitting the signal at an intermediate frequency, and receiving the signal having the intermediate frequency and retransmitting the signal at the second frequency to the portable handset. The method also provides for communications originating from the portable handset.

EP 0 690 637 A2

Printed by Rank Xerox (UK) Business Services
2.5/3.4

Description

Technical Field

This invention relates to cellular wireless local loops. In particular, this invention relates to digital wireless local loops derived from an outdoor cellular macrocell base transceiver for use by an indoor portable handset or a device incorporating such a handset. The invention is particularly suited for single or multi-family dwellings or a multi-use building environment.

Background Art

Most metropolitan areas are now equipped with one or more forms of wireless communications networks which provide radio transmissions in the microwave frequency band to wireless telephone customers. For example, a plurality of macrocell base transceivers capable of transmitting digital radio signals to and receiving digital radio signals from one or more portable handsets are located throughout various wireless service areas. A portable handset, as the term is used herein, refers to a wireless voice telephone such as a cellular telephone or the like in a speech or data mode that can be installed at a fixed location in an indoor environment, temporarily installed in a vehicle or be completely mobile. In the case of cellular telephones, a typical cellular service area comprises a metropolitan area or larger region.

An example illustrating two possible configurations of a cellular service area comprised of segments 10a, 10b is shown in Figure 1. The segment 10a illustrates a seven-cell reuse pattern; i.e., the frequency band allocated to cellular telephone customers is divided into seven macrocells 12 operating at seven different frequency channels f1-f7. The frequency channels f1-f7 typically are not consecutive frequencies of the cellular radio frequency band. For example, frequency channel f1 may comprise channels 1, 3 and 5, while frequency channel f2 may comprise channels 2, 4 and 6. The seven frequency channels f1-f7 are repeated for each segment 10a of the entire cellular service area. The cellular service area 10b illustrates a twelve cell cite reuse pattern.

Service area 10b has reduced capacity per coverage area since the cellular frequency band is divided into twelve macrocells 12, and hence twelve frequency channels f1-f12, as opposed to the seven frequency channels f1-f7 of segment 10a. However, the larger segment 10b provides a greater distance between macrocells 12 that use the same frequency channel, resulting in reduced co-channel interference, e.g., frequency channel f6 of segment 10b versus frequency channel f6 of segment 11b.

Located within each macrocell 12 is a base transceiver 14. Each base transceiver 14 is able to broadcast and receive radio signals utilizing its corresponding frequency channel. For example, a base transceiver 14 located in segment 10a would transmit and receive radio signals from a wireless transceiver utilizing frequency channels f4 while adjacent base transceivers 14 would operate at frequency channels f1, f2, f3, f5, f6 and f7.

When a telephone call to a wireless transceiver originates from either another wireless transceiver or a land-based telephone via a Public Switched Telephone Network (PSTN) 15, a caller must access a Mobile Telephone Switching Center (MSC) 16. The MSC 16 receives the call request and instructs a central call processor 17 to begin call processing. The central call processor 17 transmits a signal over a dedicated line 18 (such as a land-based line or microwave link, etc.) to a predetermined base transceiver 14. The central call processor 17 determines which base transceiver 14 to transmit the signal based on the location of the portable handset. When the portable handset enters a macrocell 12, the portable handset registers its location with a corresponding home or visitor location register. The control call processor 17 has access to the registers and, therefore, directs the telephone call to the appropriate base transceiver 14.

Portable handsets can be used indoors as well as outdoors. Therefore, a portable handset located in an indoor environment requires service from a base transceiver 14 located outdoors. The indoor portable handset can communicate directly with an outdoor base transceiver 14 if both the base transceiver 14 and the portable handsets are allowed to exert sufficient power to penetrate the walls of a building. However, the more power a base transceiver 14 or a wireless transceiver transmits the more interference it causes to other base transceivers 14 as well as the associated portable handsets which are assigned the same frequencies.

Consequently, a need has developed for a wireless transmission system and, in particular, wireless local loops or links (WLL) which utilize the attenuation properties of buildings within their associated service areas. A WLL is a wireless link which connects an indoor cellular portable handset or a customer premises wired standard telephone to an outdoor cellular base transceiver on demand. Such a system should permit the buildings to act as shields so as to isolate outdoor users as well as the user's respective base transceiver 14 from interference caused by the indoor WLL. Still further, the WLL should allow users to make inexpensive local calls using the same portable handsets which were used to make expensive outdoor calls. Further, the WLL should provide indoor communication quality for users of outdoor portable handsets when the users transfer to indoor environments.

Several known systems have attempted unsuccessfully to address this need. One known system, for example, provides a WLL suitable for low market penetration of portable handsets. A dual-mode device is provided that requires full functionality of a portable handset as well as a regular telephone interface. This system, however, is costly for users that require primarily telephone network service since the users bear the cost of wireless functionality that is not needed for their operations.

A second known system provides a wireless link between a portable handset and a Private Branch Exchange ("PBX") utilized in a private business environment. As known to those skilled in the art, a PBX is a telephone system, complete with a private automatically operated switchboard and individual telephone sets, installed and operated on private premises but having a trunk-line connection to the central office. This system utilizes base transceivers and a corresponding control unit located within the building of the private business.

In operation, the control unit assigns frequency channels to the indoor base transceivers. The frequency assignment is based on the amount of energy detected by each indoor base transceiver. The base transceivers transmit and receive signals from a portable handset via Analog Mobile Phone Service ("AMPS") air interface standard. Low energy AMPS channels, i.e., frequencies belonging to a different macrocell than that of the local outdoor macrocell base transceiver, are assigned to the wireless link between the indoor base transceivers and a cellular portable handset. Therefore, the attenuation properties of the building are used to shield the indoor communications from outdoor signals.

In such systems, following receipt of an analog signal from the portable handset, the indoor base transceivers are required to perform full demodulation and baseband speech processing in order to communicate with the PBX. As a result, the indoor base transceivers act in the same manner as an outdoor macrocell base transceiver. Significantly, systems of this type do not provide wireless links between an outdoor cellular base station and indoor wireless users on demand. These systems also produce unacceptable speech delays when applied to digital cellular systems.

A third known system provides increased indoor coverage by amplifying both transmitted and received signals between the outdoor macrocell base transceiver and the indoor portable handset. To prevent the amplifiers from acting as oscillators, the gain of the amplifiers is very limited and, in most cases, does not compensate for building penetration and indoor propagation losses, which result in poor indoor coverage. Moving objects or people in the immediate vicinity of the amplifiers may change their input-to-output isolation, resulting in oscillating. Such an amplifier then becomes a jammer to all portable handsets in the vicinity.

As referenced above, the known prior art fails to disclose an inexpensive cellular WLL. The known prior art also fails to disclose a digital cellular WLL. Consequently, a need has developed to provide a wireless local loop system and method as referenced above which may be practically and economically implemented for use by single and multi-family dwellings and multi-use building environments.

It is further desirable that such a system be compatible with existing digital cellular radio communications. Finally, such a system should neither require the allocation of more radio frequencies than are currently allocated to wireless communication systems, nor require a substantial portion of existing wireless frequencies.

Disclosure Of The Invention

It is thus a general object of the present invention to overcome the limitations of the prior art by providing a cellular wireless local loop for use in single and multi-family dwellings and multi-use building environments which utilizes digital radio communications.

Yet another object of the present invention is the provision of a digital wireless local loop that provides cellular services to indoor users utilizing the attenuation properties of buildings.

Still further, it is an object of the present invention to provide a wireless local loop of the type referenced above that transmits and receives digital signals at a frequency distinct from the frequency of the corresponding outdoor macrocell base transceiver.

In carrying out the above objects and other objects of the present invention, a method is disclosed for providing a digital wireless local loop for use by a wireless transceiver in an indoor environment utilizing an outdoor macrocell base transceiver transmitting a digital signal at a first selected frequency.

The method begins with the step of receiving the digital signal at a first selected frequency from the outdoor macrocell base transceiver when a call is initiated from another portable handset or a land-based telephone. The method continues with the step of retransmitting the signal having the first selected frequency to the portable handset at a second selected frequency.

The step of retransmitting the signal at a second selected frequency includes receiving the signal at the first selected frequency and retransmitting the signal at an intermediate frequency, and further includes receiving the signal at the intermediate frequency and retransmitting the signal at a second selected frequency to the portable handset.

The method also includes the step of receiving the digital signal at the second selected frequency from the portable handset when the portable handset initiates a call to another portable handset or a land-based telephone. The method further includes the step of retransmitting the digital signal received by the portable handset to the base transceiver at the first selected frequency.

In further carrying out the above objects and other objects, features and advantages of the present invention, a system is also provided for carrying out the steps of the above described method.

The system includes a primary transceiver operative to transmit and receive a digital signal to and from the outdoor base transceiver at a first selected frequency and to transmit and receive the digital signal at a second selected frequency to and from a portable handset.

The primary transceiver includes a secondary transceiver and a supplemental transceiver. The secondary transceiver is in communication with the outdoor base transceiver and the supplemental transceiver. The sec-

ondary transceiver transmits and receives the digital signal to and from the outdoor base transceiver at the first selected frequency and transmits and receives the digital signal to and from the supplemental transceiver at an intermediate frequency.

The supplemental transceiver is in communication with the secondary transceiver and the portable handset. The supplemental transceiver transmits and receives the digital signal to and from the secondary transceiver at the intermediate frequency and transmits and receives the digital signal to and from the portable handset at the selected second frequency.

The above objects, features and advantages of the present invention, as well as others, are readily apparent from the following detailed description of the best mode for carrying out the invention when taken in connection with the accompanying drawings, wherein like reference numbers correspond to like components.

Brief Description Of The Drawings

The present invention will be apparent from the detailed description taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a schematic diagram of a prior art cellular telephone system illustrating typical layouts of cellular service areas;
FIGURE 2 is a block diagram illustrating the general sequence of steps associated with the operation of the present invention;
FIGURE 3 is a block diagram illustrating the general sequence of steps associated with the operation of an alternate embodiment of the present invention;
FIGURE 4 is a block diagram of the preferred embodiment of the present invention; and
FIGURE 5 is a block diagram of an alternative embodiment of the present invention made in accordance with the teachings of the preferred embodiment of this invention;

Best Modes For Carrying Out The Invention

With reference to Figure 2 of the drawings, there is provided a block diagram illustrating the sequential steps associated with the operation of the present invention when a telephone call to a wireless transceiver originates from either another portable handset or a land-based telephone via a PSTN.

An outdoor macrocell base transceiver 14 transmits digital signals to various portable handsets at a first selected frequency within the frequency band constituting the cellular radio spectrum of segments 10a, 10b. The digital signal may be either an audio, data or video signal. As shown by block 20, the first step of the present invention includes receiving the digital signal at the first selected frequency from the outdoor base transceiver 14.

The next step of the present invention includes retransmitting the signal at a second selected frequency to the portable handset, as shown by block 21. The second frequency is a frequency of the cellular radio spectrum distinct from the frequencies assigned to the base transceiver 14 of the macrocell 12 in which the portable handset is registered.

In a Frequency Division Duplexing (FDD) cellular system, the outdoor base transceiver 14 transmits signals at a first selected frequency and receives signals at a different frequency simultaneously. In this system, the second selected frequency of the signal being transmitted to the portable handset is different from the second selected frequency of the signal being transmitted from the portable handset. A Time Division Duplexing (TDD) cellular system, on the other hand, transmits signals for a certain period of time and then receives signals for another period of time, thereby allowing the signals to be transmitted and received at the same frequency. In this system, the second selected frequency of the signal being transmitted to the portable handset may be the same as the second selected frequency of the signal being transmitted from the portable handset.

The second frequency is determined by scanning the indoor environment for a frequency having the least amount of energy of all the frequencies scanned. The frequencies are scanned by a scanning device located within the indoor environment. The frequency with the least amount of energy may vary in different buildings located in a single outdoor macrocell 12.

Since the original digital signal is retransmitted using only a different frequency, there is no change in the content of the message being transmitted or received nor is there a need to decipher the content of the message. Consequently, there is no delay due to modulation and demodulation as well as baseband speech processing or control channel processing.

The step 21 of retransmitting the digital signal at the second selected frequency is further represented by blocks 22 and 23. As shown by block 22, the signal at the first selected frequency is received and retransmitted at an intermediate frequency.

Next, the signal at the intermediate frequency is received and retransmitted at the second frequency to the portable handset, as shown by block 23.

Figure 3 of the drawings provides a block diagram of the sequential steps associated with the operation of the present invention when a telephone call originates from the portable handset to either another portable handset or a land-based telephone via a PSTN.

As shown by block 24, the first step includes receiving the digital signal at a second selected frequency from the portable handset. The digital signal is then retransmitted at the first selected frequency to the base transceiver, as shown by block 25.

The step 24 of receiving the digital signal at a second selected frequency is further represented by blocks 26 and 27. First, the digital signal is received at the second

selected frequency and retransmitted at an intermediate frequency, as shown by block 26.

Finally, the digital signal is received at the intermediate frequency and retransmitted at the first selected frequency for receipt by the base transceiver, as shown by block 27.

Referring now to Figure 4, there is shown a digital wireless local loop ("WLL") made in accordance with the teachings of the present invention. As shown, the WLL consists of a base transceiver 32. The base transceiver 32 transmits and receives digital signals at a first selected frequency. The first selected frequency is disposed within a predetermined frequency band constituting a portion of the predefined wireless and preferably cellular radio spectrum.

The WLL also includes a primary transceiver 34 in communication with the outdoor base transceiver 32 and a portable handset 36. The primary transceiver 34 transmits and receives the digital signal to and from the outdoor base transceiver 32 at the first selected frequency.

In addition to transmitting and receiving the digital signal to and from the outdoor base transceiver 32, the primary transceiver 34 transmits and receives the digital signal to and from the portable handset 36 at a second selected frequency. The second selected frequency is determined by the primary transceiver 34.

The primary transceiver 34 may be coupled to the outdoor base transceiver 32 via a wireline link or over-the-air RF communication. The portable handset 36 may be either a fixed or a portable unit.

In single or multi-family dwellings and/or multi-use building environments having a relatively low customer market of indoor subscribers, the primary transceiver 34 may include a window or an outdoor patch panel antenna applied to a window or several windows of offices or apartments in which the occupant or occupants own a portable handset 36. In this situation, it may be more economical to integrate the primary transceiver 34 with a portable handset 36. The integration can be done on demand by a temporary connection of a portable handset 36 into a box which, while connected to the portable handset 36, contains the functionality of a primary transceiver 34 and further includes an interface to a wireline standard telephone set. Alternatively, the functionality of a portable handset 36 may be embedded in the box.

Where the number of indoor subscribers is higher, the primary transceiver 34 may include a central antenna attached to the building. The primary transceiver 34 may be an inexpensive repeater adapted to communicate with both a plurality of portable handsets 36 and the antenna. The primary transceiver 34 acts as a picocell, i.e., a small base transceiver in the building located within a macrocell.

Alternatively, a plurality of primary transceivers 34 may be located throughout the indoor environment for communication with a plurality of portable handsets 36.

An alternative embodiment shown in Figure 5 illustrates a WLL for yet an even higher number of indoor subscribers. The primary transceiver 34 includes a secondary transceiver 38 and a supplemental transceiver 40. The secondary transceiver 38 transmits and receives the digital signal from the outdoor base transceiver 32 at the first selected frequency and transmits and receives the digital to and from the supplemental transceiver 40 at an intermediate frequency. The secondary transceiver 38 is in communication with the outdoor base transceiver 32 and the supplemental transceiver 40.

The supplemental transceiver 40 transmits and receives the digital signal at intermediate frequency to and from the secondary transceiver 38 and transmits and receives the digital signal at the second selected frequency to and from the portable handset 36. The intermediate frequency is necessary due to the high selectivity required of the secondary transceiver 38 when operating in the cellular radio spectrum. The supplemental transceiver 40 is in communication with the secondary transceiver 38 and the portable handset 36. The supplemental transceiver 40 may be coupled to the secondary transceiver 38 via a wireline link or over-the-air RF communication. The intermediate frequency may be converted to another appropriate frequency when the signal is transmitted via wireless link. The intermediate frequency is converted to a cellular frequency when the signal is transmitted over the air. The cellular frequency is distinct from the first selected frequency and the second selected frequency.

In this embodiment, the supplemental transceiver 40 scans the frequencies of the indoor cellular radio spectrum for the frequency with the least amount of energy and selects the second frequency utilized to communicate with the portable handset 36.

A plurality of supplemental transceivers 40 may be placed uniformly throughout the indoor environment. The number of supplemental transceivers 40 to be chosen depends on the size of the indoor environment and the amount of power allowed to be transmitted by each supplemental transceiver 40 to the portable handset 36. Each of the plurality of supplemental transceivers 40 transmits and receives the digital signal to a plurality of portable handsets 36 at distinguished second selected frequencies. It is possible that one of the plurality of supplemental transceivers 40 transmits and receives the digital signal at a same second selected frequency as another of the plurality of supplemental transceivers 40 within the indoor environment provided there are a sufficient number of floors between the supplemental transceivers 40 to act as a shield in preventing interference between the two supplemental transceivers 40.

Alternatively, a third transceiver may be disposed between the secondary transceiver 38 and the supplemental transceiver 40. The third transceiver 42 acts as an extender for a single or a plurality of supplemental transceivers 40. The third transceiver 42 is useful when the secondary transceiver 38 and the supplemental transceiver 40 communicate via an over-the-air RF link. For health reasons, the transmission power allowed for over-the-air RF communications between the secondary transceiver 38 and the supplemental transceiver 40 may

be limited to a few milliwatts. This power will be insufficient for a reliable secondary transceiver 38 located on top of a building near an antenna to transmit and receive signals to and from a plurality of supplemental transceivers 40 in large multistory buildings, especially if some of the supplemental transceivers 40 are located on lower floors.

In low capacity situations, the plurality of supplemental transceivers 40 are normally positioned to provide the chain of intermediate frequencies from the secondary transceiver 38 located on top of a building to portable handsets 36. In this situation, the supplemental transceivers 40 transmit and receive signals to and from the portable handsets 36 at the second selected frequency. However, as capacity increases, the intermediate frequency may become exhausted and not extend to all the supplemental transceivers 40. In this case, the secondary transceiver 38 transmits several intermediate frequencies, and one or a plurality of third transceivers 42 act as repeaters for the intermediate frequencies. The third transceiver 42 may physically reside in the same box as the supplemental transceiver 40.

In a situation in which the outdoor cellular capacity needs exceed the available spectrum for combined indoor and outdoor communications, the secondary transceiver 38 may have a coaxial or an optical cable connection to a bank of outdoor base transceivers 32. In this case, the secondary transceiver 38 and the supplemental transceiver 40 may have to be tuned to a frequency other than the first selected intermediate frequency.

While the best modes for carrying out the invention have been described in detail, those familiar with the art to which this invention relates will recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

Claims

1. For use in cooperation with an outdoor macrocell base transceiver, the base transceiver operative to transmit and receive a digital signal at a first selected frequency, a system for providing a digital wireless local loop in an indoor environment, comprising:

   a primary transceiver operative to transmit and receive the digital signal to and from the base transceiver at the first selected frequency, the primary transceiver further operative to transmit and receive the digital signal at a second selected frequency; and

   a portable handset in communication with the primary transceiver operative to transmit and receive the digital signal to and from the primary transceiver at the second selected frequency.

2. The system of claim 1 wherein the first and second selected frequencies are within a predefined frequency band.

3. The system of claim 2 wherein the predefined frequency band comprises the cellular radio spectrum.

4. The system of claim 1 wherein the second selected frequency is determined by the primary transceiver.

5. The system of claim 1 wherein the digital signal is an audio signal.

6. The system of claim 1 wherein the digital signal is a video signal.

7. The system of claim 1 wherein the digital signal is a data signal.

8. The system of claim 1 wherein the primary transceiver includes a central antenna disposed outside the indoor environment.

9. The system of claim 1 wherein the primary transceiver includes a plurality of antennas disposed throughout the indoor environment.

10. The system of claim 1 wherein the primary transceiver is a repeater disposed in the indoor environment.

11. The system of claim 1 wherein the primary transceiver is combined with the portable handset.

12. The system of claim 1 wherein the primary transceiver comprises:

    a secondary transceiver in communication with the outdoor base transceiver and a supplemental transceiver for transmitting and receiving the digital signal to and from the outdoor base transceiver at the first selected frequency, the secondary transceiver further operative to transmit and receive the digital signal to and from the supplemental transceiver at an intermediate frequency; and

    a supplemental transceiver in communication with the secondary transceiver and the portable handset for transmitting and receiving the digital signal to and from the secondary transceiver at the intermediate frequency, the supplemental transceiver further operative to transmit and receive the digital signal to the portable handset at the second selected frequency.

13. The system of claim 12 wherein the supplemental transceiver is coupled to the secondary transceiver via a wireline link.

14. The system of claim 12 wherein the supplemental transceiver is coupled to the secondary transceiver via over-the-air RF communication.

15. The system of claim 12 wherein the primary transceiver includes a plurality of supplemental transceivers disposed throughout the indoor environment.

16. The system of claim 11 further comprising a third transceiver disposed between the secondary transceiver and the supplemental transceiver for extending the transmission range between the secondary transceiver and the supplemental transceiver.

17. For use in cooperation with an outdoor macrocell base transceiver, the base transceiver operative to transmit and receive a digital signal at a first selected frequency, a method for providing a digital wireless local loop in an indoor environment, comprising:

providing a primary transceiver operative to transmit and receive the digital signal to and from the base transceiver at the first selected frequency, the primary transceiver further operative to transmit and receive the digital signal at a second selected frequency; and

providing a portable handset in communication with the primary transceiver for transmitting and receiving the digital signal to and from the primary transceiver at the second selected frequency.

18. The method of claim 17 wherein the step of providing a primary transceiver includes providing a central antenna disposed outside the indoor environment.

19. The method of claim 17 wherein the step of providing a primary transceiver includes providing a plurality of antennas disposed throughout the indoor environment.

20. The method of claim 17 wherein the step of providing a primary transceiver includes:

providing a secondary transceiver in communication with the outdoor base transceiver and a supplemental transceiver for transmitting and receiving the digital signal to and from the outdoor base transceiver at the first selected frequency, the secondary transceiver further operative to transmit and receive the digital signal to and from the supplemental transceiver at an intermediate frequency; and

providing a supplemental transceiver in communication with the secondary transceiver and the portable handset for transmitting and receiving the digital signal to and from the secondary transceiver at the intermediate frequency, the supplemental transceiver further operative to transmit and receive the digital signal to the portable handset at the second selected frequency.

21. The method of claim 17 wherein the step of providing a primary transceiver includes providing a plurality of supplemental transceivers disposed in the indoor environment.

22. The method of claim 21 wherein the plurality of supplemental transceivers transmit and receive the digital signal at the intermediate frequency to a plurality of portable handsets at a plurality of distinguished second selected frequencies, the plurality of distinguished second selected frequencies varying in sensitivity to interference with the indoor/outdoor cellular radio communications.

23. The method of claim 20 further comprising providing a third transceiver for transmitting and receiving the digital signal to and from the secondary transceiver at the intermediate frequency, the third transceiver further for transmitting and receiving the digital signal to and from the supplemental transceiver at a second intermediate frequency.

24. A method for operating a portable handset in an indoor environment to communicate with an outdoor macrocell base transceiver, the base transceiver operative to transmit and receive digital signals to and from the portable handset at a first selected frequency, the method comprising:

receiving the digital signal at the first selected frequency from the base transceiver; and

retransmitting the digital signal at a second selected frequency for receipt by the portable handset.

25. The method of claim 24 wherein the step of receiving the digital signal at the first selected frequency from the base transceiver is aided by a central antenna disposed outside the indoor environment.

26. The method of claim 24 wherein the step of receiving the digital signal at the first selected frequency from the base transceiver is aided by a plurality of antennas disposed throughout the indoor environment.

27. The method of claim 24 wherein the step of retransmitting the digital signal at the second selected frequency for receipt by the portable handset is performed by a repeater disposed in the indoor environment.

28. The method of claim 24 wherein the step of retransmitting the digital signal at a second selected frequency for receipt by the portable handset includes:

receiving the digital signal at the first selected frequency and retransmitting the digital signal at an intermediate frequency; and

receiving the digital signal at the intermediate frequency and retransmitting the digital signal at the second selected frequency for receipt by the portable handset.

29. The method of claim 28 wherein the step of receiving the digital signal at the intermediate frequency and retransmitting the digital signal at the selected sec-

ond frequency includes retransmitting the signal to a plurality of portable handsets.

30. The method of claim 28 wherein the step of receiving the digital signal at the intermediate frequency and retransmitting the digital signal at the second selected frequency further includes scanning all frequencies of the cellular radio spectrum for the frequency having the least amount of energy.

31. A method for operating a portable handset in an indoor environment to communicate with an outdoor macrocell base transceiver, the base transceiver operative to transmit and receive digital signals to and from the portable handset at a first selected frequency, the method comprising:

receiving the digital signal at a second selected frequency from the portable handset; and

retransmitting the digital signal at the first selected frequency for receipt by the base transceiver.

32. The method of claim 31 wherein the step of receiving the digital signal at the second selected frequency from the portable handset is performed by a repeater disposed in the indoor environment.

33. The method of claim 31 wherein the step of receiving the digital signal at the second selected frequency from the portable handset includes:

receiving the digital signal at the second selected frequency and retransmitting the digital signal at an intermediate frequency; and

receiving the digital signal at the intermediate frequency and retransmitting the digital signal at the first selected frequency.

34. A method for providing a wireless local loop between an indoor environment and an outdoor macrocell base transceiver, the base transceiver operative to transmit and receive digital signals to and from the portable handset at a first selected frequency within the cellular radio spectrum, the method comprising:

receiving the digital signal at the first selected frequency from the base transceiver;

retransmitting the digital signal at a second selected frequency for receipt by the portable handset;

receiving the digital signal at the second selected frequency from the portable handset; and

retransmitting the digital signal at the first selected frequency for receipt by the base transceiver.

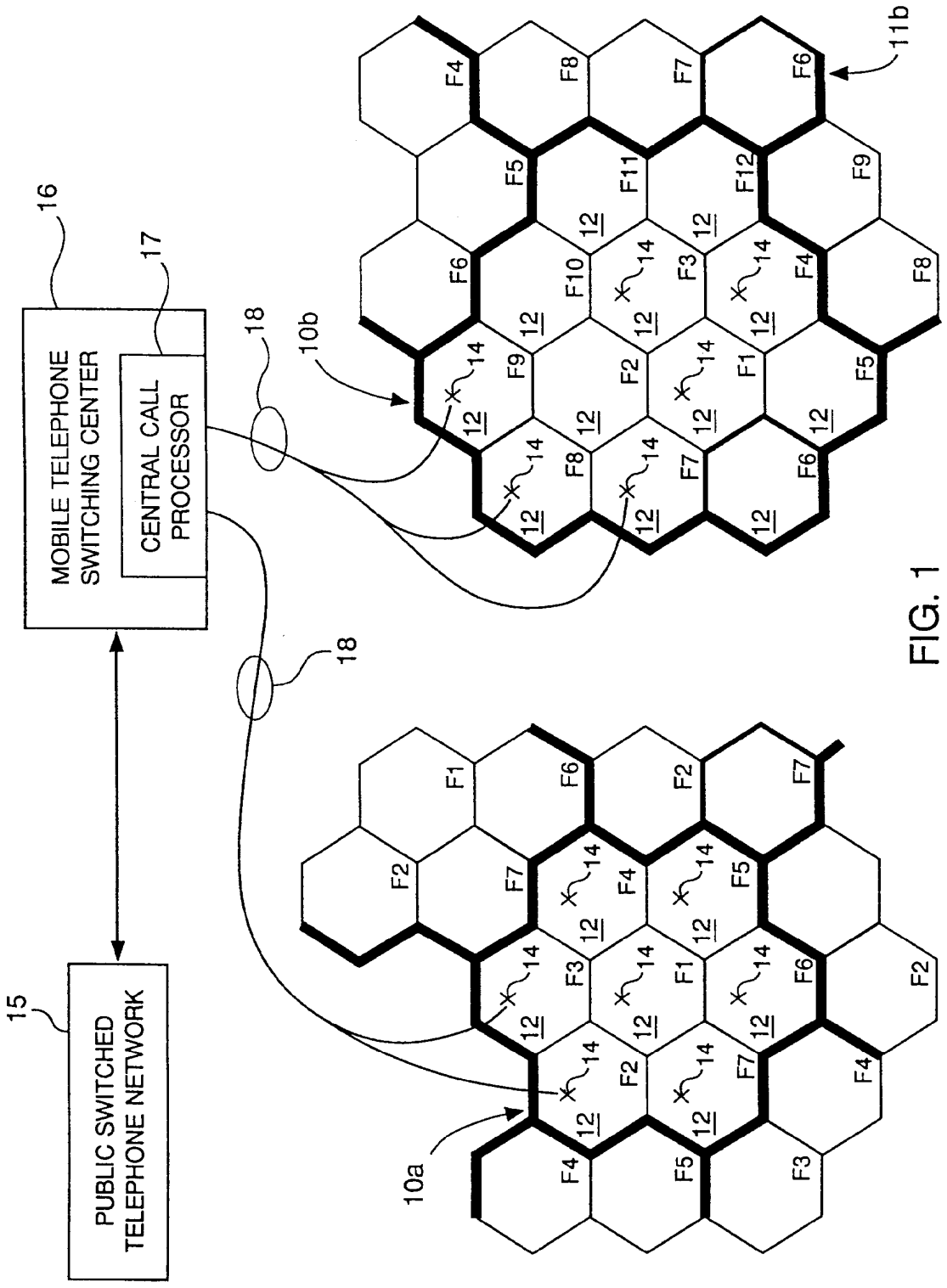

MOBILE TELEPHONE SWITCHING CENTER
CENTRAL CALL PROCESSOR
PUBLIC SWITCHED TELEPHONE NETWORK
15
16
17
18
18
10a
10b
11b
12
14
F1
F2
F3
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F5
F6
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F8
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F12

FIG. 1

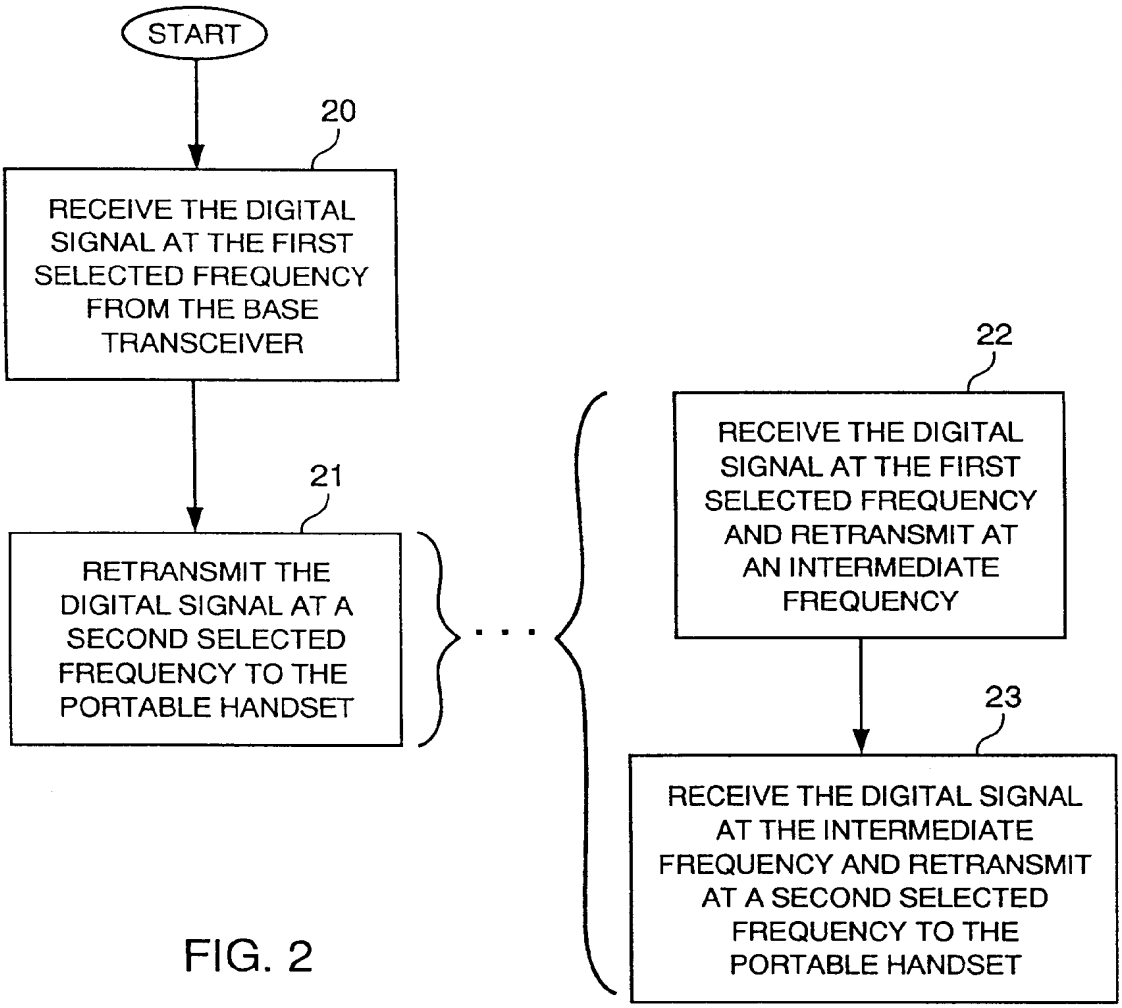

START
20
RECEIVE THE DIGITAL SIGNAL AT THE FIRST SELECTED FREQUENCY FROM THE BASE TRANSCEIVER
21
RETRANSMIT THE DIGITAL SIGNAL AT A SECOND SELECTED FREQUENCY TO THE PORTABLE HANDSET
22
RECEIVE THE DIGITAL SIGNAL AT THE FIRST SELECTED FREQUENCY AND RETRANSMIT AT AN INTERMEDIATE FREQUENCY
23
RECEIVE THE DIGITAL SIGNAL AT THE INTERMEDIATE FREQUENCY AND RETRANSMIT AT A SECOND SELECTED FREQUENCY TO THE PORTABLE HANDSET

FIG. 2

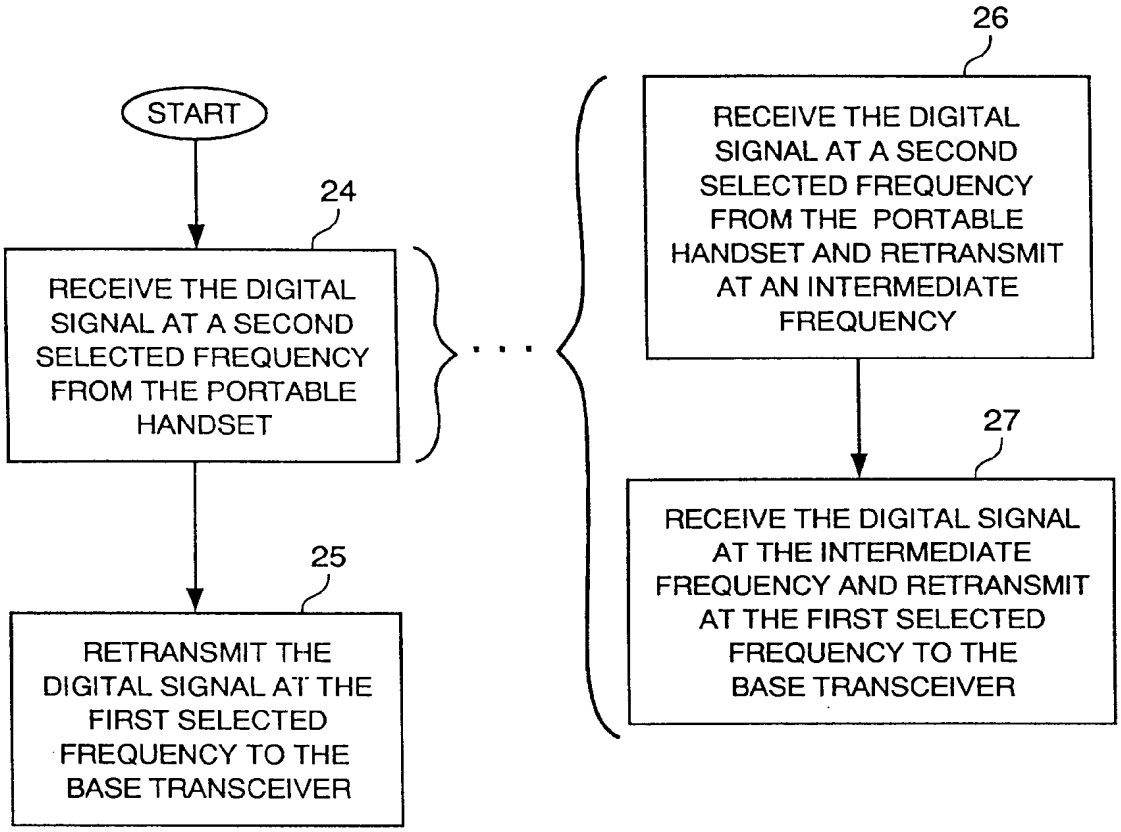

START
24
RECEIVE THE DIGITAL SIGNAL AT A SECOND SELECTED FREQUENCY FROM THE PORTABLE HANDSET
25
RETRANSMIT THE DIGITAL SIGNAL AT THE FIRST SELECTED FREQUENCY TO THE BASE TRANSCEIVER
26
RECEIVE THE DIGITAL SIGNAL AT A SECOND SELECTED FREQUENCY FROM THE PORTABLE HANDSET AND RETRANSMIT AT AN INTERMEDIATE FREQUENCY
27
RECEIVE THE DIGITAL SIGNAL AT THE INTERMEDIATE FREQUENCY AND RETRANSMIT AT THE FIRST SELECTED FREQUENCY TO THE BASE TRANSCEIVER

FIG. 3

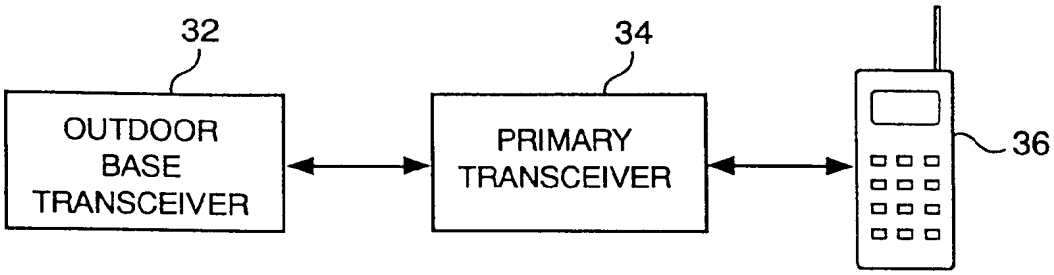

32
34
OUTDOOR BASE TRANSCEIVER
PRIMARY TRANSCEIVER
36

FIG. 4

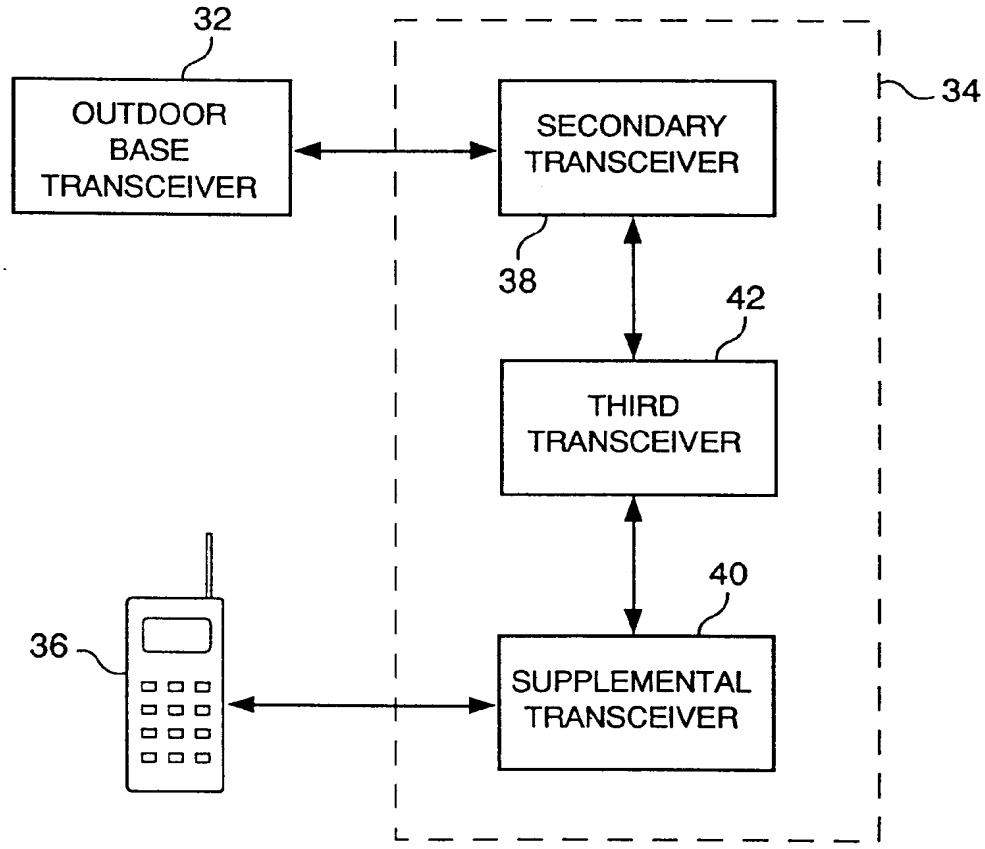

32
34
OUTDOOR BASE TRANSCEIVER
SECONDARY TRANSCEIVER
38
42
THIRD TRANSCEIVER
40
36
SUPPLEMENTAL TRANSCEIVER

FIG. 5

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	Art Unit
	HUY C HO	2644

SEARCHED			
Class	Subclass	Date	Examiner
455	443	10/8/2012	HH

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Database Search	10/8/2012	HH
Inventor Search complete	10/8/2012	HH

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
455	444, 554.2	10/8/2012	HH
370	274, 401	10/8/2012	HH

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13488374	STRUHSAKER, PAUL F.
	Examiner	Art Unit
	HUY C HO	2644

✓	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	10/08/2012								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								

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BIB DATA SHEET

CONFIRMATION NO. 2192

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/488,374	06/04/2012 RULE	455	2644	9030101.141-US0

APPLICANTS
Paul F. Struhsaker, Plano, TX;

**** CONTINUING DATA ***************************
This application is a CON of 11/982,424 10/31/2007 ABN

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
06/13/2012

Foreign Priority claimed	35 USC 119(a-d) conditions met	Verified and Acknowledged	Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ Yes ☑ No	☐ Yes ☑ No	/HUY C HO/ Examiner's Signature	☐	TX	3	5	1
			HH Initials				

ADDRESS

Byrne Poh LLP
11 Broadway, Ste 814
New York, NY 10004
UNITED STATES

TITLE

Wireless Communication System and Device For Coupling A Base Station and Mobile Stations

FILING FEE RECEIVED	FEES: Authority has been given in Paper	
530	No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/488,374

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	95		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	310		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	125		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	5 minus 20 =	*	x 30 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*	x 125 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	530		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	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	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	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 found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/488,374	06/04/2012	2617	530	9030101.141-US0	5	1

CONFIRMATION NO. 2192

70763
Byrne Poh LLP
11 Broadway, Ste 814
New York, NY 10004

UPDATED FILING RECEIPT



Date Mailed: 08/28/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Paul F. Struhsaker, Plano, TX;

Power of Attorney:
William Munck--39308
John Mockler--39775

Domestic Priority data as claimed by applicant

This application is a CON of 11/982,424 10/31/2007 ABN

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

If Required, Foreign Filing License Granted: 06/13/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/488,374**

Projected Publication Date: 12/06/2012

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****

Title

Wireless Communication System and Device For Coupling A Base Station and Mobile Stations

Preliminary Class

455

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0

CONFIRMATION NO. 2192

70763
Byrne Poh LLP
11 Broadway, Ste 814
New York, NY 10004

FORMALITIES LETTER

OC00000054837564

Date Mailed: 06/14/2012

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Filing Date Granted

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given TWO MONTHS from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

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

- A substitute specification excluding claims in compliance with 37 CFR 1.52, 1.121(b)(3), and 1.125 is required. The substitute specification must be submitted with markings and be accompanied by a clean version (without markings) as set forth in 37 CFR 1.125(c) and a statement that the substitute specification contains no new matter (see 37 CFR 1.125(b)). Since a preliminary amendment was present on the filing date of the application and such amendment is part of the original disclosure of the application, the substitute specification must include all of the desired changes made in the preliminary amendment. See 37 CFR 1.115 and 1.215.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Paul F. Struhsaker	Examiner:	TBA
Application No.:	13/488,374	Confirmation No.:	2192
Filing Date:	6/4/2012	Art Unit:	TBA
For:	WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS		

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

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

Dear Sir:

On June 14, 2012, the USPTO issued a Notice to File Corrected Application Papers (NTFCAP), in the above-identified application, requiring applicant to submit a substitute specification. A copy of the NTFCAP is attached hereto.

Remarks begin on page 2 of this paper.

REMARKS

In response to the Notice to File Corrected Application Papers dated June 14, 2012, applicant submits herewith a substitute specification, excluding the claims, in compliance with 37 C.F.R. §§ 1.52, 1.121(b)(3), and 1.125. Applicant also submits herewith a marked up copy of the substitute specification showing all the changes made in the Preliminary Amendment filed on June 4, 2012. The substitute specification includes no new matter.

It is believed that no petition or fee is due in connection with this submission. If, however, any petition or fee is due, applicants respectfully request that this submission be considered a petition and that the petition be granted, and applicant hereby authorizes the Director to charge any fees that may be due to Deposit Account No. 50-4207.

Respectfully submitted,

/Joanna M Polizzi/

Joanna M Polizzi
Registration No. 66,243
Agent for Applicant

Byrne Poh LLP
11 Broadway, Suite 814
New York, NY 10004
Telephone: (212) 509-8877
Facsimile: (212) 931-8521

Date: August 20, 2012

WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of prior U.S. Patent Application Serial No. 11/982,424 filed on October 31, 2007, which claims priority to: U.S. Patent Application Serial No. 09/839,499 filed on April 20, 2001, now U.S. Patent No. 7,346,347. U.S. Patent Application Serial No. 09/839,499 claims priority to provisional U.S. Patent Application Serial No. 60/262,708 filed on January 19, 2011; U.S. Patent Application Serial No. 09/713,684 filed on November 15, 2000; provisional U.S. Patent Application Serial No. 60/262,712 filed on January 19, 2001 and entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/262,825 filed on January 19, 2001 and entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM"; provisional U.S. Patent Application Serial No.

60/262,698 filed on January 19, 2001 and entitled "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM"; provisional U.S. Patent Application Serial No. 60/262,827 filed on January 19, 2001 entitled "APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION"; provisional U.S. Patent Application Serial No. 60/262,826 filed on January 19, 2001 and entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES"; provisional U.S. Patent Application Serial No. 60/262,951 filed on January 19, 2001 entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS"; provisional U.S. Patent Application Serial No. 60/262,824 filed on January 19, 2001 entitled "SYSTEM AND METHOD FOR ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS"; provisional U.S. Patent Application Serial No. 60/263,101 filed on January 19, 2001 entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/263,097 filed on January 19, 2001 and entitled "REDUNDANT TELECOMMUNICATION SYSTEM USING MEMORY EQUALIZATION APPARATUS AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/273,579 filed March 5, 2001 and entitled "WIRELESS ACCESS SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND DOWNLINK OF

TDD FRAMES AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/262,955 filed January 19, 2001 and entitled "TDD FDD AIR INTERFACE"; provisional U.S. Patent Application Serial No. 60/273,689 filed on March 5, 2001 and entitled "WIRELESS ACCESS SYSTEM USING MULTIPLE MODULATION FORMATS IN TDD FRAMES AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/273,757 filed March 5, 2001 and entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE"; provisional U.S. Patent Application Serial No. 60/270,378 filed February 21, 2001 and entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM"; provisional U.S. Patent Application Serial No. 60/270,385 filed February 21, 2001 and entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM"; and provisional U.S. Patent Application Serial No. 60/270,430 filed February 21, 2001 and entitled "METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM. Each of these applications and/or patents are hereby incorporated by reference herein in their entireties.

In addition, the subject matter disclosed in the present application is related to that disclosed in the following United States Patent Applications:

1) Serial No. 09/713,684 filed on November 15, 2000 and entitled "SUBSCRIBER INTEGRATED ACCESS DEVICE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS";

2) Serial No. 09/838,810 filed April 20, 2001 and entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION", now U.S. Patent No. 7,075,967;

3) Serial No. 09/839,726 filed April 20, 2001 and entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM", now U.S. Patent No. 7,099,383;

4) Serial No. 09/839,729 filed April 20, 2001 and entitled "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM", abandoned;

5) Serial No. 09/839,719 filed April 20, 2001 and entitled "APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION", now U.S. Patent No. 6,947,477;

6) Serial No. 09/838,910 filed April 20, 2001 and entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES", now U.S. Patent No. 6,564,051;

7) Serial No. 09/839,509 filed April 20, 2001 and entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS", abandoned;

8) Serial No. 09/839,514 filed April 20, 2001 and entitled "SYSTEM AND METHOD FOR ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS", now U.S. Patent No. 7,069,047;

9) Serial No. 09/839,512 filed April 20, 2001 and entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION", now U.S. Patent No. 6,804,527;

10) Serial No. 09/839,259 filed April 20, 2001 and entitled "REDUNDANT TELECOMMUNICAION SYSTEM USING MEMORY EQUALIZATION APPARATUS AND METHOD OF OPERATION", now U.S. Patent No. 7,065,098;

11) Serial No. 09/839,457 filed April 20, 2001 and entitled "WIRELESS ACCESS SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION", now U.S. Patent No. 7,002,929;

12) Serial No. 09/839,075 filed April 20, 2001 and entitled "TDD FDD AIR INTERFACE", now U.S. Patent No. 6,859,655;

13) Serial No. 09/839,458 filed April 20, 2001 and entitled "WIRELESS ACCESS SYSTEM USING MULITPLE MODULATION", now U.S. Patent No. 7,173,916;

14) Serial No. 09/839,456 filed April 20, 2001 and entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE", now U.S. Patent No. 6,891,810;

15) Serial No. 09/838,924 filed April 20, 2001 and entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM", now U.S. Patent No. 7,274,946;

16) Serial No. 09/839,727 filed April 20, 2001 and entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM", now U.S. Patent No. 7,031,738;

17) Serial No. 09/839,734 filed April 20, 2001 and entitled "METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM", now U.S. Patent No. 7,035,241; and

18) Serial No. 09/839,513 filed April 20, 2001 and entitled "SYSTEM AND METHOD FOR PROVIDING AN IMPROVED COMMON CONTROL BUS

FOR USE IN ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS", now U.S. Patent No. 6,925,516.

The above applications are commonly assigned to the assignee of the present application. The disclosures of these related patent applications may share common subject matter and figures and are hereby incorporated by reference herein in their entireties.

The present invention relates generally to a manner by which to provide mobile communications in a fixed wireless access (FWA) communication system. More particularly, the present invention relates to apparatus, and an associated method, for providing WLAN (wireless local area network) service at a subscriber station of the fixed wireless access communication system. Mobile stations operation in the WLAN are thereby able to communicate in the WLAN coverage area encompassing the subscriber station. When WLAN service is provided to a plurality of fixed-site subscriber stations, cellular coverage areas are formed, between which handover of communications are permitted all by way of the fixed wireless access communication system.

BACKGROUND OF THE INVENTION

Advancements in communication technologies have permitted the development, and implementation, of new types of communication systems. Such communication systems are able to permit the communication of increased amounts of data at increased thruput rates relative to conventional communication systems. And, such new communication systems have permitted communication of information at, and between, communication stations positioned at locations from which communications have conventionally been inconvenient or impractical.

Radio communication systems, for instance, are exemplarily of communication systems of which new types, and improvements to existing types, have been made possible as a result of advancements in communication technologies. Similar to other types of communication systems, in a radio communication system, information is communicated between a sending station and a receiving station by way of a communication channel. In a radio communication system, unlike other types of communication systems, a communication channel formed between the sending and the receiving stations and upon which information is communicated by the sending station to the receiving station, is formed of a portion of the electromagnetic spectrum. Radio links are defined upon the portion

of the electromagnetic spectrum allocated to the radio communication system.

Because a radio link is utilized upon which to form communication channels, a fixed, or wireline, connection is not required to be formed between the sending and receiving stations to form a communication channel. Information can be communicated between the sending and receiving stations at, and between, locations at which conventional wireline communications would not be permitted. Additionally, the infrastructure costs associated with the installation of a radio communication system are also generally lower than the corresponding costs which would be required to install a conventional, wireline communication system. And, as the advancements in communication technologies have permitted the bandwidth allocated to a radio communication system to be utilized more efficiently, a radio communication can increasingly be utilized effectuate a communication service which require relatively significant data thruput capability.

A wireless broadband communication system has been proposed, for instance, by which to permit the effectuation of any of various communication services by way of radio links with fixed-site subscriber stations. Radio links are formed with the subscriber stations by fixed-site base stations. The base stations are

installed at spaced-apart locations throughout the geographical area which is to be encompassed by the wireless broadband communication system. Several subscriber stations are capable of communicating with a single base station.

Communication of data is effectuated between the subscriber stations and an associated base station by way of radio links upon which communication channels are defined. Because radio links are utilized between the subscriber stations and the base stations, the infrastructure costs associated with the formation of wireline connections between the subscriber stations are obviated. Broadband communications, and communication services which require the communication of broadband data, as well as communication services necessitating smaller data thruput rates are effectuable through use of the wireless broadband communication system.

Advancements in communication technologies have also permitted the development, and introduction, of other types of radio communication systems. Wireless communication systems, sometimes referred to as micro-cellular networks, private networks, and WLANs (wireless local area networks) are exemplary of such systems. Such networks, generally, provide for radio communications with mobile stations positioned within communication range of such networks.

Generally, the communication ranges of the mobile stations

operable in such systems is relatively small as relatively low-power signals are originated at the mobile stations and, correspondingly, originated at the network infrastructure of such systems to be terminated at the mobile stations. The network infrastructure of such systems typically include fixed-location transceivers, sometimes referred to as access points. The access points are capable of communicating with a group of mobile stations positioned within a micro-cellular, or other, area defined by the access point. In some of such systems, the access points are coupled to a conventional, local area network, also used to interconnect the processing stations of an office computer system. In other such systems, the access points are connected in other manners.

Installation of a wireless broadband communication system to provide broadband services with a plurality of subscriber stations provides a radio infrastructure throughout a geographical area throughout which wireless broadband communication services are effectuable. If a manner could be provided by which to utilize the communication capabilities of a wireless broadband communication system to provide additional communication services, additional benefits of a wireless broadband communication system would be provided.

It is in light of this background information related to radio communication systems that the significant improvements of the present invention have evolved.

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SUMMARY OF THE INVENTION

The present invention, accordingly, advantageously provides apparatus, and an associated method, by which to provide mobile communications in a fixed wireless access (FWA) communication system.

Through operation of an embodiment of the present invention, WLAN (wireless local area network) service is provided to a subscriber station of the fixed wireless access communication system. Mobile stations within communication range of the subscriber station, and operable in the WLAN, are able to communicate by way of the WLAN. By providing WLAN service to a plurality of subscriber stations and thereafter providing integrated control over WLAN communications, handover of communications with a mobile station is provided as the mobile station travels between coverage areas formed at separate ones of the subscriber stations.

In one aspect of the present invention, a WLAN transceiver, such as an access point, is installed at a subscriber station of a fixed wireless access communication system. A WLAN transceiver provides localized radio communications throughout a coverage area defined by the communication range of the WLAN transceiver and mobile stations with which WLAN transceiver communications. More

than one WLAN transceiver is positionable at the subscriber station, as appropriate. Radio communications between a mobile station and the WLAN transceiver provide for two-way communications with the mobile station.

In another aspect of the present invention, the WLAN transceiver positioned at the subscriber station is, in turn, coupled by way of a radio link with a base station of the fixed wireless access communication system. Information originated at a mobile station is communicated by way of a local radio link to the WLAN transceiver. The WLAN transceiver, in turn, is coupled to a transceiver station, such as an IAD (integrated access device), located at the subscriber station and operable in the fixed wireless access communication system. The integrated access device, or other subscriber-station transceiver, in turn, communicates the information originated at the mobile station to the base station of the fixed wireless access system. Thereafter, the information is forwarded, as appropriate, to a destination. Analogously, information originated at, or provided to, a base station operable in the fixed wireless access communication system and which is to be terminated at the mobile station is communicated by the base station to the integrated access device, or other subscriber-station transceiver. Subsequent to reception thereat,

the information is forwarded to the WLAN transceiver to be transmitted therefrom by way of the local radio link through the mobile station. Thereby, communication is effectuable between mobile station and the base station of the fixed wireless access communication system.

In another aspect of the present invention, the WLAN transceivers are installed at a plurality of subscriber stations such that the coverage areas of the separately-installed transceivers at least partially overlap. Integrated control over operation of the WLAN transceivers is provided at the network of the fixed wireless access communication system. Mobile stations which travel between coverage areas defined by different ones of the WLAN transceivers are permitted continued communication by way of local radio links by handing over communications between WLAN transceivers. Ongoing communication sessions with the mobile station continue in spite of handover of communications between the WLAN transceivers.

In another aspect of the present invention, a routing map is maintained at a location coupled to, or integrated within, the fixed wireless access communication system. The routing map maintains a listing of the location of mobile stations operable to communicate by way of local radio links with WLAN transceivers

positioned at different ones of the subscriber stations of the fixed wireless access communication system. The locations at which the mobile stations are positioned are updated, as needed, as a mobile station travels between coverage areas defined by different ones of the WLAN transceivers. When information is to be communicated to a particular mobile station, the routing map is accessed to retrieve indications of the location at which the mobile station at which the information is to be terminated is positioned. Through use of the indications retrieved from the routing map, the information which is to be communicated to the mobile station is able to be most-efficiently routed to the mobile station.

In another aspect of the present invention, when a handover of communications is effectuated, the routing map is updated, and information routed to the mobile by way of a WLAN transceiver from which a handover of communication is effectuated, but not yet delivered to the mobile station, is retrieved and then re-routed to the mobile station by way of the mobile station to which communications have been handed over.

In these and other aspects, therefor, apparatus, and an associated method, is provided for a fixed wireless access communication system. The fixed wireless access communication

system has at least a first fixed-site base station and at least a first fixed-site subscriber station capable of communicating with the first fixed-site base station. Radio communication with a mobile station is facilitated. A first local-network radio transceiver is positioned at the at least first fixed-site subscriber station. The first local-network radio transceiver selectably transceives communication signals with the mobile station upon a first local radio link formed between the first local-network radio transceiver and the mobile station when the mobile station is positioned within a selected range of the first fixed-site subscriber station.

A more complete appreciation of the present invention and to the scope thereof can be obtained from the accompanying drawings which are briefly summarized below, the following detailed description of the presently-preferred embodiments of the invention, and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a functional block diagram of a fixed wireless access (FWA) communication system in which an embodiment of the present invention is operable.

Figure 2 illustrates a representation of a fixed wireless access communication system similar to that shown in Figure 1 here also illustrating a plurality of cellular coverage areas defined by about a plurality of subscriber stations of the fixed wireless access communication system.

Figure 3 illustrates another representation of the fixed wireless access communication system shown in Figures 1 and 2.

Figure 4 illustrates a method flow diagram listing the method of operation of the method of an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

A fixed wireless access (FWA) communication system 10 provides for radio communications between fixed-site base stations, of which the base station 12 is exemplary and fixed-site subscriber stations 14 of which the subscriber station 14 is exemplary. A radio link 16 upon which forward link channels 18 and reverse link channels 22 is of a bandwidth permitting broadband communication services to be effectuated with devices located at the subscriber station 14.

In the exemplary implementation, an integrated access device (IAD) 24 forms a transceiver located at the subscriber station and at which forward link signals transmitted upon the forward link channels of the radio link are detectable and which generate reverse link signals for transmission upon the reverse link channels of the radio link. A separate IAD 24 is located at each subscriber station of the communication system.

In the exemplary implementation, each base transceiver station includes a remote modem (modulator-demodulator) capable of communicating with seven separate subscriber stations located within a radial sector. In other implementations, the circuitry of the base transceiver station is configured in other manners.

The base station 12, and the set of remote modems thereof, is coupled to an access process 28 which is operable, amongst other

things, to perform control operations to control operation of the communication system. The access process 28 is, in turn, coupled to a communication network 32 such as a public-switched telephonic network or a packet data network. And, a correspondent node 34 is coupled to the communication network. A communication path is formable between the correspondent node and the IAD 24 positioned at the subscriber station by way of the communication network, the access process 28, the base station 12, and the radio link 16. Communication of information by the correspondent node to the integrated access device and from the integrated access device to the correspondent node is effectuable by way of the communication path.

Pursuant to an embodiment of the present invention, a WLAN (wireless local area network) transceiver 38 is positioned at the subscriber station 14 at the integrated access device 24 to be connected to the transceiver circuitry of the integrated access device. The WLAN transceiver defines a coverage area 42 defining a cell. A mobile station 44 positioned within the cell 42 is capable of communicating with the transceiver 38. That is to say, the radio link 46 is formable between the transceiver 38 and the mobile station 44 upon which forward and reverse link signals are communicated therebetween. Signals originated at the mobile

station are communicated upon reverse link channels of the radio link 46 to the WLAN transceiver 38. And, communication signals to be terminated at the mobile station 44 are communicated upon forward link channels of the radio link 46.

Because of the connection of the WLAN transceiver to the transceiver of the integrated access device 24, signals originated at the mobile station and communicated to the WLAN transceiver can, in turn, be provided to the transceiver of the integrated access device to be communicated upon reverse link channels of the radio link 16 and, thereafter, be communicated to another device, such as the correspondent node 34. Analogously, signals originated at the correspondent node, or elsewhere, can be communicated to the mobile station by way of forward link channels of the radio links 16 and 46 to the mobile station. Thereby communications are effectuable with a mobile station in the fixed wireless access communication system.

In the exemplary implementation, the integrated access device 24 forms a rack-assembly having expansion slots to receive expansion cards thereat. And, the WLAN transceiver is mounted upon, or is otherwise formed at, an expansion card connectable to the expansion slot of the rack-assembly. Thereby the integrated access device together with the WLAN transceiver form an integrated

device providing for two-way communication upon the radio link 16 as well as two-way communication upon the radio link 46.

Figure 2 illustrates another view of the communication system 10, here illustrating an implementation in which a plurality of subscriber stations 14 include WLAN transceivers 38 (shown in Figure 1) connected to corresponding integrated access devices 24 (also shown in Figure 1). The coverage areas 42 defined by respective ones of the WLAN transceivers are shown in the figure. Adjacent ones of the coverage areas over lap with one another. The remote modes of the base transceivers are again shown in the Figure as is the access process. An arrangement in which the remote modems communicate with subscriber stations positioned within a radio sector is shown in the figure. In other implementations, other arrangements are utilized.

A mobile station initially positioned within, or approximate to, a coverage area 42 defined by a WLAN transceiver positioned at a first subscriber station is permitted movement, such as out of the coverage area defined by the transceiver positioned at a first subscriber station and into the coverage area defined by a WLAN transceiver of another subscriber station. Through operation of an embodiment of the present invention, a handover of communications is effectuated from the first WLAN transceiver to another WLAN

transceiver, thereby to permit continued communications with the mobile station.

Determination of when to initiate handover of communications is made responsive to measurements of signal characteristics of communication signals communicated between the WLAN transceiver and the mobile station. In one implementation signal characteristics are measured, or otherwise determined, at the mobile station and results of such measures or determinations of are reported back to the WLAN transceiver and appropriate control circuitry. Thereafter, if appropriate, the handover of communications is effectuated.

A routing map 52 is further shown in the figure. The routing map is functionally connected to the access process 28. The routing map includes a listing of the mobile stations, such as the mobile station 46 operable to transceive communication signals pursuant to the WLAN service. Indexed together with the listing the mobile stations are the locations at which the mobile stations are positioned. When communications are to be effectuated with a particular mobile station, such as communications originated by the correspondent node 34, the routing map is accessed and the communication signals are routed to the mobile stations at the position indicated in the routing map. And, when a handover is

effectuated, information routed to a mobile station but not yet delivered is rerouted to the WLAN transceiver to which communications have been handed over.

Figure 3 again illustrates the communication system 10, here showing a plurality of base stations 12 and subscriber stations 14 associated with various ones of the base stations. Each of the subscriber stations includes a WLAN transceiver (shown in Figure 1) various of the base transceiver stations are here shown also to be coupled by way of the communication network 32, again either a PSTN, a packet data network, or a combination of such networks. Movement of a mobile station between the coverage areas is defined by different ones of the subscriber stations are shown in the figure. For instance, movement of a mobile station indicated by the arrow 56 represents movement of the mobile station between subscriber stations associated with separate cells of separate base stations. Such movement results in access process routing of subsequent communication signals to a new cell of the fixed wireless access communication system, access process routing to a separate remote mode sector, and remote modem routing to a new subscriber integrated access device. The arrow 58 is representative of movement of a mobile station within a single sector of a single base station. Here, the result is a subscriber

integrated access device to a remote modem routing change.

The arrow 62 is representative of movement of a mobile station between adjacent sectors defined by a single base station. Such movement results in access process routing of the communication signal to the new remote modem sector transceiver. And, the arrow 64 is representative of movement of a mobile station between sectors of different cells defined by two different base stations. Such movement results in access process to access process routing resolution, access processing routing to the new cell, access process routing to the new remote modem sector, and remote modem routing to the new subscriber access integrated device. Thereby, handovers of communications are effectuable through any movement of a mobile station between coverage areas defined by WLAN transceivers forming a portion of a fixed wireless access communication system.

Figure 4 illustrates a method, shown generally at 72 of an embodiment of the present invention. The method facilitates radio communications with the mobile station in a fixed wireless access communication system having at least a first base station and at least a first subscriber station capable of communicating with the base station. First, and as indicated by the block 74, a local-network radio transceiver is positioned at the fixed-site

subscriber station. Then, and as indicated by the block 76, communication signals are selectably transceived with the mobile station upon a first local radio link between the local-network radio transceiver and a mobile station when the mobile station is positioned within a coverage area defined by the local-network radio transceiver.

Through operation of the method of an embodiment of the present invention, WLAN service is provided in a fixed wireless access in a communication system. A mobile station operable in a wireless local area network is thereby able to communicate in the WLAN coverage area encompassing the subscriber station at which the local-network radio transceiver is positioned.

The previous descriptions are of preferred examples for implementing the invention, and the scope of the invention should not necessarily be limited by this description. The scope of the present invention is defined by the following claims.

ABSTRACT

A wireless communication system comprising first and second transceivers. The first transceiver communicate with a base station, wherein the base station communicates with the first transceiver and a plurality of other wireless communication devices according to a wide area wireless communication protocol. The second transceiver is coupled to the first transceiver and communicates with a first mobile station, wherein the second transceiver communicates with the first mobile station according to a local area wireless communication protocol. The first transceiver receives from the base station a first downlink signal intended for the first mobile station and transmits the first downlink signal to the second transceiver. The second transceiver re-transmits the first downlink signal to the first mobile station as a second downlink signal according to the local area wireless communication protocol.

WIRELESS COMMUNICATION SYSTEM AND DEVICE FOR COUPLING A BASE STATION AND MOBILE STATIONS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of prior U.S. Patent Application Serial No. 11/982,424 filed on October 31, 2007, which claims priority to: U.S. Patent Application Serial No. 09/839,499 filed on April 20, 2001, now U.S. Patent No. 7,346,347. U.S. Patent Application Serial No. 09/839,499 claims priority to provisional U.S. Patent Application Serial No. 60/262,708 filed on January 19, 2011; U.S. Patent Application Serial No. 09/713,684 filed on November 15, 2000; provisional U.S. Patent Application Serial No. 60/262,712 filed on January 19, 2001 and entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/262,825 filed on January 19, 2001 and entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM"; provisional U.S. Patent Application Serial No. 60/262,698 filed on January 19, 2001 and entitled "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM"; provisional U.S. Patent Application Serial No. 60/262,827 filed on January 19, 2001 entitled "APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION"; provisional U.S. Patent Application Serial No. 60/262,826 filed on January 19, 2001 and entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES"; provisional U.S. Patent Application Serial No. 60/262,951 filed on January 19, 2001 entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS"; provisional U.S. Patent Application Serial No.

60/262,824 filed on January 19, 2001 entitled "SYSTEM AND METHOD FOR ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS"; provisional U.S. Patent Application Serial No. 60/263,101 filed on January 19, 2001 entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/263,097 filed on January 19, 2001 and entitled "REDUNDANT TELECOMMUNICATION SYSTEM USING MEMORY EQUALIZATION APPARATUS AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/273,579 filed March 5, 2001 and entitled "WIRELESS ACCESS SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/262,955 filed January 19, 2001 and entitled "TDD FDD AIR INTERFACE"; provisional U.S. Patent Application Serial No. 60/273,689 filed on March 5, 2001 and entitled "WIRELESS ACCESS SYSTEM USING MULTIPLE MODULATION FORMATS IN TDD FRAMES AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/273,757 filed March 5, 2001 and entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE"; provisional U.S. Patent Application Serial No. 60/270,378 filed February 21, 2001 and entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM"; provisional U.S. Patent Application Serial No. 60/270,385 filed February 21, 2001 and entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM"; and provisional U.S. Patent Application Serial No. 60/270,430 filed February 21, 2001 and entitled "METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM. Each of these applications and/or patents are hereby incorporated by reference herein in their entireties.

~~The~~ In addition, the subject matter disclosed in the present ~~invention~~ application is related to ~~those~~ that disclosed in the following United States Patent Applications:

1) Serial No. 09/713,684[[,]] filed on November 15, 2000[[,]] and entitled "SUBSCRIBER INTEGRATED ACCESS DEVICE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS";

2) ~~{Docket No. WESTI4-00905} filed concurrently herewith,~~ Serial No. 09/838,810 filed April 20, 2001 and entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION", now U.S. Patent No. 7,075,967;

3) ~~{Docket No. WESTI4-00914} filed concurrently herewith,~~ Serial No. 09/839,726 filed April 20, 2001 and entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM", now U.S. Patent No. 7,099,383;

4) ~~{Docket No. WESTI4-00915} filed concurrently herewith,~~ Serial No. 09/839,729 filed April 20, 2001 and entitled "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM", abandoned;

5) ~~{Docket No. WESTI4-00916} filed concurrently herewith,~~ Serial No. 09/839,719 filed April 20, 2001 and entitled "APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION", now U.S. Patent No. 6,947,477;

6) ~~{Docket No. WESTI4-00917} filed concurrently herewith,~~ Serial No. 09/838,910 filed April 20, 2001 and entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES", now U.S. Patent No. 6,564,051;

7) ~~{Docket No. WESTI4-00918} filed concurrently herewith,~~ Serial No. 09/839,509 filed April 20, 2001 and entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS", abandoned;

8) ~~{Docket No. WESTI4-00919} filed concurrently herewith,~~ Serial No. 09/839,514 filed April 20, 2001 and entitled "SYSTEM AND METHOD FOR

ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS", now U.S. Patent No. 7,069,047;

9) ~~{Docket No. WEST14-00020} filed concurrently herewith,~~ Serial No. 09/839,512 filed April 20, 2001 and entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION", now U.S. Patent No. 6,804,527;

10) ~~{Docket No. WEST14-00021} filed concurrently herewith,~~ Serial No. 09/839,259 filed April 20, 2001 and entitled "REDUNDANT TELECOMMUNICAION SYSTEM USING MEMORY EQUALIZATION APPARATUS AND METHOD OF OPERATION", now U.S. Patent No.

7,065,098;

11) ~~{Docket No. WEST14-00022} filed concurrently herewith,~~ Serial No. 09/839,457 filed April 20, 2001 and entitled "WIRELESS ACCESS SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION", now U.S. Patent No. 7,002,929;

12) ~~{Docket No. WEST14-00023} filed concurrently herewith,~~ Serial No. 09/839,075 filed April 20, 2001 and entitled "TDD FDD AIR INTERFACE", now U.S. Patent No. 6,859,655;

13) ~~{Docket No. WEST14-00026} filed concurrently herewith,~~ Serial No. 09/839,458 filed April 20, 2001 and entitled "WIRELESS ACCESS SYSTEM USING MULITPLE MODULATION", now U.S. Patent No. 7,173,916;

14) ~~{Docket No. WEST14-00027} filed concurrently herewith,~~ Serial No. 09/839,456 filed April 20, 2001 and entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE", now U.S. Patent No. 6,891,810;

15) ~~{Docket No. WEST14-00028} filed concurrently herewith,~~ Serial No. 09/838,924 filed April 20, 2001 and entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM", now U.S. Patent No. 7,274,946;

16) ~~{Docket No. WEST14-00029} filed concurrently herewith,~~ Serial No. 09/839,727 filed April 20, 2001 and entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM", now U.S. Patent No. 7,031,738;

17) ~~{Docket No. WEST14-00030} filed concurrently herewith,~~ Serial No. 09/839,734 filed April 20, 2001 and entitled "METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM", now U.S. Patent No. 7,035,241; and

18) ~~{Docket No. WEST14-00033} filed concurrently herewith,~~ Serial No. 09/839,513 filed April 20, 2001 and entitled "SYSTEM AND METHOD FOR PROVIDING AN IMPROVED COMMON CONTROL BUS FOR USE IN ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN

WIRELESS AND WIRELINE ACCESS SYSTEMS"{[;]}, now U.S. Patent No. 6,925,516.

~~19) Serial No. 60/262,712, filed on January 19, 2001, entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION" {Docket No. WEST14-00005};~~

~~20) Serial No. 60/262,625, filed on January 19, 2001, entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" {Docket No. WEST 14-00014};~~

~~21) Serial No. 60/262,698, filed on January 19, 2001, entitled "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM" {Docket No. WEST14-00015};~~

~~22) Serial No. 60/262,827, filed on January 19, 2001, entitled "APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION" {Docket No. WEST14-00016};~~

~~23) Serial No. 60/262,826, filed on January 19, 2001, entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES" [Docket No. WEST 14-00017],~~

~~24) Serial No. 60/262,951, filed on January 19, 2001, entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS" [Docket No. WEST14-00018],~~

~~25) Serial No. 60/262,824, filed on January, 19, 2001, entitled "SYSTEM AND METHOD FOR ON LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS" [Docket No. WEST14-00019],~~

~~26) Serial No. 60/263,101, filed on January 19, 2001, entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION" [Docket No. WEST14-00020],~~

~~27) Serial No. 60/263,092, filed on January 19, 2001, entitled "REDUNDANT TELECOMMUNICATION SYSTEM USING MEMORY EQUALIZATION APPARATUS AND METHOD OF OPERATION" [Docket No. WEST14-00021],~~

~~28) Serial No. 60/273,579, filed March 5, 2001, entitled "WIRELESS ACCESS SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION" [Docket No. WEST14-00022],~~

~~29) Serial No. 60/262,955, filed January 19, 2001, entitled "TDD FDD AIR INTERFACE" [Docket No. WEST14-00023],~~

~~30) Serial No. 60/273,689, filed on March 5, 2001, entitled "WIRELESS ACCESS SYSTEM USING MULTIPLE MODULATION" [Docket No. WEST14-00026],~~

~~31) Serial No. 60/273,757, filed March 5, 2001, entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE" [Docket No. WEST14-00027],~~

~~32) Serial No. 60/278,378, filed February 21, 2001, entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-00028];~~

~~33) Serial No. 60/278,385, filed February 21, 2001, entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO ESTABLISI I A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-00029]; and~~

~~34) Serial No. 60/278,430, filed February 21, 2001, entitled "METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-00030].~~

The above applications are commonly assigned to the assignee of the present ~~invention~~ application. The disclosures of these related patent applications may share common subject matter and figures and are hereby incorporated by reference ~~for all purposes as if fully set forth~~ herein in their entireties.

The present invention relates generally to a manner by which to provide mobile communications in a fixed wireless access (FWA) communication system. More particularly, the present invention relates to apparatus, and an associated method, for providing WLAN (wireless local area network) service at a subscriber station of the fixed wireless access communication system. Mobile stations operation in the WLAN are thereby able to communicate in the WLAN coverage area encompassing the subscriber station. When WLAN service is provided to a plurality of fixed-site subscriber stations, cellular coverage areas are formed, between which handover of communications are permitted all by way of the fixed wireless access communication system.

BACKGROUND OF THE INVENTION

Advancements in communication technologies have permitted the development, and implementation, of new types of communication systems. Such communication systems are able to permit the communication of increased amounts of data at increased thruput rates relative to conventional communication systems. And, such new communication systems have permitted communication of information at, and between, communication stations positioned at locations from which communications have conventionally been inconvenient or impractical.

Radio communication systems, for instance, are exemplarily of communication systems of which new types, and improvements to existing types, have been made possible as a result of advancements in communication technologies. Similar to other types of communication systems, in a radio communication system, information is communicated between a sending station and a receiving station by way of a communication channel. In a radio communication system, unlike other types of communication systems, a communication channel formed between the sending and the receiving stations and upon which information is communicated by the sending station to the receiving station, is formed of a portion of the electromagnetic spectrum. Radio links are defined upon the portion

of the electromagnetic spectrum allocated to the radio communication system.

Because a radio link is utilized upon which to form communication channels, a fixed, or wireline, connection is not required to be formed between the sending and receiving stations to form a communication channel. Information can be communicated between the sending and receiving stations at, and between, locations at which conventional wireline communications would not be permitted. Additionally, the infrastructure costs associated with the installation of a radio communication system are also generally lower than the corresponding costs which would be required to install a conventional, wireline communication system. And, as the advancements in communication technologies have permitted the bandwidth allocated to a radio communication system to be utilized more efficiently, a radio communication can increasingly be utilized effectuate a communication service which require relatively significant data thruput capability.

A wireless broadband communication system has been proposed, for instance, by which to permit the effectuation of any of various communication services by way of radio links with fixed-site subscriber stations. Radio links are formed with the subscriber stations by fixed-site base stations. The base stations are

installed at spaced-apart locations throughout the geographical area which is to be encompassed by the wireless broadband communication system. Several subscriber stations are capable of communicating with a single base station.

Communication of data is effectuated between the subscriber stations and an associated base station by way of radio links upon which communication channels are defined. Because radio links are utilized between the subscriber stations and the base stations, the infrastructure costs associated with the formation of wireline connections between the subscriber stations are obviated. Broadband communications, and communication services which require the communication of broadband data, as well as communication services necessitating smaller data thruput rates are effectuable through use of the wireless broadband communication system.

Advancements in communication technologies have also permitted the development, and introduction, of other types of radio communication systems. Wireless communication systems, sometimes referred to as micro-cellular networks, private networks, and WLANs (wireless local area networks) are exemplary of such systems. Such networks, generally, provide for radio communications with mobile stations positioned within communication range of such networks.

Generally, the communication ranges of the mobile stations

operable in such systems is relatively small as relatively low-power signals are originated at the mobile stations and, correspondingly, originated at the network infrastructure of such systems to be terminated at the mobile stations. The network infrastructure of such systems typically include fixed-location transceivers, sometimes referred to as access points. The access points are capable of communicating with a group of mobile stations positioned within a micro-cellular, or other, area defined by the access point. In some of such systems, the access points are coupled to a conventional, local area network, also used to interconnect the processing stations of an office computer system. In other such systems, the access points are connected in other manners.

Installation of a wireless broadband communication system to provide broadband services with a plurality of subscriber stations provides a radio infrastructure throughout a geographical area throughout which wireless broadband communication services are effectuable. If a manner could be provided by which to utilize the communication capabilities of a wireless broadband communication system to provide additional communication services, additional benefits of a wireless broadband communication system would be provided.

It is in light of this background information related to radio communication systems that the significant improvements of the present invention have evolved.

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SUMMARY OF THE INVENTION

The present invention, accordingly, advantageously provides apparatus, and an associated method, by which to provide mobile communications in a fixed wireless access (FWA) communication system.

Through operation of an embodiment of the present invention, WLAN (wireless local area network) service is provided to a subscriber station of the fixed wireless access communication system. Mobile stations within communication range of the subscriber station, and operable in the WLAN, are able to communicate by way of the WLAN. By providing WLAN service to a plurality of subscriber stations and thereafter providing integrated control over WLAN communications, handover of communications with a mobile station is provided as the mobile station travels between coverage areas formed at separate ones of the subscriber stations.

In one aspect of the present invention, a WLAN transceiver, such as an access point, is installed at a subscriber station of a fixed wireless access communication system. A WLAN transceiver provides localized radio communications throughout a coverage area defined by the communication range of the WLAN transceiver and mobile stations with which WLAN transceiver communications. More

than one WLAN transceiver is positionable at the subscriber station, as appropriate. Radio communications between a mobile station and the WLAN transceiver provide for two-way communications with the mobile station.

In another aspect of the present invention, the WLAN transceiver positioned at the subscriber station is, in turn, coupled by way of a radio link with a base station of the fixed wireless access communication system. Information originated at a mobile station is communicated by way of a local radio link to the WLAN transceiver. The WLAN transceiver, in turn, is coupled to a transceiver station, such as an IAD (integrated access device), located at the subscriber station and operable in the fixed wireless access communication system. The integrated access device, or other subscriber-station transceiver, in turn, communicates the information originated at the mobile station to the base station of the fixed wireless access system. Thereafter, the information is forwarded, as appropriate, to a destination. Analogously, information originated at, or provided to, a base station operable in the fixed wireless access communication system and which is to be terminated at the mobile station is communicated by the base station to the integrated access device, or other subscriber-station transceiver. Subsequent to reception thereat,

the information is forwarded to the WLAN transceiver to be transmitted therefrom by way of the local radio link through the mobile station. Thereby, communication is effectuable between mobile station and the base station of the fixed wireless access communication system.

In another aspect of the present invention, the WLAN transceivers are installed at a plurality of subscriber stations such that the coverage areas of the separately-installed transceivers at least partially overlap. Integrated control over operation of the WLAN transceivers is provided at the network of the fixed wireless access communication system. Mobile stations which travel between coverage areas defined by different ones of the WLAN transceivers are permitted continued communication by way of local radio links by handing over communications between WLAN transceivers. Ongoing communication sessions with the mobile station continue in spite of handover of communications between the WLAN transceivers.

In another aspect of the present invention, a routing map is maintained at a location coupled to, or integrated within, the fixed wireless access communication system. The routing map maintains a listing of the location of mobile stations operable to communicate by way of local radio links with WLAN transceivers

positioned at different ones of the subscriber stations of the fixed wireless access communication system. The locations at which the mobile stations are positioned are updated, as needed, as a mobile station travels between coverage areas defined by different ones of the WLAN transceivers. When information is to be communicated to a particular mobile station, the routing map is accessed to retrieve indications of the location at which the mobile station at which the information is to be terminated is positioned. Through use of the indications retrieved from the routing map, the information which is to be communicated to the mobile station is able to be most-efficiently routed to the mobile station.

In another aspect of the present invention, when a handover of communications is effectuated, the routing map is updated, and information routed to the mobile by way of a WLAN transceiver from which a handover of communication is effectuated, but not yet delivered to the mobile station, is retrieved and then re-routed to the mobile station by way of the mobile station to which communications have been handed over.

In these and other aspects, therefor, apparatus, and an associated method, is provided for a fixed wireless access communication system. The fixed wireless access communication

system has at least a first fixed-site base station and at least a first fixed-site subscriber station capable of communicating with the first fixed-site base station. Radio communication with a mobile station is facilitated. A first local-network radio transceiver is positioned at the at least first fixed-site subscriber station. The first local-network radio transceiver selectably transceives communication signals with the mobile station upon a first local radio link formed between the first local-network radio transceiver and the mobile station when the mobile station is positioned within a selected range of the first fixed-site subscriber station.

A more complete appreciation of the present invention and to the scope thereof can be obtained from the accompanying drawings which are briefly summarized below, the following detailed description of the presently-preferred embodiments of the invention, and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a functional block diagram of a fixed wireless access (FWA) communication system in which an embodiment of the present invention is operable.

Figure 2 illustrates a representation of a fixed wireless access communication system similar to that shown in Figure 1 here also illustrating a plurality of cellular coverage areas defined by about a plurality of subscriber stations of the fixed wireless access communication system.

Figure 3 illustrates another representation of the fixed wireless access communication system shown in Figures 1 and 2.

Figure 4 illustrates a method flow diagram listing the method of operation of the method of an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

A fixed wireless access (FWA) communication system 10 provides for radio communications between fixed-site base stations, of which the base station 12 is exemplary and fixed-site subscriber stations 14 of which the subscriber station 14 is exemplary. A radio link 16 upon which forward link channels 18 and reverse link channels 22 is of a bandwidth permitting broadband communication services to be effectuated with devices located at the subscriber station 14.

In the exemplary implementation, an integrated access device (IAD) 24 forms a transceiver located at the subscriber station and at which forward link signals transmitted upon the forward link channels of the radio link are detectable and which generate reverse link signals for transmission upon the reverse link channels of the radio link. A separate IAD 24 is located at each subscriber station of the communication system.

In the exemplary implementation, each base transceiver station includes a remote modem (modulator-demodulator) capable of communicating with seven separate subscriber stations located within a radial sector. In other implementations, the circuitry of the base transceiver station is configured in other manners.

The base station 12, and the set of remote modems thereof, is coupled to an access process 28 which is operable, amongst other

things, to perform control operations to control operation of the communication system. The access process 28 is, in turn, coupled to a communication network 32 such as a public-switched telephonic network or a packet data network. And, a correspondent node 34 is coupled to the communication network. A communication path is formable between the correspondent node and the IAD 24 positioned at the subscriber station by way of the communication network, the access process 28, the base station 12, and the radio link 16. Communication of information by the correspondent node to the integrated access device and from the integrated access device to the correspondent node is effectuable by way of the communication path.

Pursuant to an embodiment of the present invention, a WLAN (wireless local area network) transceiver 38 is positioned at the subscriber station 14 at the integrated access device 24 to be connected to the transceiver circuitry of the integrated access device. The WLAN transceiver defines a coverage area 42 defining a cell. A mobile station 44 positioned within the cell 42 is capable of communicating with the transceiver 38. That is to say, the radio link 46 is formable between the transceiver 38 and the mobile station 44 upon which forward and reverse link signals are communicated therebetween. Signals originated at the mobile

station are communicated upon reverse link channels of the radio link 46 to the WLAN transceiver 38. And, communication signals to be terminated at the mobile station 44 are communicated upon forward link channels of the radio link 46.

Because of the connection of the WLAN transceiver to the transceiver of the integrated access device 24, signals originated at the mobile station and communicated to the WLAN transceiver can, in turn, be provided to the transceiver of the integrated access device to be communicated upon reverse link channels of the radio link 16 and, thereafter, be communicated to another device, such as the correspondent node 34. Analogously, signals originated at the correspondent node, or elsewhere, can be communicated to the mobile station by way of forward link channels of the radio links 16 and 46 to the mobile station. Thereby communications are effectuable with a mobile station in the fixed wireless access communication system.

In the exemplary implementation, the integrated access device 24 forms a rack-assembly having expansion slots to receive expansion cards thereat. And, the WLAN transceiver is mounted upon, or is otherwise formed at, an expansion card connectable to the expansion slot of the rack-assembly. Thereby the integrated access device together with the WLAN transceiver form an integrated

device providing for two-way communication upon the radio link 16 as well as two-way communication upon the radio link 46.

Figure 2 illustrates another view of the communication system 10, here illustrating an implementation in which a plurality of subscriber stations 14 include WLAN transceivers 38 (shown in Figure 1) connected to corresponding integrated access devices 24 (also shown in Figure 1). The coverage areas 42 defined by respective ones of the WLAN transceivers are shown in the figure. Adjacent ones of the coverage areas over lap with one another. The remote modes of the base transceivers are again shown in the Figure as is the access process. An arrangement in which the remote modems communicate with subscriber stations positioned within a radio sector is shown in the figure. In other implementations, other arrangements are utilized.

A mobile station initially positioned within, or approximate to, a coverage area 42 defined by a WLAN transceiver positioned at a first subscriber station is permitted movement, such as out of the coverage area defined by the transceiver positioned at a first subscriber station and into the coverage area defined by a WLAN transceiver of another subscriber station. Through operation of an embodiment of the present invention, a handover of communications is effectuated from the first WLAN transceiver to another WLAN

transceiver, thereby to permit continued communications with the mobile station.

Determination of when to initiate handover of communications is made responsive to measurements of signal characteristics of communication signals communicated between the WLAN transceiver and the mobile station. In one implementation signal characteristics are measured, or otherwise determined, at the mobile station and results of such measures or determinations of are reported back to the WLAN transceiver and appropriate control circuitry. Thereafter, if appropriate, the handover of communications is effectuated.

A routing map 52 is further shown in the figure. The routing map is functionally connected to the access process 28. The routing map includes a listing of the mobile stations, such as the mobile station 46 operable to transceive communication signals pursuant to the WLAN service. Indexed together with the listing the mobile stations are the locations at which the mobile stations are positioned. When communications are to be effectuated with a particular mobile station, such as communications originated by the correspondent node 34, the routing map is accessed and the communication signals are routed to the mobile stations at the position indicated in the routing map. And, when a handover is

effectuated, information routed to a mobile station but not yet delivered is rerouted to the WLAN transceiver to which communications have been handed over.

Figure 3 again illustrates the communication system 10, here showing a plurality of base stations 12 and subscriber stations 14 associated with various ones of the base stations. Each of the subscriber stations includes a WLAN transceiver (shown in Figure 1) various of the base transceiver stations are here shown also to be coupled by way of the communication network 32, again either a PSTN, a packet data network, or a combination of such networks. Movement of a mobile station between the coverage areas is defined by different ones of the subscriber stations are shown in the figure. For instance, movement of a mobile station indicated by the arrow 56 represents movement of the mobile station between subscriber stations associated with separate cells of separate base stations. Such movement results in access process routing of subsequent communication signals to a new cell of the fixed wireless access communication system, access process routing to a separate remote mode sector, and remote modem routing to a new subscriber integrated access device. The arrow 58 is representative of movement of a mobile station within a single sector of a single base station. Here, the result is a subscriber

integrated access device to a remote modem routing change.

The arrow 62 is representative of movement of a mobile station between adjacent sectors defined by a single base station. Such movement results in access process routing of the communication signal to the new remote modem sector transceiver. And, the arrow 64 is representative of movement of a mobile station between sectors of different cells defined by two different base stations. Such movement results in access process to access process routing resolution, access processing routing to the new cell, access process routing to the new remote modem sector, and remote modem routing to the new subscriber access integrated device. Thereby, handovers of communications are effectuable through any movement of a mobile station between coverage areas defined by WLAN transceivers forming a portion of a fixed wireless access communication system.

Figure 4 illustrates a method, shown generally at 72 of an embodiment of the present invention. The method facilitates radio communications with the mobile station in a fixed wireless access communication system having at least a first base station and at least a first subscriber station capable of communicating with the base station. First, and as indicated by the block 74, a local-network radio transceiver is positioned at the fixed-site

subscriber station. Then, and as indicated by the block 76, communication signals are selectably transceived with the mobile station upon a first local radio link between the local-network radio transceiver and a mobile station when the mobile station is positioned within a coverage area defined by the local-network radio transceiver.

Through operation of the method of an embodiment of the present invention, WLAN service is provided in a fixed wireless access in a communication system. A mobile station operable in a wireless local area network is thereby able to communicate in the WLAN coverage area encompassing the subscriber station at which the local-network radio transceiver is positioned.

The previous descriptions are of preferred examples for implementing the invention, and the scope of the invention should not necessarily be limited by this description. The scope of the present invention is defined by the following claims.

ABSTRACT

A wireless communication system comprising first and second transceivers. The first transceiver communicate with a base station, wherein the base station communicates with the first transceiver and a plurality of other wireless communication devices according to a wide area wireless communication protocol. The second transceiver is coupled to the first transceiver and communicates with a first mobile station, wherein the second transceiver communicates with the first mobile station according to a local area wireless communication protocol. The first transceiver receives from the base station a first downlink signal intended for the first mobile station and transmits the first downlink signal to the second transceiver. The second transceiver re-transmits the first downlink signal to the first mobile station as a second downlink signal according to the local area wireless communication protocol.

Electronic Patent Application Fee Transmittal

Application Number:	13488374
Filing Date:	04-Jun-2012
Title of Invention:	Wireless Communication System and Device For Coupling A Base Station and Mobile Stations
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Filer:	Joanna Michelle Polizzi
Attorney Docket Number:	9030101.141-US0

Filed as Small 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	2251	1	75	75

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**75**

Electronic Acknowledgement Receipt

EFS ID:	13534360
Application Number:	13488374
International Application Number:	
Confirmation Number:	2192
Title of Invention:	Wireless Communication System and Device For Coupling A Base Station and Mobile Stations
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Customer Number:	70763
Filer:	Joanna Michelle Polizzi
Filer Authorized By:	
Attorney Docket Number:	9030101.141-US0
Receipt Date:	20-AUG-2012
Filing Date:	04-JUN-2012
Time Stamp:	14:19:46
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$75
RAM confirmation Number	554
Deposit Account	504207
Authorized User	

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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:

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1	Applicant Response to Pre-Exam Formalities Notice	9030101_141_US0_NTFCAP.PDF	60553 2174fefe8b02c740f5fc414781f65901dd2d2d17	no	2
Warnings:					
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2	Applicant Response to Pre-Exam Formalities Notice	9030101_141_US0_Response_NTFCAP.pdf	385934 3fcb83e5ab05e67d33eb1228e1599f51c2724106	no	2
Warnings:					
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3	Specification	9030101_141_US0_Sub_Spec_Clean.pdf	5021358 5d640d313e5518b7591d52652ac7b3eaecd4b7b4	no	27
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4	Specification	9030101_141_US0_Sub_Spec_Marked.pdf	5730487 5f2c6f51c966182cc3cdb81bc386b8eef31abcd4	no	27
Warnings:					
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5	Fee Worksheet (SB06)	fee-info.pdf	30294 6a25a0d5fc317cb517c8a32a6d129d7e157ab0bd	no	2
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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/488,374	06/04/2012	Paul F. Struhsaker	9030101.141-US0

CONFIRMATION NO. 2192

70763
Byrne Poh LLP
11 Broadway, Ste 814
New York, NY 10004

FORMALITIES LETTER

OC000000054837564

Date Mailed: 06/14/2012

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Filing Date Granted

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given TWO MONTHS from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

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

- A substitute specification excluding claims in compliance with 37 CFR 1.52, 1.121(b)(3), and 1.125 is required. The substitute specification must be submitted with markings and be accompanied by a clean version (without markings) as set forth in 37 CFR 1.125(c) and a statement that the substitute specification contains no new matter (see 37 CFR 1.125(b)). Since a preliminary amendment was present on the filing date of the application and such amendment is part of the original disclosure of the application, the substitute specification must include all of the desired changes made in the preliminary amendment. See 37 CFR 1.115 and 1.215.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

Replies should be mailed to:

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

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

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

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

/atesfaye/

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/488,374

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	95		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	310		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	125		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	5 minus 20 =	*	x 30 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*	x 125 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	530		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT A	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	

		(Column 1)		(Column 2)	(Column 3)					
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	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 found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/488,374	06/04/2012	2617	530	9030101.141-US0	5	1

CONFIRMATION NO. 2192

70763
Byrne Poh LLP
11 Broadway, Ste 814
New York, NY 10004

FILING RECEIPT



Date Mailed: 06/14/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Paul F. Struhsaker, Plano, TX;

Power of Attorney:
William Munck--39308
John Mockler--39775

Domestic Priority data as claimed by applicant

This application is a CON of 11/982,424 10/31/2007

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

If Required, Foreign Filing License Granted: 06/13/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/488,374**

Projected Publication Date: To Be Determined - pending completion of Corrected Papers

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****

Title

Wireless Communication System and Device For Coupling A Base Station and Mobile Stations

Preliminary Class

455

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

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PTO/SB/05 (08-08)
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U.S. Patent and Trademark Office. U.S. DEPARTMENT OF COMMERCE
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UTILITY PATENT APPLICATION TRANSMITTAL

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

Attorney Docket No.	9030101.141-US0
First Inventor	Paul F. Struhsaker
Title	Wireless communication system .....
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☐ **Fee Transmittal Form** (e.g., PTO/SB/17)
2. ☑ **Applicant claims small entity status.** See 37 CFR 1.27.
3. ☑ **Specification** [*Total Pages* 29]
   Both the claims and abstract must start on a new page
   (For information on the preferred arrangement, see MPEP 608.01(a))
4. ☑ **Drawing(s)** (*35 U.S.C. 113*) [*Total Sheets* 3]
5. **Oath or Declaration** [*Total Sheets* 3]
   a. ☐ Newly executed (original or copy)
   b. ☑ A copy from a prior application (37 CFR 1.63(d))
   (for continuation/divisional with Box 18 completed)
   i. ☐ DELETION OF INVENTOR(S)
   Signed statement attached deleting inventor(s) name in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☐ **Application Data Sheet.** See 37 CFR 1.76
7. ☐ **CD-ROM or CD-R** in duplicate, large table or Computer Program *(Appendix)*
   ☐ Landscape Table on CD
8. **Nucleotide and/or Amino Acid Sequence Submission**
   (if applicable, items a. – c. are required)
   a. ☐ Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. ☐ CD-ROM or CD-R (2 copies); or
      ii. ☐ Paper
   c. ☐ Statements verifying identity of above copies

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

ACCOMPANYING APPLICATION PARTS

9. ☐ **Assignment Papers** (cover sheet & document(s))
   Name of Assignee .....
10. ☐ **37 CFR 3.73(b) Statement** *(when there is an assignee)* ☐ **Power of Attorney**
11. ☐ **English Translation Document** *(if applicable)*
12. ☐ **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    ☐ Copies of citations attached
13. ☑ **Preliminary Amendment**
14. ☐ **Return Receipt Postcard** (MPEP 503)
    (Should be specifically itemized)
15. ☐ **Certified Copy of Priority Document(s)**
    (if foreign priority is claimed)
16. ☐ **Nonpublication Request** under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
17. ☐ Other: .....

18. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:*

☑ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: 11/982,424

Prior application information: *Examiner* Ho, Huy C *Art Unit:* 2617

19. CORRESPONDENCE ADDRESS

☑ The address associated with Customer Number: 70763 **OR** ☐ Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature	/Matthew T Byrne/	Date	6/4/2012
Name (Print/Type)	Matthew T Byrne	Registration No. (Attorney/Agent)	40,934

This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

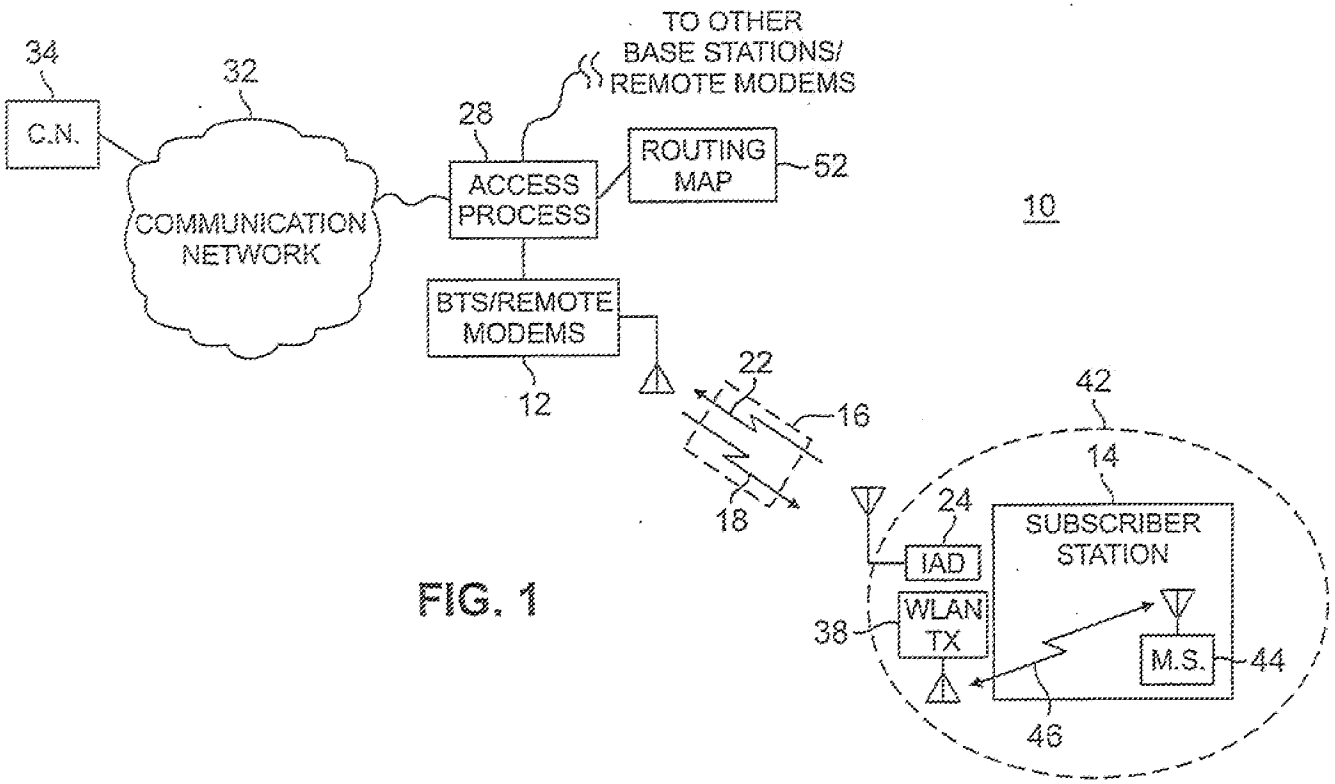

34
C.N.
32
COMMUNICATION NETWORK
28
TO OTHER BASE STATIONS/ REMOTE MODEMS
ACCESS PROCESS
ROUTING MAP
52
10
BTS/REMOTE MODEMS
12
22
16
18
42
14
24
IAD
SUBSCRIBER STATION
38
WLAN TX
M.S.
44
46

FIG. 1

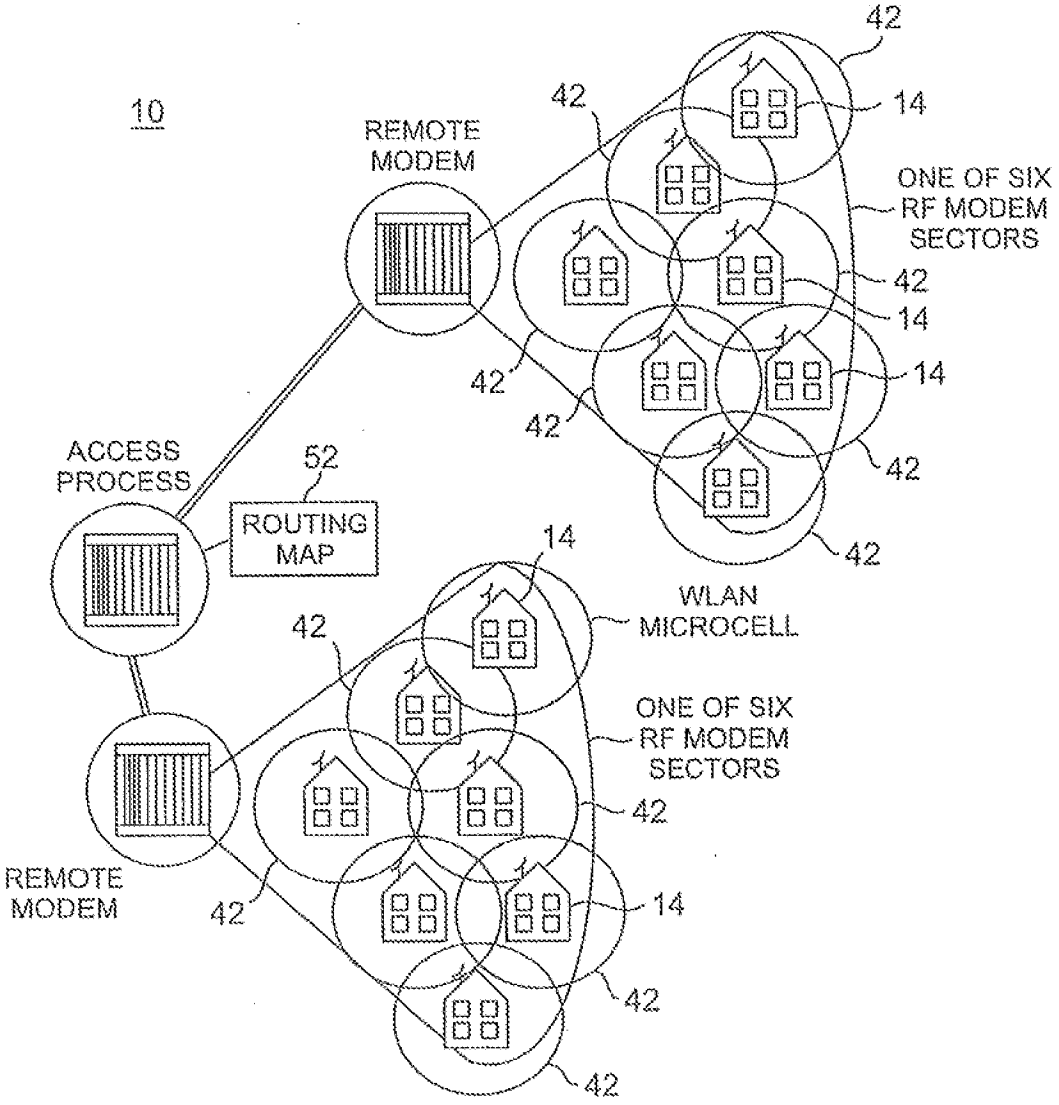

10
REMOTE MODEM
ONE OF SIX RF MODEM SECTORS
ACCESS PROCESS
52
ROUTING MAP
WLAN MICROCELL
ONE OF SIX RF MODEM SECTORS
REMOTE MODEM
42
14

FIG. 2

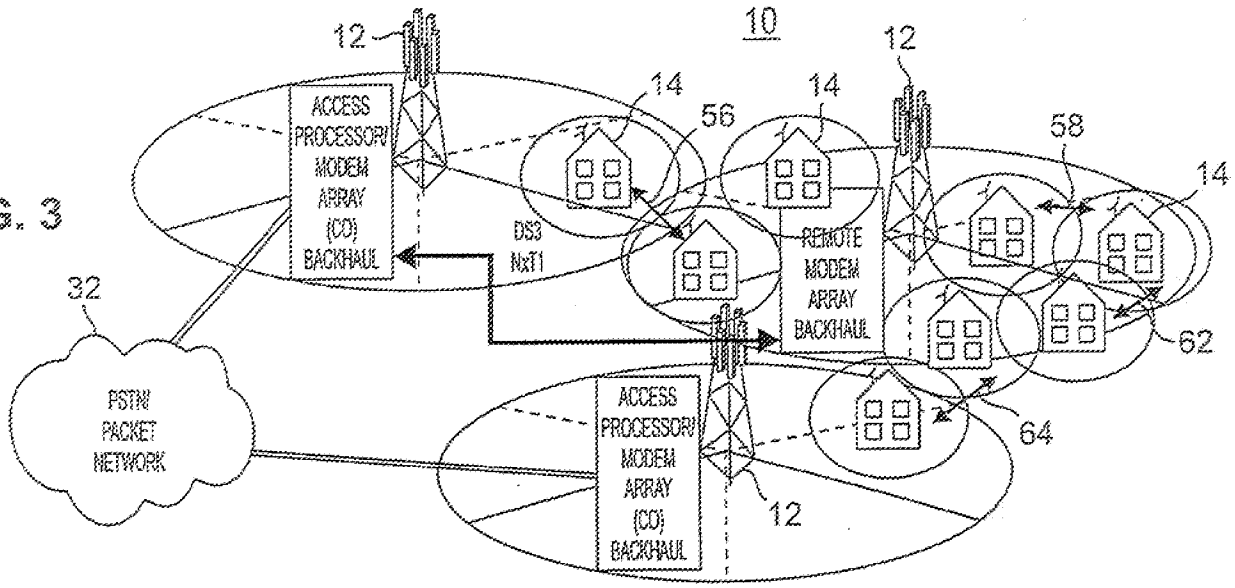

10
12
12
14
14
56
58
14
ACCESS PROCESSOR/ MODEM ARRAY (CO) BACKHAUL
DS3 NxT1
REMOTE MODEM ARRAY BACKHAUL
32
PSTN PACKET NETWORK
62
64
ACCESS PROCESSOR/ MODEM ARRAY (CO) BACKHAUL
12

FIG. 3

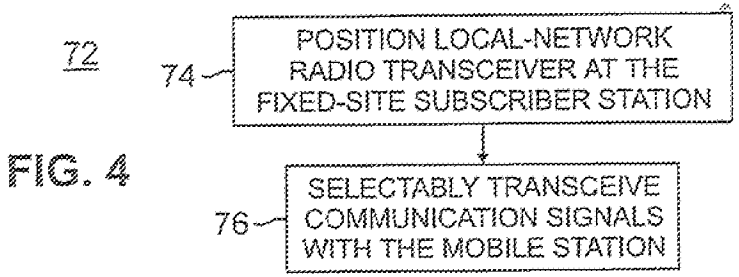

72
74
POSITION LOCAL-NETWORK RADIO TRANSCEIVER AT THE FIXED-SITE SUBSCRIBER STATION
SELECTABLY TRANSCEIVE COMMUNICATION SIGNALS WITH THE MOBILE STATION
76

FIG. 4

DOCKET NO. WEST14-00024 **PATENT**

DECLARATION AND POWER OF ATTORNEY

As a below named sole inventor, I hereby declare that:

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

I believe I am an original, first and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention, design or discovery entitled:

"APPARATUS, AND AN ASSOCIATED METHOD, FOR PROVIDING WLAN SERVICE IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM"

the specification of which is attached hereto.

I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose to the Office all information known to me to be material to the patentability of this application as defined by Title 37, Code of Federal Regulations, § 1.56.

I hereby claim no foreign priority benefits under 35 U.S.C. §119 of any foreign application(s) for patent or inventor's certificate on which priority is claimed.

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in § 1.56 which became available between the filing date of any prior application(s) and the national or PCT international filing date of this application.

APPLICATION SERIAL NO.	DATE FILED	STATUS
60/262,708	January 19, 2001	Pending

additional United States applications listed on the attached Appendix A.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in § 1.56 which became available between the filing date of any prior application(s) and the national or PCT international filing date of this application.

APPLICATION SERIAL NO.	DATE FILED	STATUS
09/713,684	November 15, 2000	Pending

I hereby appoint:

William A. Munck, Registration No. 39,308
John T. Mockler, Registration No. 39,775

all of the firm of NOVAKOV DAVIS & MUNCK, P.C. my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith, and to file and prosecute any international patent applications filed thereon before any international authorities under the Patent Cooperation Treaty.

Send correspondence to:	William A. Munck, Esq. NOVAKOV DAVIS & MUNCK, P.C. 900 Three Galleria Tower 13155 Noel Road Dallas, Texas 75240
Direct telephone calls to:	William A. Munck, Esq. (214) 922-9221
Atty. Docket No.:	WEST14-00024

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Full name of sole inventor:	Paul F. Struhsaker
Inventor's signature:	Paul F. Struhsaker
Date:	19 April 2001
Residence (City, County, State):	Plano, Collin County, Texas
Citizenship:	United States of America
Post Office Address:	5304 Brouette Court Plano, Texas 75023

APPENDIX A

Application Serial No.	Dated Filed	Status
60/262,712	January 19, 2001	Pending
60/262,825	January 19, 2001	Pending
60/262,698	January 19, 2001	Pending
60/262,827	January 19, 2001	Pending
60/262,826	January 19, 2001	Pending
60/262,951	January 19, 2001	Pending
60/262,824	January 19, 2001	Pending
60/263,101	January 19, 2001	Pending
60/263,097	January 19, 2001	Pending
60/273,579	March 5, 2001	Pending
60/262,955	January 19, 2001	Pending
60/273,689	March 5, 2001	Pending
60/273,757	March 5, 2001	Pending
60/270,378	February 21, 2001	Pending
60/270,385	February 21, 2001	Pending
60/270,430	April 17, 2001	Pending

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Paul F. Struhsaker et al.
Filed:	Concurrently Herewith
As a Continuation of Application No.:	11/982,424
Filed:	October 31, 2007
For:	Wireless communication system and device for coupling a base station and mobile stations
Examiner:	HO, HUY C
Art Unit:	2617

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

PRELIMINARY AMENDMENT

Dear Sir:

This Preliminary Amendment is being filed concurrently with the above-identified patent application. Prior to examination, applicants hereby amend the above-identified patent application as follows:

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

Remarks begin on page 8 of this paper.

REMARKS

This application is a continuation of Application No. 11/982,424 filed October 31, 2007. This Preliminary Amendment amends the specification to insert a cross-reference to the parent application, as well as to related applications. No new matter is added by these amendments to the specification.

The Director is hereby authorized to charge any fees that may be due, or credit any overpayment of the same, to Deposit Account No. 50-4207. An early and favorable action is respectfully requested.

Respectfully submitted,

Date: June 4, 2012

/Matthew T Byrne/
Registration No. 40,934
Attorney for Applicants

Byrne Poh LLP
11 Broadway, Suite 814
New York, NY 10004
Telephone: (212) 509-8870
Facsimile: (212) 931-8521

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	Wireless Communication System and Device For Coupling A Base Station and Mobile Stations
First Named Inventor/Applicant Name:	Paul F. Struhsaker
Filer:	Matthew T. Byrne
Attorney Docket Number:	9030101.141-US0

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	95	95
Utility Search Fee	2111	1	310	310
Utility Examination Fee	2311	1	125	125
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**530**

Electronic Acknowledgement Receipt

EFS ID:	12932255
Application Number:	13488374
International Application Number:	
Confirmation Number:	2192
Title of Invention:	Wireless Communication System and Device For Coupling A Base Station and Mobile Stations
First Named Inventor/Applicant Name:	Paul F. Struhsaker
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Attorney Docket Number:	9030101.141-US0
Receipt Date:	04-JUN-2012
Filing Date:	
Time Stamp:	21:42:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$530
RAM confirmation Number	7443
Deposit Account	504207
Authorized User	

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Wireless Communication System and Device For Coupling A Base Station and Mobile Stations

CROSS-REFERENCE TO RELATED APPLICATIONS

The present invention is related to those disclosed in the following United States Provisional and Non-Provisional Patent Applications:

1. Serial No. 09/713,684, filed on November 15, 2000, entitled "SUBSCRIBER INTEGRATED ACCESS DEVICE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS";
2. [Docket No. WEST14-00005] filed concurrently herewith, entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION";
3. [Docket No. WEST14-00014], filed concurrently herewith, entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM";
4. [Docket No. WEST14-00015], filed concurrently herewith, entitled "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM";

5. [Docket No. WEST14-00016], filed concurrently herewith, entitled "APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION";

6. [Docket No. WEST14-00017], filed concurrently herewith, entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES";

7. [Docket No. WEST14-00018], filed concurrently herewith, entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS";

8. [Docket No. WEST14-00019], filed concurrently herewith, entitled "SYSTEM AND METHOD FOR ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS" ;

9. [Docket No. WEST14-00020], filed concurrently herewith, entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION";

10. [Docket No. WEST14-00021], filed concurrently herewith, entitled "REDUNDANT TELECOMMUNICATION SYSTEM USING MEMORY EQUALIZATION APPARATUS AND METHOD OF OPERATION";

11. [Docket No. WEST14-00022], filed concurrently herewith, entitled "WIRELESS ACCESS SYSTEM FOR ALLOCATING AND

SYNCHRONIZING UPLINK AND DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION";

12. [Docket No. WEST14-00023], filed concurrently herewith, entitled "TDD FDD AIR INTERFACE";

13. [Docket No. WEST14-00026], filed concurrently herewith, entitled "WIRELESS ACCESS SYSTEM USING MULTIPLE MODULATION"];

14. [Docket No. WEST14-00027], filed concurrently herewith, entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE";

15. [Docket No. WEST14-00028], filed concurrently herewith, entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM";

16. [Docket No. WEST14-00029], filed concurrently herewith, entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM";

17. [Docket No. WEST14-00030], filed concurrently herewith, entitled "METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM";

18. [Docket No. WEST14-00033], filed concurrently herewith, entitled "SYSTEM AND METHOD FOR PROVIDING AN IMPROVED COMMON

CONTROL BUS FOR USE IN ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS";

19. Serial No. 60/262,712, filed on January 19, 2001, entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION" [Docket No. WEST14-00005];

20. Serial No. 60/262,825, filed on January 19, 2001, entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-00014];

21. Serial No. 60/262,698, filed on January 19, 2001, entitled "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM" [Docket No. WEST14-00015];

22. Serial No. 60/262,827, filed on January 19, 2001, entitled "APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION" [Docket No. WEST14-00016];

23. Serial No. 60/262,826, filed on January 19, 2001, entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES" [Docket No. WEST14-00017];

24. Serial No. 60/262,951, filed on January 19, 2001, entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS" [Docket No. WEST14-00018];

25. Serial No. 60/262,824, filed on January 19, 2001, entitled "SYSTEM AND METHOD FOR ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS" [Docket No. WEST14-00019];

26. Serial No. 60/263,101, filed on January 19, 2001, entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION" [Docket No. WEST14-00020];

27. Serial No. 60/263,097, filed on January 19, 2001, entitled "REDUNDANT TELECOMMUNICATION SYSTEM USING MEMORY EQUALIZATION APPARATUS AND METHOD OF OPERATION" [Docket No. WEST14-00021];

28. Serial No. 60/273,579, filed March 5, 2001, entitled "WIRELESS ACCESS SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION" [Docket No. WEST14-00022];

29. Serial No. 60/262,955, filed January 19, 2001, entitled "TDD FDD AIR INTERFACE" [Docket No. WEST14-00023];

30. Serial No. 60/273,689, filed March 5, 2001, entitled "WIRELESS ACCESS SYSTEM USING MULTIPLE MODULATION" [Docket No. WEST14-00026];

31. Serial No. 60/273,757, filed March 5, 2001, entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION

FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE" [Docket No. WEST14-00027];

32. Serial No. 60/270,378, filed February 21, 2001, entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-00028];

33. Serial No. 60/270,385, filed February 21, 2001, entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-00029]; and

34. Serial No. 60/270,430, filed February 21, 2001, entitled "METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-00030].

The above applications are commonly assigned to the assignee of the present invention. The disclosures of these related patent applications are hereby incorporated by reference for all purposes as if fully set forth herein

The present invention relates generally to a manner by which to provide mobile communications in a fixed wireless access (FWA)

communication system. More particularly, the present invention relates to apparatus, and an associated method, for providing WLAN (wireless local area network) service at a subscriber station of the fixed wireless access communication system. Mobile stations operation in the WLAN are thereby able to communicate in the WLAN coverage area encompassing the subscriber station. When WLAN service is provided to a plurality of fixed-site subscriber stations, cellular coverage areas are formed, between which handovers of communications are permitted all by way of the fixed wireless access communication system

BACKGROUND OF THE INVENTION

Advancements in communication technologies have permitted the development, and implementation, of new types of communication systems. Such communication systems are able to permit the communication of increased amounts of data at increased thruput rates relative to conventional communication systems. And, such new communication systems have permitted communication of information at, and between, communication stations positioned at locations from which communications have conventionally been inconvenient or impractical.

Radio communication systems, for instance, are exemplarily of communication systems of which new types, and improvements to existing types, have been made possible as a result of advancements in communication technologies. Similar to other types of communication systems, in a radio communication system, information is communicated between a sending station and a receiving station by way of a communication channel. In a radio communication system, unlike other types of communication systems, a communication channel formed between the sending and the receiving stations and upon which information is communicated by the sending station to the receiving station, is formed of a portion of the electromagnetic spectrum. Radio links are defined upon the portion

of the electromagnetic spectrum allocated to the radio communication system.

Because a radio link is utilized upon which to form communication channels, a fixed, or wireline, connection is not required to be formed between the sending and receiving stations to form a communication channel. Information can be communicated between the sending and receiving stations at, and between, locations at which conventional wireline communications would not be permitted. Additionally, the infrastructure costs associated with the installation of a radio communication system are also generally lower than the corresponding costs which would be required to install a conventional, wireline communication system. And, as the advancements in communication technologies have permitted the bandwidth allocated to a radio communication system to be utilized more efficiently, a radio communication can increasingly be utilized effectuate a communication service which require relatively significant data thruput capability.

A wireless broadband communication system has been proposed, for instance, by which to permit the effectuation of any of various communication services by way of radio links with fixed-site subscriber stations. Radio links are formed with the subscriber stations by fixed-site base stations. The base stations are

installed at spaced-apart locations throughout the geographical area which is to be encompassed by the wireless broadband communication system. Several subscriber stations are capable of communicating with a single base station.

Communication of data is effectuated between the subscriber stations and an associated base station by way of radio links upon which communication channels are defined. Because radio links are utilized between the subscriber stations and the base stations, the infrastructure costs associated with the formation of wireline connections between the subscriber stations are obviated. Broadband communications, and communication services which require the communication of broadband data, as well as communication services necessitating smaller data thruput rates are effectuable through use of the wireless broadband communication system.

Advancements in communication technologies have also permitted the development, and introduction, of other types of radio communication systems. Wireless communication systems, sometimes referred to as micro-cellular networks, private networks, and WLANs (wireless local area networks) are exemplary of such systems. Such networks, generally, provide for radio communications with mobile stations positioned within communication range of such networks.

Generally, the communication ranges of the mobile stations

operable in such systems is relatively small as relatively low-power signals are originated at the mobile stations and, correspondingly, originated at the network infrastructure of such systems to be terminated at the mobile stations. The network infrastructure of such systems typically include fixed-location transceivers, sometimes referred to as access points. The access points are capable of communicating with a group of mobile stations positioned within a micro-cellular, or other, area defined by the access point. In some of such systems, the access points are coupled to a conventional, local area network, also used to interconnect the processing stations of an office computer system. In other such systems, the access points are connected in other manners.

Installation of a wireless broadband communication system to provide broadband services with a plurality of subscriber stations provides a radio infrastructure throughout a geographical area throughout which wireless broadband communication services are effectuable. If a manner could be provided by which to utilize the communication capabilities of a wireless broadband communication system to provide additional communication services, additional benefits of a wireless broadband communication system would be provided.

It is in light of this background information related to radio communication systems that the significant improvements of the present invention have evolved.

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SUMMARY OF THE INVENTION

The present invention, accordingly, advantageously provides apparatus, and an associated method, by which to provide mobile communications in a fixed wireless access (FWA) communication system.

Through operation of an embodiment of the present invention, WLAN (wireless local area network) service is provided to a subscriber station of the fixed wireless access communication system. Mobile stations within communication range of the subscriber station, and operable in the WLAN, are able to communicate by way of the WLAN. By providing WLAN service to a plurality of subscriber stations and thereafter providing integrated control over WLAN communications, handover of communications with a mobile station is provided as the mobile station travels between coverage areas formed at separate ones of the subscriber stations.

In one aspect of the present invention, a WLAN transceiver, such as an access point, is installed at a subscriber station of a fixed wireless access communication system. A WLAN transceiver provides localized radio communications throughout a coverage area defined by the communication range of the WLAN transceiver and mobile stations with which WLAN transceiver communications. More

than one WLAN transceiver is positionable at the subscriber station, as appropriate. Radio communications between a mobile station and the WLAN transceiver provide for two-way communications with the mobile station.

In another aspect of the present invention, the WLAN transceiver positioned at the subscriber station is, in turn, coupled by way of a radio link with a base station of the fixed wireless access communication system. Information originated at a mobile station is communicated by way of a local radio link to the WLAN transceiver. The WLAN transceiver, in turn, is coupled to a transceiver station, such as an IAD (integrated access device), located at the subscriber station and operable in the fixed wireless access communication system. The integrated access device, or other subscriber-station transceiver, in turn, communicates the information originated at the mobile station to the base station of the fixed wireless access system. Thereafter, the information is forwarded, as appropriate, to a destination. Analogously, information originated at, or provided to, a base station operable in the fixed wireless access communication system and which is to be terminated at the mobile station is communicated by the base station to the integrated access device, or other subscriber-station transceiver. Subsequent to reception thereat,

the information is forwarded to the WLAN transceiver to be transmitted therefrom by way of the local radio link through the mobile station. Thereby, communication is effectuable between mobile station and the base station of the fixed wireless access communication system.

In another aspect of the present invention, the WLAN transceivers are installed at a plurality of subscriber stations such that the coverage areas of the separately-installed transceivers at least partially overlap. Integrated control over operation of the WLAN transceivers is provided at the network of the fixed wireless access communication system. Mobile stations which travel between coverage areas defined by different ones of the WLAN transceivers are permitted continued communication by way of local radio links by handing over communications between WLAN transceivers. Ongoing communication sessions with the mobile station continue in spite of handover of communications between the WLAN transceivers.

In another aspect of the present invention, a routing map is maintained at a location coupled to, or integrated within, the fixed wireless access communication system. The routing map maintains a listing of the location of mobile stations operable to communicate by way of local radio links with WLAN transceivers

positioned at different ones of the subscriber stations of the fixed wireless access communication system. The locations at which the mobile stations are positioned are updated, as needed, as a mobile station travels between coverage areas defined by different ones of the WLAN transceivers. When information is to be communicated to a particular mobile station, the routing map is accessed to retrieve indications of the location at which the mobile station at which the information is to be terminated is positioned. Through use of the indications retrieved from the routing map, the information which is to be communicated to the mobile station is able to be most-efficiently routed to the mobile station.

In another aspect of the present invention, when a handover of communications is effectuated, the routing map is updated, and information routed to the mobile by way of a WLAN transceiver from which a handover of communication is effectuated, but not yet delivered to the mobile station, is retrieved and then re-routed to the mobile station by way of the mobile station to which communications have been handed over.

In these and other aspects, therefor, apparatus, and an associated method, is provided for a fixed wireless access communication system. The fixed wireless access communication

system has at least a first fixed-site base station and at least a first fixed-site subscriber station capable of communicating with the first fixed-site base station. Radio communication with a mobile station is facilitated. A first local-network radio transceiver is positioned at the at least first fixed-site subscriber station. The first local-network radio transceiver selectably transceives communication signals with the mobile station upon a first local radio link formed between the first local-network radio transceiver and the mobile station when the mobile station is positioned within a selected range of the first fixed-site subscriber station.

A more complete appreciation of the present invention and to the scope thereof can be obtained from the accompanying drawings which are briefly summarized below, the following detailed description of the presently-preferred embodiments of the invention, and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a functional block diagram of a fixed wireless access (FWA) communication system in which an embodiment of the present invention is operable.

Figure 2 illustrates a representation of a fixed wireless access communication system similar to that shown in Figure 1 here also illustrating a plurality of cellular coverage areas defined by about a plurality of subscriber stations of the fixed wireless access communication system.

Figure 3 illustrates another representation of the fixed wireless access communication system shown in Figures 1 and 2.

Figure 4 illustrates a method flow diagram listing the method of operation of the method of an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

A fixed wireless access (FWA) communication system 10 provides for radio communications between fixed-site base stations, of which the base station 12 is exemplary and fixed-site subscriber stations 14 of which the subscriber station 14 is exemplary. A radio link 16 upon which forward link channels 18 and reverse link channels 22 is of a bandwidth permitting broadband communication services to be effectuated with devices located at the subscriber station 14.

In the exemplary implementation, an integrated access device (IAD) 24 forms a transceiver located at the subscriber station and at which forward link signals transmitted upon the forward link channels of the radio link are detectable and which generate reverse link signals for transmission upon the reverse link channels of the radio link. A separate IAD 24 is located at each subscriber station of the communication system.

In the exemplary implementation, each base transceiver station includes a remote modem (modulator-demodulator) capable of communicating with seven separate subscriber stations located within a radial sector. In other implementations, the circuitry of the base transceiver station is configured in other manners.

The base station 12, and the set of remote modems thereof, is coupled to an access process 28 which is operable, amongst other

things, to perform control operations to control operation of the communication system. The access process 28 is, in turn, coupled to a communication network 32 such as a public-switched telephonic network or a packet data network. And, a correspondent node 34 is coupled to the communication network. A communication path is formable between the correspondent node and the IAD 24 positioned at the subscriber station by way of the communication network, the access process 28, the base station 12, and the radio link 16. Communication of information by the correspondent node to the integrated access device and from the integrated access device to the correspondent node is effectuable by way of the communication path.

Pursuant to an embodiment of the present invention, a WLAN (wireless local area network) transceiver 38 is positioned at the subscriber station 14 at the integrated access device 24 to be connected to the transceiver circuitry of the integrated access device. The WLAN transceiver defines a coverage area 42 defining a cell. A mobile station 44 positioned within the cell 42 is capable of communicating with the transceiver 38. That is to say, the radio link 46 is formable between the transceiver 38 and the mobile station 44 upon which forward and reverse link signals are communicated therebetween. Signals originated at the mobile

station are communicated upon reverse link channels of the radio link 46 to the WLAN transceiver 38. And, communication signals to be terminated at the mobile station 44 are communicated upon forward link channels of the radio link 46.

Because of the connection of the WLAN transceiver to the transceiver of the integrated access device 24, signals originated at the mobile station and communicated to the WLAN transceiver can, in turn, be provided to the transceiver of the integrated access device to be communicated upon reverse link channels of the radio link 16 and, thereafter, be communicated to another device, such as the correspondent node 34. Analogously, signals originated at the correspondent node, or elsewhere, can be communicated to the mobile station by way of forward link channels of the radio links 16 and 46 to the mobile station. Thereby communications are effectuable with a mobile station in the fixed wireless access communication system.

In the exemplary implementation, the integrated access device 24 forms a rack-assembly having expansion slots to receive expansion cards thereat. And, the WLAN transceiver is mounted upon, or is otherwise formed at, an expansion card connectable to the expansion slot of the rack-assembly. Thereby the integrated access device together with the WLAN transceiver form an integrated

device providing for two-way communication upon the radio link 16 as well as two-way communication upon the radio link 46.

Figure 2 illustrates another view of the communication system 10, here illustrating an implementation in which a plurality of subscriber stations 14 include WLAN transceivers 38 (shown in Figure 1) connected to corresponding integrated access devices 24 (also shown in Figure 1). The coverage areas 42 defined by respective ones of the WLAN transceivers are shown in the figure. Adjacent ones of the coverage areas over lap with one another. The remote modes of the base transceivers are again shown in the Figure as is the access process. An arrangement in which the remote modems communicate with subscriber stations positioned within a radio sector is shown in the figure. In other implementations, other arrangements are utilized.

A mobile station initially positioned within, or approximate to, a coverage area 42 defined by a WLAN transceiver positioned at a first subscriber station is permitted movement, such as out of the coverage area defined by the transceiver positioned at a first subscriber station and into the coverage area defined by a WLAN transceiver of another subscriber station. Through operation of an embodiment of the present invention, a handover of communications is effectuated from the first WLAN transceiver to another WLAN

transceiver, thereby to permit continued communications with the mobile station.

Determination of when to initiate handover of communications is made responsive to measurements of signal characteristics of communication signals communicated between the WLAN transceiver and the mobile station. In one implementation signal characteristics are measured, or otherwise determined, at the mobile station and results of such measures or determinations of are reported back to the WLAN transceiver and appropriate control circuitry. Thereafter, if appropriate, the handover of communications is effectuated.

A routing map 52 is further shown in the figure. The routing map is functionally connected to the access process 28. The routing map includes a listing of the mobile stations, such as the mobile station 46 operable to transceive communication signals pursuant to the WLAN service. Indexed together with the listing the mobile stations are the locations at which the mobile stations are positioned. When communications are to be effectuated with a particular mobile station, such as communications originated by the correspondent node 34, the routing map is accessed and the communication signals are routed to the mobile stations at the position indicated in the routing map. And, when a handover is

effectuated, information routed to a mobile station but not yet delivered is rerouted to the WLAN transceiver to which communications have been handed over.

Figure 3 again illustrates the communication system 10, here showing a plurality of base stations 12 and subscriber stations 14 associated with various ones of the base stations. Each of the subscriber stations includes a WLAN transceiver (shown in Figure 1) various of the base transceiver stations are here shown also to be coupled by way of the communication network 32, again either a PSTN, a packet data network, or a combination of such networks. Movement of a mobile station between the coverage areas is defined by different ones of the subscriber stations are shown in the figure. For instance, movement of a mobile station indicated by the arrow 56 represents movement of the mobile station between subscriber stations associated with separate cells of separate base stations. Such movement results in access process routing of subsequent communication signals to a new cell of the fixed wireless access communication system, access process routing to a separate remote mode sector, and remote modem routing to a new subscriber integrated access device. The arrow 58 is representative of movement of a mobile station within a single sector of a single base station. Here, the result is a subscriber

integrated access device to a remote modem routing change.

The arrow 62 is representative of movement of a mobile station between adjacent sectors defined by a single base station. Such movement results in access process routing of the communication signal to the new remote modem sector transceiver. And, the arrow 64 is representative of movement of a mobile station between sectors of different cells defined by two different base stations. Such movement results in access process to access process routing resolution, access processing routing to the new cell, access process routing to the new remote modem sector, and remote modem routing to the new subscriber access integrated device. Thereby, handovers of communications are effectuable through any movement of a mobile station between coverage areas defined by WLAN transceivers forming a portion of a fixed wireless access communication system.

Figure 4 illustrates a method, shown generally at 72 of an embodiment of the present invention. The method facilitates radio communications with the mobile station in a fixed wireless access communication system having at least a first base station and at least a first subscriber station capable of communicating with the base station. First, and as indicated by the block 74, a local-network radio transceiver is positioned at the fixed-site

subscriber station. Then, and as indicated by the block 76, communication signals are selectably transceived with the mobile station upon a first local radio link between the local-network radio transceiver and a mobile station when the mobile station is positioned within a coverage area defined by the local-network radio transceiver.

Through operation of the method of an embodiment of the present invention, WLAN service is provided in a fixed wireless access in a communication system. A mobile station operable in a wireless local area network is thereby able to communicate in the WLAN coverage area encompassing the subscriber station at which the local-network radio transceiver is positioned.

The previous descriptions are of preferred examples for implementing the invention, and the scope of the invention should not necessarily be limited by this description. The scope of the present invention is defined by the following claims.

WHAT IS CLAIMED IS:

1. A wireless communication device, comprising:

a first wireless transceiver operable to communicate with a base station, wherein the base station communicates with the first wireless transceiver and a plurality of other wireless communication devices according to a wide area wireless communication protocol; and

a second wireless transceiver coupled to the first wireless transceiver and operable to directly communicate with a first mobile station and a second mobile station, wherein the second wireless transceiver communicates with the first mobile station and the second mobile station according to a local area wireless communication protocol,

wherein the first wireless transceiver receives from the base station a first downlink signal intended for the first mobile station and transmits provides the first downlink signal to the second wireless transceiver and wherein the second wireless transceiver receives the first downlink signal and re-transmits the first downlink signal to the first mobile station as a second downlink signal according to the local area wireless communication protocol, and

wherein the second transceiver monitors first signal characteristics of the first mobile station and monitors second signal characteristics of the second mobile station, and based on the first signal characteristics and the second characteristics, routes information to the first mobile station and the second mobile station, respectively.

2. The wireless communication device of claim 1, wherein the second wireless transceiver is coupled to the first wireless transceiver by a wireline connection.

3. The wireless communication device of claim 2, wherein the second wireless transceiver is removably coupled to the first wireless transceiver.

4. The wireless communication device of claim 1, wherein the first wireless transceiver and second transceivers wireless transceiver are disposed in a fixed site subscriber station.

5. The wireless communication device of claim 1, wherein the first wireless transceiver and the second wireless transceiver are part of an integrated device.

ABSTRACT

A wireless communication system comprising first and second transceivers. The first transceiver communicate with a base station, wherein the base station communicates with the first transceiver and a plurality of other wireless communication devices according to a wide area wireless communication protocol. The second transceiver is coupled to the first transceiver and communicates with a first mobile station, wherein the second transceiver communicates with the first mobile station according to a local area wireless communication protocol. The first transceiver receives from the base station a first downlink signal intended for the first mobile station and transmits the first downlink signal to the second transceiver. The second transceiver re-transmits the first downlink signal to the first mobile station as a second downlink signal according to the local area wireless communication protocol.

Amendment to the Specification

Please add the following new paragraph before page 1, line 5 of the specification:

This application is a continuation of prior U.S. Patent Application Serial No. 11/982,424 filed on October 31, 2007, which claims priority to: U.S. Patent Application Serial No. 09/839,499 filed on April 20, 2001, now U.S. Patent No. 7,346,347. U.S. Patent Application Serial No. 09/839,499 claims priority to provisional U.S. Patent Application Serial No. 60/262,708 filed on January 19, 2011; U.S. Patent Application Serial No. 09/713,684 filed on November 15, 2000; provisional U.S. Patent Application Serial No. 60/262,712 filed on January 19, 2001 and entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EOUALIZATION-DEMODULATION AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/262,825 filed on January 19, 2001 and entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM"; provisional U.S. Patent Application Serial No. 60/262,698 filed on January 19, 2001 and entitled "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM"; provisional U.S. Patent Application Serial No. 60/262,827 filed on January 19, 2001 entitled "APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION"; provisional U.S. Patent Application Serial No. 60/262,826 filed on January 19, 2001 and entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES"; provisional U.S. Patent Application Serial No. 60/262,951 filed on January 19, 2001 entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS"; provisional U.S. Patent Application Serial No. 60/262,824 filed on January 19, 2001 entitled "SYSTEM AND METHOD FOR ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS"; provisional U.S. Patent Application Serial No. 60/263,101 filed on January 19, 2001 entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/263,097 filed on January 19, 2001 and entitled "REDUNDANT TELECOMMUNICATION SYSTEM USING MEMORY EOUALIZATION APPARATUS AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/273,579 filed March 5, 2001 and entitled "WIRELESS ACCESS

SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/262,955 filed January 19, 2001 and entitled "TDD FDD AIR INTERFACE"; provisional U.S. Patent Application Serial No. 60/273,689 filed on March 5, 2001 and entitled "WIRELESS ACCESS SYSTEM USING MULTIPLE MODULATION FORMATS IN TDD FRAMES AND METHOD OF OPERATION"; provisional U.S. Patent Application Serial No. 60/273,757 filed March 5, 2001 and entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE"; provisional U.S. Patent Application Serial No. 60/270,378 filed February 21, 2001 and entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM"; provisional U.S. Patent Application Serial No. 60/270,385 filed February 21, 2001 and entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM"; and provisional U.S. Patent Application Serial No. 60/270,430 filed February 21, 2001 and entitled "METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM. Each of these applications and/or patents are hereby incorporated by reference herein in their entireties.

Please replace the paragraph starting on page 1, line 5 and ending at page 6, line 13 with the following:

~~The~~ In addition, the subject matter disclosed in the present ~~invention~~ application is related to ~~those~~ that disclosed in the following United States Patent Applications:

1) Serial No. 09/713,684[[,]] filed on November 15, 2000[[,]] and entitled "SUBSCRIBER INTEGRATED ACCESS DEVICE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS";

2) ~~[Docket No. WEST14-00005] filed concurrently herewith,~~ Serial No. 09/838,810 filed April 20, 2001 and entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION", now U.S. Patent No. 7,075,967;

3) ~~[Docket No. WEST14-00014] filed concurrently herewith,~~ Serial No. 09/839,726 filed April 20, 2001 and entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM", now U.S. Patent No. 7,099,383;

4) ~~[Docket No. WEST14-00015] filed concurrently herewith,~~ Serial No. 09/839,729 filed April 20, 2001 and entitled "APPARATUS AND METHOD FOR OPERATING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM", abandoned;

5) ~~[Docket No. WEST14-00016] filed concurrently herewith,~~ Serial No. 09/839,719 filed April 20, 2001 and entitled "APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION", now U.S. Patent No. 6,947,477;

6) ~~[Docket No. WEST14-00017] filed concurrently herewith,~~ Serial No. 09/838,910 filed April 20, 2001 and entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES", now U.S. Patent No. 6,564,051;

7) ~~[Docket No. WEST14-00018] filed concurrently herewith,~~ Serial No. 09/839,509 filed April 20, 2001 and entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS", abandoned;

8) ~~[Docket No. WEST14-00019] filed concurrently herewith,~~ Serial No. 09/839,514 filed April 20, 2001 and entitled "SYSTEM AND METHOD FOR ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS", now U.S. Patent No. 7,069,047;

9) ~~[Docket No. WEST14-00020] filed concurrently herewith,~~ Serial No. 09/839,512 filed April 20, 2001 and entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION", now U.S. Patent No. 6,804,527;

10) ~~[Docket No. WEST14-00021] filed concurrently herewith,~~ Serial No. 09/839,259 filed April 20, 2001 and entitled "REDUNDANT TELECOMMUNICAION SYSTEM USING MEMORY EQUALIZATION APPARATUS AND METHOD OF OPERATION", now U.S. Patent No. 7,065,098;

11) ~~[Docket No. WEST14-00022] filed concurrently herewith,~~ Serial No. 09/839,457 filed April 20, 2001 and entitled "WIRELESS ACCESS SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION", now U.S. Patent No. 7,002,929;

12) ~~[Docket No. WEST14-00023] filed concurrently herewith,~~ Serial No. 09/839,075 filed April 20, 2001 and entitled "TDD FDD AIR INTERFACE", now U.S. Patent No. 6,859,655;

13) ~~[Docket No. WEST14-00026] filed concurrently herewith,~~ Serial No. 09/839,458 filed April 20, 2001 and entitled "WIRELESS ACCESS SYSTEM USING MULITPLE MODULATION", now U.S. Patent No. 7,173,916;

14) ~~[Docket No. WEST14-00027] filed concurrently herewith,~~ Serial No. 09/839,456 filed April 20, 2001 and entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE", now U.S. Patent No. 6,891,810;

15) ~~[Docket No. WEST14-00828] filed concurrently herewith,~~ Serial No. 09/838,924 filed April 20, 2001 and entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM", now U.S. Patent No. 7,274,946;

16) ~~[Docket No. WEST14-00029] filed concurrently herewith,~~ Serial No. 09/839,727 filed April 20, 2001 and entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM", now U.S. Patent No. 7,031,738;

17) ~~[Docket No. WEST14-0030] filed concurrently herewith,~~ Serial No. 09/839,734 filed April 20, 2001 and entitled "METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM", now U.S. Patent No. 7,035,241; and

18) ~~[Docket No. WEST14-00033] filed concurrently herewith,~~ Serial No. 09/839,513 filed April 20, 2001 and entitled "SYSTEM AND METHOD FOR PROVIDING AN IMPROVED COMMON CONTROL BUS FOR USE IN ON-LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS"~~[[;]]~~, now U.S. Patent No. 6,925,516.

~~19) Serial No. 60/262,712, filed on January 19, 2001, entitled "WIRELESS COMMUNICATION SYSTEM USING BLOCK FILTERING AND FAST EQUALIZATION-DEMODULATION AND METHOD OF OPERATION" [Docket No. WEST14-00005];~~

~~20) Serial No. 60/262,825, filed on January 19, 2001, entitled "APPARATUS AND ASSOCIATED METHOD FOR OPERATING UPON DATA SIGNALS RECEIVED AT A RECEIVING STATION OF A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST 14-00014];~~

~~21) Serial No. 60/262,698, filed on January 19, 2001, entitled "APPARATUS AND METHOD FOR OPERATRING A SUBSCRIBER INTERFACE IN A FIXED WIRELESS SYSTEM" [Docket No. WESTI4-00015];~~

~~22) Serial No. 60/262,827, filed on January 19, 2001, entitled "APPARATUS AND METHOD FOR CREATING SIGNAL AND PROFILES AT A RECEIVING STATION" [Docket No. WEST14-00016];~~

~~23) Serial No. 60/262,826, filed on January 19, 2001, entitled "SYSTEM AND METHOD FOR INTERFACE BETWEEN A SUBSCRIBER MODEM AND SUBSCRIBER PREMISES INTERFACES" [Docket No. WEST 14-00017];~~

~~24) Serial No. 60/262,951, filed on January 19, 2001, entitled "BACKPLANE ARCHITECTURE FOR USE IN WIRELESS AND WIRELINE ACCESS SYSTEMS" [Docket No. WEST14-00018];~~

~~25) Serial No. 60/262,824, filed on January, 19, 2001, entitled "SYSTEM AND METHOD FOR ON LINE INSERTION OF LINE REPLACEABLE UNITS IN WIRELESS AND WIRELINE ACCESS SYSTEMS" [Docket No. WEST14-00019];~~

~~26) Serial No. 60/263,101, filed on January 19, 2001, entitled "SYSTEM FOR COORDINATION OF TDD TRANSMISSION BURSTS WITHIN AND BETWEEN CELLS IN A WIRELESS ACCESS SYSTEM AND METHOD OF OPERATION" [Docket No. WEST14-00020];~~

~~27) Serial No. 60/263,097, filed on January 19, 2001, entitled "REDUNDANT TELECOMMUNICATION SYSTEM USING MEMORY EQUALIZATION APPARATUS AND METHOD OF OPERATION" [Docket No. WEST14-00021];~~

~~28) Serial No. 60/273,579, filed March 5, 2001, entitled "WIRELESS ACCESS SYSTEM FOR ALLOCATING AND SYNCHRONIZING UPLINK AND DOWNLINK OF TDD FRAMES AND METHOD OF OPERATION" [Docket No. WEST14-00022];~~

~~29) Serial No. 60/262,955, filed January 19, 2001, entitled "TDD FDD AIR INTERFACE" [Docket No. WEST14-00023];~~

~~30) Serial No. 60/273,689, filed on March 5, 2001, entitled "WIRELESS ACCESS SYSTEM USING MULTIPLE MODULATION" [Docket No. WEST14-00026];~~

~~31) Serial No. 60/273,757, filed March 5, 2001, entitled "WIRELESS ACCESS SYSTEM AND ASSOCIATED METHOD USING MULTIPLE MODULATION FORMATS IN TDD FRAMES ACCORDING TO SUBSCRIBER SERVICE TYPE" [Docket No. WEST14-00027];~~

~~32) Serial No. 60/278,378, filed February 21, 2001, entitled "APPARATUS FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-00028];~~

~~33) Serial No. 60/278,385, filed February 21, 2001, entitled "APPARATUS FOR REALLOCATING COMMUNICATION RESOURCES TO ESTABLISH A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-00029]; and~~

~~34) Serial No. 60/278,430, filed February 21, 2001, entitled "METHOD FOR ESTABLISHING A PRIORITY CALL IN A FIXED WIRELESS ACCESS COMMUNICATION SYSTEM" [Docket No. WEST14-00030].~~

Please replace the paragraph starting on page 6, line 21 and ending at page 6, line 24 with the following:

The above applications are commonly assigned to the assignee of the present ~~invention~~ application. The disclosures of these related patent applications may share common subject matter and figures and are hereby incorporated by reference ~~for all purposes as if fully set forth~~ herein in their entireties.